



## Full wwPDB EM Validation Report ⓘ

May 29, 2025 – 01:00 PM EDT

PDB ID : 7TJJ / pdb\_00007tjj  
EMDB ID : EMD-25927  
Title : S. cerevisiae ORC bound to 84 bp ARS1 DNA and Cdc6 (state 1) with docked Orc6 N-terminal domain  
Authors : Schmidt, J.M.; Yang, R.; Kumar, A.; Hunker, O.; Bleichert, F.  
Deposited on : 2022-01-16  
Resolution : 2.70 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.dev118  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0rc1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.43.1

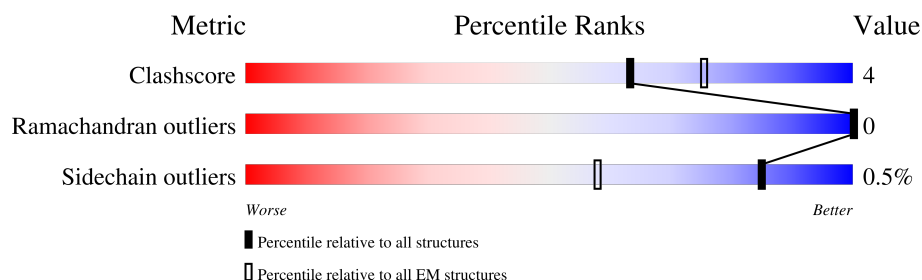
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.70 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 (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	A	917	
2	B	620	
3	C	616	
4	D	532	
5	E	479	
6	F	435	
7	G	84	
8	H	84	

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Mol	Chain	Length	Quality of chain
9	I	516	<div><div></div><div>64%</div><div>9%</div><div>26%</div></div>

## 2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 24732 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 Origin recognition complex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	485	Total	C	N	O	S	0	0
			3889	2484	667	720	18		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP P54784
A	-1	ASN	-	expression tag	UNP P54784
A	0	ALA	-	expression tag	UNP P54784

- Molecule 2 is a protein called Origin recognition complex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	251	Total	C	N	O	S	0	0
			2081	1350	344	378	9		

- Molecule 3 is a protein called Origin recognition complex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	544	Total	C	N	O	S	0	0
			4504	2916	736	836	16		

- Molecule 4 is a protein called Origin recognition complex subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	433	Total	C	N	O	S	0	0
			3536	2266	600	657	13		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	SER	-	expression tag	UNP P54791

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-1	ASN	-	expression tag	UNP P54791
D	0	ALA	-	expression tag	UNP P54791

- Molecule 5 is a protein called Origin recognition complex subunit 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	438	Total	C	N	O	S	0	0
			3596	2341	584	659	12		

- Molecule 6 is a protein called Origin recognition complex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	260	Total	C	N	O	S	0	0
			2141	1367	366	387	21		

- Molecule 7 is a DNA chain called DNA, 84 bp ARS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	41	Total	C	N	O	P	0	0
			832	405	132	255	40		

- Molecule 8 is a DNA chain called DNA, 84 bp ARS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	41	Total	C	N	O	P	0	0
			846	405	165	235	41		

- Molecule 9 is a protein called Cell division control protein 6.

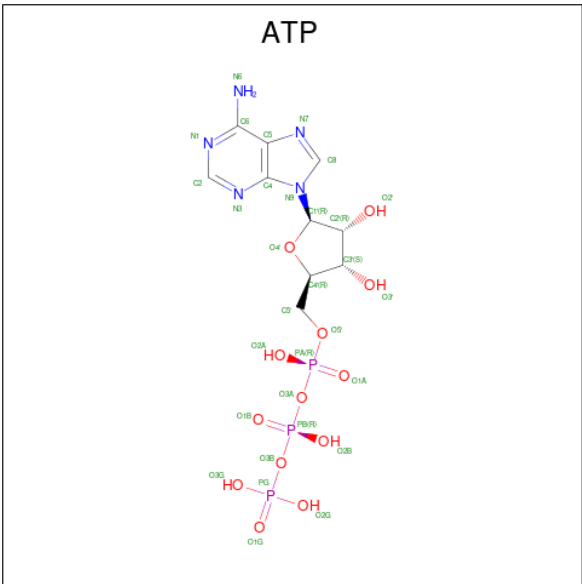
Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	380	Total	C	N	O	S	0	0
			3019	1945	498	560	16		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	-2	SER	-	expression tag	UNP P09119
I	-1	ASN	-	expression tag	UNP P09119
I	0	ALA	-	expression tag	UNP P09119

- Molecule 10 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>)

(labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
10	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
10	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
10	E	1	Total	C	N	O	P	0
			31	10	5	13	3	
10	I	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 11 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

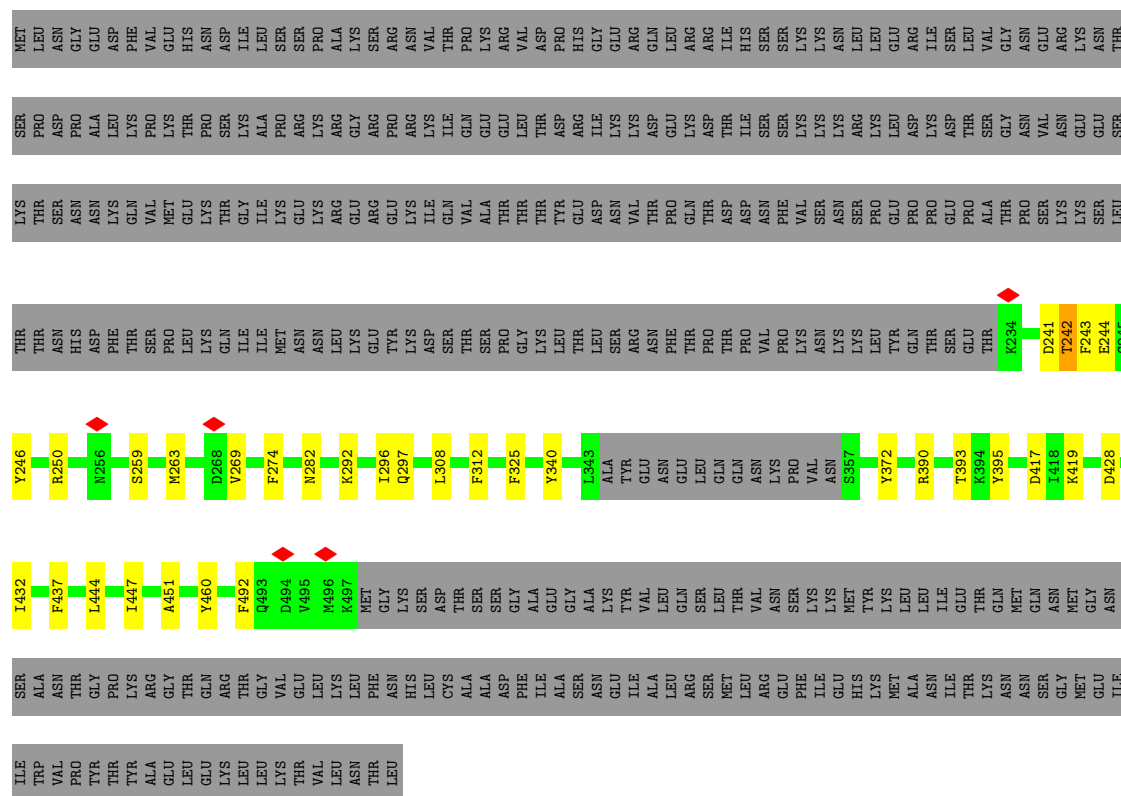
Mol	Chain	Residues	Atoms		AltConf
11	A	1	Total	Mg	0
			1	1	
11	D	1	Total	Mg	0
			1	1	
11	E	1	Total	Mg	0
			1	1	
11	I	1	Total	Mg	0
			1	1	

- Molecule 12 is water.

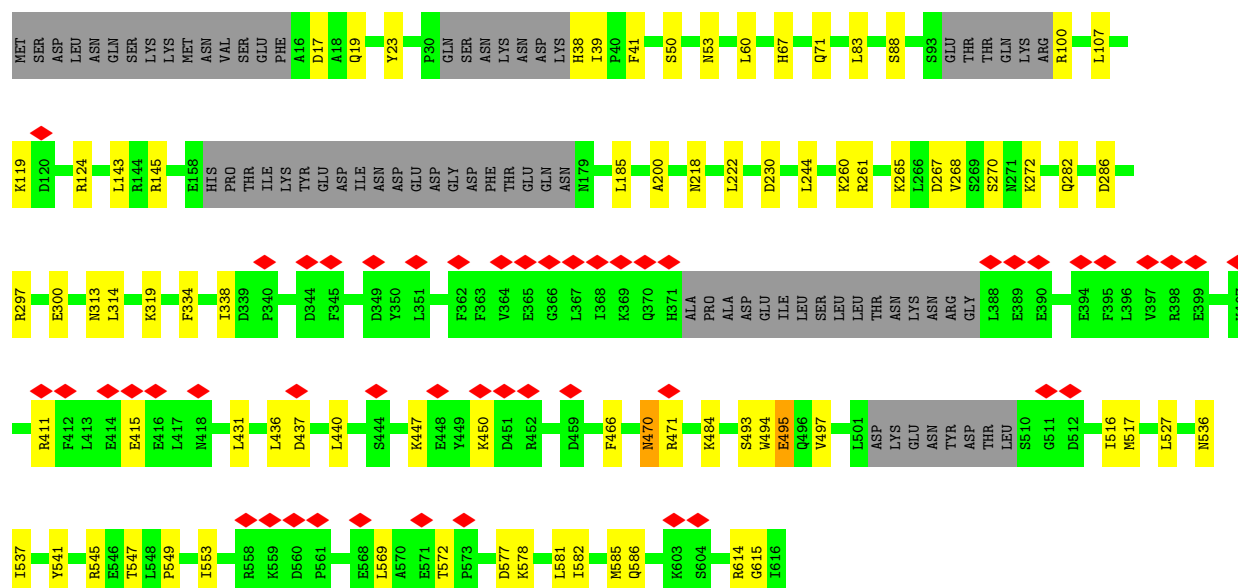
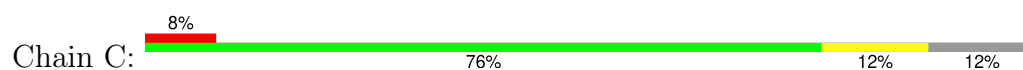
Mol	Chain	Residues	Atoms		AltConf
12	A	30	Total 30	O 30	0
12	B	7	Total 7	O 7	0
12	C	4	Total 4	O 4	0
12	D	60	Total 60	O 60	0
12	E	29	Total 29	O 29	0
12	F	1	Total 1	O 1	0
12	G	13	Total 13	O 13	0
12	H	11	Total 11	O 11	0
12	I	5	Total 5	O 5	0







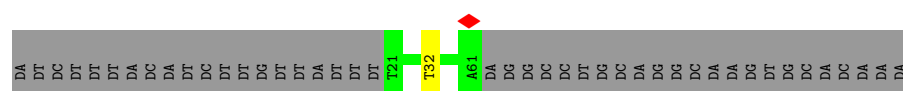
### • Molecule 3: Origin recognition complex subunit 3



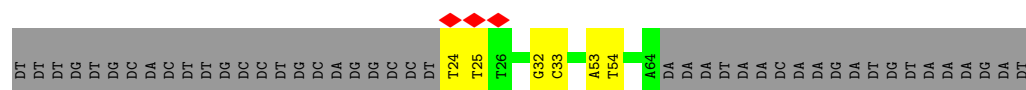
### • Molecule 4: Origin recognition complex subunit 4



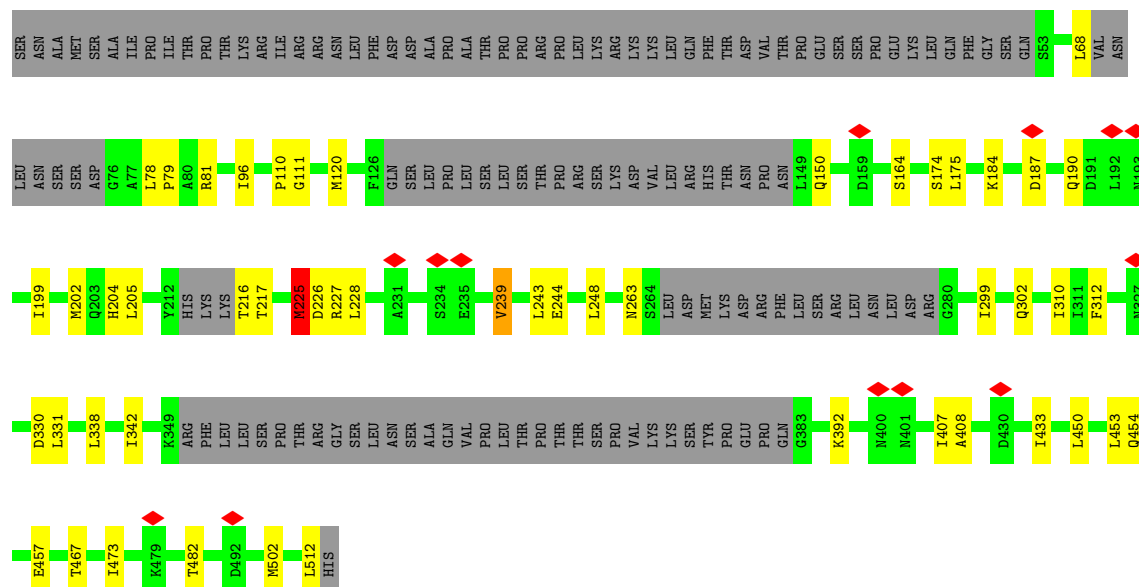




- Chain H: 



- Chain I: 



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	88859	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 ( $e^-/\text{\AA}^2$ )	6.6	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.092	Depositor
Minimum map value	-0.025	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	258.0, 258.0, 258.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86, 0.86, 0.86	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ATP

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	A	0.25	0/3948	0.53	1/5308 (0.0%)
2	B	0.30	0/2134	0.59	0/2884
3	C	0.23	0/4601	0.53	0/6207
4	D	0.27	0/3598	0.53	0/4860
5	E	0.22	0/3679	0.46	0/4992
6	F	0.41	2/2178 (0.1%)	0.69	1/2931 (0.0%)
7	G	0.26	0/928	0.57	0/1431
8	H	0.24	0/953	0.48	0/1468
9	I	0.31	1/3064 (0.0%)	0.62	6/4126 (0.1%)
All	All	0.28	3/25083 (0.0%)	0.55	8/34207 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	F	98	PHE	C-N	9.04	1.46	1.33
6	F	99	ARG	C-N	-8.39	1.22	1.33
9	I	407	ILE	C-N	-6.17	1.24	1.33

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	I	227	ARG	N-CA-C	-5.77	106.47	112.93
6	F	29	LEU	N-CA-C	-5.57	105.36	111.82
1	A	601	THR	CA-C-O	-5.32	115.22	121.44
9	I	225	MET	N-CA-C	-5.16	106.24	112.54
9	I	239	VAL	CA-C-N	5.09	127.81	120.38
9	I	239	VAL	C-N-CA	5.09	127.81	120.38
9	I	450	LEU	CA-CB-CG	5.07	134.05	116.30
9	I	227	ARG	CB-CA-C	5.04	119.53	110.81

There are no chirality outliers.

There are no planarity outliers.

## 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	A	3889	0	4007	39	0
2	B	2081	0	2056	30	0
3	C	4504	0	4463	52	0
4	D	3536	0	3594	24	0
5	E	3596	0	3631	28	0
6	F	2141	0	2189	30	0
7	G	832	0	474	1	0
8	H	846	0	462	5	0
9	I	3019	0	3137	30	0
10	A	31	0	12	0	0
10	D	31	0	12	0	0
10	E	31	0	12	0	0
10	I	31	0	12	1	0
11	A	1	0	0	0	0
11	D	1	0	0	0	0
11	E	1	0	0	0	0
11	I	1	0	0	0	0
12	A	30	0	0	1	0
12	B	7	0	0	0	0
12	C	4	0	0	0	0
12	D	60	0	0	3	0
12	E	29	0	0	0	0
12	F	1	0	0	0	0
12	G	13	0	0	0	0
12	H	11	0	0	0	0
12	I	5	0	0	0	0
All	All	24732	0	24061	195	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 4.

All (195) 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)
2:B:244:GLU:HG3	5:E:353:LYS:HE3	1.37	1.05
3:C:411:ARG:O	3:C:415:GLU:HB2	1.72	0.90
6:F:45:ASN:HD21	9:I:457:GLU:CD	1.96	0.73
2:B:241:ASP:OD1	2:B:242:THR:N	2.21	0.72
1:A:518:MET:HE2	1:A:523:ASP:HB3	1.73	0.69
2:B:241:ASP:OD1	3:C:615:GLY:HA3	1.93	0.68
1:A:569:ASP:OD2	12:A:1101:HOH:O	2.11	0.68
9:I:164:SER:O	9:I:216:THR:HA	1.95	0.66
9:I:225:MET:O	9:I:228:LEU:HB2	1.95	0.66
9:I:202:MET:HG2	9:I:244:GLU:HB3	1.77	0.65
1:A:718:GLU:OE1	4:D:84:ARG:NH2	2.30	0.64
1:A:705:ARG:NH1	4:D:270:GLN:OE1	2.31	0.63
2:B:241:ASP:OD1	3:C:614:ARG:O	2.16	0.62
1:A:518:MET:HE2	1:A:523:ASP:CB	2.30	0.62
4:D:59:GLN:HG2	4:D:64:LEU:HD11	1.82	0.61
3:C:83:LEU:HD11	3:C:268:VAL:HG13	1.81	0.61
9:I:111:GLY:HA3	9:I:330:ASP:HB2	1.82	0.61
3:C:67:HIS:O	3:C:71:GLN:NE2	2.34	0.61
4:D:219:ILE:HG22	4:D:251:THR:HB	1.82	0.60
5:E:205:ARG:NH2	5:E:263:ASP:OD1	2.34	0.60
2:B:244:GLU:HG3	5:E:353:LYS:CE	2.23	0.60
5:E:77:ILE:HG12	5:E:130:LEU:HD21	1.84	0.59
1:A:364:ASN:ND2	5:E:103:GLU:OE1	2.35	0.59
6:F:26:SER:HA	6:F:30:LYS:HB2	1.84	0.59
3:C:581:LEU:HG	3:C:585:MET:HE2	1.84	0.59
1:A:712:ARG:NH1	1:A:715:GLU:OE1	2.35	0.59
9:I:263:ASN:ND2	10:I:1001:ATP:O1G	2.35	0.59
4:D:131:ARG:NH1	12:D:1104:HOH:O	2.37	0.58
2:B:282:ASN:HD21	3:C:586:GLN:HE22	1.52	0.58
4:D:315:ASP:O	4:D:321:ASN:ND2	2.38	0.57
1:A:860:GLN:OE1	4:D:375:ASN:ND2	2.38	0.56
2:B:242:THR:HG23	2:B:244:GLU:H	1.71	0.56
6:F:29:LEU:O	6:F:33:THR:HG23	2.05	0.55
1:A:569:ASP:HB3	1:A:604:LEU:HD11	1.88	0.55
3:C:470:ASN:C	3:C:470:ASN:HD22	2.15	0.55
3:C:545:ARG:NH2	3:C:577:ASP:OD1	2.38	0.54
5:E:366:ARG:HD2	8:H:33:DC:H5"	1.90	0.54
9:I:78:LEU:HB2	9:I:81:ARG:HB2	1.89	0.54
3:C:100:ARG:NH2	3:C:230:ASP:OD1	2.40	0.54
9:I:110:PRO:HD3	9:I:263:ASN:OD1	2.08	0.54
1:A:842:VAL:HA	1:A:845:ILE:HG22	1.89	0.54
9:I:299:ILE:HG21	9:I:331:LEU:HD21	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:49:LEU:HB3	6:F:53:GLU:HB2	1.91	0.53
3:C:60:LEU:HD21	3:C:338:ILE:HB	1.90	0.53
3:C:88:SER:OG	3:C:119:LYS:NZ	2.42	0.53
4:D:400:ARG:CG	4:D:529:LEU:HD21	2.38	0.53
9:I:68:LEU:HB3	9:I:120:MET:HE1	1.90	0.53
2:B:390:ARG:NH2	8:H:54:DT:OP1	2.38	0.53
2:B:372:TYR:HB3	2:B:437:PHE:HD1	1.73	0.53
1:A:359:LYS:NZ	8:H:53:DA:OP1	2.38	0.52
4:D:299:SER:HB3	4:D:302:VAL:HG23	1.91	0.52
1:A:489:VAL:HG11	1:A:564:LEU:HD13	1.90	0.52
1:A:845:ILE:HG13	1:A:849:LEU:HG	1.90	0.52
1:A:683:ARG:O	1:A:772:THR:HA	2.09	0.52
2:B:417:ASP:OD1	2:B:419:LYS:NZ	2.43	0.52
3:C:39:ILE:HG22	3:C:41:PHE:H	1.73	0.52
3:C:260:LYS:NZ	5:E:296:ASP:O	2.41	0.52
9:I:433:ILE:HD11	9:I:473:ILE:HG12	1.92	0.52
2:B:312:PHE:HE1	3:C:319:LYS:HG3	1.75	0.51
1:A:699:VAL:O	9:I:467:THR:OG1	2.27	0.51
6:F:61:CYS:HA	6:F:64:ILE:HD12	1.92	0.51
9:I:310:ILE:HG22	9:I:312:PHE:H	1.75	0.51
4:D:400:ARG:HG2	4:D:529:LEU:HD21	1.92	0.51
2:B:242:THR:CG2	2:B:244:GLU:H	2.24	0.51
6:F:45:ASN:ND2	9:I:457:GLU:CD	2.68	0.51
9:I:150:GLN:NE2	9:I:190:GLN:O	2.45	0.50
1:A:900:GLU:HA	1:A:903:ARG:HG2	1.93	0.50
2:B:242:THR:HG23	2:B:243:PHE:N	2.25	0.50
1:A:393:GLU:HG2	1:A:534:GLY:HA3	1.93	0.50
4:D:290:ASN:ND2	12:D:1103:HOH:O	2.44	0.50
1:A:867:ASP:OD2	5:E:177:GLN:HG2	2.11	0.50
5:E:344:ARG:HH22	8:H:32:DG:H2'	1.78	0.49
6:F:342:ILE:HA	6:F:345:PHE:HB3	1.94	0.49
1:A:512:GLU:HG3	1:A:564:LEU:HD23	1.94	0.49
3:C:244:LEU:HD22	3:C:265:LYS:HD3	1.95	0.49
6:F:325:LEU:HA	6:F:328:THR:HG22	1.93	0.49
3:C:50:SER:OG	3:C:53:ASN:OD1	2.31	0.49
3:C:517:MET:HE1	3:C:553:ILE:HD11	1.94	0.49
3:C:185:LEU:HB3	5:E:66:GLU:HB3	1.95	0.49
3:C:261:ARG:NH2	5:E:260:ASP:OD1	2.46	0.49
2:B:432:ILE:HG13	2:B:437:PHE:CE2	2.48	0.49
1:A:422:ILE:HG13	1:A:682:LEU:HD13	1.94	0.48
3:C:143:LEU:HD13	3:C:222:LEU:HD21	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:105:GLN:HB3	4:D:335:PRO:HG2	1.94	0.48
1:A:362:LYS:NZ	7:G:32:DT:O2	2.37	0.48
3:C:471:ARG:HE	6:F:411:ILE:HG12	1.78	0.48
3:C:218:ASN:HB3	5:E:139:GLN:HE22	1.78	0.48
3:C:484:LYS:HD3	5:E:416:ALA:HB3	1.95	0.48
9:I:184:LYS:HA	9:I:187:ASP:HB2	1.95	0.48
2:B:263:MET:HE3	3:C:537:ILE:HG23	1.96	0.47
6:F:32:LEU:HG	6:F:69:MET:HE3	1.96	0.47
3:C:100:ARG:HH12	3:C:230:ASP:HA	1.79	0.47
6:F:350:MET:HG3	6:F:362:VAL:HG21	1.95	0.47
1:A:708:LYS:HD3	4:D:269:SER:HA	1.95	0.47
6:F:287:ARG:HA	6:F:290:ASN:HB2	1.97	0.47
1:A:536:ARG:NH2	4:D:179:GLU:OE2	2.47	0.47
5:E:337:ILE:HG23	5:E:341:LEU:HD12	1.96	0.47
3:C:267:ASP:HB3	3:C:272:LYS:HD3	1.97	0.47
4:D:418:MET:HG3	4:D:526:TRP:CD2	2.49	0.47
1:A:459:ILE:HG22	1:A:492:VAL:HG11	1.96	0.47
1:A:518:MET:CE	1:A:523:ASP:HB3	2.43	0.47
3:C:517:MET:HE2	3:C:549:PRO:HD2	1.96	0.47
6:F:329:PHE:O	6:F:336:ARG:NH1	2.47	0.47
1:A:684:MET:HG3	1:A:773:VAL:HB	1.97	0.46
3:C:516:ILE:O	6:F:377:LYS:NZ	2.41	0.46
9:I:79:PRO:HG3	9:I:302:GLN:HG2	1.98	0.46
1:A:809:LEU:HD13	1:A:902:LYS:HD2	1.98	0.46
3:C:124:ARG:HD3	3:C:200:ALA:HB2	1.98	0.46
9:I:453:LEU:HD22	9:I:457:GLU:OE1	2.16	0.46
2:B:460:TYR:OH	5:E:384:GLU:OE1	2.34	0.46
1:A:523:ASP:O	1:A:526:GLU:HB2	2.15	0.46
1:A:688:ALA:HB1	1:A:778:VAL:HG21	1.97	0.46
3:C:297:ARG:HA	3:C:300:GLU:HG2	1.98	0.46
6:F:35:ALA:O	6:F:36:THR:C	2.57	0.45
3:C:431:LEU:HD13	3:C:436:LEU:HD22	1.99	0.45
5:E:175:PHE:HA	5:E:178:ARG:HD2	1.97	0.45
9:I:175:LEU:HD11	9:I:184:LYS:HD2	1.98	0.45
4:D:332:ARG:NH2	12:D:1109:HOH:O	2.44	0.45
4:D:396:ARG:HB2	4:D:529:LEU:CD1	2.45	0.45
9:I:502:MET:HB3	9:I:512:LEU:HD11	1.98	0.45
5:E:268:LYS:HD2	5:E:291:LEU:HD21	1.98	0.45
6:F:14:LEU:O	6:F:15:ARG:HG3	2.17	0.45
1:A:523:ASP:OD1	1:A:526:GLU:OE1	2.34	0.45
9:I:199:ILE:HG23	9:I:204:HIS:HB2	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:269:VAL:HG22	3:C:578:LYS:HG3	1.98	0.45
8:H:24:DT:H2"	8:H:25:DT:H5"	1.98	0.45
2:B:259:SER:OG	3:C:536:ASN:ND2	2.47	0.45
3:C:494:TRP:HZ2	6:F:380:ARG:NH1	2.15	0.45
5:E:332:LEU:HD11	5:E:432:LEU:HD13	1.99	0.45
3:C:495:GLU:HG2	6:F:380:ARG:HG3	1.99	0.45
5:E:134:GLY:H	5:E:169:THR:HB	1.81	0.45
6:F:356:THR:HG22	6:F:358:LYS:H	1.81	0.45
2:B:395:TYR:HB3	3:C:145:ARG:HG2	1.98	0.44
3:C:527:LEU:HD21	3:C:547:THR:HG21	1.98	0.44
1:A:880:PHE:HB3	9:I:482:THR:HG21	2.00	0.44
3:C:541:TYR:CZ	3:C:545:ARG:HD2	2.52	0.44
3:C:270:SER:HB2	3:C:314:LEU:HD13	2.00	0.43
3:C:334:PHE:HB3	3:C:466:PHE:HE1	1.81	0.43
5:E:67:LEU:HD13	5:E:73:LEU:HA	2.00	0.43
9:I:96:ILE:HG13	9:I:217:THR:HG21	2.00	0.43
2:B:492:PHE:HZ	3:C:19:GLN:HA	1.83	0.43
1:A:368:ALA:HB3	1:A:370:LYS:HE2	2.01	0.43
1:A:861:LEU:HD22	4:D:512:GLU:HB3	2.00	0.43
5:E:380:LEU:HB3	5:E:449:ARG:HB3	2.00	0.43
6:F:367:LYS:HB3	6:F:367:LYS:HE2	1.84	0.43
6:F:313:LEU:HD21	6:F:319:LEU:HD13	2.00	0.43
6:F:335:ARG:H	6:F:335:ARG:HG2	1.66	0.43
9:I:338:LEU:O	9:I:342:ILE:HD12	2.19	0.43
5:E:210:MET:HG3	5:E:211:GLU:HG3	2.01	0.43
3:C:447:LYS:HA	3:C:450:LYS:HE2	1.99	0.43
4:D:408:PHE:HB3	4:D:500:ASP:HA	2.00	0.43
2:B:308:LEU:HD22	2:B:451:ALA:HB1	2.00	0.43
2:B:428:ASP:OD1	2:B:428:ASP:N	2.49	0.43
9:I:239:VAL:HB	9:I:243:LEU:HD13	2.01	0.43
3:C:569:LEU:O	3:C:572:THR:OG1	2.34	0.42
1:A:406:PHE:HB3	4:D:187:LEU:HD12	2.01	0.42
2:B:241:ASP:O	2:B:242:THR:HG22	2.19	0.42
4:D:214:PHE:HB2	4:D:247:ILE:HG12	2.01	0.42
5:E:152:LEU:HD22	5:E:166:PHE:HE2	1.85	0.42
6:F:51:GLN:NE2	9:I:408:ALA:O	2.52	0.42
6:F:53:GLU:OE2	6:F:90:LYS:NZ	2.49	0.42
6:F:333:ASN:HA	6:F:336:ARG:HB2	2.02	0.42
6:F:43:SER:OG	6:F:57:ARG:NH1	2.49	0.42
3:C:107:LEU:HB3	3:C:268:VAL:HG21	2.01	0.42
2:B:297:GLN:HG3	2:B:325:PHE:HE2	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:444:LEU:HA	2:B:447:ILE:HD12	2.02	0.42
9:I:174:SER:O	9:I:174:SER:OG	2.36	0.42
1:A:808:LEU:O	1:A:812:MET:HG3	2.20	0.42
9:I:205:LEU:HD23	9:I:248:LEU:HD21	2.02	0.42
5:E:243:ILE:HG21	5:E:262:ILE:HG13	2.02	0.41
2:B:274:PHE:HA	3:C:582:ILE:HD12	2.01	0.41
5:E:68:VAL:HG13	5:E:139:GLN:HB2	2.02	0.41
5:E:460:LYS:NZ	5:E:471:SER:OG	2.47	0.41
9:I:225:MET:HB2	9:I:225:MET:HE2	1.76	0.41
1:A:576:GLN:NE2	1:A:608:GLN:O	2.53	0.41
3:C:282:GLN:O	3:C:286:ASP:N	2.52	0.41
3:C:17:ASP:HB3	3:C:23:TYR:CZ	2.56	0.41
3:C:437:ASP:HA	3:C:440:LEU:HD23	2.02	0.41
1:A:605:PRO:HB2	1:A:614:THR:HG23	2.03	0.41
2:B:390:ARG:O	2:B:393:THR:OG1	2.39	0.41
2:B:292:LYS:O	2:B:296:ILE:HD12	2.21	0.41
4:D:400:ARG:HG3	4:D:529:LEU:HD21	2.03	0.41
5:E:128:LEU:HD12	5:E:128:LEU:HA	1.90	0.41
3:C:270:SER:OG	3:C:313:ASN:OD1	2.34	0.41
6:F:29:LEU:HD23	6:F:29:LEU:C	2.46	0.41
2:B:246:TYR:OH	2:B:250:ARG:NH2	2.54	0.41
3:C:494:TRP:CZ2	6:F:380:ARG:NH1	2.89	0.41
9:I:392:LYS:HB3	9:I:392:LYS:HE3	1.96	0.41
1:A:419:VAL:HG23	1:A:730:ASP:HB2	2.03	0.40
1:A:819:GLU:HG2	1:A:893:LYS:HB2	2.03	0.40
4:D:136:ILE:HG23	5:E:105:PRO:HB2	2.03	0.40
6:F:56:ALA:HB2	6:F:85:PRO:HD2	2.03	0.40
2:B:340:TYR:HB3	3:C:38:HIS:CE1	2.56	0.40
4:D:400:ARG:NH2	4:D:414:GLU:OE1	2.40	0.40
6:F:30:LYS:HE3	6:F:30:LYS:HB3	1.87	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	A	475/917 (52%)	468 (98%)	7 (2%)	0	100	100
2	B	247/620 (40%)	239 (97%)	8 (3%)	0	100	100
3	C	532/616 (86%)	510 (96%)	22 (4%)	0	100	100
4	D	425/532 (80%)	416 (98%)	9 (2%)	0	100	100
5	E	430/479 (90%)	422 (98%)	8 (2%)	0	100	100
6	F	254/435 (58%)	245 (96%)	9 (4%)	0	100	100
9	I	368/516 (71%)	352 (96%)	16 (4%)	0	100	100
All	All	2731/4115 (66%)	2652 (97%)	79 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	A	430/815 (53%)	430 (100%)	0	100	100
2	B	234/573 (41%)	233 (100%)	1 (0%)	89	96
3	C	508/576 (88%)	504 (99%)	4 (1%)	79	91
4	D	400/490 (82%)	397 (99%)	3 (1%)	79	91
5	E	405/440 (92%)	404 (100%)	1 (0%)	92	98
6	F	246/406 (61%)	246 (100%)	0	100	100
9	I	343/472 (73%)	340 (99%)	3 (1%)	75	90
All	All	2566/3772 (68%)	2554 (100%)	12 (0%)	85	95

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	242	THR
3	C	470	ASN

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Mol	Chain	Res	Type
3	C	493	SER
3	C	495	GLU
3	C	497	VAL
4	D	525	SER
4	D	528	GLN
4	D	529	LEU
5	E	177	GLN
9	I	225	MET
9	I	226	ASP
9	I	454	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	397	ASN
1	A	576	GLN
1	A	611	ASN
1	A	629	HIS
1	A	860	GLN
2	B	282	ASN
3	C	212	ASN
3	C	253	GLN
3	C	264	HIS
3	C	470	ASN
3	C	490	ASN
3	C	523	GLN
3	C	536	ASN
4	D	96	HIS
4	D	144	ASN
4	D	304	GLN
4	D	375	ASN
4	D	489	ASN
5	E	2	ASN
5	E	32	ASN
5	E	58	HIS
5	E	163	ASN
5	E	248	HIS
5	E	253	ASN
5	E	467	HIS
6	F	34	ASN
6	F	45	ASN
6	F	51	GLN

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Mol	Chain	Res	Type
6	F	309	ASN
9	I	63	GLN
9	I	87	GLN
9	I	117	GLN
9	I	171	ASN
9	I	206	GLN
9	I	237	GLN
9	I	327	ASN
9	I	399	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 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	$\# Z  > 2$
10	ATP	E	1001	11	28,33,33	0.74	0	34,52,52	0.60	1 (2%)
10	ATP	D	1001	11	28,33,33	0.78	0	34,52,52	0.63	1 (2%)
10	ATP	A	1001	11	28,33,33	1.20	3 (10%)	34,52,52	0.83	1 (2%)
10	ATP	I	1001	11	28,33,33	1.04	3 (10%)	34,52,52	0.84	1 (2%)

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
10	ATP	E	1001	11	-	2/18/38/38	0/3/3/3
10	ATP	D	1001	11	-	7/18/38/38	0/3/3/3
10	ATP	A	1001	11	-	6/18/38/38	0/3/3/3
10	ATP	I	1001	11	-	5/18/38/38	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	A	1001	ATP	PG-O3G	-2.95	1.43	1.54
10	A	1001	ATP	PG-O2G	-2.80	1.44	1.54
10	I	1001	ATP	C1'-N9	-2.43	1.43	1.49
10	I	1001	ATP	C8-N7	-2.10	1.30	1.34
10	A	1001	ATP	C8-N7	-2.08	1.30	1.34
10	I	1001	ATP	PG-O2G	-2.08	1.47	1.54

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	A	1001	ATP	C5-C6-N6	2.61	124.28	120.31
10	E	1001	ATP	C5-C6-N6	2.34	123.87	120.31
10	D	1001	ATP	C5-C6-N6	2.29	123.80	120.31
10	I	1001	ATP	O3B-PB-O1B	-2.01	104.65	110.70

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	A	1001	ATP	C5'-O5'-PA-O1A
10	D	1001	ATP	PB-O3B-PG-O3G
10	D	1001	ATP	C5'-O5'-PA-O1A
10	D	1001	ATP	C5'-O5'-PA-O3A
10	D	1001	ATP	PB-O3B-PG-O1G
10	D	1001	ATP	PG-O3B-PB-O1B
10	E	1001	ATP	PA-O3A-PB-O2B
10	I	1001	ATP	PG-O3B-PB-O2B
10	A	1001	ATP	C5'-O5'-PA-O3A
10	D	1001	ATP	C5'-O5'-PA-O2A

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Mol	Chain	Res	Type	Atoms
10	A	1001	ATP	PG-O3B-PB-O1B
10	A	1001	ATP	PA-O3A-PB-O2B
10	I	1001	ATP	PB-O3B-PG-O2G
10	A	1001	ATP	PG-O3B-PB-O2B
10	I	1001	ATP	PA-O3A-PB-O1B
10	I	1001	ATP	PA-O3A-PB-O2B
10	D	1001	ATP	C4'-C5'-O5'-PA
10	A	1001	ATP	PA-O3A-PB-O1B
10	E	1001	ATP	PA-O3A-PB-O1B
10	I	1001	ATP	PG-O3B-PB-O1B

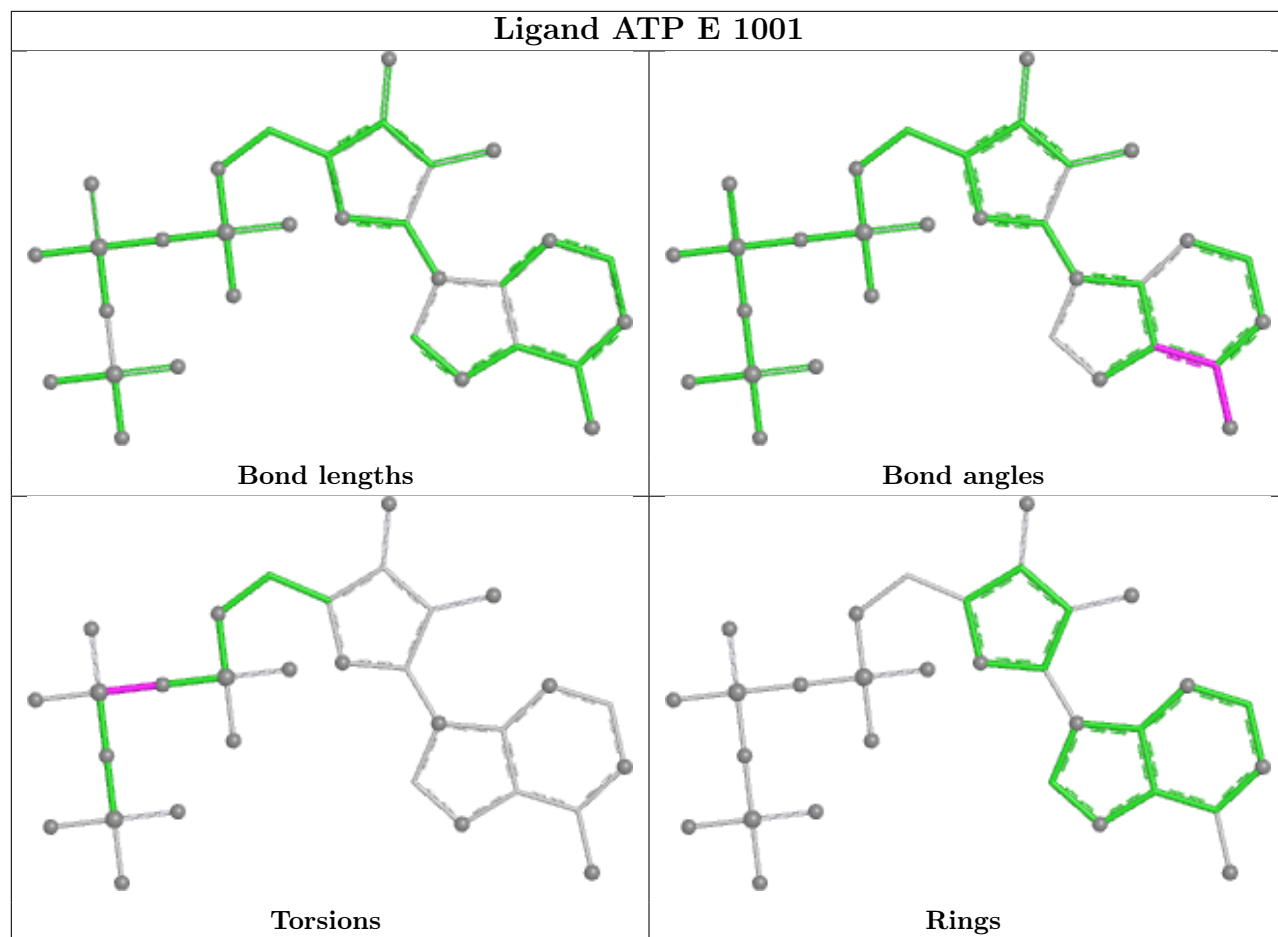
There are no ring outliers.

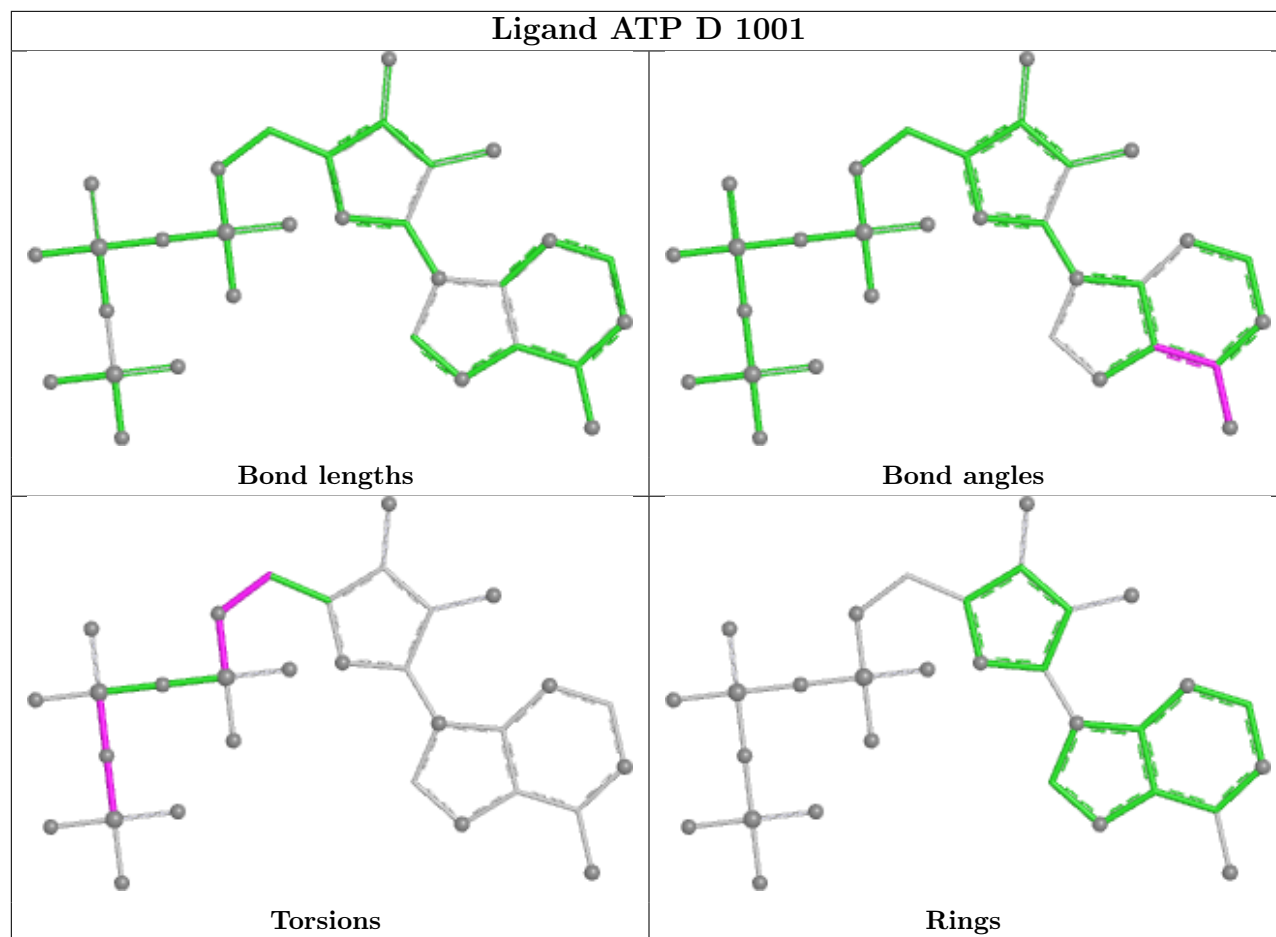
1 monomer is involved in 1 short contact:

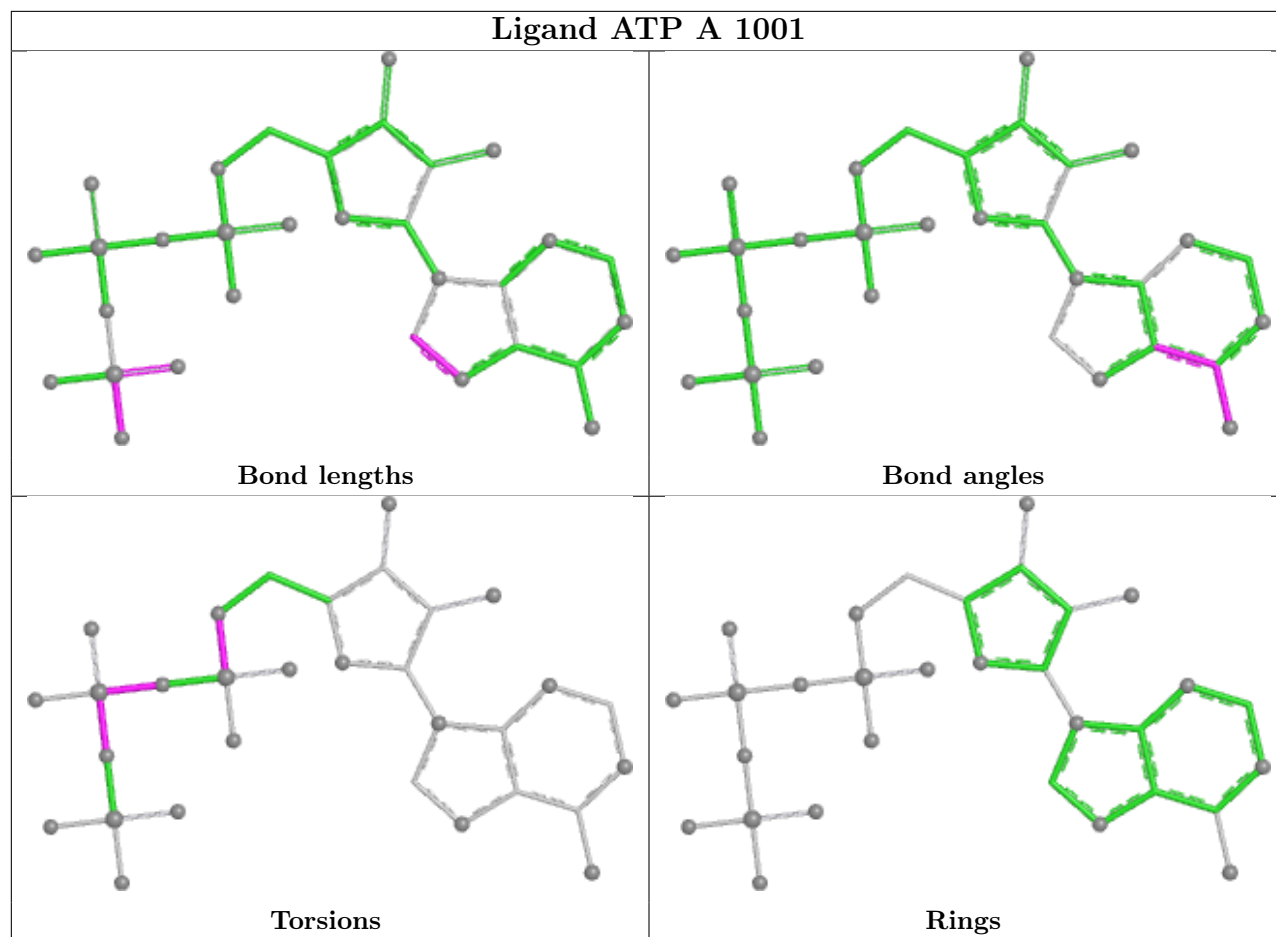
Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	I	1001	ATP	1	0

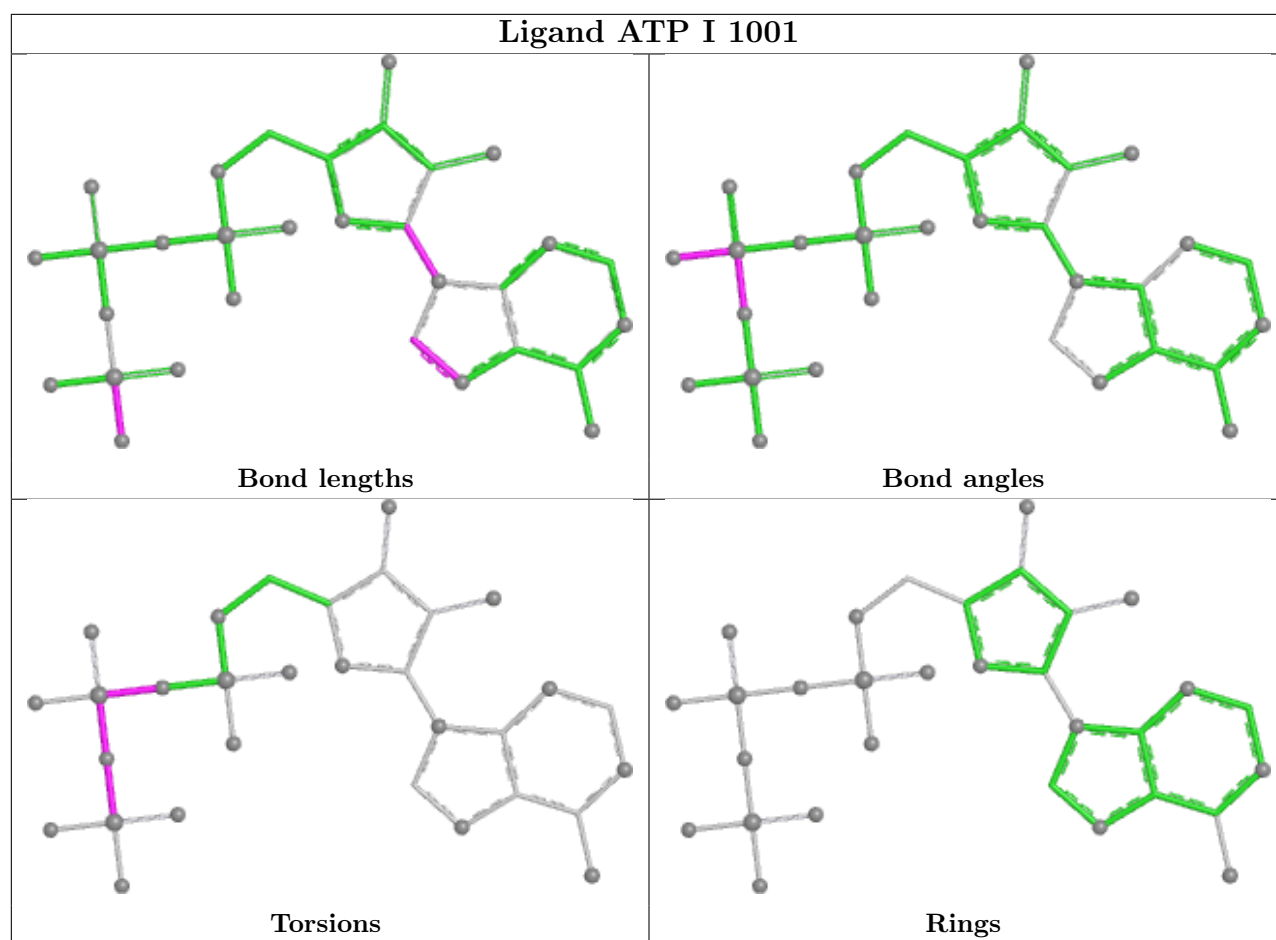
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

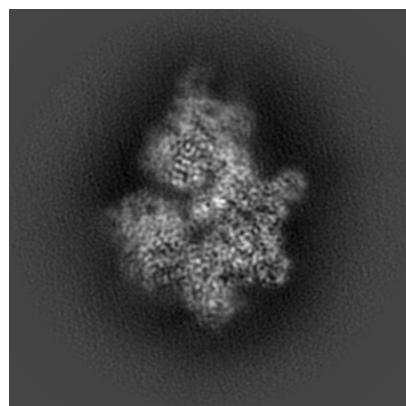
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-25927. These allow visual inspection of the internal detail of the map and identification of artifacts.

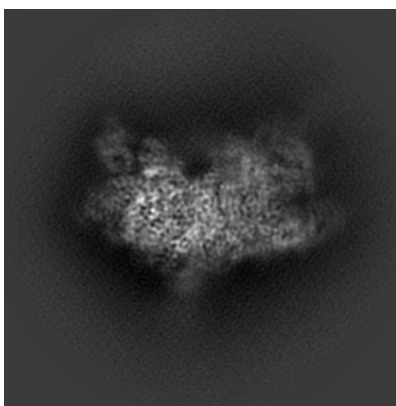
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

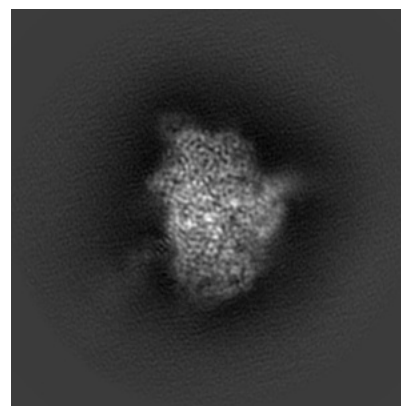
#### 6.1.1 Primary map



X

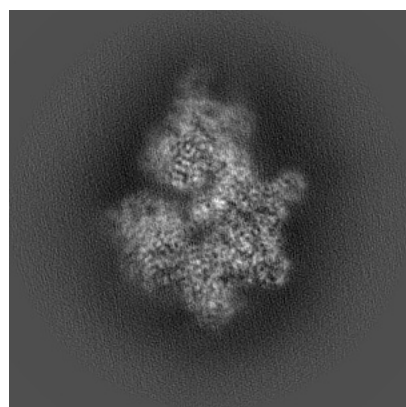


Y

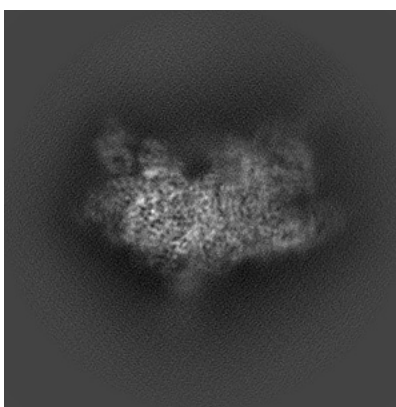


Z

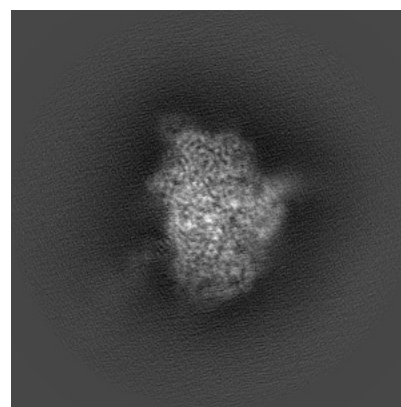
#### 6.1.2 Raw map



X



Y

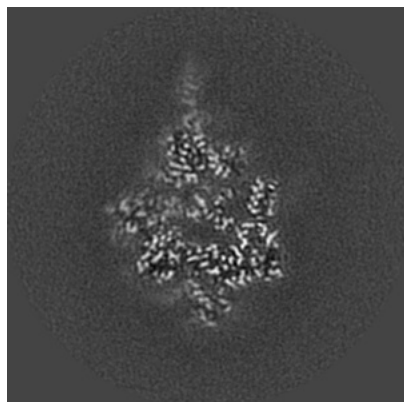


Z

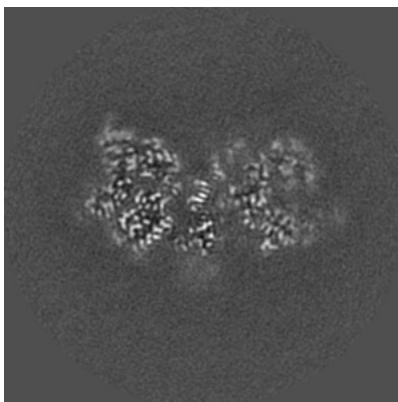
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

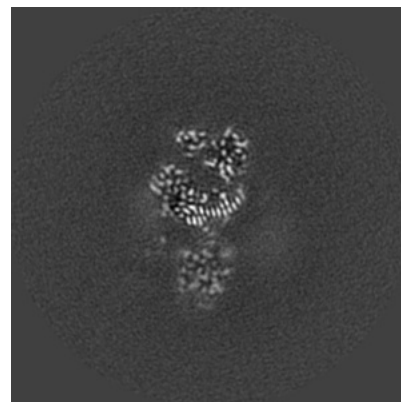
### 6.2.1 Primary map



X Index: 150

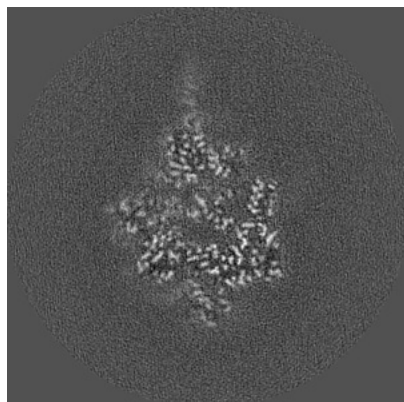


Y Index: 150

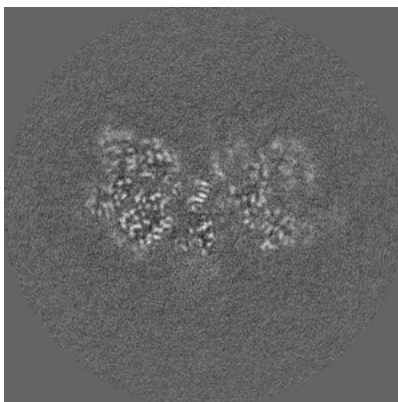


Z Index: 150

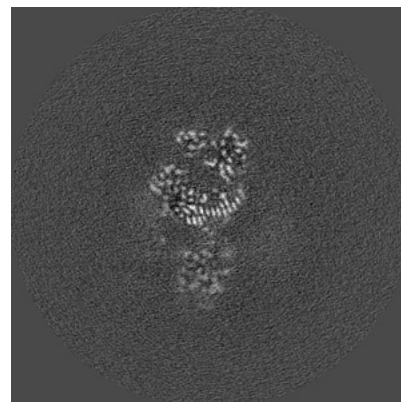
### 6.2.2 Raw map



X Index: 150



Y Index: 150

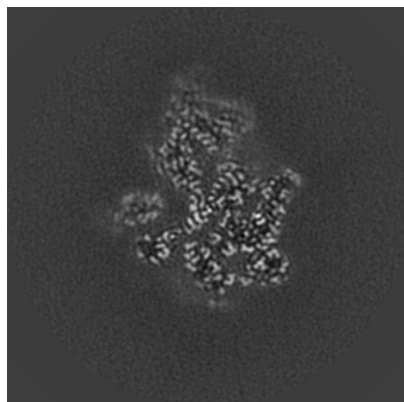


Z Index: 150

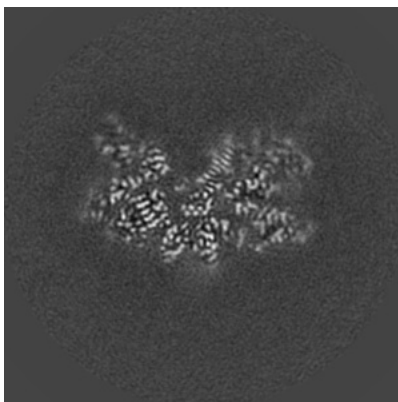
The images above show central slices of the map in three orthogonal directions.

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

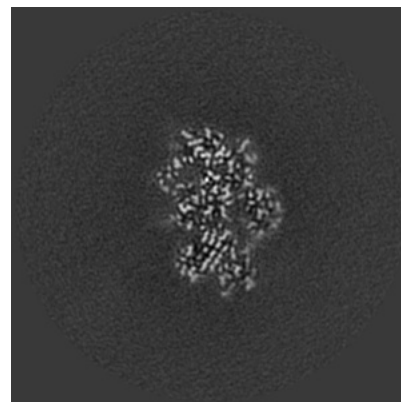
### 6.3.1 Primary map



X Index: 133

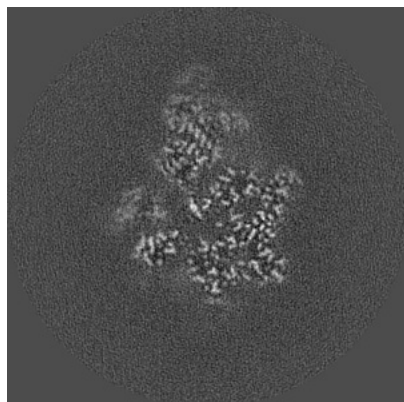


Y Index: 157

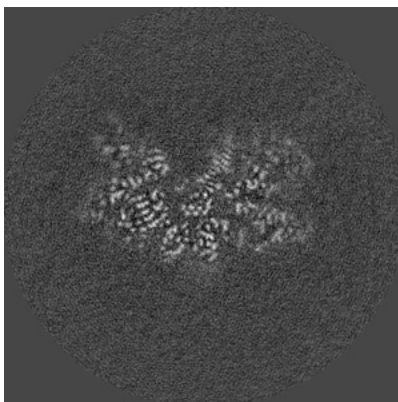


Z Index: 113

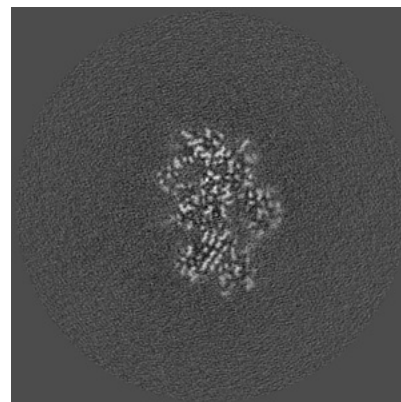
### 6.3.2 Raw map



X Index: 137



Y Index: 157



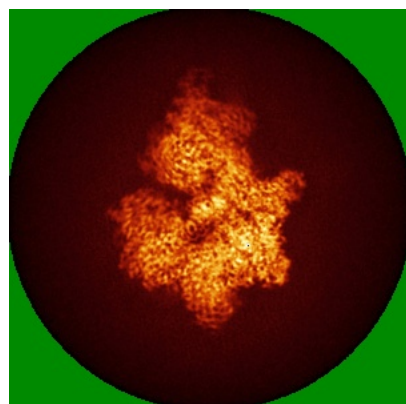
Z Index: 113

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

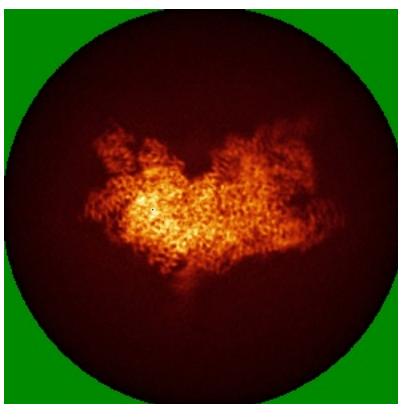


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

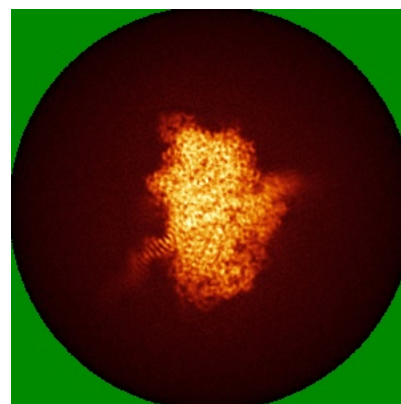
### 6.4.1 Primary map



X

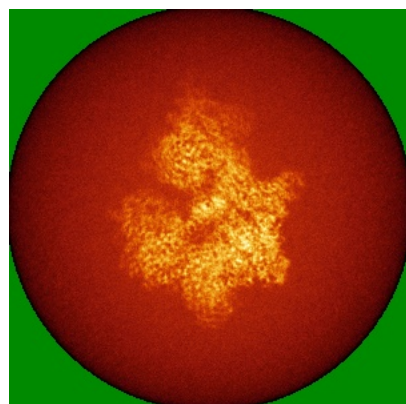


Y

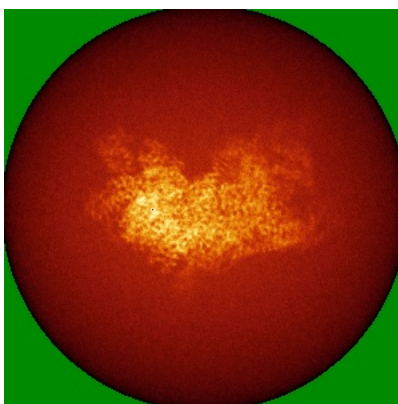


Z

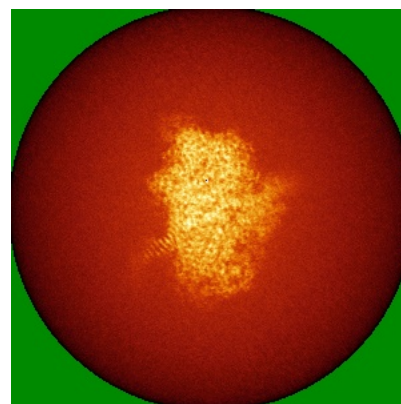
### 6.4.2 Raw map



X



Y



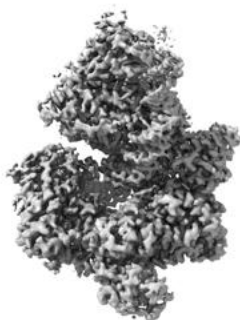
Z

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.

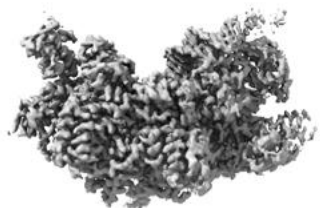


## 6.5 Orthogonal surface views [i](#)

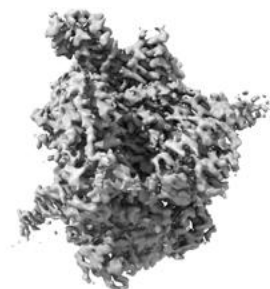
### 6.5.1 Primary map



X



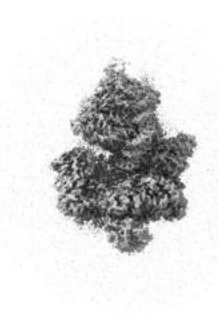
Y



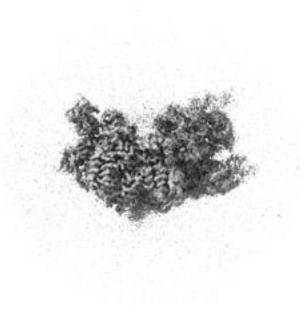
Z

The images above show the 3D surface view of the map at the recommended contour level 0.01. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

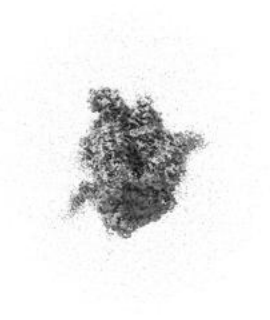
### 6.5.2 Raw map



X



Y



Z

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.

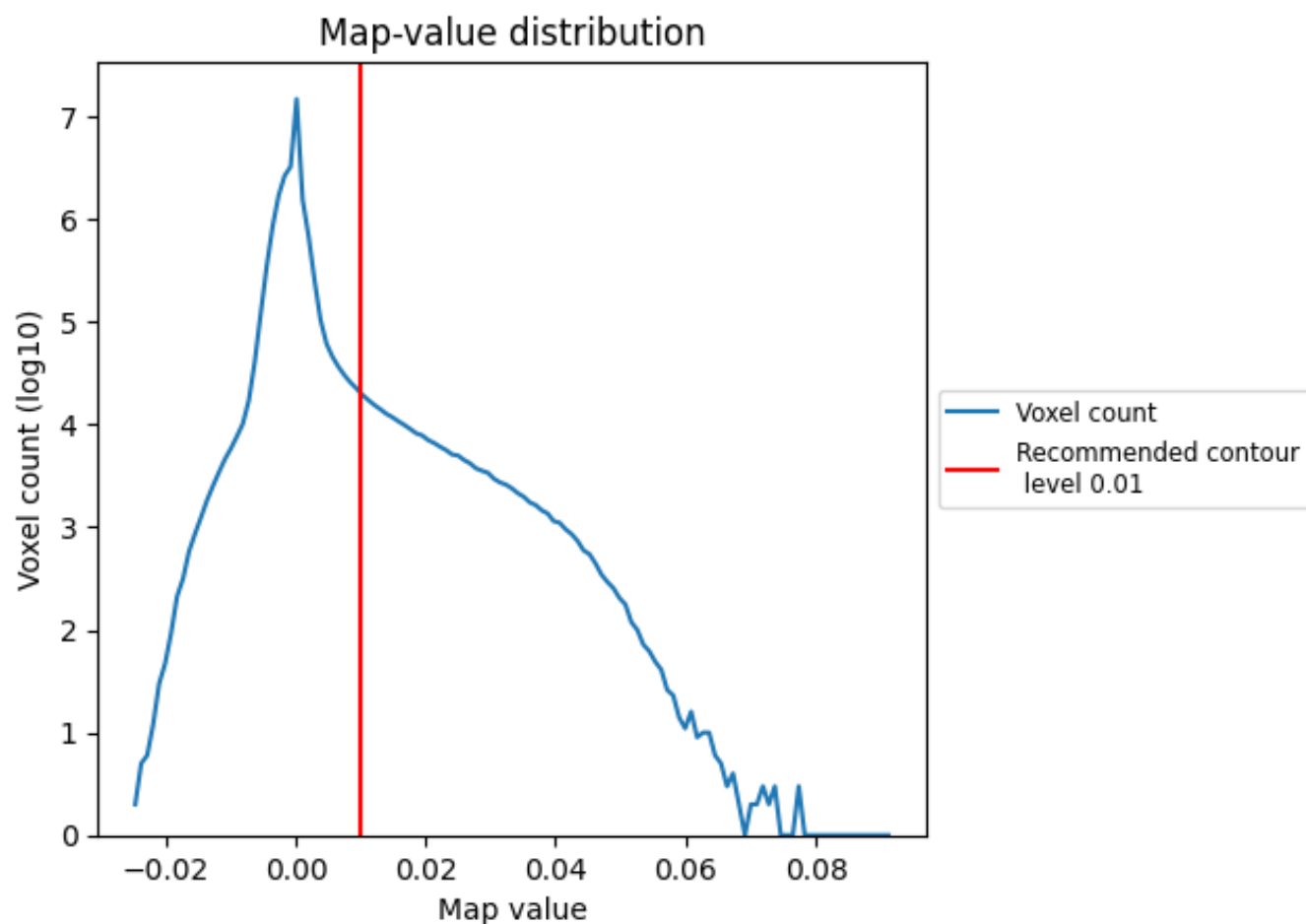
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

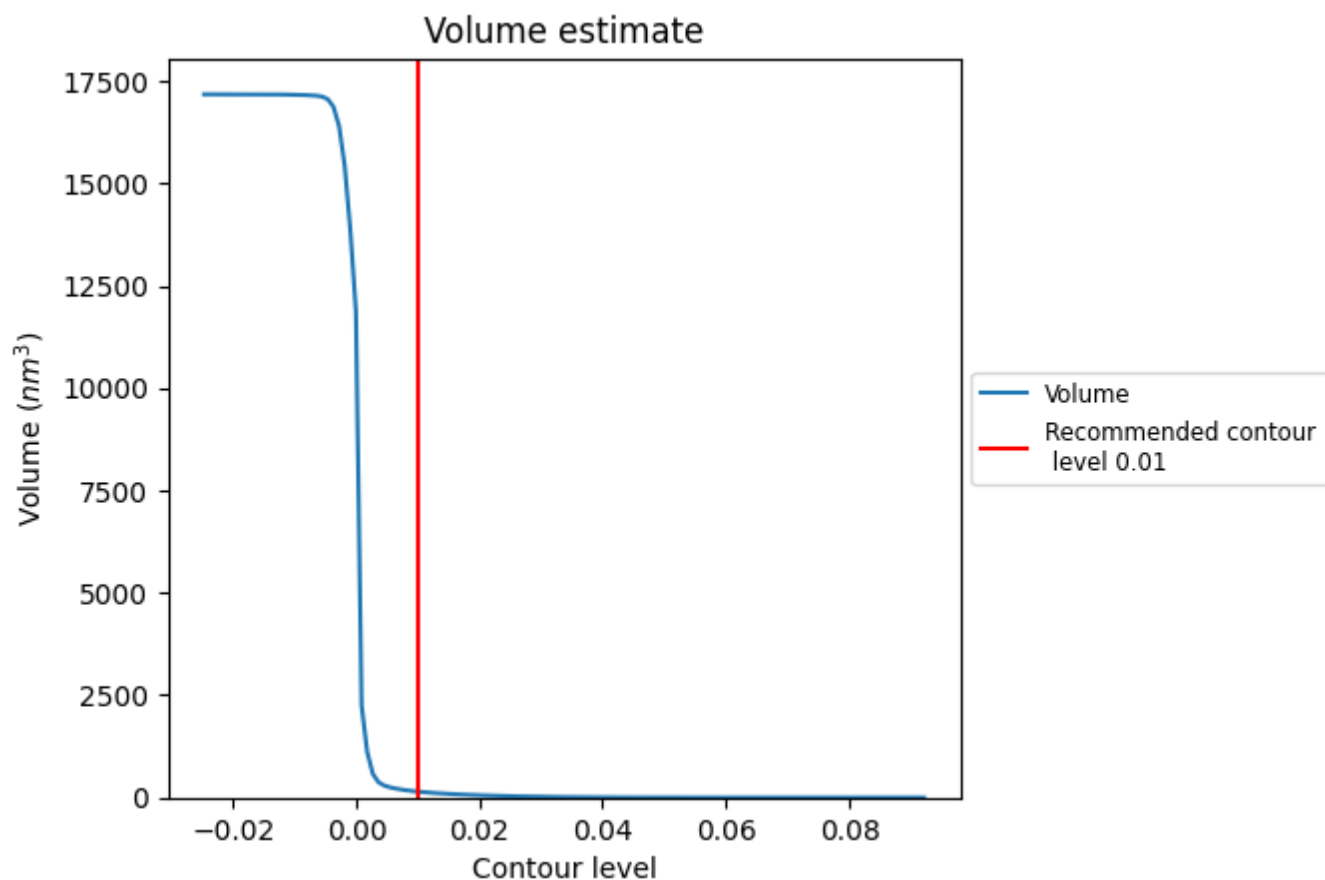
This section contains the results of statistical analysis of the map.

### 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.

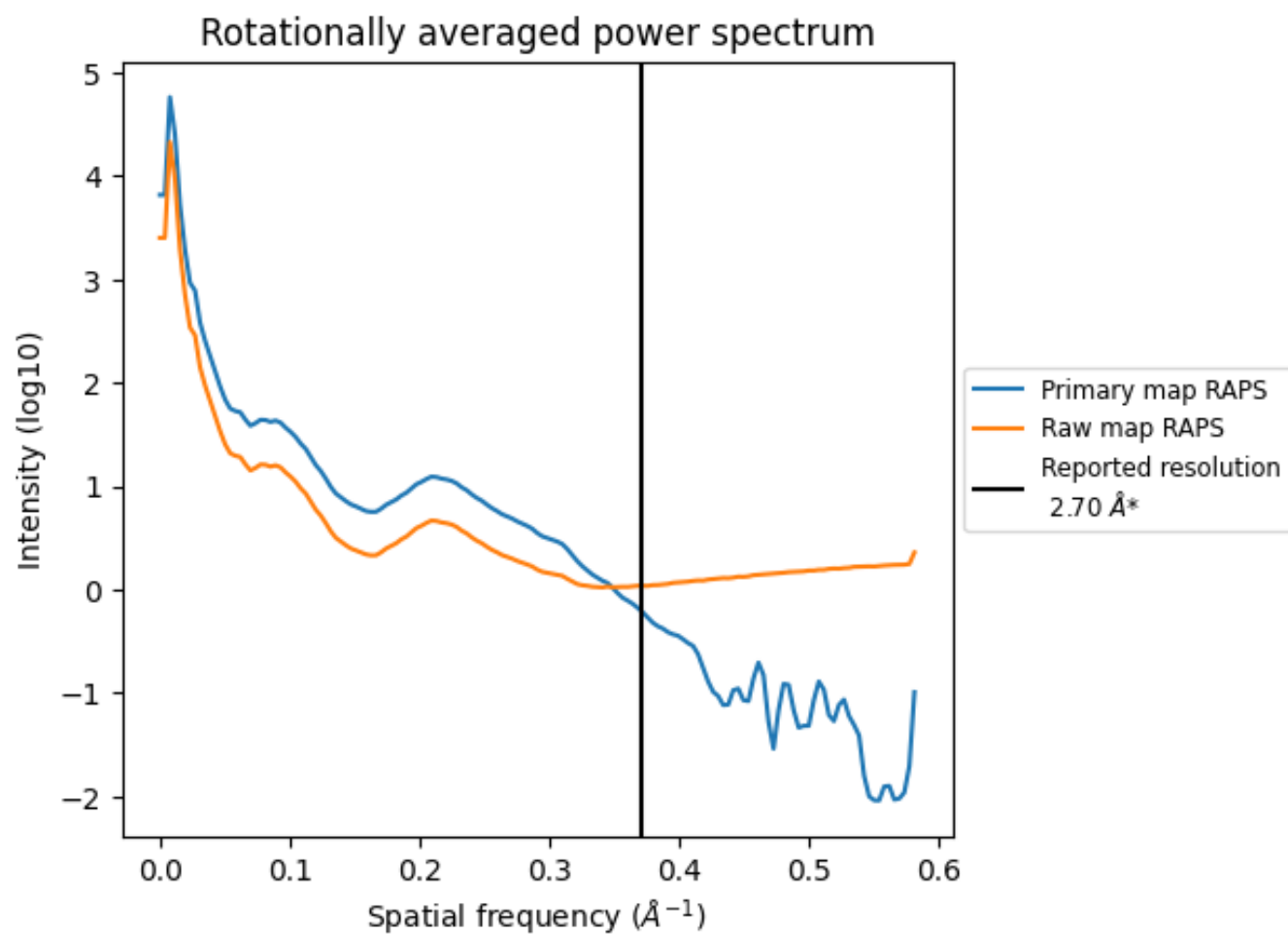
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 145 nm<sup>3</sup>; this corresponds to an approximate mass of 131 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 ⓘ

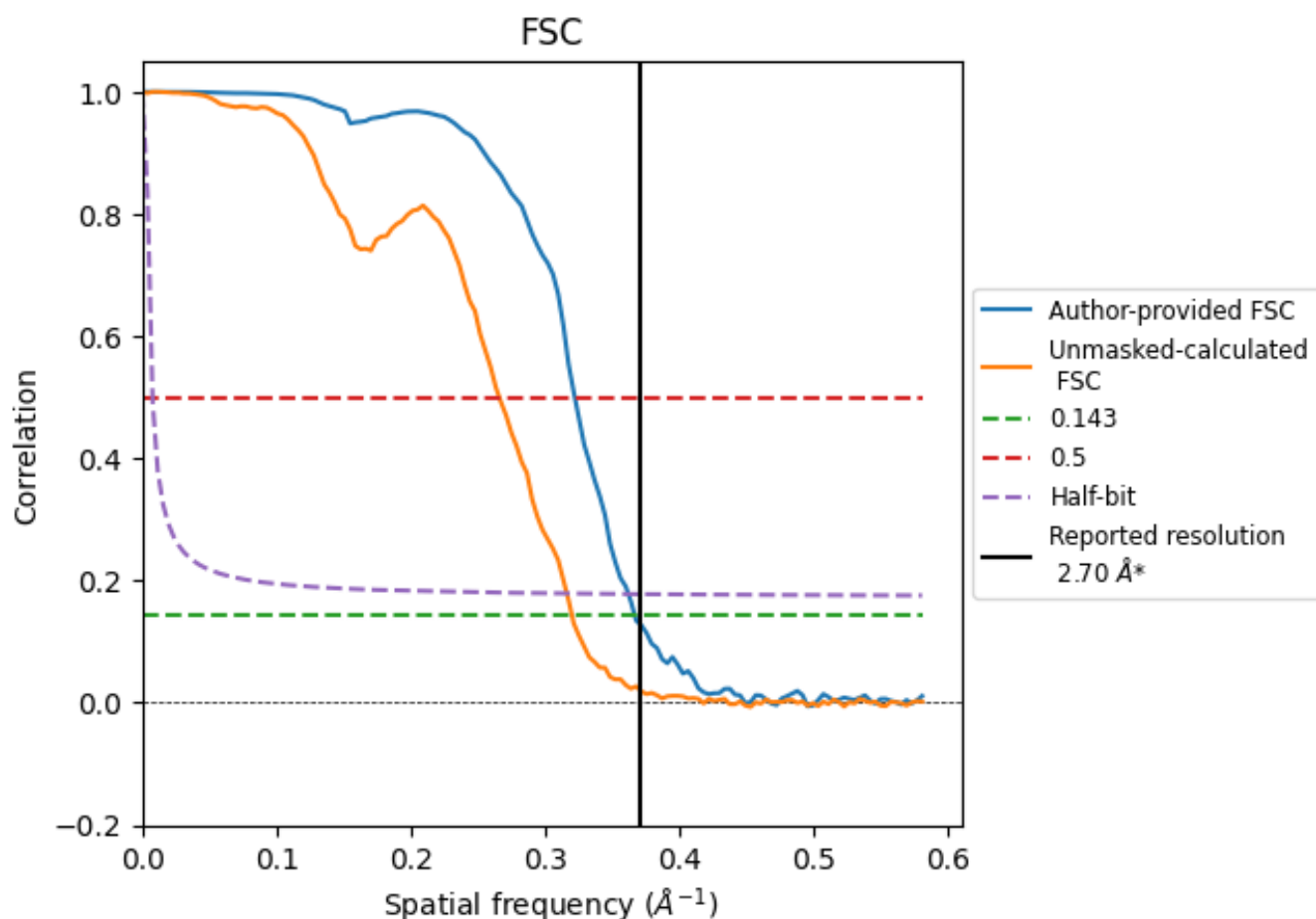


\*Reported resolution corresponds to spatial frequency of  $0.370 \text{ \AA}^{-1}$

## 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 0.370  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

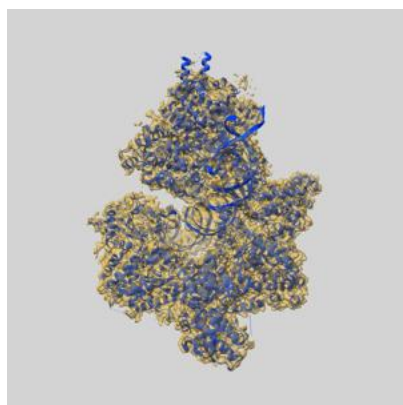
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.70	-	-
Author-provided FSC curve	2.72	3.10	2.76
Unmasked-calculated*	3.12	3.76	3.16

\*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 3.12 differs from the reported value 2.7 by more than 10 %

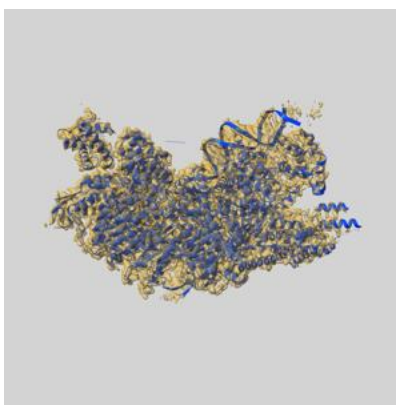
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-25927 and PDB model 7TJJ. Per-residue inclusion information can be found in section [3](#) on page [8](#).

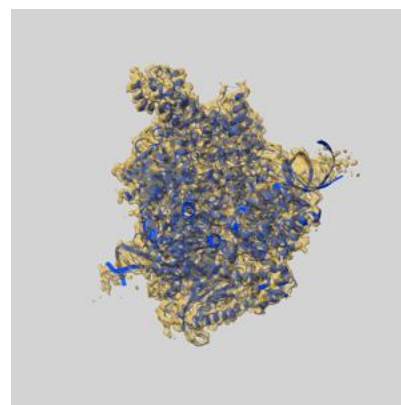
### 9.1 Map-model overlay [i](#)



X



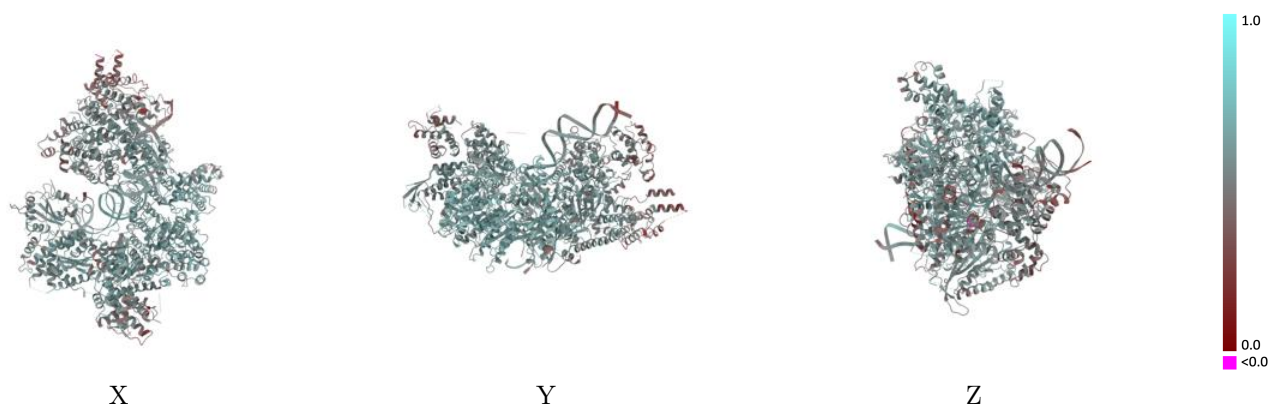
Y



Z

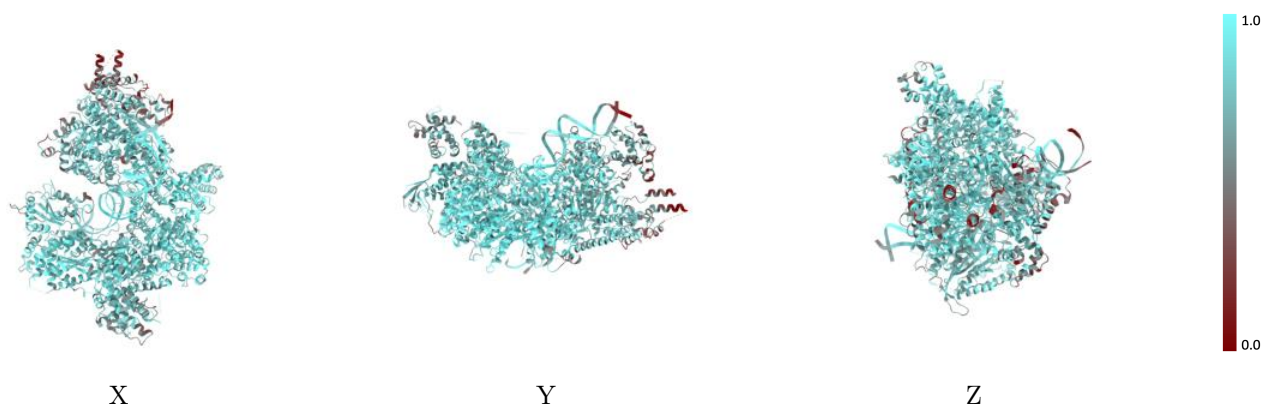
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

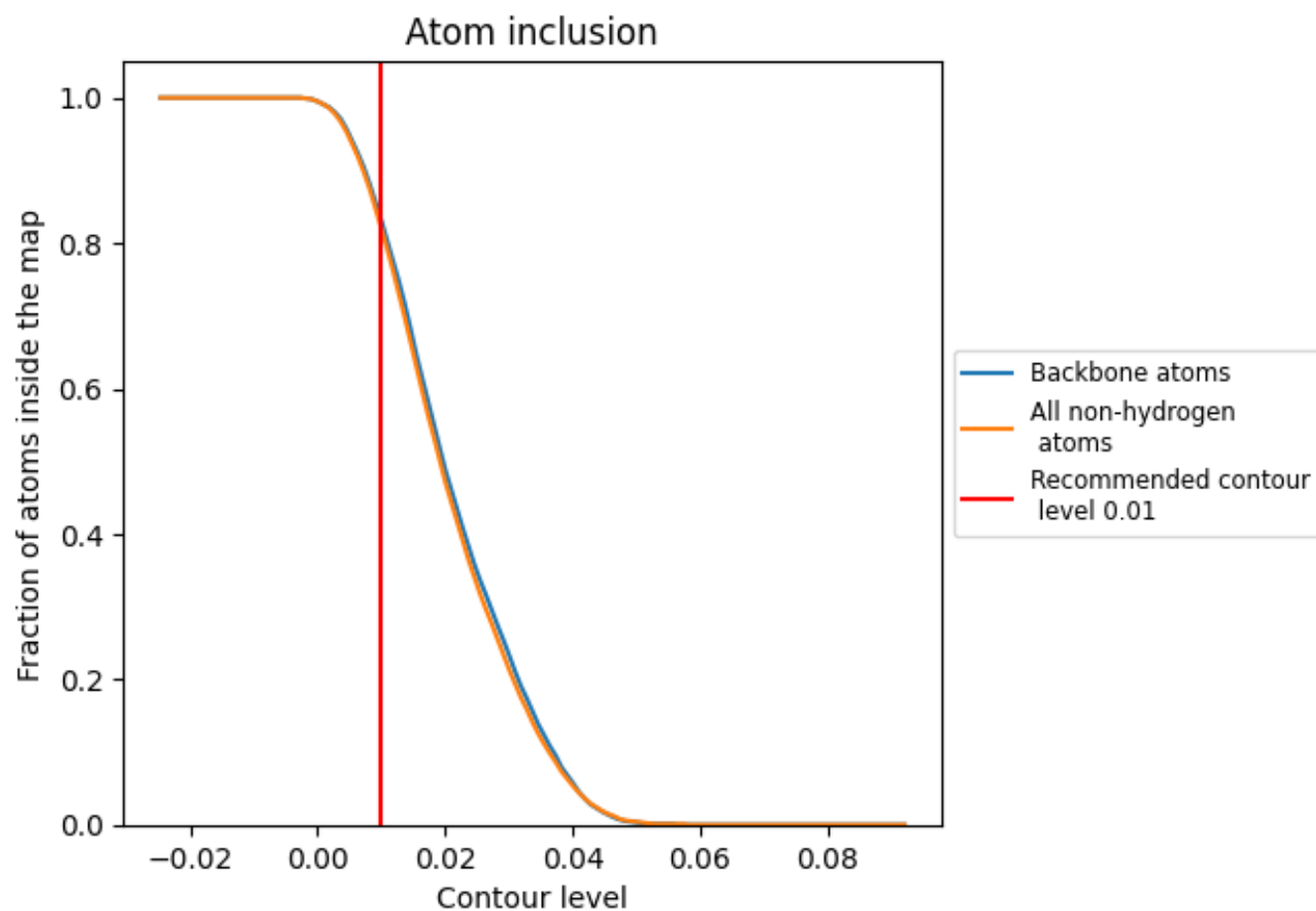
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.01).



## 9.4 Atom inclusion [i](#)



At the recommended contour level, 83% of all backbone atoms, 82% 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 (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div>0.8210</div>	<div><div></div>0.5570</div>
A	<div><div></div>0.8790</div>	<div><div></div>0.5900</div>
B	<div><div></div>0.8560</div>	<div><div></div>0.5600</div>
C	<div><div></div>0.7600</div>	<div><div></div>0.5200</div>
D	<div><div></div>0.9220</div>	<div><div></div>0.6150</div>
E	<div><div></div>0.8740</div>	<div><div></div>0.5900</div>
F	<div><div></div>0.6090</div>	<div><div></div>0.4480</div>
G	<div><div></div>0.8820</div>	<div><div></div>0.5690</div>
H	<div><div></div>0.8590</div>	<div><div></div>0.5730</div>
I	<div><div></div>0.7820</div>	<div><div></div>0.5250</div>

1.0

0.0

<0.0