



## Full wwPDB EM Validation Report ⓘ

Oct 6, 2024 – 03:54 pm BST

PDB ID : 6YI5  
EMDB ID : EMD-10810  
Title : In-situ structure of the trimeric HEF from influenza C by flexible fitting into a cryo-ET map.  
Authors : Halldorsson, S.; Rosenthal, P.B.  
Deposited on : 2020-03-31  
Resolution : 9.10 Å(reported)  
Based on initial model : 1FLC

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.dev113  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
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) : 2.39

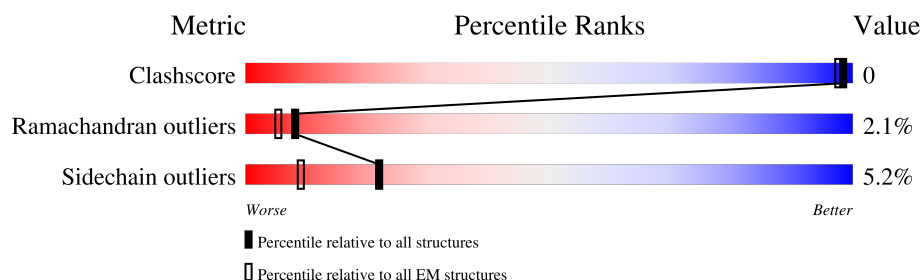
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 9.10 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	432	 88% 9% ..
1	C	432	 90% 7% ..
1	E	432	 90% 7% ..
2	B	175	 6% 83% 9% • 7%
2	D	175	 6% 79% 11% • 7%
2	F	175	 7% 85% 6% • 7%
3	G	3	 33% 67%
3	H	3	 100%

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Mol	Chain	Length	Quality of chain
3	J	3	 100%
3	K	3	 100%
3	M	3	 33%67%
3	N	3	 100%
4	I	3	 33%67%
4	L	3	 33%67%
4	O	3	 100%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 14061 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.

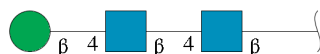
- Molecule 1 is a protein called Hemagglutinin-esterase-fusion glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	427	Total	C	N	O	S	0	0
			3339	2113	565	636	25		
1	E	427	Total	C	N	O	S	0	0
			3339	2113	565	636	25		
1	C	427	Total	C	N	O	S	0	0
			3339	2113	565	636	25		

- Molecule 2 is a protein called Hemagglutinin-esterase-fusion glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	162	Total	C	N	O	S	0	0
			1231	776	206	246	3		
2	F	162	Total	C	N	O	S	0	0
			1231	776	206	246	3		
2	D	162	Total	C	N	O	S	0	0
			1231	776	206	246	3		

- Molecule 3 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



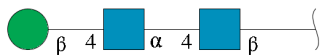
Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	3	Total	C	N	O		0	0
			39	22	2	15			
3	H	3	Total	C	N	O		0	0
			39	22	2	15			
3	J	3	Total	C	N	O		0	0
			39	22	2	15			
3	K	3	Total	C	N	O		0	0
			39	22	2	15			

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Mol	Chain	Residues	Atoms				AltConf	Trace
3	M	3	Total	C	N	O	0	0
			39	22	2	15		
3	N	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 4 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

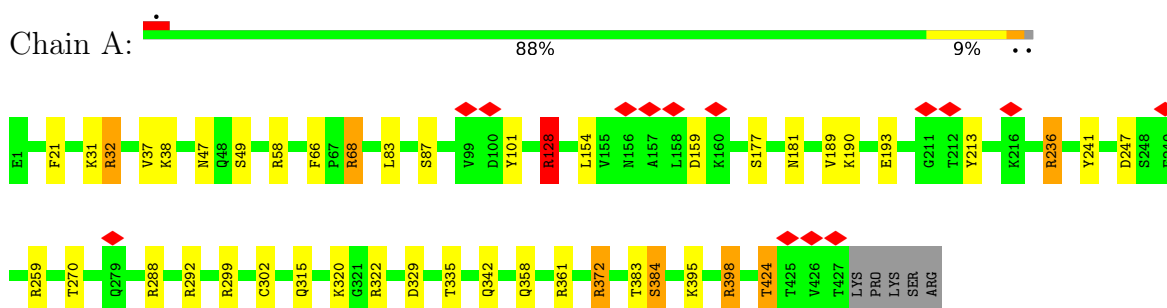


Mol	Chain	Residues	Atoms				AltConf	Trace
4	I	3	Total	C	N	O	0	0
			39	22	2	15		
4	L	3	Total	C	N	O	0	0
			39	22	2	15		
4	O	3	Total	C	N	O	0	0
			39	22	2	15		

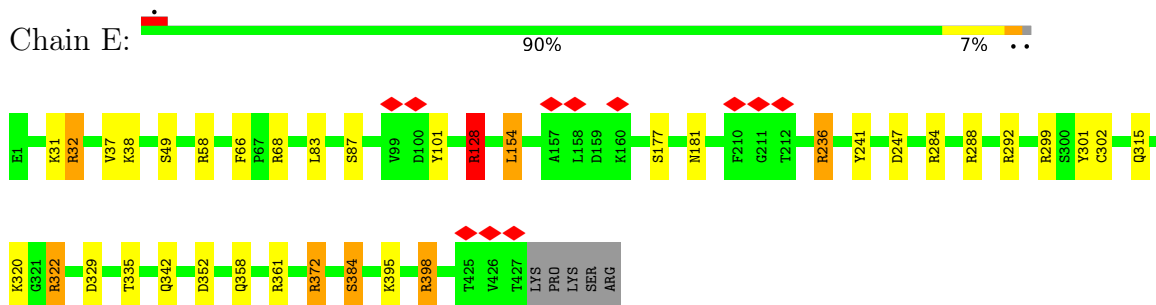
### 3 Residue-property plots

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.

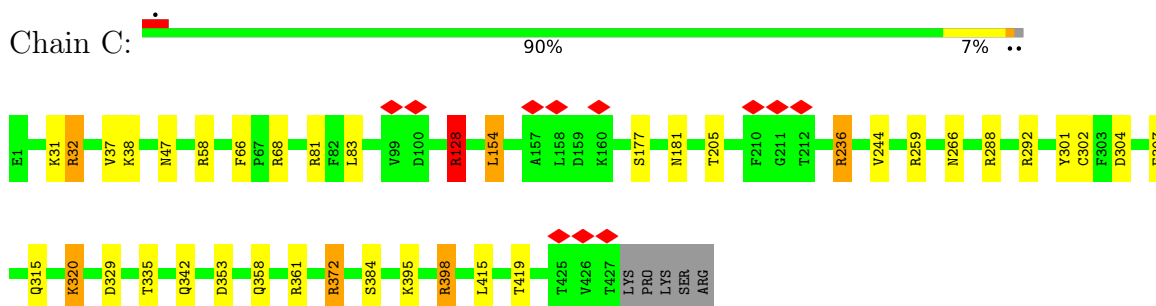
- Molecule 1: Hemagglutinin-esterase-fusion glycoprotein



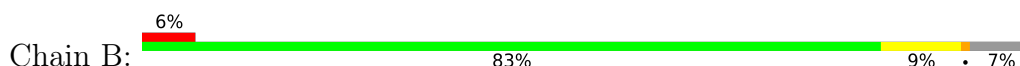
- Molecule 1: Hemagglutinin-esterase-fusion glycoprotein

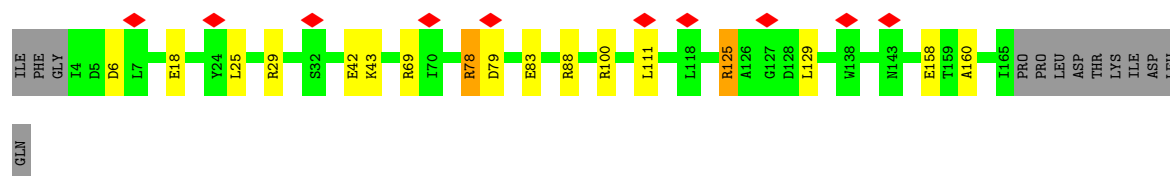


- Molecule 1: Hemagglutinin-esterase-fusion glycoprotein

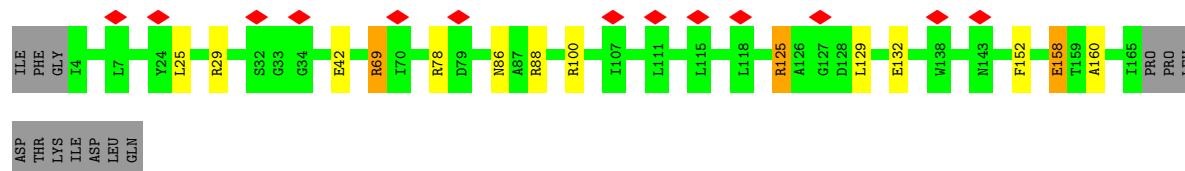
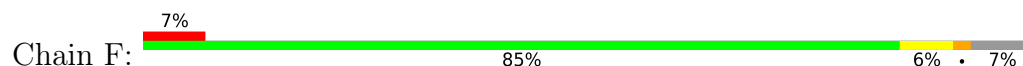


- Molecule 2: Hemagglutinin-esterase-fusion glycoprotein

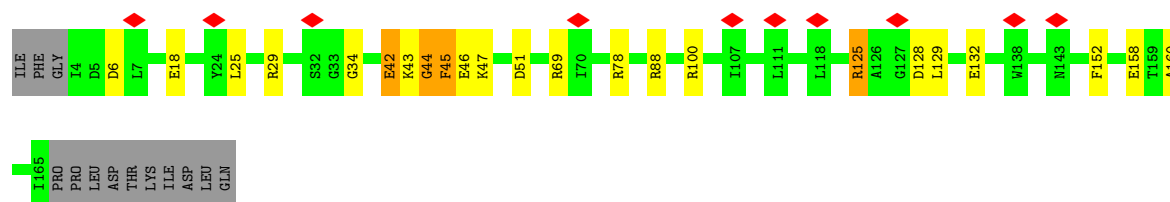
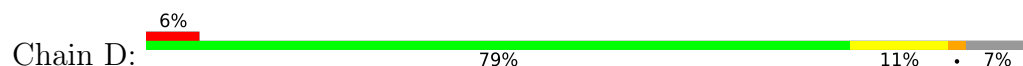




- Molecule 2: Hemagglutinin-esterase-fusion glycoprotein



- Molecule 2: Hemagglutinin-esterase-fusion glycoprotein



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  100%

MAG1  
MAG2  
BMA3

- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M:  33% 67%

MAG1  
MAG2  
BMA3

- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain N:  100%

MAG1  
MAG2  
BMA3

- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  33% 67%

MAG1  
NDG2  
BMA3

- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain L:  33% 67%

MAG1  
NDG2  
BMA3

- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain O:  100%

MAG1  
NDG2  
BMA3



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SUBTOMOGRAM AVERAGING	Depositor
Imposed symmetry	POINT, C3	Depositor
Number of subtomograms used	14057	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	1.57	Depositor
Minimum defocus (nm)	2.5	Depositor
Maximum defocus (nm)	4.5	Depositor
Magnification	64000	Depositor
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.571	Depositor
Minimum map value	-0.414	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.028	Depositor
Recommended contour level	0.11	Depositor
Map size ( $\text{\AA}$ )	440.0, 440.0, 440.0	wwPDB
Map dimensions	200, 200, 200	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	2.2, 2.2, 2.2	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, NDG, BMA

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	0.76	0/3420	1.11	15/4622 (0.3%)
1	C	0.76	0/3420	1.09	14/4622 (0.3%)
1	E	0.76	0/3420	1.10	18/4622 (0.4%)
2	B	0.73	0/1244	1.09	8/1682 (0.5%)
2	D	0.84	1/1244 (0.1%)	1.34	18/1682 (1.1%)
2	F	0.72	0/1244	1.14	9/1682 (0.5%)
All	All	0.76	1/13992 (0.0%)	1.13	82/18912 (0.4%)

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	A	0	8
1	C	0	5
1	E	0	6
2	B	0	2
2	D	0	2
2	F	0	2
All	All	0	25

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	45	PHE	CG-CD2	6.36	1.48	1.38

All (82) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	88	ARG	NE-CZ-NH1	11.85	126.23	120.30
1	C	58	ARG	NE-CZ-NH2	-11.35	114.62	120.30
1	A	58	ARG	NE-CZ-NH2	-11.15	114.72	120.30
1	A	32	ARG	NE-CZ-NH1	10.98	125.79	120.30
1	E	58	ARG	NE-CZ-NH2	-10.91	114.85	120.30
2	F	78	ARG	NE-CZ-NH1	10.16	125.38	120.30
2	F	100	ARG	NE-CZ-NH1	9.49	125.05	120.30
1	A	32	ARG	NE-CZ-NH2	-9.45	115.58	120.30
2	D	100	ARG	NE-CZ-NH1	9.27	124.94	120.30
1	A	288	ARG	NE-CZ-NH1	9.21	124.90	120.30
2	D	43	LYS	N-CA-CB	-9.14	94.15	110.60
1	C	288	ARG	NE-CZ-NH1	8.97	124.79	120.30
1	A	236	ARG	NE-CZ-NH1	8.66	124.63	120.30
1	C	372	ARG	NE-CZ-NH1	8.65	124.62	120.30
1	E	372	ARG	NE-CZ-NH1	8.55	124.57	120.30
1	E	322	ARG	NE-CZ-NH1	8.53	124.57	120.30
2	B	88	ARG	NE-CZ-NH1	8.46	124.53	120.30
1	C	236	ARG	NE-CZ-NH1	8.46	124.53	120.30
2	D	69	ARG	NE-CZ-NH1	8.43	124.51	120.30
1	E	292	ARG	NE-CZ-NH1	8.42	124.51	120.30
2	D	43	LYS	N-CA-C	8.27	133.34	111.00
1	A	372	ARG	NE-CZ-NH1	8.23	124.41	120.30
1	E	288	ARG	NE-CZ-NH1	8.00	124.30	120.30
2	D	78	ARG	NE-CZ-NH1	7.75	124.17	120.30
1	E	32	ARG	NE-CZ-NH2	-7.71	116.44	120.30
2	B	78	ARG	NE-CZ-NH1	7.53	124.06	120.30
1	C	81	ARG	NE-CZ-NH1	7.50	124.05	120.30
1	A	68	ARG	NE-CZ-NH1	7.43	124.02	120.30
1	A	372	ARG	NE-CZ-NH2	-7.25	116.68	120.30
1	C	398	ARG	NE-CZ-NH2	-7.20	116.70	120.30
2	F	29	ARG	NE-CZ-NH1	7.15	123.88	120.30
2	D	45	PHE	CB-CG-CD1	-7.14	115.80	120.80
2	F	69	ARG	NE-CZ-NH1	7.12	123.86	120.30
2	D	69	ARG	NE-CZ-NH2	-7.11	116.75	120.30
2	D	44	GLY	O-C-N	-7.10	111.35	122.70
2	D	43	LYS	C-N-CA	7.09	137.19	122.30
2	F	69	ARG	NE-CZ-NH2	-7.06	116.77	120.30
1	E	236	ARG	NE-CZ-NH1	6.98	123.79	120.30
1	E	372	ARG	NE-CZ-NH2	-6.84	116.88	120.30
2	B	125	ARG	NE-CZ-NH1	6.79	123.69	120.30
2	B	100	ARG	NE-CZ-NH1	6.67	123.64	120.30
2	D	29	ARG	NE-CZ-NH1	6.66	123.63	120.30
2	D	43	LYS	CD-CE-NZ	-6.65	96.41	111.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	128	ARG	NE-CZ-NH1	6.62	123.61	120.30
2	B	29	ARG	NE-CZ-NH1	6.62	123.61	120.30
1	E	68	ARG	NE-CZ-NH1	6.56	123.58	120.30
2	F	78	ARG	NE-CZ-NH2	-6.55	117.02	120.30
1	E	398	ARG	NE-CZ-NH1	6.38	123.49	120.30
2	F	88	ARG	NE-CZ-NH1	6.37	123.49	120.30
1	C	292	ARG	NE-CZ-NH1	6.36	123.48	120.30
1	E	32	ARG	NE-CZ-NH1	6.34	123.47	120.30
1	C	372	ARG	NE-CZ-NH2	-6.29	117.16	120.30
1	E	284	ARG	NE-CZ-NH1	6.19	123.39	120.30
2	B	69	ARG	NE-CZ-NH2	-6.04	117.28	120.30
1	A	292	ARG	NE-CZ-NH2	-6.01	117.29	120.30
2	F	125	ARG	NE-CZ-NH1	5.97	123.28	120.30
2	B	69	ARG	NE-CZ-NH1	5.88	123.24	120.30
2	D	125	ARG	NE-CZ-NH1	5.84	123.22	120.30
2	B	78	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	E	292	ARG	NE-CZ-NH2	-5.69	117.46	120.30
2	D	88	ARG	NE-CZ-NH2	-5.62	117.49	120.30
2	D	45	PHE	CB-CG-CD2	5.61	124.73	120.80
1	E	128	ARG	NE-CZ-NH1	5.52	123.06	120.30
2	D	45	PHE	N-CA-CB	5.46	120.44	110.60
1	A	398	ARG	NE-CZ-NH1	5.42	123.01	120.30
2	F	100	ARG	NE-CZ-NH2	-5.33	117.63	120.30
1	E	322	ARG	NE-CZ-NH2	-5.25	117.67	120.30
1	A	322	ARG	NE-CZ-NH1	5.24	122.92	120.30
1	E	384	SER	N-CA-CB	5.24	118.36	110.50
1	C	398	ARG	NE-CZ-NH1	5.24	122.92	120.30
1	A	299	ARG	NE-CZ-NH1	5.23	122.92	120.30
2	D	51	ASP	CB-CG-OD1	5.22	123.00	118.30
1	C	58	ARG	NE-CZ-NH1	5.21	122.91	120.30
1	A	292	ARG	NE-CZ-NH1	5.15	122.87	120.30
1	A	128	ARG	NE-CZ-NH2	5.11	122.85	120.30
1	C	32	ARG	NE-CZ-NH2	-5.09	117.75	120.30
1	C	236	ARG	NE-CZ-NH2	-5.08	117.76	120.30
1	E	58	ARG	NE-CZ-NH1	5.07	122.83	120.30
2	D	42	GLU	CA-C-O	5.06	130.72	120.10
1	E	299	ARG	NE-CZ-NH1	5.04	122.82	120.30
1	C	304	ASP	CB-CG-OD2	-5.03	113.78	118.30
1	A	384	SER	N-CA-CB	5.00	118.01	110.50

There are no chirality outliers.

All (25) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	101	TYR	Sidechain
1	A	213	TYR	Sidechain
1	A	241	TYR	Sidechain
1	A	259	ARG	Sidechain
1	A	361	ARG	Sidechain
1	A	372	ARG	Sidechain
1	A	398	ARG	Sidechain
1	A	68	ARG	Sidechain
2	B	125	ARG	Sidechain
2	B	78	ARG	Sidechain
1	C	259	ARG	Sidechain
1	C	361	ARG	Sidechain
1	C	372	ARG	Sidechain
1	C	398	ARG	Sidechain
1	C	68	ARG	Sidechain
2	D	125	ARG	Sidechain
2	D	45	PHE	Sidechain
1	E	101	TYR	Sidechain
1	E	241	TYR	Sidechain
1	E	322	ARG	Sidechain
1	E	361	ARG	Sidechain
1	E	372	ARG	Sidechain
1	E	398	ARG	Sidechain
2	F	125	ARG	Sidechain
2	F	69	ARG	Sidechain

## 5.2 Too-close contacts [i](#)

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	3339	0	3253	2	0
1	C	3339	0	3253	2	0
1	E	3339	0	3253	1	0
2	B	1231	0	1241	0	0
2	D	1231	0	1241	1	0
2	F	1231	0	1241	0	0
3	G	39	0	34	0	0
3	H	39	0	34	0	0
3	J	39	0	34	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	K	39	0	34	0	0
3	M	39	0	34	0	0
3	N	39	0	34	0	0
4	I	39	0	33	0	0
4	L	39	0	33	1	0
4	O	39	0	33	0	0
All	All	14061	0	13785	6	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 0.

All (6) 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)
1:C:320:LYS:HZ3	1:C:353:ASP:CG	2.13	0.52
2:D:44:GLY:O	2:D:47:LYS:HB3	2.11	0.51
1:E:154:LEU:HD23	1:E:301:TYR:CE1	2.50	0.46
1:C:154:LEU:HD23	1:C:301:TYR:CE1	2.53	0.43
1:A:190:LYS:HZ3	1:A:193:GLU:CD	2.23	0.43
1:A:21:PHE:CE1	4:L:1:NAG:H82	2.55	0.41

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	A	425/432 (98%)	380 (89%)	35 (8%)	10 (2%)	5	27
1	C	425/432 (98%)	384 (90%)	33 (8%)	8 (2%)	6	32
1	E	425/432 (98%)	380 (89%)	36 (8%)	9 (2%)	5	30
2	B	160/175 (91%)	140 (88%)	17 (11%)	3 (2%)	6	32

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	D	160/175 (91%)	140 (88%)	16 (10%)	4 (2%)	4	26
2	F	160/175 (91%)	139 (87%)	18 (11%)	3 (2%)	6	32
All	All	1755/1821 (96%)	1563 (89%)	155 (9%)	37 (2%)	8	30

All (37) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	181	ASN
1	A	384	SER
1	E	384	SER
1	C	181	ASN
1	A	83	LEU
2	B	42	GLU
1	E	181	ASN
2	F	42	GLU
1	C	266	ASN
1	C	384	SER
1	A	49	SER
1	E	83	LEU
2	F	158	GLU
2	D	42	GLU
1	A	128	ARG
1	A	177	SER
1	A	315	GLN
2	B	6	ASP
1	E	128	ARG
1	C	177	SER
2	D	6	ASP
2	D	34	GLY
1	A	87	SER
1	A	424	THR
2	B	160	ALA
1	E	49	SER
1	E	87	SER
1	E	315	GLN
1	C	83	LEU
1	C	315	GLN
1	A	66	PHE
1	E	66	PHE
1	E	177	SER
2	F	160	ALA

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Mol	Chain	Res	Type
1	C	128	ARG
2	D	160	ALA
1	C	66	PHE

### 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	369/374 (99%)	348 (94%)	21 (6%)	17	38
1	C	369/374 (99%)	349 (95%)	20 (5%)	18	40
1	E	369/374 (99%)	353 (96%)	16 (4%)	25	46
2	B	135/147 (92%)	127 (94%)	8 (6%)	16	37
2	D	135/147 (92%)	127 (94%)	8 (6%)	16	37
2	F	135/147 (92%)	129 (96%)	6 (4%)	24	45
All	All	1512/1563 (97%)	1433 (95%)	79 (5%)	22	40

All (79) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	LYS
1	A	32	ARG
1	A	37	VAL
1	A	38	LYS
1	A	47	ASN
1	A	128	ARG
1	A	154	LEU
1	A	159	ASP
1	A	189	VAL
1	A	236	ARG
1	A	247	ASP
1	A	270	THR
1	A	302	CYS
1	A	320	LYS
1	A	329	ASP

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Mol	Chain	Res	Type
1	A	335	THR
1	A	342	GLN
1	A	358	GLN
1	A	383	THR
1	A	395	LYS
1	A	424	THR
2	B	18	GLU
2	B	25	LEU
2	B	43	LYS
2	B	79	ASP
2	B	83	GLU
2	B	111	LEU
2	B	129	LEU
2	B	158	GLU
1	E	31	LYS
1	E	32	ARG
1	E	37	VAL
1	E	38	LYS
1	E	128	ARG
1	E	154	LEU
1	E	236	ARG
1	E	247	ASP
1	E	302	CYS
1	E	320	LYS
1	E	329	ASP
1	E	335	THR
1	E	342	GLN
1	E	352	ASP
1	E	358	GLN
1	E	395	LYS
2	F	25	LEU
2	F	86	ASN
2	F	129	LEU
2	F	132	GLU
2	F	152	PHE
2	F	158	GLU
1	C	31	LYS
1	C	32	ARG
1	C	37	VAL
1	C	38	LYS
1	C	47	ASN
1	C	128	ARG

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Mol	Chain	Res	Type
1	C	154	LEU
1	C	205	THR
1	C	236	ARG
1	C	244	VAL
1	C	302	CYS
1	C	307	GLU
1	C	320	LYS
1	C	329	ASP
1	C	335	THR
1	C	342	GLN
1	C	358	GLN
1	C	395	LYS
1	C	415	LEU
1	C	419	THR
2	D	18	GLU
2	D	25	LEU
2	D	46	GLU
2	D	128	ASP
2	D	129	LEU
2	D	132	GLU
2	D	152	PHE
2	D	158	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	121	HIS
1	E	209	GLN
2	F	86	ASN
2	F	147	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates

27 monosaccharides are modelled in this entry.

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	$\# Z  > 2$
3	NAG	G	1	1,3	14,14,15	0.22	0	17,19,21	0.75	0
3	NAG	G	2	3	14,14,15	0.31	0	17,19,21	1.17	1 (5%)
3	BMA	G	3	3	11,11,12	0.20	0	15,15,17	1.33	2 (13%)
3	NAG	H	1	1,3	14,14,15	0.33	0	17,19,21	0.99	1 (5%)
3	NAG	H	2	3	14,14,15	0.27	0	17,19,21	1.37	2 (11%)
3	BMA	H	3	3	11,11,12	0.20	0	15,15,17	1.10	1 (6%)
4	NAG	I	1	2,4	14,14,15	0.38	0	17,19,21	0.98	1 (5%)
4	NDG	I	2	4	14,14,15	0.34	0	17,19,21	1.32	3 (17%)
4	BMA	I	3	4	11,11,12	0.29	0	15,15,17	0.66	0
3	NAG	J	1	1,3	14,14,15	0.22	0	17,19,21	1.00	1 (5%)
3	NAG	J	2	3	14,14,15	0.26	0	17,19,21	1.29	2 (11%)
3	BMA	J	3	3	11,11,12	0.19	0	15,15,17	0.95	2 (13%)
3	NAG	K	1	1,3	14,14,15	0.23	0	17,19,21	1.05	1 (5%)
3	NAG	K	2	3	14,14,15	0.34	0	17,19,21	1.28	3 (17%)
3	BMA	K	3	3	11,11,12	0.26	0	15,15,17	1.48	1 (6%)
4	NAG	L	1	2,4	14,14,15	0.38	0	17,19,21	0.90	0
4	NDG	L	2	4	14,14,15	0.37	0	17,19,21	1.13	0
4	BMA	L	3	4	11,11,12	0.26	0	15,15,17	0.81	1 (6%)
3	NAG	M	1	1,3	14,14,15	0.23	0	17,19,21	0.98	0
3	NAG	M	2	3	14,14,15	0.41	0	17,19,21	1.26	2 (11%)
3	BMA	M	3	3	11,11,12	0.38	0	15,15,17	1.16	1 (6%)
3	NAG	N	1	1,3	14,14,15	0.25	0	17,19,21	1.22	1 (5%)
3	NAG	N	2	3	14,14,15	0.30	0	17,19,21	1.31	2 (11%)
3	BMA	N	3	3	11,11,12	0.27	0	15,15,17	1.29	1 (6%)
4	NAG	O	1	2,4	14,14,15	0.41	0	17,19,21	0.91	1 (5%)
4	NDG	O	2	4	14,14,15	0.40	0	17,19,21	1.42	3 (17%)
4	BMA	O	3	4	11,11,12	0.23	0	15,15,17	0.81	1 (6%)

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
3	NAG	G	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	G	2	3	-	1/6/23/26	0/1/1/1
3	BMA	G	3	3	-	0/2/19/22	0/1/1/1
3	NAG	H	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	H	2	3	-	0/6/23/26	0/1/1/1
3	BMA	H	3	3	-	0/2/19/22	0/1/1/1
4	NAG	I	1	2,4	-	0/6/23/26	0/1/1/1
4	NDG	I	2	4	-	0/6/23/26	0/1/1/1
4	BMA	I	3	4	-	0/2/19/22	0/1/1/1
3	NAG	J	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	J	2	3	-	1/6/23/26	0/1/1/1
3	BMA	J	3	3	-	0/2/19/22	0/1/1/1
3	NAG	K	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	K	2	3	-	2/6/23/26	0/1/1/1
3	BMA	K	3	3	-	0/2/19/22	0/1/1/1
4	NAG	L	1	2,4	-	0/6/23/26	0/1/1/1
4	NDG	L	2	4	-	0/6/23/26	0/1/1/1
4	BMA	L	3	4	-	0/2/19/22	0/1/1/1
3	NAG	M	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	M	2	3	-	1/6/23/26	0/1/1/1
3	BMA	M	3	3	-	0/2/19/22	0/1/1/1
3	NAG	N	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	N	2	3	-	0/6/23/26	0/1/1/1
3	BMA	N	3	3	-	0/2/19/22	0/1/1/1
4	NAG	O	1	2,4	-	0/6/23/26	0/1/1/1
4	NDG	O	2	4	-	0/6/23/26	0/1/1/1
4	BMA	O	3	4	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	K	3	BMA	O5-C1-C2	-4.48	103.86	110.77
3	H	2	NAG	O5-C1-C2	-4.23	104.61	111.29
3	N	2	NAG	O5-C1-C2	-4.10	104.82	111.29
3	N	3	BMA	O5-C1-C2	-4.09	104.46	110.77
3	J	2	NAG	O5-C5-C6	-3.83	101.20	107.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	N	1	NAG	O5-C1-C2	-3.80	105.28	111.29
3	G	3	BMA	O5-C1-C2	-3.70	105.06	110.77
3	K	1	NAG	O5-C1-C2	-3.50	105.76	111.29
3	H	1	NAG	O5-C1-C2	-3.45	105.85	111.29
3	M	2	NAG	O5-C1-C2	-3.37	105.96	111.29
3	M	2	NAG	O5-C5-C6	-3.23	102.15	107.20
3	H	3	BMA	O5-C1-C2	-3.18	105.87	110.77
3	M	3	BMA	O5-C1-C2	-3.07	106.04	110.77
3	K	2	NAG	C2-N2-C7	2.72	126.77	122.90
3	G	2	NAG	O5-C1-C2	-2.70	107.03	111.29
4	I	2	NDG	C3-C4-C5	-2.68	105.45	110.24
4	O	2	NDG	C3-C4-C5	-2.53	105.73	110.24
3	H	2	NAG	C1-C2-N2	2.48	114.73	110.49
3	K	2	NAG	O5-C1-C2	-2.47	107.38	111.29
3	J	3	BMA	O5-C1-C2	-2.32	107.19	110.77
4	O	2	NDG	C4-C3-C2	-2.32	107.62	111.02
4	I	2	NDG	O5-C5-C4	-2.30	105.24	110.83
3	K	2	NAG	C4-C3-C2	2.23	114.29	111.02
3	J	3	BMA	O2-C2-C1	2.21	113.67	109.15
4	I	1	NAG	C3-C4-C5	-2.20	106.31	110.24
4	I	2	NDG	C4-C3-C2	-2.17	107.84	111.02
4	L	3	BMA	O5-C1-C2	-2.15	107.45	110.77
3	J	1	NAG	C3-C4-C5	-2.14	106.42	110.24
4	O	1	NAG	O5-C1-C2	-2.11	107.95	111.29
3	N	2	NAG	C4-C3-C2	2.09	114.08	111.02
3	G	3	BMA	O3-C3-C2	2.09	114.00	109.99
3	J	2	NAG	O5-C1-C2	-2.05	108.05	111.29
4	O	3	BMA	O5-C1-C2	-2.05	107.61	110.77
4	O	2	NDG	C1-O5-C5	2.04	114.95	112.19

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	1	NAG	C4-C5-C6-O6
3	G	1	NAG	O5-C5-C6-O6
3	J	1	NAG	C4-C5-C6-O6
3	M	1	NAG	C4-C5-C6-O6
3	J	1	NAG	O5-C5-C6-O6
3	M	1	NAG	O5-C5-C6-O6
3	G	2	NAG	O5-C5-C6-O6
3	M	2	NAG	O5-C5-C6-O6

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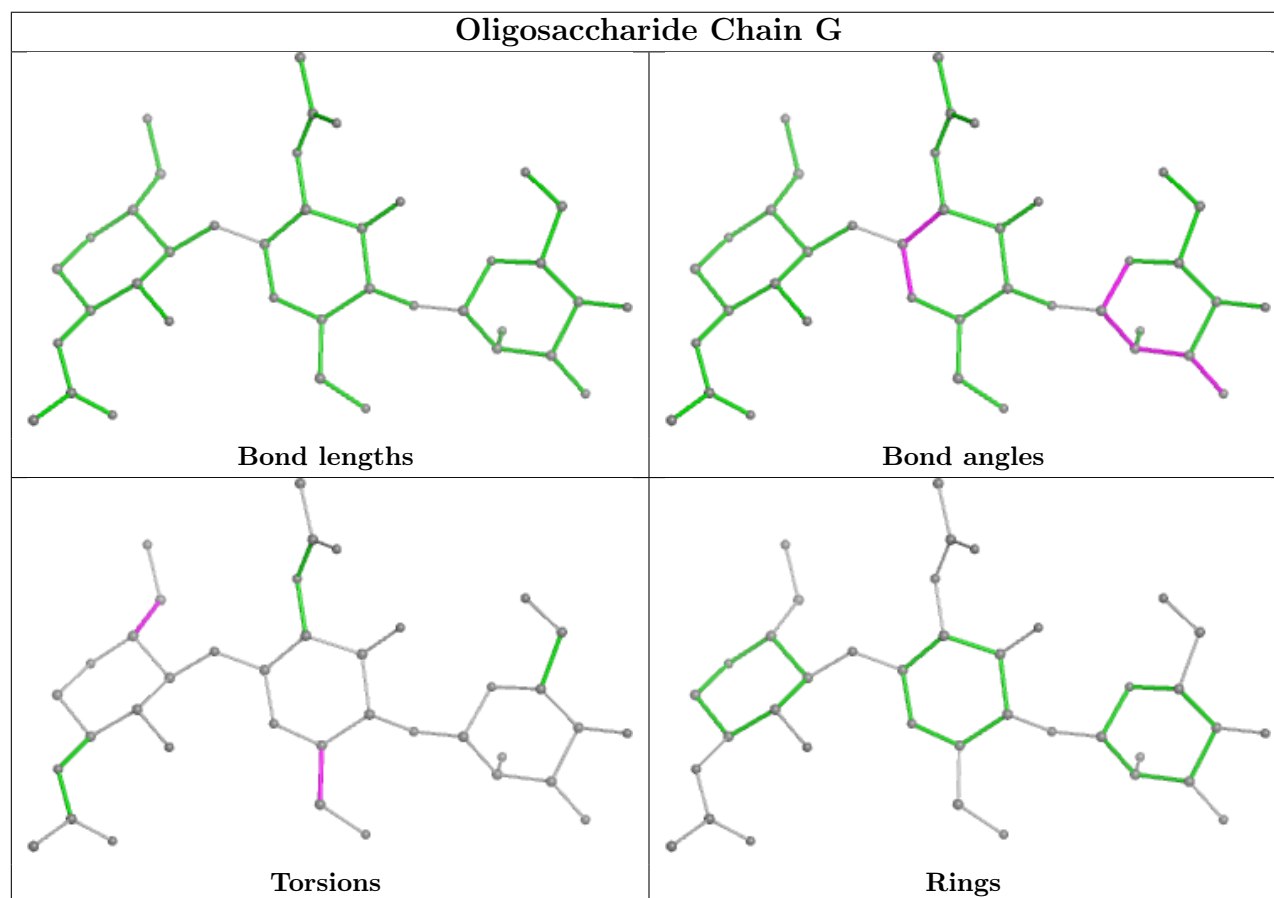
Mol	Chain	Res	Type	Atoms
3	J	2	NAG	O5-C5-C6-O6
3	K	2	NAG	C1-C2-N2-C7
3	K	2	NAG	C3-C2-N2-C7

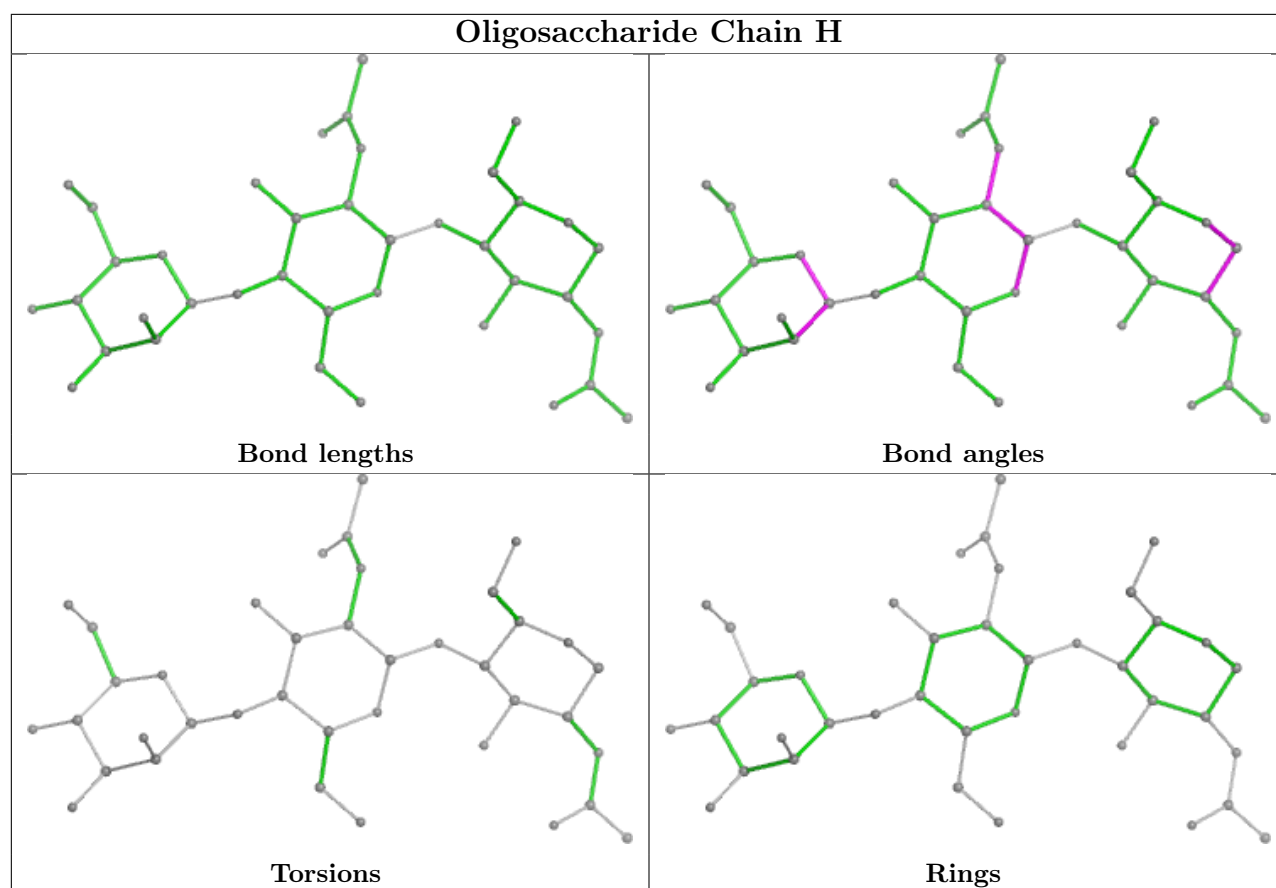
There are no ring outliers.

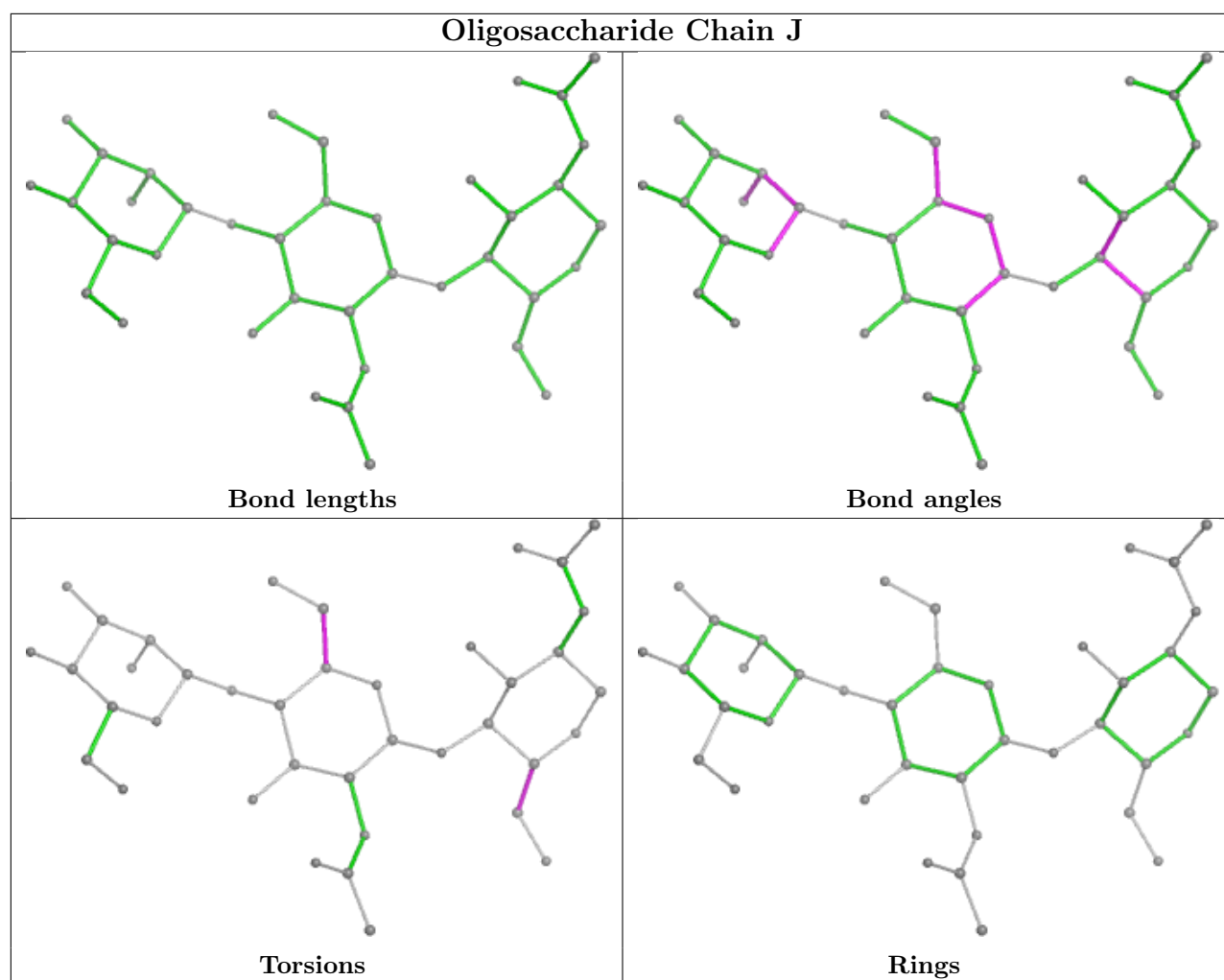
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	L	1	NAG	1	0

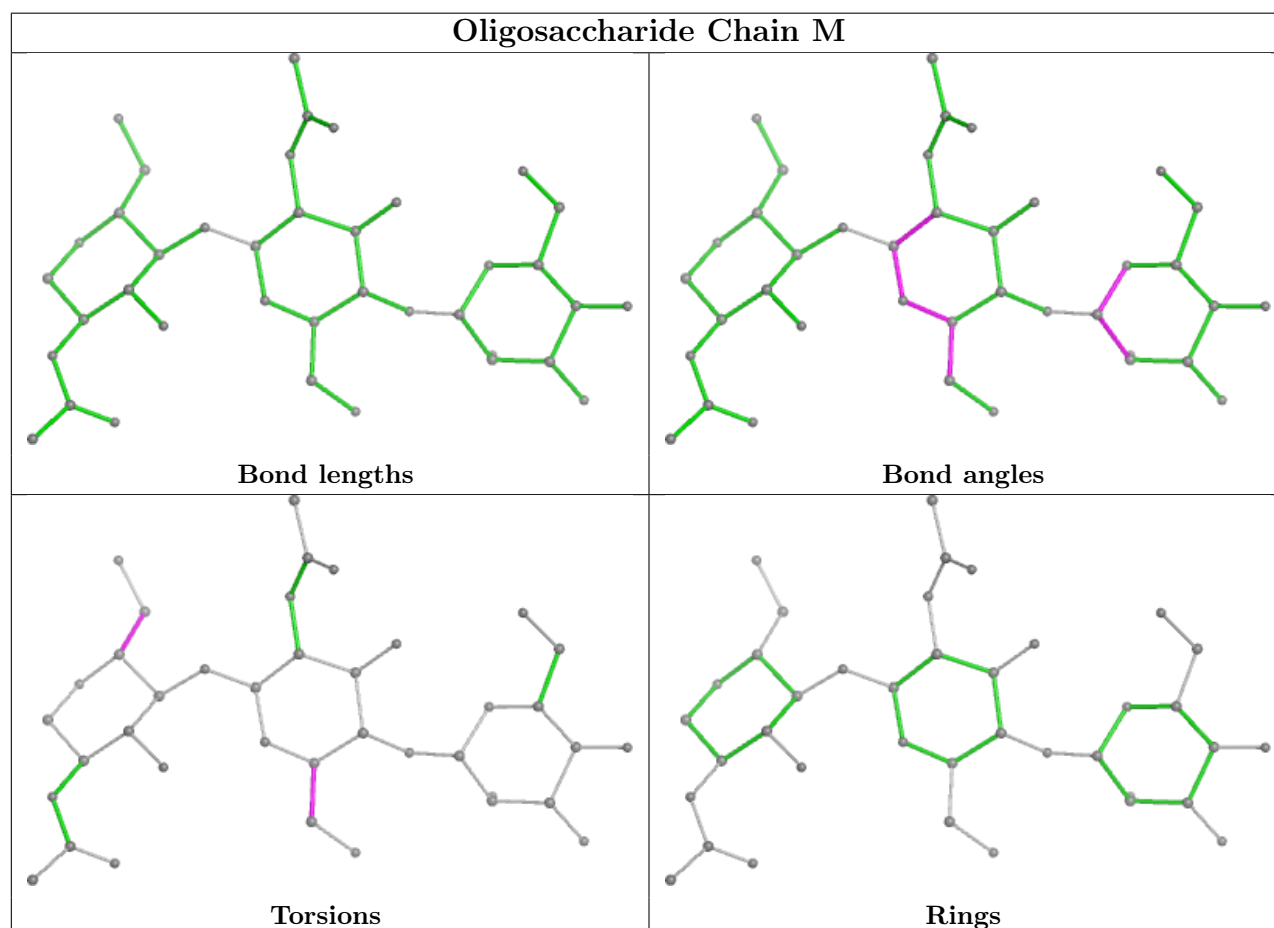
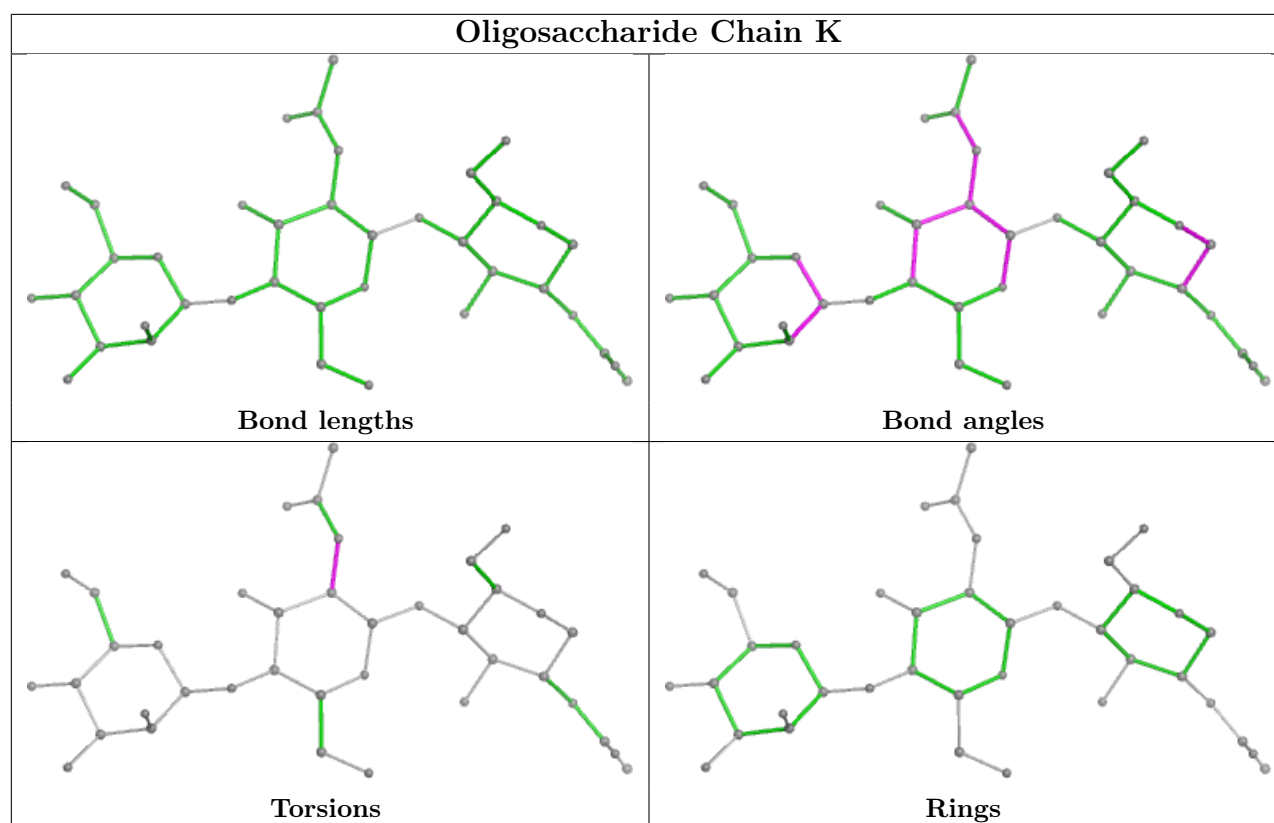
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

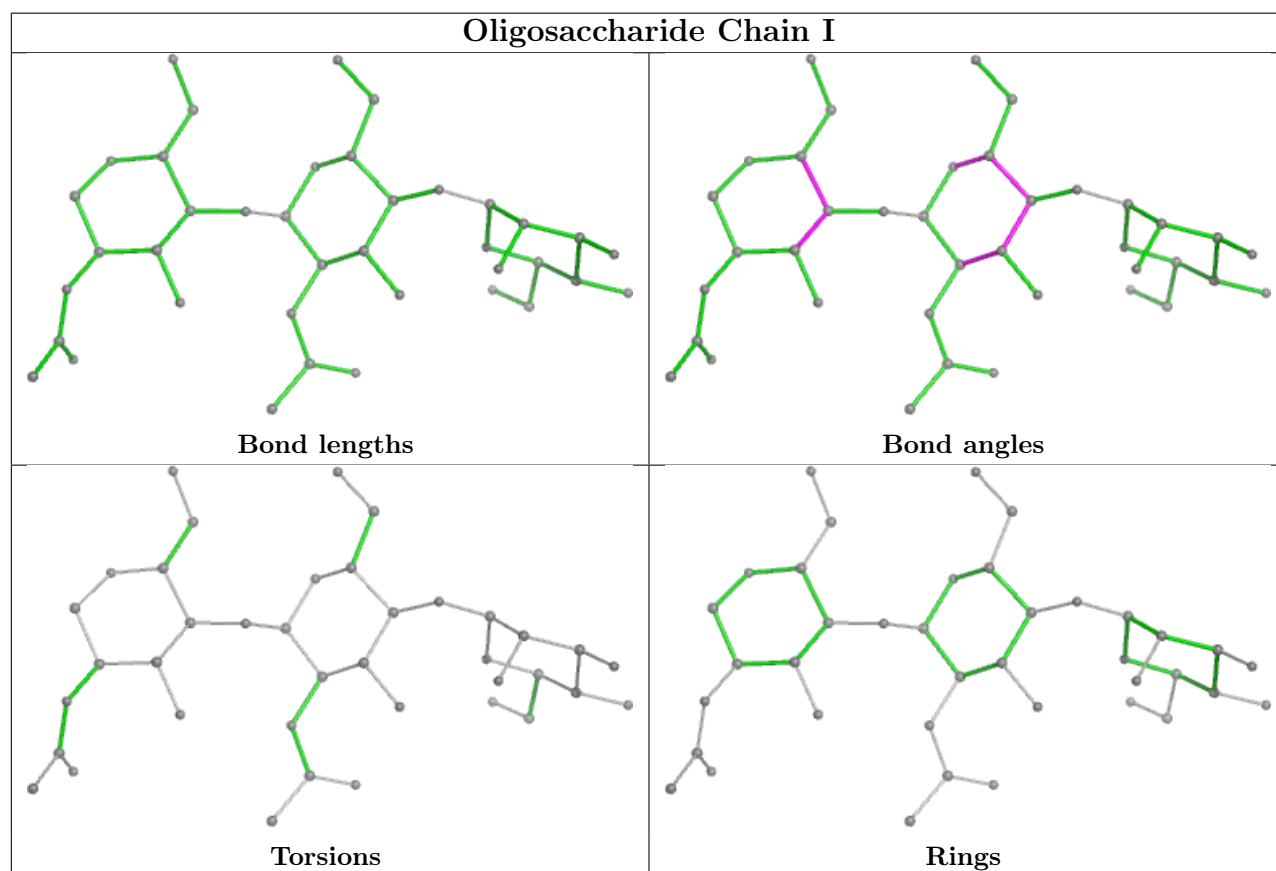
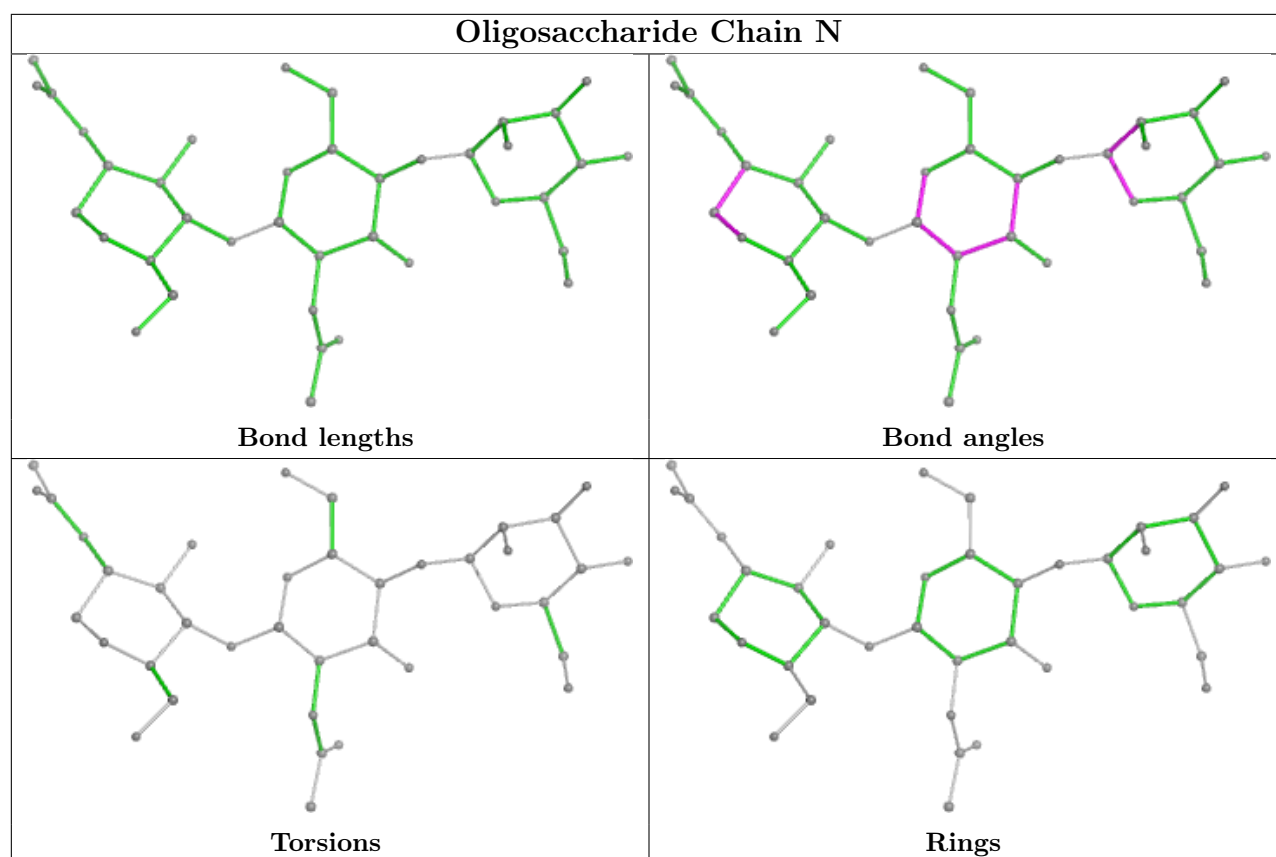


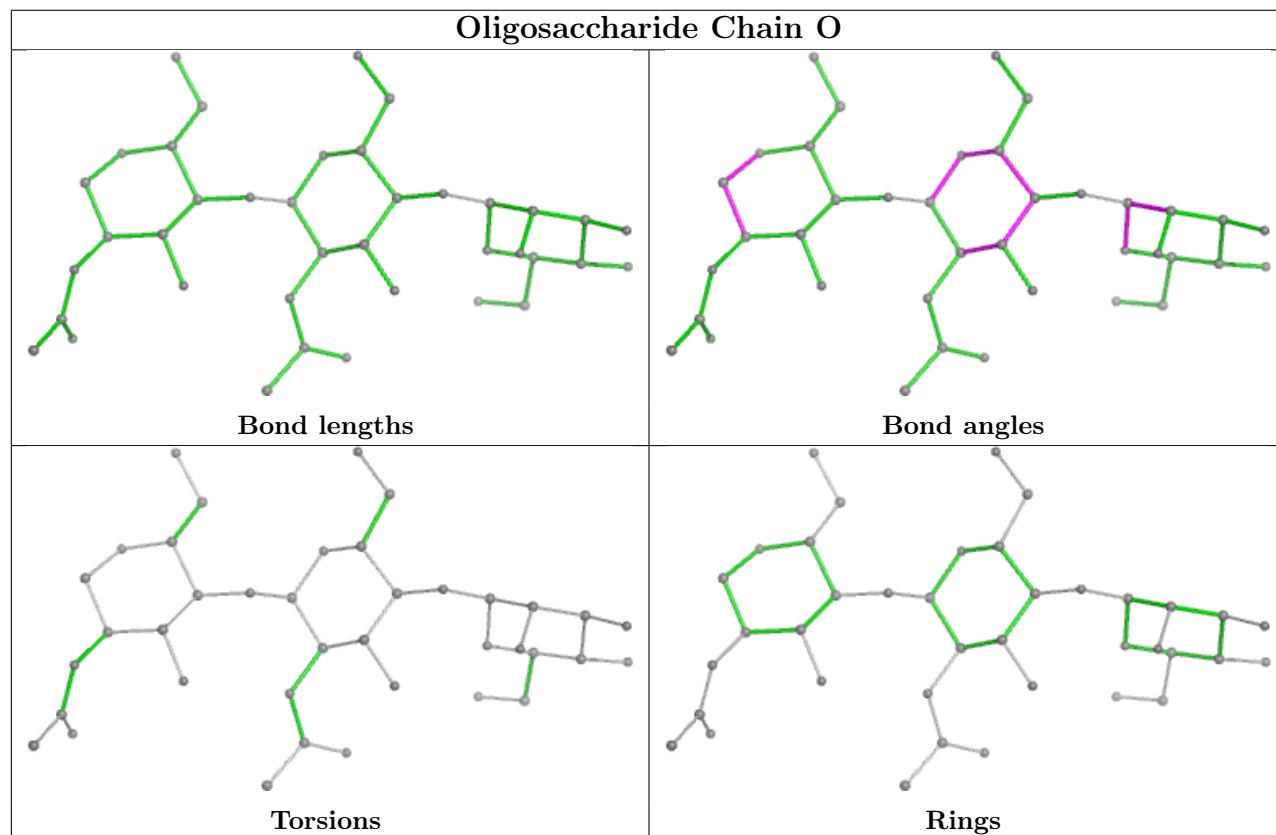
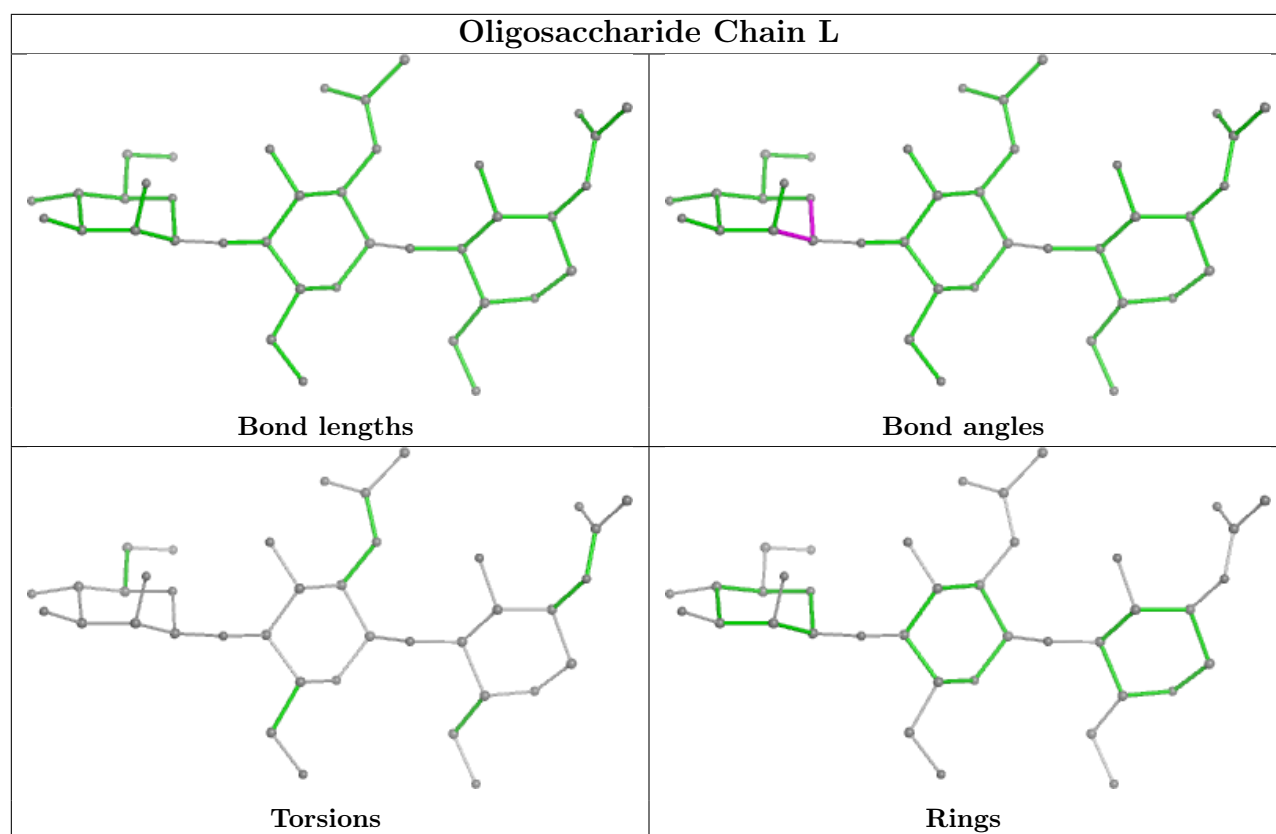












## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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.

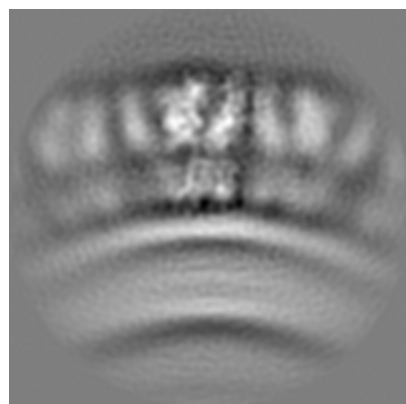
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-10810. These allow visual inspection of the internal detail of the map and identification of artifacts.

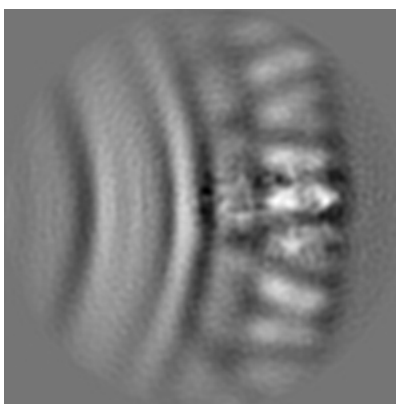
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

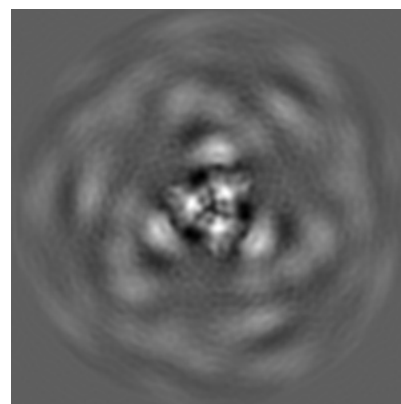
#### 6.1.1 Primary map



X

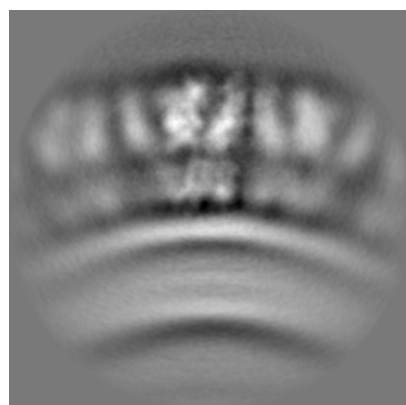


Y

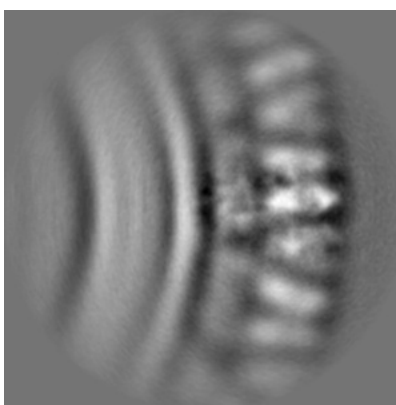


Z

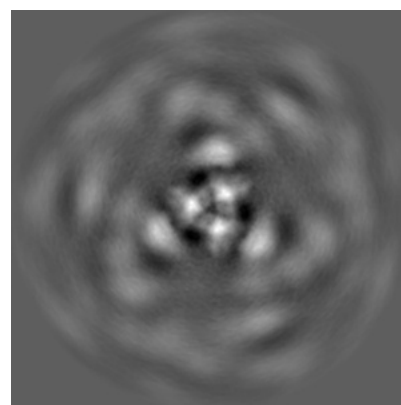
#### 6.1.2 Raw map



X



Y

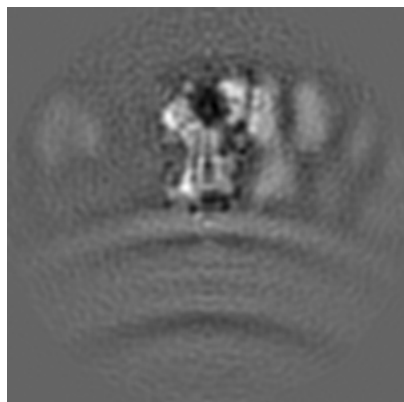


Z

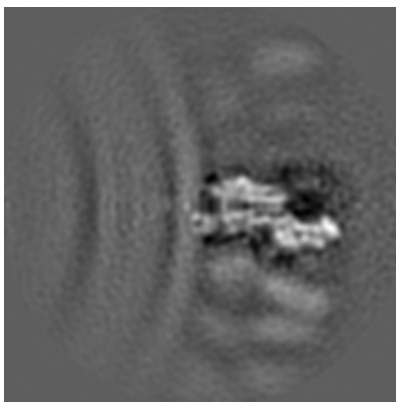
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

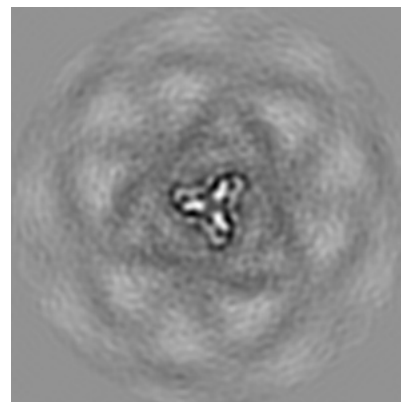
### 6.2.1 Primary map



X Index: 100

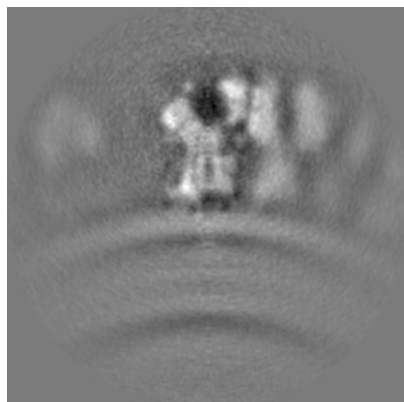


Y Index: 100

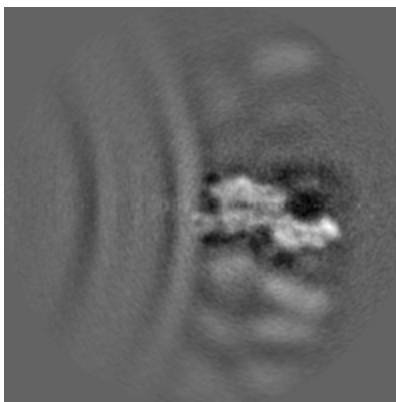


Z Index: 100

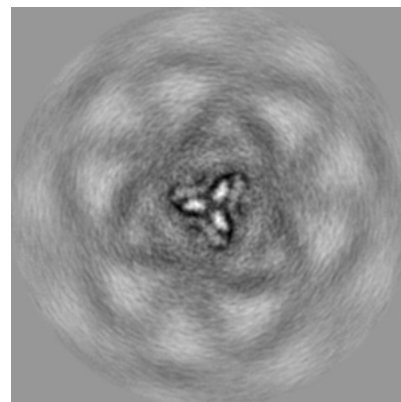
### 6.2.2 Raw map



X Index: 100



Y Index: 100

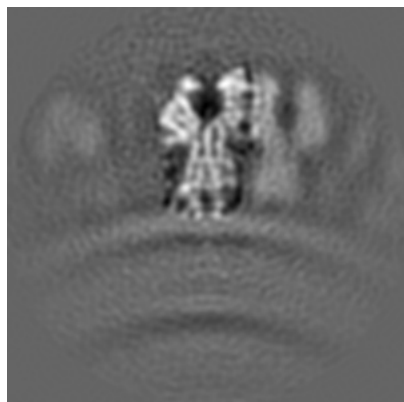


Z Index: 100

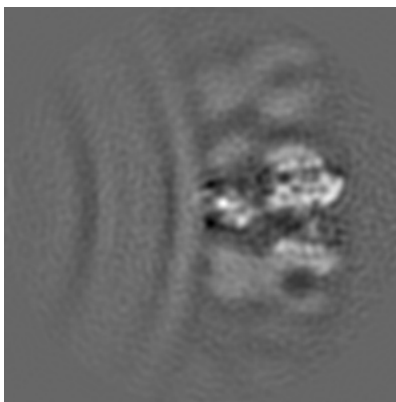
The images above show central slices of the map in three orthogonal directions.

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

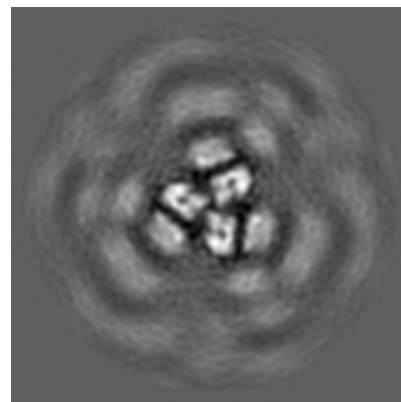
### 6.3.1 Primary map



X Index: 103

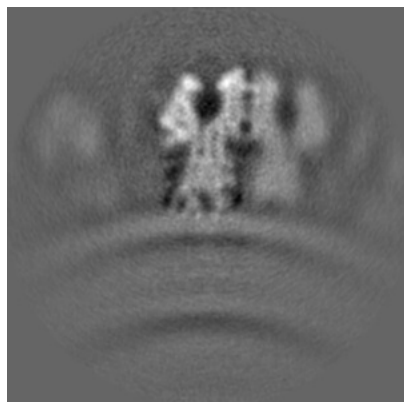


Y Index: 89

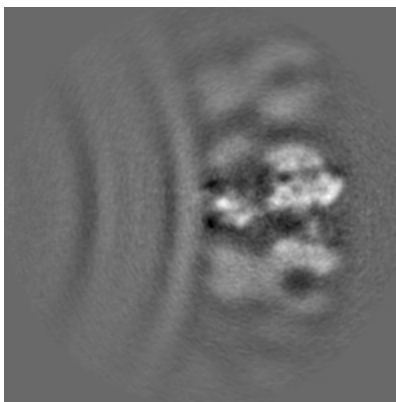


Z Index: 141

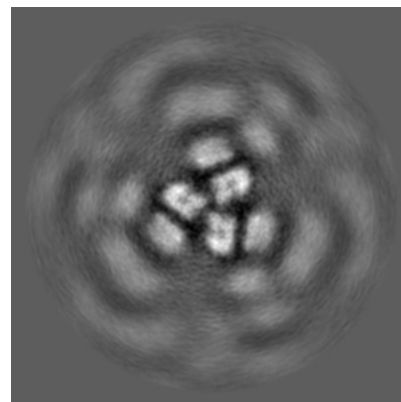
### 6.3.2 Raw map



X Index: 104



Y Index: 89

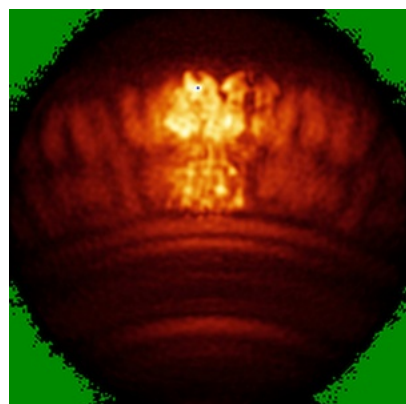


Z Index: 141

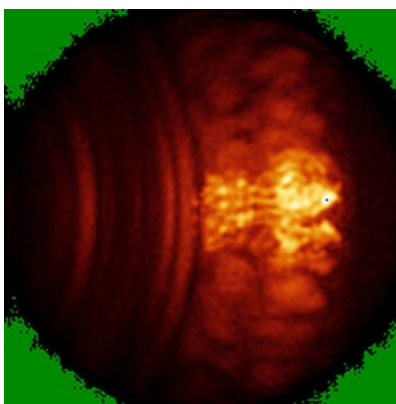
The images above show the largest variance slices of the map in three orthogonal directions.

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

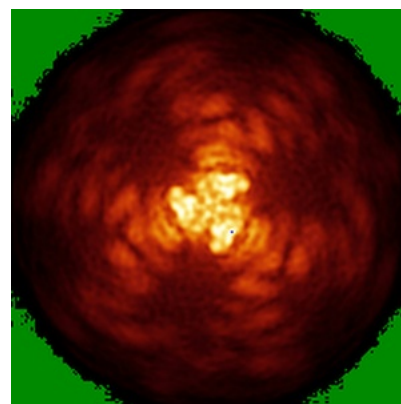
### 6.4.1 Primary map



X

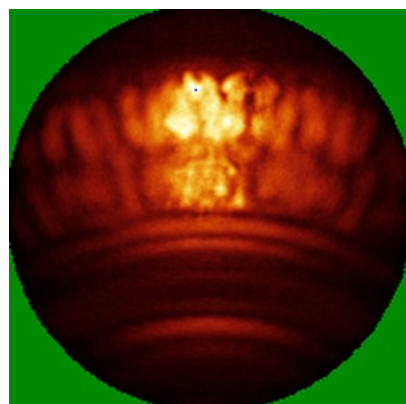


Y

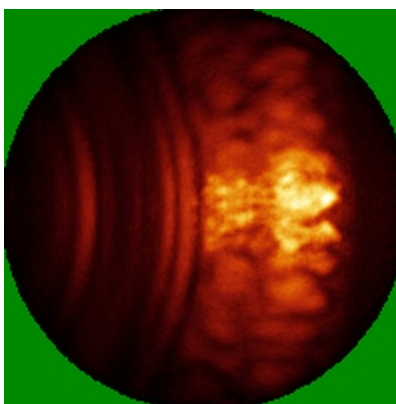


Z

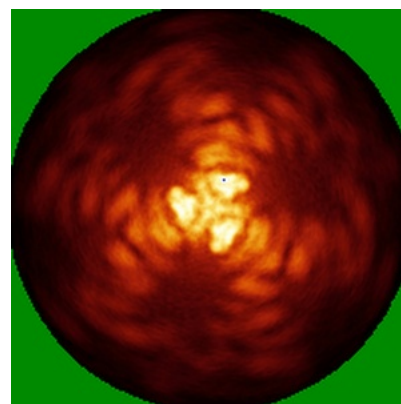
### 6.4.2 Raw map



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 0.11. 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.

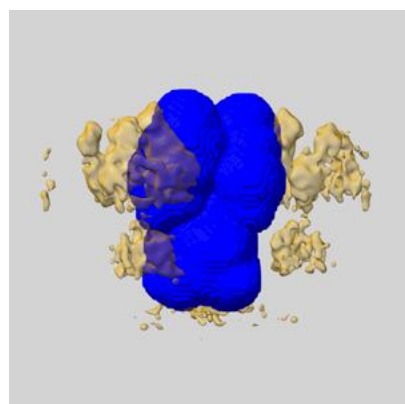
## 6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

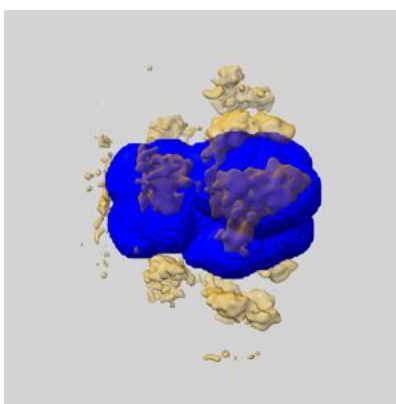
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

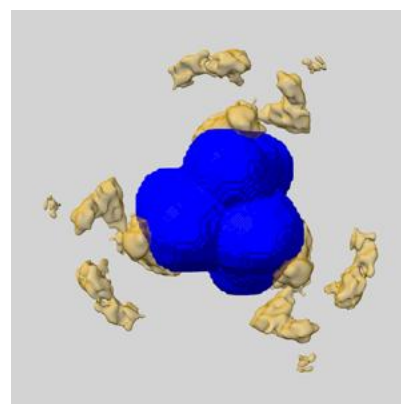
### 6.6.1 emd\_10810\_msk\_1.map [i](#)



X



Y

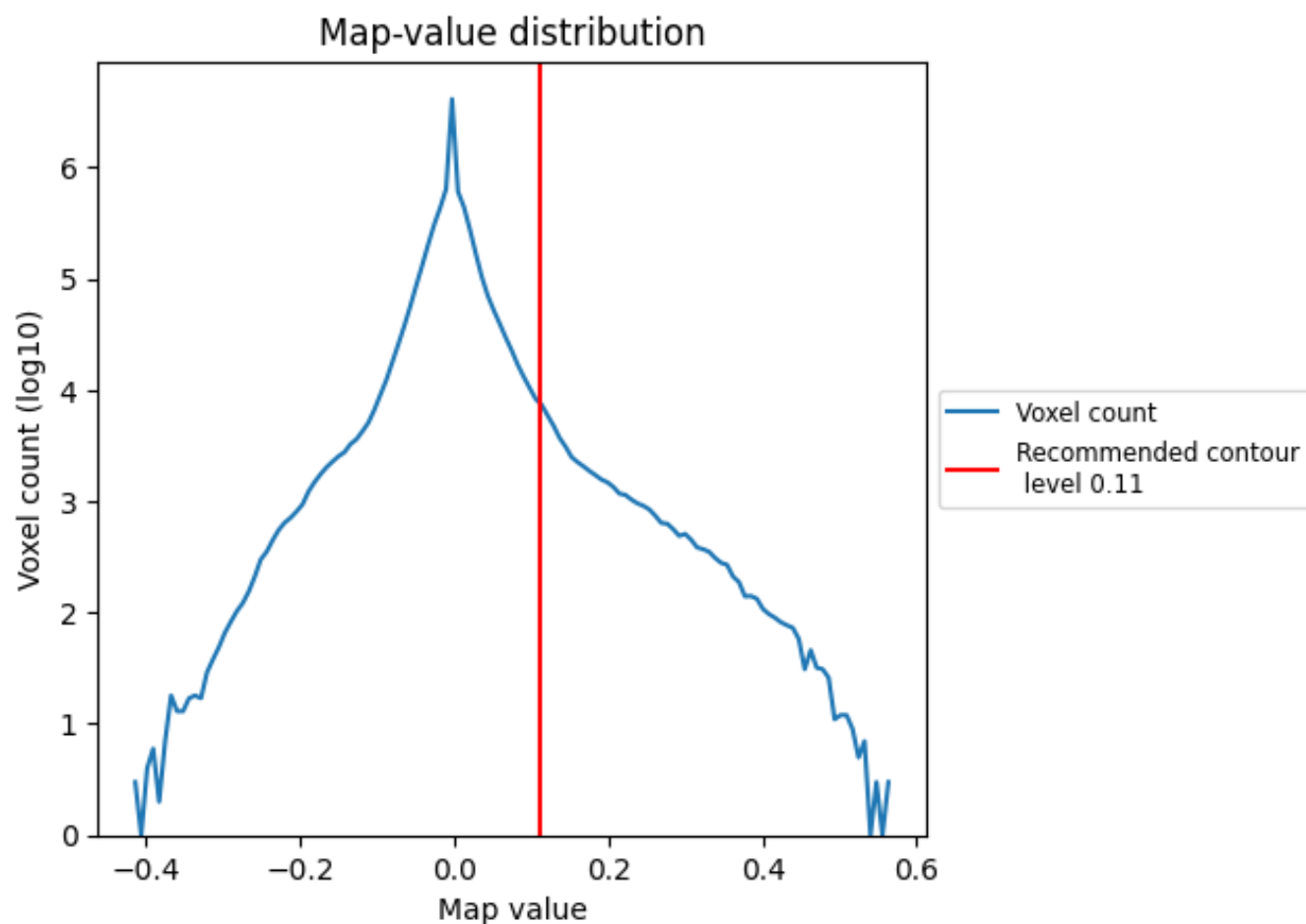


Z

## 7 Map analysis [i](#)

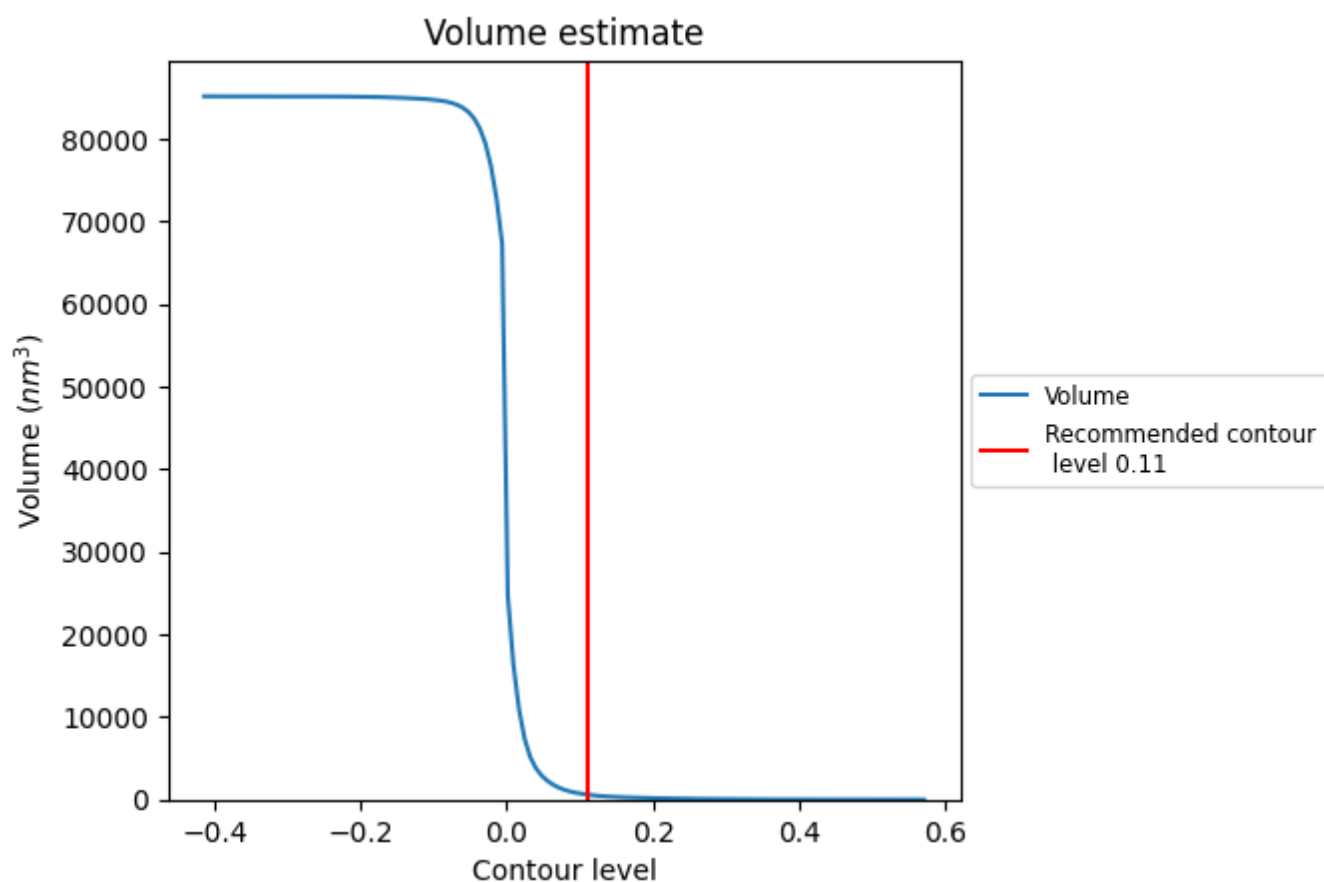
This section contains the results of statistical analysis of the map.

### 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.

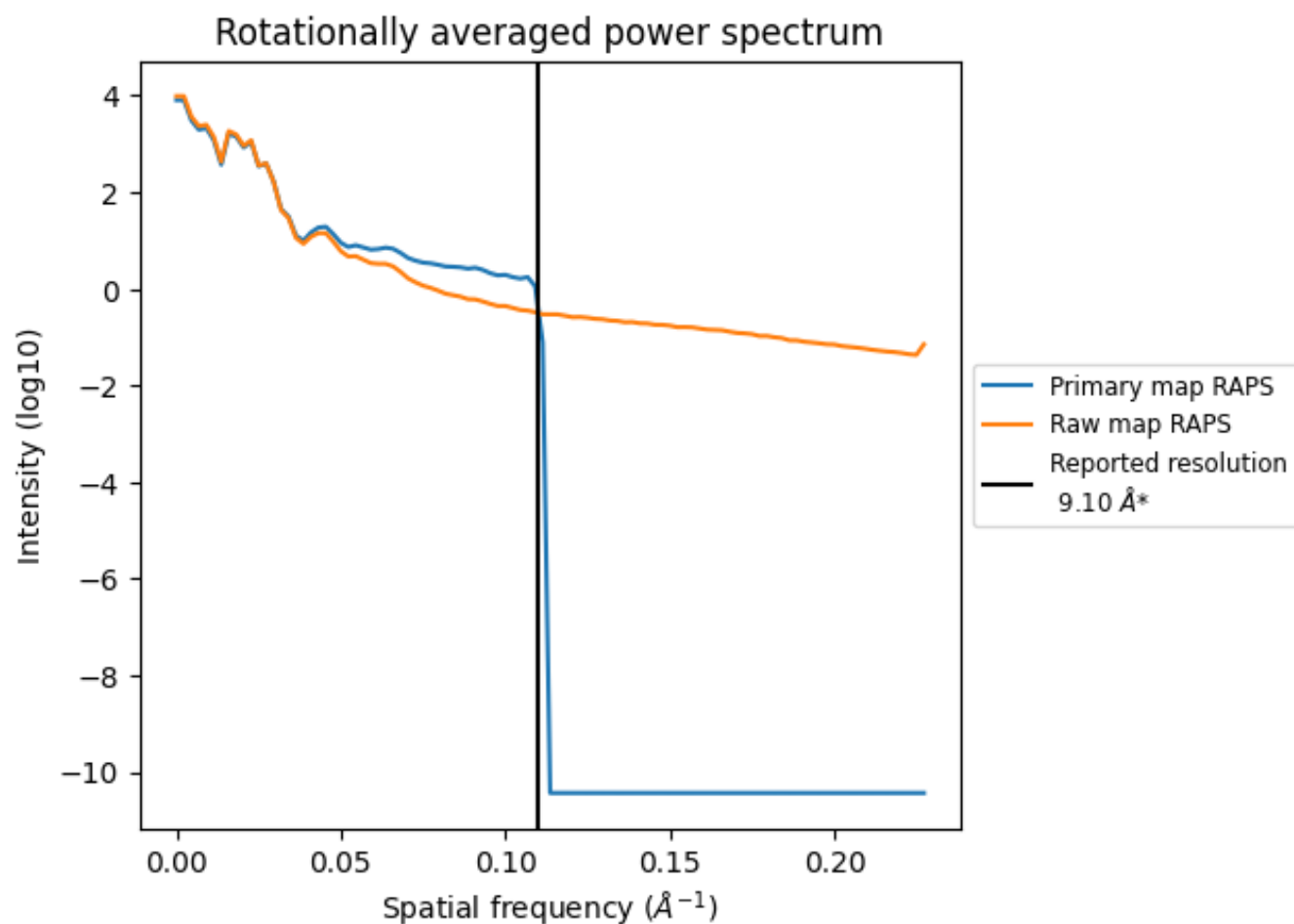
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 604 nm<sup>3</sup>; this corresponds to an approximate mass of 546 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 ⓘ

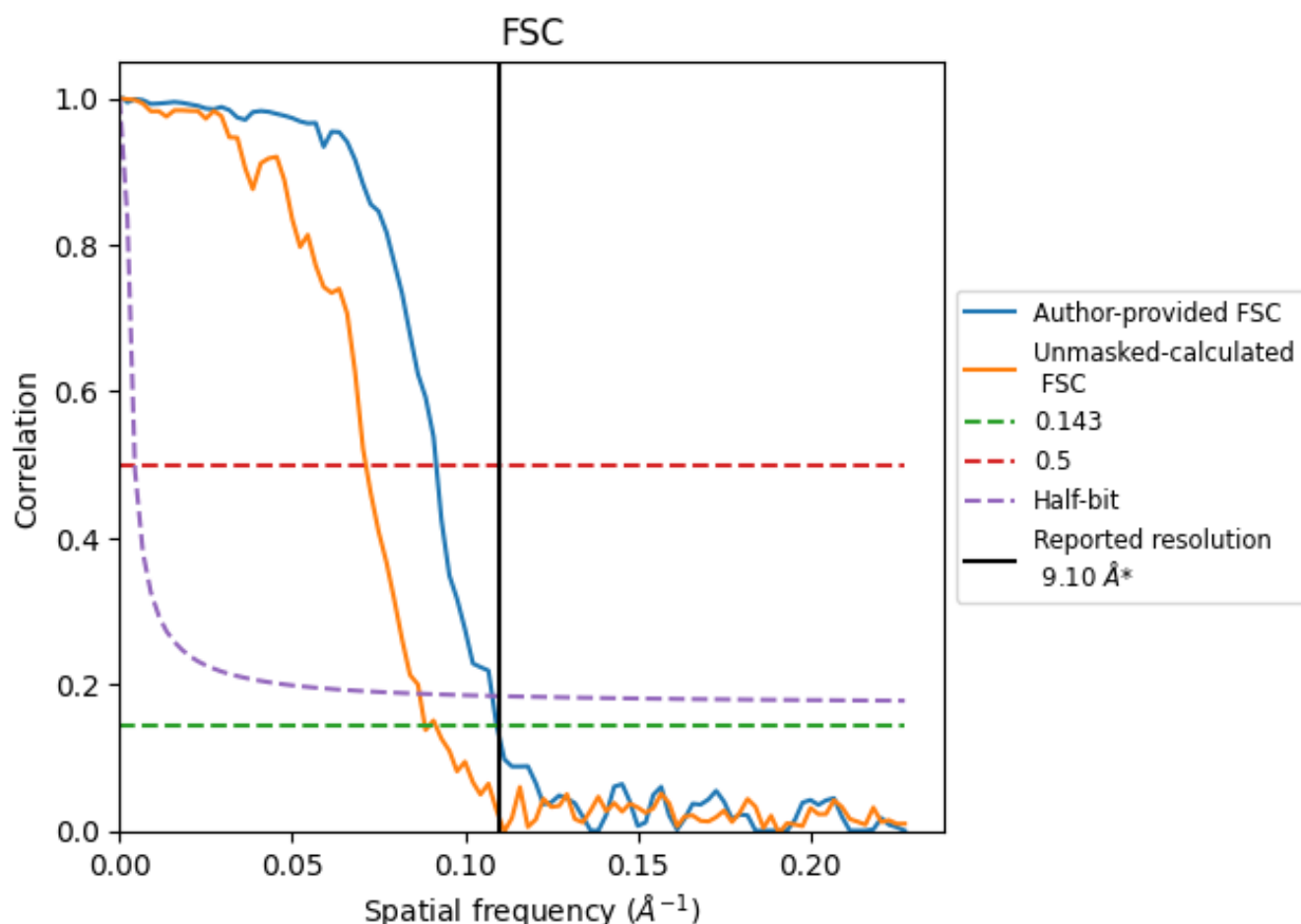


\*Reported resolution corresponds to spatial frequency of 0.110  $\text{\AA}^{-1}$

## 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 0.110 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

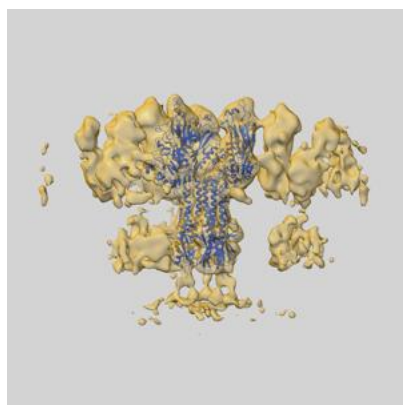
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	9.10	-	-
Author-provided FSC curve	9.16	10.91	9.27
Unmasked-calculated*	11.31	14.03	11.52

\*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 11.31 differs from the reported value 9.1 by more than 10 %

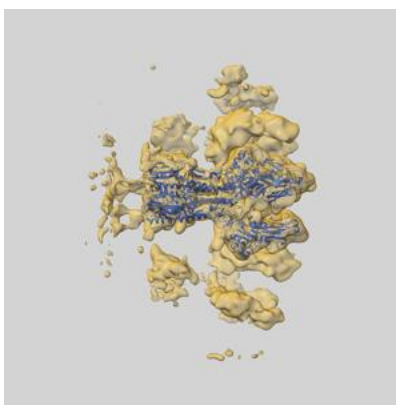
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-10810 and PDB model 6YI5. Per-residue inclusion information can be found in section 3 on page 6.

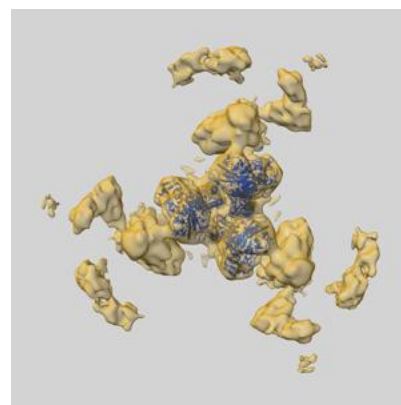
### 9.1 Map-model overlay [i](#)



X



Y

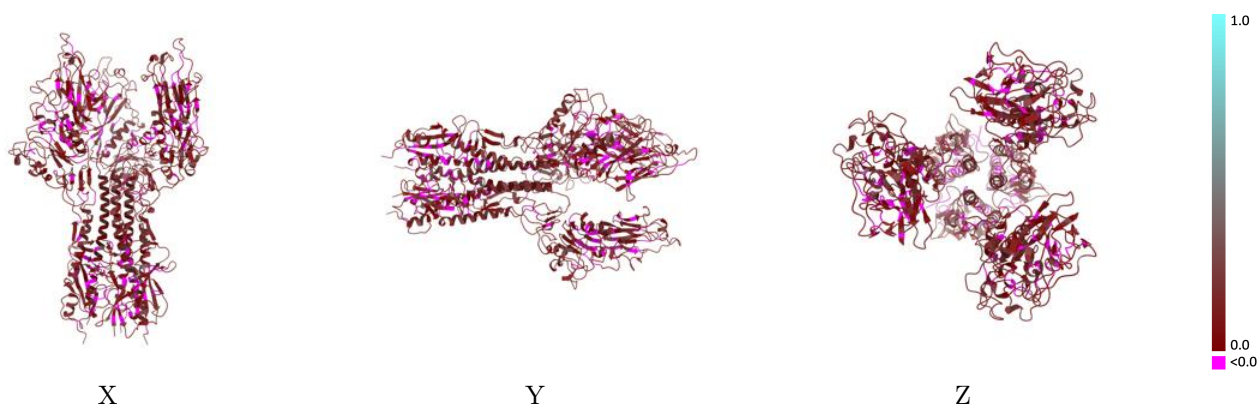


Z

The images above show the 3D surface view of the map at the recommended contour level 0.11 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.

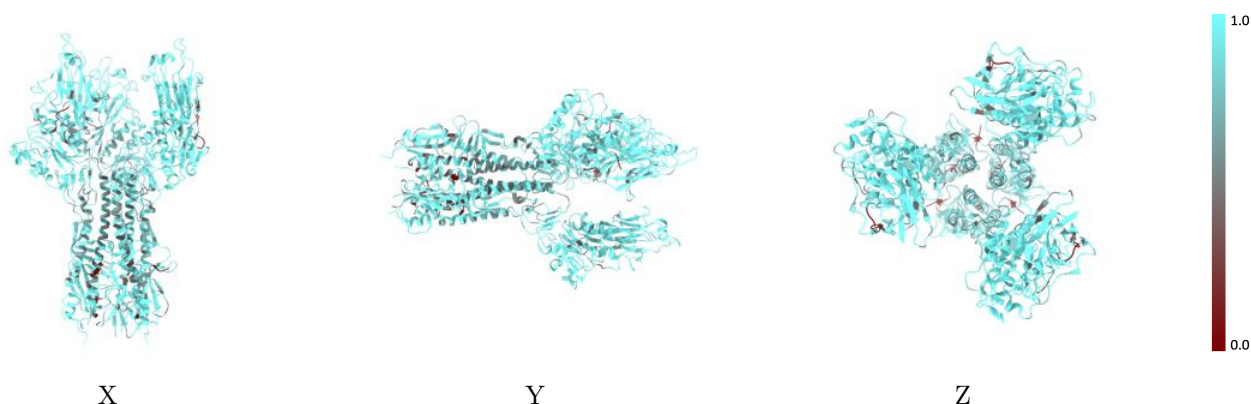


## 9.2 Q-score mapped to coordinate model [i](#)



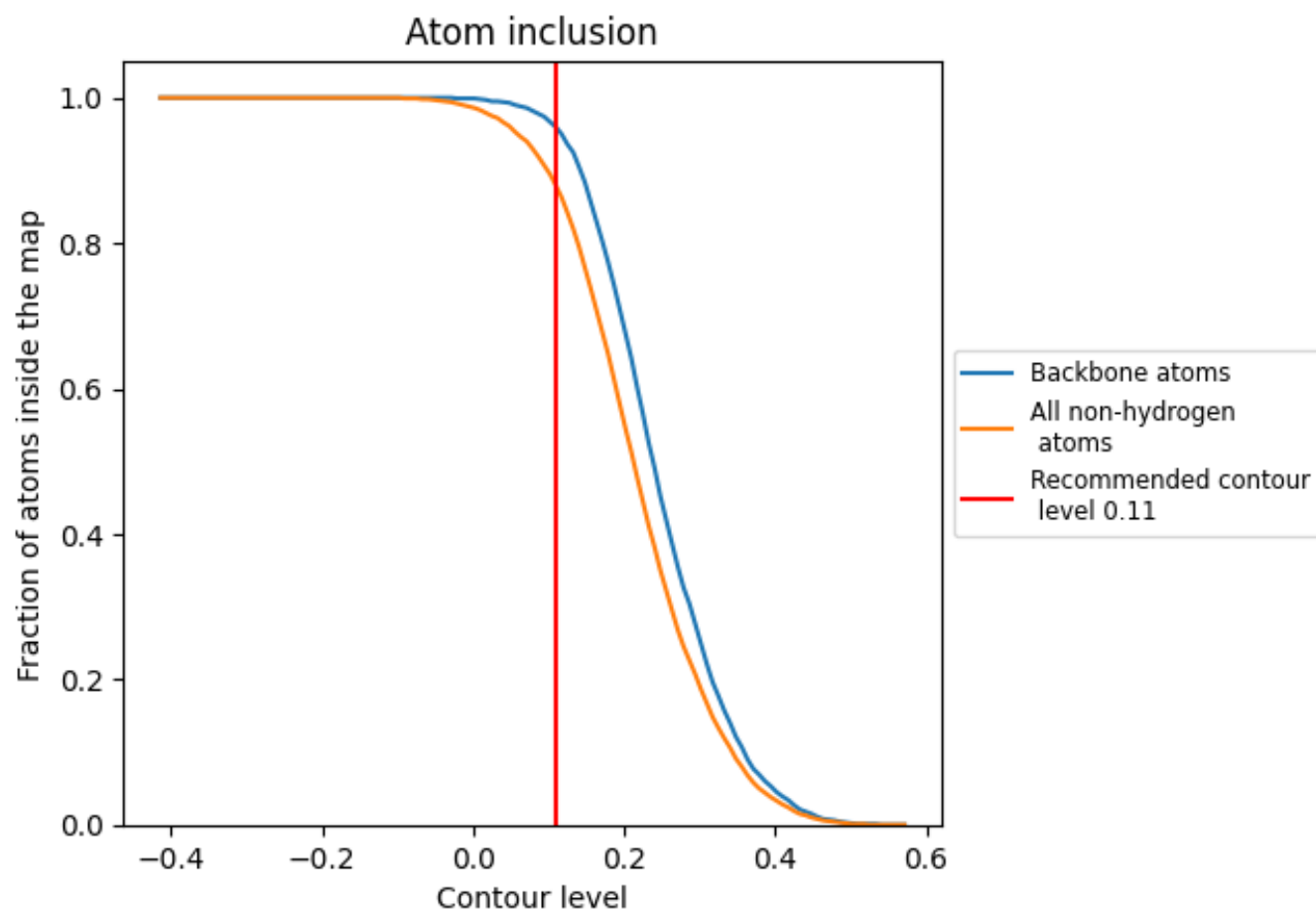
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.11).

































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 96% of all backbone atoms, 88% 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 (0.11) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8780	 0.1170
A	 0.8920	 0.1090
B	 0.8350	 0.1280
C	 0.8980	 0.1100
D	 0.8220	 0.1240
E	 0.8960	 0.1100
F	 0.8160	 0.1260
G	 0.9740	 0.2860
H	 0.8970	 0.2370
I	 0.8460	 0.1140
J	 0.9740	 0.3060
K	 0.9740	 0.2880
L	 0.8720	 0.1370
M	 1.0000	 0.3230
N	 0.9740	 0.2850
O	 0.8720	 0.1180

