



Full wwPDB EM Validation Report ⓘ

Oct 16, 2023 – 12:32 PM JST

PDB ID : 8H6F
EMDB ID : EMD-34501
Title : Cryo-EM structure of SARS-CoV-2 Spike protein in complex with A6 rebody
Authors : Kim, U.J.; Yoo, Y.; Cho, H.S.
Deposited on : 2022-10-17
Resolution : 3.30 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

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>.

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

EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

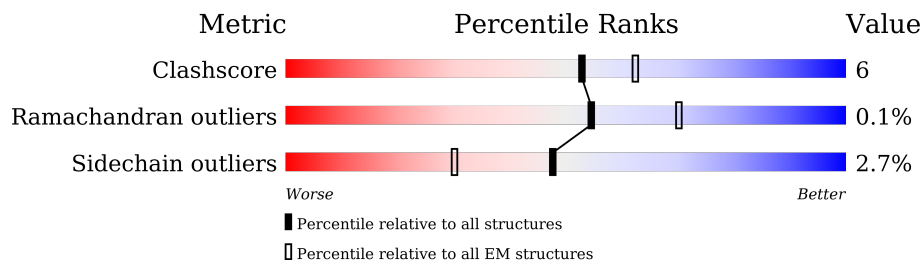
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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.




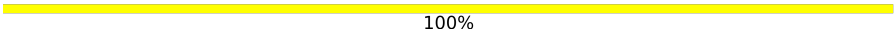
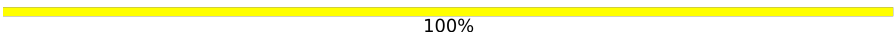
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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 ≥ 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	1208	 6% (Poor fit), 74% (0 outliers), 12% (1 outlier), 14% (2+ outliers)
1	B	1208	 7% (Poor fit), 72% (0 outliers), 13% (1 outlier), 14% (2+ outliers)
1	C	1208	 10% (Poor fit), 73% (0 outliers), 13% (1 outlier), 14% (2+ outliers)
2	X	267	 40% (Poor fit), 76% (0 outliers), 21% (1 outlier), 5% (2+ outliers)
2	Y	267	 76% (0 outliers), 79% (1 outlier), 18% (2+ outliers)
2	Z	267	 62% (Poor fit), 83% (0 outliers), 14% (1 outlier), 5% (2+ outliers)
3	E	2	 50% (0 outliers), 50% (1 outlier)
3	F	2	 50% (0 outliers), 50% (1 outlier)

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Mol	Chain	Length	Quality of chain
3	H	2	 50% 50%
3	I	2	 100%
3	K	2	 100%

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 31017 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1036	8096	5173	1343	1544	36	0	0
1	B	1038	8123	5190	1351	1546	36	0	0
1	C	1036	8106	5177	1348	1544	37	0	0

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	682	GLY	ARG	engineered mutation	UNP P0DTC2
A	683	SER	ARG	engineered mutation	UNP P0DTC2
A	685	SER	ARG	engineered mutation	UNP P0DTC2
A	817	PRO	PHE	engineered mutation	UNP P0DTC2
A	892	PRO	ALA	engineered mutation	UNP P0DTC2
A	899	PRO	ALA	engineered mutation	UNP P0DTC2
A	942	PRO	ALA	engineered mutation	UNP P0DTC2
A	986	PRO	LYS	engineered mutation	UNP P0DTC2
A	987	PRO	VAL	engineered mutation	UNP P0DTC2
B	682	GLY	ARG	engineered mutation	UNP P0DTC2
B	683	SER	ARG	engineered mutation	UNP P0DTC2
B	685	SER	ARG	engineered mutation	UNP P0DTC2
B	817	PRO	PHE	engineered mutation	UNP P0DTC2
B	892	PRO	ALA	engineered mutation	UNP P0DTC2
B	899	PRO	ALA	engineered mutation	UNP P0DTC2
B	942	PRO	ALA	engineered mutation	UNP P0DTC2
B	986	PRO	LYS	engineered mutation	UNP P0DTC2
B	987	PRO	VAL	engineered mutation	UNP P0DTC2
C	682	GLY	ARG	engineered mutation	UNP P0DTC2
C	683	SER	ARG	engineered mutation	UNP P0DTC2
C	685	SER	ARG	engineered mutation	UNP P0DTC2
C	817	PRO	PHE	engineered mutation	UNP P0DTC2
C	892	PRO	ALA	engineered mutation	UNP P0DTC2
C	899	PRO	ALA	engineered mutation	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	942	PRO	ALA	engineered mutation	UNP P0DTC2
C	986	PRO	LYS	engineered mutation	UNP P0DTC2
C	987	PRO	VAL	engineered mutation	UNP P0DTC2

- Molecule 2 is a protein called Repebody (A6).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	X	260	Total	C	N	O	S	0	0
			2072	1328	348	391	5		
2	Y	260	Total	C	N	O	S	0	0
			2072	1328	348	391	5		
2	Z	260	Total	C	N	O	S	0	0
			2072	1328	348	391	5		

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



Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	E	2	Total	C	N	O	0	0
			28	16	2	10		
3	F	2	Total	C	N	O	0	0
			28	16	2	10		
3	H	2	Total	C	N	O	0	0
			28	16	2	10		
3	I	2	Total	C	N	O	0	0
			28	16	2	10		
3	K	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	A	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	
4	B	1	Total	C	N	O	0
			14	8	1	5	

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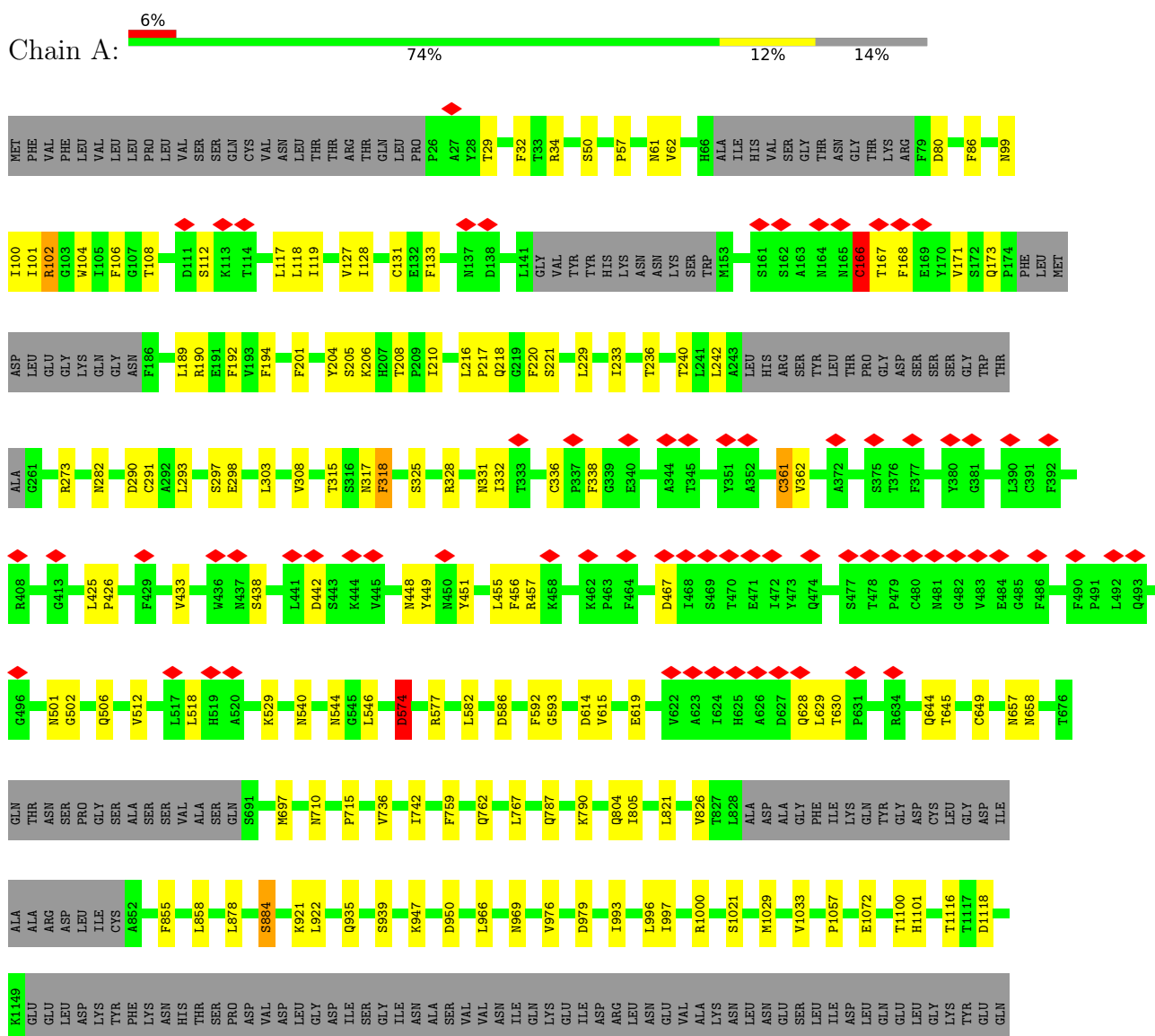
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Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
4	B	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0
4	C	1	Total 14	8	1	5	0

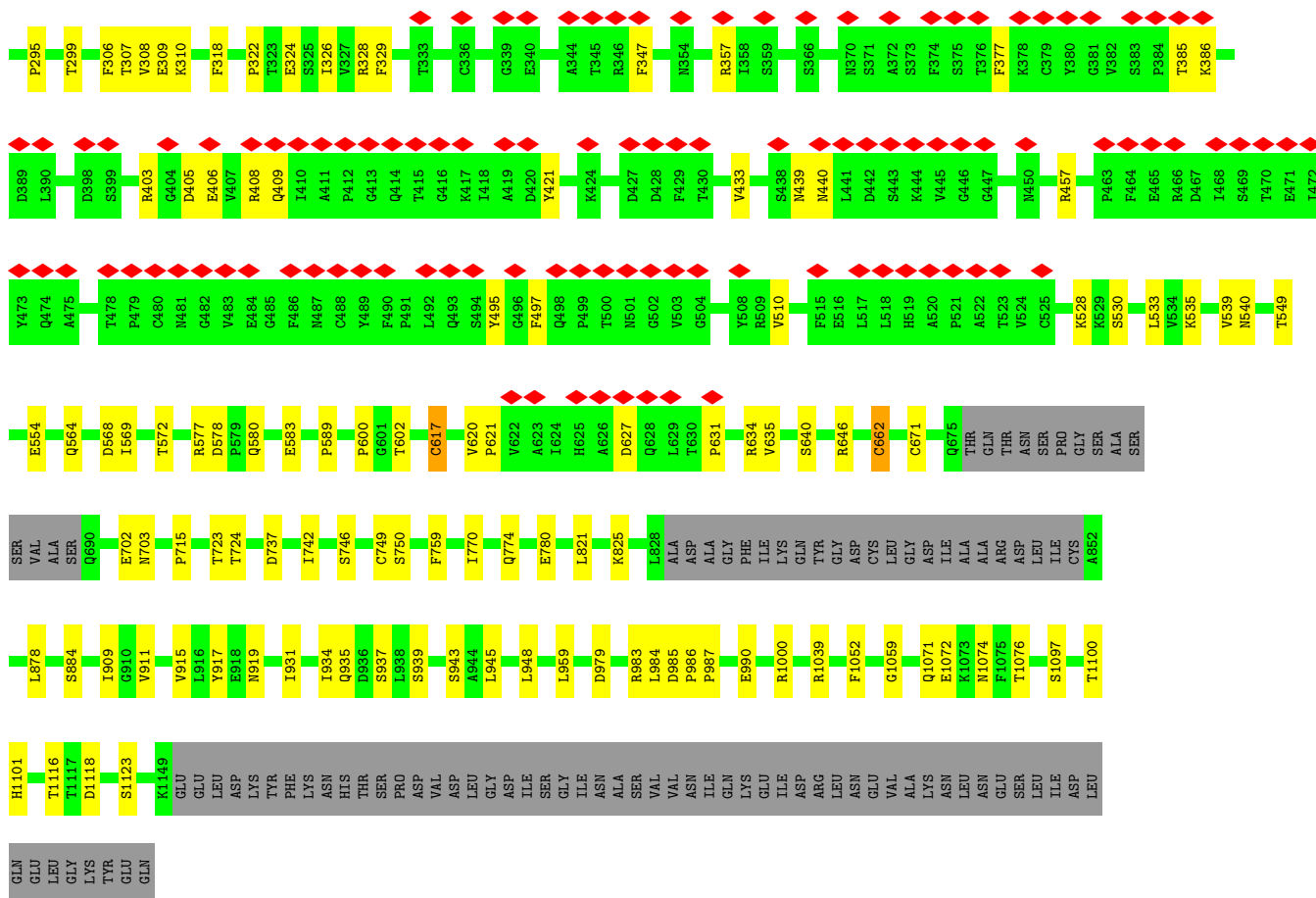
3 Residue-property plots

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.

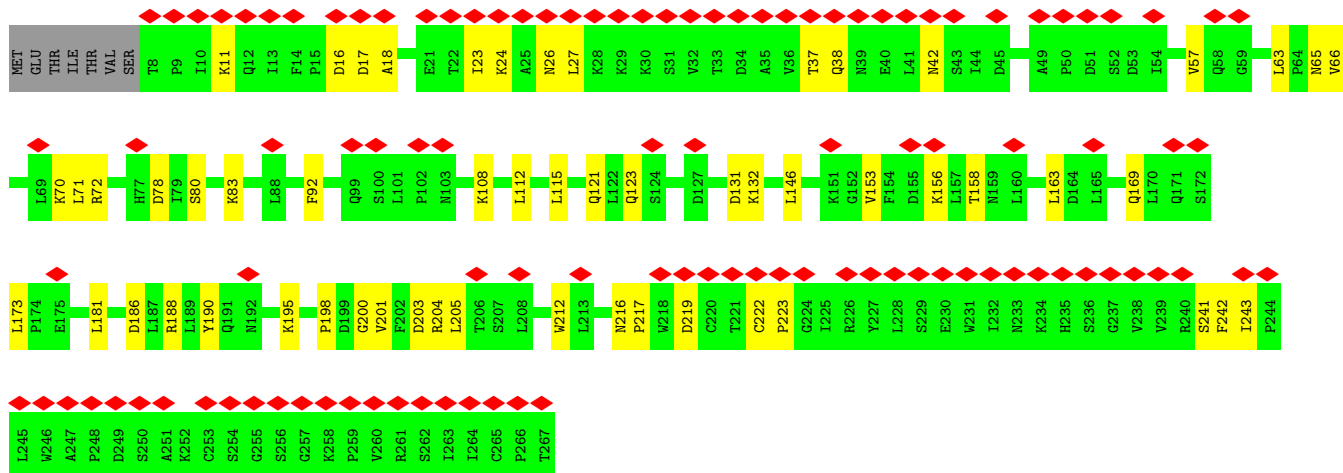
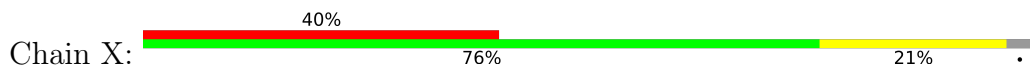
- Molecule 1: Spike glycoprotein



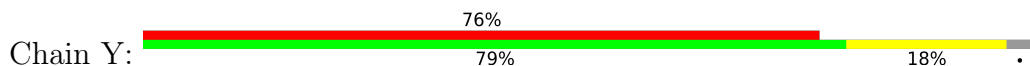
- Molecule 1: Spike glycoprotein

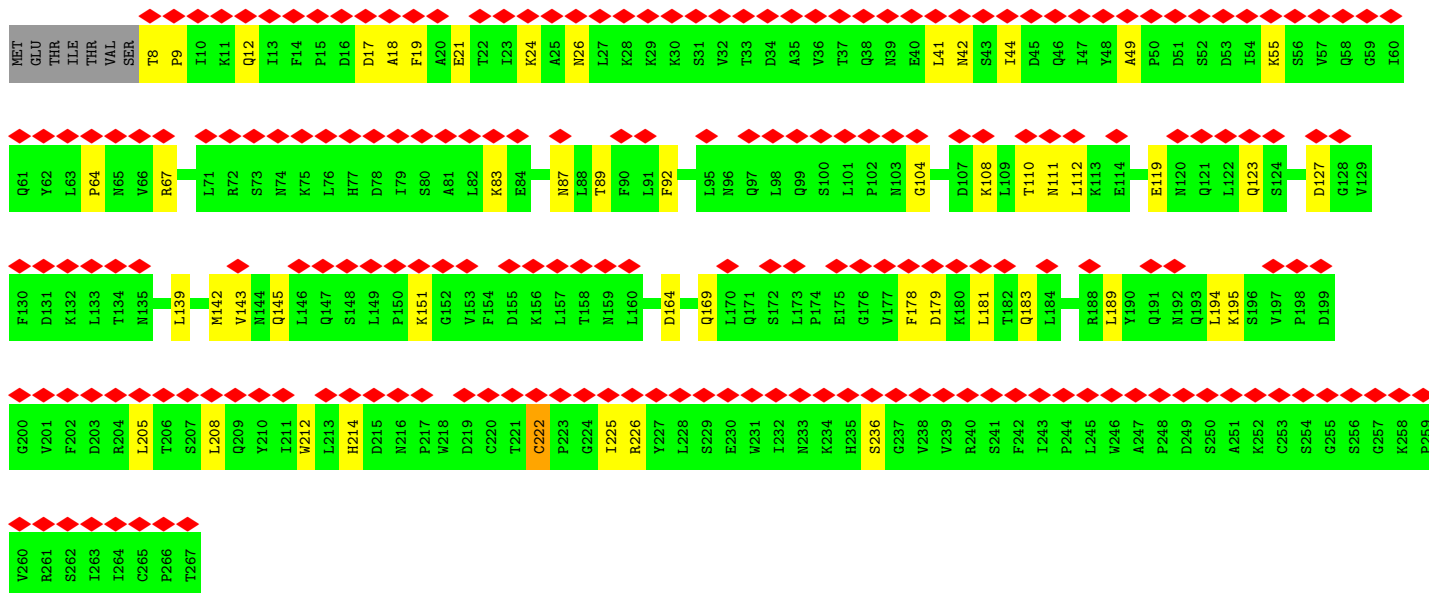


• Molecule 2: Repebody (A6)

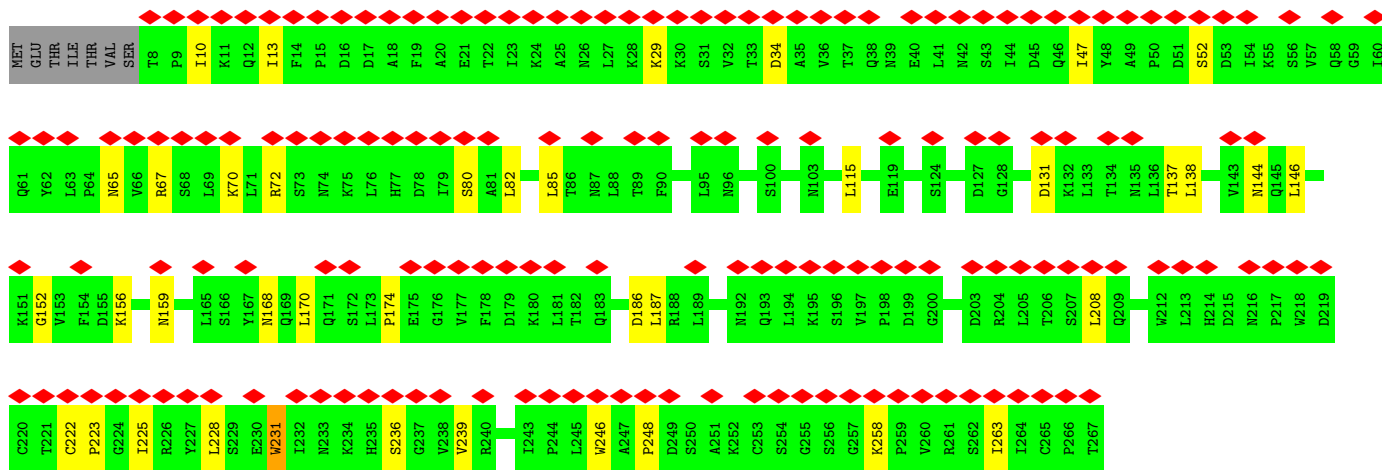
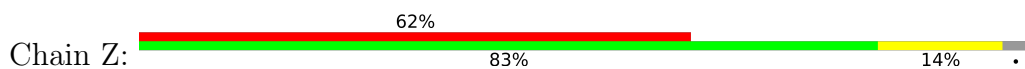


• Molecule 2: Repebody (A6)





• Molecule 2: Repebody (A6)



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



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



MAG1
MAG2

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

Chain H:  50% 50%

MAG1
MAG2

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

Chain I:  100%

MAG1
MAG2

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

Chain K:  100%

MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	350850	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 ($e^-/\text{\AA}^2$)	62.11	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	4.036	Depositor
Minimum map value	-2.630	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.075	Depositor
Recommended contour level	0.15	Depositor
Map size (\AA)	353.43, 353.43, 353.43	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.8415, 0.8415, 0.8415	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: NAG

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	0.26	0/8286	0.49	3/11283 (0.0%)
1	B	0.27	0/8314	0.49	0/11320
1	C	0.26	0/8296	0.48	0/11296
2	X	0.25	0/2114	0.50	0/2875
2	Y	0.25	0/2114	0.53	0/2875
2	Z	0.24	0/2114	0.50	0/2875
All	All	0.26	0/31238	0.49	3/42524 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	166	CYS	CA-CB-SG	5.66	124.19	114.00
1	A	574	ASP	CB-CG-OD1	5.11	122.90	118.30
1	A	950	ASP	CB-CG-OD1	5.05	122.84	118.30

There are no chirality outliers.

There are no planarity outliers.

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	8096	0	7892	87	0
1	B	8123	0	7920	101	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	8106	0	7902	89	0
2	X	2072	0	2111	31	0
2	Y	2072	0	2111	24	0
2	Z	2072	0	2111	21	0
3	E	28	0	25	1	0
3	F	28	0	25	1	0
3	H	28	0	25	1	0
3	I	28	0	25	3	0
3	K	28	0	25	4	0
4	A	98	0	91	3	0
4	B	112	0	104	8	0
4	C	126	0	117	1	0
All	All	31017	0	30484	346	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 6.

All (346) 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:1071:GLN:NE2	4:C:1304:NAG:O7	1.90	1.04
1:B:124:THR:HB	4:B:1308:NAG:H61	1.59	0.84
1:B:106:PHE:HB3	1:B:235:ILE:HD11	1.64	0.79
3:K:1:NAG:H61	3:K:2:NAG:H82	1.65	0.78
1:A:1116:THR:HG23	1:A:1118:ASP:H	1.52	0.74
1:A:804:GLN:NE2	1:A:935:GLN:OE1	2.22	0.71
2:X:80:SER:HA	2:X:83:LYS:HG2	1.70	0.71
1:A:57:PRO:HG3	1:A:273:ARG:HD2	1.73	0.71
1:C:621:PRO:HB3	1:C:634:ARG:HH12	1.56	0.71
3:I:1:NAG:H61	3:I:2:NAG:H82	1.74	0.70
2:Y:222:CYS:SG	2:Y:226:ARG:NH1	2.65	0.70
1:B:201:PHE:HB3	1:B:229:LEU:HB2	1.74	0.70
1:A:922:LEU:HD11	4:A:1304:NAG:H61	1.74	0.69
1:A:976:VAL:HG12	1:A:979:ASP:H	1.57	0.69
1:C:1100:THR:HG23	3:K:1:NAG:H81	1.75	0.69
2:Z:187:LEU:HB3	2:Z:208:LEU:HD21	1.75	0.68
1:C:190:ARG:HE	1:C:192:PHE:HE1	1.42	0.66
1:B:1101:HIS:ND1	3:I:1:NAG:H5	2.11	0.65
1:A:1101:HIS:CE1	3:F:2:NAG:H3	2.33	0.64
1:B:125:ASN:HA	1:B:174:PRO:HD3	1.80	0.64
1:C:108:THR:HG22	1:C:109:THR:HG23	1.79	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:X:212:TRP:O	2:X:216:ASN:ND2	2.31	0.64
1:B:815:ARG:NH1	1:B:820:ASP:OD1	2.31	0.64
1:B:281:GLU:HB3	4:B:1302:NAG:H81	1.80	0.63
1:B:540:ASN:HB3	1:B:549:THR:HG23	1.80	0.63
1:C:742:ILE:O	1:C:1000:ARG:NH1	2.28	0.63
2:X:203:ASP:OD1	2:X:204:ARG:N	2.32	0.63
2:X:158:THR:HB	2:X:181:LEU:HD22	1.81	0.62
1:C:1101:HIS:ND1	3:K:1:NAG:H5	2.15	0.62
1:A:787:GLN:OE1	1:C:703:ASN:ND2	2.33	0.61
2:Y:145:GLN:HG3	2:Y:169:GLN:HE21	1.63	0.61
1:A:34:ARG:NH2	1:A:221:SER:OG	2.34	0.61
2:X:23:ILE:HG22	2:X:24:LYS:HD3	1.82	0.61
1:C:308:VAL:HG22	1:C:602:THR:HG23	1.83	0.61
2:Z:10:ILE:HB	2:Z:13:ILE:HD11	1.82	0.60
1:B:411:ALA:HB3	1:B:414:GLN:HG3	1.84	0.60
1:A:644:GLN:NE2	1:A:645:THR:O	2.34	0.60
2:X:173:LEU:HG	2:X:198:PRO:HG3	1.83	0.60
1:B:317:ASN:ND2	1:C:737:ASP:OD2	2.34	0.60
1:B:922:LEU:HD11	3:H:1:NAG:H62	1.84	0.60
2:Y:178:PHE:HA	2:Y:181:LEU:HD13	1.84	0.60
1:B:563:GLN:O	1:B:577:ARG:NH1	2.35	0.59
1:A:433:VAL:HG22	1:A:512:VAL:HG22	1.84	0.59
1:A:614:ASP:O	1:B:853:GLN:NE2	2.35	0.59
1:A:108:THR:O	1:A:236:THR:OG1	2.15	0.59
1:C:535:LYS:NZ	1:C:554:GLU:OE2	2.35	0.59
1:C:578:ASP:N	1:C:583:GLU:O	2.28	0.59
1:C:190:ARG:HB3	1:C:192:PHE:CE1	2.38	0.58
1:C:57:PRO:HG3	1:C:273:ARG:HD2	1.85	0.58
1:A:438:SER:OG	1:A:442:ASP:O	2.21	0.58
1:B:125:ASN:ND2	4:B:1308:NAG:H4	2.19	0.58
1:B:617:CYS:HA	1:B:620:VAL:HG12	1.85	0.58
2:X:37:THR:HG22	2:X:38:GLN:H	1.69	0.58
1:A:32:PHE:HD2	1:A:218:GLN:HG2	1.69	0.58
2:Y:64:PRO:HA	2:Y:87:ASN:HD22	1.69	0.57
1:C:985:ASP:OD1	1:C:985:ASP:N	2.36	0.57
2:Y:12:GLN:O	2:Y:12:GLN:NE2	2.37	0.57
1:A:117:LEU:HD23	1:A:233:ILE:HD11	1.86	0.57
1:C:106:PHE:HB2	1:C:117:LEU:HB2	1.86	0.57
1:B:50:SER:HB2	1:B:276:LEU:HD12	1.87	0.57
1:B:498:GLN:HB2	1:B:501:ASN:HB2	1.87	0.57
1:C:1116:THR:HG22	1:C:1118:ASP:H	1.70	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:Z:152:GLY:H	2:Z:174:PRO:HB3	1.70	0.57
1:B:915:VAL:O	1:B:919:ASN:ND2	2.36	0.56
1:C:309:GLU:N	1:C:309:GLU:OE1	2.38	0.56
1:A:317:ASN:ND2	1:A:593:GLY:O	2.33	0.56
1:C:115:GLN:HA	1:C:132:GLU:HB2	1.86	0.56
1:A:127:VAL:HA	1:A:171:VAL:HG13	1.88	0.56
2:Y:142:MET:HG3	2:Y:143:VAL:HG23	1.87	0.56
1:B:28:TYR:CD2	4:B:1307:NAG:H62	2.41	0.55
1:A:61:ASN:HA	4:A:1301:NAG:O7	2.05	0.55
1:C:439:ASN:OD1	1:C:440:ASN:N	2.40	0.55
1:B:32:PHE:HD2	1:B:218:GLN:HG2	1.71	0.55
1:A:1100:THR:HG22	1:A:1101:HIS:CE1	2.42	0.55
2:X:200:GLY:O	2:X:204:ARG:NH1	2.39	0.55
2:Y:183:GLN:O	2:Y:183:GLN:HG2	2.06	0.55
1:B:91:TYR:OH	1:B:191:GLU:OE1	2.20	0.55
1:A:101:ILE:HD11	1:A:240:THR:OG1	2.06	0.55
1:B:263:ALA:HB1	1:B:265:TYR:HE1	1.71	0.55
1:A:619:GLU:OE2	1:A:619:GLU:N	2.39	0.54
1:B:878:LEU:HD21	1:B:1052:PHE:HB3	1.89	0.54
1:C:746:SER:O	1:C:750:SER:OG	2.24	0.54
1:C:821:LEU:HD11	1:C:939:SER:HB2	1.89	0.54
2:X:188:ARG:HD3	2:X:190:TYR:CE1	2.42	0.54
1:B:108:THR:OG1	1:B:234:ASN:O	2.26	0.54
1:B:357:ARG:NH1	1:B:359:SER:OG	2.41	0.54
1:B:124:THR:CB	4:B:1308:NAG:H61	2.35	0.53
2:Z:168:ASN:HD21	2:Z:170:LEU:HG	1.74	0.53
1:A:742:ILE:O	1:A:1000:ARG:NH1	2.41	0.53
1:B:726:ILE:HG13	1:B:1061:VAL:HG22	1.89	0.53
1:C:878:LEU:HD21	1:C:1052:PHE:HB3	1.91	0.53
1:C:403:ARG:NE	1:C:405:ASP:OD1	2.40	0.53
2:Z:131:ASP:O	2:Z:156:LYS:NZ	2.41	0.53
1:C:646:ARG:N	1:C:646:ARG:HD2	2.23	0.53
1:C:915:VAL:O	1:C:919:ASN:ND2	2.40	0.53
1:A:303:LEU:HD12	1:A:308:VAL:HG22	1.91	0.53
1:B:168:PHE:HE1	1:B:170:TYR:HB2	1.74	0.53
1:A:192:PHE:HB3	1:A:194:PHE:CE1	2.44	0.53
1:C:310:LYS:HG3	1:C:600:PRO:HA	1.91	0.53
1:C:118:LEU:HD22	1:C:129:LYS:HE3	1.91	0.52
1:C:122:ASN:ND2	1:C:125:ASN:OD1	2.42	0.52
1:C:979:ASP:O	1:C:983:ARG:HG2	2.09	0.52
1:B:379:CYS:HB3	1:B:382:VAL:HB	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:307:THR:HG1	1:C:602:THR:HG1	1.55	0.52
1:B:263:ALA:HB1	1:B:265:TYR:CE1	2.44	0.52
1:A:457:ARG:NH2	1:A:467:ASP:OD2	2.42	0.52
1:B:1028:LYS:NZ	1:B:1042:PHE:O	2.40	0.52
2:Z:168:ASN:ND2	2:Z:170:LEU:HG	2.25	0.52
2:Z:144:ASN:HD21	2:Z:146:LEU:HD12	1.75	0.52
1:C:226:LEU:HD23	1:C:227:VAL:HG23	1.91	0.51
1:A:167:THR:HG22	1:A:168:PHE:H	1.75	0.51
1:B:199:GLY:HA2	1:B:232:GLY:HA2	1.93	0.51
1:A:112:SER:O	1:A:112:SER:OG	2.27	0.51
1:C:171:VAL:HG23	1:C:173:GLN:H	1.74	0.51
1:A:361:CYS:SG	1:A:362:VAL:N	2.83	0.51
1:B:747:THR:O	1:B:750:SER:OG	2.28	0.51
1:C:54:LEU:HD22	1:C:197:ILE:HD11	1.92	0.51
1:C:190:ARG:NH2	1:C:205:SER:OG	2.44	0.50
2:Y:41:LEU:HD23	2:Y:44:ILE:HD12	1.93	0.50
2:Y:205:LEU:HG	2:Y:208:LEU:HB3	1.92	0.50
2:Y:189:LEU:HD21	2:Y:194:LEU:HD22	1.94	0.50
1:A:206:LYS:HE3	1:A:208:THR:HB	1.93	0.50
2:X:121:GLN:O	2:X:123:GLN:NE2	2.45	0.50
1:C:322:PRO:HG3	1:C:549:THR:HG21	1.94	0.50
1:B:113:LYS:HG3	1:B:114:THR:HG23	1.94	0.50
1:C:122:ASN:ND2	1:C:125:ASN:H	2.10	0.50
1:A:104:TRP:CD1	1:A:194:PHE:HE2	2.30	0.49
1:A:210:ILE:HG21	1:A:217:PRO:HG3	1.94	0.49
1:B:736:VAL:HG11	1:B:1004:LEU:HD21	1.94	0.49
1:C:986:PRO:O	1:C:990:GLU:HG2	2.12	0.49
2:X:63:LEU:HD22	2:X:66:VAL:HG13	1.94	0.49
1:B:742:ILE:O	1:B:1000:ARG:NH1	2.41	0.49
1:B:819:GLU:OE1	1:B:1055:SER:OG	2.29	0.49
1:A:993:ILE:O	1:A:997:ILE:HG12	2.12	0.49
1:C:106:PHE:CZ	1:C:194:PHE:HE2	2.30	0.49
1:C:627:ASP:OD1	1:C:627:ASP:N	2.45	0.49
1:A:106:PHE:HE2	1:A:201:PHE:HZ	1.60	0.49
1:B:210:ILE:HG21	1:B:217:PRO:HB3	1.94	0.49
1:B:298:GLU:HG2	1:B:315:THR:HB	1.95	0.49
1:B:627:ASP:N	1:B:627:ASP:OD1	2.45	0.49
1:C:825:LYS:HD2	1:C:945:LEU:HD23	1.93	0.49
1:C:621:PRO:HB2	1:C:634:ARG:HH22	1.77	0.49
1:B:216:LEU:HG	1:B:266:TYR:CE2	2.48	0.49
1:B:1041:ASP:OD1	1:B:1041:ASP:O	2.31	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:Y:164:ASP:OD1	2:Y:164:ASP:O	2.30	0.49
1:A:171:VAL:HG12	1:A:173:GLN:HG3	1.94	0.48
1:A:577:ARG:HD3	1:A:582:LEU:HD22	1.95	0.48
1:B:111:ASP:OD1	1:B:113:LYS:N	2.37	0.48
1:C:287:ASP:HB3	1:C:306:PHE:HE2	1.78	0.48
1:A:29:THR:O	1:A:62:VAL:HG12	2.13	0.48
1:A:336:CYS:HB3	1:A:361:CYS:HB2	1.60	0.48
1:B:546:LEU:HD23	1:B:546:LEU:H	1.79	0.48
1:A:1029:MET:O	1:A:1033:VAL:HB	2.14	0.48
1:B:770:ILE:HD11	1:B:1012:LEU:HD23	1.94	0.48
1:B:976:VAL:HG23	1:B:979:ASP:HB3	1.95	0.48
1:B:1129:VAL:HG13	1:C:917:TYR:HB3	1.96	0.48
1:B:662:CYS:HB2	1:B:671:CYS:HB2	1.32	0.47
2:Y:225:ILE:HG22	2:Y:225:ILE:O	2.13	0.47
1:A:293:LEU:HD12	1:A:630:THR:HG21	1.96	0.47
1:C:190:ARG:HB3	1:C:192:PHE:CZ	2.48	0.47
1:A:298:GLU:HG2	1:A:315:THR:HB	1.97	0.47
1:B:1100:THR:HG23	3:I:1:NAG:H81	1.97	0.47
2:X:112:LEU:HD12	2:X:115:LEU:HD11	1.96	0.47
2:X:195:LYS:NZ	2:X:217:PRO:O	2.48	0.47
2:X:241:SER:OG	2:X:243:ILE:O	2.32	0.47
1:A:190:ARG:HB3	1:A:192:PHE:CE1	2.50	0.47
1:C:568:ASP:OD1	1:C:572:THR:OG1	2.29	0.47
1:B:418:ILE:HG21	1:B:425:LEU:HD11	1.97	0.47
1:A:790:LYS:HE2	1:C:702:GLU:OE2	2.15	0.47
2:Z:246:TRP:CD1	2:Z:248:PRO:HD2	2.50	0.47
2:Z:258:LYS:HE2	2:Z:263:ILE:HD11	1.96	0.46
1:A:325:SER:HA	1:A:540:ASN:HB3	1.96	0.46
1:A:736:VAL:HG22	1:A:858:LEU:HD23	1.96	0.46
1:B:57:PRO:HG3	1:B:273:ARG:HD3	1.98	0.46
1:B:328:ARG:HG3	1:B:330:PRO:HD3	1.96	0.46
1:C:195:LYS:HD3	1:C:202:LYS:HD3	1.97	0.46
1:B:330:PRO:HD2	1:B:579:PRO:HG2	1.98	0.46
2:X:204:ARG:HG2	2:X:205:LEU:HD22	1.96	0.46
1:B:321:GLN:HG3	1:B:322:PRO:HD2	1.98	0.46
1:C:326:ILE:HG12	1:C:326:ILE:O	2.15	0.46
1:A:501:ASN:O	1:A:506:GLN:NE2	2.40	0.46
2:Y:212:TRP:HD1	2:Y:214:HIS:HE2	1.64	0.46
1:B:127:VAL:HG23	1:B:171:VAL:HG22	1.97	0.46
1:C:540:ASN:HA	1:C:549:THR:HA	1.97	0.46
1:C:406:GLU:HA	1:C:409:GLN:HG3	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:822:LEU:HD22	1:B:945:LEU:HD21	1.97	0.46
1:C:37:TYR:OH	1:C:53:ASP:OD2	2.29	0.46
1:A:318:PHE:CE1	1:A:615:VAL:HG21	2.51	0.45
1:B:111:ASP:OD1	1:B:112:SER:N	2.49	0.45
2:X:16:ASP:OD1	2:X:16:ASP:N	2.38	0.45
2:Z:47:ILE:O	2:Z:67:ARG:NH2	2.49	0.45
1:A:118:LEU:HD13	1:A:133:PHE:CE2	2.51	0.45
1:A:821:LEU:HD11	1:A:939:SER:HB2	1.98	0.45
1:C:295:PRO:O	1:C:299:THR:HG23	2.16	0.45
1:A:318:PHE:HE1	1:A:615:VAL:HG21	1.82	0.45
1:B:240:THR:HG21	1:B:265:TYR:CE2	2.51	0.45
1:A:167:THR:HG22	1:A:168:PHE:N	2.31	0.45
1:B:322:PRO:HA	1:B:538:CYS:O	2.16	0.45
1:C:329:PHE:HD2	1:C:528:LYS:HB3	1.82	0.45
1:C:715:PRO:HA	1:C:1072:GLU:HA	1.99	0.45
2:X:71:LEU:O	2:X:71:LEU:HD12	2.17	0.45
1:B:102:ARG:HD3	1:B:102:ARG:HA	1.90	0.45
2:X:219:ASP:N	2:X:219:ASP:OD1	2.46	0.45
2:X:42:ASN:HB3	2:X:65:ASN:HD21	1.82	0.45
1:A:189:LEU:HD11	1:A:210:ILE:HD13	1.98	0.45
1:C:103:GLY:C	1:C:104:TRP:HD1	2.20	0.45
1:C:983:ARG:HG3	1:C:984:LEU:HD23	1.97	0.45
1:B:442:ASP:OD1	1:B:509:ARG:NH2	2.50	0.45
1:C:200:TYR:CZ	1:C:230:PRO:HB3	2.52	0.45
2:X:201:VAL:O	2:X:205:LEU:HD23	2.17	0.45
2:X:222:CYS:HA	2:X:223:PRO:HA	1.80	0.45
2:Y:108:LYS:O	2:Y:110:THR:N	2.49	0.45
1:C:385:THR:HG23	1:C:386:LYS:HG2	1.99	0.45
2:Y:42:ASN:O	2:Y:67:ARG:NH1	2.49	0.45
1:B:406:GLU:HA	1:B:409:GLN:HE21	1.82	0.44
1:C:530:SER:OG	1:C:580:GLN:OE1	2.26	0.44
2:X:26:ASN:OD1	2:X:27:LEU:N	2.50	0.44
2:Y:151:LYS:HD3	2:Y:151:LYS:HA	1.81	0.44
1:A:216:LEU:HD12	1:A:216:LEU:HA	1.82	0.44
1:A:546:LEU:H	1:A:546:LEU:HD23	1.82	0.44
1:A:715:PRO:HA	1:A:1072:GLU:HA	1.99	0.44
1:A:855:PHE:CZ	1:C:589:PRO:HG3	2.51	0.44
1:B:330:PRO:O	1:B:331:ASN:HB2	2.16	0.44
1:B:916:LEU:HD12	1:B:923:ILE:HD13	1.99	0.44
1:C:1100:THR:HG23	3:K:1:NAG:C8	2.46	0.44
1:B:26:PRO:HB2	1:B:27:ALA:H	1.61	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:32:PHE:CD1	1:A:32:PHE:N	2.84	0.44
1:B:1014:ARG:O	1:B:1017:GLU:HG2	2.18	0.44
1:C:118:LEU:HG	1:C:120:VAL:HG23	1.99	0.44
1:A:884:SER:O	1:A:884:SER:OG	2.35	0.44
1:B:979:ASP:OD1	1:B:983:ARG:NH2	2.51	0.44
2:X:131:ASP:OD1	2:X:132:LYS:N	2.51	0.44
2:X:169:GLN:N	2:X:169:GLN:OE1	2.51	0.44
1:C:617:CYS:HA	1:C:620:VAL:HG13	2.00	0.44
2:Z:231:TRP:HZ3	2:Z:239:VAL:HG21	1.82	0.44
1:A:100:ILE:HG22	1:A:242:LEU:HD22	1.99	0.43
1:B:538:CYS:HB2	1:B:590:CYS:HB3	1.56	0.43
1:B:555:SER:OG	1:B:584:ILE:O	2.32	0.43
1:B:566:GLY:HA2	1:C:43:PHE:HB3	1.99	0.43
1:B:870:ILE:O	1:B:874:THR:HG23	2.19	0.43
1:C:104:TRP:N	1:C:104:TRP:CD1	2.85	0.43
1:B:945:LEU:HD23	1:B:948:LEU:HD12	2.00	0.43
1:C:943:SER:O	1:C:943:SER:OG	2.33	0.43
2:X:17:ASP:OD1	2:X:18:ALA:N	2.46	0.43
1:A:119:ILE:HG23	1:A:128:ILE:HG13	2.00	0.43
1:A:947:LYS:HE2	1:A:947:LYS:HB2	1.89	0.43
2:Y:21:GLU:HA	2:Y:24:LYS:HE3	1.99	0.43
2:Y:119:GLU:H	2:Y:143:VAL:HG21	1.83	0.43
2:Z:137:THR:HG23	2:Z:159:ASN:HB3	2.00	0.43
1:B:231:ILE:HD13	1:B:231:ILE:HA	1.92	0.43
1:A:759:PHE:O	1:A:762:GLN:HG3	2.18	0.43
1:B:1072:GLU:HG3	4:B:1305:NAG:H83	2.00	0.43
1:A:201:PHE:HB3	1:A:229:LEU:HB2	2.00	0.43
1:A:425:LEU:HD23	1:A:426:PRO:HD2	2.01	0.43
1:B:93:ALA:HB3	1:B:266:TYR:HB2	1.99	0.43
1:C:564:GLN:O	1:C:577:ARG:HG2	2.19	0.43
2:Y:89:THR:HB	2:Y:112:LEU:HA	2.01	0.43
1:A:328:ARG:HD2	1:A:328:ARG:HA	1.77	0.43
2:Z:65:ASN:CG	2:Z:65:ASN:O	2.57	0.43
1:A:544:ASN:OD1	1:A:544:ASN:N	2.50	0.43
1:B:825:LYS:HE3	1:B:939:SER:HA	2.01	0.43
2:X:42:ASN:OD1	2:X:63:LEU:HD21	2.19	0.43
1:B:506:GLN:H	1:B:506:GLN:HG3	1.67	0.43
1:B:936:ASP:OD1	1:B:936:ASP:N	2.52	0.43
1:C:1076:THR:HG23	1:C:1097:SER:HB3	2.01	0.43
2:Y:26:ASN:HB3	2:Y:49:ALA:HB1	2.00	0.43
1:B:715:PRO:HA	1:B:1072:GLU:HA	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:662:CYS:HB2	1:C:671:CYS:HB3	1.80	0.42
2:Y:55:LYS:HA	2:Y:55:LYS:HD3	1.76	0.42
1:A:592:PHE:HE1	1:B:853:GLN:HB3	1.84	0.42
1:A:921:LYS:HA	1:A:921:LYS:HD3	1.67	0.42
1:B:811:LYS:HE2	1:B:811:LYS:HB3	1.86	0.42
2:Y:83:LYS:NZ	2:Y:104:GLY:O	2.52	0.42
2:Z:131:ASP:OD1	2:Z:131:ASP:N	2.52	0.42
1:A:331:ASN:OD1	3:E:1:NAG:N2	2.53	0.42
1:A:710:ASN:HB3	4:A:1303:NAG:O7	2.18	0.42
1:C:909:ILE:HG13	1:C:911:VAL:HG23	2.00	0.42
1:A:290:ASP:OD1	1:A:291:CYS:N	2.53	0.42
1:C:103:GLY:HA2	1:C:120:VAL:HG22	2.01	0.42
1:C:631:PRO:O	1:C:635:VAL:HG23	2.20	0.42
1:A:131:CYS:HB2	1:A:166:CYS:HB2	1.51	0.42
1:A:529:LYS:HB3	1:A:529:LYS:HE2	1.73	0.42
2:Z:70:LYS:HD2	2:Z:70:LYS:HA	1.81	0.42
1:B:160:TYR:HB3	1:B:161:SER:H	1.66	0.42
1:A:966:LEU:HD23	1:A:966:LEU:HA	1.90	0.42
1:B:986:PRO:N	1:B:987:PRO:HD2	2.35	0.42
1:C:113:LYS:HE2	1:C:113:LYS:HB3	1.80	0.42
1:B:125:ASN:HB3	4:B:1308:NAG:H62	2.01	0.42
1:C:723:THR:HG22	1:C:724:THR:H	1.85	0.42
1:A:996:LEU:HD23	1:A:996:LEU:HA	1.88	0.42
1:C:948:LEU:HD21	1:C:1059:GLY:HA3	2.01	0.42
2:Z:115:LEU:H	2:Z:138:LEU:HD11	1.85	0.42
1:A:805:ILE:HD12	1:A:878:LEU:HD22	2.02	0.42
1:A:99:ASN:HB3	1:A:102:ARG:HD2	2.02	0.41
1:A:192:PHE:HA	1:A:204:TYR:O	2.20	0.41
1:A:826:VAL:HB	1:A:1057:PRO:HG2	2.02	0.41
1:B:58:PHE:HB2	1:B:290:ASP:OD2	2.20	0.41
1:C:173:GLN:HB2	1:C:174:PRO:HD3	2.02	0.41
2:Y:8:THR:HA	2:Y:9:PRO:HD3	1.96	0.41
1:A:449:TYR:HD2	2:X:242:PHE:HE1	1.68	0.41
1:C:821:LEU:HD13	1:C:935:GLN:HG3	2.02	0.41
2:X:146:LEU:HD12	2:X:146:LEU:HA	1.88	0.41
1:B:240:THR:HG21	1:B:265:TYR:HE2	1.86	0.41
1:B:276:LEU:HD23	1:B:306:PHE:HE1	1.85	0.41
2:Z:82:LEU:HD22	2:Z:85:LEU:HD12	2.02	0.41
2:Z:144:ASN:ND2	2:Z:146:LEU:HD12	2.35	0.41
1:C:1039:ARG:H	1:C:1039:ARG:HG2	1.58	0.41
2:Z:29:LYS:HE2	2:Z:34:ASP:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:628:GLN:HG2	1:A:629:LEU:N	2.36	0.41
1:C:985:ASP:HB2	1:C:987:PRO:HD2	2.02	0.41
1:B:356:LYS:HE3	1:B:358:ILE:HD11	2.01	0.41
1:C:569:ILE:H	1:C:569:ILE:HG13	1.67	0.41
1:C:931:ILE:O	1:C:934:ILE:HG22	2.21	0.41
2:Y:17:ASP:OD1	2:Y:18:ALA:N	2.54	0.41
1:A:448:ASN:HB3	1:A:451:TYR:CE2	2.56	0.41
1:C:959:LEU:HD12	1:C:959:LEU:HA	1.86	0.41
2:Z:222:CYS:SG	2:Z:223:PRO:HA	2.61	0.41
1:A:455:LEU:HG	1:A:456:PHE:CD2	2.56	0.41
1:B:220:PHE:HE2	1:B:285:ILE:HG22	1.86	0.41
1:B:657:ASN:HB3	4:B:1303:NAG:H2	2.03	0.41
1:B:809:PRO:HA	1:B:814:LYS:HD3	2.01	0.41
1:B:905:ARG:HD3	1:B:1049:LEU:O	2.20	0.41
1:C:324:GLU:O	1:C:539:VAL:HG23	2.21	0.41
1:C:433:VAL:HA	1:C:510:VAL:HG22	2.02	0.41
2:X:11:LYS:HD2	2:X:11:LYS:HA	1.82	0.41
2:Z:225:ILE:HD11	2:Z:228:LEU:HD22	2.03	0.41
1:A:189:LEU:HD13	1:A:208:THR:O	2.21	0.41
1:B:94:SER:HA	1:B:264:ALA:HB3	2.03	0.41
1:B:922:LEU:O	1:B:926:GLN:HG3	2.21	0.41
1:C:328:ARG:CZ	1:C:533:LEU:HD11	2.51	0.41
1:A:290:ASP:O	1:A:297:SER:HB3	2.21	0.40
1:B:187:LYS:HG2	1:B:188:ASN:N	2.36	0.40
1:A:502:GLY:O	1:A:506:GLN:HG3	2.21	0.40
1:A:767:LEU:HD23	1:A:767:LEU:HA	1.91	0.40
1:B:295:PRO:O	1:B:299:THR:HG23	2.21	0.40
1:C:33:THR:HG22	1:C:58:PHE:CE2	2.57	0.40
2:X:57:VAL:O	2:X:57:VAL:HG12	2.21	0.40
1:A:574:ASP:OD1	1:A:574:ASP:C	2.60	0.40
1:B:130:VAL:HG21	1:B:168:PHE:HB3	2.04	0.40
1:B:629:LEU:HB3	1:B:633:TRP:HE1	1.85	0.40
1:B:825:LYS:HE2	1:B:825:LYS:HB2	1.99	0.40
1:C:770:ILE:O	1:C:774:GLN:HG2	2.21	0.40
1:B:97:LYS:HB3	1:B:97:LYS:HE3	1.69	0.40
1:B:776:LYS:HB2	1:B:776:LYS:HE3	1.71	0.40
1:C:233:ILE:HD12	1:C:233:ILE:HA	1.89	0.40
2:X:153:VAL:HA	2:X:156:LYS:HZ2	1.86	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	A	1022/1208 (85%)	990 (97%)	31 (3%)	1 (0%)	51	81
1	B	1024/1208 (85%)	971 (95%)	52 (5%)	1 (0%)	51	81
1	C	1022/1208 (85%)	975 (95%)	47 (5%)	0	100	100
2	X	258/267 (97%)	242 (94%)	16 (6%)	0	100	100
2	Y	258/267 (97%)	240 (93%)	18 (7%)	0	100	100
2	Z	258/267 (97%)	251 (97%)	7 (3%)	0	100	100
All	All	3842/4425 (87%)	3669 (96%)	171 (4%)	2 (0%)	54	81

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	331	ASN
1	A	332	ILE

5.3.2 Protein sidechains [i](#)

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	908/1056 (86%)	887 (98%)	21 (2%)	50	73
1	B	911/1056 (86%)	891 (98%)	20 (2%)	52	74
1	C	910/1056 (86%)	881 (97%)	29 (3%)	39	67
2	X	242/249 (97%)	235 (97%)	7 (3%)	42	69
2	Y	242/249 (97%)	232 (96%)	10 (4%)	30	61

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	Z	242/249 (97%)	236 (98%)	6 (2%)	47 72
All	All	3455/3915 (88%)	3362 (97%)	93 (3%)	48 71

All (93) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	SER
1	A	80	ASP
1	A	86	PHE
1	A	102	ARG
1	A	166	CYS
1	A	205	SER
1	A	220	PHE
1	A	282	ASN
1	A	318	PHE
1	A	338	PHE
1	A	361	CYS
1	A	518	LEU
1	A	574	ASP
1	A	586	ASP
1	A	649	CYS
1	A	657	ASN
1	A	658	ASN
1	A	697	MET
1	A	884	SER
1	A	969	ASN
1	A	1021	SER
1	B	48	LEU
1	B	65	PHE
1	B	97	LYS
1	B	111	ASP
1	B	170	TYR
1	B	207	HIS
1	B	329	PHE
1	B	429	PHE
1	B	464	PHE
1	B	486	PHE
1	B	559	PHE
1	B	605	SER
1	B	633	TRP
1	B	646	ARG
1	B	649	CYS

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Mol	Chain	Res	Type
1	B	663	ASP
1	B	801	ASN
1	B	936	ASP
1	B	994	ASP
1	B	1148	PHE
1	C	32	PHE
1	C	50	SER
1	C	104	TRP
1	C	129	LYS
1	C	158	ARG
1	C	200	TYR
1	C	265	TYR
1	C	276	LEU
1	C	287	ASP
1	C	291	CYS
1	C	318	PHE
1	C	347	PHE
1	C	357	ARG
1	C	377	PHE
1	C	408	ARG
1	C	421	TYR
1	C	457	ARG
1	C	495	TYR
1	C	497	PHE
1	C	617	CYS
1	C	640	SER
1	C	662	CYS
1	C	749	CYS
1	C	759	PHE
1	C	780	GLU
1	C	884	SER
1	C	937	SER
1	C	1074	ASN
1	C	1123	SER
2	X	70	LYS
2	X	72	ARG
2	X	78	ASP
2	X	92	PHE
2	X	108	LYS
2	X	163	LEU
2	X	186	ASP
2	Y	19	PHE

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Mol	Chain	Res	Type
2	Y	92	PHE
2	Y	111	ASN
2	Y	123	GLN
2	Y	127	ASP
2	Y	139	LEU
2	Y	179	ASP
2	Y	195	LYS
2	Y	222	CYS
2	Y	236	SER
2	Z	52	SER
2	Z	72	ARG
2	Z	80	SER
2	Z	186	ASP
2	Z	231	TRP
2	Z	236	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	282	ASN
1	A	710	ASN
1	A	1101	HIS
1	B	360	ASN
1	B	913	GLN
1	B	926	GLN
2	X	96	ASN
2	Y	169	GLN

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](#)

10 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	E	1	1,3	14,14,15	0.40	0	17,19,21	0.54	0
3	NAG	E	2	3	14,14,15	0.40	0	17,19,21	0.35	0
3	NAG	F	1	1,3	14,14,15	0.41	0	17,19,21	0.44	0
3	NAG	F	2	3	14,14,15	0.41	0	17,19,21	0.39	0
3	NAG	H	1	1,3	14,14,15	0.38	0	17,19,21	0.45	0
3	NAG	H	2	3	14,14,15	0.40	0	17,19,21	0.35	0
3	NAG	I	1	1,3	14,14,15	0.39	0	17,19,21	0.58	0
3	NAG	I	2	3	14,14,15	0.40	0	17,19,21	0.32	0
3	NAG	K	1	1,3	14,14,15	0.40	0	17,19,21	0.49	0
3	NAG	K	2	3	14,14,15	0.39	0	17,19,21	0.33	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
3	NAG	E	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	E	2	3	-	0/6/23/26	0/1/1/1
3	NAG	F	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	F	2	3	-	4/6/23/26	0/1/1/1
3	NAG	H	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	H	2	3	-	2/6/23/26	0/1/1/1
3	NAG	I	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	I	2	3	-	0/6/23/26	0/1/1/1
3	NAG	K	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	K	2	3	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (26) torsion outliers are listed below:

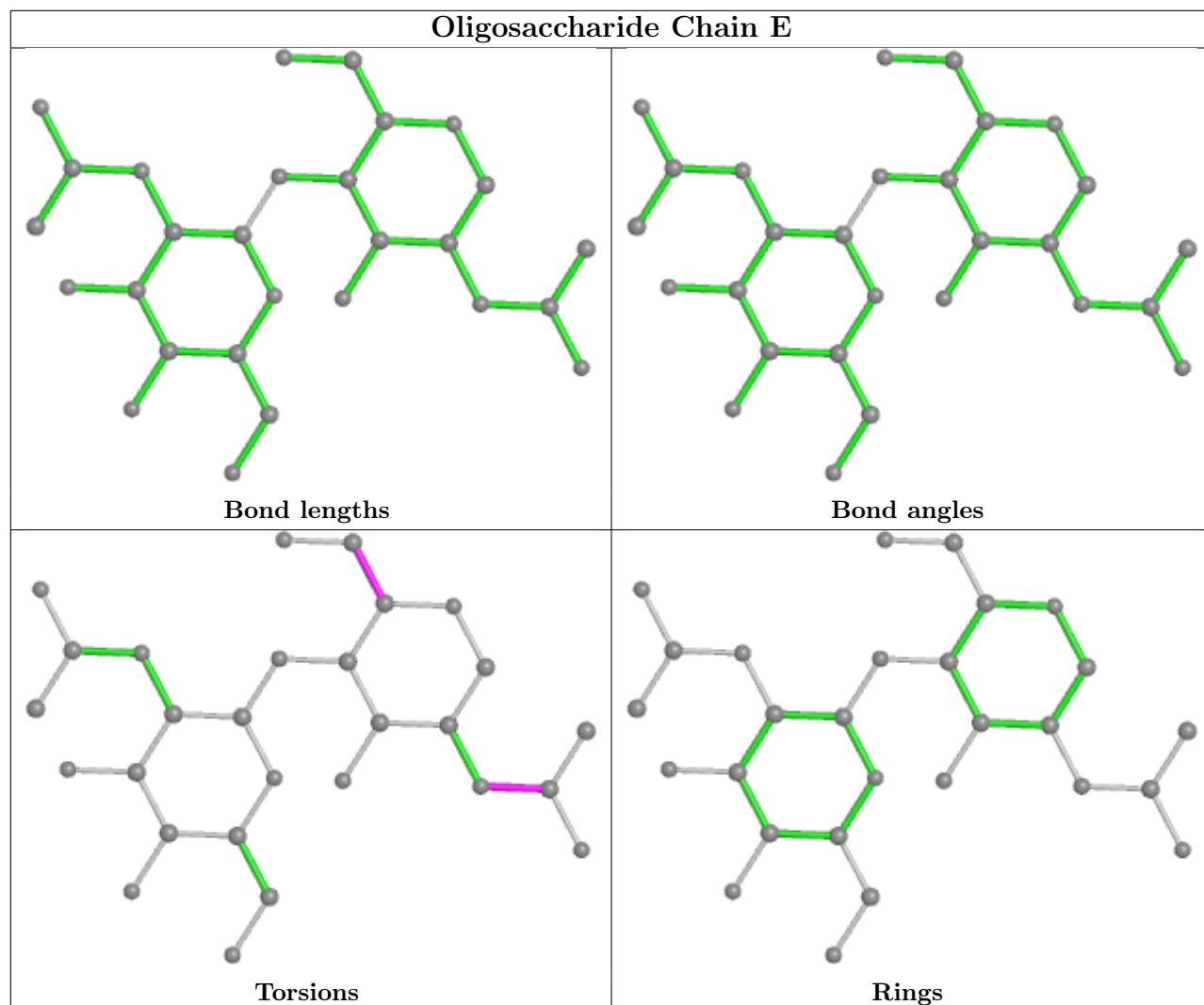
Mol	Chain	Res	Type	Atoms
3	F	1	NAG	C8-C7-N2-C2
3	F	1	NAG	O7-C7-N2-C2
3	F	2	NAG	O7-C7-N2-C2
3	H	1	NAG	C8-C7-N2-C2
3	H	1	NAG	O7-C7-N2-C2
3	H	2	NAG	C8-C7-N2-C2
3	H	2	NAG	O7-C7-N2-C2
3	F	2	NAG	O5-C5-C6-O6
3	F	2	NAG	C8-C7-N2-C2
3	E	1	NAG	O5-C5-C6-O6
3	F	2	NAG	C4-C5-C6-O6
3	E	1	NAG	C4-C5-C6-O6
3	E	1	NAG	C8-C7-N2-C2
3	E	1	NAG	O7-C7-N2-C2
3	F	1	NAG	C4-C5-C6-O6
3	K	2	NAG	C8-C7-N2-C2
3	K	1	NAG	C4-C5-C6-O6
3	K	2	NAG	O7-C7-N2-C2
3	F	1	NAG	O5-C5-C6-O6
3	K	1	NAG	O5-C5-C6-O6
3	I	1	NAG	C3-C2-N2-C7
3	K	1	NAG	C3-C2-N2-C7
3	I	1	NAG	C1-C2-N2-C7
3	K	1	NAG	C1-C2-N2-C7
3	I	1	NAG	C8-C7-N2-C2
3	I	1	NAG	O7-C7-N2-C2

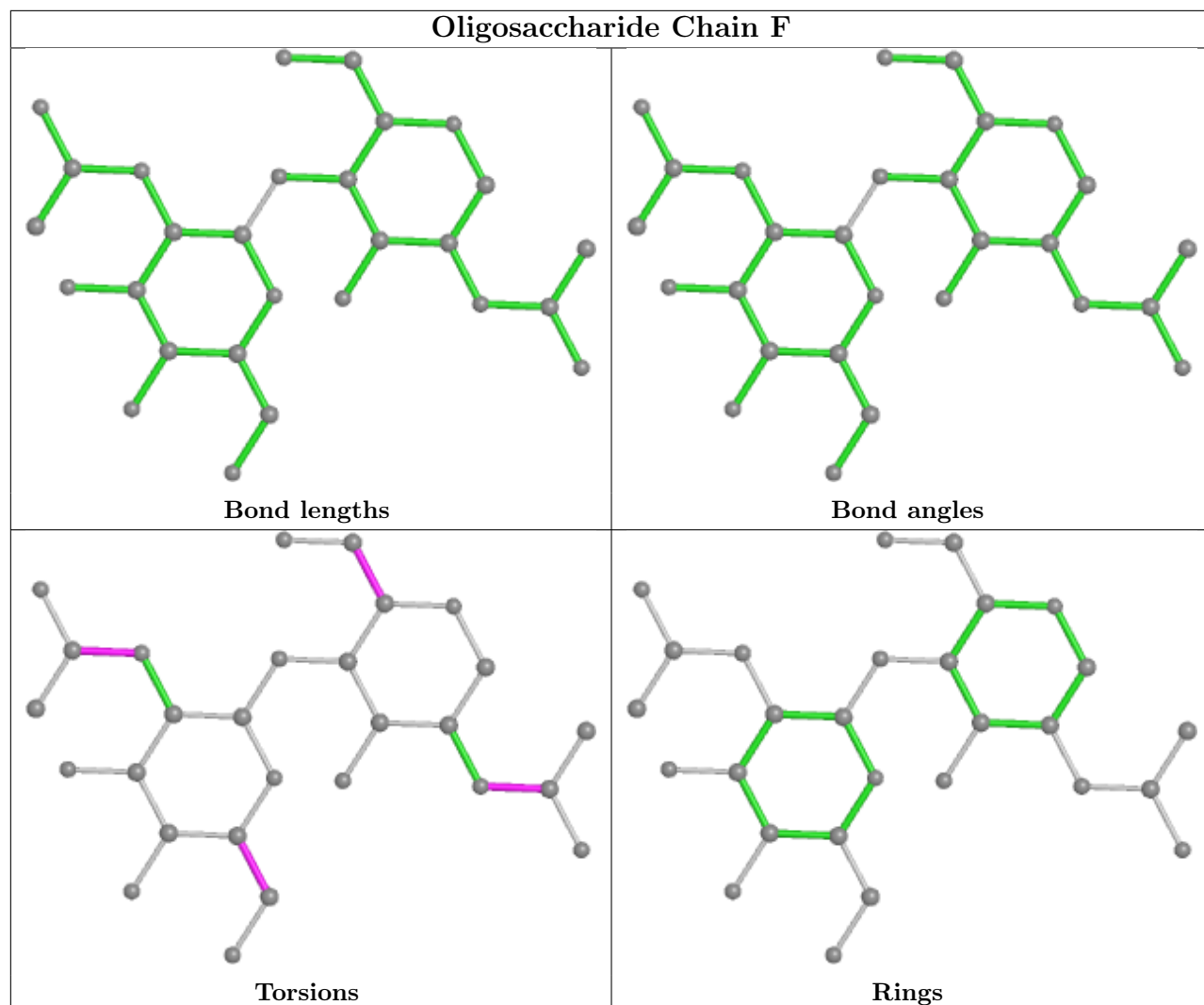
There are no ring outliers.

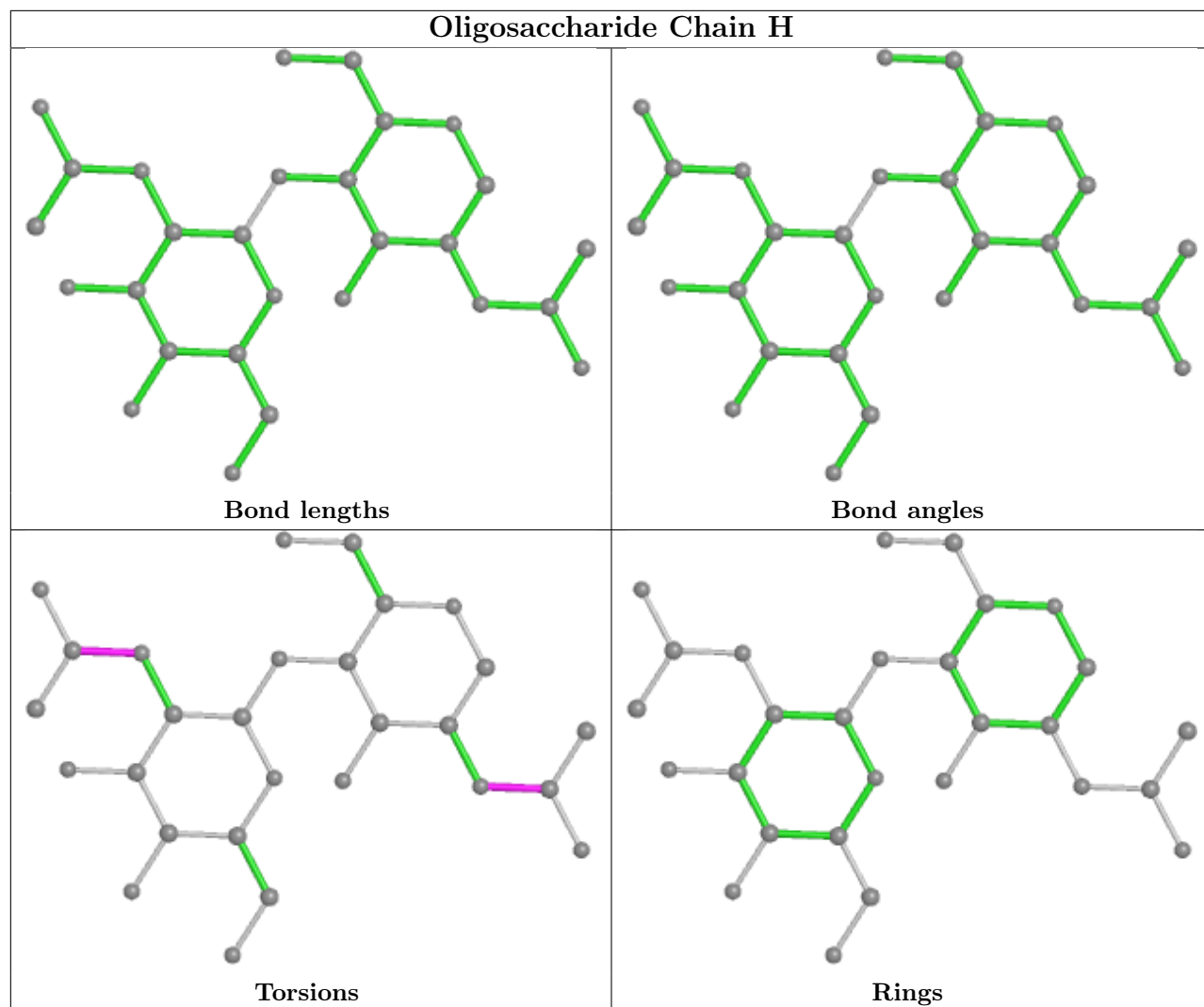
7 monomers are involved in 10 short contacts:

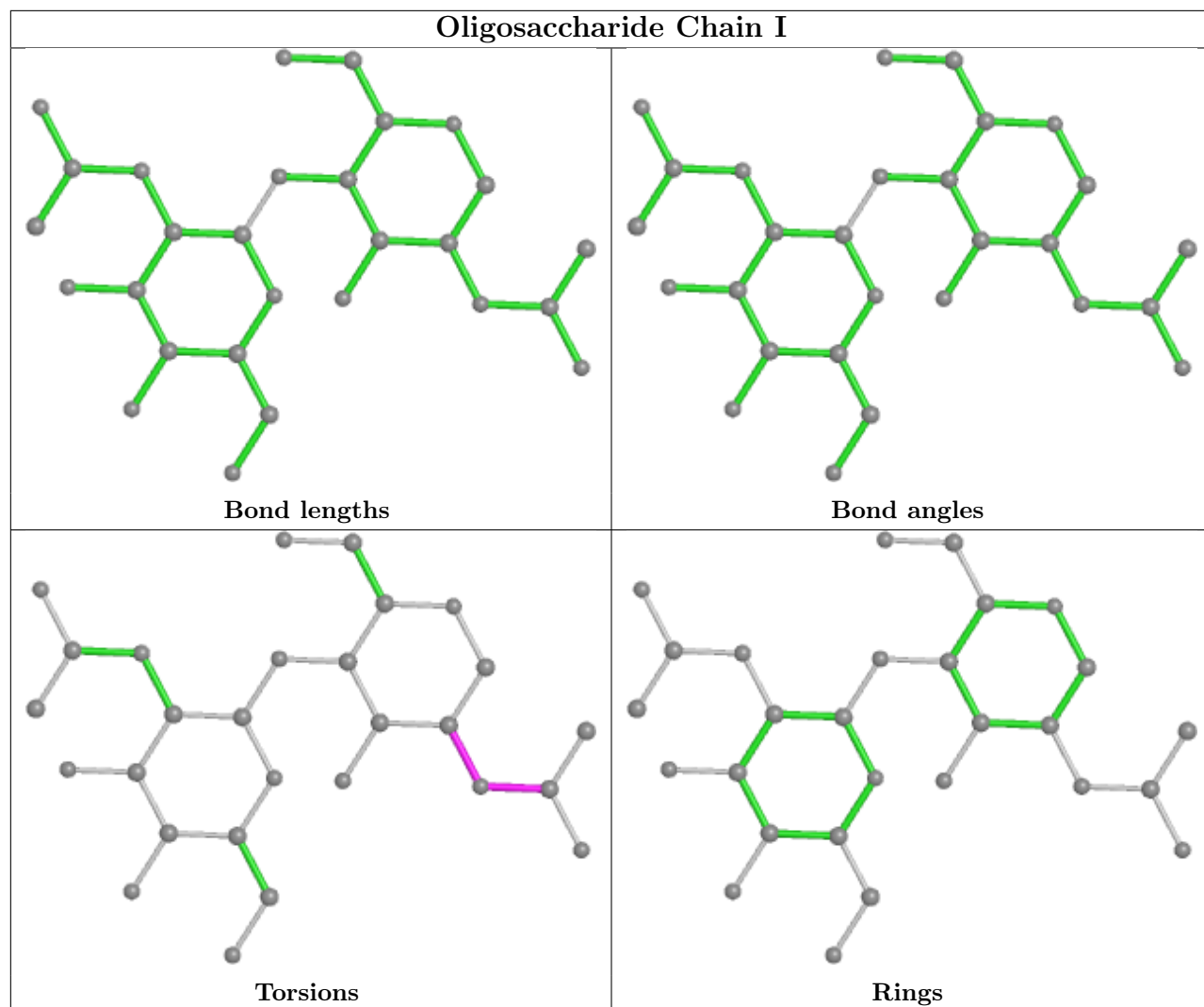
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	K	2	NAG	1	0
3	I	2	NAG	1	0
3	H	1	NAG	1	0
3	K	1	NAG	4	0
3	E	1	NAG	1	0
3	I	1	NAG	3	0
3	F	2	NAG	1	0

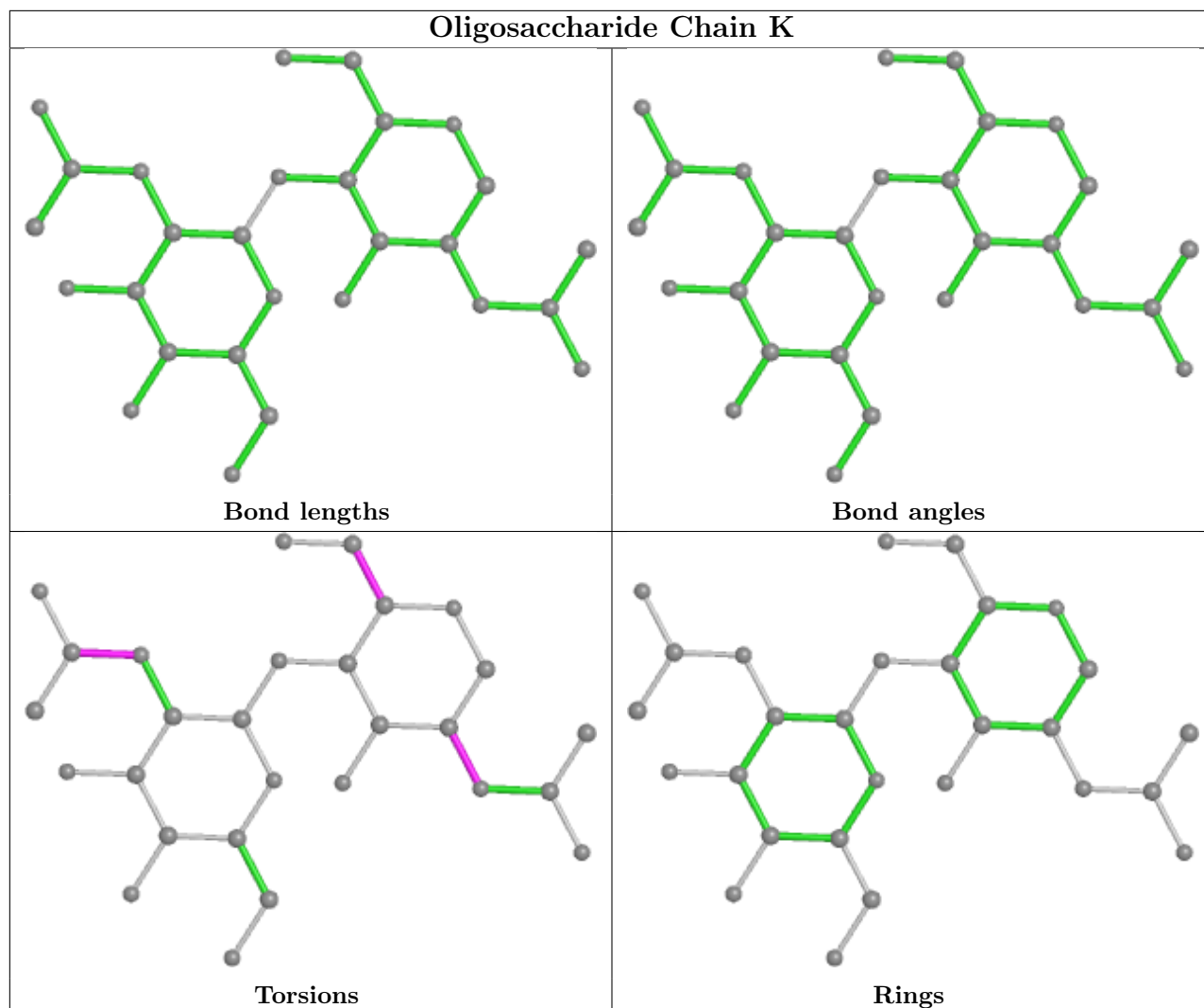
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

24 ligands 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	$\# Z > 2$
4	NAG	C	1307	1	14,14,15	0.39	0	17,19,21	0.36	0
4	NAG	A	1304	1	14,14,15	0.40	0	17,19,21	0.38	0
4	NAG	C	1309	1	14,14,15	0.39	0	17,19,21	0.39	0
4	NAG	B	1306	1	14,14,15	0.41	0	17,19,21	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	B	1304	1	14,14,15	0.39	0	17,19,21	0.40	0
4	NAG	A	1305	1	14,14,15	0.40	0	17,19,21	0.40	0
4	NAG	B	1308	1	14,14,15	0.38	0	17,19,21	0.35	0
4	NAG	C	1305	1	14,14,15	0.41	0	17,19,21	0.38	0
4	NAG	B	1301	1	14,14,15	0.39	0	17,19,21	0.37	0
4	NAG	C	1308	1	14,14,15	0.38	0	17,19,21	0.38	0
4	NAG	C	1304	1	14,14,15	0.39	0	17,19,21	0.36	0
4	NAG	C	1306	1	14,14,15	0.39	0	17,19,21	0.37	0
4	NAG	B	1303	1	14,14,15	0.40	0	17,19,21	0.37	0
4	NAG	A	1301	1	14,14,15	0.40	0	17,19,21	0.41	0
4	NAG	B	1302	1	14,14,15	0.40	0	17,19,21	0.46	0
4	NAG	B	1307	1	14,14,15	0.39	0	17,19,21	0.37	0
4	NAG	A	1306	1	14,14,15	0.40	0	17,19,21	0.85	2 (11%)
4	NAG	A	1302	1	14,14,15	0.41	0	17,19,21	0.40	0
4	NAG	A	1303	1	14,14,15	0.40	0	17,19,21	0.34	0
4	NAG	A	1307	1	14,14,15	0.40	0	17,19,21	0.34	0
4	NAG	C	1303	1	14,14,15	0.39	0	17,19,21	0.33	0
4	NAG	C	1301	1	14,14,15	0.40	0	17,19,21	0.36	0
4	NAG	B	1305	1	14,14,15	0.40	0	17,19,21	0.40	0
4	NAG	C	1302	1	14,14,15	0.39	0	17,19,21	0.33	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
4	NAG	C	1307	1	-	2/6/23/26	0/1/1/1
4	NAG	A	1304	1	-	5/6/23/26	0/1/1/1
4	NAG	C	1309	1	-	4/6/23/26	0/1/1/1
4	NAG	B	1306	1	-	1/6/23/26	0/1/1/1
4	NAG	B	1304	1	-	1/6/23/26	0/1/1/1
4	NAG	A	1305	1	-	4/6/23/26	0/1/1/1
4	NAG	B	1308	1	-	6/6/23/26	0/1/1/1
4	NAG	C	1305	1	-	3/6/23/26	0/1/1/1
4	NAG	B	1301	1	-	3/6/23/26	0/1/1/1
4	NAG	C	1308	1	-	3/6/23/26	0/1/1/1
4	NAG	C	1304	1	-	3/6/23/26	0/1/1/1
4	NAG	C	1306	1	-	3/6/23/26	0/1/1/1
4	NAG	B	1303	1	-	3/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	A	1301	1	-	2/6/23/26	0/1/1/1
4	NAG	B	1302	1	-	4/6/23/26	0/1/1/1
4	NAG	B	1307	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1306	1	-	3/6/23/26	0/1/1/1
4	NAG	A	1302	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1303	1	-	2/6/23/26	0/1/1/1
4	NAG	A	1307	1	-	4/6/23/26	0/1/1/1
4	NAG	C	1303	1	-	2/6/23/26	0/1/1/1
4	NAG	C	1301	1	-	3/6/23/26	0/1/1/1
4	NAG	B	1305	1	-	0/6/23/26	0/1/1/1
4	NAG	C	1302	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1306	NAG	C1-C2-N2	2.30	114.42	110.49
4	A	1306	NAG	C2-N2-C7	2.06	125.84	122.90

There are no chirality outliers.

All (71) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1301	NAG	C8-C7-N2-C2
4	A	1301	NAG	O7-C7-N2-C2
4	A	1302	NAG	C8-C7-N2-C2
4	A	1302	NAG	O7-C7-N2-C2
4	A	1303	NAG	C8-C7-N2-C2
4	A	1303	NAG	O7-C7-N2-C2
4	A	1304	NAG	C8-C7-N2-C2
4	A	1304	NAG	O7-C7-N2-C2
4	A	1306	NAG	C8-C7-N2-C2
4	A	1306	NAG	O7-C7-N2-C2
4	A	1307	NAG	C8-C7-N2-C2
4	A	1307	NAG	O7-C7-N2-C2
4	B	1301	NAG	C8-C7-N2-C2
4	B	1301	NAG	O7-C7-N2-C2
4	B	1308	NAG	C8-C7-N2-C2
4	B	1308	NAG	O7-C7-N2-C2

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Mol	Chain	Res	Type	Atoms
4	C	1301	NAG	C8-C7-N2-C2
4	C	1301	NAG	O7-C7-N2-C2
4	C	1302	NAG	C8-C7-N2-C2
4	C	1302	NAG	O7-C7-N2-C2
4	C	1303	NAG	C8-C7-N2-C2
4	C	1303	NAG	O7-C7-N2-C2
4	C	1305	NAG	C8-C7-N2-C2
4	C	1305	NAG	O7-C7-N2-C2
4	C	1306	NAG	C8-C7-N2-C2
4	C	1306	NAG	O7-C7-N2-C2
4	C	1308	NAG	C3-C2-N2-C7
4	C	1308	NAG	C8-C7-N2-C2
4	C	1308	NAG	O7-C7-N2-C2
4	C	1309	NAG	C8-C7-N2-C2
4	C	1309	NAG	O7-C7-N2-C2
4	C	1306	NAG	C1-C2-N2-C7
4	B	1302	NAG	C8-C7-N2-C2
4	B	1303	NAG	C8-C7-N2-C2
4	A	1307	NAG	O5-C5-C6-O6
4	A	1307	NAG	C4-C5-C6-O6
4	C	1309	NAG	O5-C5-C6-O6
4	A	1305	NAG	C8-C7-N2-C2
4	B	1302	NAG	O7-C7-N2-C2
4	A	1304	NAG	C1-C2-N2-C7
4	A	1306	NAG	C1-C2-N2-C7
4	A	1305	NAG	O7-C7-N2-C2
4	B	1303	NAG	O7-C7-N2-C2
4	B	1307	NAG	C8-C7-N2-C2
4	C	1304	NAG	C8-C7-N2-C2
4	C	1304	NAG	O7-C7-N2-C2
4	C	1309	NAG	C4-C5-C6-O6
4	A	1302	NAG	C1-C2-N2-C7
4	B	1302	NAG	C1-C2-N2-C7
4	A	1304	NAG	C4-C5-C6-O6
4	B	1307	NAG	O7-C7-N2-C2
4	B	1308	NAG	O5-C5-C6-O6
4	A	1305	NAG	C1-C2-N2-C7
4	B	1302	NAG	O5-C5-C6-O6
4	A	1304	NAG	O5-C5-C6-O6
4	B	1301	NAG	O5-C5-C6-O6
4	A	1305	NAG	O5-C5-C6-O6
4	A	1302	NAG	O5-C5-C6-O6

Continued on next page...

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Mol	Chain	Res	Type	Atoms
4	B	1303	NAG	O5-C5-C6-O6
4	B	1304	NAG	O5-C5-C6-O6
4	B	1306	NAG	O5-C5-C6-O6
4	C	1305	NAG	O5-C5-C6-O6
4	C	1301	NAG	O5-C5-C6-O6
4	C	1304	NAG	O5-C5-C6-O6
4	C	1307	NAG	C4-C5-C6-O6
4	C	1307	NAG	O5-C5-C6-O6
4	B	1308	NAG	C1-C2-N2-C7
4	B	1307	NAG	O5-C5-C6-O6
4	B	1307	NAG	C4-C5-C6-O6
4	B	1308	NAG	C3-C2-N2-C7
4	B	1308	NAG	C4-C5-C6-O6

There are no ring outliers.

9 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1304	NAG	1	0
4	B	1308	NAG	4	0
4	C	1304	NAG	1	0
4	B	1303	NAG	1	0
4	A	1301	NAG	1	0
4	B	1302	NAG	1	0
4	B	1307	NAG	1	0
4	A	1303	NAG	1	0
4	B	1305	NAG	1	0

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.

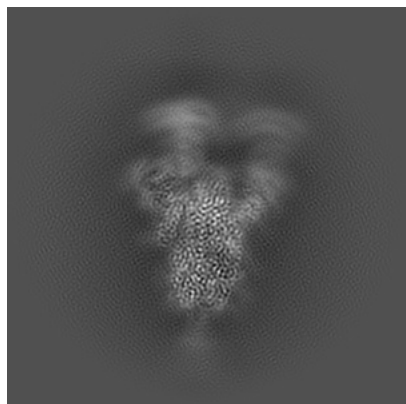
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-34501. These allow visual inspection of the internal detail of the map and identification of artifacts.

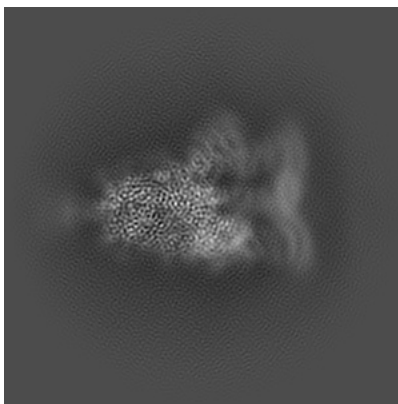
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

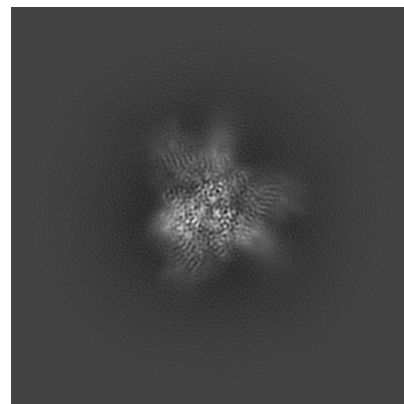
6.1.1 Primary map



X

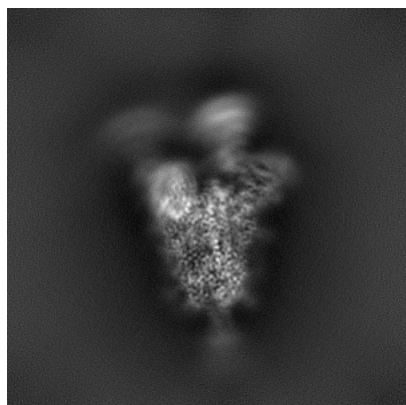


Y

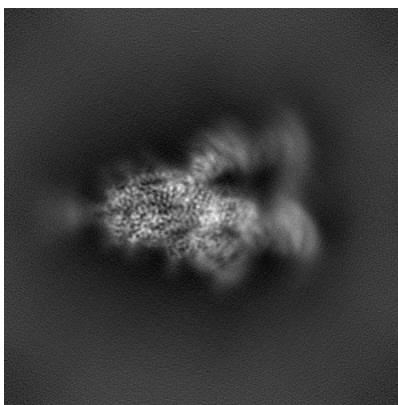


Z

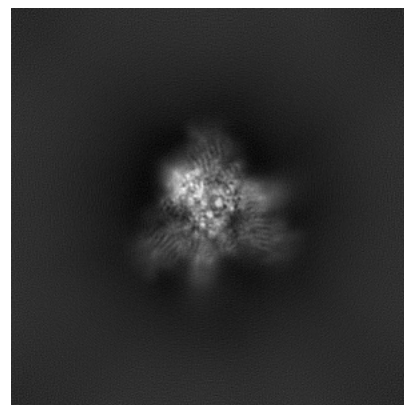
6.1.2 Raw map



X



Y

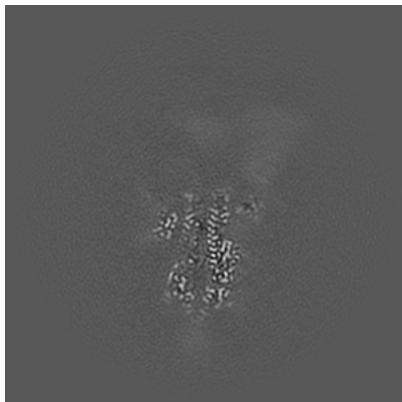


Z

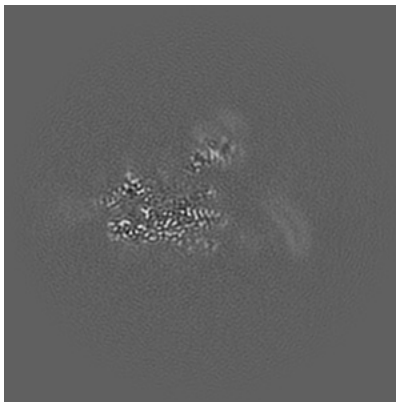
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

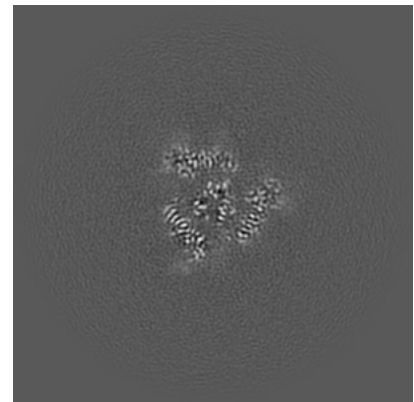
6.2.1 Primary map



X Index: 210

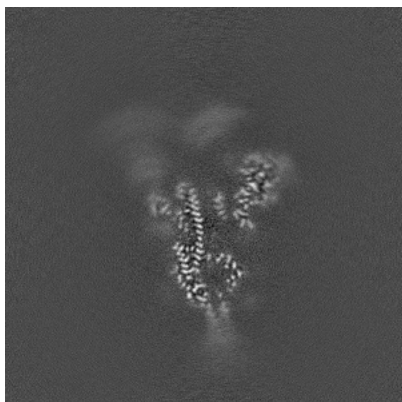


Y Index: 210

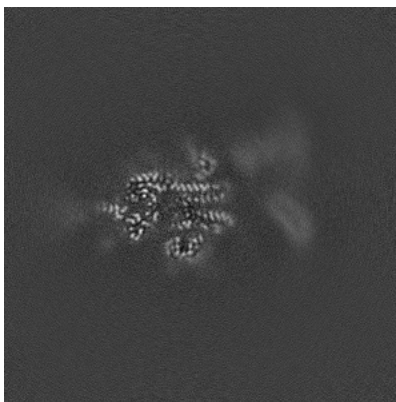


Z Index: 210

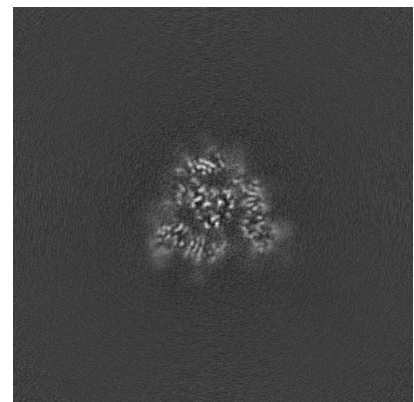
6.2.2 Raw map



X Index: 210



Y Index: 210

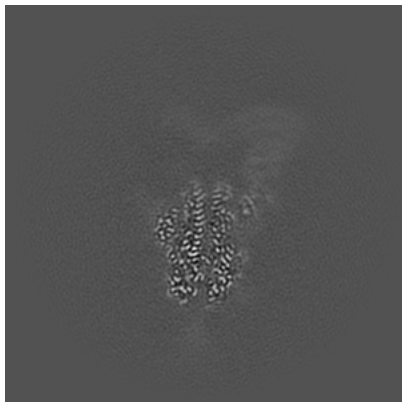


Z Index: 210

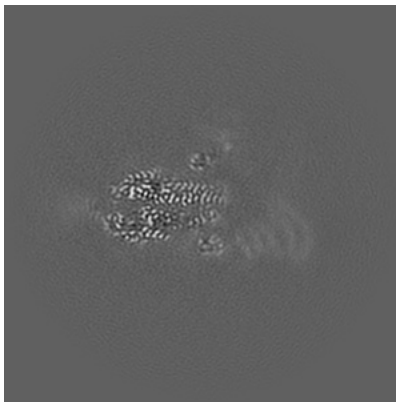
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

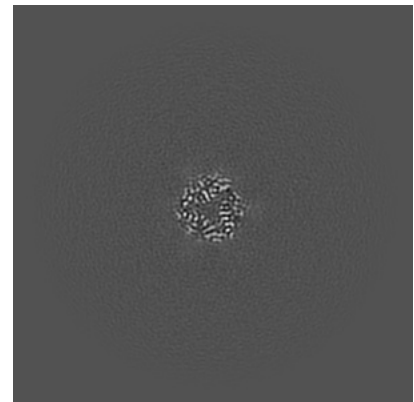
6.3.1 Primary map



X Index: 218

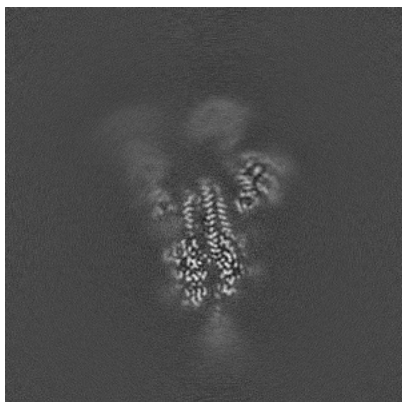


Y Index: 201

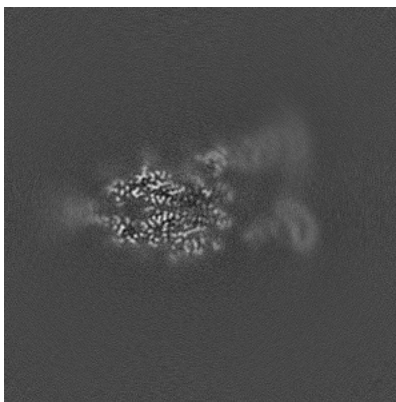


Z Index: 133

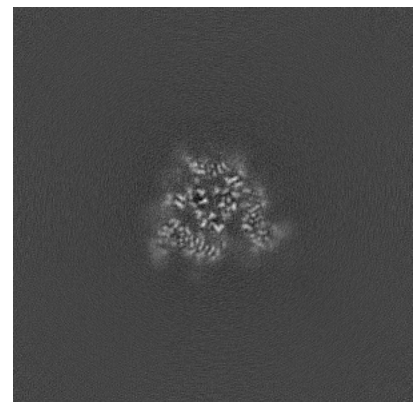
6.3.2 Raw map



X Index: 200



Y Index: 221



Z Index: 207

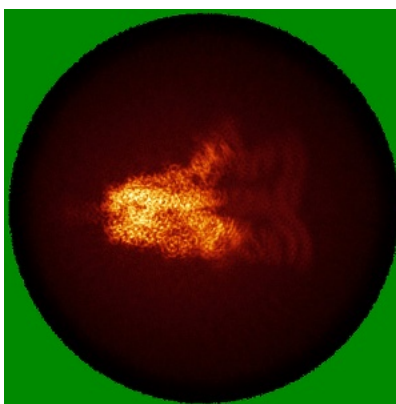
The images above show the largest variance slices of the map in three orthogonal directions.

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

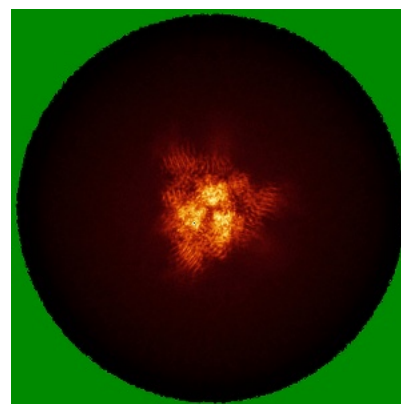
6.4.1 Primary map



X



Y

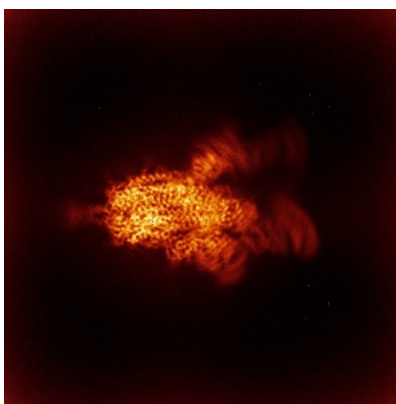


Z

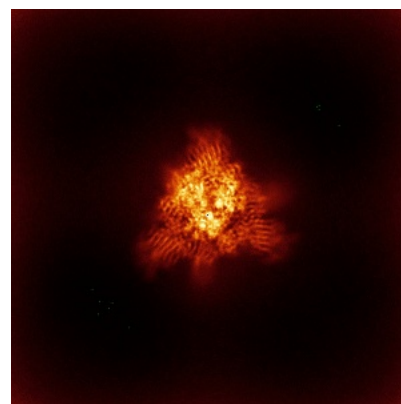
6.4.2 Raw map



X



Y

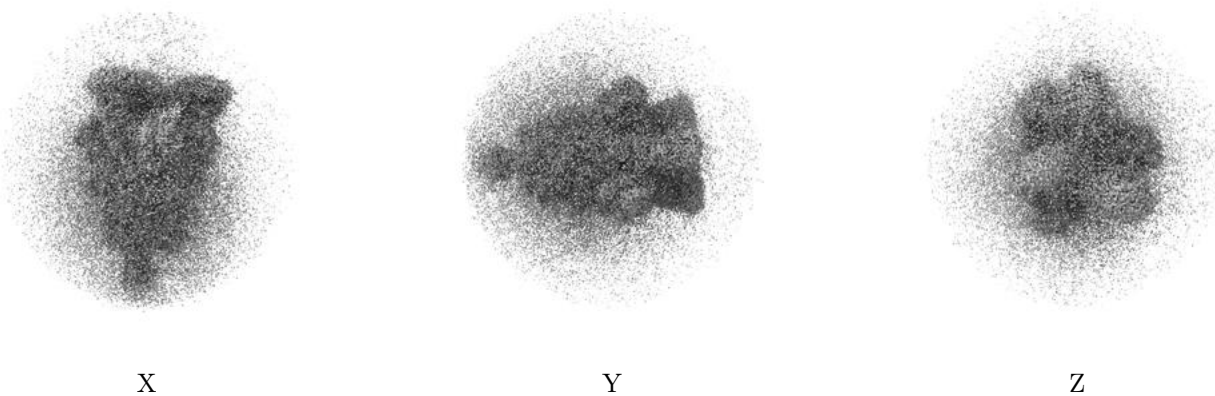


Z

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.

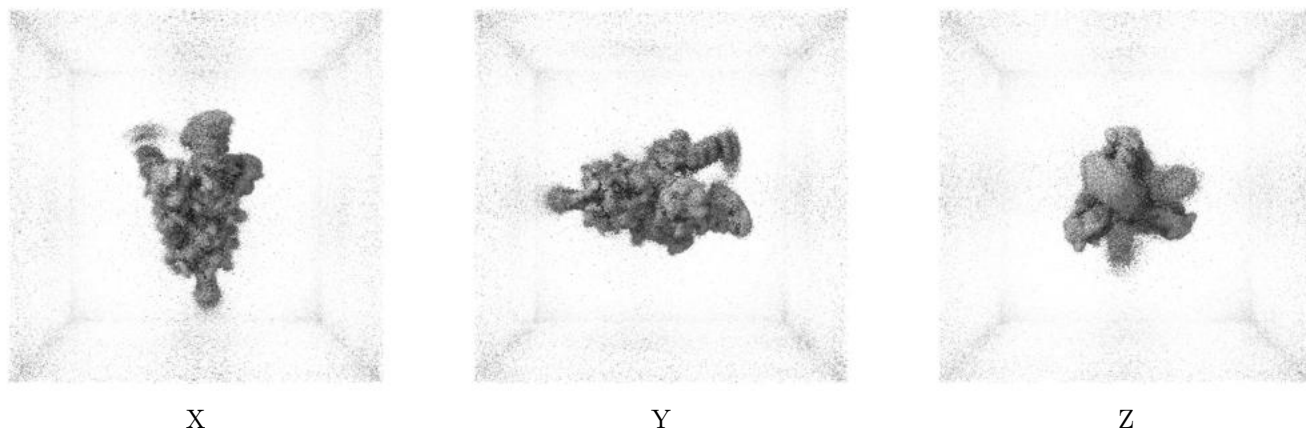
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.15. 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.

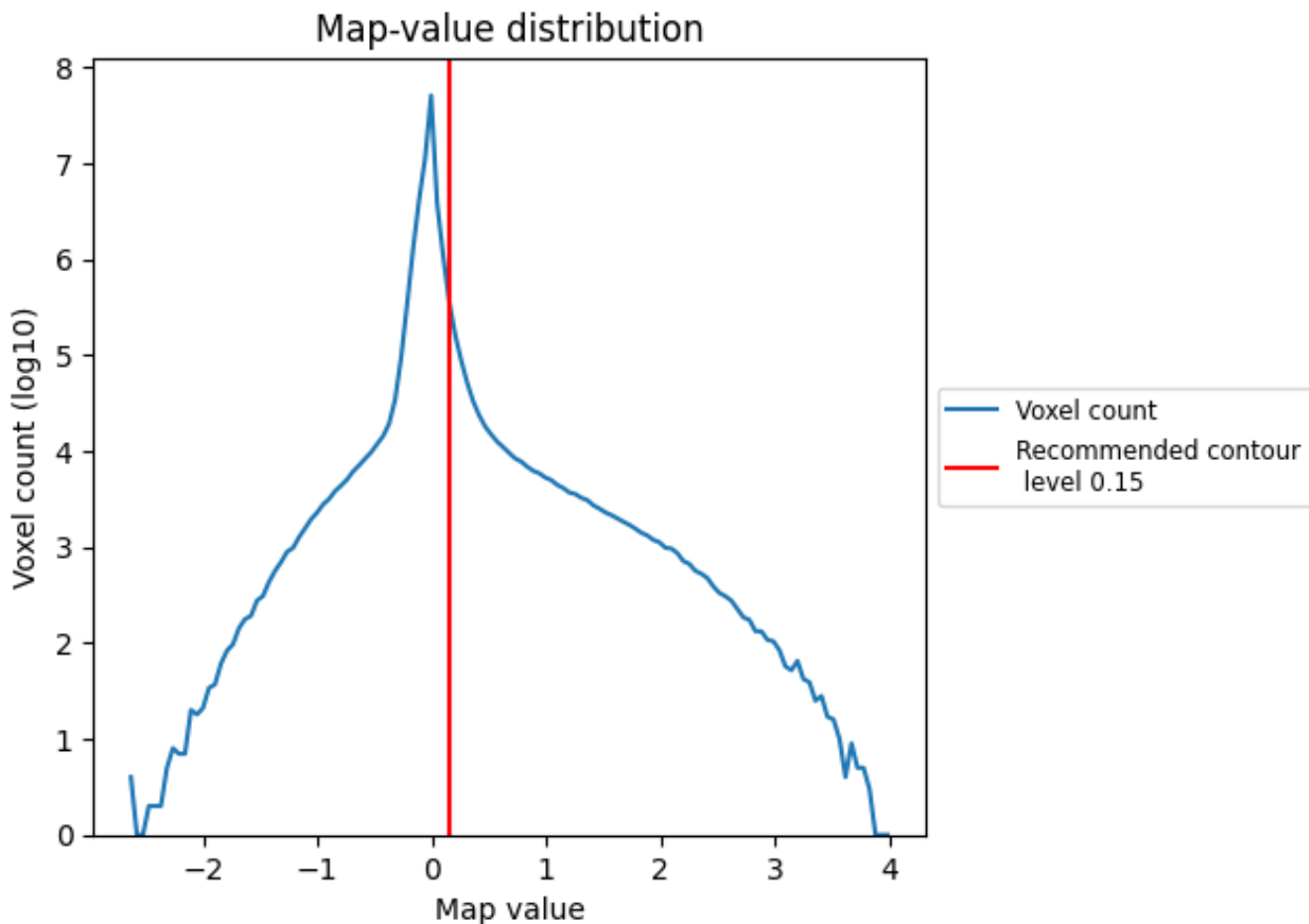
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

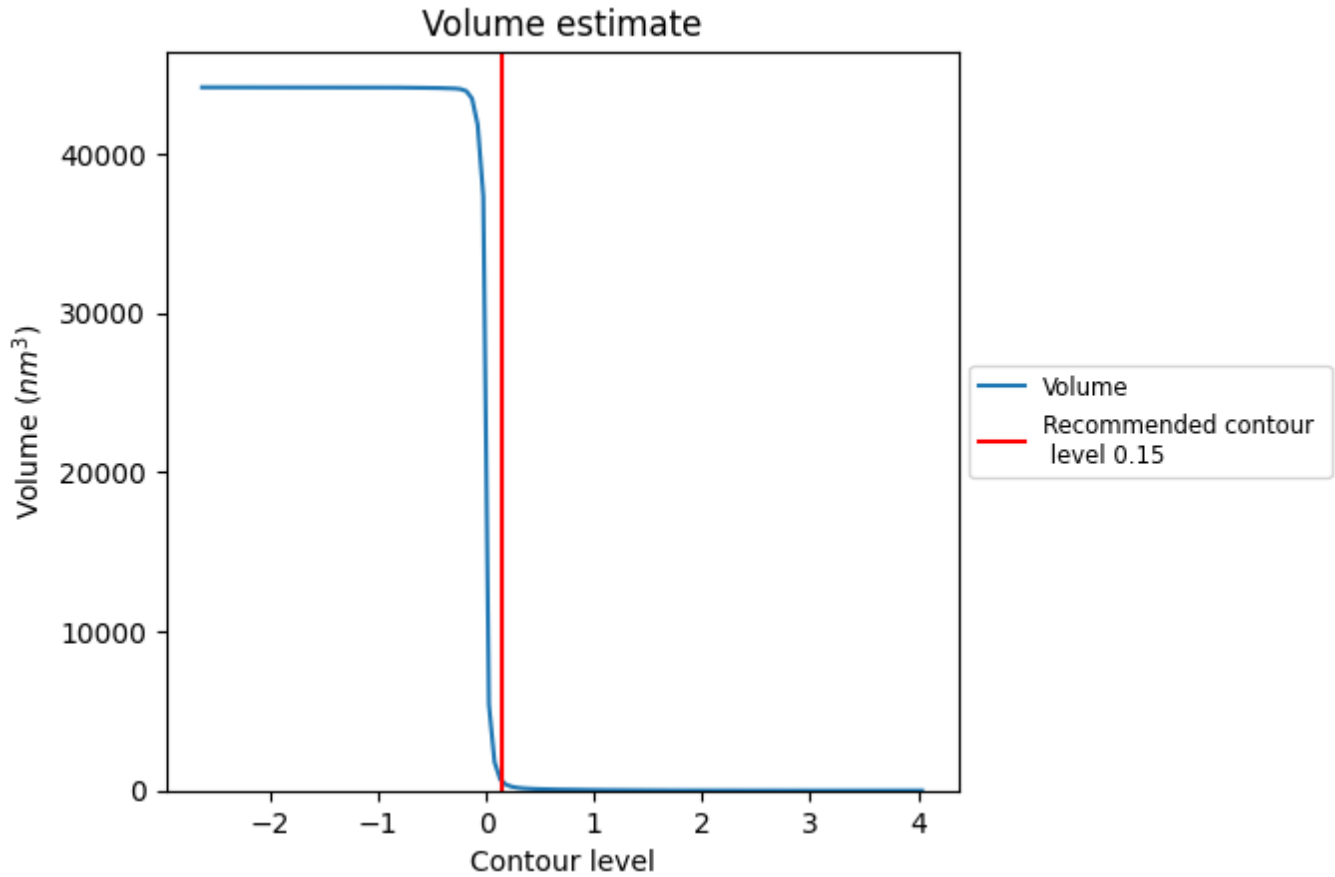
This section contains the results of statistical analysis of the map.

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.

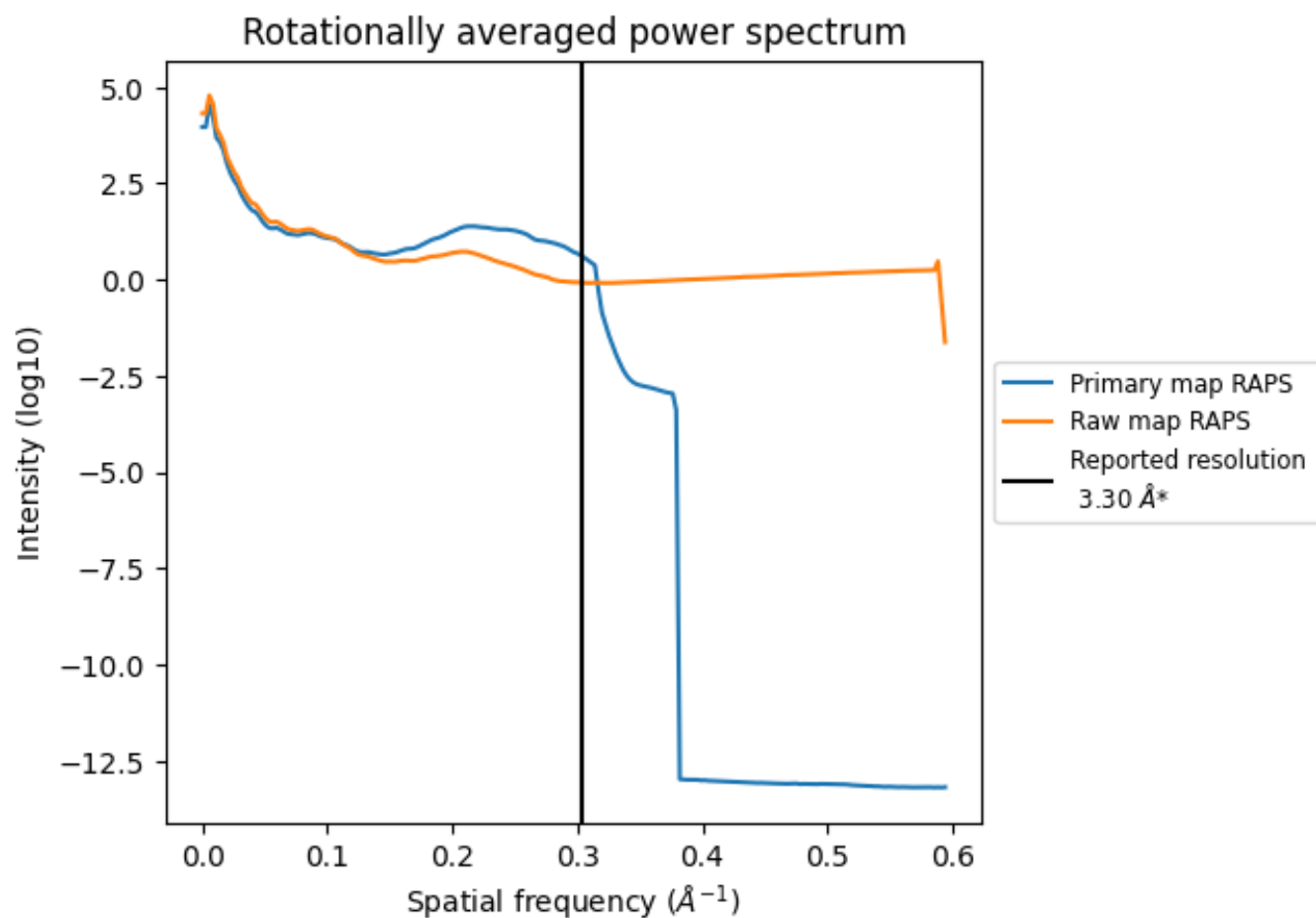
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 583 nm^3 ; this corresponds to an approximate mass of 527 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 [i](#)

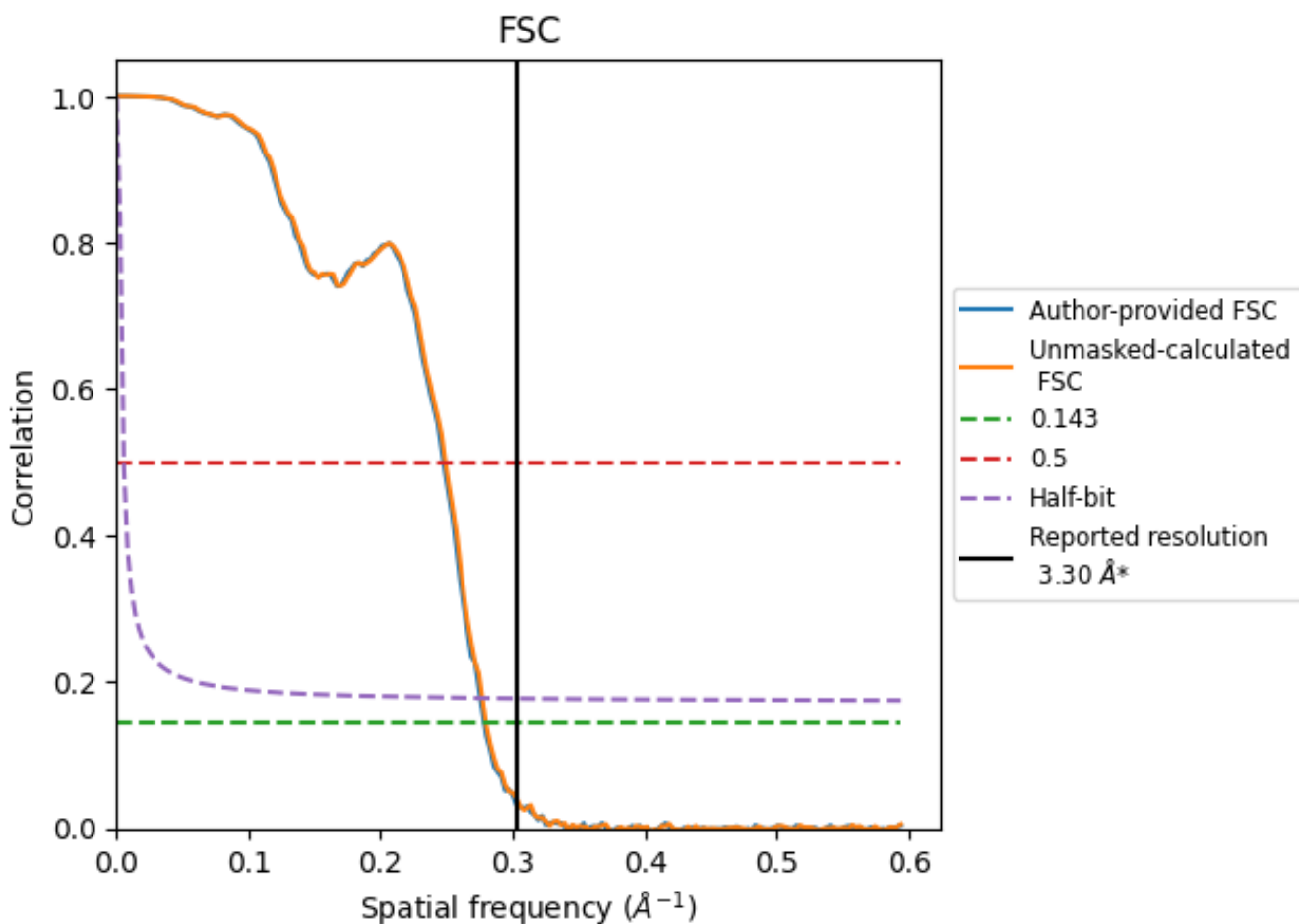


*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

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 0.303 Å⁻¹

8.2 Resolution estimates [i](#)

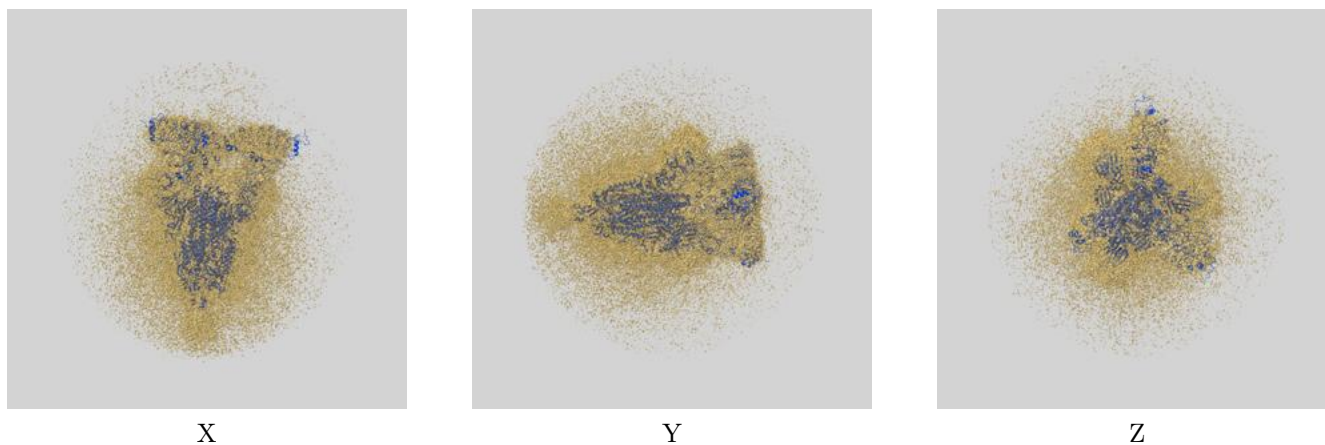
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.59	4.04	3.63
Unmasked-calculated*	3.57	4.01	3.61

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

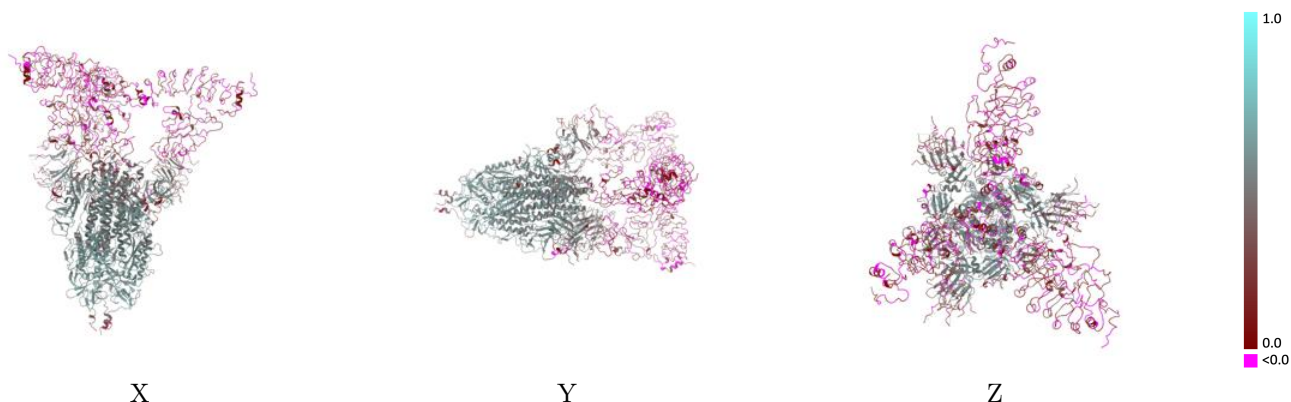
This section contains information regarding the fit between EMDB map EMD-34501 and PDB model 8H6F. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



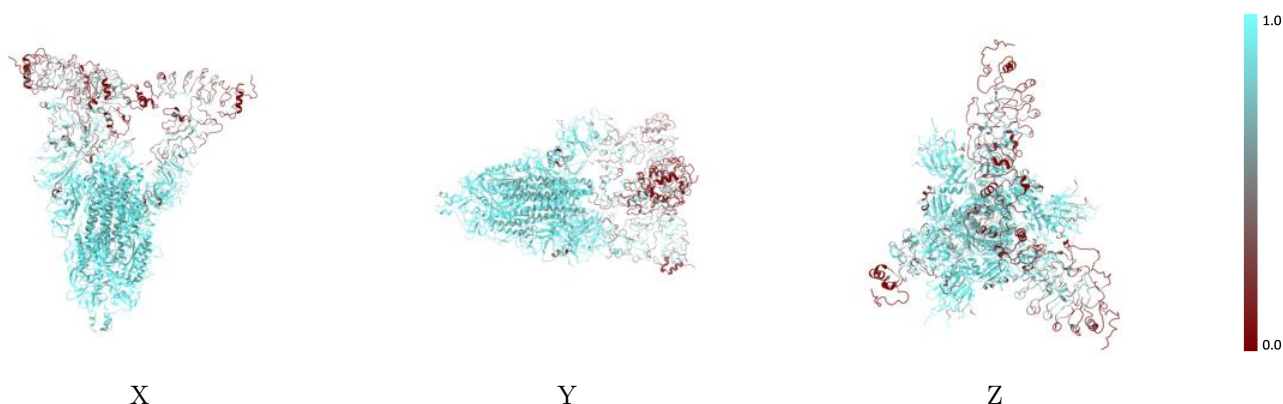
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



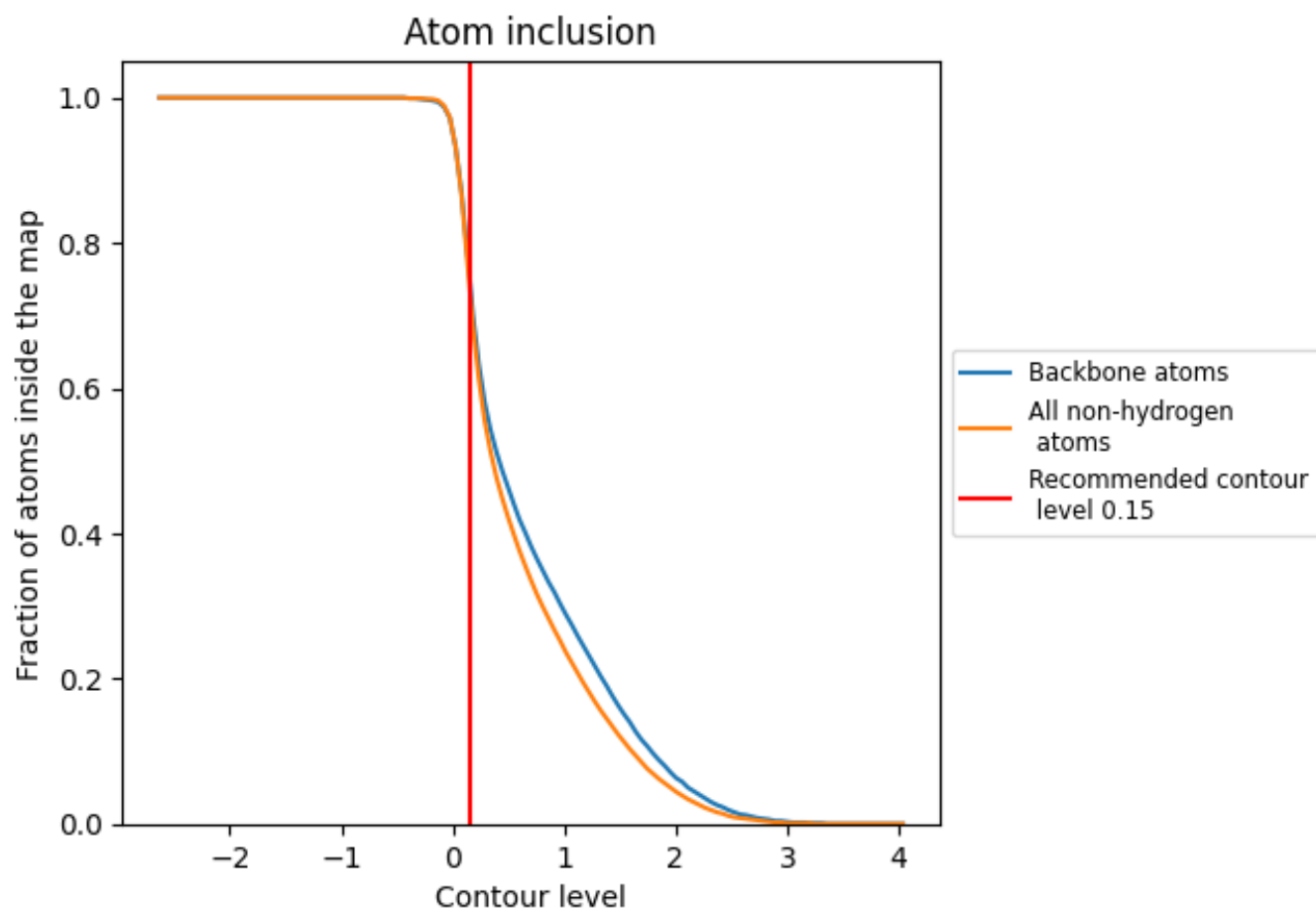
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.15).

























9.4 Atom inclusion [i](#)



At the recommended contour level, 76% of all backbone atoms, 74% 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 (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7430	 0.3400
A	 0.8620	 0.4070
B	 0.8470	 0.4170
C	 0.8210	 0.3980
E	 0.6790	 0.0830
F	 0.7500	 0.1930
H	 0.7500	 0.2580
I	 0.8570	 0.1970
K	 0.7140	 0.1560
X	 0.4870	 0.0800
Y	 0.2420	 0.0700
Z	 0.3060	 0.0810

