



## Full wwPDB EM Validation Report ⓘ

Jul 14, 2024 – 05:30 pm BST

PDB ID : 8A57  
EMDB ID : EMD-15161  
Title : Cryo-EM structure of HflXr bound to the *Listeria monocytogenes* 50S ribosomal subunit.  
Authors : Koller, T.O.; Crowe-McAuliffe, C.; Wilson, D.N.  
Deposited on : 2022-06-14  
Resolution : 2.30 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev92  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

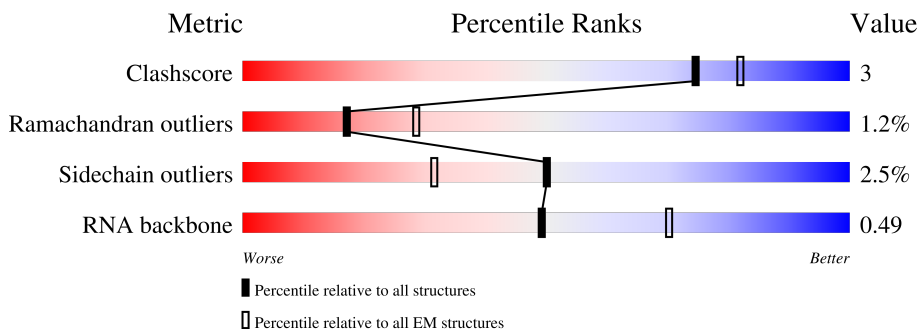
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.







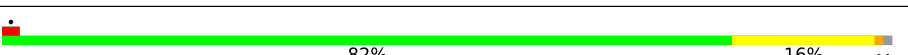
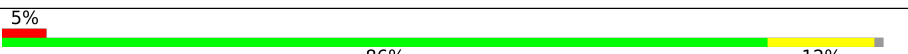
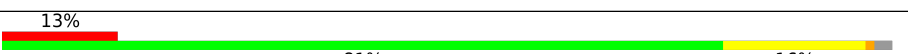
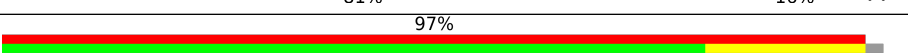

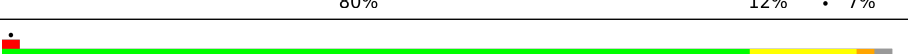
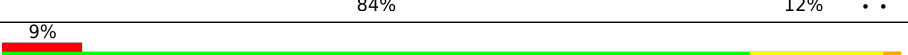

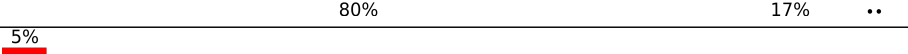
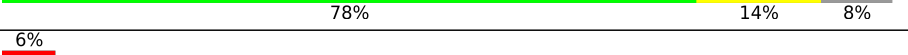


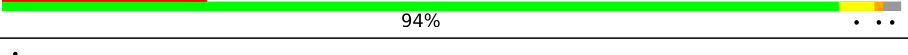

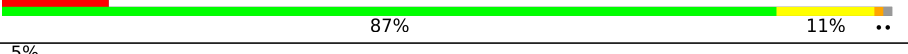
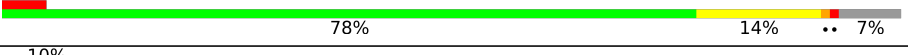
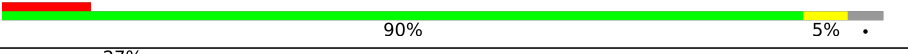
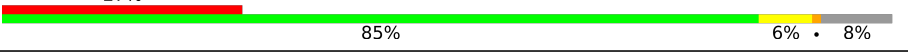


| Metric                | Whole archive<br>(#Entries) | EM structures<br>(#Entries) |
|-----------------------|-----------------------------|-----------------------------|
| Clashscore            | 158937                      | 4297                        |
| Ramachandran outliers | 154571                      | 4023                        |
| Sidechain outliers    | 154315                      | 3826                        |
| RNA backbone          | 4643                        | 859                         |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain   |
|-----|-------|--------|--|
| 1   | 1     | 62     | <div> <div>19%</div> <div>81%</div> <div>10%</div> <div>6%</div> </div>  |
| 2   | 2     | 63     | <div> <div>21%</div> <div>87%</div> <div>6%</div> <div>6%</div> </div>   |
| 3   | 3     | 59     | <div> <div>5%</div> <div>88%</div> <div>7%</div> <div>5%</div> </div>    |
| 4   | 4     | 81     | <div> <div>73%</div> <div>69%</div> <div>27%</div> </div>                |
| 5   | 5     | 57     | <div> <div>33%</div> <div>70%</div> <div>23%</div> <div>7%</div> </div>  |
| 6   | 6     | 49     | <div> <div>47%</div> <div>80%</div> <div>14%</div> <div>• •</div> </div> |
| 7   | 7     | 44     | <div> <div>91%</div> <div>5%</div> <div>5%</div> </div>                  |

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| Mol | Chain | Length | Quality of chain   |
|-----|-------|--------|--|
| 8   | 8     | 66     |    |
| 9   | 9     | 37     |    |
| 10  | A     | 2931   |    |
| 11  | B     | 114    |    |
| 12  | G     | 277    |    |
| 13  | H     | 209    |    |
| 14  | I     | 207    |    |
| 15  | J     | 179    |    |
| 16  | K     | 178    |    |
| 17  | M     | 145    |    |
| 18  | N     | 122    |    |
| 19  | O     | 146    |    |
| 20  | P     | 144    |   |
| 21  | Q     | 135    |  |
| 22  | R     | 119    |  |
| 23  | S     | 114    |  |
| 24  | T     | 119    |  |
| 25  | U     | 102    |  |
| 26  | V     | 118    |  |
| 27  | W     | 94     |  |
| 28  | X     | 103    |  |
| 29  | Z     | 96     |  |
| 30  | D     | 418    |  |
| 31  | E     | 141    |  |

## 2 Entry composition

There are 37 unique types of molecules in this entry. The entry contains 92760 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called 50S ribosomal protein L28.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 1   | 1     | 58       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 457   | 283 | 96 | 76 | 2 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 2 is a protein called 50S ribosomal protein L29.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 2   | 2     | 59       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 487   | 298 | 94 | 94 | 1 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 3 is a protein called 50S ribosomal protein L30.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 3   | 3     | 56       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 433   | 272 | 82 | 78 | 1 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 4 is a protein called 50S ribosomal protein L31 type B.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 4   | 4     | 59       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 477   | 305 | 75 | 96 | 1 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 5 is a protein called 50S ribosomal protein L32-2.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 5   | 5     | 53       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 425   | 259 | 87 | 74 | 5 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 6 is a protein called 50S ribosomal protein L33 1.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 6   | 6     | 47       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 400   | 243 | 81 | 73 | 3 |         |       |
|     |       |          |       |     |    |    |   |         |       |

- Molecule 7 is a protein called 50S ribosomal protein L34.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 7   | 7     | 42       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 357   | 217 | 87 | 52 | 1 |         |       |

- Molecule 8 is a protein called 50S ribosomal protein L35.

| Mol | Chain | Residues | Atoms |     |     |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 8   | 8     | 63       | Total | C   | N   | O  | S | 0       | 0     |
|     |       |          | 512   | 317 | 113 | 78 | 4 |         |       |

- Molecule 9 is a protein called 50S ribosomal protein L36.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 9   | 9     | 36       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 292   | 183 | 59 | 44 | 6 |         |       |

- Molecule 10 is a RNA chain called 23S ribosomal RNA.

| Mol | Chain | Residues | Atoms |       |       |       |      | AltConf | Trace |
|-----|-------|----------|-------|-------|-------|-------|------|---------|-------|
| 10  | A     | 2908     | Total | C     | N     | O     | P    | 0       | 0     |
|     |       |          | 62459 | 27874 | 11544 | 20133 | 2908 |         |       |

- Molecule 11 is a RNA chain called 5S ribosomal RNA.

| Mol | Chain | Residues | Atoms |      |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|-----|---------|-------|
| 11  | B     | 114      | Total | C    | N   | O   | P   | 0       | 0     |
|     |       |          | 2430  | 1083 | 430 | 803 | 114 |         |       |

- Molecule 12 is a protein called 50S ribosomal protein L2.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 12  | G     | 273      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 2108  | 1307 | 415 | 379 | 7 |         |       |

- Molecule 13 is a protein called 50S ribosomal protein L3.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 13  | H     | 206      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1582  | 995 | 291 | 292 | 4 |         |       |

- Molecule 14 is a protein called 50S ribosomal protein L4.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 14  | I     | 203      | Total | C   | N   | O   | 0       | 0     |
|     |       |          | 1563  | 987 | 286 | 290 |         |       |

- Molecule 15 is a protein called 50S ribosomal protein L5.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 15  | J     | 175      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1365  | 865 | 236 | 258 | 6 |         |       |

- Molecule 16 is a protein called 50S ribosomal protein L6.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 16  | K     | 165      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1271  | 801 | 232 | 237 | 1 |         |       |

- Molecule 17 is a protein called 50S ribosomal protein L13.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 17  | M     | 142      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1117  | 708 | 201 | 205 | 3 |         |       |

- Molecule 18 is a protein called 50S ribosomal protein L14.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 18  | N     | 122      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 925   | 573 | 175 | 172 | 5 |         |       |

- Molecule 19 is a protein called 50S ribosomal protein L15.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 19  | O     | 144      | Total | C   | N   | O   | 0       | 0     |
|     |       |          | 1094  | 675 | 214 | 205 |         |       |

- Molecule 20 is a protein called 50S ribosomal protein L16.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 20  | P     | 133      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1055  | 675 | 205 | 170 | 5 |         |       |

- Molecule 21 is a protein called 50S ribosomal protein L17.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 21  | Q     | 122      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 983   | 619 | 191 | 172 | 1 |         |       |

- Molecule 22 is a protein called 50S ribosomal protein L18.

| Mol | Chain | Residues | Atoms |     |     |     |  | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|--|---------|-------|
| 22  | R     | 118      | Total | C   | N   | O   |  | 0       | 0     |
|     |       |          | 914   | 564 | 176 | 174 |  |         |       |

- Molecule 23 is a protein called 50S ribosomal protein L19.

| Mol | Chain | Residues | Atoms |     |     |     |  | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|--|---------|-------|
| 23  | S     | 112      | Total | C   | N   | O   |  | 0       | 0     |
|     |       |          | 905   | 570 | 181 | 154 |  |         |       |

- Molecule 24 is a protein called 50S ribosomal protein L20.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 24  | T     | 116      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 939   | 596 | 185 | 154 | 4 |         |       |

- Molecule 25 is a protein called 50S ribosomal protein L21.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 25  | U     | 101      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 786   | 507 | 134 | 144 | 1 |         |       |

- Molecule 26 is a protein called 50S ribosomal protein L22.

| Mol | Chain | Residues | Atoms |     |     |     |  | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|--|---------|-------|
| 26  | V     | 110      | Total | C   | N   | O   |  | 0       | 0     |
|     |       |          | 848   | 534 | 160 | 154 |  |         |       |

- Molecule 27 is a protein called 50S ribosomal protein L23.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 27  | W     | 90       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 731   | 462 | 129 | 138 | 2 |         |       |

- Molecule 28 is a protein called 50S ribosomal protein L24.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 28  | X     | 95       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 723   | 459 | 134 | 127 | 3 |         |       |

- Molecule 29 is a protein called 50S ribosomal protein L27.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 29  | Z     | 73       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 563   | 345 | 111 | 106 | 1 |         |       |

- Molecule 30 is a protein called GTPase HflX.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 30  | D     | 414      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 3310  | 2081 | 565 | 652 | 12 |         |       |

- Molecule 31 is a protein called 50S ribosomal protein L11.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 31  | E     | 140      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1032  | 655 | 178 | 193 | 6 |         |       |

There is a discrepancy between the modelled and reference sequences:

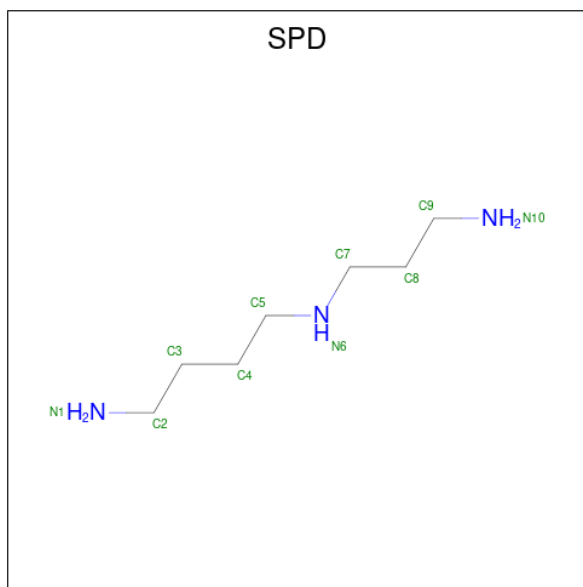
| Chain | Residue | Modelled | Actual | Comment  | Reference  |
|-------|---------|----------|--------|----------|------------|
| E     | 137     | ILE      | THR    | conflict | UNP P66054 |

- Molecule 32 is ZINC ION (three-letter code: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms |    | AltConf |
|-----|-------|----------|-------|----|---------|
| 32  | 5     | 1        | Total | Zn | 0       |
|     |       |          | 1     | 1  |         |
| 32  | 9     | 1        | Total | Zn | 0       |
|     |       |          | 1     | 1  |         |

- Molecule 33 is SPERMIDINE (three-letter code: SPD) (formula: C<sub>7</sub>H<sub>19</sub>N<sub>3</sub>).



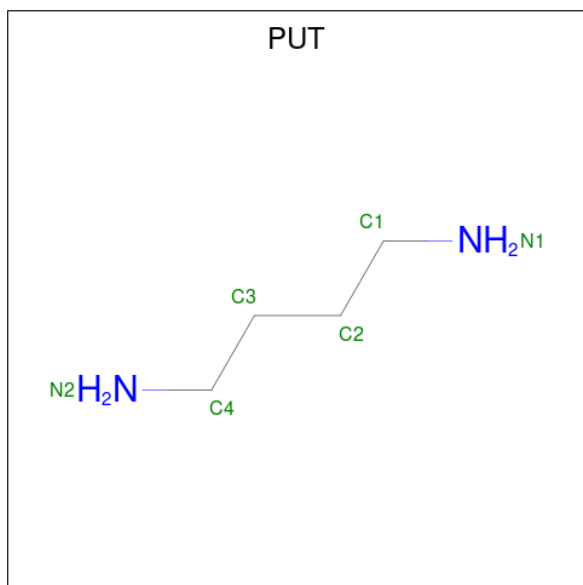


| Mol | Chain | Residues | Atoms |   |   | AltConf |
|-----|-------|----------|-------|---|---|---------|
| 33  | A     | 1        | Total | C | N | 0       |
|     |       |          | 10    | 7 | 3 |         |

- Molecule 34 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms |     | AltConf |
|-----|-------|----------|-------|-----|---------|
| 34  | A     | 156      | Total | Mg  | 0       |
|     |       |          | 156   | 156 |         |
| 34  | G     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 34  | H     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 34  | O     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 34  | D     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |

- Molecule 35 is 1,4-DIAMINOBUTANE (three-letter code: PUT) (formula: C<sub>4</sub>H<sub>12</sub>N<sub>2</sub>).

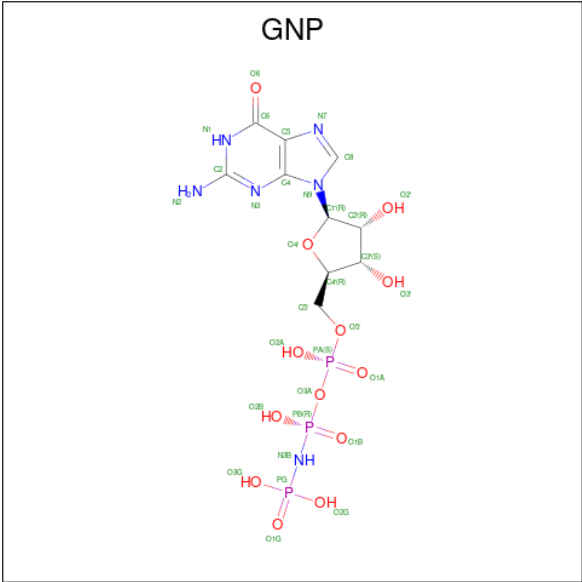


| Mol | Chain | Residues | Atoms |   |   | AltConf |
|-----|-------|----------|-------|---|---|---------|
| 35  | A     | 1        | Total | C | N | 0       |
|     |       |          | 6     | 4 | 2 |         |
| 35  | A     | 1        | Total | C | N | 0       |
|     |       |          | 6     | 4 | 2 |         |

- Molecule 36 is POTASSIUM ION (three-letter code: K) (formula: K).

| Mol | Chain | Residues | Atoms |   | AltConf |
|-----|-------|----------|-------|---|---------|
| 36  | P     | 1        | Total | K | 0       |
|     |       |          | 1     | 1 |         |

- Molecule 37 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: C<sub>10</sub>H<sub>17</sub>N<sub>6</sub>O<sub>13</sub>P<sub>3</sub>).

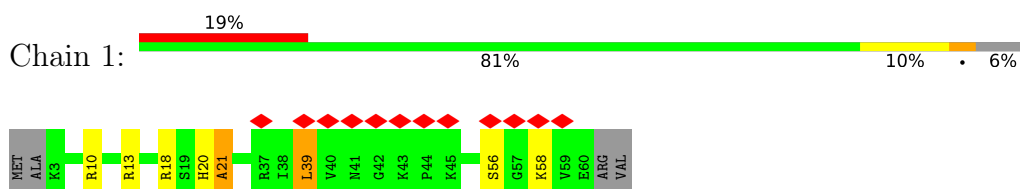


| Mol | Chain | Residues | Atoms |    |   |    |   | AltConf |
|-----|-------|----------|-------|----|---|----|---|---------|
|     |       |          | Total | C  | N | O  | P |         |
| 37  | D     | 1        | 32    | 10 | 6 | 13 | 3 | 0       |

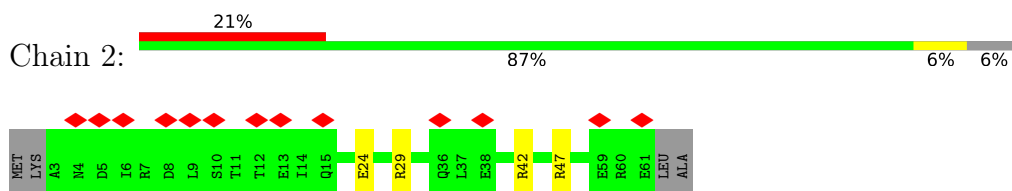
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

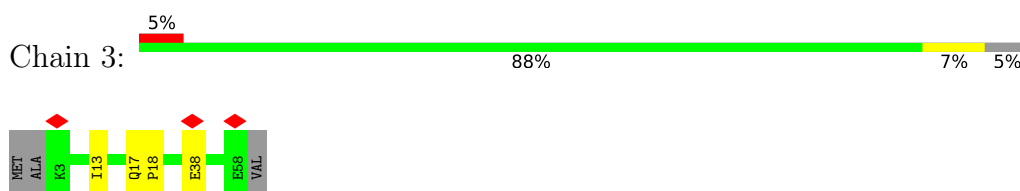
- Molecule 1: 50S ribosomal protein L28



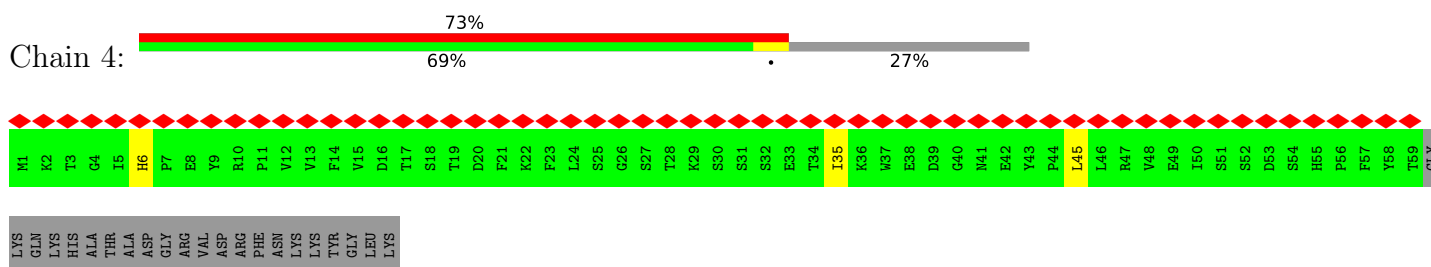
- Molecule 2: 50S ribosomal protein L29



- Molecule 3: 50S ribosomal protein L30

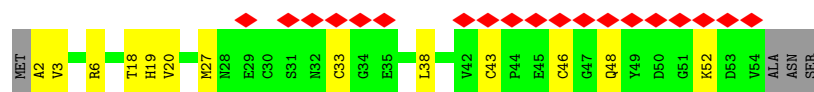


- Molecule 4: 50S ribosomal protein L31 type B

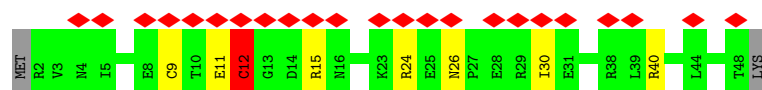
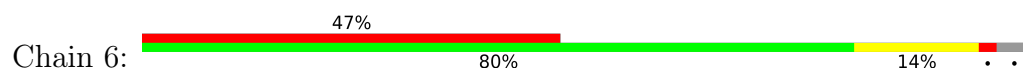


- Molecule 5: 50S ribosomal protein L32-2

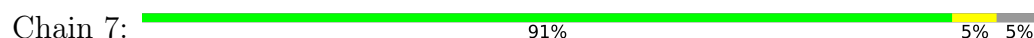




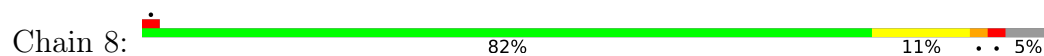
- Molecule 6: 50S ribosomal protein L33 1



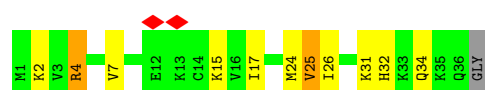
- Molecule 7: 50S ribosomal protein L34



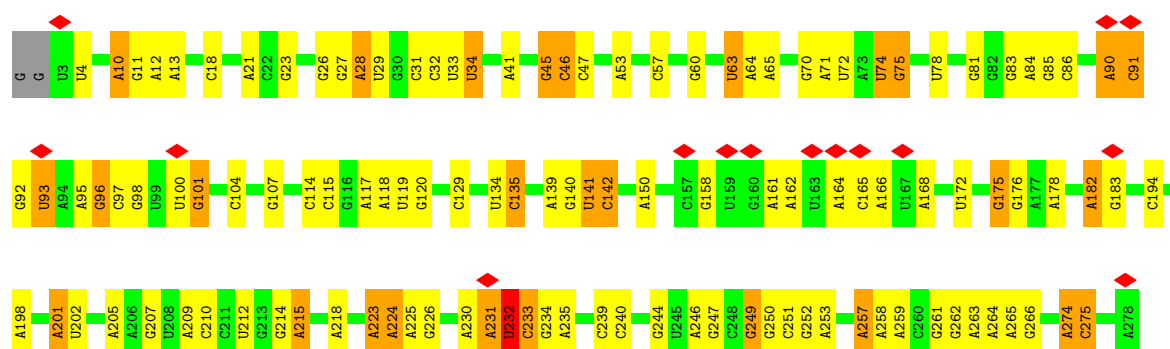
- Molecule 8: 50S ribosomal protein L35



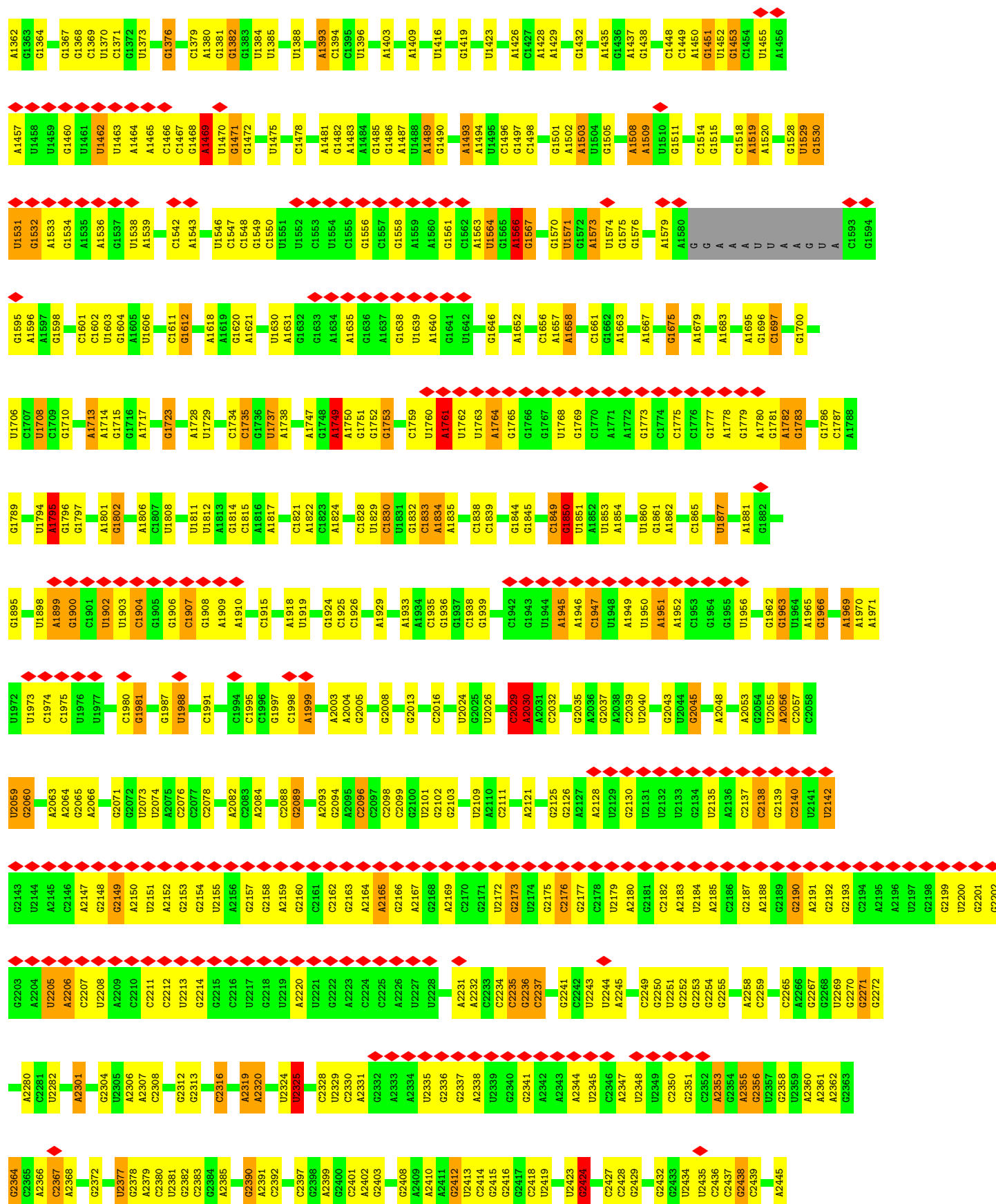
- Molecule 9: 50S ribosomal protein L36

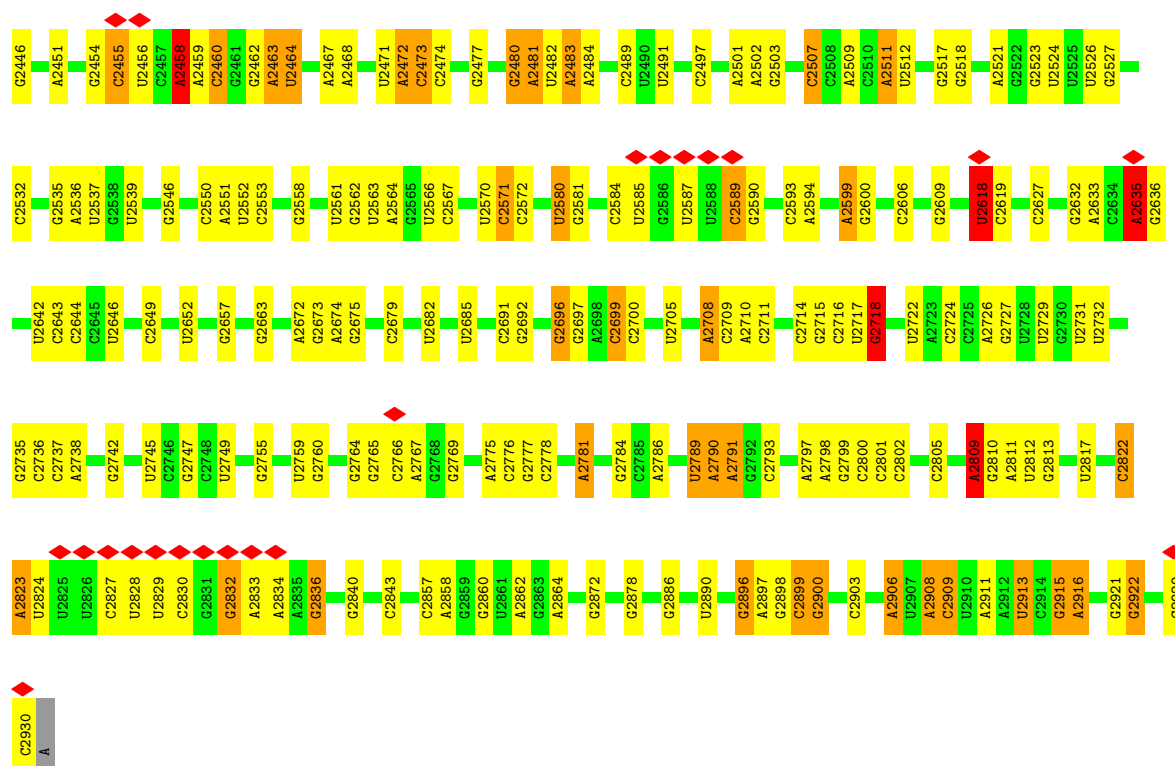


- Molecule 10: 23S ribosomal RNA

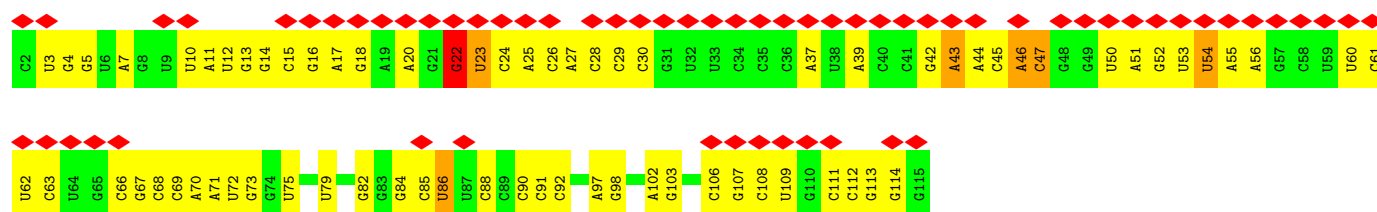




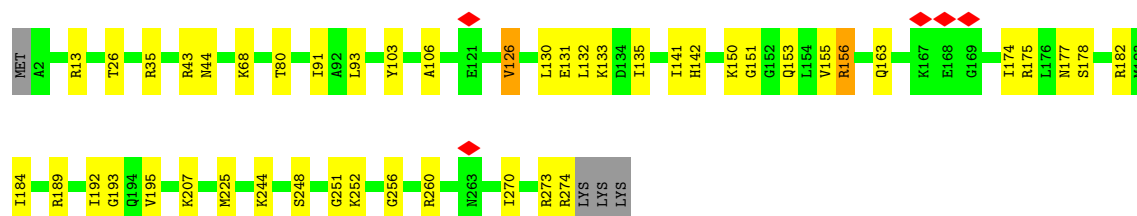
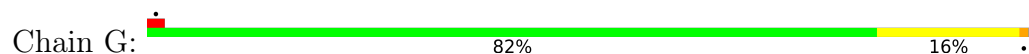




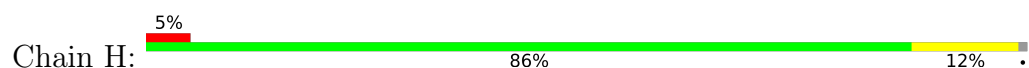
- Molecule 11: 5S ribosomal RNA



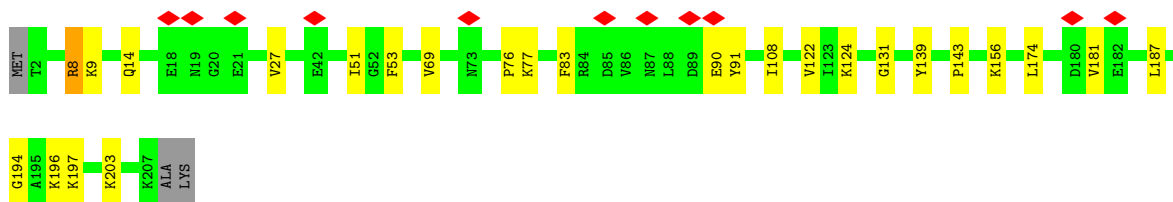
- Molecule 12: 50S ribosomal protein L2



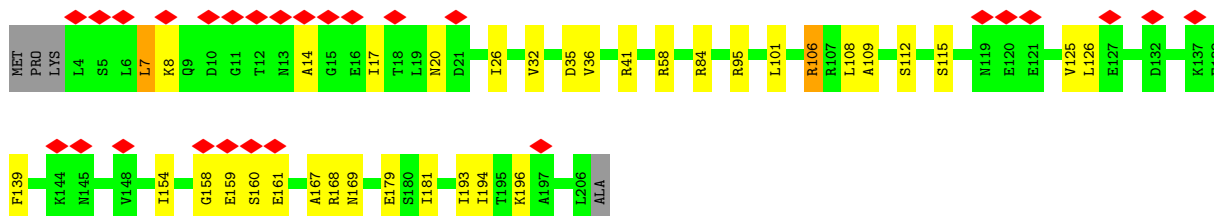
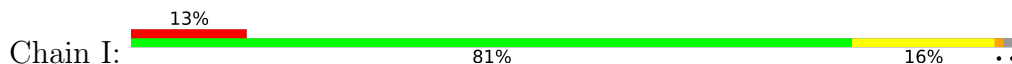
- Molecule 13: 50S ribosomal protein L3



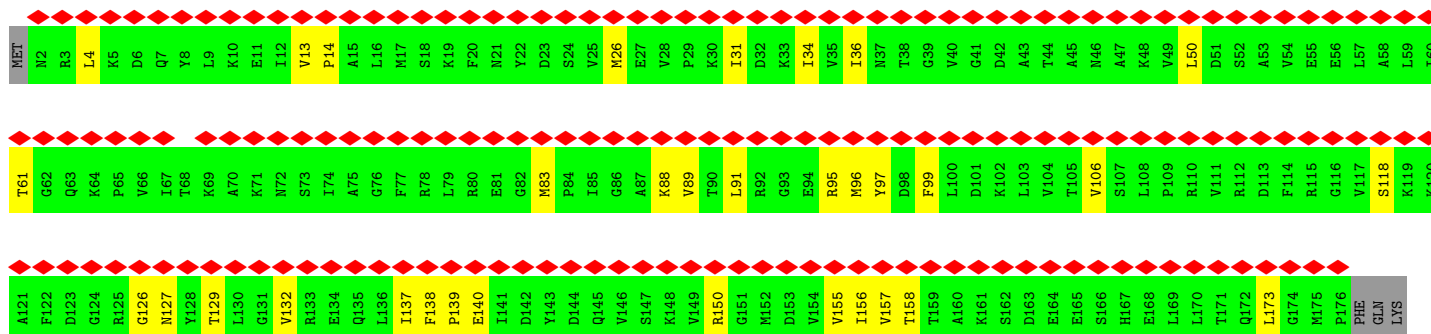
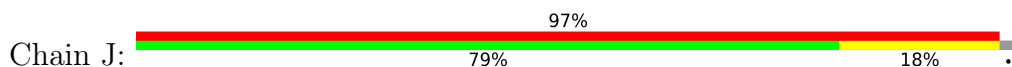




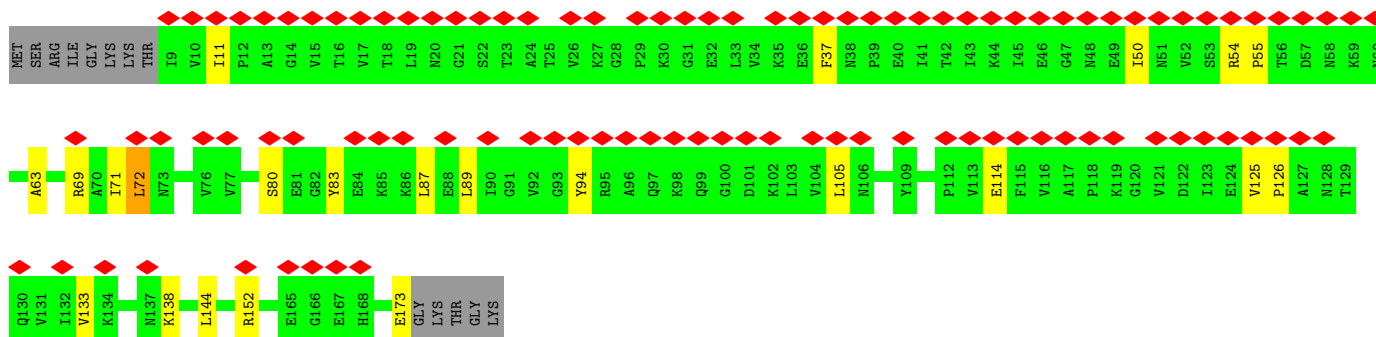
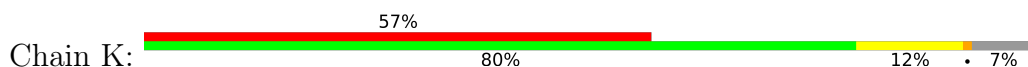
• Molecule 14: 50S ribosomal protein L4



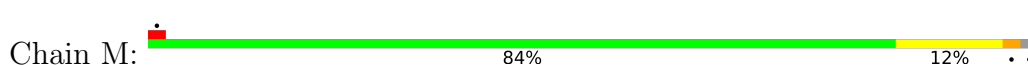
• Molecule 15: 50S ribosomal protein L5



• Molecule 16: 50S ribosomal protein L6

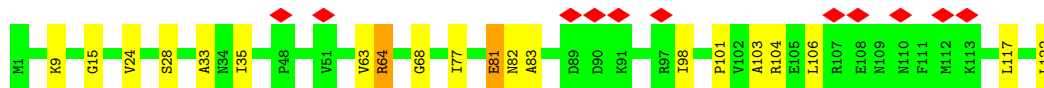
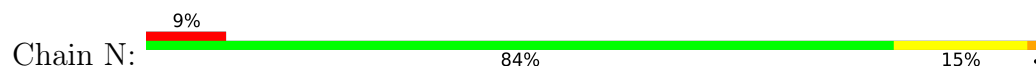


• Molecule 17: 50S ribosomal protein L13

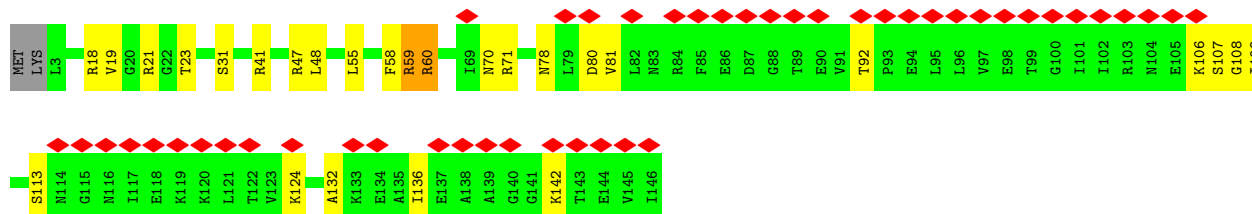
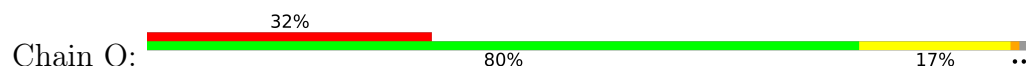




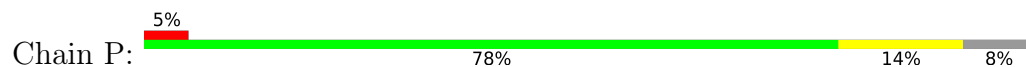
- Molecule 18: 50S ribosomal protein L14



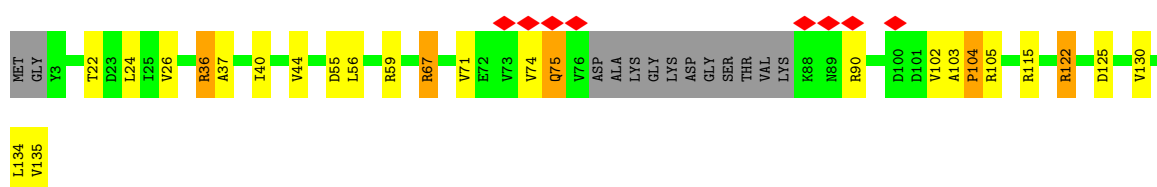
- Molecule 19: 50S ribosomal protein L15



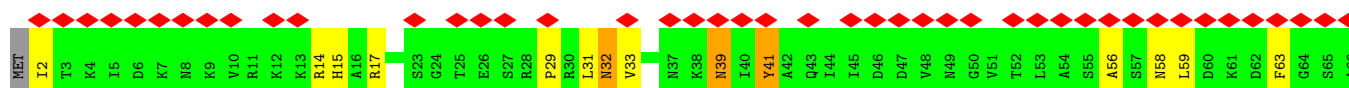
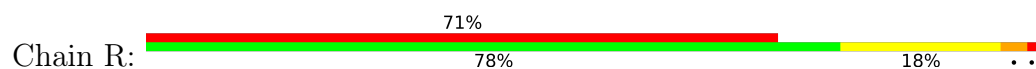
- Molecule 20: 50S ribosomal protein L16

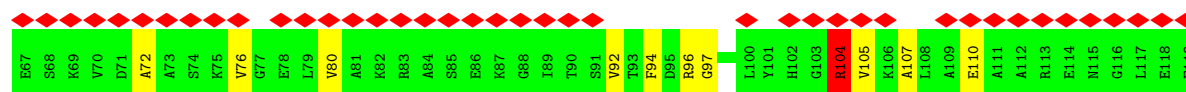


- Molecule 21: 50S ribosomal protein L17

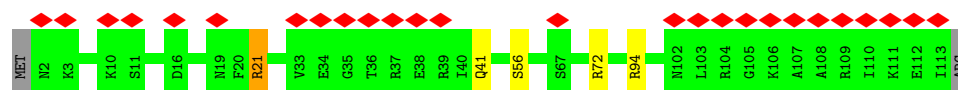


- Molecule 22: 50S ribosomal protein L18

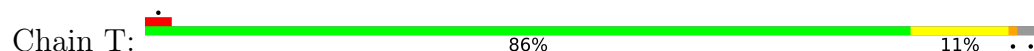




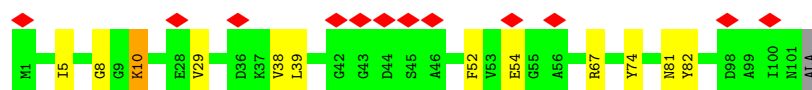
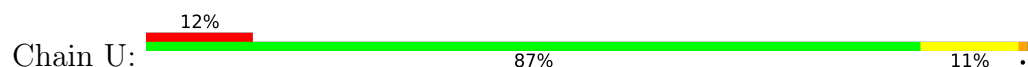
- Molecule 23: 50S ribosomal protein L19



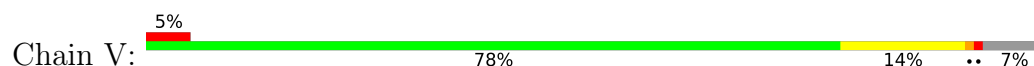
- Molecule 24: 50S ribosomal protein L20



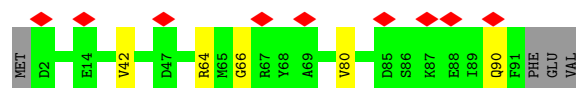
- Molecule 25: 50S ribosomal protein L21



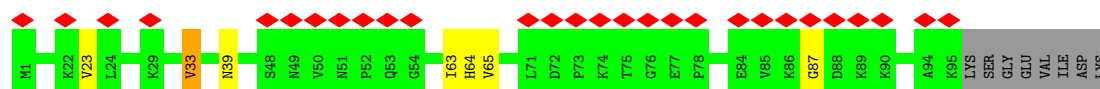
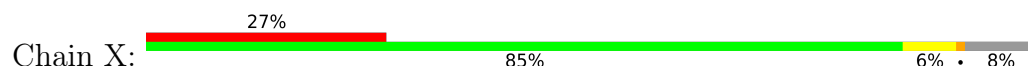
- Molecule 26: 50S ribosomal protein L22



- Molecule 27: 50S ribosomal protein L23



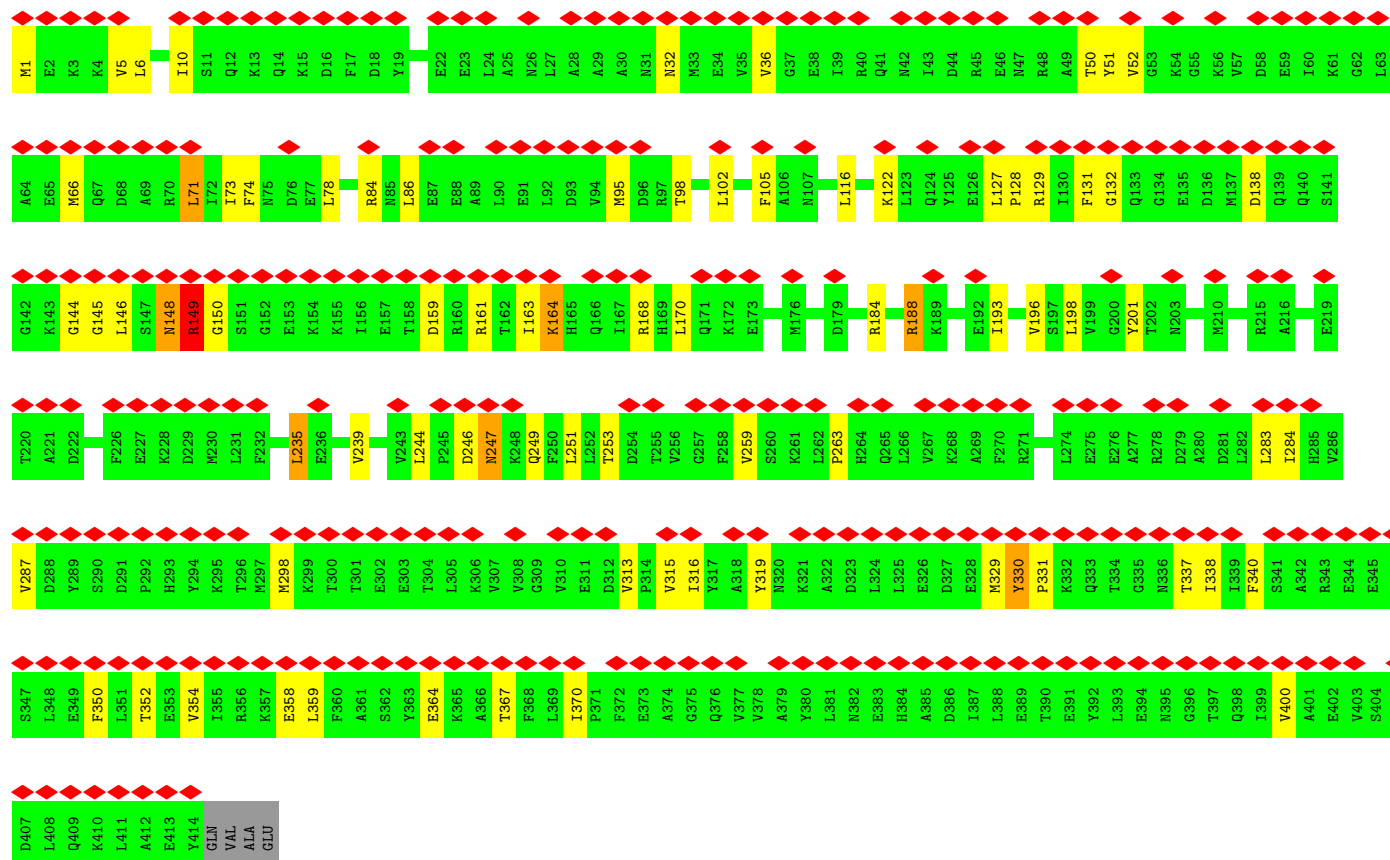
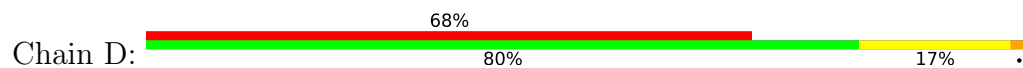
- Molecule 28: 50S ribosomal protein L24



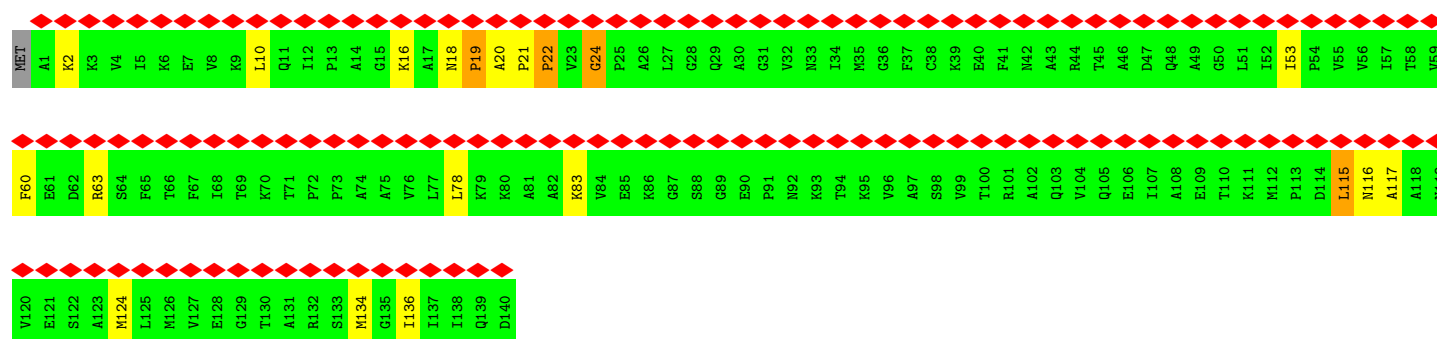
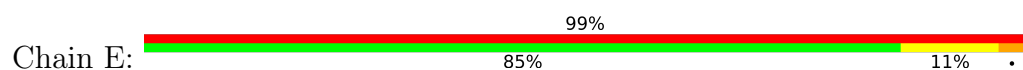
- Molecule 29: 50S ribosomal protein L27



• Molecule 30: GTPase HflX



• Molecule 31: 50S ribosomal protein L11



## 4 Experimental information

| Property                             | Value                                   | Source    |
|--------------------------------------|---|-----------|
| EM reconstruction method             | SINGLE PARTICLE                         | Depositor |
| Imposed symmetry                     | POINT, Not provided                     |           |
| Number of particles used             | 204545                                  | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF                       | Depositor |
| CTF correction method                | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope                           | FEI TITAN KRIOS                         | Depositor |
| Voltage (kV)                         | 300                                     | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 35.022                                  | Depositor |
| Minimum defocus (nm)                 | 800                                     | Depositor |
| Maximum defocus (nm)                 | 2000                                    | Depositor |
| Magnification                        | 165000                                  | Depositor |
| Image detector                       | GATAN K2 SUMMIT (4k x 4k)               | Depositor |
| Maximum map value                    | 0.318                                   | Depositor |
| Minimum map value                    | -0.158                                  | Depositor |
| Average map value                    | 0.001                                   | Depositor |
| Map value standard deviation         | 0.010                                   | Depositor |
| Recommended contour level            | 0.035                                   | Depositor |
| Map size (Å)                         | 295.2, 295.2, 295.2                     | wwPDB     |
| Map dimensions                       | 360, 360, 360                           | wwPDB     |
| Map angles (°)                       | 90.0, 90.0, 90.0                        | wwPDB     |
| Pixel spacing (Å)                    | 0.82000005, 0.82000005, 0.82000005      | Depositor |

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, SPD, PUT, K, GNP, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Chain | Bond lengths |                  | Bond angles |                   |
|-----|-------|--------------|------------------|-------------|-------------------|
|     |       | RMSZ         | # $ Z  > 5$      | RMSZ        | # $ Z  > 5$       |
| 1   | 1     | 0.36         | 0/462            | 0.55        | 0/612             |
| 2   | 2     | 0.25         | 0/488            | 0.42        | 0/651             |
| 3   | 3     | 0.29         | 0/436            | 0.51        | 0/585             |
| 4   | 4     | 0.29         | 0/491            | 0.46        | 0/666             |
| 5   | 5     | 0.35         | 0/433            | 0.59        | 0/577             |
| 6   | 6     | 0.25         | 0/404            | 0.52        | 0/541             |
| 7   | 7     | 0.37         | 0/360            | 0.69        | 0/469             |
| 8   | 8     | 0.35         | 0/519            | 0.58        | 0/675             |
| 9   | 9     | 0.30         | 0/295            | 0.62        | 0/387             |
| 10  | A     | 0.67         | 14/69974 (0.0%)  | 1.20        | 738/109160 (0.7%) |
| 11  | B     | 0.91         | 0/2714           | 1.30        | 47/4229 (1.1%)    |
| 12  | G     | 0.62         | 0/2144           | 0.80        | 0/2875            |
| 13  | H     | 0.61         | 0/1604           | 0.79        | 0/2156            |
| 14  | I     | 0.64         | 0/1583           | 0.76        | 0/2133            |
| 15  | J     | 0.71         | 0/1383           | 0.75        | 0/1863            |
| 16  | K     | 0.69         | 0/1293           | 0.76        | 0/1749            |
| 17  | M     | 0.61         | 0/1140           | 0.73        | 0/1533            |
| 18  | N     | 0.63         | 0/932            | 0.78        | 0/1248            |
| 19  | O     | 0.64         | 0/1105           | 0.78        | 0/1470            |
| 20  | P     | 0.60         | 0/1077           | 0.74        | 0/1439            |
| 21  | Q     | 0.61         | 0/994            | 0.77        | 0/1329            |
| 22  | R     | 0.68         | 0/923            | 0.74        | 0/1232            |
| 23  | S     | 0.63         | 0/917            | 0.77        | 0/1230            |
| 24  | T     | 0.60         | 0/952            | 0.75        | 0/1266            |
| 25  | U     | 0.60         | 0/799            | 0.80        | 0/1072            |
| 26  | V     | 0.63         | 0/858            | 0.76        | 0/1160            |
| 27  | W     | 0.61         | 0/739            | 0.75        | 0/990             |
| 28  | X     | 0.66         | 0/733            | 0.77        | 0/980             |
| 29  | Z     | 0.60         | 0/570            | 0.79        | 0/758             |
| 30  | D     | 0.67         | 0/3353           | 0.74        | 0/4516            |
| 31  | E     | 0.73         | 0/1046           | 0.77        | 0/1413            |
| All | All   | 0.66         | 14/100721 (0.0%) | 1.10        | 785/150964 (0.5%) |

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

| Mol | Chain | #Chirality outliers | #Planarity outliers |
|-----|-------|---------------------|---------------------|
| 1   | 1     | 0                   | 3                   |
| 2   | 2     | 0                   | 1                   |
| 5   | 5     | 0                   | 1                   |
| 7   | 7     | 0                   | 2                   |
| 8   | 8     | 0                   | 2                   |
| 9   | 9     | 0                   | 1                   |
| 12  | G     | 0                   | 6                   |
| 13  | H     | 0                   | 1                   |
| 14  | I     | 0                   | 3                   |
| 16  | K     | 0                   | 2                   |
| 17  | M     | 0                   | 2                   |
| 19  | O     | 0                   | 6                   |
| 20  | P     | 0                   | 3                   |
| 21  | Q     | 0                   | 4                   |
| 22  | R     | 0                   | 4                   |
| 23  | S     | 0                   | 3                   |
| 24  | T     | 0                   | 2                   |
| 25  | U     | 0                   | 1                   |
| 26  | V     | 0                   | 1                   |
| 27  | W     | 0                   | 1                   |
| 29  | Z     | 0                   | 1                   |
| 30  | D     | 0                   | 5                   |
| All | All   | 0                   | 55                  |

All (14) bond length outliers are listed below:

| Mol | Chain | Res  | Type | Atoms | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|-------|-------------|----------|
| 10  | A     | 205  | A    | N9-C4 | 11.65 | 1.44        | 1.37     |
| 10  | A     | 2726 | A    | N9-C4 | 9.63  | 1.43        | 1.37     |
| 10  | A     | 726  | A    | N9-C4 | 7.51  | 1.42        | 1.37     |
| 10  | A     | 723  | A    | N9-C4 | 7.47  | 1.42        | 1.37     |
| 10  | A     | 844  | G    | C8-N7 | 7.17  | 1.35        | 1.30     |
| 10  | A     | 28   | A    | C6-N6 | -6.29 | 1.28        | 1.33     |
| 10  | A     | 844  | G    | N9-C4 | 6.12  | 1.42        | 1.38     |
| 10  | A     | 725  | C    | N1-C2 | 5.86  | 1.46        | 1.40     |
| 10  | A     | 823  | G    | C8-N7 | 5.86  | 1.34        | 1.30     |
| 10  | A     | 824  | G    | C8-N7 | 5.51  | 1.34        | 1.30     |
| 10  | A     | 1481 | A    | C8-N7 | 5.51  | 1.35        | 1.31     |
| 10  | A     | 557  | G    | C6-O6 | -5.39 | 1.19        | 1.24     |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Res  | Type | Atoms | Z    | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|------|-------------|----------|
| 10  | A     | 205  | A    | C8-N7 | 5.11 | 1.35        | 1.31     |
| 10  | A     | 1481 | A    | N9-C4 | 5.01 | 1.40        | 1.37     |

All (785) bond angle outliers are listed below:

| Mol | Chain | Res  | Type | Atoms      | Z      | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|--------|-------------|----------|
| 10  | A     | 2366 | A    | P-O3'-C3'  | -11.19 | 106.27      | 119.70   |
| 10  | A     | 605  | U    | P-O3'-C3'  | -11.12 | 106.36      | 119.70   |
| 10  | A     | 548  | A    | P-O3'-C3'  | 10.54  | 132.35      | 119.70   |
| 10  | A     | 85   | G    | P-O3'-C3'  | -9.27  | 108.57      | 119.70   |
| 10  | A     | 502  | C    | P-O3'-C3'  | -9.18  | 108.69      | 119.70   |
| 10  | A     | 731  | A    | O3'-P-O5'  | -9.07  | 86.78       | 104.00   |
| 10  | A     | 1849 | C    | O3'-P-O5'  | -8.84  | 87.21       | 104.00   |
| 10  | A     | 557  | G    | O4'-C1'-N9 | 8.68   | 115.14      | 108.20   |
| 10  | A     | 2501 | A    | P-O3'-C3'  | -8.53  | 109.46      | 119.70   |
| 10  | A     | 2502 | A    | P-O3'-C3'  | -8.48  | 109.52      | 119.70   |
| 10  | A     | 1861 | G    | P-O3'-C3'  | -8.38  | 109.64      | 119.70   |
| 10  | A     | 916  | G    | P-O3'-C3'  | -8.28  | 109.76      | 119.70   |
| 10  | A     | 2809 | A    | P-O3'-C3'  | 8.15   | 129.47      | 119.70   |
| 10  | A     | 1004 | U    | P-O3'-C3'  | -8.02  | 110.08      | 119.70   |
| 11  | B     | 22   | G    | P-O3'-C3'  | -8.01  | 110.09      | 119.70   |
| 10  | A     | 2618 | U    | P-O3'-C3'  | -7.91  | 110.20      | 119.70   |
| 10  | A     | 2527 | G    | P-O3'-C3'  | -7.91  | 110.21      | 119.70   |
| 10  | A     | 2512 | U    | P-O3'-C3'  | -7.88  | 110.24      | 119.70   |
| 10  | A     | 2691 | C    | P-O3'-C3'  | -7.86  | 110.27      | 119.70   |
| 10  | A     | 339  | U    | P-O3'-C3'  | -7.80  | 110.34      | 119.70   |
| 10  | A     | 297  | U    | P-O3'-C3'  | -7.79  | 110.35      | 119.70   |
| 10  | A     | 263  | A    | P-O3'-C3'  | -7.70  | 110.46      | 119.70   |
| 10  | A     | 46   | C    | P-O3'-C3'  | -7.64  | 110.54      | 119.70   |
| 10  | A     | 414  | C    | P-O3'-C3'  | -7.59  | 110.59      | 119.70   |
| 10  | A     | 899  | C    | P-O3'-C3'  | -7.56  | 110.62      | 119.70   |
| 11  | B     | 47   | C    | P-O3'-C3'  | -7.54  | 110.65      | 119.70   |
| 10  | A     | 1538 | U    | P-O3'-C3'  | -7.51  | 110.69      | 119.70   |
| 11  | B     | 23   | U    | P-O3'-C3'  | -7.45  | 110.77      | 119.70   |
| 10  | A     | 669  | C    | P-O3'-C3'  | -7.44  | 110.78      | 119.70   |
| 10  | A     | 2269 | U    | P-O3'-C3'  | -7.44  | 110.78      | 119.70   |
| 10  | A     | 465  | C    | P-O3'-C3'  | -7.42  | 110.80      | 119.70   |
| 10  | A     | 580  | U    | P-O3'-C3'  | -7.40  | 110.82      | 119.70   |
| 10  | A     | 372  | A    | P-O3'-C3'  | -7.36  | 110.86      | 119.70   |
| 10  | A     | 1381 | G    | P-O3'-C3'  | -7.35  | 110.88      | 119.70   |
| 10  | A     | 588  | G    | P-O3'-C3'  | -7.33  | 110.90      | 119.70   |
| 10  | A     | 1316 | G    | P-O3'-C3'  | -7.30  | 110.94      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms     | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-----------|-------|-------------|----------|
| 10  | A     | 2708 | A    | P-O3'-C3' | -7.28 | 110.96      | 119.70   |
| 10  | A     | 2056 | A    | P-O3'-C3' | -7.28 | 110.96      | 119.70   |
| 10  | A     | 2760 | G    | P-O3'-C3' | -7.26 | 110.99      | 119.70   |
| 10  | A     | 234  | G    | P-O3'-C3' | -7.22 | 111.04      | 119.70   |
| 10  | A     | 1016 | U    | P-O3'-C3' | -7.21 | 111.05      | 119.70   |
| 10  | A     | 685  | C    | P-O3'-C3' | -7.20 | 111.06      | 119.70   |
| 10  | A     | 648  | G    | P-O3'-C3' | -7.20 | 111.06      | 119.70   |
| 10  | A     | 2898 | G    | P-O3'-C3' | -7.20 | 111.06      | 119.70   |
| 10  | A     | 661  | A    | P-O3'-C3' | -7.19 | 111.07      | 119.70   |
| 10  | A     | 2121 | A    | P-O3'-C3' | -7.18 | 111.08      | 119.70   |
| 10  | A     | 298  | U    | P-O3'-C3' | -7.17 | 111.09      | 119.70   |
| 10  | A     | 86   | C    | P-O3'-C3' | -7.12 | 111.16      | 119.70   |
| 10  | A     | 598  | G    | P-O3'-C3' | -7.12 | 111.16      | 119.70   |
| 10  | A     | 873  | U    | P-O3'-C3' | -7.12 | 111.16      | 119.70   |
| 10  | A     | 605  | U    | O3'-P-O5' | -7.11 | 90.50       | 104.00   |
| 10  | A     | 581  | A    | P-O3'-C3' | -7.10 | 111.18      | 119.70   |
| 10  | A     | 2151 | U    | P-O3'-C3' | -7.08 | 111.20      | 119.70   |
| 10  | A     | 1194 | A    | P-O3'-C3' | -7.07 | 111.22      | 119.70   |
| 10  | A     | 1197 | A    | P-O3'-C3' | -7.05 | 111.24      | 119.70   |
| 10  | A     | 2325 | U    | P-O3'-C3' | -7.03 | 111.26      | 119.70   |
| 10  | A     | 258  | A    | P-O3'-C3' | -7.01 | 111.29      | 119.70   |
| 10  | A     | 968  | C    | P-O3'-C3' | -7.01 | 111.29      | 119.70   |
| 10  | A     | 2735 | G    | P-O3'-C3' | -6.98 | 111.32      | 119.70   |
| 10  | A     | 1178 | U    | P-O3'-C3' | -6.97 | 111.34      | 119.70   |
| 10  | A     | 1118 | C    | P-O3'-C3' | -6.95 | 111.36      | 119.70   |
| 10  | A     | 963  | G    | P-O3'-C3' | -6.91 | 111.40      | 119.70   |
| 10  | A     | 2718 | G    | P-O3'-C3' | -6.90 | 111.42      | 119.70   |
| 10  | A     | 2566 | U    | P-O3'-C3' | -6.89 | 111.43      | 119.70   |
| 10  | A     | 2140 | C    | P-O3'-C3' | -6.87 | 111.46      | 119.70   |
| 10  | A     | 1368 | G    | P-O3'-C3' | -6.86 | 111.46      | 119.70   |
| 10  | A     | 896  | A    | P-O3'-C3' | -6.84 | 111.49      | 119.70   |
| 10  | A     | 2497 | C    | P-O3'-C3' | -6.84 | 111.49      | 119.70   |
| 10  | A     | 21   | A    | P-O3'-C3' | -6.83 | 111.51      | 119.70   |
| 10  | A     | 515  | G    | P-O3'-C3' | -6.81 | 111.53      | 119.70   |
| 10  | A     | 1154 | U    | P-O3'-C3' | -6.80 | 111.54      | 119.70   |
| 10  | A     | 2817 | U    | P-O3'-C3' | -6.77 | 111.58      | 119.70   |
| 10  | A     | 1737 | U    | P-O3'-C3' | -6.74 | 111.62      | 119.70   |
| 10  | A     | 480  | U    | P-O3'-C3' | -6.73 | 111.62      | 119.70   |
| 10  | A     | 1310 | A    | P-O3'-C3' | -6.73 | 111.62      | 119.70   |
| 10  | A     | 2564 | A    | P-O3'-C3' | -6.73 | 111.63      | 119.70   |
| 10  | A     | 663  | C    | P-O3'-C3' | -6.72 | 111.64      | 119.70   |
| 10  | A     | 897  | G    | P-O3'-C3' | -6.72 | 111.64      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2550 | C    | P-O3'-C3'   | -6.69 | 111.67      | 119.70   |
| 10  | A     | 868  | U    | P-O3'-C3'   | -6.69 | 111.67      | 119.70   |
| 10  | A     | 2900 | G    | P-O3'-C3'   | -6.68 | 111.69      | 119.70   |
| 10  | A     | 1030 | G    | O4'-C1'-N9  | 6.67  | 113.53      | 108.20   |
| 10  | A     | 2330 | C    | P-O3'-C3'   | -6.65 | 111.72      | 119.70   |
| 10  | A     | 2526 | U    | P-O3'-C3'   | -6.65 | 111.72      | 119.70   |
| 10  | A     | 63   | U    | P-O3'-C3'   | -6.64 | 111.73      | 119.70   |
| 10  | A     | 995  | U    | P-O3'-C3'   | -6.64 | 111.73      | 119.70   |
| 10  | A     | 1101 | G    | P-O3'-C3'   | -6.64 | 111.73      | 119.70   |
| 10  | A     | 577  | A    | P-O3'-C3'   | -6.61 | 111.77      | 119.70   |
| 10  | A     | 895  | G    | P-O3'-C3'   | -6.60 | 111.78      | 119.70   |
| 10  | A     | 1963 | G    | C3'-C2'-C1' | -6.59 | 96.23       | 101.50   |
| 10  | A     | 2482 | U    | P-O3'-C3'   | -6.57 | 111.81      | 119.70   |
| 10  | A     | 829  | A    | P-O3'-C3'   | -6.57 | 111.81      | 119.70   |
| 10  | A     | 924  | U    | P-O3'-C3'   | -6.56 | 111.83      | 119.70   |
| 10  | A     | 2709 | C    | P-O3'-C3'   | -6.56 | 111.82      | 119.70   |
| 10  | A     | 386  | U    | P-O3'-C3'   | -6.56 | 111.83      | 119.70   |
| 10  | A     | 194  | C    | P-O3'-C3'   | -6.55 | 111.84      | 119.70   |
| 10  | A     | 2745 | U    | P-O3'-C3'   | -6.53 | 111.86      | 119.70   |
| 10  | A     | 2532 | C    | P-O3'-C3'   | -6.53 | 111.86      | 119.70   |
| 10  | A     | 33   | U    | P-O3'-C3'   | -6.52 | 111.88      | 119.70   |
| 10  | A     | 1735 | C    | P-O3'-C3'   | -6.50 | 111.89      | 119.70   |
| 10  | A     | 1259 | A    | P-O3'-C3'   | -6.50 | 111.90      | 119.70   |
| 10  | A     | 223  | A    | P-O3'-C3'   | -6.49 | 111.91      | 119.70   |
| 10  | A     | 1269 | G    | P-O3'-C3'   | -6.49 | 111.91      | 119.70   |
| 11  | B     | 91   | C    | P-O3'-C3'   | -6.49 | 111.92      | 119.70   |
| 10  | A     | 481  | C    | P-O3'-C3'   | -6.49 | 111.92      | 119.70   |
| 10  | A     | 2429 | G    | P-O3'-C3'   | -6.48 | 111.93      | 119.70   |
| 10  | A     | 1710 | G    | P-O3'-C3'   | -6.48 | 111.93      | 119.70   |
| 10  | A     | 1100 | A    | P-O3'-C3'   | -6.47 | 111.93      | 119.70   |
| 10  | A     | 364  | A    | P-O3'-C3'   | -6.47 | 111.93      | 119.70   |
| 10  | A     | 562  | C    | P-O3'-C3'   | -6.47 | 111.94      | 119.70   |
| 10  | A     | 2364 | G    | P-O3'-C3'   | -6.47 | 111.94      | 119.70   |
| 10  | A     | 224  | A    | O3'-P-O5'   | -6.46 | 91.72       | 104.00   |
| 10  | A     | 2150 | A    | P-O3'-C3'   | -6.46 | 111.94      | 119.70   |
| 10  | A     | 1388 | U    | P-O3'-C3'   | -6.46 | 111.95      | 119.70   |
| 10  | A     | 1074 | A    | P-O3'-C3'   | -6.46 | 111.95      | 119.70   |
| 10  | A     | 2235 | C    | P-O3'-C3'   | -6.46 | 111.95      | 119.70   |
| 10  | A     | 673  | G    | P-O3'-C3'   | -6.45 | 111.96      | 119.70   |
| 10  | A     | 1787 | C    | P-O3'-C3'   | -6.45 | 111.97      | 119.70   |
| 10  | A     | 674  | C    | P-O3'-C3'   | -6.44 | 111.97      | 119.70   |
| 10  | A     | 201  | A    | C1'-O4'-C4' | -6.44 | 104.75      | 109.90   |

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| Mol | Chain | Res  | Type | Atoms      | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 10  | A     | 1288 | U    | P-O3'-C3'  | -6.44 | 111.98      | 119.70   |
| 10  | A     | 2458 | A    | P-O3'-C3'  | 6.43  | 127.42      | 119.70   |
| 10  | A     | 1564 | U    | P-O3'-C3'  | -6.43 | 111.98      | 119.70   |
| 10  | A     | 2749 | U    | P-O3'-C3'  | -6.43 | 111.99      | 119.70   |
| 10  | A     | 2580 | U    | P-O3'-C3'  | -6.42 | 111.99      | 119.70   |
| 11  | B     | 39   | A    | P-O3'-C3'  | -6.42 | 112.00      | 119.70   |
| 10  | A     | 2074 | U    | P-O3'-C3'  | -6.41 | 112.00      | 119.70   |
| 10  | A     | 1877 | U    | P-O3'-C3'  | -6.41 | 112.01      | 119.70   |
| 10  | A     | 918  | U    | P-O3'-C3'  | -6.40 | 112.03      | 119.70   |
| 10  | A     | 1576 | G    | P-O3'-C3'  | -6.39 | 112.03      | 119.70   |
| 10  | A     | 2481 | A    | P-O3'-C3'  | -6.39 | 112.03      | 119.70   |
| 10  | A     | 746  | G    | P-O3'-C3'  | -6.39 | 112.03      | 119.70   |
| 10  | A     | 1432 | G    | P-O3'-C3'  | -6.39 | 112.03      | 119.70   |
| 10  | A     | 379  | C    | P-O3'-C3'  | -6.39 | 112.03      | 119.70   |
| 10  | A     | 178  | A    | P-O3'-C3'  | -6.38 | 112.04      | 119.70   |
| 10  | A     | 375  | A    | P-O3'-C3'  | -6.36 | 112.07      | 119.70   |
| 10  | A     | 2397 | C    | P-O3'-C3'  | -6.35 | 112.08      | 119.70   |
| 10  | A     | 2729 | U    | P-O3'-C3'  | -6.35 | 112.08      | 119.70   |
| 11  | B     | 3    | U    | P-O3'-C3'  | -6.34 | 112.08      | 119.70   |
| 10  | A     | 641  | U    | P-O3'-C3'  | -6.34 | 112.09      | 119.70   |
| 10  | A     | 904  | A    | P-O3'-C3'  | -6.33 | 112.10      | 119.70   |
| 10  | A     | 2635 | A    | P-O3'-C3'  | -6.33 | 112.10      | 119.70   |
| 10  | A     | 2419 | U    | P-O3'-C3'  | -6.33 | 112.10      | 119.70   |
| 10  | A     | 162  | A    | P-O3'-C3'  | -6.33 | 112.11      | 119.70   |
| 10  | A     | 292  | U    | P-O3'-C3'  | -6.32 | 112.12      | 119.70   |
| 10  | A     | 745  | A    | P-O3'-C3'  | -6.31 | 112.12      | 119.70   |
| 10  | A     | 528  | C    | P-O3'-C3'  | -6.31 | 112.13      | 119.70   |
| 10  | A     | 1367 | G    | P-O3'-C3'  | -6.31 | 112.13      | 119.70   |
| 10  | A     | 2377 | U    | P-O3'-C3'  | -6.31 | 112.13      | 119.70   |
| 10  | A     | 821  | G    | O4'-C1'-N9 | 6.30  | 113.24      | 108.20   |
| 10  | A     | 2013 | G    | P-O3'-C3'  | -6.30 | 112.14      | 119.70   |
| 10  | A     | 2148 | G    | P-O3'-C3'  | -6.29 | 112.15      | 119.70   |
| 10  | A     | 259  | A    | P-O3'-C3'  | -6.29 | 112.15      | 119.70   |
| 10  | A     | 232  | U    | O4'-C1'-N1 | 6.29  | 113.23      | 108.20   |
| 10  | A     | 450  | C    | P-O3'-C3'  | -6.29 | 112.16      | 119.70   |
| 10  | A     | 964  | A    | P-O3'-C3'  | -6.29 | 112.16      | 119.70   |
| 10  | A     | 2190 | G    | P-O3'-C3'  | -6.28 | 112.16      | 119.70   |
| 10  | A     | 473  | U    | P-O3'-C3'  | -6.28 | 112.17      | 119.70   |
| 10  | A     | 2523 | G    | P-O3'-C3'  | -6.28 | 112.17      | 119.70   |
| 10  | A     | 1697 | C    | P-O3'-C3'  | -6.27 | 112.18      | 119.70   |
| 10  | A     | 98   | G    | P-O3'-C3'  | -6.27 | 112.18      | 119.70   |
| 10  | A     | 2511 | A    | P-O3'-C3'  | -6.27 | 112.18      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2737 | C    | P-O3'-C3'   | -6.27 | 112.18      | 119.70   |
| 10  | A     | 2836 | G    | P-O3'-C3'   | -6.26 | 112.19      | 119.70   |
| 10  | A     | 244  | G    | C3'-C2'-C1' | -6.25 | 96.50       | 101.50   |
| 10  | A     | 912  | C    | P-O3'-C3'   | -6.25 | 112.19      | 119.70   |
| 10  | A     | 2096 | C    | P-O3'-C3'   | -6.25 | 112.20      | 119.70   |
| 11  | B     | 4    | G    | P-O3'-C3'   | -6.25 | 112.20      | 119.70   |
| 10  | A     | 2351 | G    | P-O3'-C3'   | -6.25 | 112.20      | 119.70   |
| 10  | A     | 1752 | G    | P-O3'-C3'   | -6.23 | 112.22      | 119.70   |
| 10  | A     | 552  | U    | P-O3'-C3'   | -6.23 | 112.22      | 119.70   |
| 10  | A     | 2259 | C    | P-O3'-C3'   | -6.23 | 112.22      | 119.70   |
| 10  | A     | 780  | A    | P-O3'-C3'   | -6.22 | 112.23      | 119.70   |
| 10  | A     | 866  | A    | P-O3'-C3'   | -6.22 | 112.23      | 119.70   |
| 10  | A     | 1713 | A    | P-O3'-C3'   | -6.22 | 112.24      | 119.70   |
| 11  | B     | 70   | A    | P-O3'-C3'   | -6.22 | 112.24      | 119.70   |
| 10  | A     | 943  | A    | P-O3'-C3'   | -6.21 | 112.24      | 119.70   |
| 10  | A     | 1998 | C    | P-O3'-C3'   | -6.21 | 112.25      | 119.70   |
| 10  | A     | 265  | A    | P-O3'-C3'   | -6.20 | 112.26      | 119.70   |
| 10  | A     | 1933 | A    | P-O3'-C3'   | -6.20 | 112.25      | 119.70   |
| 10  | A     | 2673 | G    | P-O3'-C3'   | -6.20 | 112.26      | 119.70   |
| 10  | A     | 501  | C    | P-O3'-C3'   | -6.20 | 112.27      | 119.70   |
| 11  | B     | 50   | U    | P-O3'-C3'   | -6.19 | 112.27      | 119.70   |
| 10  | A     | 2111 | C    | P-O3'-C3'   | -6.18 | 112.29      | 119.70   |
| 10  | A     | 2767 | A    | P-O3'-C3'   | -6.17 | 112.29      | 119.70   |
| 10  | A     | 1151 | U    | P-O3'-C3'   | -6.16 | 112.31      | 119.70   |
| 10  | A     | 2163 | G    | P-O3'-C3'   | -6.16 | 112.31      | 119.70   |
| 10  | A     | 1498 | C    | P-O3'-C3'   | -6.16 | 112.31      | 119.70   |
| 10  | A     | 2696 | G    | P-O3'-C3'   | -6.15 | 112.32      | 119.70   |
| 10  | A     | 2055 | U    | P-O3'-C3'   | -6.14 | 112.33      | 119.70   |
| 10  | A     | 799  | G    | P-O3'-C3'   | -6.14 | 112.33      | 119.70   |
| 10  | A     | 838  | G    | P-O3'-C3'   | -6.14 | 112.33      | 119.70   |
| 10  | A     | 2103 | G    | P-O3'-C3'   | -6.14 | 112.33      | 119.70   |
| 10  | A     | 642  | U    | P-O3'-C3'   | -6.14 | 112.33      | 119.70   |
| 10  | A     | 466  | C    | P-O3'-C3'   | -6.13 | 112.34      | 119.70   |
| 10  | A     | 2692 | G    | P-O3'-C3'   | -6.13 | 112.34      | 119.70   |
| 10  | A     | 1895 | G    | P-O3'-C3'   | -6.13 | 112.34      | 119.70   |
| 10  | A     | 1761 | A    | P-O3'-C3'   | -6.13 | 112.35      | 119.70   |
| 10  | A     | 1080 | G    | P-O3'-C3'   | -6.12 | 112.35      | 119.70   |
| 10  | A     | 827  | A    | O3'-P-O5'   | -6.12 | 92.36       | 104.00   |
| 10  | A     | 783  | C    | O5'-P-OP2   | -6.11 | 100.20      | 105.70   |
| 10  | A     | 2253 | G    | P-O3'-C3'   | -6.11 | 112.36      | 119.70   |
| 10  | A     | 2099 | C    | P-O3'-C3'   | -6.11 | 112.37      | 119.70   |
| 10  | A     | 2109 | U    | P-O3'-C3'   | -6.10 | 112.38      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 11  | B     | 13   | G    | P-O3'-C3'   | -6.09 | 112.40      | 119.70   |
| 10  | A     | 769  | C    | P-O3'-C3'   | -6.08 | 112.41      | 119.70   |
| 10  | A     | 1529 | U    | P-O3'-C3'   | -6.07 | 112.41      | 119.70   |
| 10  | A     | 2489 | C    | P-O3'-C3'   | -6.07 | 112.41      | 119.70   |
| 10  | A     | 561  | C    | P-O3'-C3'   | -6.07 | 112.41      | 119.70   |
| 10  | A     | 936  | U    | P-O3'-C3'   | -6.07 | 112.41      | 119.70   |
| 10  | A     | 2727 | G    | C8-N9-C4    | -6.07 | 103.97      | 106.40   |
| 10  | A     | 794  | G    | C1'-O4'-C4' | -6.06 | 105.05      | 109.90   |
| 10  | A     | 1602 | C    | P-O3'-C3'   | -6.06 | 112.43      | 119.70   |
| 10  | A     | 2609 | G    | P-O3'-C3'   | -6.06 | 112.43      | 119.70   |
| 10  | A     | 4    | U    | P-O3'-C3'   | -6.06 | 112.43      | 119.70   |
| 10  | A     | 1324 | G    | P-O3'-C3'   | -6.06 | 112.43      | 119.70   |
| 10  | A     | 2521 | A    | P-O3'-C3'   | -6.05 | 112.44      | 119.70   |
| 10  | A     | 596  | G    | P-O3'-C3'   | -6.04 | 112.45      | 119.70   |
| 10  | A     | 456  | G    | P-O3'-C3'   | -6.04 | 112.45      | 119.70   |
| 10  | A     | 623  | C    | P-O3'-C3'   | -6.04 | 112.46      | 119.70   |
| 11  | B     | 69   | C    | P-O3'-C3'   | -6.04 | 112.46      | 119.70   |
| 10  | A     | 627  | C    | P-O3'-C3'   | -6.03 | 112.46      | 119.70   |
| 10  | A     | 1002 | G    | P-O3'-C3'   | -6.03 | 112.46      | 119.70   |
| 10  | A     | 1380 | A    | P-O3'-C3'   | -6.03 | 112.46      | 119.70   |
| 11  | B     | 15   | C    | P-O3'-C3'   | -6.03 | 112.47      | 119.70   |
| 10  | A     | 2432 | G    | P-O3'-C3'   | -6.03 | 112.47      | 119.70   |
| 10  | A     | 205  | A    | C4-C5-C6    | 6.03  | 120.01      | 117.00   |
| 11  | B     | 86   | U    | P-O3'-C3'   | -6.03 | 112.47      | 119.70   |
| 10  | A     | 1199 | C    | P-O3'-C3'   | -6.02 | 112.47      | 119.70   |
| 10  | A     | 2438 | G    | P-O3'-C3'   | -6.02 | 112.48      | 119.70   |
| 10  | A     | 1700 | G    | P-O3'-C3'   | -6.01 | 112.48      | 119.70   |
| 10  | A     | 1475 | U    | P-O3'-C3'   | -6.01 | 112.48      | 119.70   |
| 10  | A     | 1380 | A    | O3'-P-O5'   | -6.01 | 92.58       | 104.00   |
| 10  | A     | 2101 | U    | P-O3'-C3'   | -6.01 | 112.49      | 119.70   |
| 10  | A     | 730  | G    | OP2-P-O3'   | 6.00  | 118.41      | 105.20   |
| 10  | A     | 1549 | G    | P-O3'-C3'   | -6.00 | 112.50      | 119.70   |
| 10  | A     | 2697 | G    | P-O3'-C3'   | -6.00 | 112.50      | 119.70   |
| 10  | A     | 1368 | G    | O3'-P-O5'   | -5.99 | 92.61       | 104.00   |
| 10  | A     | 290  | C    | P-O3'-C3'   | -5.99 | 112.51      | 119.70   |
| 10  | A     | 1571 | U    | P-O3'-C3'   | -5.99 | 112.51      | 119.70   |
| 10  | A     | 1573 | A    | C1'-O4'-C4' | -5.99 | 105.11      | 109.90   |
| 10  | A     | 777  | C    | P-O3'-C3'   | -5.98 | 112.52      | 119.70   |
| 10  | A     | 632  | U    | P-O3'-C3'   | -5.98 | 112.52      | 119.70   |
| 10  | A     | 696  | G    | P-O3'-C3'   | -5.98 | 112.52      | 119.70   |
| 11  | B     | 75   | U    | P-O3'-C3'   | -5.98 | 112.53      | 119.70   |
| 11  | B     | 53   | U    | P-O3'-C3'   | -5.98 | 112.53      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2316 | C    | P-O3'-C3'   | -5.97 | 112.53      | 119.70   |
| 11  | B     | 98   | G    | P-O3'-C3'   | -5.97 | 112.53      | 119.70   |
| 10  | A     | 2769 | G    | P-O3'-C3'   | -5.97 | 112.54      | 119.70   |
| 10  | A     | 1208 | G    | P-O3'-C3'   | -5.97 | 112.54      | 119.70   |
| 10  | A     | 1838 | C    | P-O3'-C3'   | -5.97 | 112.54      | 119.70   |
| 10  | A     | 2201 | G    | P-O3'-C3'   | -5.96 | 112.55      | 119.70   |
| 10  | A     | 104  | C    | P-O3'-C3'   | -5.95 | 112.56      | 119.70   |
| 10  | A     | 1987 | G    | P-O3'-C3'   | -5.95 | 112.56      | 119.70   |
| 10  | A     | 1573 | A    | C3'-C2'-C1' | -5.95 | 96.74       | 101.50   |
| 10  | A     | 421  | C    | P-O3'-C3'   | -5.94 | 112.57      | 119.70   |
| 10  | A     | 1131 | A    | P-O3'-C3'   | -5.94 | 112.57      | 119.70   |
| 10  | A     | 1403 | A    | P-O3'-C3'   | -5.94 | 112.58      | 119.70   |
| 10  | A     | 264  | A    | P-O3'-C3'   | -5.93 | 112.58      | 119.70   |
| 10  | A     | 1708 | U    | P-O3'-C3'   | -5.93 | 112.58      | 119.70   |
| 10  | A     | 2906 | A    | P-O3'-C3'   | -5.93 | 112.58      | 119.70   |
| 11  | B     | 30   | C    | P-O3'-C3'   | -5.93 | 112.58      | 119.70   |
| 10  | A     | 1503 | A    | P-O3'-C3'   | -5.93 | 112.59      | 119.70   |
| 10  | A     | 2165 | A    | P-O3'-C3'   | -5.92 | 112.60      | 119.70   |
| 10  | A     | 931  | C    | P-O3'-C3'   | -5.91 | 112.61      | 119.70   |
| 10  | A     | 1082 | G    | P-O3'-C3'   | -5.91 | 112.61      | 119.70   |
| 10  | A     | 2030 | A    | C4'-C3'-C2' | -5.91 | 96.69       | 102.60   |
| 10  | A     | 423  | G    | P-O3'-C3'   | -5.90 | 112.62      | 119.70   |
| 10  | A     | 2710 | A    | P-O3'-C3'   | -5.90 | 112.62      | 119.70   |
| 10  | A     | 1601 | C    | P-O3'-C3'   | -5.90 | 112.62      | 119.70   |
| 10  | A     | 2480 | G    | C3'-C2'-C1' | -5.89 | 96.78       | 101.50   |
| 10  | A     | 952  | A    | P-O3'-C3'   | -5.89 | 112.63      | 119.70   |
| 10  | A     | 1472 | G    | P-O3'-C3'   | -5.89 | 112.64      | 119.70   |
| 10  | A     | 366  | G    | P-O3'-C3'   | -5.88 | 112.64      | 119.70   |
| 10  | A     | 504  | G    | C3'-C2'-C1' | -5.88 | 96.79       | 101.50   |
| 10  | A     | 1658 | A    | P-O3'-C3'   | -5.88 | 112.65      | 119.70   |
| 10  | A     | 1821 | C    | P-O3'-C3'   | -5.88 | 112.65      | 119.70   |
| 10  | A     | 28   | A    | C5-N7-C8    | 5.87  | 106.84      | 103.90   |
| 10  | A     | 2329 | U    | P-O3'-C3'   | -5.87 | 112.66      | 119.70   |
| 10  | A     | 1260 | G    | P-O3'-C3'   | -5.86 | 112.67      | 119.70   |
| 10  | A     | 2428 | C    | P-O3'-C3'   | -5.86 | 112.67      | 119.70   |
| 10  | A     | 2913 | U    | P-O3'-C3'   | -5.86 | 112.67      | 119.70   |
| 10  | A     | 415  | U    | P-O3'-C3'   | -5.85 | 112.67      | 119.70   |
| 10  | A     | 1307 | A    | P-O3'-C3'   | -5.85 | 112.68      | 119.70   |
| 10  | A     | 1094 | A    | P-O3'-C3'   | -5.85 | 112.69      | 119.70   |
| 10  | A     | 47   | C    | P-O3'-C3'   | -5.84 | 112.69      | 119.70   |
| 10  | A     | 431  | C    | P-O3'-C3'   | -5.84 | 112.69      | 119.70   |
| 10  | A     | 1129 | G    | P-O3'-C3'   | -5.84 | 112.69      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2593 | C    | P-O3'-C3'   | -5.84 | 112.69      | 119.70   |
| 11  | B     | 73   | G    | P-O3'-C3'   | -5.84 | 112.69      | 119.70   |
| 10  | A     | 1759 | C    | P-O3'-C3'   | -5.83 | 112.70      | 119.70   |
| 10  | A     | 96   | G    | P-O3'-C3'   | -5.83 | 112.70      | 119.70   |
| 10  | A     | 901  | U    | P-O3'-C3'   | -5.83 | 112.71      | 119.70   |
| 10  | A     | 34   | U    | P-O3'-C3'   | -5.82 | 112.71      | 119.70   |
| 10  | A     | 1371 | C    | P-O3'-C3'   | -5.82 | 112.71      | 119.70   |
| 10  | A     | 2775 | A    | P-O3'-C3'   | -5.82 | 112.72      | 119.70   |
| 11  | B     | 112  | C    | P-O3'-C3'   | -5.82 | 112.72      | 119.70   |
| 10  | A     | 2255 | G    | P-O3'-C3'   | -5.81 | 112.72      | 119.70   |
| 10  | A     | 984  | G    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 1945 | A    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 261  | G    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 360  | G    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 960  | U    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 1102 | G    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 2801 | C    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 2572 | C    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 2699 | C    | P-O3'-C3'   | -5.81 | 112.73      | 119.70   |
| 10  | A     | 1348 | U    | P-O3'-C3'   | -5.80 | 112.73      | 119.70   |
| 10  | A     | 783  | C    | O5'-P-OP1   | 5.80  | 117.66      | 110.70   |
| 10  | A     | 2385 | A    | P-O3'-C3'   | -5.80 | 112.74      | 119.70   |
| 10  | A     | 2270 | G    | P-O3'-C3'   | -5.79 | 112.75      | 119.70   |
| 10  | A     | 1728 | A    | P-O3'-C3'   | -5.79 | 112.76      | 119.70   |
| 10  | A     | 966  | U    | P-O3'-C3'   | -5.78 | 112.77      | 119.70   |
| 10  | A     | 291  | U    | P-O3'-C3'   | -5.78 | 112.77      | 119.70   |
| 10  | A     | 2909 | C    | P-O3'-C3'   | -5.78 | 112.77      | 119.70   |
| 10  | A     | 770  | U    | P-O3'-C3'   | -5.77 | 112.77      | 119.70   |
| 10  | A     | 2149 | G    | P-O3'-C3'   | -5.77 | 112.78      | 119.70   |
| 10  | A     | 1109 | G    | P-O3'-C3'   | -5.77 | 112.78      | 119.70   |
| 10  | A     | 1902 | U    | P-O3'-C3'   | -5.77 | 112.78      | 119.70   |
| 10  | A     | 1207 | U    | P-O3'-C3'   | -5.76 | 112.78      | 119.70   |
| 10  | A     | 257  | A    | O5'-P-OP1   | -5.76 | 100.52      | 105.70   |
| 10  | A     | 979  | U    | P-O3'-C3'   | -5.76 | 112.79      | 119.70   |
| 10  | A     | 428  | A    | P-O3'-C3'   | -5.75 | 112.80      | 119.70   |
| 10  | A     | 1489 | A    | P-O3'-C3'   | -5.75 | 112.80      | 119.70   |
| 10  | A     | 1509 | A    | P-O3'-C3'   | -5.74 | 112.81      | 119.70   |
| 10  | A     | 1749 | A    | O5'-P-OP2   | 5.74  | 117.59      | 110.70   |
| 10  | A     | 2908 | A    | C2'-C3'-O3' | 5.74  | 122.89      | 113.70   |
| 10  | A     | 1814 | G    | P-O3'-C3'   | -5.74 | 112.81      | 119.70   |
| 11  | B     | 92   | C    | P-O3'-C3'   | -5.74 | 112.81      | 119.70   |
| 10  | A     | 337  | A    | P-O3'-C3'   | -5.74 | 112.82      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms      | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 10  | A     | 2152 | A    | P-O3'-C3'  | -5.73 | 112.82      | 119.70   |
| 10  | A     | 1548 | C    | P-O3'-C3'  | -5.73 | 112.82      | 119.70   |
| 10  | A     | 312  | U    | P-O3'-C3'  | -5.73 | 112.83      | 119.70   |
| 10  | A     | 732  | U    | O5'-P-OP1  | 5.73  | 117.57      | 110.70   |
| 10  | A     | 1001 | U    | P-O3'-C3'  | -5.73 | 112.83      | 119.70   |
| 10  | A     | 1090 | U    | P-O3'-C3'  | -5.73 | 112.83      | 119.70   |
| 10  | A     | 226  | G    | P-O3'-C3'  | -5.72 | 112.83      | 119.70   |
| 10  | A     | 2045 | G    | P-O3'-C3'  | -5.72 | 112.83      | 119.70   |
| 11  | B     | 16   | G    | P-O3'-C3'  | -5.72 | 112.83      | 119.70   |
| 10  | A     | 23   | G    | P-O3'-C3'  | -5.72 | 112.84      | 119.70   |
| 10  | A     | 2313 | G    | P-O3'-C3'  | -5.71 | 112.84      | 119.70   |
| 10  | A     | 643  | G    | P-O3'-C3'  | -5.71 | 112.85      | 119.70   |
| 10  | A     | 2008 | G    | P-O3'-C3'  | -5.70 | 112.86      | 119.70   |
| 10  | A     | 2675 | G    | P-O3'-C3'  | -5.70 | 112.86      | 119.70   |
| 10  | A     | 1193 | U    | P-O3'-C3'  | -5.70 | 112.86      | 119.70   |
| 10  | A     | 135  | C    | P-O3'-C3'  | -5.70 | 112.86      | 119.70   |
| 10  | A     | 1782 | A    | P-O3'-C3'  | -5.69 | 112.87      | 119.70   |
| 10  | A     | 529  | A    | P-O3'-C3'  | -5.69 | 112.87      | 119.70   |
| 10  | A     | 2191 | A    | P-O3'-C3'  | -5.69 | 112.87      | 119.70   |
| 11  | B     | 108  | C    | P-O3'-C3'  | -5.69 | 112.88      | 119.70   |
| 10  | A     | 2039 | C    | P-O3'-C3'  | -5.68 | 112.88      | 119.70   |
| 11  | B     | 45   | C    | P-O3'-C3'  | -5.68 | 112.88      | 119.70   |
| 10  | A     | 1729 | U    | P-O3'-C3'  | -5.68 | 112.89      | 119.70   |
| 10  | A     | 1881 | A    | P-O3'-C3'  | -5.68 | 112.89      | 119.70   |
| 10  | A     | 2434 | U    | P-O3'-C3'  | -5.68 | 112.89      | 119.70   |
| 10  | A     | 2372 | G    | P-O3'-C3'  | -5.67 | 112.89      | 119.70   |
| 10  | A     | 636  | A    | P-O3'-C3'  | -5.67 | 112.90      | 119.70   |
| 10  | A     | 2082 | A    | P-O3'-C3'  | -5.67 | 112.90      | 119.70   |
| 10  | A     | 1915 | C    | P-O3'-C3'  | -5.67 | 112.90      | 119.70   |
| 10  | A     | 2840 | G    | P-O3'-C3'  | -5.66 | 112.90      | 119.70   |
| 10  | A     | 142  | C    | P-O3'-C3'  | -5.66 | 112.91      | 119.70   |
| 11  | B     | 109  | U    | P-O3'-C3'  | -5.66 | 112.91      | 119.70   |
| 10  | A     | 1160 | G    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 1293 | G    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 527  | G    | O4'-C1'-N9 | 5.65  | 112.72      | 108.20   |
| 10  | A     | 1262 | C    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 1502 | A    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 1661 | C    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 2408 | G    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 1783 | G    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 2571 | C    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |
| 10  | A     | 766  | U    | P-O3'-C3'  | -5.65 | 112.92      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms      | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 10  | A     | 409  | G    | P-O3'-C3'  | -5.64 | 112.93      | 119.70   |
| 10  | A     | 1533 | A    | P-O3'-C3'  | -5.64 | 112.93      | 119.70   |
| 10  | A     | 1738 | A    | P-O3'-C3'  | -5.64 | 112.93      | 119.70   |
| 10  | A     | 1579 | A    | P-O3'-C3'  | -5.64 | 112.93      | 119.70   |
| 10  | A     | 1801 | A    | P-O3'-C3'  | -5.64 | 112.94      | 119.70   |
| 10  | A     | 1306 | U    | O5'-P-OP2  | -5.63 | 100.63      | 105.70   |
| 10  | A     | 2716 | C    | P-O3'-C3'  | -5.62 | 112.95      | 119.70   |
| 11  | B     | 54   | U    | P-O3'-C3'  | -5.62 | 112.95      | 119.70   |
| 10  | A     | 2732 | U    | P-O3'-C3'  | -5.62 | 112.95      | 119.70   |
| 10  | A     | 2833 | A    | P-O3'-C3'  | -5.62 | 112.95      | 119.70   |
| 10  | A     | 410  | G    | P-O3'-C3'  | -5.62 | 112.96      | 119.70   |
| 10  | A     | 2731 | U    | P-O3'-C3'  | -5.62 | 112.96      | 119.70   |
| 10  | A     | 2736 | C    | P-O3'-C3'  | -5.62 | 112.96      | 119.70   |
| 10  | A     | 2251 | U    | P-O3'-C3'  | -5.62 | 112.96      | 119.70   |
| 10  | A     | 1469 | A    | P-O3'-C3'  | -5.61 | 112.96      | 119.70   |
| 10  | A     | 1844 | G    | P-O3'-C3'  | -5.61 | 112.96      | 119.70   |
| 10  | A     | 1849 | C    | OP1-P-O3'  | 5.61  | 117.55      | 105.20   |
| 10  | A     | 2903 | C    | P-O3'-C3'  | -5.61 | 112.97      | 119.70   |
| 10  | A     | 377  | C    | P-O3'-C3'  | -5.61 | 112.97      | 119.70   |
| 10  | A     | 2518 | G    | P-O3'-C3'  | -5.61 | 112.97      | 119.70   |
| 10  | A     | 1909 | A    | P-O3'-C3'  | -5.60 | 112.97      | 119.70   |
| 10  | A     | 2335 | U    | P-O3'-C3'  | -5.60 | 112.97      | 119.70   |
| 10  | A     | 2437 | C    | P-O3'-C3'  | -5.60 | 112.98      | 119.70   |
| 10  | A     | 2857 | C    | P-O3'-C3'  | -5.60 | 112.98      | 119.70   |
| 10  | A     | 653  | G    | P-O3'-C3'  | -5.60 | 112.98      | 119.70   |
| 10  | A     | 684  | U    | P-O3'-C3'  | -5.60 | 112.98      | 119.70   |
| 10  | A     | 1453 | G    | P-O3'-C3'  | -5.60 | 112.98      | 119.70   |
| 10  | A     | 1357 | U    | P-O3'-C3'  | -5.59 | 112.99      | 119.70   |
| 10  | A     | 517  | A    | P-O3'-C3'  | -5.59 | 112.99      | 119.70   |
| 10  | A     | 1981 | G    | P-O3'-C3'  | -5.59 | 112.99      | 119.70   |
| 10  | A     | 797  | A    | P-O3'-C3'  | -5.59 | 112.99      | 119.70   |
| 10  | A     | 1032 | C    | P-O3'-C3'  | -5.59 | 112.99      | 119.70   |
| 10  | A     | 129  | C    | P-O3'-C3'  | -5.59 | 113.00      | 119.70   |
| 10  | A     | 2899 | C    | P-O3'-C3'  | -5.59 | 113.00      | 119.70   |
| 10  | A     | 1229 | C    | P-O3'-C3'  | -5.58 | 113.00      | 119.70   |
| 10  | A     | 1573 | A    | O4'-C1'-N9 | 5.58  | 112.66      | 108.20   |
| 11  | B     | 90   | C    | P-O3'-C3'  | -5.58 | 113.00      | 119.70   |
| 10  | A     | 2649 | C    | P-O3'-C3'  | -5.58 | 113.01      | 119.70   |
| 10  | A     | 182  | A    | P-O3'-C3'  | -5.58 | 113.01      | 119.70   |
| 10  | A     | 886  | C    | P-O3'-C3'  | -5.58 | 113.01      | 119.70   |
| 10  | A     | 1360 | U    | P-O3'-C3'  | -5.57 | 113.02      | 119.70   |
| 10  | A     | 2682 | U    | P-O3'-C3'  | -5.57 | 113.02      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms     | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-----------|-------|-------------|----------|
| 10  | A     | 1253 | C    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 10  | A     | 1603 | U    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 11  | B     | 43   | A    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 11  | B     | 60   | U    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 10  | A     | 521  | U    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 10  | A     | 1452 | U    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 10  | A     | 2403 | G    | P-O3'-C3' | -5.57 | 113.02      | 119.70   |
| 10  | A     | 165  | C    | P-O3'-C3' | -5.56 | 113.02      | 119.70   |
| 10  | A     | 935  | C    | P-O3'-C3' | -5.56 | 113.02      | 119.70   |
| 10  | A     | 695  | C    | P-O3'-C3' | -5.56 | 113.03      | 119.70   |
| 10  | A     | 767  | U    | P-O3'-C3' | -5.56 | 113.03      | 119.70   |
| 10  | A     | 1550 | C    | P-O3'-C3' | -5.56 | 113.03      | 119.70   |
| 10  | A     | 57   | C    | P-O3'-C3' | -5.56 | 113.03      | 119.70   |
| 10  | A     | 2929 | C    | P-O3'-C3' | -5.56 | 113.03      | 119.70   |
| 10  | A     | 1536 | A    | P-O3'-C3' | -5.55 | 113.04      | 119.70   |
| 10  | A     | 2657 | G    | P-O3'-C3' | -5.55 | 113.04      | 119.70   |
| 10  | A     | 2584 | C    | P-O3'-C3' | -5.55 | 113.04      | 119.70   |
| 10  | A     | 2793 | C    | P-O3'-C3' | -5.55 | 113.04      | 119.70   |
| 10  | A     | 90   | A    | P-O3'-C3' | -5.54 | 113.05      | 119.70   |
| 10  | A     | 975  | C    | P-O3'-C3' | -5.54 | 113.05      | 119.70   |
| 10  | A     | 2911 | A    | P-O3'-C3' | -5.54 | 113.05      | 119.70   |
| 10  | A     | 1089 | C    | P-O3'-C3' | -5.54 | 113.05      | 119.70   |
| 10  | A     | 2176 | C    | P-O3'-C3' | -5.54 | 113.05      | 119.70   |
| 10  | A     | 2057 | C    | P-O3'-C3' | -5.53 | 113.06      | 119.70   |
| 10  | A     | 95   | A    | P-O3'-C3' | -5.53 | 113.07      | 119.70   |
| 10  | A     | 41   | A    | P-O3'-C3' | -5.53 | 113.07      | 119.70   |
| 10  | A     | 970  | A    | P-O3'-C3' | -5.53 | 113.07      | 119.70   |
| 10  | A     | 1768 | U    | P-O3'-C3' | -5.53 | 113.07      | 119.70   |
| 10  | A     | 2858 | A    | P-O3'-C3' | -5.53 | 113.07      | 119.70   |
| 10  | A     | 253  | A    | P-O3'-C3' | -5.52 | 113.07      | 119.70   |
| 10  | A     | 639  | U    | P-O3'-C3' | -5.52 | 113.07      | 119.70   |
| 10  | A     | 2098 | C    | P-O3'-C3' | -5.52 | 113.07      | 119.70   |
| 10  | A     | 2169 | A    | P-O3'-C3' | -5.52 | 113.07      | 119.70   |
| 10  | A     | 2802 | C    | P-O3'-C3' | -5.52 | 113.07      | 119.70   |
| 10  | A     | 1925 | C    | P-O3'-C3' | -5.52 | 113.08      | 119.70   |
| 10  | A     | 368  | C    | P-O3'-C3' | -5.52 | 113.08      | 119.70   |
| 11  | B     | 56   | A    | P-O3'-C3' | -5.52 | 113.08      | 119.70   |
| 10  | A     | 134  | U    | P-O3'-C3' | -5.52 | 113.08      | 119.70   |
| 10  | A     | 2179 | U    | P-O3'-C3' | -5.51 | 113.08      | 119.70   |
| 11  | B     | 66   | C    | P-O3'-C3' | -5.51 | 113.08      | 119.70   |
| 11  | B     | 71   | A    | P-O3'-C3' | -5.51 | 113.08      | 119.70   |
| 10  | A     | 1795 | A    | P-O3'-C3' | -5.51 | 113.08      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms      | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 10  | A     | 2155 | U    | P-O3'-C3'  | -5.51 | 113.09      | 119.70   |
| 10  | A     | 759  | G    | P-O3'-C3'  | -5.50 | 113.09      | 119.70   |
| 10  | A     | 2053 | A    | P-O3'-C3'  | -5.50 | 113.10      | 119.70   |
| 10  | A     | 2234 | C    | P-O3'-C3'  | -5.50 | 113.09      | 119.70   |
| 10  | A     | 843  | U    | P-O3'-C3'  | -5.50 | 113.10      | 119.70   |
| 10  | A     | 1065 | U    | P-O3'-C3'  | -5.50 | 113.10      | 119.70   |
| 10  | A     | 1052 | C    | P-O3'-C3'  | -5.50 | 113.11      | 119.70   |
| 11  | B     | 97   | A    | P-O3'-C3'  | -5.49 | 113.11      | 119.70   |
| 10  | A     | 1435 | A    | O4'-C1'-N9 | 5.49  | 112.59      | 108.20   |
| 11  | B     | 28   | C    | P-O3'-C3'  | -5.49 | 113.11      | 119.70   |
| 10  | A     | 274  | A    | P-O3'-C3'  | -5.49 | 113.11      | 119.70   |
| 10  | A     | 1833 | C    | P-O3'-C3'  | -5.49 | 113.11      | 119.70   |
| 10  | A     | 2464 | U    | P-O3'-C3'  | -5.49 | 113.11      | 119.70   |
| 10  | A     | 2503 | G    | P-O3'-C3'  | -5.49 | 113.12      | 119.70   |
| 10  | A     | 915  | U    | P-O3'-C3'  | -5.48 | 113.12      | 119.70   |
| 10  | A     | 2886 | G    | P-O3'-C3'  | -5.48 | 113.12      | 119.70   |
| 10  | A     | 2567 | C    | P-O3'-C3'  | -5.48 | 113.13      | 119.70   |
| 10  | A     | 2776 | C    | P-O3'-C3'  | -5.48 | 113.13      | 119.70   |
| 10  | A     | 2800 | C    | P-O3'-C3'  | -5.47 | 113.13      | 119.70   |
| 10  | A     | 2633 | A    | P-O3'-C3'  | -5.47 | 113.14      | 119.70   |
| 10  | A     | 2282 | U    | P-O3'-C3'  | -5.47 | 113.14      | 119.70   |
| 10  | A     | 1267 | C    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 10  | A     | 2035 | G    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 11  | B     | 5    | G    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 11  | B     | 79   | U    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 10  | A     | 2059 | U    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 10  | A     | 2738 | A    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 10  | A     | 78   | U    | P-O3'-C3'  | -5.46 | 113.15      | 119.70   |
| 10  | A     | 583  | A    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 10  | A     | 722  | A    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 10  | A     | 1261 | U    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 10  | A     | 1924 | G    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 11  | B     | 44   | A    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 10  | A     | 107  | G    | P-O3'-C3'  | -5.45 | 113.16      | 119.70   |
| 10  | A     | 1706 | U    | P-O3'-C3'  | -5.45 | 113.17      | 119.70   |
| 10  | A     | 768  | A    | P-O3'-C3'  | -5.44 | 113.17      | 119.70   |
| 10  | A     | 1631 | A    | P-O3'-C3'  | -5.44 | 113.17      | 119.70   |
| 10  | A     | 2180 | A    | P-O3'-C3'  | -5.44 | 113.17      | 119.70   |
| 10  | A     | 723  | A    | P-O3'-C3'  | -5.44 | 113.18      | 119.70   |
| 11  | B     | 72   | U    | P-O3'-C3'  | -5.43 | 113.18      | 119.70   |
| 10  | A     | 1936 | G    | P-O3'-C3'  | -5.43 | 113.18      | 119.70   |
| 10  | A     | 252  | G    | P-O3'-C3'  | -5.43 | 113.19      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 1675 | G    | P-O3'-C3'   | -5.43 | 113.19      | 119.70   |
| 10  | A     | 2401 | C    | P-O3'-C3'   | -5.43 | 113.19      | 119.70   |
| 10  | A     | 2700 | C    | P-O3'-C3'   | -5.42 | 113.19      | 119.70   |
| 10  | A     | 2711 | C    | P-O3'-C3'   | -5.42 | 113.19      | 119.70   |
| 10  | A     | 1042 | A    | O5'-P-OP1   | -5.42 | 100.82      | 105.70   |
| 10  | A     | 905  | G    | P-O3'-C3'   | -5.42 | 113.20      | 119.70   |
| 10  | A     | 53   | A    | P-O3'-C3'   | -5.41 | 113.20      | 119.70   |
| 10  | A     | 1043 | G    | P-O3'-C3'   | -5.41 | 113.20      | 119.70   |
| 10  | A     | 413  | C    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 301  | A    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 1191 | C    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 1463 | U    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 1639 | U    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 1514 | C    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 11  | B     | 18   | G    | P-O3'-C3'   | -5.41 | 113.21      | 119.70   |
| 10  | A     | 1947 | C    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 2252 | G    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 1489 | A    | C1'-O4'-C4' | -5.40 | 105.58      | 109.90   |
| 10  | A     | 70   | G    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 175  | G    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 2184 | U    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 2232 | A    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 2536 | A    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 1898 | U    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 976  | U    | P-O3'-C3'   | -5.40 | 113.22      | 119.70   |
| 10  | A     | 1250 | G    | P-O3'-C3'   | -5.39 | 113.23      | 119.70   |
| 10  | A     | 2705 | U    | P-O3'-C3'   | -5.39 | 113.23      | 119.70   |
| 10  | A     | 2832 | G    | P-O3'-C3'   | -5.39 | 113.23      | 119.70   |
| 10  | A     | 2834 | A    | P-O3'-C3'   | -5.39 | 113.23      | 119.70   |
| 10  | A     | 1714 | A    | P-O3'-C3'   | -5.39 | 113.24      | 119.70   |
| 10  | A     | 2154 | G    | P-O3'-C3'   | -5.38 | 113.24      | 119.70   |
| 10  | A     | 1135 | G    | P-O3'-C3'   | -5.38 | 113.24      | 119.70   |
| 10  | A     | 803  | G    | P-O3'-C3'   | -5.38 | 113.24      | 119.70   |
| 10  | A     | 856  | U    | P-O3'-C3'   | -5.38 | 113.24      | 119.70   |
| 11  | B     | 20   | A    | P-O3'-C3'   | -5.38 | 113.24      | 119.70   |
| 10  | A     | 1044 | U    | P-O3'-C3'   | -5.38 | 113.25      | 119.70   |
| 10  | A     | 1146 | C    | P-O3'-C3'   | -5.37 | 113.25      | 119.70   |
| 10  | A     | 2208 | U    | P-O3'-C3'   | -5.37 | 113.25      | 119.70   |
| 10  | A     | 2594 | A    | P-O3'-C3'   | -5.37 | 113.25      | 119.70   |
| 10  | A     | 1246 | C    | P-O3'-C3'   | -5.37 | 113.26      | 119.70   |
| 10  | A     | 266  | G    | P-O3'-C3'   | -5.37 | 113.26      | 119.70   |
| 10  | A     | 1566 | A    | P-O3'-C3'   | -5.37 | 113.26      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2265 | C    | P-O3'-C3'   | -5.36 | 113.27      | 119.70   |
| 10  | A     | 293  | G    | P-O3'-C3'   | -5.36 | 113.27      | 119.70   |
| 10  | A     | 1520 | A    | P-O3'-C3'   | -5.36 | 113.27      | 119.70   |
| 10  | A     | 1066 | A    | P-O3'-C3'   | 5.36  | 126.13      | 119.70   |
| 10  | A     | 240  | C    | P-O3'-C3'   | -5.35 | 113.28      | 119.70   |
| 10  | A     | 338  | A    | P-O3'-C3'   | -5.35 | 113.28      | 119.70   |
| 10  | A     | 1481 | A    | N9-C4-C5    | 5.35  | 107.94      | 105.80   |
| 10  | A     | 262  | G    | P-O3'-C3'   | -5.35 | 113.28      | 119.70   |
| 10  | A     | 1451 | G    | P-O3'-C3'   | -5.34 | 113.29      | 119.70   |
| 10  | A     | 1107 | U    | P-O3'-C3'   | -5.34 | 113.29      | 119.70   |
| 10  | A     | 333  | U    | P-O3'-C3'   | -5.34 | 113.30      | 119.70   |
| 10  | A     | 2267 | G    | P-O3'-C3'   | -5.34 | 113.30      | 119.70   |
| 10  | A     | 2589 | C    | P-O3'-C3'   | -5.34 | 113.30      | 119.70   |
| 10  | A     | 302  | G    | P-O3'-C3'   | -5.33 | 113.30      | 119.70   |
| 10  | A     | 172  | U    | P-O3'-C3'   | -5.33 | 113.30      | 119.70   |
| 10  | A     | 1753 | G    | P-O3'-C3'   | -5.33 | 113.30      | 119.70   |
| 10  | A     | 2402 | A    | P-O3'-C3'   | -5.33 | 113.30      | 119.70   |
| 10  | A     | 2214 | G    | P-O3'-C3'   | -5.33 | 113.31      | 119.70   |
| 10  | A     | 2249 | C    | P-O3'-C3'   | -5.33 | 113.31      | 119.70   |
| 10  | A     | 2581 | G    | P-O3'-C3'   | -5.32 | 113.31      | 119.70   |
| 10  | A     | 772  | G    | P-O3'-C3'   | -5.32 | 113.31      | 119.70   |
| 10  | A     | 1808 | U    | P-O3'-C3'   | -5.32 | 113.32      | 119.70   |
| 10  | A     | 1919 | U    | P-O3'-C3'   | -5.32 | 113.31      | 119.70   |
| 10  | A     | 2843 | C    | P-O3'-C3'   | -5.32 | 113.32      | 119.70   |
| 10  | A     | 850  | A    | O3'-P-O5'   | -5.31 | 93.90       | 104.00   |
| 10  | A     | 2446 | G    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 635  | G    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 1206 | G    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 715  | G    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 2812 | U    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 1547 | C    | P-O3'-C3'   | -5.31 | 113.33      | 119.70   |
| 10  | A     | 1286 | C    | P-O3'-C3'   | -5.30 | 113.33      | 119.70   |
| 10  | A     | 1344 | A    | P-O3'-C3'   | 5.30  | 126.07      | 119.70   |
| 10  | A     | 2809 | A    | C2'-C3'-O3' | 5.30  | 122.19      | 113.70   |
| 10  | A     | 447  | A    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 589  | U    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 2073 | U    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 2860 | G    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 18   | C    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 1471 | G    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 1519 | A    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 207  | G    | C3'-C2'-C1' | -5.30 | 97.26       | 101.50   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 721  | A    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 176  | G    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 1646 | G    | P-O3'-C3'   | -5.30 | 113.34      | 119.70   |
| 10  | A     | 1095 | C    | P-O3'-C3'   | -5.29 | 113.35      | 119.70   |
| 10  | A     | 1907 | C    | P-O3'-C3'   | -5.29 | 113.35      | 119.70   |
| 10  | A     | 1467 | C    | P-O3'-C3'   | -5.29 | 113.35      | 119.70   |
| 10  | A     | 2672 | A    | P-O3'-C3'   | -5.29 | 113.35      | 119.70   |
| 10  | A     | 2805 | C    | P-O3'-C3'   | -5.29 | 113.35      | 119.70   |
| 10  | A     | 2071 | G    | P-O3'-C3'   | -5.29 | 113.36      | 119.70   |
| 11  | B     | 51   | A    | P-O3'-C3'   | -5.29 | 113.36      | 119.70   |
| 10  | A     | 657  | A    | C3'-C2'-C1' | -5.28 | 97.28       | 101.50   |
| 10  | A     | 1828 | C    | P-O3'-C3'   | -5.28 | 113.37      | 119.70   |
| 10  | A     | 205  | A    | P-O3'-C3'   | -5.27 | 113.37      | 119.70   |
| 10  | A     | 1468 | G    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 998  | G    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 1546 | U    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 1822 | A    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 2241 | G    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 1081 | U    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 2193 | G    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 2423 | U    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 1448 | C    | P-O3'-C3'   | -5.27 | 113.38      | 119.70   |
| 10  | A     | 2415 | G    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 11  | B     | 102  | A    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 10  | A     | 93   | U    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 10  | A     | 1305 | G    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 10  | A     | 1462 | U    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 10  | A     | 1482 | G    | N9-C4-C5    | 5.26  | 107.50      | 105.40   |
| 10  | A     | 2445 | A    | P-O3'-C3'   | -5.26 | 113.39      | 119.70   |
| 10  | A     | 1865 | C    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 81   | G    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 2336 | G    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 97   | C    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 1854 | A    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 2356 | G    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 2205 | U    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 11  | B     | 46   | A    | P-O3'-C3'   | -5.25 | 113.40      | 119.70   |
| 10  | A     | 2632 | G    | P-O3'-C3'   | -5.25 | 113.41      | 119.70   |
| 10  | A     | 406  | A    | P-O3'-C3'   | -5.24 | 113.41      | 119.70   |
| 10  | A     | 29   | U    | P-O3'-C3'   | -5.24 | 113.41      | 119.70   |
| 10  | A     | 1764 | A    | P-O3'-C3'   | -5.24 | 113.41      | 119.70   |
| 10  | A     | 212  | U    | P-O3'-C3'   | -5.24 | 113.42      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 294  | G    | P-O3'-C3'   | -5.24 | 113.42      | 119.70   |
| 10  | A     | 592  | A    | C3'-C2'-C1' | -5.24 | 97.31       | 101.50   |
| 10  | A     | 1419 | G    | P-O3'-C3'   | -5.24 | 113.42      | 119.70   |
| 10  | A     | 1099 | C    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 737  | C    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 1769 | G    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 246  | A    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 2029 | C    | O3'-P-O5'   | -5.23 | 94.06       | 104.00   |
| 10  | A     | 944  | C    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 1839 | C    | P-O3'-C3'   | -5.23 | 113.42      | 119.70   |
| 10  | A     | 2685 | U    | P-O3'-C3'   | -5.23 | 113.43      | 119.70   |
| 10  | A     | 671  | U    | P-O3'-C3'   | -5.22 | 113.43      | 119.70   |
| 10  | A     | 1450 | A    | P-O3'-C3'   | -5.22 | 113.43      | 119.70   |
| 10  | A     | 2455 | C    | P-O3'-C3'   | -5.22 | 113.43      | 119.70   |
| 10  | A     | 2173 | G    | P-O3'-C3'   | -5.22 | 113.44      | 119.70   |
| 10  | A     | 844  | G    | P-O3'-C3'   | -5.22 | 113.44      | 119.70   |
| 10  | A     | 1455 | U    | P-O3'-C3'   | -5.22 | 113.44      | 119.70   |
| 10  | A     | 1482 | G    | C8-N9-C4    | -5.22 | 104.31      | 106.40   |
| 11  | B     | 111  | C    | P-O3'-C3'   | -5.22 | 113.44      | 119.70   |
| 10  | A     | 1244 | U    | P-O3'-C3'   | -5.21 | 113.44      | 119.70   |
| 10  | A     | 2142 | U    | P-O3'-C3'   | -5.21 | 113.44      | 119.70   |
| 10  | A     | 2175 | G    | P-O3'-C3'   | -5.21 | 113.44      | 119.70   |
| 10  | A     | 1534 | G    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 2778 | C    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 356  | G    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 752  | A    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 922  | A    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 736  | C    | P-O3'-C3'   | -5.21 | 113.45      | 119.70   |
| 10  | A     | 398  | C    | P-O3'-C3'   | -5.20 | 113.46      | 119.70   |
| 10  | A     | 1620 | G    | O3'-P-O5'   | -5.20 | 94.12       | 104.00   |
| 10  | A     | 1734 | C    | P-O3'-C3'   | -5.20 | 113.46      | 119.70   |
| 10  | A     | 586  | C    | P-O3'-C3'   | -5.20 | 113.46      | 119.70   |
| 10  | A     | 1980 | C    | P-O3'-C3'   | -5.20 | 113.47      | 119.70   |
| 10  | A     | 747  | G    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 10  | A     | 2202 | G    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 10  | A     | 2463 | A    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 10  | A     | 699  | U    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 10  | A     | 1251 | G    | P-O3'-C3'   | -5.19 | 113.48      | 119.70   |
| 10  | A     | 1252 | G    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 11  | B     | 14   | G    | P-O3'-C3'   | -5.19 | 113.47      | 119.70   |
| 10  | A     | 1903 | U    | P-O3'-C3'   | -5.18 | 113.48      | 119.70   |
| 10  | A     | 83   | G    | O3'-P-O5'   | -5.18 | 94.15       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2138 | C    | P-O3'-C3'   | -5.18 | 113.48      | 119.70   |
| 10  | A     | 1376 | G    | P-O3'-C3'   | -5.18 | 113.49      | 119.70   |
| 10  | A     | 1640 | A    | P-O3'-C3'   | -5.18 | 113.49      | 119.70   |
| 10  | A     | 249  | G    | P-O3'-C3'   | -5.17 | 113.49      | 119.70   |
| 10  | A     | 2619 | C    | P-O3'-C3'   | -5.17 | 113.49      | 119.70   |
| 10  | A     | 2188 | A    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 957  | A    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 2254 | G    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 2546 | G    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 601  | A    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 2301 | A    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 2922 | G    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 1532 | G    | P-O3'-C3'   | -5.17 | 113.50      | 119.70   |
| 10  | A     | 1282 | A    | O3'-P-O5'   | -5.16 | 94.19       | 104.00   |
| 10  | A     | 2427 | C    | P-O3'-C3'   | -5.16 | 113.51      | 119.70   |
| 10  | A     | 761  | A    | P-O3'-C3'   | -5.16 | 113.51      | 119.70   |
| 10  | A     | 2460 | C    | O3'-P-O5'   | -5.16 | 94.20       | 104.00   |
| 10  | A     | 374  | C    | C3'-C2'-C1' | -5.15 | 97.38       | 101.50   |
| 10  | A     | 1426 | A    | P-O3'-C3'   | -5.15 | 113.52      | 119.70   |
| 10  | A     | 2644 | C    | P-O3'-C3'   | -5.15 | 113.52      | 119.70   |
| 10  | A     | 2147 | A    | P-O3'-C3'   | -5.15 | 113.52      | 119.70   |
| 10  | A     | 1935 | C    | P-O3'-C3'   | -5.15 | 113.52      | 119.70   |
| 10  | A     | 1110 | C    | P-O3'-C3'   | -5.15 | 113.53      | 119.70   |
| 10  | A     | 2627 | C    | P-O3'-C3'   | -5.14 | 113.53      | 119.70   |
| 10  | A     | 711  | C    | P-O3'-C3'   | -5.14 | 113.53      | 119.70   |
| 10  | A     | 114  | C    | P-O3'-C3'   | -5.14 | 113.53      | 119.70   |
| 10  | A     | 823  | G    | N9-C4-C5    | 5.14  | 107.46      | 105.40   |
| 10  | A     | 2350 | C    | P-O3'-C3'   | -5.14 | 113.53      | 119.70   |
| 10  | A     | 1449 | C    | P-O3'-C3'   | -5.14 | 113.54      | 119.70   |
| 10  | A     | 2355 | A    | P-O3'-C3'   | -5.14 | 113.53      | 119.70   |
| 10  | A     | 569  | C    | P-O3'-C3'   | -5.13 | 113.54      | 119.70   |
| 10  | A     | 496  | G    | C4'-C3'-C2' | -5.13 | 97.47       | 102.60   |
| 10  | A     | 668  | C    | P-O3'-C3'   | -5.13 | 113.54      | 119.70   |
| 11  | B     | 17   | A    | P-O3'-C3'   | -5.13 | 113.54      | 119.70   |
| 10  | A     | 367  | A    | P-O3'-C3'   | -5.13 | 113.54      | 119.70   |
| 10  | A     | 444  | C    | P-O3'-C3'   | -5.13 | 113.55      | 119.70   |
| 10  | A     | 1531 | U    | P-O3'-C3'   | -5.13 | 113.55      | 119.70   |
| 10  | A     | 619  | U    | P-O3'-C3'   | -5.12 | 113.55      | 119.70   |
| 10  | A     | 2250 | G    | P-O3'-C3'   | -5.12 | 113.55      | 119.70   |
| 10  | A     | 412  | U    | P-O3'-C3'   | -5.12 | 113.55      | 119.70   |
| 10  | A     | 1084 | G    | P-O3'-C3'   | -5.12 | 113.55      | 119.70   |
| 10  | A     | 1460 | G    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 1951 | A    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 542  | A    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 977  | U    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 1850 | G    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 2016 | C    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 2399 | A    | P-O3'-C3'   | -5.12 | 113.56      | 119.70   |
| 10  | A     | 65   | A    | P-O3'-C3'   | -5.11 | 113.56      | 119.70   |
| 10  | A     | 564  | U    | P-O3'-C3'   | -5.11 | 113.56      | 119.70   |
| 10  | A     | 697  | C    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 1860 | U    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 2381 | U    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 802  | C    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 1904 | C    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 905  | G    | C3'-C2'-C1' | 5.11  | 105.58      | 101.50   |
| 10  | A     | 1496 | C    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 1679 | A    | P-O3'-C3'   | -5.11 | 113.57      | 119.70   |
| 10  | A     | 900  | A    | P-O3'-C3'   | -5.10 | 113.58      | 119.70   |
| 10  | A     | 1060 | U    | P-O3'-C3'   | -5.10 | 113.58      | 119.70   |
| 10  | A     | 760  | U    | P-O3'-C3'   | -5.10 | 113.58      | 119.70   |
| 10  | A     | 2308 | C    | P-O3'-C3'   | -5.10 | 113.58      | 119.70   |
| 11  | B     | 61   | C    | P-O3'-C3'   | -5.10 | 113.58      | 119.70   |
| 10  | A     | 2040 | U    | P-O3'-C3'   | -5.09 | 113.59      | 119.70   |
| 10  | A     | 1483 | A    | P-O3'-C3'   | -5.09 | 113.59      | 119.70   |
| 10  | A     | 388  | A    | P-O3'-C3'   | -5.09 | 113.59      | 119.70   |
| 10  | A     | 2908 | A    | C3'-C2'-C1' | 5.09  | 105.57      | 101.50   |
| 10  | A     | 2726 | A    | P-O3'-C3'   | -5.09 | 113.59      | 119.70   |
| 10  | A     | 1765 | G    | P-O3'-C3'   | -5.09 | 113.60      | 119.70   |
| 10  | A     | 168  | A    | P-O3'-C3'   | -5.08 | 113.60      | 119.70   |
| 10  | A     | 2451 | A    | P-O3'-C3'   | -5.08 | 113.60      | 119.70   |
| 10  | A     | 1830 | C    | P-O3'-C3'   | -5.08 | 113.60      | 119.70   |
| 10  | A     | 2786 | A    | P-O3'-C3'   | -5.08 | 113.60      | 119.70   |
| 10  | A     | 315  | G    | P-O3'-C3'   | -5.08 | 113.61      | 119.70   |
| 10  | A     | 472  | C    | P-O3'-C3'   | -5.08 | 113.61      | 119.70   |
| 10  | A     | 275  | C    | P-O3'-C3'   | -5.08 | 113.61      | 119.70   |
| 10  | A     | 342  | A    | P-O3'-C3'   | -5.08 | 113.61      | 119.70   |
| 10  | A     | 1851 | U    | O4'-C1'-N1  | 5.08  | 112.26      | 108.20   |
| 10  | A     | 2552 | U    | P-O3'-C3'   | -5.07 | 113.61      | 119.70   |
| 10  | A     | 362  | C    | P-O3'-C3'   | -5.07 | 113.62      | 119.70   |
| 10  | A     | 1751 | G    | P-O3'-C3'   | -5.07 | 113.62      | 119.70   |
| 10  | A     | 2200 | U    | P-O3'-C3'   | -5.07 | 113.62      | 119.70   |
| 10  | A     | 2517 | G    | P-O3'-C3'   | -5.06 | 113.62      | 119.70   |
| 10  | A     | 1910 | A    | P-O3'-C3'   | -5.06 | 113.63      | 119.70   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 10  | A     | 2424 | G    | C1'-O4'-C4' | -5.06 | 105.85      | 109.90   |
| 10  | A     | 758  | G    | P-O3'-C3'   | -5.06 | 113.63      | 119.70   |
| 10  | A     | 2162 | C    | P-O3'-C3'   | -5.05 | 113.63      | 119.70   |
| 10  | A     | 115  | C    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 495  | A    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 1362 | A    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 1918 | A    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 540  | G    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 2483 | A    | P-O3'-C3'   | -5.05 | 113.64      | 119.70   |
| 10  | A     | 1908 | G    | P-O3'-C3'   | -5.04 | 113.65      | 119.70   |
| 10  | A     | 2213 | U    | P-O3'-C3'   | -5.04 | 113.65      | 119.70   |
| 10  | A     | 1612 | G    | P-O3'-C3'   | -5.04 | 113.65      | 119.70   |
| 10  | A     | 120  | G    | P-O3'-C3'   | -5.03 | 113.66      | 119.70   |
| 10  | A     | 391  | U    | P-O3'-C3'   | -5.03 | 113.67      | 119.70   |
| 10  | A     | 1379 | C    | O3'-P-O5'   | -5.03 | 94.45       | 104.00   |
| 10  | A     | 1802 | G    | P-O3'-C3'   | -5.03 | 113.67      | 119.70   |
| 10  | A     | 2187 | G    | P-O3'-C3'   | -5.03 | 113.67      | 119.70   |
| 10  | A     | 908  | A    | P-O3'-C3'   | -5.02 | 113.67      | 119.70   |
| 10  | A     | 2812 | U    | C3'-C2'-C1' | -5.02 | 97.48       | 101.50   |
| 10  | A     | 1926 | C    | P-O3'-C3'   | -5.02 | 113.68      | 119.70   |
| 10  | A     | 837  | C    | P-O3'-C3'   | -5.02 | 113.68      | 119.70   |
| 10  | A     | 775  | G    | C1'-O4'-C4' | -5.01 | 105.89      | 109.90   |
| 10  | A     | 1036 | A    | O5'-P-OP2   | -5.01 | 101.19      | 105.70   |
| 10  | A     | 2206 | A    | P-O3'-C3'   | -5.01 | 113.69      | 119.70   |
| 10  | A     | 778  | C    | P-O3'-C3'   | -5.01 | 113.69      | 119.70   |
| 10  | A     | 2424 | G    | O4'-C1'-N9  | 5.01  | 112.21      | 108.20   |
| 10  | A     | 239  | C    | P-O3'-C3'   | -5.01 | 113.69      | 119.70   |
| 10  | A     | 1991 | C    | P-O3'-C3'   | -5.01 | 113.69      | 119.70   |
| 10  | A     | 72   | U    | C3'-C2'-C1' | -5.01 | 97.49       | 101.50   |
| 10  | A     | 317  | A    | P-O3'-C3'   | -5.00 | 113.69      | 119.70   |
| 10  | A     | 914  | C    | P-O3'-C3'   | -5.00 | 113.69      | 119.70   |
| 10  | A     | 2477 | G    | P-O3'-C3'   | -5.00 | 113.69      | 119.70   |
| 10  | A     | 2714 | C    | P-O3'-C3'   | -5.00 | 113.69      | 119.70   |
| 10  | A     | 801  | G    | P-O3'-C3'   | -5.00 | 113.70      | 119.70   |
| 11  | B     | 62   | U    | P-O3'-C3'   | -5.00 | 113.70      | 119.70   |

There are no chirality outliers.

All (55) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group     |
|-----|-------|-----|------|-----------|
| 1   | 1     | 10  | ARG  | Sidechain |
| 1   | 1     | 13  | ARG  | Sidechain |

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| Mol | Chain | Res | Type | Group     |
|-----|-------|-----|------|-----------|
| 1   | 1     | 18  | ARG  | Sidechain |
| 2   | 2     | 47  | ARG  | Sidechain |
| 5   | 5     | 6   | ARG  | Sidechain |
| 7   | 7     | 29  | ARG  | Sidechain |
| 7   | 7     | 3   | ARG  | Sidechain |
| 8   | 8     | 45  | ARG  | Sidechain |
| 8   | 8     | 59  | ARG  | Sidechain |
| 9   | 9     | 4   | ARG  | Sidechain |
| 30  | D     | 129 | ARG  | Sidechain |
| 30  | D     | 149 | ARG  | Sidechain |
| 30  | D     | 168 | ARG  | Sidechain |
| 30  | D     | 184 | ARG  | Sidechain |
| 30  | D     | 188 | ARG  | Sidechain |
| 12  | G     | 13  | ARG  | Sidechain |
| 12  | G     | 156 | ARG  | Sidechain |
| 12  | G     | 182 | ARG  | Sidechain |
| 12  | G     | 274 | ARG  | Sidechain |
| 12  | G     | 35  | ARG  | Sidechain |
| 12  | G     | 43  | ARG  | Sidechain |
| 13  | H     | 8   | ARG  | Sidechain |
| 14  | I     | 106 | ARG  | Sidechain |
| 14  | I     | 41  | ARG  | Sidechain |
| 14  | I     | 58  | ARG  | Sidechain |
| 16  | K     | 54  | ARG  | Sidechain |
| 16  | K     | 69  | ARG  | Sidechain |
| 17  | M     | 14  | ARG  | Sidechain |
| 17  | M     | 2   | ARG  | Sidechain |
| 19  | O     | 18  | ARG  | Sidechain |
| 19  | O     | 41  | ARG  | Sidechain |
| 19  | O     | 47  | ARG  | Sidechain |
| 19  | O     | 59  | ARG  | Sidechain |
| 19  | O     | 60  | ARG  | Sidechain |
| 19  | O     | 71  | ARG  | Sidechain |
| 20  | P     | 134 | ARG  | Sidechain |
| 20  | P     | 14  | ARG  | Sidechain |
| 20  | P     | 45  | ARG  | Sidechain |
| 21  | Q     | 122 | ARG  | Sidechain |
| 21  | Q     | 36  | ARG  | Sidechain |
| 21  | Q     | 59  | ARG  | Sidechain |
| 21  | Q     | 67  | ARG  | Sidechain |
| 22  | R     | 104 | ARG  | Sidechain |
| 22  | R     | 14  | ARG  | Sidechain |

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| Mol | Chain | Res | Type | Group     |
|-----|-------|-----|------|-----------|
| 22  | R     | 17  | ARG  | Sidechain |
| 22  | R     | 96  | ARG  | Sidechain |
| 23  | S     | 21  | ARG  | Sidechain |
| 23  | S     | 72  | ARG  | Sidechain |
| 23  | S     | 94  | ARG  | Sidechain |
| 24  | T     | 51  | ARG  | Sidechain |
| 24  | T     | 92  | ARG  | Sidechain |
| 25  | U     | 67  | ARG  | Sidechain |
| 26  | V     | 16  | ARG  | Sidechain |
| 27  | W     | 64  | ARG  | Sidechain |
| 29  | Z     | 22  | ARG  | Sidechain |

## 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1   | 1     | 457   | 0        | 502      | 2       | 0            |
| 2   | 2     | 487   | 0        | 504      | 2       | 0            |
| 3   | 3     | 433   | 0        | 479      | 2       | 0            |
| 4   | 4     | 477   | 0        | 454      | 1       | 0            |
| 5   | 5     | 425   | 0        | 421      | 12      | 0            |
| 6   | 6     | 400   | 0        | 411      | 10      | 0            |
| 7   | 7     | 357   | 0        | 405      | 0       | 0            |
| 8   | 8     | 512   | 0        | 562      | 6       | 0            |
| 9   | 9     | 292   | 0        | 334      | 5       | 0            |
| 10  | A     | 62459 | 0        | 31403    | 223     | 0            |
| 11  | B     | 2430  | 0        | 1229     | 5       | 0            |
| 12  | G     | 2108  | 0        | 2184     | 29      | 0            |
| 13  | H     | 1582  | 0        | 1646     | 14      | 0            |
| 14  | I     | 1563  | 0        | 1655     | 25      | 0            |
| 15  | J     | 1365  | 0        | 1417     | 18      | 0            |
| 16  | K     | 1271  | 0        | 1308     | 9       | 0            |
| 17  | M     | 1117  | 0        | 1140     | 12      | 0            |
| 18  | N     | 925   | 0        | 982      | 16      | 0            |
| 19  | O     | 1094  | 0        | 1137     | 13      | 0            |
| 20  | P     | 1055  | 0        | 1125     | 12      | 0            |
| 21  | Q     | 983   | 0        | 1045     | 17      | 0            |
| 22  | R     | 914   | 0        | 941      | 13      | 0            |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 23  | S     | 905   | 0        | 973      | 6       | 0            |
| 24  | T     | 939   | 0        | 1011     | 8       | 0            |
| 25  | U     | 786   | 0        | 825      | 7       | 0            |
| 26  | V     | 848   | 0        | 905      | 12      | 0            |
| 27  | W     | 731   | 0        | 763      | 2       | 0            |
| 28  | X     | 723   | 0        | 794      | 3       | 0            |
| 29  | Z     | 563   | 0        | 568      | 3       | 0            |
| 30  | D     | 3310  | 0        | 3336     | 46      | 0            |
| 31  | E     | 1032  | 0        | 1097     | 10      | 0            |
| 32  | 5     | 1     | 0        | 0        | 0       | 0            |
| 32  | 9     | 1     | 0        | 0        | 0       | 0            |
| 33  | A     | 10    | 0        | 19       | 1       | 0            |
| 34  | A     | 156   | 0        | 0        | 0       | 0            |
| 34  | D     | 1     | 0        | 0        | 0       | 0            |
| 34  | G     | 1     | 0        | 0        | 0       | 0            |
| 34  | H     | 1     | 0        | 0        | 0       | 0            |
| 34  | O     | 1     | 0        | 0        | 0       | 0            |
| 35  | A     | 12    | 0        | 24       | 0       | 0            |
| 36  | P     | 1     | 0        | 0        | 0       | 0            |
| 37  | D     | 32    | 0        | 13       | 0       | 0            |
| All | All   | 92760 | 0        | 61612    | 475     | 0            |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (475) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 6:6:9:CYS:SG      | 6:6:12:CYS:HB2    | 1.79                     | 1.22              |
| 10:A:1489:A:H2    | 10:A:1604:G:H21   | 1.12                     | 0.96              |
| 10:A:655:G:H21    | 10:A:661:A:H62    | 1.07                     | 0.92              |
| 10:A:655:G:N2     | 10:A:661:A:H62    | 1.66                     | 0.91              |
| 10:A:1713:A:H61   | 10:A:2029:C:H5    | 1.17                     | 0.88              |
| 20:P:54:MET:HG3   | 20:P:121:ALA:HB2  | 1.59                     | 0.85              |
| 21:Q:134:LEU:O    | 21:Q:135:VAL:HG22 | 1.78                     | 0.84              |
| 12:G:142:HIS:ND1  | 12:G:193:GLY:O    | 2.10                     | 0.82              |
| 10:A:830:U:H5     | 10:A:839:A:N1     | 1.79                     | 0.80              |
| 10:A:1416:U:HO2'  | 10:A:2245:A:H8    | 1.27                     | 0.80              |
| 18:N:104:ARG:HH12 | 23:S:41:GLN:HE22  | 1.27                     | 0.79              |
| 10:A:2471:U:O3'   | 10:A:2472:A:H3'   | 1.81                     | 0.78              |
| 10:A:655:G:H21    | 10:A:661:A:N6     | 1.81                     | 0.78              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:905:G:O2'    | 10:A:2301:A:O2'   | 2.02                     | 0.77              |
| 6:6:9:CYS:HG      | 6:6:12:CYS:HB2    | 1.46                     | 0.76              |
| 31:E:21:PRO:HB2   | 31:E:22:PRO:HD3   | 1.68                     | 0.76              |
| 10:A:1311:G:H5''  | 26:V:20:ARG:HH22  | 1.51                     | 0.76              |
| 10:A:1812:U:H5    | 10:A:1817:A:N7    | 1.83                     | 0.75              |
| 10:A:890:G:H1     | 10:A:980:A:H61    | 1.34                     | 0.75              |
| 28:X:39:ASN:HB2   | 28:X:63:ILE:HD11  | 1.69                     | 0.73              |
| 8:8:27:GLY:O      | 8:8:29:THR:N      | 2.23                     | 0.72              |
| 12:G:142:HIS:HA   | 12:G:155:VAL:CG2  | 2.21                     | 0.71              |
| 21:Q:115:ARG:HH12 | 21:Q:135:VAL:HG23 | 1.55                     | 0.70              |
| 31:E:78:LEU:HD21  | 31:E:136:ILE:HD11 | 1.74                     | 0.70              |
| 10:A:1028:C:O2    | 10:A:1028:C:O5'   | 2.09                     | 0.70              |
| 6:6:9:CYS:SG      | 6:6:12:CYS:CB     | 2.71                     | 0.70              |
| 10:A:2789:U:H5    | 10:A:2791:A:N7    | 1.89                     | 0.69              |
| 18:N:64:ARG:NH1   | 18:N:81:GLU:OE2   | 2.25                     | 0.69              |
| 10:A:2635:A:H61   | 30:D:146:LEU:HD13 | 1.57                     | 0.68              |
| 10:A:1501:G:N2    | 10:A:1509:A:H62   | 1.92                     | 0.68              |
| 30:D:338:ILE:HD11 | 30:D:354:VAL:HG11 | 1.76                     | 0.68              |
| 10:A:2537:U:C4    | 30:D:149:ARG:NH2  | 2.62                     | 0.67              |
| 22:R:32:ASN:HD22  | 22:R:33:VAL:N     | 1.93                     | 0.67              |
| 12:G:106:ALA:O    | 12:G:195:VAL:O    | 2.13                     | 0.65              |
| 10:A:2029:C:O2    | 10:A:2029:C:O5'   | 2.14                     | 0.65              |
| 10:A:1519:A:H62   | 10:A:1573:A:H2    | 1.43                     | 0.65              |
| 10:A:789:A:O2'    | 10:A:1708:U:OP1   | 2.15                     | 0.64              |
| 21:Q:24:LEU:HD23  | 21:Q:44:VAL:HG21  | 1.78                     | 0.64              |
| 10:A:1501:G:H21   | 10:A:1509:A:H62   | 1.44                     | 0.64              |
| 10:A:1416:U:O2'   | 10:A:2245:A:H8    | 1.81                     | 0.63              |
| 30:D:367:THR:HG23 | 30:D:400:VAL:HG22 | 1.81                     | 0.63              |
| 10:A:1393:A:H8    | 10:A:1393:A:H5''  | 1.64                     | 0.62              |
| 10:A:363:A:N3     | 14:I:169:ASN:ND2  | 2.45                     | 0.62              |
| 30:D:5:VAL:HG12   | 30:D:71:LEU:HG    | 1.82                     | 0.62              |
| 14:I:158:GLY:O    | 14:I:160:SER:N    | 2.33                     | 0.61              |
| 10:A:1332:U:H5    | 10:A:1370:U:O2    | 1.83                     | 0.61              |
| 18:N:24:VAL:HG13  | 18:N:33:ALA:HB2   | 1.82                     | 0.61              |
| 10:A:2699:C:O2    | 10:A:2699:C:O5'   | 2.17                     | 0.61              |
| 24:T:98:LEU:HD22  | 24:T:102:ASP:OD2  | 2.00                     | 0.60              |
| 26:V:114:GLU:O    | 26:V:115:VAL:HB   | 2.01                     | 0.60              |
| 5:5:20:VAL:HG23   | 5:5:20:VAL:O      | 2.01                     | 0.60              |
| 30:D:74:PHE:CD2   | 30:D:78:LEU:HD11  | 2.37                     | 0.60              |
| 11:B:12:U:OP2     | 11:B:68:C:O2'     | 2.18                     | 0.60              |
| 21:Q:115:ARG:NH1  | 21:Q:135:VAL:HG23 | 2.17                     | 0.60              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 12:G:126:VAL:O    | 12:G:192:ILE:HB   | 2.01                     | 0.60              |
| 12:G:155:VAL:HG23 | 12:G:155:VAL:O    | 2.01                     | 0.60              |
| 30:D:338:ILE:CD1  | 30:D:354:VAL:HG11 | 2.31                     | 0.60              |
| 30:D:10:ILE:HD11  | 30:D:52:VAL:HA    | 1.83                     | 0.60              |
| 10:A:333:U:H3     | 10:A:392:G:H1     | 1.48                     | 0.59              |
| 10:A:1336:U:H2'   | 10:A:1337:U:C6    | 2.38                     | 0.59              |
| 13:H:122:VAL:HG21 | 13:H:143:PRO:HA   | 1.84                     | 0.59              |
| 17:M:38:ARG:HG2   | 17:M:38:ARG:HH11  | 1.67                     | 0.59              |
| 8:8:30:SER:O      | 8:8:31:HIS:CD2    | 2.56                     | 0.59              |
| 19:O:106:LYS:O    | 19:O:108:GLY:N    | 2.32                     | 0.59              |
| 10:A:2458:A:H5''  | 10:A:2460:C:O4'   | 2.03                     | 0.58              |
| 21:Q:115:ARG:HH12 | 21:Q:135:VAL:CG2  | 2.14                     | 0.58              |
| 8:8:35:ASN:ND2    | 10:A:2424:G:OP2   | 2.33                     | 0.58              |
| 10:A:2045:G:OP1   | 26:V:16:ARG:NH2   | 2.36                     | 0.58              |
| 24:T:76:TYR:CZ    | 24:T:80:MET:HG3   | 2.39                     | 0.58              |
| 18:N:98:ILE:HD13  | 18:N:117:LEU:HB2  | 1.84                     | 0.58              |
| 10:A:232:U:O2'    | 10:A:233:C:P      | 2.61                     | 0.58              |
| 10:A:890:G:N2     | 10:A:980:A:N1     | 2.42                     | 0.58              |
| 14:I:26:ILE:HD11  | 14:I:112:SER:HA   | 1.85                     | 0.58              |
| 18:N:63:VAL:HG12  | 18:N:106:LEU:HD11 | 1.86                     | 0.57              |
| 17:M:2:ARG:HG3    | 17:M:3:THR:HG23   | 1.86                     | 0.57              |
| 19:O:78:ASN:O     | 19:O:81:VAL:HG22  | 2.04                     | 0.57              |
| 16:K:87:LEU:N     | 16:K:87:LEU:HD12  | 2.19                     | 0.57              |
| 10:A:1713:A:N6    | 10:A:2029:C:H5    | 1.97                     | 0.57              |
| 26:V:15:VAL:HG11  | 26:V:51:ILE:HG21  | 1.87                     | 0.57              |
| 10:A:2652:U:OP1   | 13:H:156:LYS:HE3  | 2.04                     | 0.57              |
| 30:D:50:THR:O     | 30:D:52:VAL:N     | 2.37                     | 0.57              |
| 10:A:2319:A:H4'   | 10:A:2320:A:O4'   | 2.05                     | 0.56              |
| 10:A:1319:A:H4'   | 10:A:1320:G:OP1   | 2.05                     | 0.56              |
| 10:A:1486:G:H2'   | 10:A:1487:A:O4'   | 2.06                     | 0.56              |
| 30:D:319:TYR:CE1  | 30:D:337:THR:HG23 | 2.39                     | 0.56              |
| 5:5:18:THR:CG2    | 10:A:2078:C:O2'   | 2.53                     | 0.56              |
| 10:A:1344:A:C2    | 10:A:1675:G:C6    | 2.94                     | 0.56              |
| 10:A:1811:U:H2'   | 10:A:1817:A:N6    | 2.21                     | 0.56              |
| 26:V:87:LEU:HB2   | 26:V:103:LYS:HB2  | 1.88                     | 0.56              |
| 10:A:1187:U:H4'   | 10:A:1188:A:O4'   | 2.05                     | 0.56              |
| 10:A:1760:U:H3'   | 10:A:1761:A:C5'   | 2.35                     | 0.56              |
| 10:A:91:C:H5'     | 10:A:91:C:C6      | 2.40                     | 0.56              |
| 10:A:1340:A:OP1   | 10:A:2742:G:O2'   | 2.18                     | 0.55              |
| 16:K:83:TYR:CE2   | 16:K:138:LYS:HB2  | 2.41                     | 0.55              |
| 5:5:2:ALA:HB3     | 10:A:2089:G:N2    | 2.21                     | 0.55              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:2306:A:H2'   | 10:A:2307:A:C8    | 2.42                     | 0.55              |
| 10:A:1245:U:H1'   | 24:T:4:VAL:HG22   | 1.87                     | 0.55              |
| 13:H:8:ARG:NH1    | 13:H:197:LYS:O    | 2.38                     | 0.55              |
| 10:A:2708:A:N1    | 10:A:2765:G:N2    | 2.50                     | 0.55              |
| 20:P:30:GLY:HA2   | 20:P:107:ALA:HB2  | 1.88                     | 0.55              |
| 10:A:45:G:H21     | 10:A:182:A:H62    | 1.55                     | 0.55              |
| 10:A:2708:A:H61   | 10:A:2765:G:H1    | 1.55                     | 0.54              |
| 21:Q:103:ALA:HB3  | 21:Q:104:PRO:HD3  | 1.89                     | 0.54              |
| 10:A:2507:C:O2    | 10:A:2507:C:O4'   | 2.23                     | 0.54              |
| 10:A:2361:A:H2'   | 10:A:2362:A:C8    | 2.42                     | 0.54              |
| 10:A:2878:G:O6    | 23:S:21:ARG:NH1   | 2.37                     | 0.54              |
| 10:A:344:C:O4'    | 10:A:344:C:O2     | 2.25                     | 0.54              |
| 10:A:631:U:H2'    | 10:A:632:U:C6     | 2.42                     | 0.54              |
| 18:N:35:ILE:HG21  | 18:N:103:ALA:HB3  | 1.89                     | 0.54              |
| 20:P:116:GLU:OE2  | 20:P:119:ARG:NH1  | 2.41                     | 0.54              |
| 10:A:2789:U:O2    | 10:A:2789:U:H2'   | 2.08                     | 0.54              |
| 10:A:2822:C:H2'   | 10:A:2823:A:C8    | 2.43                     | 0.54              |
| 15:J:31:ILE:HD11  | 15:J:173:LEU:CD1  | 2.38                     | 0.54              |
| 11:B:22:G:H21     | 11:B:25:A:H62     | 1.56                     | 0.54              |
| 10:A:1988:U:C4    | 10:A:2585:U:H1'   | 2.43                     | 0.54              |
| 2:2:29:ARG:HH11   | 2:2:29:ARG:HG2    | 1.72                     | 0.54              |
| 6:6:9:CYS:CB      | 6:6:12:CYS:HB2    | 2.38                     | 0.53              |
| 10:A:1154:U:O4'   | 10:A:1154:U:O2    | 2.26                     | 0.53              |
| 19:O:92:THR:HG22  | 19:O:124:LYS:HD2  | 1.91                     | 0.53              |
| 30:D:330:TYR:HB2  | 30:D:331:PRO:HD3  | 1.90                     | 0.53              |
| 15:J:157:VAL:HG11 | 22:R:2:ILE:HD12   | 1.88                     | 0.53              |
| 31:E:18:ASN:N     | 31:E:19:PRO:CD    | 2.70                     | 0.53              |
| 21:Q:26:VAL:HG22  | 21:Q:71:VAL:HG22  | 1.91                     | 0.53              |
| 10:A:1497:G:O2'   | 10:A:1596:A:N3    | 2.37                     | 0.53              |
| 10:A:538:G:H2'    | 10:A:539:G:O4'    | 2.09                     | 0.53              |
| 28:X:23:VAL:HG13  | 28:X:33:VAL:HG22  | 1.90                     | 0.53              |
| 10:A:1233:G:H5''  | 25:U:82:TYR:CE1   | 2.44                     | 0.52              |
| 22:R:31:LEU:HD23  | 22:R:94:PHE:CD1   | 2.44                     | 0.52              |
| 10:A:575:G:N3     | 10:A:575:G:H2'    | 2.25                     | 0.52              |
| 10:A:1151:U:H2'   | 10:A:1152:G:C8    | 2.44                     | 0.52              |
| 10:A:1737:U:O2    | 10:A:1749:A:H5'   | 2.09                     | 0.52              |
| 10:A:2235:C:O2'   | 10:A:2237:C:OP1   | 2.20                     | 0.52              |
| 10:A:890:G:H1     | 10:A:980:A:N6     | 2.04                     | 0.52              |
| 30:D:98:THR:HG23  | 30:D:263:PRO:HB3  | 1.91                     | 0.51              |
| 15:J:31:ILE:HD11  | 15:J:173:LEU:HD11 | 1.92                     | 0.51              |
| 20:P:27:VAL:N     | 20:P:102:ILE:HD12 | 2.26                     | 0.51              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:2570:U:H2'   | 10:A:2571:C:C6    | 2.45                     | 0.51              |
| 27:W:42:VAL:HG21  | 27:W:80:VAL:HG21  | 1.93                     | 0.51              |
| 8:8:31:HIS:CD2    | 8:8:32:MET:HG2    | 2.46                     | 0.51              |
| 12:G:68:LYS:HA    | 12:G:151:GLY:HA2  | 1.93                     | 0.51              |
| 30:D:73:ILE:HA    | 30:D:95:MET:O     | 2.10                     | 0.51              |
| 10:A:613:G:H2'    | 10:A:2063:A:N7    | 2.26                     | 0.51              |
| 15:J:36:ILE:HD12  | 15:J:36:ILE:N     | 2.26                     | 0.51              |
| 30:D:84:ARG:HH12  | 30:D:132:GLY:HA3  | 1.76                     | 0.51              |
| 31:E:78:LEU:CD2   | 31:E:136:ILE:HD11 | 2.41                     | 0.51              |
| 15:J:127:ASN:ND2  | 15:J:157:VAL:HG13 | 2.26                     | 0.51              |
| 30:D:105:PHE:CD2  | 30:D:235:LEU:HD21 | 2.45                     | 0.51              |
| 10:A:1272:G:N7    | 24:T:16:LYS:NZ    | 2.58                     | 0.51              |
| 12:G:132:LEU:HD23 | 12:G:135:ILE:HD12 | 1.92                     | 0.51              |
| 14:I:8:LYS:CG     | 14:I:14:ALA:HB2   | 2.41                     | 0.51              |
| 18:N:68:GLY:HA3   | 18:N:77:ILE:O     | 2.11                     | 0.51              |
| 22:R:15:HIS:CD2   | 22:R:97:GLY:HA2   | 2.45                     | 0.51              |
| 10:A:306:A:H61    | 10:A:408:U:H3     | 1.58                     | 0.50              |
| 13:H:69:VAL:HG11  | 13:H:76:PRO:HA    | 1.93                     | 0.50              |
| 10:A:2618:U:O4'   | 30:D:146:LEU:O    | 2.29                     | 0.50              |
| 22:R:29:PRO:HG2   | 22:R:92:VAL:HG12  | 1.92                     | 0.50              |
| 19:O:58:PHE:CE1   | 19:O:59:ARG:HG3   | 2.46                     | 0.50              |
| 10:A:875:A:N7     | 10:A:2280:A:O2'   | 2.43                     | 0.50              |
| 26:V:17:ILE:HG23  | 26:V:17:ILE:O     | 2.11                     | 0.50              |
| 29:Z:55:PRO:HG3   | 29:Z:61:ARG:HB2   | 1.94                     | 0.50              |
| 15:J:13:VAL:HB    | 15:J:14:PRO:HD3   | 1.94                     | 0.50              |
| 10:A:842:U:H2'    | 10:A:843:U:C6     | 2.47                     | 0.50              |
| 14:I:36:VAL:HG21  | 14:I:109:ALA:HB2  | 1.94                     | 0.50              |
| 10:A:1469:A:H2'   | 10:A:1471:G:N7    | 2.27                     | 0.50              |
| 10:A:2378:G:N3    | 10:A:2414:C:H2'   | 2.27                     | 0.50              |
| 10:A:351:G:H2'    | 10:A:352:A:C8     | 2.47                     | 0.49              |
| 11:B:52:G:H21     | 15:J:26:MET:CE    | 2.24                     | 0.49              |
| 12:G:270:ILE:HG21 | 12:G:273:ARG:HD2  | 1.92                     | 0.49              |
| 10:A:1794:U:H2'   | 10:A:1795:A:H5''  | 1.94                     | 0.49              |
| 5:5:3:VAL:HG12    | 10:A:2048:A:C2    | 2.48                     | 0.49              |
| 10:A:26:G:H1'     | 10:A:559:A:N6     | 2.27                     | 0.49              |
| 10:A:1207:U:O2'   | 25:U:8:GLY:HA2    | 2.12                     | 0.49              |
| 10:A:2271:G:H2'   | 10:A:2271:G:N3    | 2.27                     | 0.49              |
| 10:A:1489:A:H2    | 10:A:1604:G:N2    | 1.95                     | 0.49              |
| 22:R:39:ASN:OD1   | 22:R:39:ASN:N     | 2.46                     | 0.49              |
| 10:A:829:A:H2'    | 10:A:830:U:H4'    | 1.94                     | 0.49              |
| 10:A:100:U:H3'    | 10:A:101:G:H5'    | 1.95                     | 0.49              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:2096:C:O2    | 10:A:2483:A:N1    | 2.46                     | 0.49              |
| 18:N:24:VAL:CG1   | 18:N:33:ALA:HB2   | 2.42                     | 0.49              |
| 24:T:68:ALA:HB2   | 24:T:99:ALA:HB1   | 1.94                     | 0.49              |
| 10:A:2237:C:OP2   | 12:G:150:LYS:NZ   | 2.46                     | 0.49              |
| 12:G:80:THR:HG22  | 12:G:93:LEU:HB3   | 1.94                     | 0.49              |
| 30:D:239:VAL:HG22 | 30:D:253:THR:HG22 | 1.93                     | 0.49              |
| 10:A:32:C:H5'     | 10:A:1283:G:OP1   | 2.13                     | 0.49              |
| 10:A:1012:G:C6    | 10:A:1013:U:C4    | 3.00                     | 0.49              |
| 10:A:1364:G:C2    | 10:A:1373:U:H5''  | 2.48                     | 0.49              |
| 17:M:5:TYR:CG     | 24:T:100:VAL:HG11 | 2.48                     | 0.49              |
| 30:D:287:VAL:HG21 | 30:D:298:MET:CE   | 2.43                     | 0.49              |
| 10:A:2032:C:OP1   | 13:H:124:LYS:NZ   | 2.40                     | 0.48              |
| 30:D:244:LEU:HD22 | 30:D:352:THR:CG2  | 2.43                     | 0.48              |
| 6:6:9:CYS:HB3     | 6:6:12:CYS:HB3    | 1.94                     | 0.48              |
| 9:9:7:VAL:HG13    | 9:9:25:VAL:HG13   | 1.95                     | 0.48              |
| 12:G:131:GLU:HA   | 12:G:189:ARG:HA   | 1.95                     | 0.48              |
| 10:A:1501:G:H21   | 10:A:1509:A:N6    | 2.10                     | 0.48              |
| 10:A:2353:A:H2'   | 10:A:2353:A:N3    | 2.28                     | 0.48              |
| 5:5:43:CYS:N      | 5:5:48:GLN:O      | 2.46                     | 0.48              |
| 8:8:45:ARG:NH2    | 10:A:2382:G:OP1   | 2.43                     | 0.48              |
| 10:A:506:A:H2'    | 10:A:507:C:O4'    | 2.14                     | 0.48              |
| 13:H:27:VAL:HG22  | 13:H:187:LEU:HD22 | 1.94                     | 0.48              |
| 31:E:115:LEU:HD12 | 31:E:117:ALA:HB3  | 1.95                     | 0.48              |
| 10:A:1096:A:C2    | 10:A:2784:G:C5    | 3.02                     | 0.48              |
| 13:H:51:ILE:HD12  | 13:H:83:PHE:CE1   | 2.49                     | 0.48              |
| 5:5:18:THR:HG22   | 10:A:2078:C:O2'   | 2.13                     | 0.48              |
| 5:5:20:VAL:O      | 5:5:20:VAL:CG2    | 2.62                     | 0.48              |
| 10:A:326:A:N1     | 10:A:399:C:N3     | 2.62                     | 0.48              |
| 10:A:420:A:C2     | 10:A:447:A:C4     | 3.01                     | 0.48              |
| 13:H:90:GLU:O     | 13:H:91:TYR:HB2   | 2.13                     | 0.48              |
| 16:K:125:VAL:HG23 | 16:K:125:VAL:O    | 2.13                     | 0.48              |
| 24:T:43:TYR:HB3   | 25:U:74:TYR:HB3   | 1.96                     | 0.48              |
| 10:A:1503:A:H5'   | 21:Q:90:ARG:HH22  | 1.78                     | 0.47              |
| 22:R:33:VAL:HG11  | 22:R:105:VAL:HG12 | 1.96                     | 0.47              |
| 10:A:214:G:H2'    | 10:A:215:A:O4'    | 2.13                     | 0.47              |
| 10:A:2472:A:H61   | 30:D:145:GLY:HA3  | 1.80                     | 0.47              |
| 10:A:2367:C:O2    | 10:A:2367:C:O4'   | 2.33                     | 0.47              |
| 10:A:2390:G:H2'   | 10:A:2392:C:OP2   | 2.15                     | 0.47              |
| 12:G:132:LEU:HD13 | 12:G:174:ILE:HD11 | 1.95                     | 0.47              |
| 17:M:27:GLY:O     | 17:M:28:ARG:HB2   | 2.14                     | 0.47              |
| 10:A:909:G:H2'    | 10:A:910:A:O4'    | 2.14                     | 0.47              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 12:G:26:THR:HG22  | 12:G:80:THR:OG1   | 2.15                     | 0.47              |
| 30:D:330:TYR:CB   | 30:D:331:PRO:HD3  | 2.44                     | 0.47              |
| 1:1:39:LEU:H      | 1:1:39:LEU:HD23   | 1.80                     | 0.47              |
| 14:I:8:LYS:HG2    | 14:I:14:ALA:HB2   | 1.95                     | 0.47              |
| 14:I:126:LEU:CD2  | 14:I:193:ILE:HG23 | 2.45                     | 0.47              |
| 22:R:59:LEU:HD12  | 22:R:59:LEU:O     | 2.14                     | 0.47              |
| 10:A:2347:A:H2'   | 10:A:2348:U:C6    | 2.50                     | 0.47              |
| 5:5:18:THR:HG21   | 10:A:2078:C:O2'   | 2.14                     | 0.47              |
| 10:A:1393:A:H8    | 10:A:1393:A:C5'   | 2.27                     | 0.47              |
| 10:A:1663:A:C2    | 26:V:98:ALA:HB2   | 2.50                     | 0.47              |
| 14:I:125:VAL:HA   | 14:I:194:ILE:O    | 2.15                     | 0.47              |
| 30:D:370:ILE:N    | 30:D:370:ILE:HD12 | 2.30                     | 0.46              |
| 10:A:1965:A:H2'   | 10:A:1966:G:O4'   | 2.15                     | 0.46              |
| 15:J:61:THR:HG21  | 15:J:89:VAL:HG11  | 1.96                     | 0.46              |
| 5:5:33:CYS:N      | 5:5:46:CYS:SG     | 2.89                     | 0.46              |
| 10:A:495:A:OP1    | 14:I:84:ARG:O     | 2.33                     | 0.46              |
| 10:A:1151:U:H2'   | 10:A:1152:G:N7    | 2.30                     | 0.46              |
| 10:A:27:G:O2'     | 10:A:28:A:OP2     | 2.30                     | 0.46              |
| 15:J:127:ASN:HD21 | 15:J:157:VAL:HG13 | 1.80                     | 0.46              |
| 25:U:54:GLU:N     | 25:U:54:GLU:OE1   | 2.47                     | 0.46              |
| 30:D:246:ASP:O    | 30:D:247:ASN:HB2  | 2.16                     | 0.46              |
| 10:A:230:A:H2'    | 10:A:231:A:H4'    | 1.98                     | 0.46              |
| 10:A:2043:G:H5''  | 26:V:47:SER:HB3   | 1.98                     | 0.46              |
| 18:N:101:PRO:HB2  | 18:N:122:LEU:HD23 | 1.96                     | 0.46              |
| 18:N:104:ARG:NH1  | 23:S:41:GLN:HE22  | 2.04                     | 0.46              |
| 19:O:55:LEU:HD23  | 19:O:60:ARG:HG2   | 1.96                     | 0.46              |
| 10:A:2789:U:H1'   | 10:A:2790:A:H5''  | 1.97                     | 0.46              |
| 10:A:2899:C:H2'   | 10:A:2900:G:O4'   | 2.15                     | 0.46              |
| 13:H:9:LYS:HE3    | 13:H:194:GLY:O    | 2.16                     | 0.46              |
| 10:A:1899:A:H2'   | 10:A:1900:G:O4'   | 2.16                     | 0.46              |
| 10:A:638:U:H2'    | 10:A:639:U:C6     | 2.51                     | 0.46              |
| 14:I:32:VAL:HG21  | 14:I:108:LEU:HD23 | 1.98                     | 0.46              |
| 10:A:1877:U:H5'   | 12:G:256:GLY:O    | 2.16                     | 0.46              |
| 2:2:24:GLU:OE2    | 2:2:42:ARG:NH1    | 2.49                     | 0.45              |
| 8:8:30:SER:O      | 8:8:31:HIS:HD2    | 2.00                     | 0.45              |
| 10:A:182:A:H2'    | 10:A:182:A:N3     | 2.30                     | 0.45              |
| 10:A:1074:A:N6    | 10:A:1171:G:H2'   | 2.31                     | 0.45              |
| 14:I:161:GLU:N    | 14:I:161:GLU:OE1  | 2.50                     | 0.45              |
| 30:D:116:LEU:HD22 | 30:D:170:LEU:CD2  | 2.45                     | 0.45              |
| 10:A:908:A:C2     | 10:A:964:A:C4     | 3.04                     | 0.45              |
| 10:A:2337:G:H22   | 10:A:2345:U:H3    | 1.64                     | 0.45              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:2537:U:N3    | 30:D:149:ARG:NH2  | 2.64                     | 0.45              |
| 10:A:2915:G:H2'   | 10:A:2916:A:O4'   | 2.17                     | 0.45              |
| 24:T:78:LYS:HE2   | 24:T:78:LYS:HA    | 1.98                     | 0.45              |
| 13:H:53:PHE:O     | 13:H:77:LYS:HD2   | 2.17                     | 0.45              |
| 14:I:181:ILE:HG23 | 14:I:181:ILE:O    | 2.16                     | 0.45              |
| 15:J:106:VAL:HG11 | 15:J:139:PRO:HG3  | 1.97                     | 0.45              |
| 30:D:163:ILE:O    | 30:D:164:LYS:CB   | 2.65                     | 0.45              |
| 10:A:1853:U:OP1   | 12:G:177:ASN:ND2  | 2.45                     | 0.45              |
| 10:A:2717:U:C4    | 10:A:2718:G:N7    | 2.84                     | 0.45              |
| 14:I:26:ILE:HD12  | 14:I:26:ILE:C     | 2.37                     | 0.45              |
| 6:6:26:ASN:HB3    | 6:6:30:ILE:HD11   | 1.98                     | 0.45              |
| 10:A:1489:A:H2'   | 10:A:1490:G:O4'   | 2.17                     | 0.45              |
| 10:A:1969:A:N1    | 10:A:1995:C:O2    | 2.49                     | 0.45              |
| 18:N:9:LYS:O      | 18:N:83:ALA:HA    | 2.16                     | 0.45              |
| 10:A:831:U:H2'    | 10:A:832:C:C6     | 2.51                     | 0.45              |
| 10:A:859:U:H2'    | 10:A:860:C:C6     | 2.52                     | 0.45              |
| 21:Q:103:ALA:HB3  | 21:Q:104:PRO:CD   | 2.47                     | 0.45              |
| 10:A:1344:A:C2    | 10:A:1675:G:O6    | 2.69                     | 0.45              |
| 10:A:1382:G:O2'   | 10:A:1437:A:N1    | 2.46                     | 0.45              |
| 13:H:196:LYS:O    | 13:H:197:LYS:HB2  | 2.16                     | 0.45              |
| 14:I:126:LEU:HD23 | 14:I:193:ILE:HG23 | 1.98                     | 0.45              |
| 22:R:72:ALA:O     | 22:R:76:VAL:HG23  | 2.17                     | 0.45              |
| 25:U:5:ILE:HG22   | 25:U:38:VAL:HG22  | 1.99                     | 0.45              |
| 31:E:115:LEU:HD13 | 31:E:116:ASN:N    | 2.32                     | 0.45              |
| 10:A:2029:C:H4'   | 10:A:2030:A:OP1   | 2.17                     | 0.45              |
| 10:A:2599:A:N1    | 18:N:28:SER:OG    | 2.49                     | 0.45              |
| 20:P:51:ARG:HD3   | 20:P:66:ILE:HD11  | 1.98                     | 0.45              |
| 15:J:106:VAL:HG11 | 15:J:139:PRO:HB3  | 1.99                     | 0.45              |
| 10:A:661:A:OP1    | 14:I:106:ARG:HD2  | 2.17                     | 0.45              |
| 10:A:2764:G:H2'   | 10:A:2765:G:C8    | 2.52                     | 0.45              |
| 17:M:49:ILE:O     | 17:M:50:ASP:CB    | 2.65                     | 0.45              |
| 21:Q:122:ARG:NH1  | 21:Q:125:ASP:OD2  | 2.43                     | 0.45              |
| 30:D:196:VAL:CG2  | 30:D:359:LEU:HD11 | 2.47                     | 0.45              |
| 10:A:1040:C:H1'   | 25:U:10:LYS:HE2   | 1.99                     | 0.44              |
| 10:A:1501:G:H2'   | 10:A:1508:A:H62   | 1.82                     | 0.44              |
| 13:H:108:ILE:HG13 | 13:H:174:LEU:O    | 2.16                     | 0.44              |
| 10:A:579:U:H2'    | 10:A:580:U:C6     | 2.52                     | 0.44              |
| 16:K:37:PHE:CZ    | 16:K:72:LEU:HD22  | 2.52                     | 0.44              |
| 16:K:133:VAL:HG13 | 16:K:144:LEU:HD23 | 2.00                     | 0.44              |
| 18:N:104:ARG:HH22 | 23:S:41:GLN:NE2   | 2.16                     | 0.44              |
| 10:A:857:U:H2'    | 19:O:21:ARG:HA    | 1.99                     | 0.44              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:1130:A:N3    | 10:A:1131:A:N3    | 2.66                     | 0.44              |
| 12:G:155:VAL:CG2  | 12:G:155:VAL:O    | 2.65                     | 0.44              |
| 22:R:41:TYR:N     | 22:R:41:TYR:CD2   | 2.85                     | 0.44              |
| 5:5:38:LEU:HD21   | 26:V:43:TYR:HB3   | 1.99                     | 0.44              |
| 10:A:1493:A:C8    | 10:A:1493:A:H5''  | 2.53                     | 0.44              |
| 10:A:1997:G:H2'   | 10:A:1999:A:H4'   | 1.99                     | 0.44              |
| 10:A:2472:A:H4'   | 10:A:2473:C:O5'   | 2.18                     | 0.44              |
| 12:G:163:GLN:OE1  | 12:G:175:ARG:NH2  | 2.50                     | 0.44              |
| 15:J:138:PHE:CD1  | 15:J:139:PRO:HD2  | 2.52                     | 0.44              |
| 18:N:81:GLU:N     | 18:N:81:GLU:OE1   | 2.51                     | 0.44              |
| 19:O:19:VAL:HB    | 19:O:31:SER:HB3   | 1.99                     | 0.44              |
| 10:A:209:A:H2'    | 10:A:210:C:O4'    | 2.17                     | 0.44              |
| 10:A:1058:U:O4    | 17:M:28:ARG:HA    | 2.18                     | 0.44              |
| 10:A:1130:A:O2'   | 10:A:1131:A:O4'   | 2.34                     | 0.44              |
| 10:A:2096:C:H1'   | 30:D:148:ASN:HB3  | 2.00                     | 0.44              |
| 30:D:148:ASN:C    | 30:D:148:ASN:HD22 | 2.21                     | 0.44              |
| 31:E:21:PRO:HB2   | 31:E:22:PRO:CD    | 2.44                     | 0.44              |
| 10:A:1130:A:C2    | 10:A:1131:A:N3    | 2.86                     | 0.44              |
| 17:M:54:PHE:CE2   | 17:M:122:LYS:HG2  | 2.53                     | 0.44              |
| 30:D:74:PHE:CE2   | 30:D:86:LEU:HD13  | 2.53                     | 0.44              |
| 6:6:9:CYS:CB      | 6:6:12:CYS:CB     | 2.96                     | 0.44              |
| 14:I:154:ILE:HD13 | 14:I:193:ILE:HB   | 1.99                     | 0.44              |
| 26:V:34:VAL:HB    | 26:V:60:ILE:HD11  | 2.00                     | 0.44              |
| 26:V:114:GLU:O    | 26:V:115:VAL:CB   | 2.65                     | 0.44              |
| 30:D:159:ASP:O    | 30:D:163:ILE:O    | 2.35                     | 0.44              |
| 30:D:319:TYR:HE1  | 30:D:337:THR:HG23 | 1.81                     | 0.44              |
| 10:A:775:G:C6     | 12:G:207:LYS:HB2  | 2.54                     | 0.43              |
| 10:A:2896:G:C2    | 23:S:21:ARG:NH1   | 2.86                     | 0.43              |
| 14:I:7:LEU:HD23   | 14:I:7:LEU:N      | 2.33                     | 0.43              |
| 17:M:79:SER:O     | 17:M:80:GLN:HB2   | 2.18                     | 0.43              |
| 15:J:129:THR:HG22 | 15:J:155:VAL:HG22 | 1.99                     | 0.43              |
| 20:P:54:MET:HE1   | 20:P:64:VAL:HG13  | 2.00                     | 0.43              |
| 30:D:127:LEU:HB3  | 30:D:128:PRO:HD3  | 2.00                     | 0.43              |
| 10:A:74:U:H5''    | 10:A:75:G:O4'     | 2.18                     | 0.43              |
| 10:A:1715:G:OP1   | 18:N:82:ASN:ND2   | 2.48                     | 0.43              |
| 22:R:31:LEU:HD23  | 22:R:94:PHE:HD1   | 1.80                     | 0.43              |
| 30:D:74:PHE:CG    | 30:D:78:LEU:HD11  | 2.54                     | 0.43              |
| 30:D:188:ARG:HD3  | 30:D:251:LEU:CD1  | 2.48                     | 0.43              |
| 10:A:371:U:H4'    | 28:X:64:HIS:CD2   | 2.53                     | 0.43              |
| 10:A:698:A:H5''   | 10:A:699:U:H5''   | 2.00                     | 0.43              |
| 10:A:710:U:H4'    | 10:A:987:A:OP1    | 2.18                     | 0.43              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 15:J:34:ILE:HD12  | 15:J:96:MET:HG3   | 2.01                     | 0.43              |
| 21:Q:37:ALA:CB    | 21:Q:130:VAL:HG21 | 2.49                     | 0.43              |
| 21:Q:55:ASP:OD2   | 21:Q:56:LEU:N     | 2.52                     | 0.43              |
| 30:D:102:LEU:HD13 | 30:D:122:LYS:HA   | 1.99                     | 0.43              |
| 31:E:53:ILE:HG23  | 31:E:53:ILE:O     | 2.18                     | 0.43              |
| 4:4:35:ILE:HG22   | 4:4:45:LEU:HD13   | 2.01                     | 0.43              |
| 10:A:141:U:H5'    | 10:A:142:C:OP2    | 2.19                     | 0.43              |
| 10:A:829:A:C8     | 10:A:829:A:H3'    | 2.53                     | 0.43              |
| 10:A:1076:G:OP2   | 20:P:128:LYS:NZ   | 2.51                     | 0.43              |
| 10:A:2438:G:OP1   | 19:O:70:ASN:ND2   | 2.47                     | 0.43              |
| 21:Q:36:ARG:O     | 21:Q:40:ILE:HG12  | 2.19                     | 0.43              |
| 10:A:999:A:P      | 20:P:18:ARG:HH22  | 2.42                     | 0.43              |
| 10:A:1829:U:H2'   | 10:A:1830:C:C6    | 2.54                     | 0.43              |
| 10:A:1834:A:OP2   | 12:G:150:LYS:NZ   | 2.52                     | 0.43              |
| 11:B:46:A:C2      | 11:B:47:C:C2      | 3.06                     | 0.43              |
| 10:A:2324:U:H2'   | 10:A:2325:U:C6    | 2.53                     | 0.43              |
| 14:I:17:ILE:HD12  | 14:I:196:LYS:HG3  | 2.00                     | 0.43              |
| 15:J:99:PHE:CG    | 15:J:99:PHE:O     | 2.72                     | 0.43              |
| 19:O:113:SER:O    | 19:O:113:SER:OG   | 2.32                     | 0.43              |
| 22:R:104:ARG:O    | 22:R:107:ALA:N    | 2.51                     | 0.43              |
| 30:D:5:VAL:O      | 30:D:36:VAL:HG22  | 2.19                     | 0.43              |
| 10:A:577:A:H2'    | 10:A:577:A:N3     | 2.33                     | 0.43              |
| 3:3:13:ILE:HD11   | 10:A:1035:G:C8    | 2.54                     | 0.43              |
| 3:3:17:GLN:N      | 3:3:18:PRO:HD2    | 2.34                     | 0.43              |
| 5:5:18:THR:HG23   | 5:5:19:HIS:CD2    | 2.54                     | 0.43              |
| 10:A:2618:U:C4    | 30:D:148:ASN:O    | 2.71                     | 0.43              |
| 21:Q:102:VAL:O    | 21:Q:105:ARG:HG2  | 2.19                     | 0.43              |
| 10:A:698:A:C5'    | 10:A:699:U:H5''   | 2.49                     | 0.42              |
| 12:G:91:ILE:HD12  | 12:G:103:TYR:CD1  | 2.54                     | 0.42              |
| 30:D:316:ILE:HD11 | 30:D:358:GLU:HG3  | 2.01                     | 0.42              |
| 6:6:9:CYS:SG      | 6:6:12:CYS:N      | 2.92                     | 0.42              |
| 16:K:11:ILE:HD11  | 16:K:50:ILE:HD11  | 1.99                     | 0.42              |
| 19:O:109:ILE:HD12 | 19:O:109:ILE:N    | 2.34                     | 0.42              |
| 9:9:32:HIS:O      | 9:9:34:GLN:HG3    | 2.18                     | 0.42              |
| 10:A:1832:G:OP1   | 12:G:260:ARG:NH1  | 2.45                     | 0.42              |
| 10:A:592:A:O2'    | 10:A:593:U:H5''   | 2.19                     | 0.42              |
| 10:A:1186:C:P     | 17:M:69:LYS:HZ3   | 2.42                     | 0.42              |
| 10:A:1747:A:C8    | 10:A:1749:A:O4'   | 2.73                     | 0.42              |
| 10:A:2412:G:H2'   | 10:A:2413:U:C6    | 2.54                     | 0.42              |
| 10:A:2561:U:H2'   | 10:A:2563:U:O5'   | 2.19                     | 0.42              |
| 20:P:3:VAL:HG13   | 20:P:93:TRP:CE2   | 2.55                     | 0.42              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:1066:A:C2    | 10:A:1187:U:C2    | 3.07                     | 0.42              |
| 10:A:1384:U:H4'   | 10:A:1385:U:OP2   | 2.19                     | 0.42              |
| 15:J:132:VAL:HG13 | 15:J:137:ILE:HD13 | 2.00                     | 0.42              |
| 30:D:98:THR:HG23  | 30:D:263:PRO:CG   | 2.49                     | 0.42              |
| 30:D:193:ILE:HD13 | 30:D:249:GLN:HE22 | 1.84                     | 0.42              |
| 10:A:903:G:H2'    | 10:A:904:A:C8     | 2.55                     | 0.42              |
| 12:G:248:SER:OG   | 12:G:251:GLY:O    | 2.21                     | 0.42              |
| 14:I:35:ASP:HB3   | 14:I:101:LEU:HD11 | 2.01                     | 0.42              |
| 14:I:36:VAL:HG21  | 14:I:109:ALA:CB   | 2.49                     | 0.42              |
| 10:A:548:A:H4'    | 10:A:549:C:O5'    | 2.19                     | 0.42              |
| 10:A:630:G:H5'    | 10:A:630:G:N3     | 2.35                     | 0.42              |
| 10:A:660:A:H2'    | 10:A:661:A:O4'    | 2.20                     | 0.42              |
| 30:D:350:PHE:O    | 30:D:354:VAL:HG23 | 2.19                     | 0.42              |
| 5:5:33:CYS:SG     | 5:5:46:CYS:N      | 2.93                     | 0.42              |
| 10:A:1308:U:C4    | 10:A:1309:G:C6    | 3.08                     | 0.42              |
| 10:A:2791:A:N1    | 16:K:71:ILE:HD11  | 2.35                     | 0.42              |
| 18:N:77:ILE:O     | 18:N:77:ILE:HG23  | 2.20                     | 0.42              |
| 30:D:313:VAL:O    | 30:D:315:VAL:HG23 | 2.19                     | 0.42              |
| 10:A:1850:G:OP2   | 12:G:156:ARG:NH2  | 2.45                     | 0.41              |
| 19:O:23:THR:HG21  | 25:U:81:ASN:HB3   | 2.02                     | 0.41              |
| 30:D:198:LEU:HD23 | 30:D:284:ILE:HB   | 2.02                     | 0.41              |
| 6:6:11:GLU:O      | 6:6:12:CYS:C      | 2.58                     | 0.41              |
| 10:A:855:G:C6     | 10:A:856:U:C4     | 3.08                     | 0.41              |
| 10:A:2304:G:OP1   | 29:Z:26:SER:HB3   | 2.20                     | 0.41              |
| 10:A:2781:A:O2'   | 16:K:63:ALA:O     | 2.33                     | 0.41              |
| 12:G:141:ILE:HD11 | 12:G:174:ILE:HD12 | 2.02                     | 0.41              |
| 10:A:383:A:O2'    | 14:I:168:ARG:NH2  | 2.53                     | 0.41              |
| 10:A:2589:C:H2'   | 10:A:2590:G:O4'   | 2.19                     | 0.41              |
| 12:G:174:ILE:HG13 | 12:G:184:ILE:HG13 | 2.01                     | 0.41              |
| 17:M:36:ILE:HD11  | 17:M:141:TYR:CE1  | 2.55                     | 0.41              |
| 22:R:56:ALA:HB3   | 22:R:80:VAL:HB    | 2.02                     | 0.41              |
| 9:9:2:LYS:HE2     | 9:9:31:LYS:O      | 2.20                     | 0.41              |
| 10:A:826:G:H21    | 10:A:829:A:H62    | 1.68                     | 0.41              |
| 10:A:2377:U:H4'   | 10:A:2378:G:OP1   | 2.20                     | 0.41              |
| 10:A:2484:A:H2    | 30:D:148:ASN:HB2  | 1.85                     | 0.41              |
| 13:H:131:GLY:HA3  | 13:H:139:TYR:O    | 2.20                     | 0.41              |
| 17:M:73:LYS:HE3   | 17:M:75:TYR:CZ    | 2.55                     | 0.41              |
| 1:1:20:HIS:O      | 1:1:21:ALA:HB2    | 2.20                     | 0.41              |
| 10:A:1845:G:N3    | 12:G:44:ASN:OD1   | 2.52                     | 0.41              |
| 16:K:94:TYR:OH    | 16:K:152:ARG:NH1  | 2.53                     | 0.41              |
| 19:O:58:PHE:CZ    | 19:O:59:ARG:HG3   | 2.55                     | 0.41              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 10:A:342:A:N1     | 10:A:376:G:O2'    | 2.47                     | 0.41              |
| 13:H:14:GLN:NE2   | 23:S:56:SER:HA    | 2.35                     | 0.41              |
| 20:P:51:ARG:CD    | 20:P:66:ILE:HD11  | 2.51                     | 0.41              |
| 21:Q:22:THR:HG21  | 21:Q:67:ARG:HB2   | 2.02                     | 0.41              |
| 9:9:17:ILE:HD13   | 9:9:26:ILE:HD13   | 2.02                     | 0.41              |
| 10:A:249:G:H4'    | 10:A:432:G:C5     | 2.55                     | 0.41              |
| 10:A:742:U:H2'    | 10:A:743:C:C6     | 2.55                     | 0.41              |
| 10:A:2809:A:H3'   | 10:A:2809:A:OP1   | 2.20                     | 0.41              |
| 20:P:4:PRO:HG2    | 20:P:93:TRP:CZ3   | 2.56                     | 0.41              |
| 21:Q:115:ARG:NH1  | 21:Q:135:VAL:CG2  | 2.80                     | 0.41              |
| 10:A:10:A:H2'     | 10:A:11:G:C8      | 2.56                     | 0.41              |
| 10:A:368:C:H2'    | 10:A:369:G:O4'    | 2.20                     | 0.41              |
| 10:A:999:A:N1     | 10:A:1010:C:O2    | 2.54                     | 0.41              |
| 10:A:1438:G:H4'   | 10:A:1652:A:H4'   | 2.03                     | 0.41              |
| 10:A:1760:U:H3'   | 10:A:1761:A:H5''  | 2.01                     | 0.41              |
| 10:A:1832:G:N7    | 12:G:178:SER:OG   | 2.50                     | 0.41              |
| 10:A:2491:U:O2    | 10:A:2491:U:H2'   | 2.20                     | 0.41              |
| 14:I:126:LEU:N    | 14:I:126:LEU:HD22 | 2.36                     | 0.41              |
| 14:I:179:GLU:OE1  | 14:I:179:GLU:N    | 2.50                     | 0.41              |
| 15:J:34:ILE:HG12  | 15:J:156:ILE:HG23 | 2.03                     | 0.41              |
| 15:J:126:GLY:O    | 15:J:158:THR:OG1  | 2.39                     | 0.41              |
| 17:M:25:SER:O     | 17:M:27:GLY:O     | 2.39                     | 0.41              |
| 19:O:132:ALA:O    | 19:O:136:ILE:HG12 | 2.20                     | 0.41              |
| 26:V:12:ALA:HB2   | 26:V:55:VAL:HG22  | 2.02                     | 0.41              |
| 10:A:828:A:C2     | 12:G:225:MET:HG2  | 2.56                     | 0.41              |
| 10:A:2243:U:C2    | 10:A:2245:A:C2    | 3.09                     | 0.41              |
| 11:B:68:C:O3'     | 29:Z:82:ARG:NH2   | 2.53                     | 0.41              |
| 14:I:8:LYS:HG3    | 14:I:14:ALA:HB2   | 2.03                     | 0.41              |
| 14:I:139:PHE:CE2  | 14:I:167:ALA:HB2  | 2.56                     | 0.41              |
| 10:A:31:C:O3'     | 10:A:1283:G:H5'   | 2.21                     | 0.40              |
| 10:A:1288:U:H2'   | 10:A:1289:A:O4'   | 2.21                     | 0.40              |
| 10:A:1717:A:O2'   | 10:A:1723:G:N7    | 2.44                     | 0.40              |
| 10:A:2059:U:H2'   | 10:A:2060:G:O4'   | 2.20                     | 0.40              |
| 27:W:90:GLN:N     | 27:W:90:GLN:OE1   | 2.54                     | 0.40              |
| 9:9:15:LYS:O      | 9:9:25:VAL:HA     | 2.22                     | 0.40              |
| 21:Q:74:VAL:O     | 21:Q:75:GLN:CB    | 2.69                     | 0.40              |
| 30:D:116:LEU:HD22 | 30:D:170:LEU:HD22 | 2.03                     | 0.40              |
| 31:E:20:ALA:HA    | 31:E:24:GLY:HA3   | 2.04                     | 0.40              |
| 10:A:301:A:H2'    | 10:A:302:G:C8     | 2.56                     | 0.40              |
| 10:A:1530:G:C2    | 10:A:1563:A:C2    | 3.09                     | 0.40              |
| 10:A:1570:G:H2'   | 10:A:1571:U:O4'   | 2.20                     | 0.40              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 10:A:2679:C:H6   | 10:A:2679:C:O5'   | 2.04                     | 0.40              |
| 12:G:142:HIS:HA  | 12:G:155:VAL:HG22 | 1.99                     | 0.40              |
| 10:A:339:U:H2'   | 10:A:340:G:O4'    | 2.21                     | 0.40              |
| 10:A:1566:A:H5'' | 10:A:1567:G:OP2   | 2.21                     | 0.40              |
| 31:E:10:LEU:HD12 | 31:E:10:LEU:C     | 2.42                     | 0.40              |
| 6:6:9:CYS:HB3    | 6:6:12:CYS:CB     | 2.51                     | 0.40              |
| 10:A:620:G:O6    | 33:A:3001:SPD:H21 | 2.21                     | 0.40              |
| 10:A:911:G:C6    | 10:A:912:C:N4     | 2.90                     | 0.40              |
| 10:A:1002:G:OP2  | 20:P:87:LYS:NZ    | 2.53                     | 0.40              |
| 10:A:1834:A:H4'  | 10:A:2236:G:C2    | 2.57                     | 0.40              |
| 10:A:2699:C:O2   | 10:A:2699:C:O4'   | 2.38                     | 0.40              |

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed      | Favoured  | Allowed | Outliers | Percentiles |     |
|-----|-------|---------------|-----------|---------|----------|-------------|-----|
| 1   | 1     | 56/62 (90%)   | 48 (86%)  | 6 (11%) | 2 (4%)   | 3           | 2   |
| 2   | 2     | 57/63 (90%)   | 56 (98%)  | 1 (2%)  | 0        | 100         | 100 |
| 3   | 3     | 54/59 (92%)   | 51 (94%)  | 3 (6%)  | 0        | 100         | 100 |
| 4   | 4     | 57/81 (70%)   | 48 (84%)  | 9 (16%) | 0        | 100         | 100 |
| 5   | 5     | 51/57 (90%)   | 47 (92%)  | 4 (8%)  | 0        | 100         | 100 |
| 6   | 6     | 45/49 (92%)   | 42 (93%)  | 2 (4%)  | 1 (2%)   | 6           | 5   |
| 7   | 7     | 40/44 (91%)   | 40 (100%) | 0       | 0        | 100         | 100 |
| 8   | 8     | 61/66 (92%)   | 58 (95%)  | 1 (2%)  | 2 (3%)   | 4           | 2   |
| 9   | 9     | 34/37 (92%)   | 33 (97%)  | 1 (3%)  | 0        | 100         | 100 |
| 12  | G     | 271/277 (98%) | 252 (93%) | 17 (6%) | 2 (1%)   | 22          | 26  |
| 13  | H     | 204/209 (98%) | 191 (94%) | 13 (6%) | 0        | 100         | 100 |

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| Mol | Chain | Analysed        | Favoured   | Allowed  | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|----------|----------|-------------|-----|
| 14  | I     | 201/207 (97%)   | 189 (94%)  | 11 (6%)  | 1 (0%)   | 29          | 35  |
| 15  | J     | 173/179 (97%)   | 138 (80%)  | 31 (18%) | 4 (2%)   | 6           | 5   |
| 16  | K     | 163/178 (92%)   | 149 (91%)  | 11 (7%)  | 3 (2%)   | 8           | 7   |
| 17  | M     | 140/145 (97%)   | 131 (94%)  | 7 (5%)   | 2 (1%)   | 11          | 11  |
| 18  | N     | 120/122 (98%)   | 112 (93%)  | 7 (6%)   | 1 (1%)   | 19          | 23  |
| 19  | O     | 142/146 (97%)   | 128 (90%)  | 11 (8%)  | 3 (2%)   | 7           | 5   |
| 20  | P     | 131/144 (91%)   | 123 (94%)  | 8 (6%)   | 0        | 100         | 100 |
| 21  | Q     | 118/135 (87%)   | 109 (92%)  | 7 (6%)   | 2 (2%)   | 9           | 8   |
| 22  | R     | 116/119 (98%)   | 103 (89%)  | 11 (10%) | 2 (2%)   | 9           | 8   |
| 23  | S     | 110/114 (96%)   | 104 (94%)  | 6 (6%)   | 0        | 100         | 100 |
| 24  | T     | 114/119 (96%)   | 112 (98%)  | 2 (2%)   | 0        | 100         | 100 |
| 25  | U     | 99/102 (97%)    | 91 (92%)   | 6 (6%)   | 2 (2%)   | 7           | 6   |
| 26  | V     | 108/118 (92%)   | 100 (93%)  | 6 (6%)   | 2 (2%)   | 8           | 7   |
| 27  | W     | 88/94 (94%)     | 82 (93%)   | 5 (6%)   | 1 (1%)   | 14          | 15  |
| 28  | X     | 93/103 (90%)    | 85 (91%)   | 7 (8%)   | 1 (1%)   | 14          | 15  |
| 29  | Z     | 71/96 (74%)     | 66 (93%)   | 5 (7%)   | 0        | 100         | 100 |
| 30  | D     | 412/418 (99%)   | 376 (91%)  | 29 (7%)  | 7 (2%)   | 9           | 8   |
| 31  | E     | 138/141 (98%)   | 116 (84%)  | 18 (13%) | 4 (3%)   | 4           | 3   |
| All | All   | 3467/3684 (94%) | 3180 (92%) | 245 (7%) | 42 (1%)  | 17          | 14  |

All (42) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | 1     | 21  | ALA  |
| 12  | G     | 126 | VAL  |
| 17  | M     | 50  | ASP  |
| 26  | V     | 17  | ILE  |
| 30  | D     | 247 | ASN  |
| 31  | E     | 19  | PRO  |
| 8   | 8     | 31  | HIS  |
| 15  | J     | 118 | SER  |
| 17  | M     | 28  | ARG  |
| 18  | N     | 15  | GLY  |
| 19  | O     | 48  | LEU  |
| 26  | V     | 68  | ASP  |
| 30  | D     | 51  | TYR  |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 30  | D     | 164 | LYS  |
| 31  | E     | 24  | GLY  |
| 6   | 6     | 12  | CYS  |
| 8   | 8     | 28  | PHE  |
| 14  | I     | 159 | GLU  |
| 15  | J     | 83  | MET  |
| 16  | K     | 55  | PRO  |
| 21  | Q     | 75  | GLN  |
| 30  | D     | 32  | ASN  |
| 31  | E     | 22  | PRO  |
| 1   | 1     | 56  | SER  |
| 12  | G     | 252 | LYS  |
| 15  | J     | 97  | TYR  |
| 16  | K     | 80  | SER  |
| 19  | O     | 80  | ASP  |
| 28  | X     | 87  | GLY  |
| 15  | J     | 150 | ARG  |
| 21  | Q     | 104 | PRO  |
| 22  | R     | 104 | ARG  |
| 25  | U     | 52  | PHE  |
| 30  | D     | 150 | GLY  |
| 30  | D     | 330 | TYR  |
| 19  | O     | 107 | SER  |
| 22  | R     | 63  | PHE  |
| 27  | W     | 66  | GLY  |
| 31  | E     | 60  | PHE  |
| 30  | D     | 144 | GLY  |
| 25  | U     | 29  | VAL  |
| 16  | K     | 126 | PRO  |

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed    | Rotameric | Outliers | Percentiles |     |
|-----|-------|-------------|-----------|----------|-------------|-----|
| 1   | 1     | 50/53 (94%) | 48 (96%)  | 2 (4%)   | 31          | 44  |
| 2   | 2     | 52/55 (94%) | 52 (100%) | 0        | 100         | 100 |

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| Mol | Chain | Analysed        | Rotameric  | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|----------|-------------|-----|
| 3   | 3     | 50/52 (96%)     | 49 (98%)   | 1 (2%)   | 55          | 72  |
| 4   | 4     | 56/73 (77%)     | 55 (98%)   | 1 (2%)   | 59          | 75  |
| 5   | 5     | 47/50 (94%)     | 45 (96%)   | 2 (4%)   | 29          | 40  |
| 6   | 6     | 46/48 (96%)     | 42 (91%)   | 4 (9%)   | 10          | 12  |
| 7   | 7     | 38/39 (97%)     | 38 (100%)  | 0        | 100         | 100 |
| 8   | 8     | 53/56 (95%)     | 52 (98%)   | 1 (2%)   | 57          | 73  |
| 9   | 9     | 35/35 (100%)    | 32 (91%)   | 3 (9%)   | 10          | 12  |
| 12  | G     | 221/225 (98%)   | 217 (98%)  | 4 (2%)   | 59          | 75  |
| 13  | H     | 169/171 (99%)   | 167 (99%)  | 2 (1%)   | 71          | 84  |
| 14  | I     | 171/174 (98%)   | 167 (98%)  | 4 (2%)   | 50          | 67  |
| 15  | J     | 151/155 (97%)   | 145 (96%)  | 6 (4%)   | 31          | 44  |
| 16  | K     | 137/147 (93%)   | 132 (96%)  | 5 (4%)   | 35          | 49  |
| 17  | M     | 119/121 (98%)   | 118 (99%)  | 1 (1%)   | 81          | 91  |
| 18  | N     | 101/101 (100%)  | 99 (98%)   | 2 (2%)   | 55          | 72  |
| 19  | O     | 113/115 (98%)   | 112 (99%)  | 1 (1%)   | 78          | 89  |
| 20  | P     | 105/113 (93%)   | 105 (100%) | 0        | 100         | 100 |
| 21  | Q     | 102/111 (92%)   | 102 (100%) | 0        | 100         | 100 |
| 22  | R     | 96/97 (99%)     | 91 (95%)   | 5 (5%)   | 23          | 32  |
| 23  | S     | 98/100 (98%)    | 98 (100%)  | 0        | 100         | 100 |
| 24  | T     | 95/97 (98%)     | 93 (98%)   | 2 (2%)   | 53          | 70  |
| 25  | U     | 82/82 (100%)    | 80 (98%)   | 2 (2%)   | 49          | 66  |
| 26  | V     | 91/97 (94%)     | 89 (98%)   | 2 (2%)   | 52          | 69  |
| 27  | W     | 80/84 (95%)     | 80 (100%)  | 0        | 100         | 100 |
| 28  | X     | 81/88 (92%)     | 79 (98%)   | 2 (2%)   | 47          | 65  |
| 29  | Z     | 58/76 (76%)     | 58 (100%)  | 0        | 100         | 100 |
| 30  | D     | 362/365 (99%)   | 346 (96%)  | 16 (4%)  | 28          | 39  |
| 31  | E     | 110/111 (99%)   | 103 (94%)  | 7 (6%)   | 17          | 23  |
| All | All   | 2969/3091 (96%) | 2894 (98%) | 75 (2%)  | 50          | 65  |

All (75) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | 1     | 39  | LEU  |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | 1     | 58  | LYS  |
| 3   | 3     | 38  | GLU  |
| 4   | 4     | 6   | HIS  |
| 5   | 5     | 27  | MET  |
| 5   | 5     | 52  | LYS  |
| 6   | 6     | 12  | CYS  |
| 6   | 6     | 15  | ARG  |
| 6   | 6     | 24  | ARG  |
| 6   | 6     | 40  | ARG  |
| 8   | 8     | 31  | HIS  |
| 9   | 9     | 4   | ARG  |
| 9   | 9     | 24  | MET  |
| 9   | 9     | 25  | VAL  |
| 12  | G     | 130 | LEU  |
| 12  | G     | 133 | LYS  |
| 12  | G     | 153 | GLN  |
| 12  | G     | 244 | LYS  |
| 13  | H     | 181 | VAL  |
| 13  | H     | 203 | LYS  |
| 14  | I     | 7   | LEU  |
| 14  | I     | 20  | ASN  |
| 14  | I     | 95  | ARG  |
| 14  | I     | 115 | SER  |
| 15  | J     | 4   | LEU  |
| 15  | J     | 50  | LEU  |
| 15  | J     | 88  | LYS  |
| 15  | J     | 91  | LEU  |
| 15  | J     | 95  | ARG  |
| 15  | J     | 140 | GLU  |
| 16  | K     | 72  | LEU  |
| 16  | K     | 89  | LEU  |
| 16  | K     | 105 | LEU  |
| 16  | K     | 114 | GLU  |
| 16  | K     | 173 | GLU  |
| 17  | M     | 29  | LEU  |
| 18  | N     | 64  | ARG  |
| 18  | N     | 81  | GLU  |
| 19  | O     | 142 | LYS  |
| 22  | R     | 32  | ASN  |
| 22  | R     | 39  | ASN  |
| 22  | R     | 41  | TYR  |
| 22  | R     | 58  | ASN  |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 22  | R     | 110 | GLU  |
| 24  | T     | 97  | ASP  |
| 24  | T     | 102 | ASP  |
| 25  | U     | 10  | LYS  |
| 25  | U     | 39  | LEU  |
| 26  | V     | 16  | ARG  |
| 26  | V     | 76  | VAL  |
| 28  | X     | 33  | VAL  |
| 28  | X     | 65  | VAL  |
| 30  | D     | 1   | MET  |
| 30  | D     | 6   | LEU  |
| 30  | D     | 66  | MET  |
| 30  | D     | 71  | LEU  |
| 30  | D     | 131 | PHE  |
| 30  | D     | 138 | ASP  |
| 30  | D     | 148 | ASN  |
| 30  | D     | 149 | ARG  |
| 30  | D     | 161 | ARG  |
| 30  | D     | 201 | TYR  |
| 30  | D     | 235 | LEU  |
| 30  | D     | 259 | VAL  |
| 30  | D     | 283 | LEU  |
| 30  | D     | 329 | MET  |
| 30  | D     | 340 | PHE  |
| 30  | D     | 364 | GLU  |
| 31  | E     | 2   | LYS  |
| 31  | E     | 16  | LYS  |
| 31  | E     | 63  | ARG  |
| 31  | E     | 83  | LYS  |
| 31  | E     | 115 | LEU  |
| 31  | E     | 124 | MET  |
| 31  | E     | 134 | MET  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2   | 2     | 17  | GLN  |
| 2   | 2     | 31  | GLN  |
| 3   | 3     | 40  | ASN  |
| 5   | 5     | 28  | ASN  |
| 8   | 8     | 31  | HIS  |
| 12  | G     | 153 | GLN  |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 12  | G     | 194 | GLN  |
| 12  | G     | 199 | GLN  |
| 12  | G     | 226 | ASN  |
| 13  | H     | 87  | ASN  |
| 13  | H     | 184 | ASN  |
| 14  | I     | 20  | ASN  |
| 15  | J     | 127 | ASN  |
| 15  | J     | 135 | GLN  |
| 15  | J     | 172 | GLN  |
| 16  | K     | 97  | GLN  |
| 16  | K     | 140 | HIS  |
| 18  | N     | 109 | ASN  |
| 21  | Q     | 61  | GLN  |
| 22  | R     | 32  | ASN  |
| 22  | R     | 58  | ASN  |
| 23  | S     | 41  | GLN  |
| 24  | T     | 72  | GLN  |
| 25  | U     | 101 | ASN  |
| 30  | D     | 47  | ASN  |
| 30  | D     | 133 | GLN  |
| 30  | D     | 140 | GLN  |
| 30  | D     | 249 | GLN  |
| 30  | D     | 264 | HIS  |
| 31  | E     | 92  | ASN  |

### 5.3.3 RNA ⓘ

| Mol | Chain | Analysed        | Backbone Outliers | Pucker Outliers |
|-----|-------|-----------------|-------------------|-----------------|
| 10  | A     | 2905/2931 (99%) | 556 (19%)         | 76 (2%)         |
| 11  | B     | 113/114 (99%)   | 24 (21%)          | 2 (1%)          |
| All | All   | 3018/3045 (99%) | 580 (19%)         | 78 (2%)         |

All (580) RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 10  | A    |
| 10  | A     | 12  | A    |
| 10  | A     | 13  | A    |
| 10  | A     | 34  | U    |
| 10  | A     | 45  | G    |
| 10  | A     | 46  | C    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 64  | A    |
| 10  | A     | 71  | A    |
| 10  | A     | 74  | U    |
| 10  | A     | 75  | G    |
| 10  | A     | 84  | A    |
| 10  | A     | 90  | A    |
| 10  | A     | 91  | C    |
| 10  | A     | 92  | G    |
| 10  | A     | 93  | U    |
| 10  | A     | 96  | G    |
| 10  | A     | 101 | G    |
| 10  | A     | 117 | A    |
| 10  | A     | 118 | A    |
| 10  | A     | 119 | U    |
| 10  | A     | 135 | C    |
| 10  | A     | 139 | A    |
| 10  | A     | 140 | G    |
| 10  | A     | 141 | U    |
| 10  | A     | 150 | A    |
| 10  | A     | 158 | G    |
| 10  | A     | 161 | A    |
| 10  | A     | 164 | A    |
| 10  | A     | 166 | A    |
| 10  | A     | 175 | G    |
| 10  | A     | 183 | G    |
| 10  | A     | 198 | A    |
| 10  | A     | 201 | A    |
| 10  | A     | 202 | U    |
| 10  | A     | 215 | A    |
| 10  | A     | 218 | A    |
| 10  | A     | 223 | A    |
| 10  | A     | 224 | A    |
| 10  | A     | 225 | A    |
| 10  | A     | 231 | A    |
| 10  | A     | 232 | U    |
| 10  | A     | 233 | C    |
| 10  | A     | 235 | A    |
| 10  | A     | 247 | G    |
| 10  | A     | 250 | G    |
| 10  | A     | 257 | A    |
| 10  | A     | 274 | A    |
| 10  | A     | 275 | C    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 279 | G    |
| 10  | A     | 281 | A    |
| 10  | A     | 282 | G    |
| 10  | A     | 283 | C    |
| 10  | A     | 284 | U    |
| 10  | A     | 285 | U    |
| 10  | A     | 286 | G    |
| 10  | A     | 288 | U    |
| 10  | A     | 293 | G    |
| 10  | A     | 297 | U    |
| 10  | A     | 298 | U    |
| 10  | A     | 299 | G    |
| 10  | A     | 300 | U    |
| 10  | A     | 306 | A    |
| 10  | A     | 309 | C    |
| 10  | A     | 311 | A    |
| 10  | A     | 312 | U    |
| 10  | A     | 313 | A    |
| 10  | A     | 314 | U    |
| 10  | A     | 320 | U    |
| 10  | A     | 323 | A    |
| 10  | A     | 326 | A    |
| 10  | A     | 327 | G    |
| 10  | A     | 328 | A    |
| 10  | A     | 336 | A    |
| 10  | A     | 345 | G    |
| 10  | A     | 354 | A    |
| 10  | A     | 360 | G    |
| 10  | A     | 361 | C    |
| 10  | A     | 372 | A    |
| 10  | A     | 373 | A    |
| 10  | A     | 389 | A    |
| 10  | A     | 399 | C    |
| 10  | A     | 404 | A    |
| 10  | A     | 407 | G    |
| 10  | A     | 409 | G    |
| 10  | A     | 410 | G    |
| 10  | A     | 411 | A    |
| 10  | A     | 417 | A    |
| 10  | A     | 418 | G    |
| 10  | A     | 421 | C    |
| 10  | A     | 429 | C    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 431 | C    |
| 10  | A     | 432 | G    |
| 10  | A     | 450 | C    |
| 10  | A     | 451 | C    |
| 10  | A     | 452 | G    |
| 10  | A     | 457 | G    |
| 10  | A     | 466 | C    |
| 10  | A     | 470 | G    |
| 10  | A     | 482 | C    |
| 10  | A     | 490 | C    |
| 10  | A     | 497 | U    |
| 10  | A     | 503 | A    |
| 10  | A     | 527 | G    |
| 10  | A     | 536 | A    |
| 10  | A     | 549 | C    |
| 10  | A     | 550 | A    |
| 10  | A     | 552 | U    |
| 10  | A     | 553 | U    |
| 10  | A     | 567 | G    |
| 10  | A     | 575 | G    |
| 10  | A     | 576 | U    |
| 10  | A     | 577 | A    |
| 10  | A     | 578 | G    |
| 10  | A     | 583 | A    |
| 10  | A     | 591 | A    |
| 10  | A     | 594 | G    |
| 10  | A     | 606 | G    |
| 10  | A     | 616 | G    |
| 10  | A     | 618 | A    |
| 10  | A     | 630 | G    |
| 10  | A     | 641 | U    |
| 10  | A     | 646 | A    |
| 10  | A     | 655 | G    |
| 10  | A     | 658 | A    |
| 10  | A     | 659 | A    |
| 10  | A     | 672 | A    |
| 10  | A     | 679 | G    |
| 10  | A     | 682 | A    |
| 10  | A     | 690 | U    |
| 10  | A     | 692 | G    |
| 10  | A     | 699 | U    |
| 10  | A     | 700 | A    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 731 | A    |
| 10  | A     | 732 | U    |
| 10  | A     | 757 | A    |
| 10  | A     | 758 | G    |
| 10  | A     | 759 | G    |
| 10  | A     | 762 | A    |
| 10  | A     | 763 | U    |
| 10  | A     | 765 | C    |
| 10  | A     | 776 | U    |
| 10  | A     | 793 | U    |
| 10  | A     | 803 | G    |
| 10  | A     | 810 | A    |
| 10  | A     | 811 | G    |
| 10  | A     | 821 | G    |
| 10  | A     | 828 | A    |
| 10  | A     | 830 | U    |
| 10  | A     | 836 | U    |
| 10  | A     | 837 | C    |
| 10  | A     | 838 | G    |
| 10  | A     | 851 | G    |
| 10  | A     | 858 | C    |
| 10  | A     | 865 | A    |
| 10  | A     | 873 | U    |
| 10  | A     | 874 | U    |
| 10  | A     | 890 | G    |
| 10  | A     | 891 | U    |
| 10  | A     | 892 | A    |
| 10  | A     | 893 | A    |
| 10  | A     | 905 | G    |
| 10  | A     | 906 | G    |
| 10  | A     | 913 | A    |
| 10  | A     | 916 | G    |
| 10  | A     | 924 | U    |
| 10  | A     | 926 | G    |
| 10  | A     | 928 | G    |
| 10  | A     | 930 | C    |
| 10  | A     | 931 | C    |
| 10  | A     | 932 | C    |
| 10  | A     | 933 | U    |
| 10  | A     | 934 | U    |
| 10  | A     | 935 | C    |
| 10  | A     | 936 | U    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 937  | C    |
| 10  | A     | 938  | G    |
| 10  | A     | 940  | G    |
| 10  | A     | 942  | U    |
| 10  | A     | 943  | A    |
| 10  | A     | 944  | C    |
| 10  | A     | 950  | U    |
| 10  | A     | 954  | A    |
| 10  | A     | 957  | A    |
| 10  | A     | 959  | C    |
| 10  | A     | 964  | A    |
| 10  | A     | 973  | U    |
| 10  | A     | 976  | U    |
| 10  | A     | 979  | U    |
| 10  | A     | 987  | A    |
| 10  | A     | 991  | A    |
| 10  | A     | 992  | G    |
| 10  | A     | 1007 | G    |
| 10  | A     | 1014 | A    |
| 10  | A     | 1020 | A    |
| 10  | A     | 1029 | A    |
| 10  | A     | 1035 | G    |
| 10  | A     | 1036 | A    |
| 10  | A     | 1042 | A    |
| 10  | A     | 1045 | U    |
| 10  | A     | 1058 | U    |
| 10  | A     | 1059 | A    |
| 10  | A     | 1066 | A    |
| 10  | A     | 1067 | A    |
| 10  | A     | 1068 | G    |
| 10  | A     | 1072 | A    |
| 10  | A     | 1083 | G    |
| 10  | A     | 1084 | G    |
| 10  | A     | 1091 | U    |
| 10  | A     | 1092 | A    |
| 10  | A     | 1093 | G    |
| 10  | A     | 1097 | A    |
| 10  | A     | 1106 | U    |
| 10  | A     | 1107 | U    |
| 10  | A     | 1108 | G    |
| 10  | A     | 1115 | A    |
| 10  | A     | 1116 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 1117 | G    |
| 10  | A     | 1119 | A    |
| 10  | A     | 1126 | A    |
| 10  | A     | 1128 | U    |
| 10  | A     | 1129 | G    |
| 10  | A     | 1130 | A    |
| 10  | A     | 1131 | A    |
| 10  | A     | 1133 | G    |
| 10  | A     | 1134 | A    |
| 10  | A     | 1136 | U    |
| 10  | A     | 1138 | C    |
| 10  | A     | 1143 | U    |
| 10  | A     | 1145 | G    |
| 10  | A     | 1146 | C    |
| 10  | A     | 1148 | C    |
| 10  | A     | 1149 | A    |
| 10  | A     | 1150 | C    |
| 10  | A     | 1151 | U    |
| 10  | A     | 1152 | G    |
| 10  | A     | 1153 | G    |
| 10  | A     | 1154 | U    |
| 10  | A     | 1155 | C    |
| 10  | A     | 1157 | A    |
| 10  | A     | 1158 | G    |
| 10  | A     | 1174 | A    |
| 10  | A     | 1178 | U    |
| 10  | A     | 1179 | A    |
| 10  | A     | 1181 | C    |
| 10  | A     | 1182 | G    |
| 10  | A     | 1188 | A    |
| 10  | A     | 1216 | C    |
| 10  | A     | 1227 | U    |
| 10  | A     | 1241 | G    |
| 10  | A     | 1265 | A    |
| 10  | A     | 1278 | G    |
| 10  | A     | 1283 | G    |
| 10  | A     | 1298 | A    |
| 10  | A     | 1301 | G    |
| 10  | A     | 1302 | C    |
| 10  | A     | 1311 | G    |
| 10  | A     | 1316 | G    |
| 10  | A     | 1317 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 1319 | A    |
| 10  | A     | 1320 | G    |
| 10  | A     | 1333 | C    |
| 10  | A     | 1344 | A    |
| 10  | A     | 1345 | A    |
| 10  | A     | 1347 | A    |
| 10  | A     | 1369 | C    |
| 10  | A     | 1382 | G    |
| 10  | A     | 1393 | A    |
| 10  | A     | 1394 | C    |
| 10  | A     | 1396 | U    |
| 10  | A     | 1409 | A    |
| 10  | A     | 1423 | U    |
| 10  | A     | 1428 | A    |
| 10  | A     | 1429 | A    |
| 10  | A     | 1451 | G    |
| 10  | A     | 1453 | G    |
| 10  | A     | 1457 | A    |
| 10  | A     | 1462 | U    |
| 10  | A     | 1464 | A    |
| 10  | A     | 1465 | A    |
| 10  | A     | 1466 | C    |
| 10  | A     | 1469 | A    |
| 10  | A     | 1470 | U    |
| 10  | A     | 1478 | C    |
| 10  | A     | 1485 | G    |
| 10  | A     | 1493 | A    |
| 10  | A     | 1494 | A    |
| 10  | A     | 1505 | G    |
| 10  | A     | 1508 | A    |
| 10  | A     | 1511 | G    |
| 10  | A     | 1515 | G    |
| 10  | A     | 1518 | C    |
| 10  | A     | 1528 | G    |
| 10  | A     | 1529 | U    |
| 10  | A     | 1530 | G    |
| 10  | A     | 1531 | U    |
| 10  | A     | 1532 | G    |
| 10  | A     | 1539 | A    |
| 10  | A     | 1542 | C    |
| 10  | A     | 1543 | A    |
| 10  | A     | 1556 | G    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 1558 | G    |
| 10  | A     | 1561 | G    |
| 10  | A     | 1564 | U    |
| 10  | A     | 1566 | A    |
| 10  | A     | 1567 | G    |
| 10  | A     | 1574 | U    |
| 10  | A     | 1575 | G    |
| 10  | A     | 1595 | G    |
| 10  | A     | 1611 | C    |
| 10  | A     | 1612 | G    |
| 10  | A     | 1618 | A    |
| 10  | A     | 1621 | A    |
| 10  | A     | 1630 | U    |
| 10  | A     | 1635 | A    |
| 10  | A     | 1638 | G    |
| 10  | A     | 1656 | C    |
| 10  | A     | 1657 | A    |
| 10  | A     | 1658 | A    |
| 10  | A     | 1683 | A    |
| 10  | A     | 1695 | A    |
| 10  | A     | 1696 | G    |
| 10  | A     | 1697 | C    |
| 10  | A     | 1723 | G    |
| 10  | A     | 1735 | C    |
| 10  | A     | 1749 | A    |
| 10  | A     | 1750 | A    |
| 10  | A     | 1753 | G    |
| 10  | A     | 1761 | A    |
| 10  | A     | 1762 | U    |
| 10  | A     | 1763 | U    |
| 10  | A     | 1764 | A    |
| 10  | A     | 1773 | G    |
| 10  | A     | 1775 | C    |
| 10  | A     | 1777 | G    |
| 10  | A     | 1778 | A    |
| 10  | A     | 1779 | G    |
| 10  | A     | 1780 | A    |
| 10  | A     | 1781 | G    |
| 10  | A     | 1782 | A    |
| 10  | A     | 1783 | G    |
| 10  | A     | 1786 | G    |
| 10  | A     | 1789 | G    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 1795 | A    |
| 10  | A     | 1796 | G    |
| 10  | A     | 1797 | G    |
| 10  | A     | 1802 | G    |
| 10  | A     | 1806 | A    |
| 10  | A     | 1815 | C    |
| 10  | A     | 1824 | A    |
| 10  | A     | 1833 | C    |
| 10  | A     | 1834 | A    |
| 10  | A     | 1835 | A    |
| 10  | A     | 1849 | C    |
| 10  | A     | 1850 | G    |
| 10  | A     | 1862 | A    |
| 10  | A     | 1899 | A    |
| 10  | A     | 1900 | G    |
| 10  | A     | 1902 | U    |
| 10  | A     | 1904 | C    |
| 10  | A     | 1906 | G    |
| 10  | A     | 1907 | C    |
| 10  | A     | 1929 | A    |
| 10  | A     | 1938 | C    |
| 10  | A     | 1939 | G    |
| 10  | A     | 1945 | A    |
| 10  | A     | 1946 | A    |
| 10  | A     | 1947 | C    |
| 10  | A     | 1949 | A    |
| 10  | A     | 1950 | U    |
| 10  | A     | 1951 | A    |
| 10  | A     | 1952 | A    |
| 10  | A     | 1956 | U    |
| 10  | A     | 1962 | G    |
| 10  | A     | 1963 | G    |
| 10  | A     | 1966 | G    |
| 10  | A     | 1969 | A    |
| 10  | A     | 1970 | A    |
| 10  | A     | 1971 | A    |
| 10  | A     | 1973 | U    |
| 10  | A     | 1974 | C    |
| 10  | A     | 1975 | C    |
| 10  | A     | 1981 | G    |
| 10  | A     | 1988 | U    |
| 10  | A     | 1999 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 2003 | A    |
| 10  | A     | 2004 | A    |
| 10  | A     | 2005 | G    |
| 10  | A     | 2024 | U    |
| 10  | A     | 2026 | U    |
| 10  | A     | 2029 | C    |
| 10  | A     | 2030 | A    |
| 10  | A     | 2037 | G    |
| 10  | A     | 2056 | A    |
| 10  | A     | 2060 | G    |
| 10  | A     | 2064 | A    |
| 10  | A     | 2065 | G    |
| 10  | A     | 2066 | A    |
| 10  | A     | 2076 | C    |
| 10  | A     | 2088 | C    |
| 10  | A     | 2089 | G    |
| 10  | A     | 2093 | A    |
| 10  | A     | 2094 | G    |
| 10  | A     | 2102 | G    |
| 10  | A     | 2125 | G    |
| 10  | A     | 2126 | G    |
| 10  | A     | 2128 | A    |
| 10  | A     | 2130 | G    |
| 10  | A     | 2135 | U    |
| 10  | A     | 2137 | C    |
| 10  | A     | 2138 | C    |
| 10  | A     | 2139 | G    |
| 10  | A     | 2140 | C    |
| 10  | A     | 2142 | U    |
| 10  | A     | 2149 | G    |
| 10  | A     | 2153 | G    |
| 10  | A     | 2157 | G    |
| 10  | A     | 2158 | G    |
| 10  | A     | 2159 | A    |
| 10  | A     | 2160 | G    |
| 10  | A     | 2164 | A    |
| 10  | A     | 2165 | A    |
| 10  | A     | 2166 | G    |
| 10  | A     | 2167 | A    |
| 10  | A     | 2172 | U    |
| 10  | A     | 2173 | G    |
| 10  | A     | 2176 | C    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 2177 | G    |
| 10  | A     | 2182 | C    |
| 10  | A     | 2183 | A    |
| 10  | A     | 2185 | A    |
| 10  | A     | 2190 | G    |
| 10  | A     | 2192 | G    |
| 10  | A     | 2199 | G    |
| 10  | A     | 2205 | U    |
| 10  | A     | 2206 | A    |
| 10  | A     | 2207 | C    |
| 10  | A     | 2211 | C    |
| 10  | A     | 2212 | C    |
| 10  | A     | 2220 | A    |
| 10  | A     | 2231 | A    |
| 10  | A     | 2236 | G    |
| 10  | A     | 2237 | C    |
| 10  | A     | 2244 | U    |
| 10  | A     | 2258 | A    |
| 10  | A     | 2271 | G    |
| 10  | A     | 2272 | G    |
| 10  | A     | 2312 | G    |
| 10  | A     | 2316 | C    |
| 10  | A     | 2319 | A    |
| 10  | A     | 2320 | A    |
| 10  | A     | 2325 | U    |
| 10  | A     | 2328 | C    |
| 10  | A     | 2331 | A    |
| 10  | A     | 2338 | A    |
| 10  | A     | 2341 | G    |
| 10  | A     | 2353 | A    |
| 10  | A     | 2355 | A    |
| 10  | A     | 2356 | G    |
| 10  | A     | 2358 | G    |
| 10  | A     | 2360 | A    |
| 10  | A     | 2364 | G    |
| 10  | A     | 2367 | C    |
| 10  | A     | 2368 | A    |
| 10  | A     | 2380 | C    |
| 10  | A     | 2383 | C    |
| 10  | A     | 2390 | G    |
| 10  | A     | 2391 | A    |
| 10  | A     | 2410 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 2412 | G    |
| 10  | A     | 2416 | G    |
| 10  | A     | 2418 | C    |
| 10  | A     | 2424 | G    |
| 10  | A     | 2435 | U    |
| 10  | A     | 2436 | C    |
| 10  | A     | 2439 | C    |
| 10  | A     | 2454 | G    |
| 10  | A     | 2455 | C    |
| 10  | A     | 2456 | U    |
| 10  | A     | 2458 | A    |
| 10  | A     | 2459 | A    |
| 10  | A     | 2462 | G    |
| 10  | A     | 2463 | A    |
| 10  | A     | 2464 | U    |
| 10  | A     | 2467 | A    |
| 10  | A     | 2468 | A    |
| 10  | A     | 2472 | A    |
| 10  | A     | 2473 | C    |
| 10  | A     | 2474 | C    |
| 10  | A     | 2480 | G    |
| 10  | A     | 2481 | A    |
| 10  | A     | 2507 | C    |
| 10  | A     | 2509 | A    |
| 10  | A     | 2511 | A    |
| 10  | A     | 2524 | U    |
| 10  | A     | 2535 | G    |
| 10  | A     | 2539 | U    |
| 10  | A     | 2551 | A    |
| 10  | A     | 2553 | C    |
| 10  | A     | 2558 | G    |
| 10  | A     | 2562 | G    |
| 10  | A     | 2580 | U    |
| 10  | A     | 2587 | U    |
| 10  | A     | 2599 | A    |
| 10  | A     | 2600 | G    |
| 10  | A     | 2606 | C    |
| 10  | A     | 2618 | U    |
| 10  | A     | 2635 | A    |
| 10  | A     | 2636 | G    |
| 10  | A     | 2642 | U    |
| 10  | A     | 2643 | C    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 2646 | U    |
| 10  | A     | 2663 | G    |
| 10  | A     | 2674 | A    |
| 10  | A     | 2696 | G    |
| 10  | A     | 2715 | G    |
| 10  | A     | 2718 | G    |
| 10  | A     | 2722 | U    |
| 10  | A     | 2724 | C    |
| 10  | A     | 2747 | G    |
| 10  | A     | 2755 | G    |
| 10  | A     | 2759 | U    |
| 10  | A     | 2766 | C    |
| 10  | A     | 2777 | G    |
| 10  | A     | 2781 | A    |
| 10  | A     | 2790 | A    |
| 10  | A     | 2791 | A    |
| 10  | A     | 2797 | A    |
| 10  | A     | 2798 | A    |
| 10  | A     | 2799 | G    |
| 10  | A     | 2810 | G    |
| 10  | A     | 2811 | A    |
| 10  | A     | 2813 | G    |
| 10  | A     | 2822 | C    |
| 10  | A     | 2823 | A    |
| 10  | A     | 2824 | U    |
| 10  | A     | 2827 | C    |
| 10  | A     | 2828 | U    |
| 10  | A     | 2829 | U    |
| 10  | A     | 2830 | C    |
| 10  | A     | 2832 | G    |
| 10  | A     | 2836 | G    |
| 10  | A     | 2862 | A    |
| 10  | A     | 2864 | A    |
| 10  | A     | 2872 | G    |
| 10  | A     | 2890 | U    |
| 10  | A     | 2896 | G    |
| 10  | A     | 2897 | A    |
| 10  | A     | 2906 | A    |
| 10  | A     | 2908 | A    |
| 10  | A     | 2909 | C    |
| 10  | A     | 2913 | U    |
| 10  | A     | 2915 | G    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 2916 | A    |
| 10  | A     | 2921 | G    |
| 10  | A     | 2922 | G    |
| 10  | A     | 2930 | C    |
| 11  | B     | 7    | A    |
| 11  | B     | 10   | U    |
| 11  | B     | 11   | A    |
| 11  | B     | 23   | U    |
| 11  | B     | 24   | C    |
| 11  | B     | 26   | C    |
| 11  | B     | 27   | A    |
| 11  | B     | 29   | C    |
| 11  | B     | 37   | A    |
| 11  | B     | 42   | G    |
| 11  | B     | 43   | A    |
| 11  | B     | 54   | U    |
| 11  | B     | 55   | A    |
| 11  | B     | 63   | C    |
| 11  | B     | 67   | G    |
| 11  | B     | 82   | G    |
| 11  | B     | 84   | G    |
| 11  | B     | 85   | C    |
| 11  | B     | 86   | U    |
| 11  | B     | 88   | C    |
| 11  | B     | 103  | G    |
| 11  | B     | 107  | G    |
| 11  | B     | 113  | G    |
| 11  | B     | 114  | G    |

All (78) RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 10  | A     | 12  | A    |
| 10  | A     | 45  | G    |
| 10  | A     | 60  | G    |
| 10  | A     | 63  | U    |
| 10  | A     | 90  | A    |
| 10  | A     | 91  | C    |
| 10  | A     | 139 | A    |
| 10  | A     | 183 | G    |
| 10  | A     | 201 | A    |
| 10  | A     | 232 | U    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 251  | C    |
| 10  | A     | 274  | A    |
| 10  | A     | 297  | U    |
| 10  | A     | 308  | U    |
| 10  | A     | 388  | A    |
| 10  | A     | 548  | A    |
| 10  | A     | 614  | U    |
| 10  | A     | 630  | G    |
| 10  | A     | 732  | U    |
| 10  | A     | 810  | A    |
| 10  | A     | 836  | U    |
| 10  | A     | 851  | G    |
| 10  | A     | 873  | U    |
| 10  | A     | 890  | G    |
| 10  | A     | 905  | G    |
| 10  | A     | 913  | A    |
| 10  | A     | 990  | C    |
| 10  | A     | 1030 | G    |
| 10  | A     | 1035 | G    |
| 10  | A     | 1057 | A    |
| 10  | A     | 1066 | A    |
| 10  | A     | 1103 | A    |
| 10  | A     | 1116 | A    |
| 10  | A     | 1117 | G    |
| 10  | A     | 1129 | G    |
| 10  | A     | 1133 | G    |
| 10  | A     | 1148 | C    |
| 10  | A     | 1149 | A    |
| 10  | A     | 1151 | U    |
| 10  | A     | 1153 | G    |
| 10  | A     | 1188 | A    |
| 10  | A     | 1203 | A    |
| 10  | A     | 1311 | G    |
| 10  | A     | 1344 | A    |
| 10  | A     | 1369 | C    |
| 10  | A     | 1376 | G    |
| 10  | A     | 1464 | A    |
| 10  | A     | 1493 | A    |
| 10  | A     | 1528 | G    |
| 10  | A     | 1598 | G    |
| 10  | A     | 1606 | U    |
| 10  | A     | 1611 | C    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 10  | A     | 1635 | A    |
| 10  | A     | 1656 | C    |
| 10  | A     | 1657 | A    |
| 10  | A     | 1667 | A    |
| 10  | A     | 1849 | C    |
| 10  | A     | 1949 | A    |
| 10  | A     | 1951 | A    |
| 10  | A     | 2030 | A    |
| 10  | A     | 2084 | A    |
| 10  | A     | 2344 | A    |
| 10  | A     | 2379 | A    |
| 10  | A     | 2458 | A    |
| 10  | A     | 2463 | A    |
| 10  | A     | 2472 | A    |
| 10  | A     | 2480 | G    |
| 10  | A     | 2551 | A    |
| 10  | A     | 2636 | G    |
| 10  | A     | 2789 | U    |
| 10  | A     | 2797 | A    |
| 10  | A     | 2809 | A    |
| 10  | A     | 2823 | A    |
| 10  | A     | 2896 | G    |
| 10  | A     | 2908 | A    |
| 10  | A     | 2921 | G    |
| 11  | B     | 22   | G    |
| 11  | B     | 106  | C    |

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 167 ligands modelled in this entry, 163 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Type | Chain | Res  | Link | Bond lengths |      |          | Bond angles |      |          |
|-----|------|-------|------|------|--------------|------|----------|-------------|------|----------|
|     |      |       |      |      | Counts       | RMSZ | # Z  > 2 | Counts      | RMSZ | # Z  > 2 |
| 35  | PUT  | A     | 3151 | -    | 5,5,5        | 0.20 | 0        | 4,4,4       | 0.21 | 0        |
| 37  | GNP  | D     | 501  | 34   | 29,34,34     | 1.46 | 6 (20%)  | 33,54,54    | 2.24 | 5 (15%)  |
| 33  | SPD  | A     | 3001 | -    | 9,9,9        | 0.30 | 0        | 8,8,8       | 0.73 | 0        |
| 35  | PUT  | A     | 3152 | -    | 5,5,5        | 0.20 | 0        | 4,4,4       | 0.20 | 0        |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res  | Link | Chirals | Torsions   | Rings   |
|-----|------|-------|------|------|---------|------------|---------|
| 35  | PUT  | A     | 3151 | -    | -       | 1/3/3/3    | -       |
| 37  | GNP  | D     | 501  | 34   | -       | 4/14/38/38 | 0/3/3/3 |
| 33  | SPD  | A     | 3001 | -    | -       | 5/7/7/7    | -       |
| 35  | PUT  | A     | 3152 | -    | -       | 0/3/3/3    | -       |

All (6) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms  | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|--------|-------|-------------|----------|
| 37  | D     | 501 | GNP  | C6-N1  | 4.05  | 1.40        | 1.33     |
| 37  | D     | 501 | GNP  | PG-O1G | 3.35  | 1.51        | 1.46     |
| 37  | D     | 501 | GNP  | PB-O1B | 2.84  | 1.50        | 1.46     |
| 37  | D     | 501 | GNP  | PG-O3G | -2.31 | 1.50        | 1.56     |
| 37  | D     | 501 | GNP  | PG-O2G | -2.31 | 1.50        | 1.56     |
| 37  | D     | 501 | GNP  | PB-O2B | -2.25 | 1.50        | 1.56     |

All (5) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms      | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|------------|-------|-------------|----------|
| 37  | D     | 501 | GNP  | C5-C6-N1   | -8.81 | 111.38      | 123.43   |
| 37  | D     | 501 | GNP  | C2-N1-C6   | 5.93  | 125.36      | 115.93   |
| 37  | D     | 501 | GNP  | O2B-PB-O1B | 4.06  | 118.44      | 109.92   |
| 37  | D     | 501 | GNP  | N3-C2-N1   | -2.83 | 123.45      | 127.22   |
| 37  | D     | 501 | GNP  | C2-N3-C4   | -2.76 | 112.20      | 115.36   |

There are no chirality outliers.



All (10) torsion outliers are listed below:

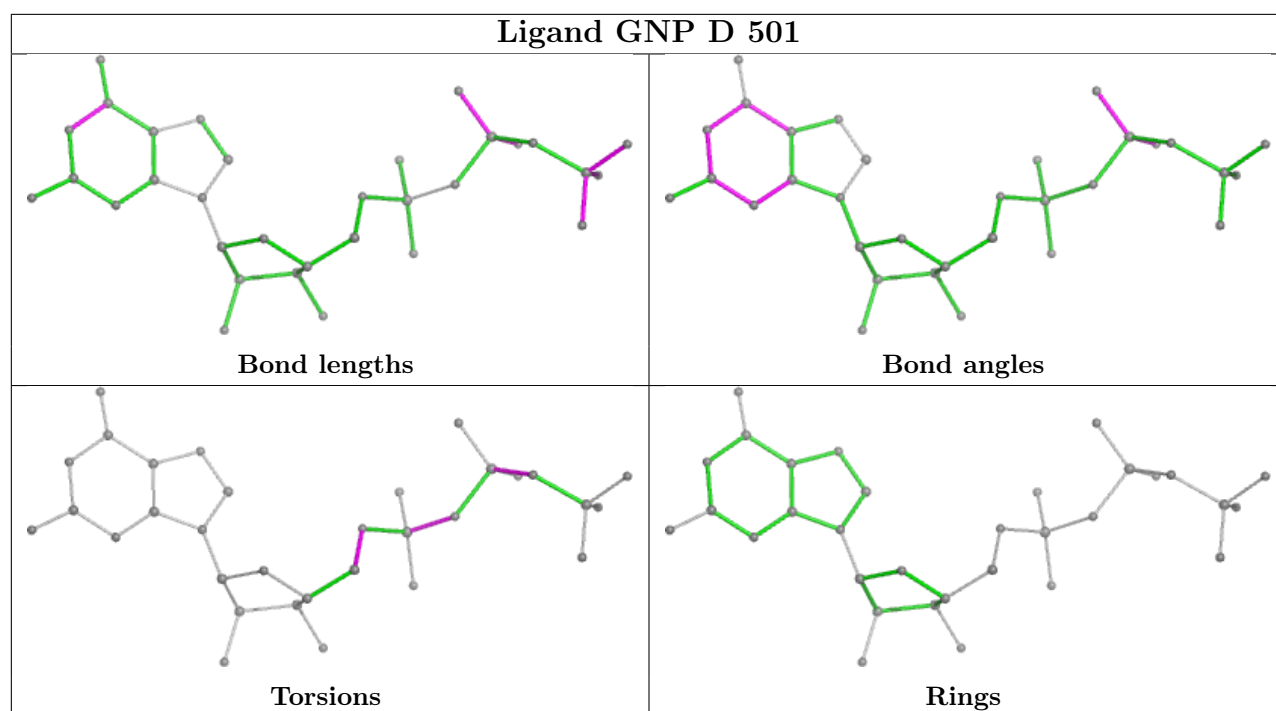
| Mol | Chain | Res  | Type | Atoms          |
|-----|-------|------|------|----------------|
| 33  | A     | 3001 | SPD  | C3-C4-C5-N6    |
| 33  | A     | 3001 | SPD  | C8-C7-N6-C5    |
| 33  | A     | 3001 | SPD  | N6-C7-C8-C9    |
| 35  | A     | 3151 | PUT  | C1-C2-C3-C4    |
| 37  | D     | 501  | GNP  | PB-O3A-PA-O1A  |
| 37  | D     | 501  | GNP  | PG-N3B-PB-O3A  |
| 37  | D     | 501  | GNP  | C4'-C5'-O5'-PA |
| 33  | A     | 3001 | SPD  | N1-C2-C3-C4    |
| 37  | D     | 501  | GNP  | PG-N3B-PB-O1B  |
| 33  | A     | 3001 | SPD  | C7-C8-C9-N10   |

There are no ring outliers.

1 monomer is involved in 1 short contact:

| Mol | Chain | Res  | Type | Clashes | Symm-Clashes |
|-----|-------|------|------|---------|--------------|
| 33  | A     | 3001 | SPD  | 1       | 0            |

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

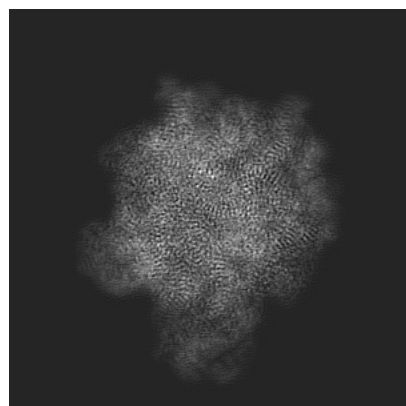
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-15161. These allow visual inspection of the internal detail of the map and identification of artifacts.

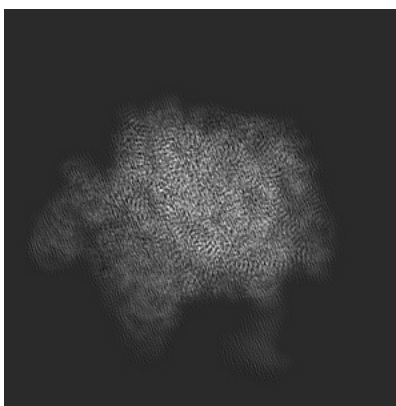
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

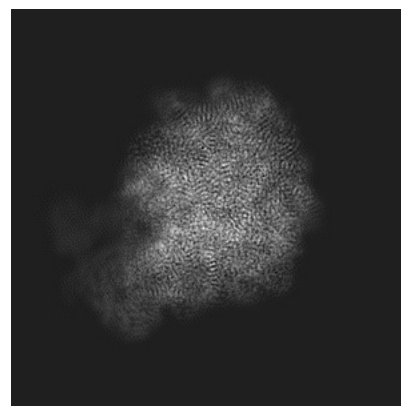
#### 6.1.1 Primary map



X

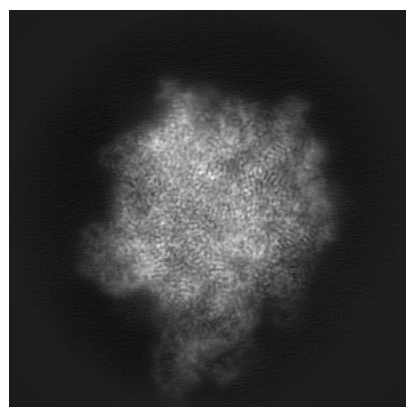


Y

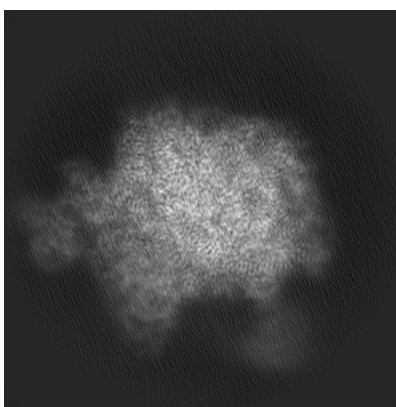


Z

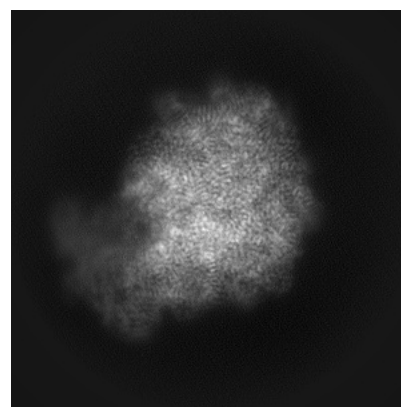
#### 6.1.2 Raw map



X



Y

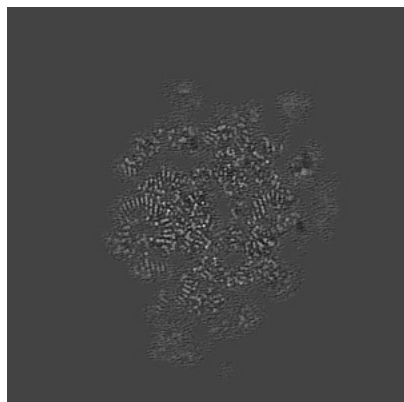


Z

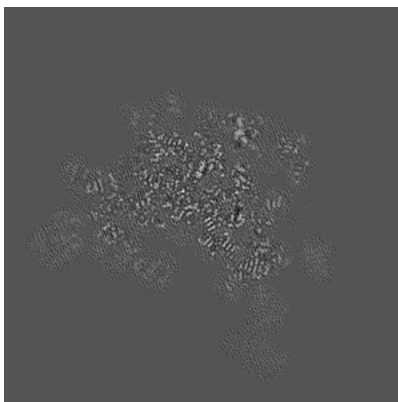
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

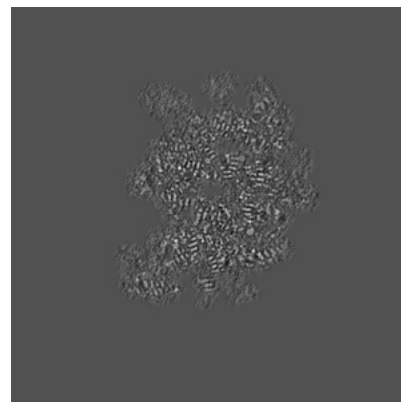
### 6.2.1 Primary map



X Index: 180

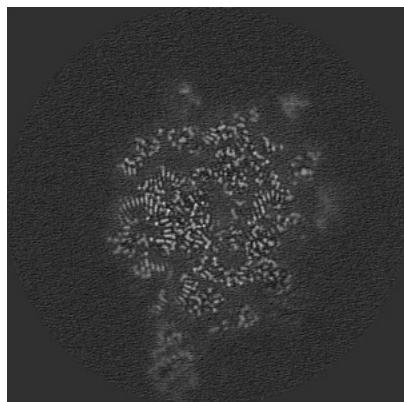


Y Index: 180

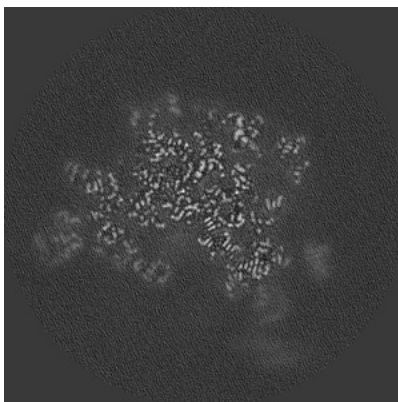


Z Index: 180

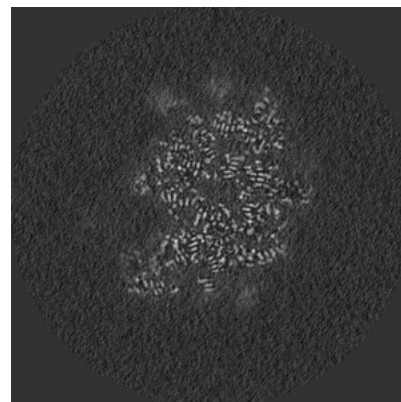
### 6.2.2 Raw map



X Index: 180



Y Index: 180

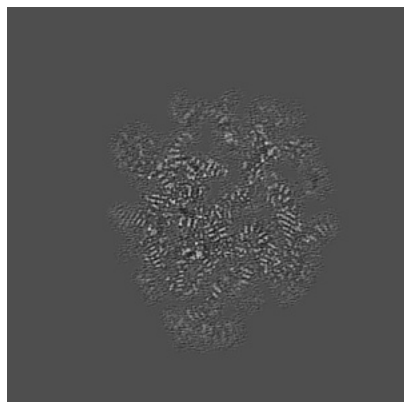


Z Index: 180

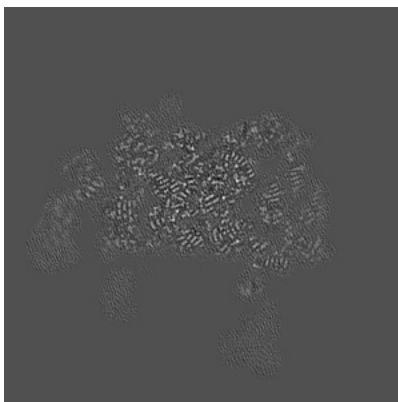
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

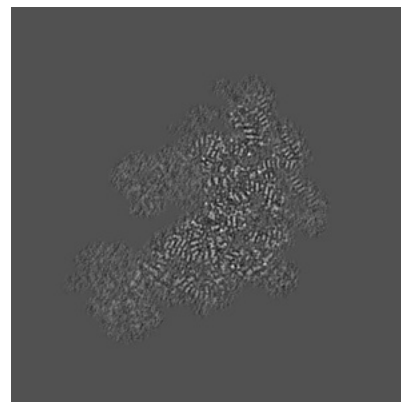
### 6.3.1 Primary map



X Index: 206

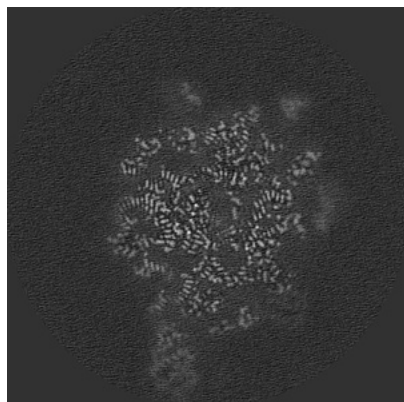


Y Index: 162

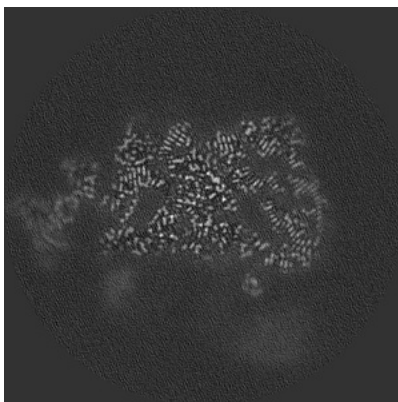


Z Index: 148

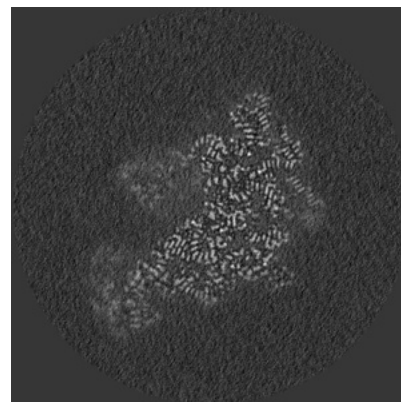
### 6.3.2 Raw map



X Index: 181



Y Index: 156



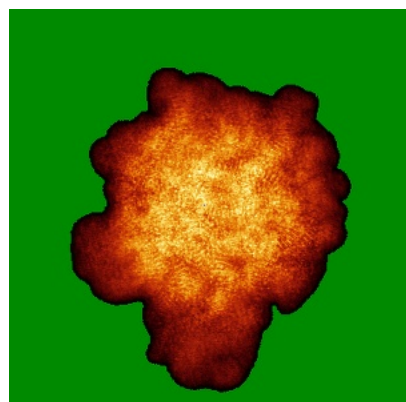
Z Index: 148

The images above show the largest variance slices of the map in three orthogonal directions.

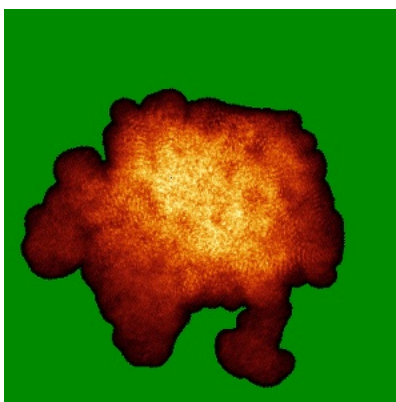


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

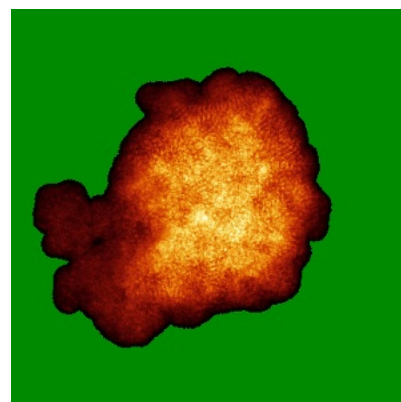
### 6.4.1 Primary map



X

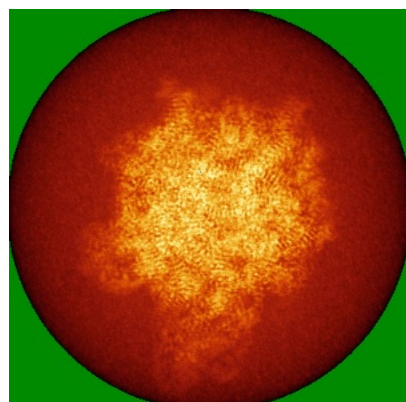


Y

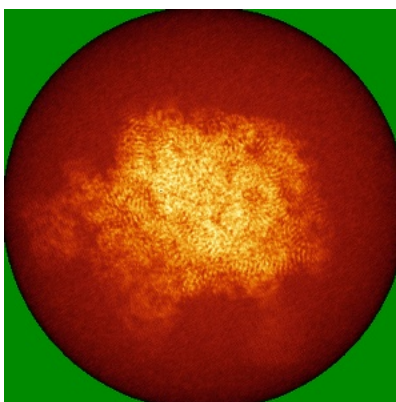


Z

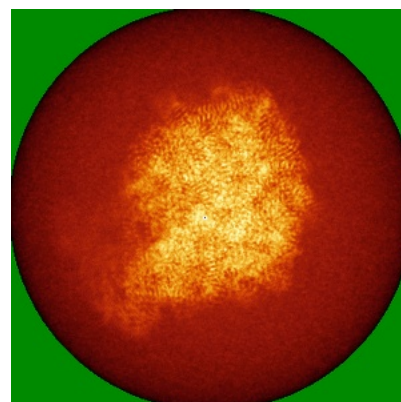
### 6.4.2 Raw map



X



Y

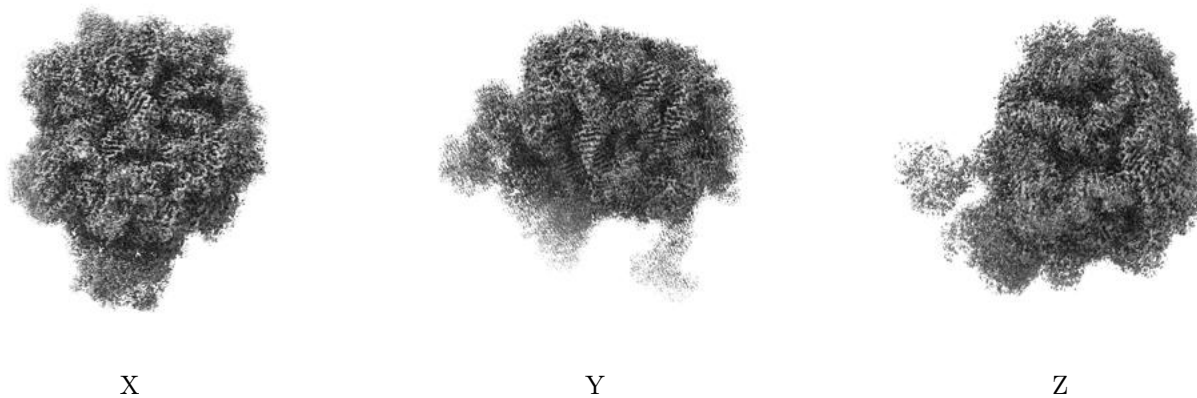


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

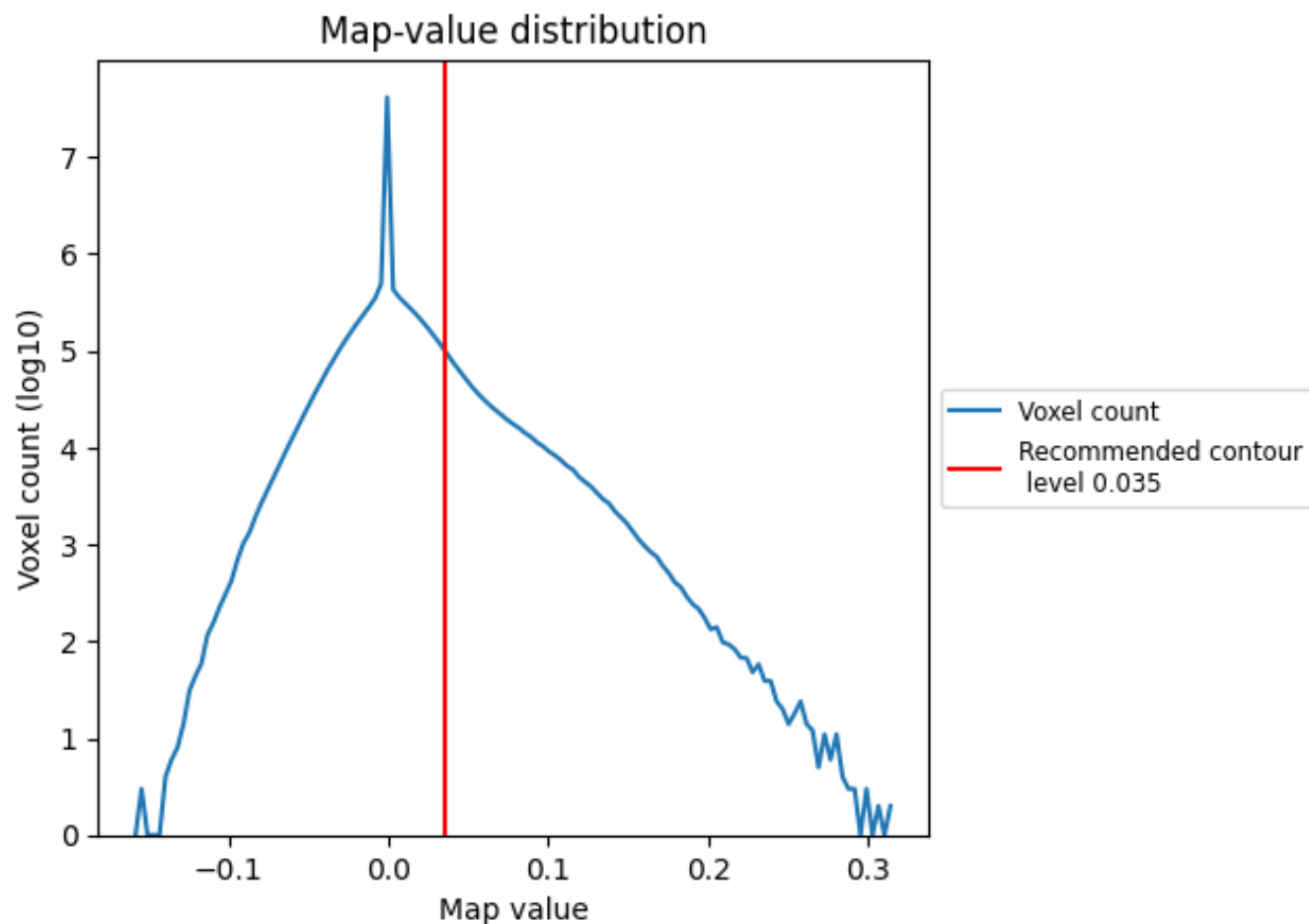
## 6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis [i](#)

This section contains the results of statistical analysis of the map.

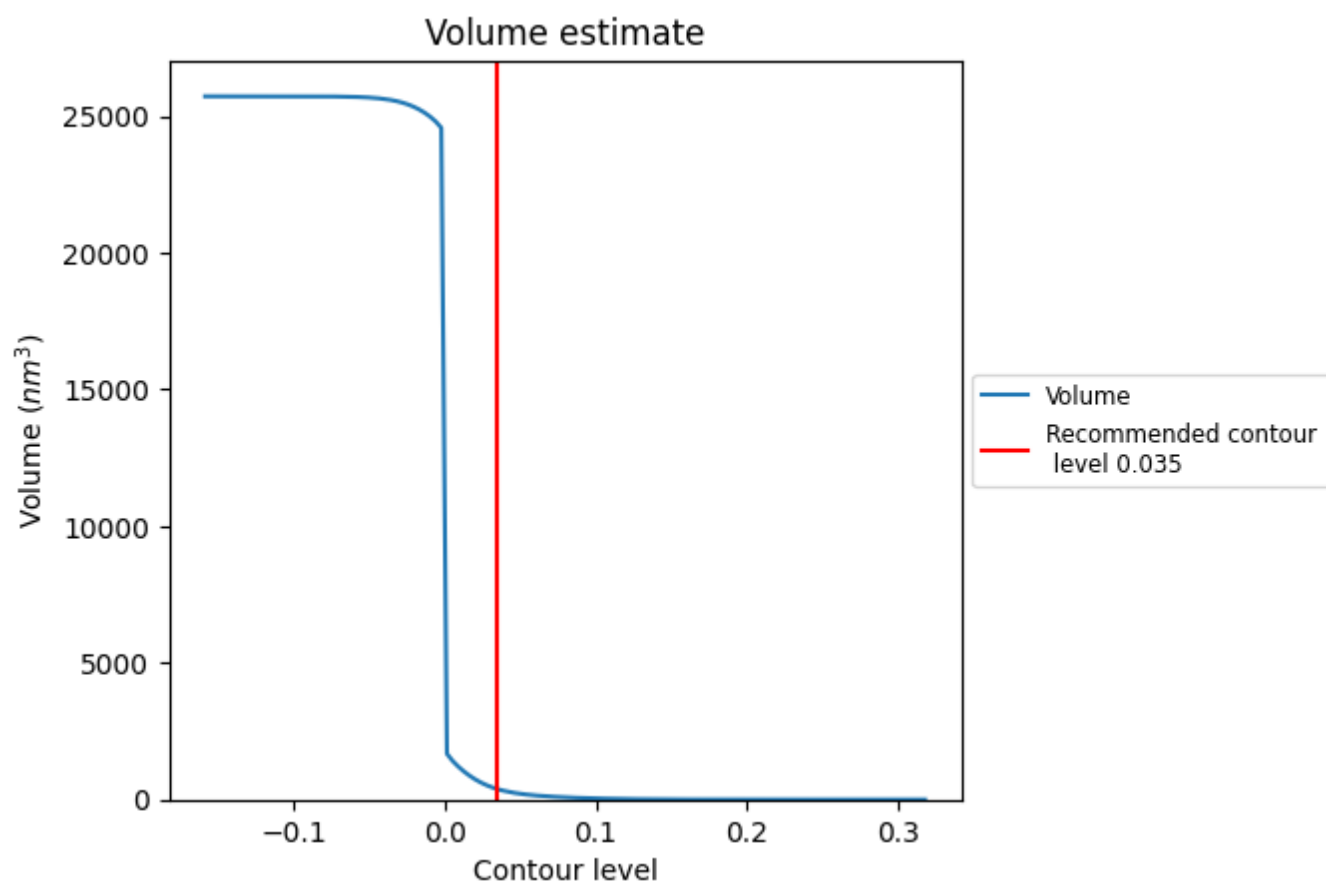
### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.



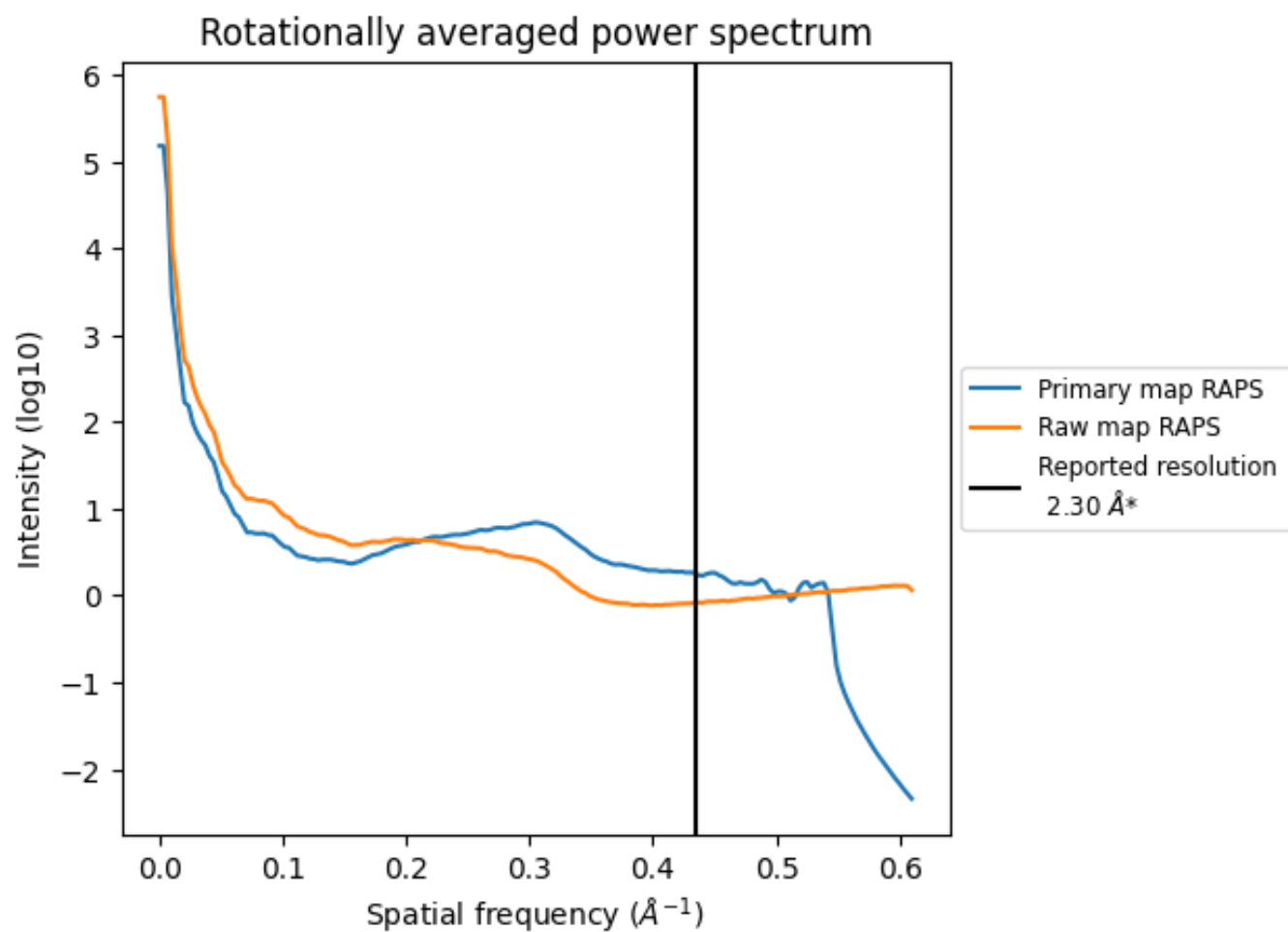
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 384 nm<sup>3</sup>; this corresponds to an approximate mass of 347 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum ⓘ

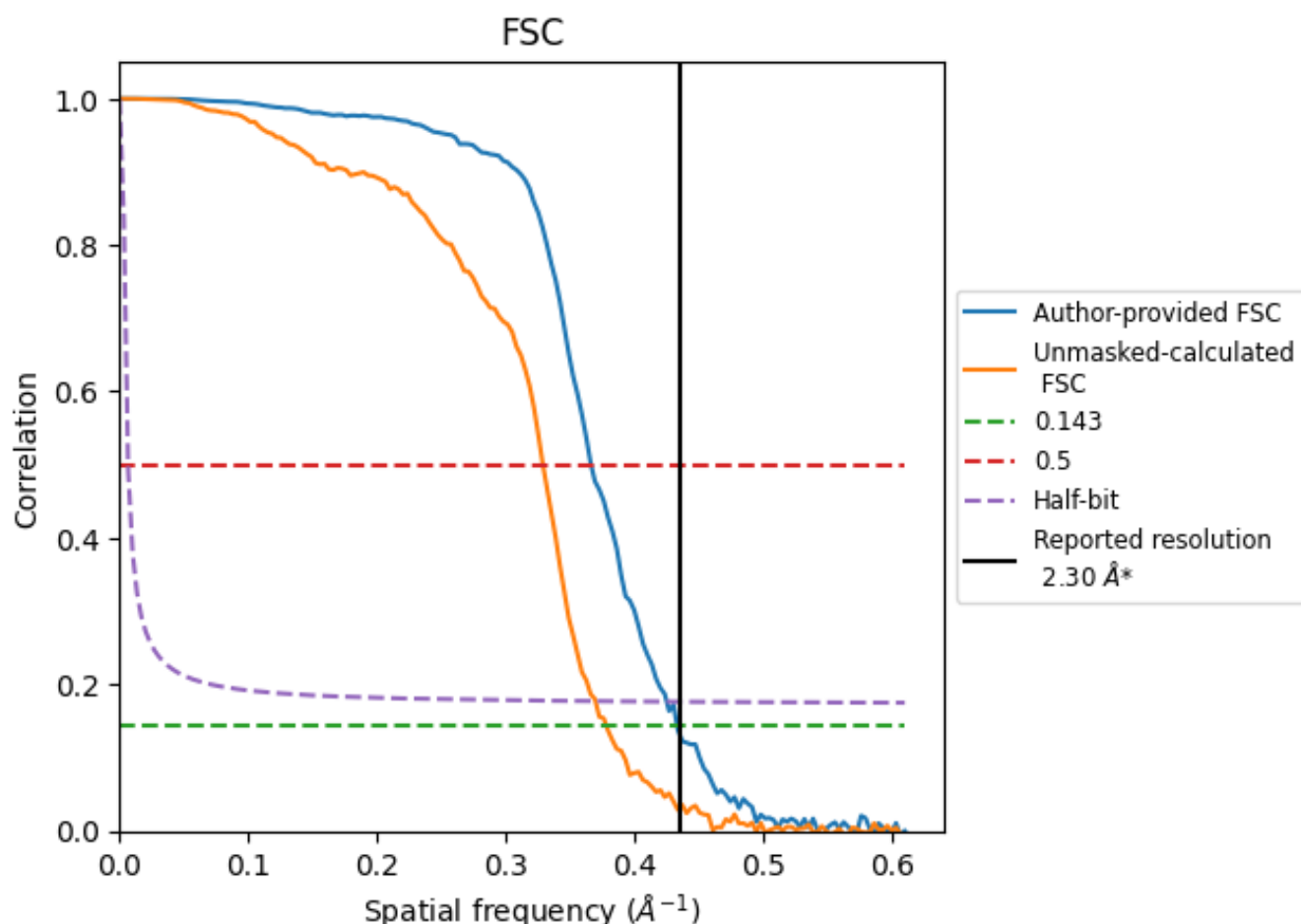


\*Reported resolution corresponds to spatial frequency of  $0.435 \text{ \AA}^{-1}$

## 8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.435 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

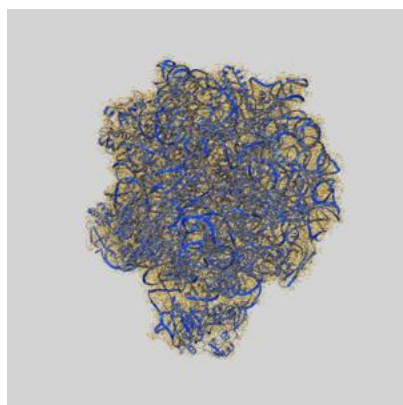
| Resolution estimate (Å)   | Estimation criterion (FSC cut-off) |      |          |
|---------------------------|------------------------------------|------|----------|
|                           | 0.143                              | 0.5  | Half-bit |
| Reported by author        | 2.30                               | -    | -        |
| Author-provided FSC curve | 2.31                               | 2.73 | 2.35     |
| Unmasked-calculated*      | 2.64                               | 3.04 | 2.71     |

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.64 differs from the reported value 2.3 by more than 10 %

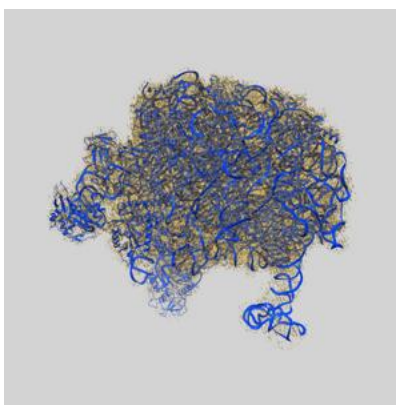
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-15161 and PDB model 8A57. Per-residue inclusion information can be found in [section 3](#) on [page 12](#).

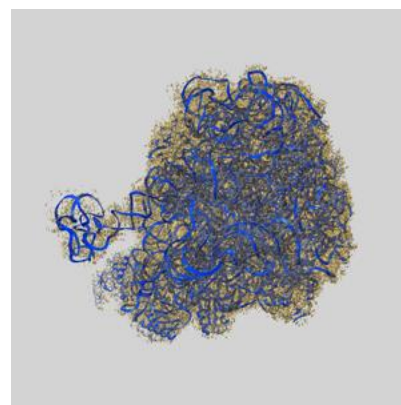
### 9.1 Map-model overlay [i](#)



X



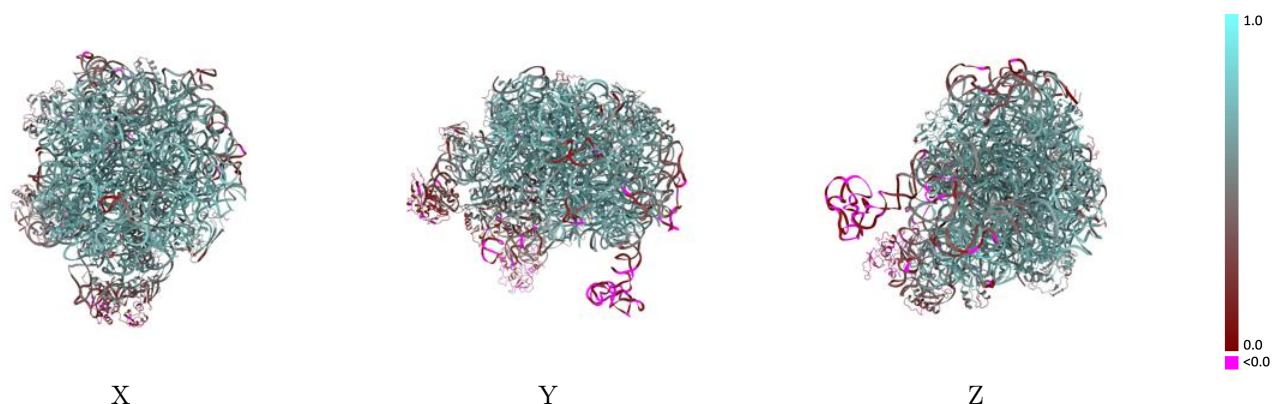
Y



Z

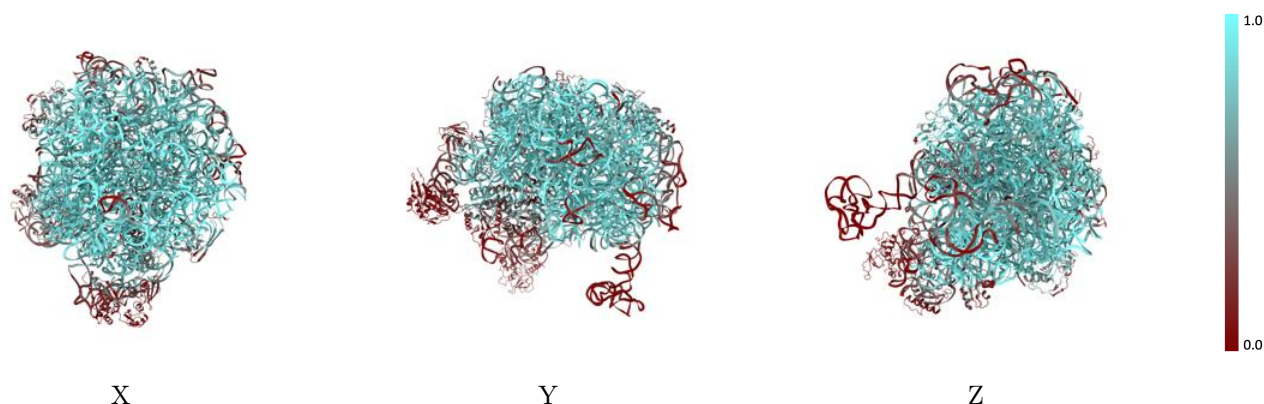
The images above show the 3D surface view of the map at the recommended contour level 0.035 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)



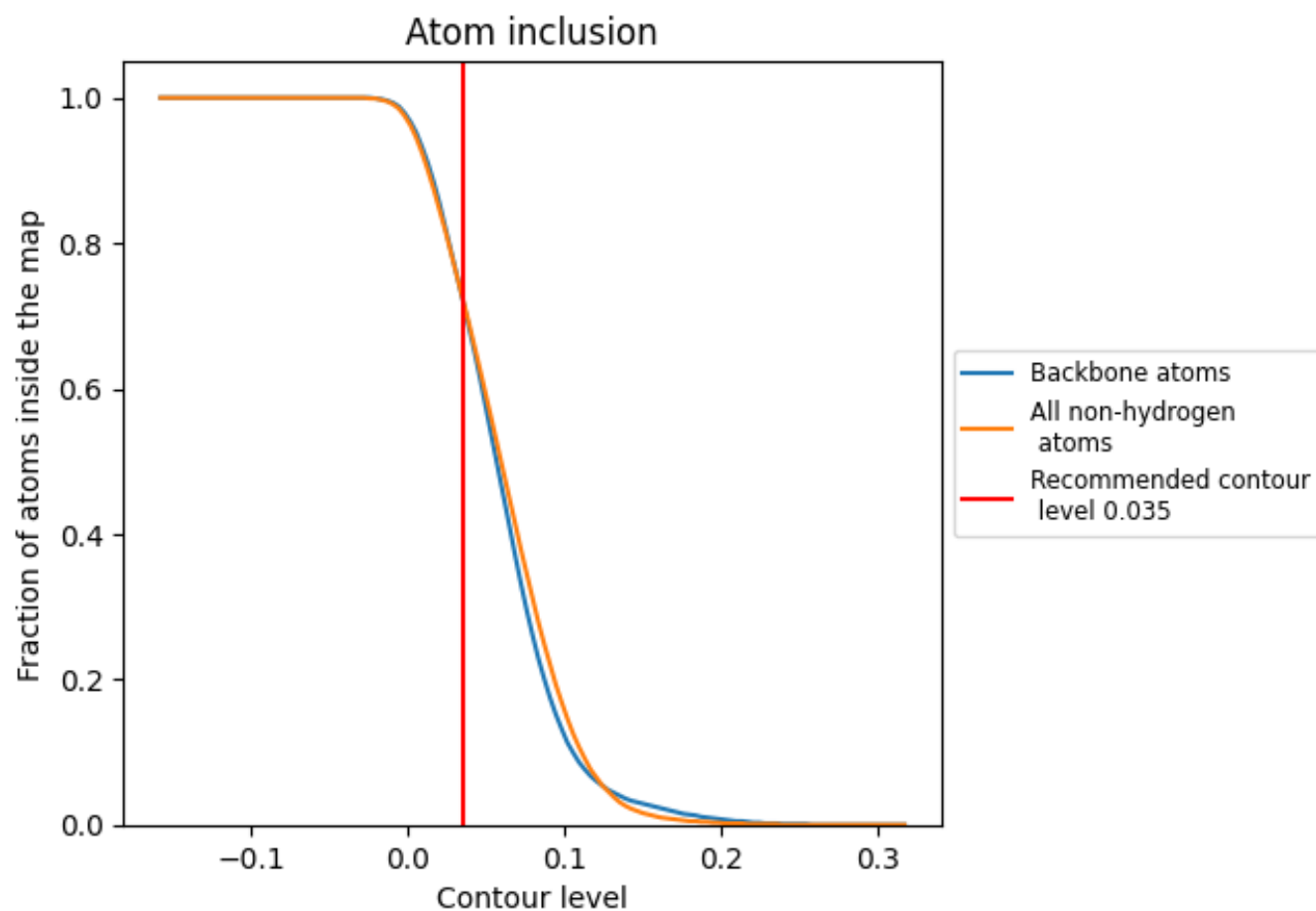
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.035).

































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 72% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.035) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion   | Q-score  |
|-------|--|--|
| All   |  0.7250   |  0.5790   |
| 1     |  0.7470   |  0.5970   |
| 2     |  0.6280   |  0.5470   |
| 3     |  0.8000   |  0.6390   |
| 4     |  0.0170   |  0.0140   |
| 5     |  0.6360   |  0.5470   |
| 6     |  0.4760   |  0.4880   |
| 7     |  0.9670   |  0.7490   |
| 8     |  0.8680   |  0.6820   |
| 9     |  0.8360   |  0.6490   |
| A     |  0.7860   |  0.6080   |
| B     |  0.4400   |  0.4340   |
| D     |  0.3010   |  0.3590   |
| E     |  0.0360   |  0.0850   |
| G     |  0.8540  |  0.6770  |
| H     |  0.8360 |  0.6700 |
| I     |  0.7460 |  0.6210 |
| J     |  0.0520 |  0.1020 |
| K     |  0.3420 |  0.3970 |
| M     |  0.8760 |  0.6900 |
| N     |  0.7440 |  0.6160 |
| O     |  0.6330 |  0.5620 |
| P     |  0.8060 |  0.6390 |
| Q     |  0.8340 |  0.6510 |
| R     |  0.3040 |  0.3620 |
| S     |  0.6770 |  0.5720 |
| T     |  0.9130 |  0.7200 |
| U     |  0.7710 |  0.6300 |
| V     |  0.8720 |  0.6850 |
| W     |  0.7650 |  0.6150 |
| X     |  0.5800 |  0.5240 |
| Z     |  0.8860 |  0.6870 |

