



Full wwPDB EM Validation Report ⓘ

Mar 7, 2026 – 11:28 PM UTC

PDB ID : 7WGZ / pdb_00007wgz
EMDB ID : EMD-32493
Title : SARS-CoV-2 spike glycoprotein trimer in open state
Authors : Zhu, Y.; Tai, L.; Yin, G.; Sun, F.
Deposited on : 2021-12-29
Resolution : 4.50 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:

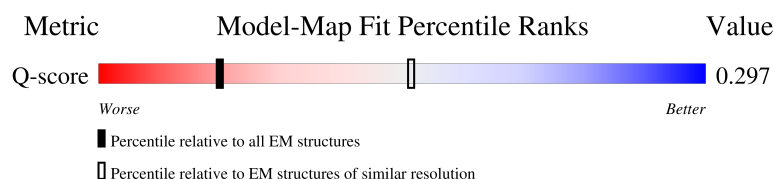
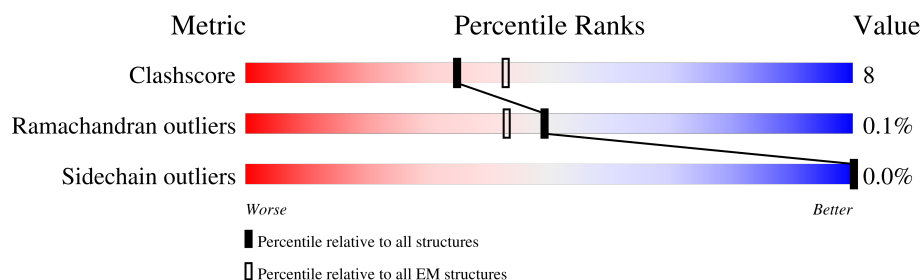
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 4.50 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	2937 (4.00 - 5.00)

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	1204	
1	B	1204	
1	C	1204	
2	D	2	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	E	2	 100%
2	F	2	 100%
2	G	2	 100%
2	H	2	 100%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 21920 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
1	A	968	Total	C	N	O	S	0	0
			7406	4749	1239	1386	32		
1	B	950	Total	C	N	O	S	0	0
			6874	4371	1165	1306	32		
1	C	961	Total	C	N	O	S	0	0
			7290	4673	1224	1361	32		

There are 42 discrepancies between the modelled and reference sequences:

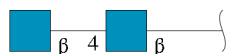
Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	PRO	deletion	UNP P0DTC2
A	?	-	ARG	deletion	UNP P0DTC2
A	?	-	ARG	deletion	UNP P0DTC2
A	?	-	ALA	deletion	UNP P0DTC2
A	1212	GLY	-	expression tag	UNP P0DTC2
A	1213	SER	-	expression tag	UNP P0DTC2
A	1214	GLY	-	expression tag	UNP P0DTC2
A	1215	ARG	-	expression tag	UNP P0DTC2
A	1216	GLU	-	expression tag	UNP P0DTC2
A	1217	ASN	-	expression tag	UNP P0DTC2
A	1218	LEU	-	expression tag	UNP P0DTC2
A	1219	TYR	-	expression tag	UNP P0DTC2
A	1220	PHE	-	expression tag	UNP P0DTC2
A	1221	GLN	-	expression tag	UNP P0DTC2
B	?	-	PRO	deletion	UNP P0DTC2
B	?	-	ARG	deletion	UNP P0DTC2
B	?	-	ARG	deletion	UNP P0DTC2
B	?	-	ALA	deletion	UNP P0DTC2
B	1212	GLY	-	expression tag	UNP P0DTC2
B	1213	SER	-	expression tag	UNP P0DTC2
B	1214	GLY	-	expression tag	UNP P0DTC2
B	1215	ARG	-	expression tag	UNP P0DTC2
B	1216	GLU	-	expression tag	UNP P0DTC2
B	1217	ASN	-	expression tag	UNP P0DTC2

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	1218	LEU	-	expression tag	UNP P0DTC2
B	1219	TYR	-	expression tag	UNP P0DTC2
B	1220	PHE	-	expression tag	UNP P0DTC2
B	1221	GLN	-	expression tag	UNP P0DTC2
C	?	-	PRO	deletion	UNP P0DTC2
C	?	-	ARG	deletion	UNP P0DTC2
C	?	-	ARG	deletion	UNP P0DTC2
C	?	-	ALA	deletion	UNP P0DTC2
C	1212	GLY	-	expression tag	UNP P0DTC2
C	1213	SER	-	expression tag	UNP P0DTC2
C	1214	GLY	-	expression tag	UNP P0DTC2
C	1215	ARG	-	expression tag	UNP P0DTC2
C	1216	GLU	-	expression tag	UNP P0DTC2
C	1217	ASN	-	expression tag	UNP P0DTC2
C	1218	LEU	-	expression tag	UNP P0DTC2
C	1219	TYR	-	expression tag	UNP P0DTC2
C	1220	PHE	-	expression tag	UNP P0DTC2
C	1221	GLN	-	expression tag	UNP P0DTC2

- Molecule 2 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
2	D	2	Total	C	N	O	0	0
			28	16	2	10		
2	E	2	Total	C	N	O	0	0
			28	16	2	10		
2	F	2	Total	C	N	O	0	0
			28	16	2	10		
2	G	2	Total	C	N	O	0	0
			28	16	2	10		
2	H	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

Continued on next page...

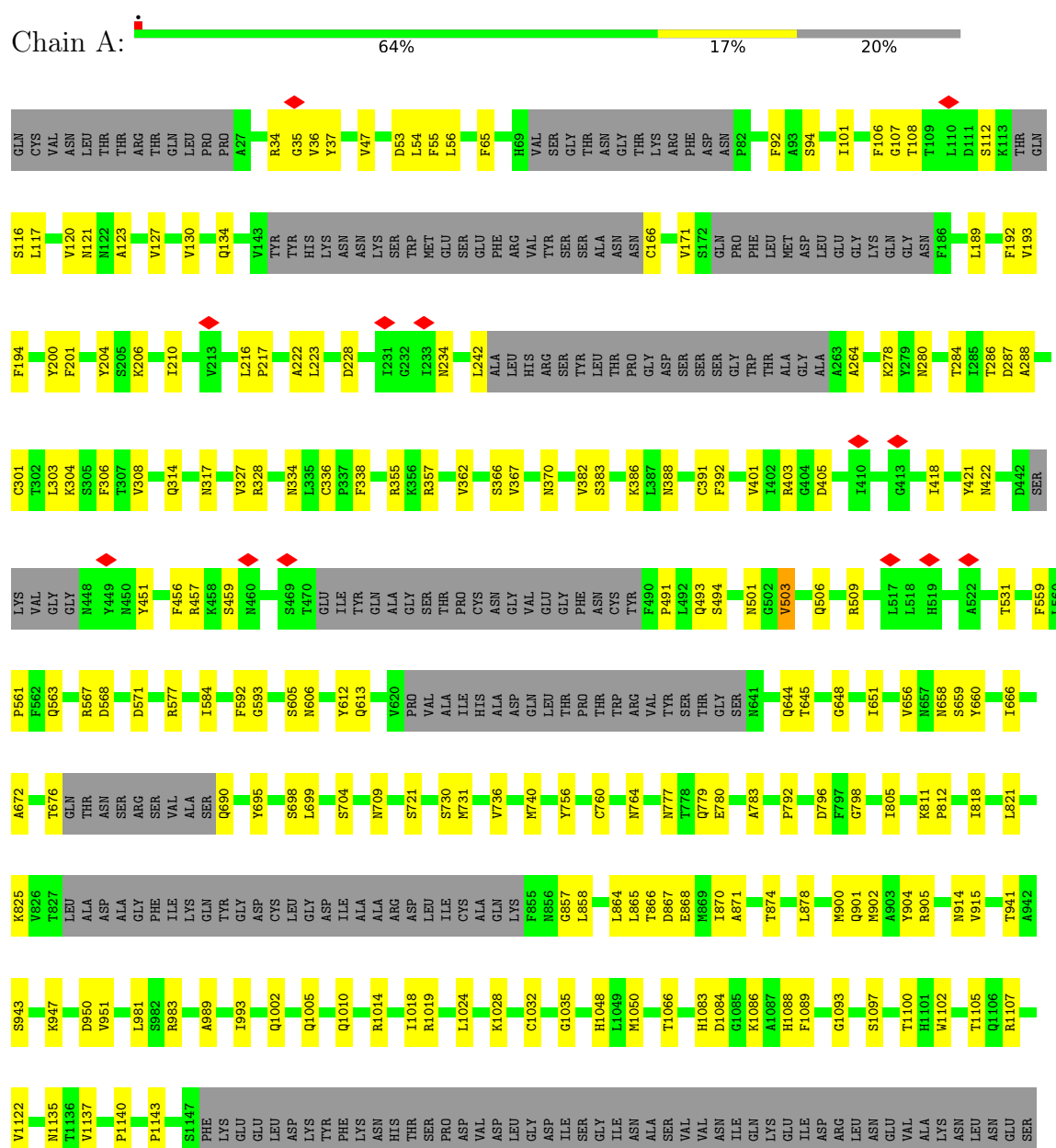
Continued from previous page...

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

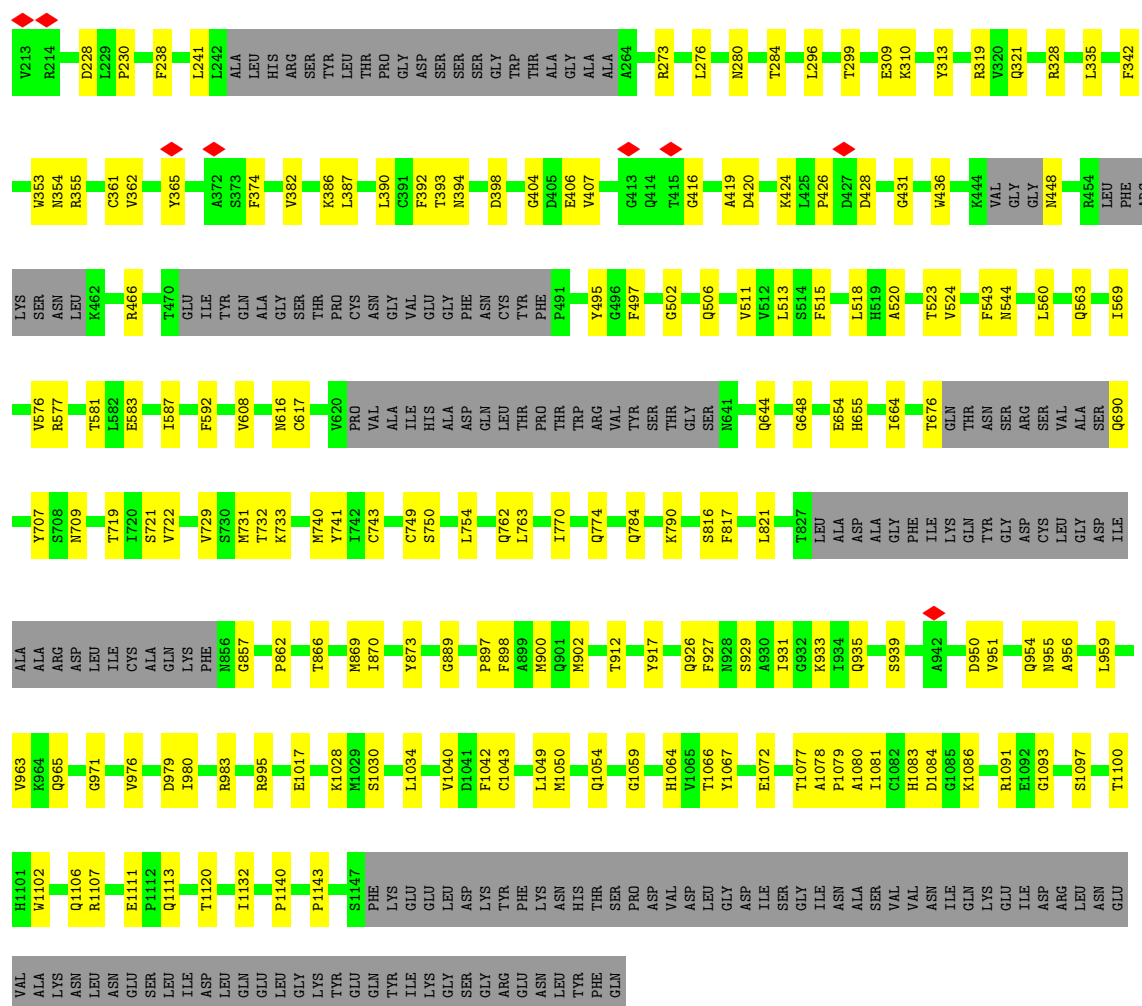
3 Residue-property plots

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

Chain D: 100%

NAG1
NAG2

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

Chain E: 100%

NAG1
NAG2

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

Chain F: 100%

MAG1
MAG2

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

Chain G:  100%MAG1
MAG2

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

Chain H:  100%MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	13523	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 ($e^-/\text{\AA}^2$)	80	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	1.419	Depositor
Minimum map value	-0.423	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.064	Depositor
Recommended contour level	0.359	Depositor
Map size (Å)	345.6, 345.6, 345.6	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.35, 1.35, 1.35	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	0.18	0/7568	0.37	0/10311
1	B	0.18	0/7007	0.37	0/9565
1	C	0.17	0/7450	0.35	0/10158
All	All	0.18	0/22025	0.36	0/30034

There are no bond length outliers.

There are no bond angle outliers.

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	7406	0	7189	129	0
1	B	6874	0	6342	104	0
1	C	7290	0	7005	133	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
3	A	84	0	78	2	0
3	B	56	0	52	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	70	0	65	4	0
All	All	21920	0	20856	342	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 8.

All (342) 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:B:656:VAL:HG12	1:B:658:ASN:H	1.42	0.82
1:B:811:LYS:HB2	1:B:812:PRO:HD2	1.61	0.82
1:A:709:ASN:ND2	3:A:1301:NAG:O7	2.20	0.75
1:A:656:VAL:HG12	1:A:658:ASN:H	1.54	0.73
1:B:808:ASP:OD2	1:B:811:LYS:NZ	2.17	0.72
1:B:339:GLY:HA2	1:B:343:ASN:HB2	1.72	0.72
1:A:101:ILE:HA	1:A:242:LEU:HA	1.71	0.71
1:B:949:GLN:NE2	1:B:953:ASN:OD1	2.22	0.70
1:C:955:ASN:OD1	1:C:956:ALA:N	2.24	0.70
1:A:314:GLN:OE1	1:A:613:GLN:NE2	2.25	0.69
1:B:1111:GLU:O	1:B:1113:GLN:NE2	2.25	0.69
1:A:503:VAL:H	1:A:506:GLN:CD	2.00	0.69
1:C:280:ASN:OD1	1:C:284:THR:N	2.25	0.68
1:B:106:PHE:HB2	1:B:117:LEU:HB3	1.75	0.67
1:C:104:TRP:HB2	1:C:119:ILE:HD13	1.75	0.67
1:A:1088:HIS:HD1	1:A:1122:VAL:HG22	1.60	0.67
1:C:1091:ARG:NH1	1:C:1120:THR:O	2.28	0.67
1:C:719:THR:HG22	1:C:926:GLN:HE22	1.59	0.67
1:A:659:SER:HB2	1:A:698:SER:HB2	1.77	0.67
1:B:702:GLU:OE2	1:C:790:LYS:NZ	2.27	0.67
1:A:559:PHE:HB2	1:A:584:ILE:HG13	1.78	0.66
1:B:100:ILE:O	1:B:102:ARG:NH1	2.29	0.66
1:B:570:ALA:HB1	1:C:963:VAL:HG11	1.78	0.66
1:B:27:ALA:N	1:B:64:TRP:O	2.30	0.65
1:C:448:ASN:HB3	1:C:497:PHE:HB2	1.78	0.65
1:B:641:ASN:ND2	1:B:653:ALA:O	2.30	0.64
1:A:1010:GLN:OE1	1:A:1014:ARG:NH1	2.30	0.64
1:C:709:ASN:ND2	3:C:1301:NAG:O7	2.30	0.64
1:A:1084:ASP:OD2	1:A:1086:LYS:NZ	2.31	0.63
1:A:34:ARG:HE	1:A:216:LEU:HD13	1.63	0.63
1:C:189:LEU:HB2	1:C:210:ILE:HD13	1.80	0.63
1:C:1100:THR:HG21	3:C:1304:NAG:HN2	1.63	0.62

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:91:TYR:HE1	1:B:191:GLU:HB3	1.64	0.62
1:C:105:ILE:HG13	1:C:241:LEU:HD11	1.81	0.62
1:C:319:ARG:O	1:C:321:GLN:NE2	2.32	0.62
1:B:551:VAL:HB	1:B:588:THR:HB	1.80	0.61
1:A:612:TYR:HE2	1:A:651:ILE:HD12	1.64	0.61
1:B:644:GLN:NE2	1:B:645:THR:O	2.33	0.61
1:A:756:TYR:O	1:C:965:GLN:NE2	2.33	0.61
1:C:48:LEU:HB3	1:C:276:LEU:HD11	1.80	0.61
1:B:877:LEU:HD13	1:B:1029:MET:HE2	1.83	0.61
1:C:1083:HIS:CD2	1:C:1084:ASP:H	2.18	0.61
1:A:644:GLN:NE2	1:A:645:THR:O	2.33	0.61
1:B:578:ASP:OD1	1:B:581:THR:N	2.34	0.61
1:C:309:GLU:O	1:C:313:TYR:OH	2.18	0.61
1:B:95:THR:HB	1:B:186:PHE:HA	1.84	0.60
1:C:416:GLY:O	1:C:420:ASP:N	2.35	0.60
1:A:760:CYS:O	1:A:764:ASN:ND2	2.35	0.59
1:B:719:THR:HG22	1:B:926:GLN:HE22	1.67	0.59
1:A:811:LYS:HG2	1:A:812:PRO:HD2	1.84	0.59
1:C:1084:ASP:O	1:C:1086:LYS:NZ	2.33	0.59
1:A:947:LYS:O	1:A:950:ASP:HB3	2.01	0.59
1:C:27:ALA:N	1:C:64:TRP:O	2.36	0.59
1:C:897:PRO:HB2	1:C:900:MET:HG2	1.84	0.59
1:A:280:ASN:OD1	1:A:284:THR:N	2.35	0.59
1:B:596:SER:HB2	1:B:611:LEU:HB3	1.85	0.59
1:C:106:PHE:HD1	1:C:238:PHE:HB2	1.68	0.59
3:C:1302:NAG:N2	3:C:1302:NAG:O4	2.35	0.59
1:A:503:VAL:N	1:A:506:GLN:CD	2.59	0.58
1:B:825:LYS:HD3	1:B:942:ALA:HB2	1.85	0.58
1:C:419:ALA:HB1	1:C:424:LYS:HD2	1.85	0.58
1:C:721:SER:OG	1:C:1066:THR:OG1	2.21	0.58
1:A:1032:CYS:SG	1:A:1048:HIS:NE2	2.77	0.58
1:B:201:PHE:HB3	1:B:229:LEU:HB2	1.85	0.58
1:B:276:LEU:HB3	1:B:289:VAL:HB	1.85	0.57
1:B:110:LEU:HD13	1:B:237:ARG:HB3	1.86	0.57
1:A:561:PRO:O	1:A:577:ARG:NH1	2.38	0.57
1:C:431:GLY:HA2	1:C:515:PHE:CE2	2.40	0.57
1:A:866:THR:OG1	1:A:868:GLU:OE2	2.22	0.56
1:C:335:LEU:HD23	1:C:362:VAL:HB	1.87	0.56
1:A:193:VAL:HB	1:A:204:TYR:HB2	1.87	0.56
1:B:319:ARG:O	1:B:321:GLN:NE2	2.38	0.56
1:C:53:ASP:OD1	1:C:54:LEU:N	2.34	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:819:GLU:OE2	1:B:1055:SER:N	2.38	0.56
1:C:37:TYR:OH	1:C:54:LEU:O	2.22	0.56
1:A:403:ARG:HG3	1:A:405:ASP:H	1.71	0.56
1:B:106:PHE:O	1:B:117:LEU:N	2.38	0.55
1:A:721:SER:OG	1:A:1066:THR:OG1	2.25	0.55
1:A:287:ASP:OD1	1:A:288:ALA:N	2.39	0.55
1:C:406:GLU:OE2	1:C:495:TYR:OH	2.25	0.55
1:C:676:THR:OG1	1:C:690:GLN:OE1	2.19	0.55
1:B:567:ARG:HG2	1:C:42:VAL:HG11	1.88	0.54
1:B:403:ARG:HA	1:B:507:PRO:HA	1.88	0.54
1:A:92:PHE:CZ	1:A:94:SER:HB3	2.42	0.54
1:C:102:ARG:HG2	1:C:141:LEU:HD22	1.90	0.54
1:C:1049:LEU:HD11	1:C:1067:TYR:HB2	1.89	0.54
1:B:203:ILE:HB	1:B:227:VAL:HB	1.88	0.54
1:B:607:GLN:OE1	1:B:674:TYR:HE1	1.90	0.54
1:B:127:VAL:HG22	1:B:171:VAL:HG13	1.90	0.54
1:C:762:GLN:NE2	1:C:763:LEU:HG	2.23	0.54
1:B:563:GLN:O	1:B:577:ARG:NH2	2.25	0.53
1:C:935:GLN:O	1:C:939:SER:OG	2.12	0.53
1:C:1072:GLU:N	1:C:1072:GLU:OE1	2.41	0.53
1:A:1019:ARG:HH22	1:C:1017:GLU:CD	2.16	0.53
1:B:105:ILE:HG12	1:B:118:LEU:HD13	1.90	0.53
1:C:296:LEU:O	1:C:299:THR:OG1	2.23	0.53
1:C:709:ASN:HD21	3:C:1301:NAG:H2	1.73	0.53
1:A:383:SER:HB2	1:A:386:LYS:HG2	1.90	0.53
1:B:279:TYR:HA	1:B:285:ILE:HA	1.91	0.53
1:C:740:MET:SD	1:C:741:TYR:N	2.82	0.53
1:A:704:SER:HB3	1:B:790:LYS:HB3	1.90	0.53
1:A:1086:LYS:HE2	1:A:1122:VAL:HG11	1.90	0.53
1:B:93:ALA:HB1	1:B:189:LEU:HD11	1.89	0.53
1:A:106:PHE:HB2	1:A:117:LEU:HB2	1.90	0.53
1:B:280:ASN:OD1	1:B:284:THR:N	2.33	0.53
1:C:106:PHE:HB2	1:C:117:LEU:HB2	1.91	0.53
1:B:676:THR:HA	1:B:690:GLN:HA	1.91	0.53
1:C:1093:GLY:O	1:C:1107:ARG:NH1	2.42	0.53
1:B:86:PHE:HE1	1:B:194:PHE:HB2	1.74	0.52
1:A:792:PRO:HG3	1:C:707:TYR:HB3	1.90	0.52
1:A:983:ARG:HG3	1:C:382:VAL:HG13	1.90	0.52
1:C:979:ASP:HB3	1:C:983:ARG:HE	1.72	0.52
1:B:897:PRO:HB2	1:B:900:MET:HG2	1.91	0.52
1:A:327:VAL:H	1:A:531:THR:HG22	1.75	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1129:VAL:HG23	1:C:917:TYR:HB3	1.92	0.52
1:B:296:LEU:HB2	1:B:608:VAL:HG11	1.91	0.52
1:C:202:LYS:NZ	1:C:228:ASP:OD2	2.43	0.51
1:A:457:ARG:NH1	1:A:459:SER:O	2.43	0.51
1:C:902:MET:HE1	1:C:1050:MET:HE2	1.91	0.51
1:A:35:GLY:HA3	1:A:56:LEU:HB3	1.93	0.51
1:C:817:PHE:O	1:C:821:LEU:HG	2.09	0.51
1:C:518:LEU:HD21	1:C:544:ASN:HB2	1.93	0.51
1:A:902:MET:HE1	1:A:1050:MET:HE2	1.92	0.51
1:A:1083:HIS:CE1	1:A:1137:VAL:H	2.30	0.50
1:C:770:ILE:O	1:C:774:GLN:HG2	2.11	0.50
1:B:46:SER:H	1:B:279:TYR:HB2	1.76	0.50
1:C:956:ALA:HA	1:C:959:LEU:HD12	1.93	0.50
1:A:864:LEU:HG	1:A:865:LEU:HD23	1.94	0.50
1:A:130:VAL:O	1:A:166:CYS:N	2.45	0.50
1:B:578:ASP:HB3	1:B:581:THR:O	2.11	0.50
1:C:1097:SER:HB2	1:C:1102:TRP:CE3	2.47	0.50
1:A:1024:LEU:O	1:A:1028:LYS:HG2	2.11	0.50
1:A:1088:HIS:ND1	1:A:1122:VAL:HG22	2.27	0.50
1:B:375:SER:N	1:B:435:ALA:O	2.45	0.50
1:C:616:ASN:OD1	1:C:617:CYS:N	2.44	0.50
1:A:317:ASN:HD21	1:A:592:PHE:HB2	1.77	0.50
1:A:904:TYR:CZ	1:C:1107:ARG:HD3	2.47	0.50
1:B:194:PHE:HD1	1:B:203:ILE:HG12	1.76	0.49
1:A:1035:GLY:HA3	1:C:1040:VAL:HG21	1.95	0.49
1:B:1090:PRO:HA	1:B:1120:THR:HG22	1.93	0.49
1:C:1083:HIS:CG	1:C:1084:ASP:H	2.29	0.49
1:A:676:THR:HA	1:A:690:GLN:HG2	1.95	0.49
1:A:192:PHE:HB3	1:A:194:PHE:CZ	2.47	0.49
1:B:229:LEU:HB3	1:B:231:ILE:HG12	1.93	0.49
1:A:1097:SER:HB2	1:A:1102:TRP:CD2	2.48	0.49
1:C:394:ASN:O	1:C:515:PHE:HA	2.12	0.49
1:A:107:GLY:HA3	1:A:116:SER:HA	1.95	0.49
1:A:120:VAL:HG22	1:A:121:ASN:H	1.77	0.49
1:A:731:MET:HE1	1:A:951:VAL:HG11	1.93	0.49
1:A:901:GLN:O	1:A:905:ARG:HG2	2.13	0.49
1:B:980:ILE:HG23	1:B:984:LEU:HD12	1.95	0.49
1:B:280:ASN:HD21	1:B:282:ASN:HB2	1.76	0.49
1:C:419:ALA:HA	1:C:424:LYS:HB2	1.95	0.49
1:C:743:CYS:HA	1:C:749:CYS:SG	2.53	0.49
1:C:296:LEU:HB2	1:C:608:VAL:HG11	1.94	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:130:VAL:HG23	1:A:166:CYS:N	2.28	0.48
1:B:52:GLN:HA	1:B:274:THR:HA	1.96	0.48
1:B:699:LEU:HD22	1:C:873:TYR:HE2	1.79	0.48
1:B:901:GLN:O	1:B:905:ARG:HG2	2.13	0.48
1:C:784:GLN:NE2	1:C:1030:SER:OG	2.46	0.48
1:C:431:GLY:HA3	1:C:513:LEU:O	2.12	0.48
1:A:730:SER:O	1:A:731:MET:HE2	2.14	0.48
1:B:103:GLY:HA3	1:B:119:ILE:O	2.13	0.48
1:C:1028:LYS:NZ	1:C:1042:PHE:O	2.38	0.48
1:C:563:GLN:O	1:C:577:ARG:NH2	2.44	0.48
1:C:576:VAL:HG13	1:C:587:ILE:HD11	1.96	0.48
1:B:54:LEU:HB2	1:B:195:LYS:HE3	1.95	0.48
1:B:973:ILE:HD11	1:B:980:ILE:HG12	1.95	0.48
1:A:1102:TRP:CD1	1:A:1135:ASN:HD21	2.32	0.47
1:A:867:ASP:OD1	1:A:868:GLU:N	2.47	0.47
1:A:382:VAL:HG12	1:B:983:ARG:HB3	1.97	0.47
1:C:731:MET:HG2	1:C:732:THR:H	1.79	0.47
1:C:929:SER:O	1:C:933:LYS:HG2	2.14	0.47
1:A:567:ARG:HB3	1:A:571:ASP:HA	1.97	0.47
1:C:353:TRP:CE2	1:C:466:ARG:HD3	2.50	0.47
1:A:857:GLY:HA2	1:C:592:PHE:HZ	1.79	0.47
1:A:981:LEU:O	1:C:386:LYS:NZ	2.40	0.47
1:A:1093:GLY:HA3	1:A:1105:THR:O	2.14	0.47
1:B:118:LEU:HD23	1:B:129:LYS:HE3	1.97	0.47
1:C:53:ASP:HB3	1:C:55:PHE:CE2	2.49	0.47
1:C:194:PHE:HB3	1:C:201:PHE:HE1	1.80	0.47
1:A:317:ASN:CG	1:A:593:GLY:H	2.23	0.46
1:A:989:ALA:O	1:A:993:ILE:HG12	2.15	0.46
1:B:187:LYS:O	1:B:209:PRO:HA	2.15	0.46
1:B:811:LYS:CB	1:B:812:PRO:HD2	2.41	0.46
1:A:731:MET:HE3	1:A:1018:ILE:HG13	1.97	0.46
1:A:858:LEU:H	1:A:858:LEU:HD23	1.81	0.46
1:C:560:LEU:HB2	1:C:563:GLN:HG3	1.96	0.46
1:C:117:LEU:HG	1:C:130:VAL:HG12	1.98	0.46
1:C:912:THR:OG1	1:C:1106:GLN:NE2	2.49	0.46
1:A:1002:GLN:O	1:A:1005:GLN:HG3	2.16	0.46
1:A:127:VAL:HG22	1:A:171:VAL:HG13	1.97	0.46
1:A:456:PHE:HB2	1:A:491:PRO:HB3	1.97	0.46
1:A:699:LEU:HD21	1:B:869:MET:HG3	1.97	0.46
1:B:927:PHE:CE2	1:B:931:ILE:HD11	2.51	0.46
1:C:866:THR:O	1:C:870:ILE:HG12	2.15	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1107:ARG:HD3	1:B:904:TYR:CE2	2.51	0.46
1:B:64:TRP:HE1	1:B:264:ALA:HB1	1.81	0.46
1:B:431:GLY:HA2	1:B:513:LEU:O	2.16	0.46
1:C:374:PHE:HA	1:C:436:TRP:HB3	1.98	0.46
1:B:318:PHE:CZ	1:B:620:VAL:HG22	2.51	0.45
1:A:941:THR:HG22	1:A:943:SER:H	1.81	0.45
1:C:354:ASN:O	1:C:398:ASP:HA	2.16	0.45
1:A:53:ASP:OD1	1:A:54:LEU:N	2.45	0.45
1:B:712:ILE:HG23	1:B:714:ILE:HD11	1.98	0.45
1:B:758:SER:O	1:B:762:GLN:HG3	2.16	0.45
1:A:303:LEU:HD12	1:A:308:VAL:HG22	1.97	0.45
1:A:367:VAL:HA	1:A:370:ASN:ND2	2.32	0.45
1:A:418:ILE:HG23	1:A:422:ASN:HB3	1.98	0.45
1:C:951:VAL:HA	1:C:954:GLN:CD	2.41	0.45
1:C:1140:PRO:O	1:C:1143:PRO:HD2	2.17	0.45
1:A:34:ARG:NH2	1:A:217:PRO:O	2.34	0.45
1:A:493:GLN:NE2	1:A:494:SER:O	2.49	0.45
1:A:645:THR:OG1	1:A:648:GLY:N	2.49	0.45
1:C:733:LYS:NZ	1:C:862:PRO:O	2.32	0.45
1:B:977:LEU:O	1:B:981:LEU:HG	2.17	0.45
1:B:280:ASN:ND2	1:B:282:ASN:HB2	2.32	0.45
1:B:811:LYS:HB2	1:B:812:PRO:CD	2.40	0.45
1:C:426:PRO:HB2	1:C:428:ASP:OD1	2.16	0.45
1:A:401:VAL:HB	1:A:451:TYR:CE1	2.52	0.45
1:C:95:THR:HB	1:C:186:PHE:HB2	1.99	0.45
1:C:194:PHE:HB3	1:C:201:PHE:CE1	2.52	0.45
1:A:660:TYR:HB2	1:A:695:TYR:CZ	2.52	0.45
1:B:1097:SER:HB2	1:B:1102:TRP:CE3	2.52	0.45
1:A:914:ASN:OD1	1:A:915:VAL:N	2.51	0.44
1:C:30:ASN:HD21	1:C:59:PHE:HD1	1.65	0.44
1:C:816:SER:OG	1:C:1054:GLN:OE1	2.23	0.44
1:C:431:GLY:HA2	1:C:515:PHE:CZ	2.53	0.44
1:C:976:VAL:O	1:C:980:ILE:HG13	2.17	0.44
1:A:796:ASP:O	1:A:798:GLY:N	2.50	0.44
1:B:569:ILE:HD12	1:C:47:VAL:HG21	1.98	0.44
1:C:328:ARG:HG3	1:C:543:PHE:CZ	2.52	0.44
1:A:328:ARG:NH2	1:A:531:THR:O	2.43	0.44
1:B:290:ASP:HB3	1:B:293:LEU:HB2	2.00	0.44
1:A:194:PHE:HB3	1:A:201:PHE:CE1	2.52	0.44
1:A:278:LYS:HD2	1:A:306:PHE:CZ	2.52	0.44
1:A:676:THR:OG1	1:A:690:GLN:OE1	2.26	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:971:GLY:HA3	1:C:995:ARG:NH1	2.33	0.44
1:A:53:ASP:HB3	1:A:55:PHE:CE2	2.52	0.44
1:A:568:ASP:C	1:A:571:ASP:H	2.26	0.44
1:A:871:ALA:O	1:A:874:THR:OG1	2.33	0.44
1:A:821:LEU:O	1:A:825:LYS:HG2	2.18	0.43
1:B:92:PHE:CZ	1:B:94:SER:HB3	2.53	0.43
1:C:1111:GLU:OE1	1:C:1113:GLN:NE2	2.48	0.43
1:A:777:ASN:HA	1:A:780:GLU:CD	2.43	0.43
1:B:92:PHE:CE1	1:B:265:TYR:HB2	2.53	0.43
1:C:404:GLY:HA2	1:C:407:VAL:HG23	2.01	0.43
1:C:889:GLY:HA3	1:C:1034:LEU:HD23	1.99	0.43
1:A:189:LEU:HB2	1:A:210:ILE:HD13	2.00	0.43
1:A:1100:THR:HG21	3:A:1303:NAG:N2	2.33	0.43
1:A:736:VAL:HG22	1:A:858:LEU:HA	2.00	0.43
1:A:900:MET:HE1	1:C:1079:PRO:HB3	1.99	0.43
1:B:913:GLN:H	1:B:913:GLN:CD	2.27	0.43
1:C:1081:ILE:C	1:C:1132:ILE:HD11	2.43	0.43
1:B:1097:SER:HB2	1:B:1102:TRP:CD2	2.53	0.43
1:A:666:ILE:HD11	1:A:672:ALA:HB2	2.01	0.43
1:C:102:ARG:N	1:C:241:LEU:O	2.48	0.43
1:C:130:VAL:HG23	1:C:167:THR:OG1	2.19	0.43
1:B:699:LEU:HD11	1:C:869:MET:HB2	2.00	0.43
1:B:743:CYS:HA	1:B:749:CYS:SG	2.59	0.43
1:A:1097:SER:HB2	1:A:1102:TRP:CE3	2.54	0.43
1:B:1135:ASN:OD1	1:B:1136:THR:N	2.44	0.43
1:C:386:LYS:O	1:C:390:LEU:HG	2.19	0.43
1:C:392:PHE:O	1:C:523:THR:HB	2.19	0.43
1:A:355:ARG:NH2	1:A:357:ARG:HB2	2.34	0.42
1:A:366:SER:N	1:A:388:ASN:HD21	2.16	0.42
1:C:817:PHE:CE2	1:C:821:LEU:HD11	2.54	0.42
1:A:200:TYR:OH	1:C:355:ARG:NH2	2.52	0.42
1:A:334:ASN:O	1:A:362:VAL:N	2.42	0.42
1:A:740:MET:HE3	1:C:592:PHE:CZ	2.54	0.42
1:B:105:ILE:HD11	1:B:241:LEU:HD21	2.01	0.42
1:B:820:ASP:HA	1:B:823:PHE:HD2	1.84	0.42
1:B:1028:LYS:HB3	1:B:1062:PHE:HE2	1.85	0.42
1:A:206:LYS:HB2	1:A:223:LEU:HG	2.00	0.42
1:A:563:GLN:O	1:A:577:ARG:NH1	2.52	0.42
1:A:1089:PHE:HB3	1:B:913:GLN:HE21	1.84	0.42
1:B:805:ILE:HG22	1:B:818:ILE:HD12	2.01	0.42
1:C:57:PRO:HB3	1:C:273:ARG:CZ	2.50	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:502:GLY:O	1:C:506:GLN:N	2.52	0.42
1:B:1080:ALA:C	1:B:1132:ILE:HG13	2.44	0.42
1:C:310:LYS:HE3	1:C:664:ILE:HD11	2.02	0.42
1:A:65:PHE:O	1:A:264:ALA:HA	2.20	0.42
1:A:201:PHE:O	1:A:228:ASP:HA	2.19	0.42
1:A:301:CYS:O	1:A:304:LYS:NZ	2.36	0.42
1:B:127:VAL:HG13	1:B:171:VAL:HG22	2.02	0.42
1:B:357:ARG:HA	1:B:396:TYR:HA	2.02	0.42
1:C:342:PHE:CE1	1:C:511:VAL:HG21	2.55	0.42
1:C:523:THR:HG22	1:C:524:VAL:HG23	2.02	0.42
1:A:805:ILE:HD12	1:A:878:LEU:HD21	2.00	0.42
1:A:47:VAL:HG21	1:C:569:ILE:HD13	2.02	0.42
1:A:391:CYS:SG	1:A:392:PHE:N	2.93	0.42
1:A:866:THR:O	1:A:870:ILE:HG12	2.20	0.42
1:B:771:ALA:O	1:B:774:GLN:HB2	2.20	0.42
1:C:654:GLU:OE1	1:C:655:HIS:N	2.49	0.42
1:C:740:MET:SD	1:C:857:GLY:HA3	2.59	0.42
1:C:950:ASP:CG	1:C:954:GLN:HE21	2.28	0.42
1:B:31:SER:HB2	1:B:56:LEU:HD21	2.01	0.42
1:C:644:GLN:NE2	1:C:648:GLY:O	2.52	0.42
1:C:927:PHE:O	1:C:931:ILE:HG12	2.19	0.42
1:C:365:TYR:CD2	1:C:387:LEU:HB3	2.55	0.41
1:B:821:LEU:O	1:B:825:LYS:HG2	2.20	0.41
1:B:1110:TYR:CZ	1:B:1112:PRO:HD3	2.56	0.41
1:C:898:PHE:CE1	1:C:902:MET:HE3	2.55	0.41
1:C:1080:ALA:O	1:C:1132:ILE:HG13	2.21	0.41
1:A:779:GLN:OE1	1:A:783:ALA:HB2	2.21	0.41
1:B:1010:GLN:HE22	1:B:1014:ARG:NH2	2.18	0.41
1:A:108:THR:HG22	1:A:234:ASN:O	2.21	0.41
1:A:328:ARG:HH21	1:A:531:THR:C	2.28	0.41
1:A:421:TYR:CE1	1:A:457:ARG:HB3	2.56	0.41
1:A:1140:PRO:C	1:A:1143:PRO:HD2	2.44	0.41
1:B:916:LEU:HD12	1:B:923:ILE:HD13	2.03	0.41
1:C:750:SER:O	1:C:754:LEU:HG	2.20	0.41
1:A:34:ARG:NE	1:A:216:LEU:HD13	2.32	0.41
1:B:1131:GLY:HA2	3:B:1301:NAG:H81	2.01	0.41
1:B:43:PHE:CE2	1:B:283:GLY:HA3	2.56	0.41
1:C:335:LEU:C	1:C:361:CYS:HB2	2.46	0.41
1:A:36:VAL:O	1:A:222:ALA:HA	2.20	0.41
1:A:120:VAL:HG22	1:A:121:ASN:N	2.35	0.41
1:B:336:CYS:HA	1:B:361:CYS:HB2	2.02	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:699:LEU:HD22	1:C:873:TYR:CE2	2.54	0.41
1:C:27:ALA:HB3	1:C:64:TRP:HE3	1.86	0.41
1:C:200:TYR:CD2	1:C:230:PRO:HB3	2.56	0.41
1:C:393:THR:HG21	1:C:520:ALA:HB3	2.02	0.41
1:A:280:ASN:HB3	1:A:286:THR:HG23	2.03	0.41
1:A:336:CYS:HB3	1:A:338:PHE:CZ	2.56	0.41
1:A:401:VAL:HG22	1:A:509:ARG:HG2	2.03	0.41
1:A:37:TYR:HB3	1:A:223:LEU:HB2	2.02	0.40
1:B:118:LEU:HD11	1:B:241:LEU:HD11	2.02	0.40
1:B:738:CYS:HA	1:B:741:TYR:HB3	2.04	0.40
1:C:722:VAL:HA	1:C:1064:HIS:O	2.21	0.40
1:A:112:SER:HA	1:A:134:GLN:HB2	2.03	0.40
1:A:805:ILE:HG22	1:A:818:ILE:HD12	2.03	0.40
1:C:729:VAL:HG23	1:C:1059:GLY:HA2	2.03	0.40
1:C:1028:LYS:HG2	1:C:1042:PHE:CZ	2.57	0.40
1:C:1043:CYS:O	1:C:1064:HIS:ND1	2.54	0.40
1:B:619:GLU:N	1:B:619:GLU:OE1	2.54	0.40
1:C:131:CYS:HB3	1:C:166:CYS:HA	2.03	0.40
1:A:605:SER:OG	1:A:606:ASN:N	2.54	0.40
1:A:194:PHE:HD2	1:A:201:PHE:HZ	1.68	0.40
1:B:206:LYS:CB	1:B:223:LEU:HG	2.51	0.40
1:C:581:THR:HG22	1:C:583:GLU:H	1.87	0.40
1:C:1077:THR:OG1	1:C:1078:ALA:N	2.55	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	946/1204 (79%)	897 (95%)	47 (5%)	2 (0%)	43 77
1	B	924/1204 (77%)	867 (94%)	56 (6%)	1 (0%)	48 83

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	939/1204 (78%)	897 (96%)	42 (4%)	0	100	100
All	All	2809/3612 (78%)	2661 (95%)	145 (5%)	3 (0%)	49	83

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	503	VAL
1	B	811	LYS
1	A	123	ALA

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	802/1049 (76%)	801 (100%)	1 (0%)	88	88
1	B	683/1049 (65%)	683 (100%)	0	100	100
1	C	776/1049 (74%)	776 (100%)	0	100	100
All	All	2261/3147 (72%)	2260 (100%)	1 (0%)	100	100

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	501	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	121	ASN
1	A	125	ASN
1	A	354	ASN
1	A	641	ASN
1	A	872	GLN
1	A	1064	HIS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	536	ASN
1	B	606	ASN
1	B	675	GLN
1	B	856	ASN
1	B	935	GLN
1	B	1119	ASN
1	C	188	ASN
1	C	196	ASN
1	C	544	ASN
1	C	564	GLN
1	C	644	GLN
1	C	709	ASN
1	C	777	ASN
1	C	824	ASN
1	C	872	GLN
1	C	954	GLN
1	C	1083	HIS

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 ⓘ

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	$\# Z > 2$
2	NAG	D	1	2	14,14,15	1.96	5 (35%)	17,19,21	1.40	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	D	2	2	14,14,15	1.97	3 (21%)	17,19,21	1.15	2 (11%)
2	NAG	E	1	2	14,14,15	1.94	3 (21%)	17,19,21	1.79	5 (29%)
2	NAG	E	2	2	14,14,15	2.04	4 (28%)	17,19,21	1.25	3 (17%)
2	NAG	F	1	1,2	14,14,15	1.93	3 (21%)	17,19,21	1.45	3 (17%)
2	NAG	F	2	2	14,14,15	1.99	3 (21%)	17,19,21	1.18	2 (11%)
2	NAG	G	1	1,2	14,14,15	1.97	3 (21%)	17,19,21	1.41	3 (17%)
2	NAG	G	2	2	14,14,15	2.11	4 (28%)	17,19,21	1.08	1 (5%)
2	NAG	H	1	1,2	14,14,15	1.95	3 (21%)	17,19,21	1.09	2 (11%)
2	NAG	H	2	2	14,14,15	2.02	3 (21%)	17,19,21	1.17	2 (11%)

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
2	NAG	D	1	2	-	2/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	2	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	H	2	2	-	0/6/23/26	0/1/1/1

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	2	NAG	O5-C1	5.35	1.52	1.43
2	E	2	NAG	O5-C1	5.10	1.52	1.43
2	F	2	NAG	O5-C1	5.08	1.52	1.43
2	H	2	NAG	O5-C1	5.01	1.52	1.43
2	G	1	NAG	O5-C1	4.98	1.52	1.43
2	H	1	NAG	O5-C1	4.89	1.51	1.43
2	D	2	NAG	O5-C1	4.81	1.51	1.43
2	F	1	NAG	O5-C1	4.77	1.51	1.43

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	1	NAG	O5-C1	4.68	1.51	1.43
2	D	1	NAG	O5-C1	4.68	1.51	1.43
2	E	1	NAG	C7-N2	3.47	1.45	1.34
2	G	2	NAG	C7-N2	3.41	1.45	1.34
2	H	2	NAG	C7-N2	3.38	1.45	1.34
2	D	2	NAG	C7-N2	3.38	1.45	1.34
2	E	2	NAG	C7-N2	3.34	1.45	1.34
2	F	2	NAG	C7-N2	3.32	1.45	1.34
2	F	1	NAG	C7-N2	3.30	1.45	1.34
2	G	1	NAG	C7-N2	3.30	1.45	1.34
2	H	1	NAG	C7-N2	3.25	1.44	1.34
2	D	1	NAG	C7-N2	3.23	1.44	1.34
2	E	1	NAG	C2-N2	3.16	1.51	1.46
2	G	2	NAG	C2-N2	2.97	1.51	1.46
2	E	2	NAG	C2-N2	2.94	1.51	1.46
2	H	2	NAG	C2-N2	2.92	1.51	1.46
2	D	2	NAG	C2-N2	2.85	1.51	1.46
2	F	2	NAG	C2-N2	2.82	1.50	1.46
2	H	1	NAG	C2-N2	2.77	1.50	1.46
2	F	1	NAG	C2-N2	2.71	1.50	1.46
2	G	1	NAG	C2-N2	2.70	1.50	1.46
2	D	1	NAG	C2-N2	2.67	1.50	1.46
2	G	2	NAG	O5-C5	2.30	1.47	1.43
2	D	1	NAG	C3-C2	-2.08	1.48	1.52
2	E	2	NAG	O5-C5	2.06	1.47	1.43
2	D	1	NAG	O5-C5	2.05	1.47	1.43

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	NAG	C4-C3-C2	4.37	117.42	111.02
2	F	1	NAG	C2-N2-C7	-3.58	118.10	122.90
2	D	1	NAG	C2-N2-C7	-3.40	118.34	122.90
2	G	1	NAG	C2-N2-C7	-3.06	118.80	122.90
2	E	2	NAG	C2-N2-C7	-2.91	119.00	122.90
2	H	2	NAG	C2-N2-C7	-2.84	119.10	122.90
2	D	2	NAG	C2-N2-C7	-2.59	119.44	122.90
2	H	1	NAG	C2-N2-C7	-2.57	119.46	122.90
2	D	1	NAG	C8-C7-N2	2.48	120.24	116.12
2	D	2	NAG	C8-C7-N2	2.47	120.22	116.12
2	H	2	NAG	C8-C7-N2	2.46	120.19	116.12
2	E	1	NAG	C8-C7-N2	2.45	120.18	116.12

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	NAG	C2-N2-C7	-2.45	119.62	122.90
2	G	1	NAG	C8-C7-N2	2.44	120.17	116.12
2	E	2	NAG	C8-C7-N2	2.41	120.11	116.12
2	G	1	NAG	C4-C3-C2	2.35	114.46	111.02
2	F	1	NAG	C8-C7-N2	2.30	119.94	116.12
2	E	1	NAG	C6-C5-C4	-2.29	107.39	113.02
2	H	1	NAG	C8-C7-N2	2.27	119.89	116.12
2	F	2	NAG	C8-C7-N2	2.23	119.82	116.12
2	G	2	NAG	C8-C7-N2	2.23	119.81	116.12
2	F	1	NAG	C4-C3-C2	2.20	114.25	111.02
2	F	2	NAG	C2-N2-C7	-2.13	120.04	122.90
2	E	1	NAG	C3-C4-C5	2.10	114.04	110.23
2	E	2	NAG	C6-C5-C4	-2.05	107.99	113.02

There are no chirality outliers.

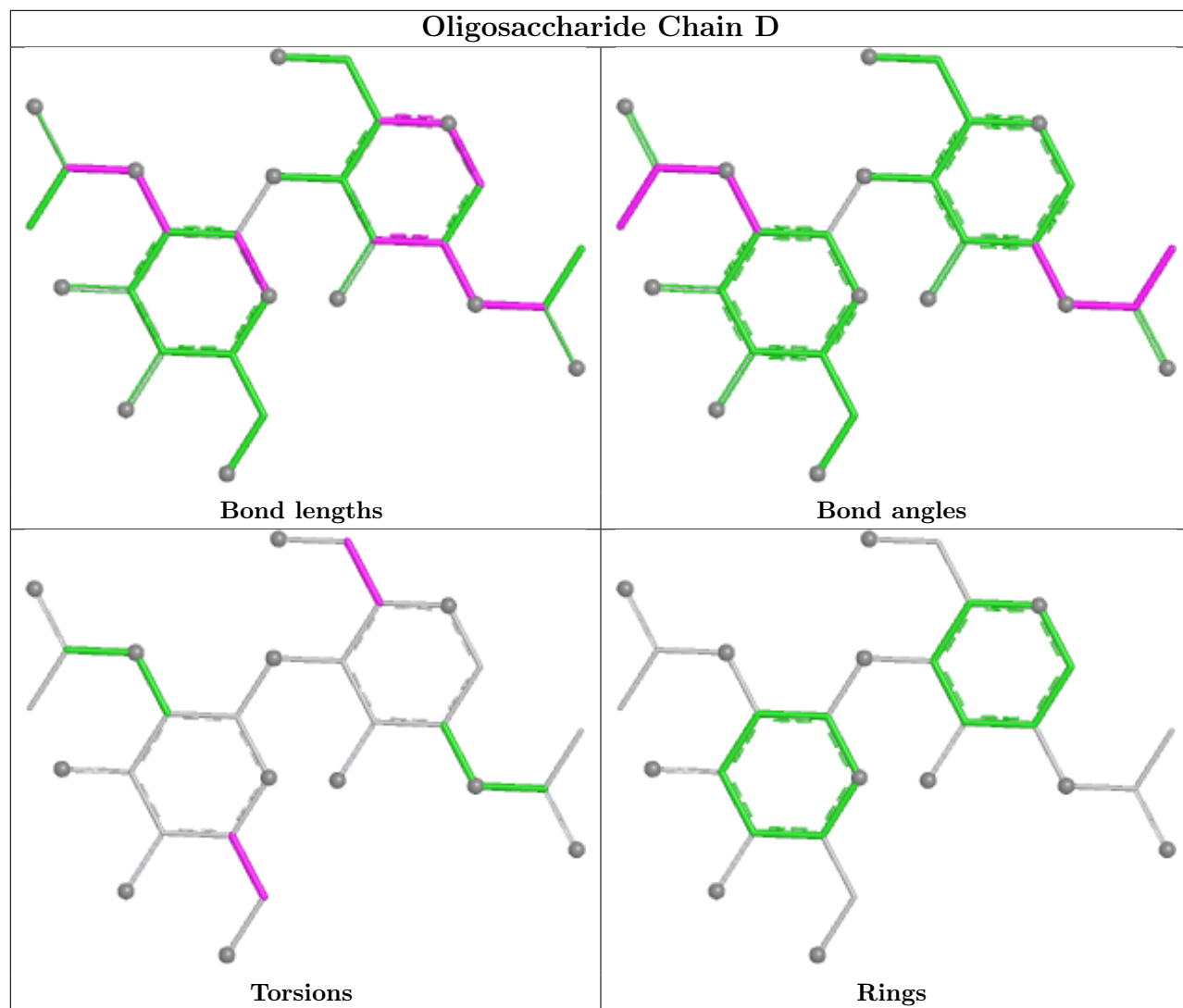
All (16) torsion outliers are listed below:

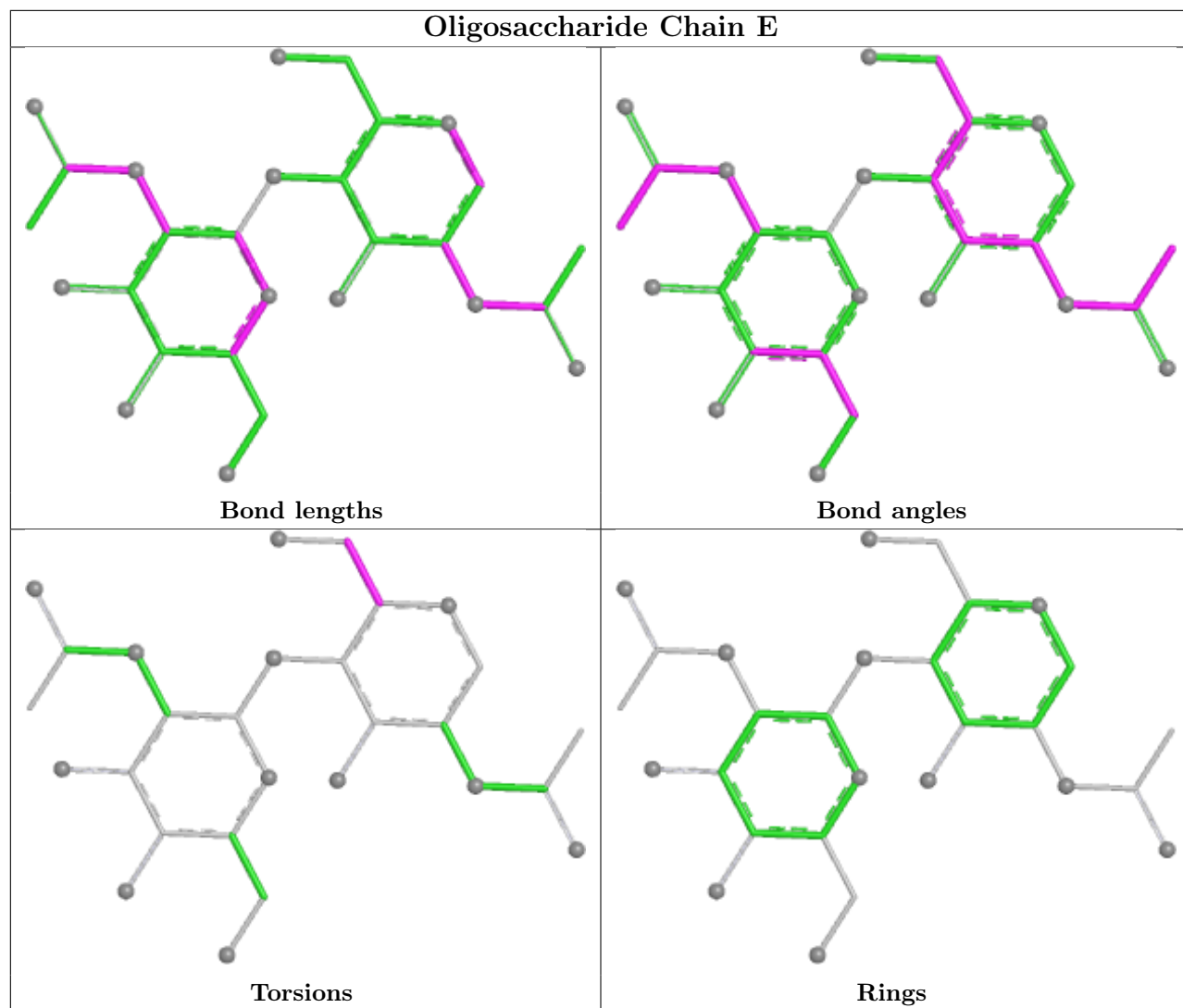
Mol	Chain	Res	Type	Atoms
2	G	2	NAG	C4-C5-C6-O6
2	D	1	NAG	C4-C5-C6-O6
2	D	1	NAG	O5-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	G	2	NAG	O5-C5-C6-O6
2	F	1	NAG	C4-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	F	2	NAG	O5-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6
2	E	1	NAG	O5-C5-C6-O6
2	F	1	NAG	O5-C5-C6-O6
2	H	1	NAG	C4-C5-C6-O6
2	F	2	NAG	C4-C5-C6-O6
2	H	1	NAG	O5-C5-C6-O6
2	G	1	NAG	C4-C5-C6-O6
2	G	1	NAG	O5-C5-C6-O6

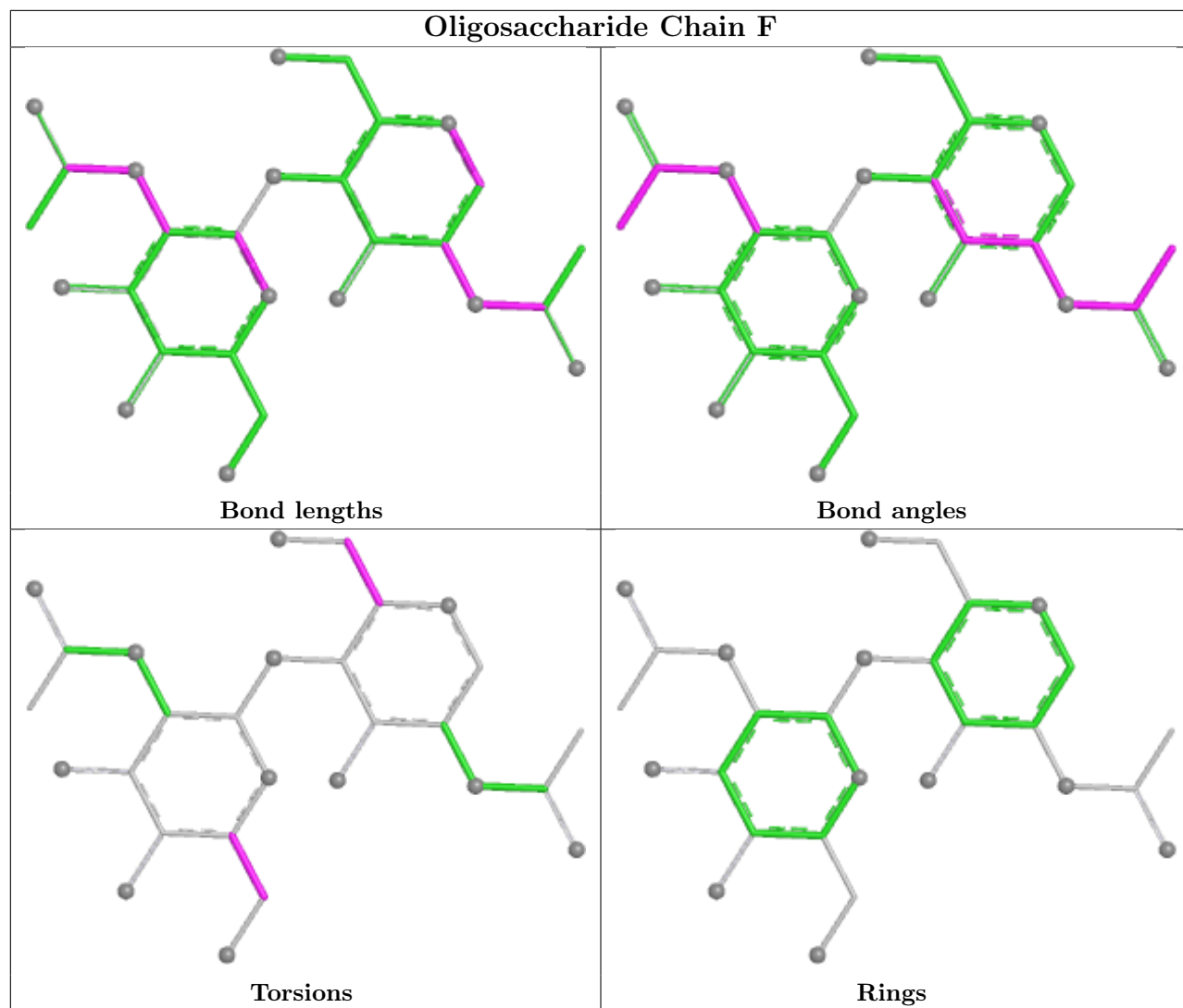
There are no ring outliers.

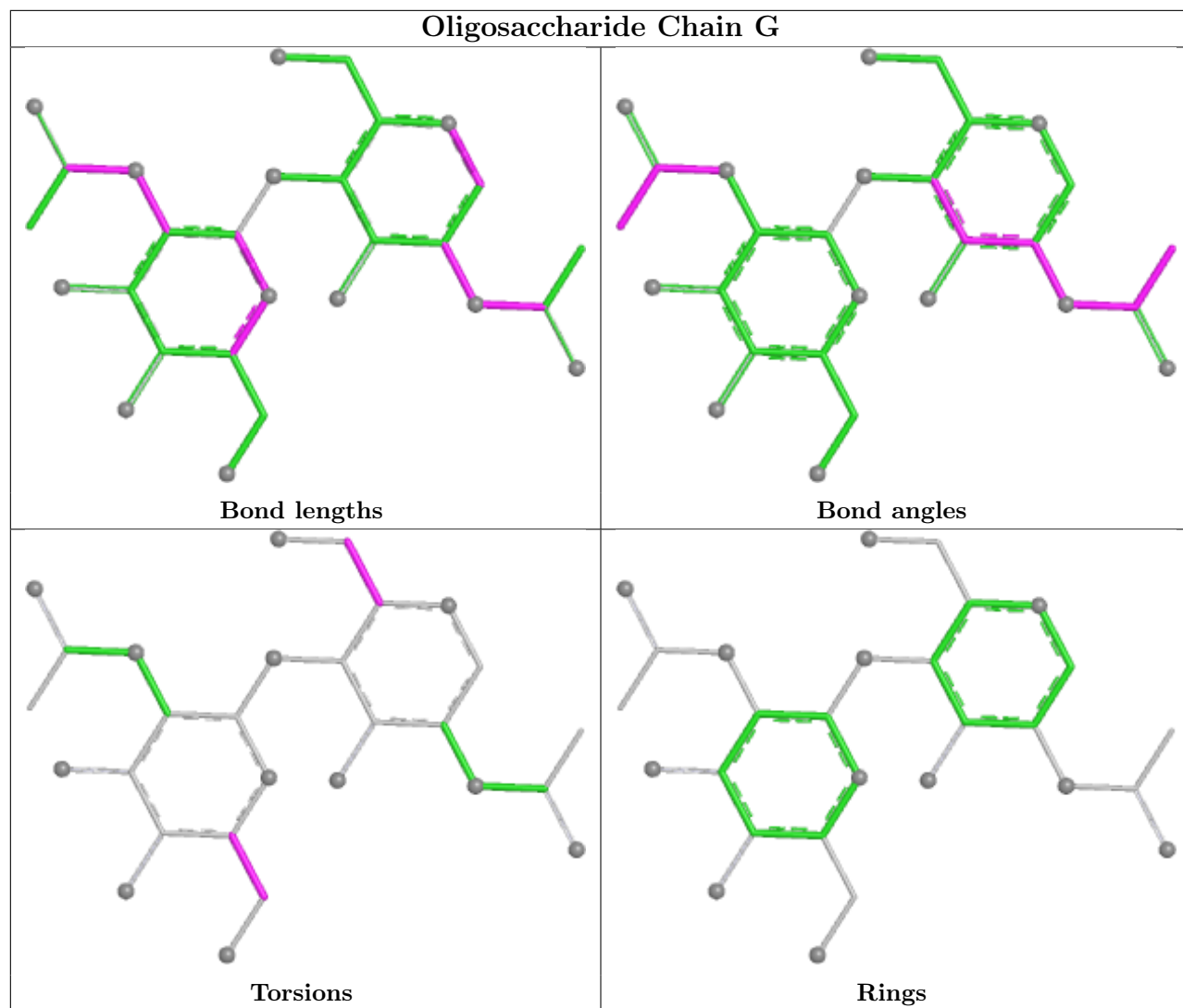
No monomer is involved in short contacts.

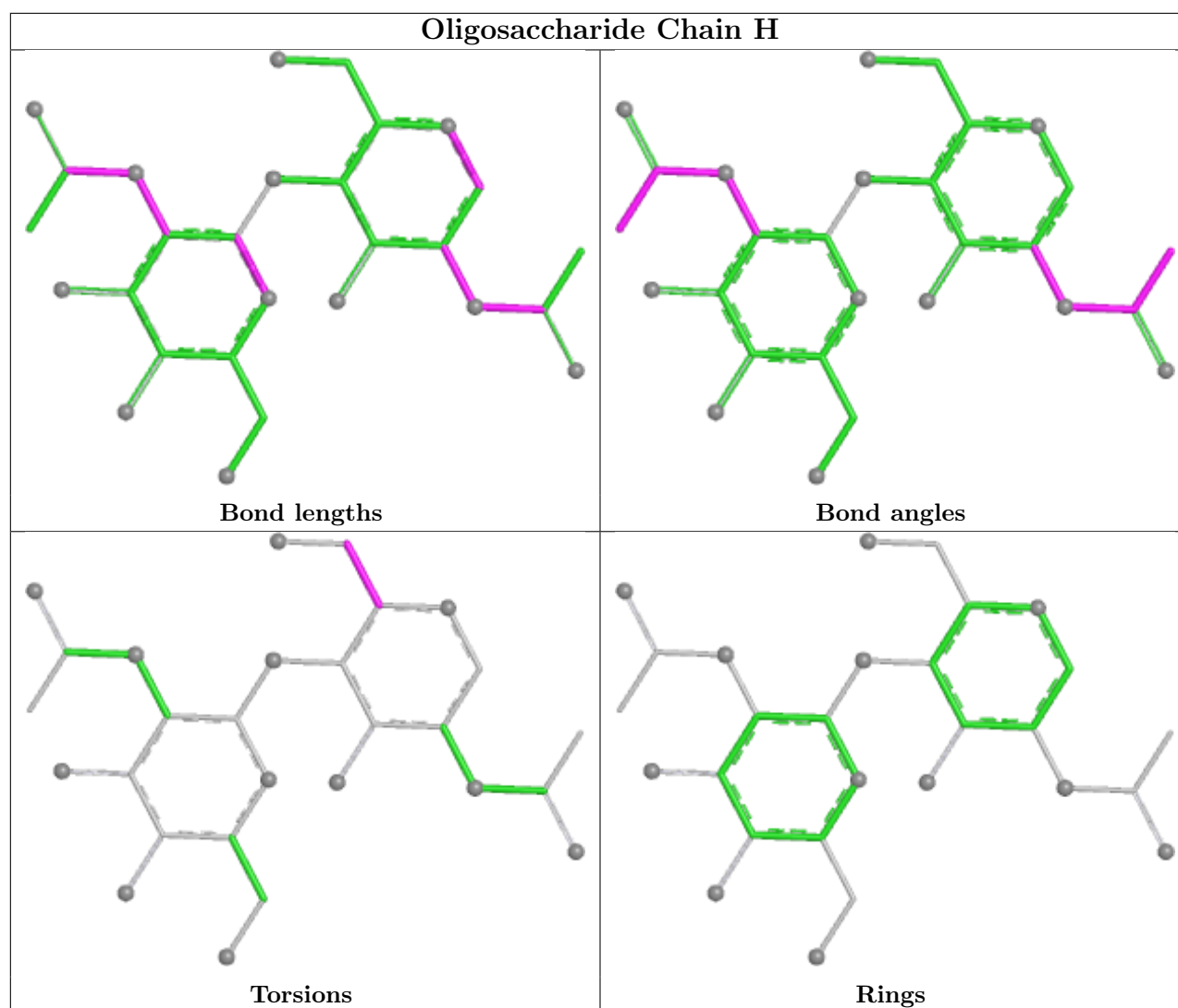
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

15 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	$\# Z > 2$
3	NAG	B	1303	-	14,14,15	1.98	3 (21%)	17,19,21	1.13	2 (11%)
3	NAG	A	1304	-	14,14,15	1.94	3 (21%)	17,19,21	1.21	2 (11%)
3	NAG	C	1304	-	14,14,15	1.98	3 (21%)	17,19,21	1.07	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	C	1305	-	14,14,15	2.07	4 (28%)	17,19,21	1.16	1 (5%)
3	NAG	B	1301	1	14,14,15	2.02	3 (21%)	17,19,21	0.98	1 (5%)
3	NAG	C	1303	1	14,14,15	1.94	3 (21%)	17,19,21	1.40	4 (23%)
3	NAG	A	1305	1	14,14,15	1.99	3 (21%)	17,19,21	1.20	1 (5%)
3	NAG	B	1302	1	14,14,15	2.13	4 (28%)	17,19,21	1.48	4 (23%)
3	NAG	A	1303	-	14,14,15	2.01	5 (35%)	17,19,21	1.26	2 (11%)
3	NAG	B	1304	-	14,14,15	2.00	3 (21%)	17,19,21	1.20	2 (11%)
3	NAG	C	1302	1	14,14,15	2.04	4 (28%)	17,19,21	1.58	4 (23%)
3	NAG	A	1306	-	14,14,15	2.01	3 (21%)	17,19,21	1.06	1 (5%)
3	NAG	C	1301	-	14,14,15	1.96	4 (28%)	17,19,21	1.69	4 (23%)
3	NAG	A	1302	1	14,14,15	2.08	3 (21%)	17,19,21	1.37	4 (23%)
3	NAG	A	1301	-	14,14,15	2.01	4 (28%)	17,19,21	1.38	2 (11%)

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	B	1303	-	-	2/6/23/26	0/1/1/1
3	NAG	A	1304	-	-	2/6/23/26	0/1/1/1
3	NAG	C	1304	-	-	2/6/23/26	0/1/1/1
3	NAG	C	1305	-	-	2/6/23/26	0/1/1/1
3	NAG	B	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1303	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1305	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1303	-	-	0/6/23/26	0/1/1/1
3	NAG	B	1304	-	-	0/6/23/26	0/1/1/1
3	NAG	C	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1306	-	-	0/6/23/26	0/1/1/1
3	NAG	C	1301	-	-	0/6/23/26	0/1/1/1
3	NAG	A	1302	1	-	3/6/23/26	0/1/1/1
3	NAG	A	1301	-	-	2/6/23/26	0/1/1/1

All (52) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1302	NAG	O5-C1	5.42	1.52	1.43
3	A	1302	NAG	O5-C1	5.25	1.52	1.43
3	C	1302	NAG	O5-C1	5.13	1.52	1.43
3	B	1301	NAG	O5-C1	5.00	1.52	1.43
3	C	1305	NAG	O5-C1	5.00	1.52	1.43
3	A	1303	NAG	O5-C1	4.97	1.52	1.43
3	A	1306	NAG	O5-C1	4.96	1.52	1.43
3	A	1301	NAG	O5-C1	4.94	1.52	1.43
3	A	1305	NAG	O5-C1	4.91	1.51	1.43
3	B	1304	NAG	O5-C1	4.90	1.51	1.43
3	C	1304	NAG	O5-C1	4.82	1.51	1.43
3	B	1303	NAG	O5-C1	4.82	1.51	1.43
3	A	1304	NAG	O5-C1	4.79	1.51	1.43
3	C	1303	NAG	O5-C1	4.77	1.51	1.43
3	C	1301	NAG	O5-C1	4.53	1.51	1.43
3	C	1305	NAG	C7-N2	3.56	1.45	1.34
3	A	1302	NAG	C7-N2	3.53	1.45	1.34
3	B	1301	NAG	C7-N2	3.44	1.45	1.34
3	C	1304	NAG	C7-N2	3.43	1.45	1.34
3	A	1306	NAG	C7-N2	3.43	1.45	1.34
3	B	1302	NAG	C7-N2	3.41	1.45	1.34
3	A	1305	NAG	C7-N2	3.40	1.45	1.34
3	C	1303	NAG	C7-N2	3.40	1.45	1.34
3	B	1303	NAG	C7-N2	3.39	1.45	1.34
3	B	1304	NAG	C7-N2	3.37	1.45	1.34
3	A	1301	NAG	C7-N2	3.33	1.45	1.34
3	A	1303	NAG	C7-N2	3.32	1.45	1.34
3	C	1301	NAG	C7-N2	3.26	1.44	1.34
3	C	1302	NAG	C7-N2	3.25	1.44	1.34
3	A	1302	NAG	C2-N2	3.25	1.51	1.46
3	A	1304	NAG	C7-N2	3.23	1.44	1.34
3	C	1305	NAG	C2-N2	3.19	1.51	1.46
3	B	1302	NAG	C2-N2	3.01	1.51	1.46
3	A	1306	NAG	C2-N2	2.98	1.51	1.46
3	A	1305	NAG	C2-N2	2.95	1.51	1.46
3	B	1301	NAG	C2-N2	2.93	1.51	1.46
3	C	1304	NAG	C2-N2	2.92	1.51	1.46
3	B	1303	NAG	C2-N2	2.85	1.51	1.46
3	B	1304	NAG	C2-N2	2.82	1.50	1.46
3	C	1303	NAG	C2-N2	2.80	1.50	1.46
3	C	1301	NAG	C2-N2	2.70	1.50	1.46
3	A	1301	NAG	C2-N2	2.69	1.50	1.46
3	A	1304	NAG	C2-N2	2.69	1.50	1.46

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1303	NAG	C2-N2	2.66	1.50	1.46
3	C	1302	NAG	C2-N2	2.58	1.50	1.46
3	C	1301	NAG	C3-C2	-2.34	1.47	1.52
3	A	1301	NAG	O5-C5	2.21	1.47	1.43
3	B	1302	NAG	O5-C5	2.20	1.47	1.43
3	C	1302	NAG	C3-C2	-2.20	1.47	1.52
3	A	1303	NAG	O5-C5	2.13	1.47	1.43
3	C	1305	NAG	O5-C5	2.12	1.47	1.43
3	A	1303	NAG	C3-C2	-2.01	1.48	1.52

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1302	NAG	C1-O5-C5	3.88	117.38	112.19
3	A	1301	NAG	C2-N2-C7	-3.51	118.20	122.90
3	C	1301	NAG	C2-N2-C7	-3.48	118.24	122.90
3	C	1302	NAG	C1-O5-C5	3.39	116.73	112.19
3	C	1302	NAG	C2-N2-C7	-3.36	118.40	122.90
3	A	1303	NAG	C2-N2-C7	-3.13	118.71	122.90
3	C	1301	NAG	C3-C4-C5	2.81	115.32	110.23
3	A	1301	NAG	C8-C7-N2	2.74	120.66	116.12
3	A	1302	NAG	C1-O5-C5	2.69	115.79	112.19
3	C	1301	NAG	C8-C7-N2	2.67	120.55	116.12
3	C	1301	NAG	C6-C5-C4	-2.64	106.55	113.02
3	B	1304	NAG	C2-N2-C7	-2.63	119.38	122.90
3	B	1302	NAG	C1-C2-N2	-2.52	106.45	110.43
3	C	1305	NAG	C8-C7-N2	2.52	120.29	116.12
3	A	1303	NAG	C8-C7-N2	2.50	120.26	116.12
3	B	1303	NAG	C2-N2-C7	-2.47	119.59	122.90
3	B	1304	NAG	C8-C7-N2	2.45	120.18	116.12
3	B	1303	NAG	C8-C7-N2	2.40	120.10	116.12
3	C	1302	NAG	C8-C7-N2	2.39	120.08	116.12
3	A	1306	NAG	C8-C7-N2	2.36	120.04	116.12
3	A	1304	NAG	C8-C7-N2	2.35	120.02	116.12
3	C	1303	NAG	C3-C4-C5	2.35	114.50	110.23
3	A	1302	NAG	O5-C1-C2	2.33	114.89	111.29
3	A	1305	NAG	C8-C7-N2	2.33	119.98	116.12
3	C	1304	NAG	C8-C7-N2	2.30	119.93	116.12
3	A	1302	NAG	C8-C7-N2	2.25	119.85	116.12
3	B	1301	NAG	C8-C7-N2	2.19	119.74	116.12
3	A	1304	NAG	C2-N2-C7	-2.16	120.00	122.90
3	A	1302	NAG	C1-C2-N2	-2.15	107.05	110.43

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1303	NAG	C8-C7-N2	2.14	119.67	116.12
3	C	1303	NAG	C6-C5-C4	-2.12	107.83	113.02
3	C	1303	NAG	C4-C3-C2	2.10	114.09	111.02
3	B	1302	NAG	C8-C7-N2	2.07	119.54	116.12
3	B	1302	NAG	O5-C1-C2	2.03	114.44	111.29
3	C	1302	NAG	C6-C5-C4	-2.01	108.08	113.02

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1304	NAG	O5-C5-C6-O6
3	B	1302	NAG	O5-C5-C6-O6
3	A	1301	NAG	C4-C5-C6-O6
3	B	1302	NAG	C4-C5-C6-O6
3	A	1301	NAG	O5-C5-C6-O6
3	C	1302	NAG	O5-C5-C6-O6
3	A	1304	NAG	C4-C5-C6-O6
3	C	1304	NAG	O5-C5-C6-O6
3	C	1304	NAG	C4-C5-C6-O6
3	C	1303	NAG	O5-C5-C6-O6
3	C	1302	NAG	C4-C5-C6-O6
3	C	1303	NAG	C4-C5-C6-O6
3	C	1305	NAG	O5-C5-C6-O6
3	C	1305	NAG	C4-C5-C6-O6
3	B	1303	NAG	C4-C5-C6-O6
3	B	1303	NAG	O5-C5-C6-O6
3	A	1305	NAG	C4-C5-C6-O6
3	A	1302	NAG	O5-C5-C6-O6
3	A	1302	NAG	C4-C5-C6-O6
3	A	1305	NAG	O5-C5-C6-O6
3	B	1301	NAG	C4-C5-C6-O6
3	B	1301	NAG	O5-C5-C6-O6
3	A	1302	NAG	C3-C2-N2-C7

There are no ring outliers.

6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1304	NAG	1	0
3	B	1301	NAG	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1303	NAG	1	0
3	C	1302	NAG	1	0
3	C	1301	NAG	2	0
3	A	1301	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.

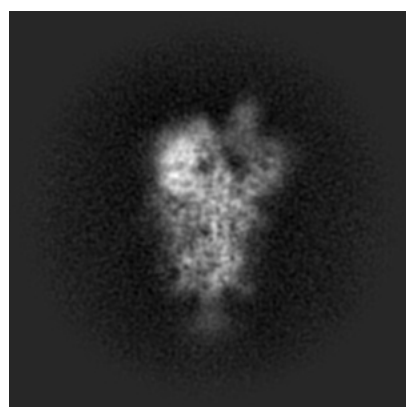
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-32493. These allow visual inspection of the internal detail of the map and identification of artifacts.

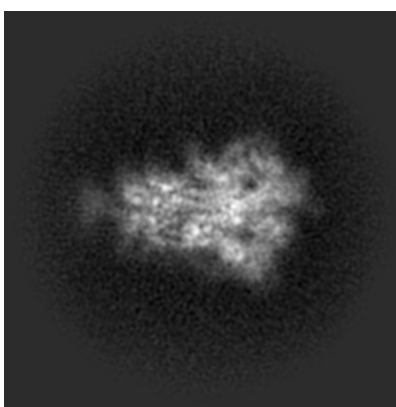
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

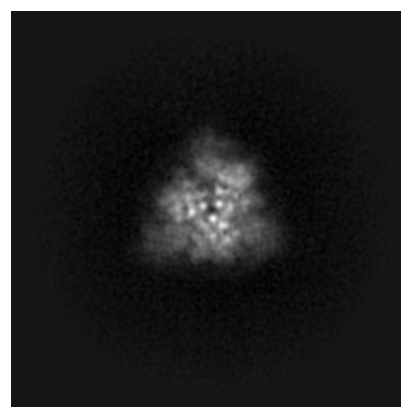
6.1.1 Primary map



X



Y

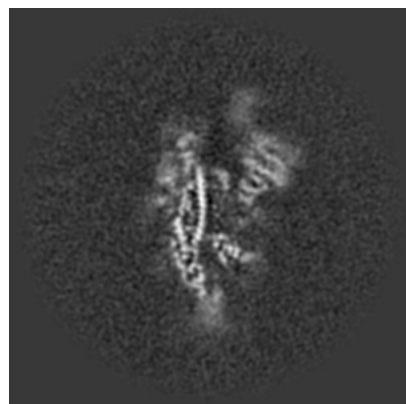


Z

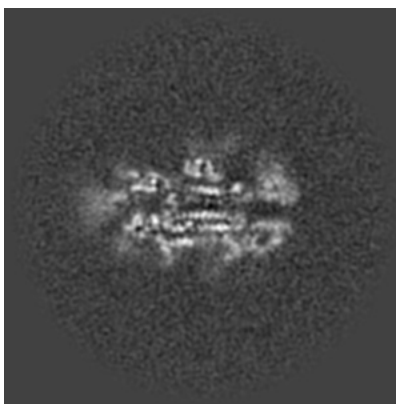
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

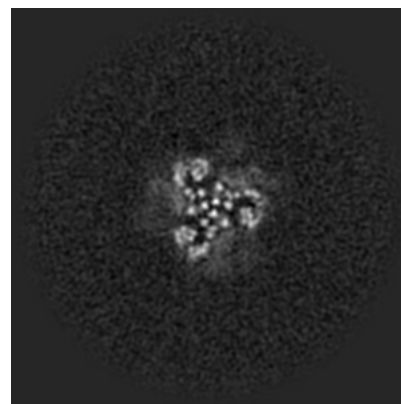
6.2.1 Primary map



X Index: 128



Y Index: 128

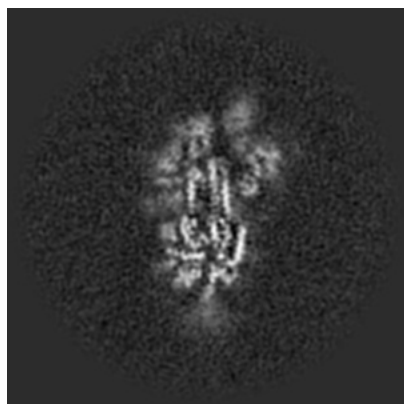


Z Index: 128

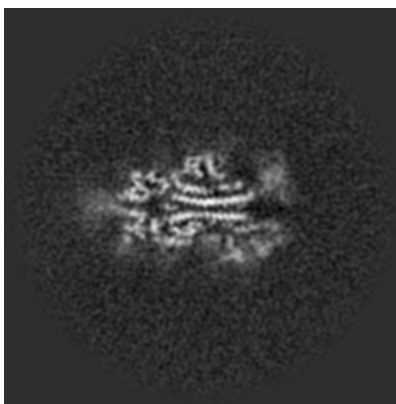
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

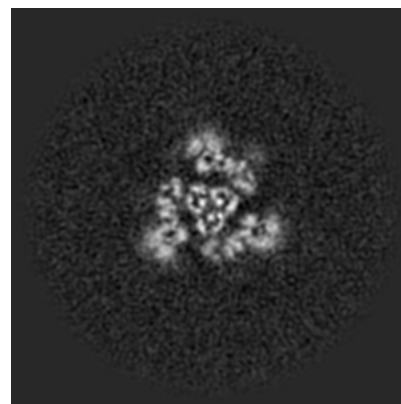
6.3.1 Primary map



X Index: 134



Y Index: 131

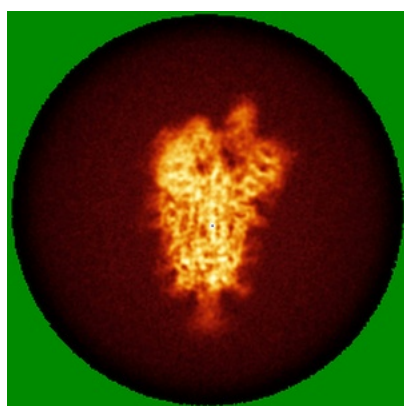


Z Index: 149

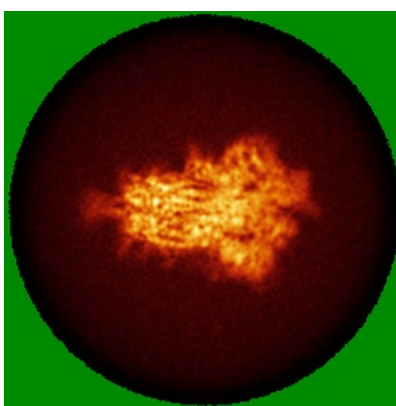
The images above show the largest variance slices of the map in three orthogonal directions.

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

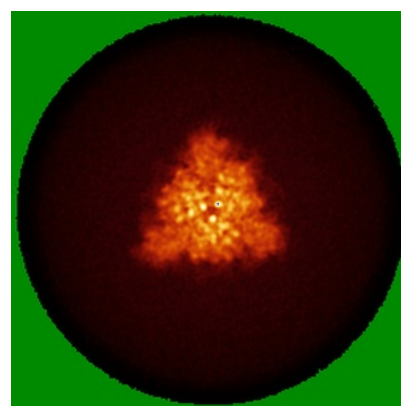
6.4.1 Primary map



X



Y



Z

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

This section was not generated.

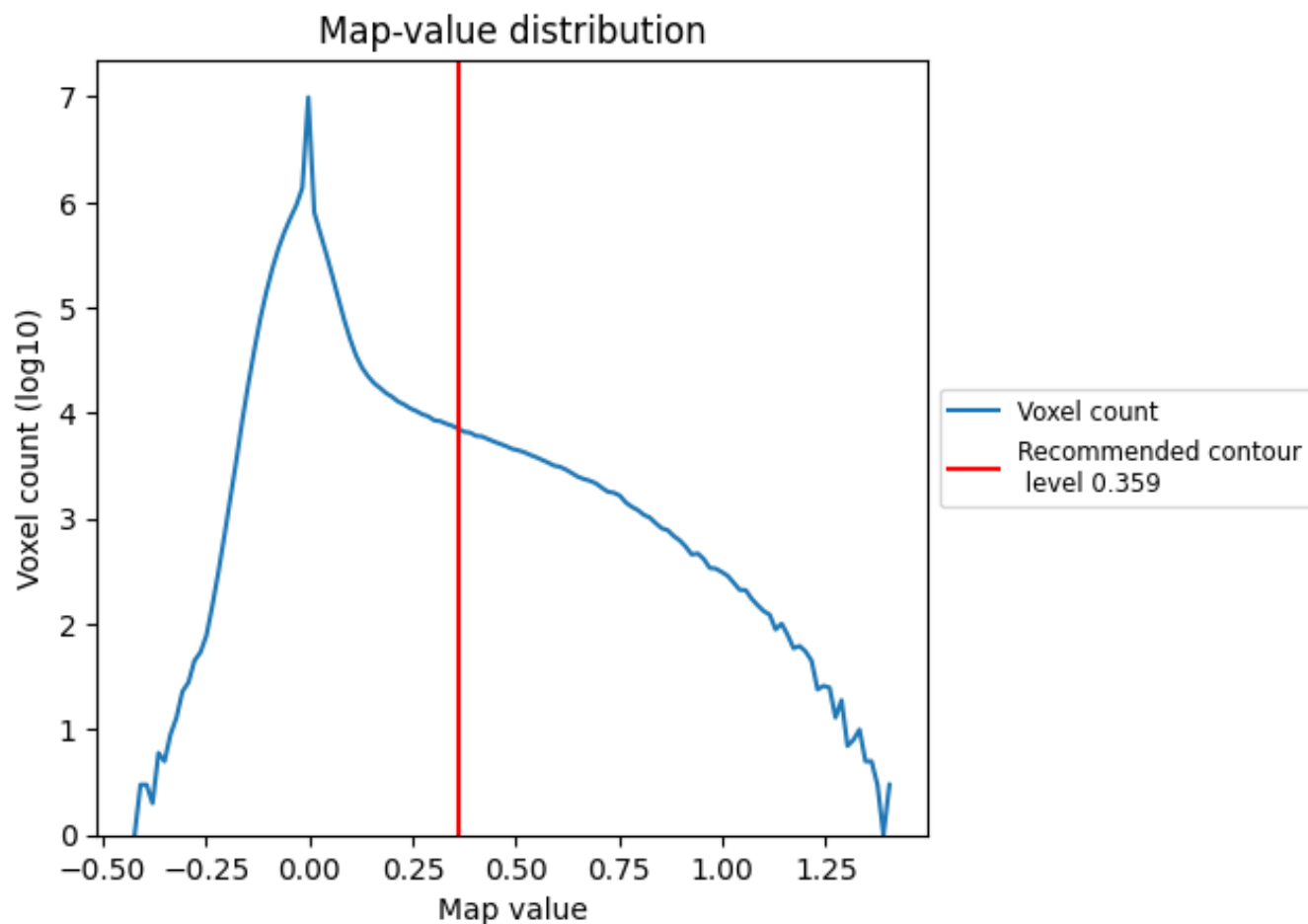
6.6 Mask visualisation

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

7 Map analysis [i](#)

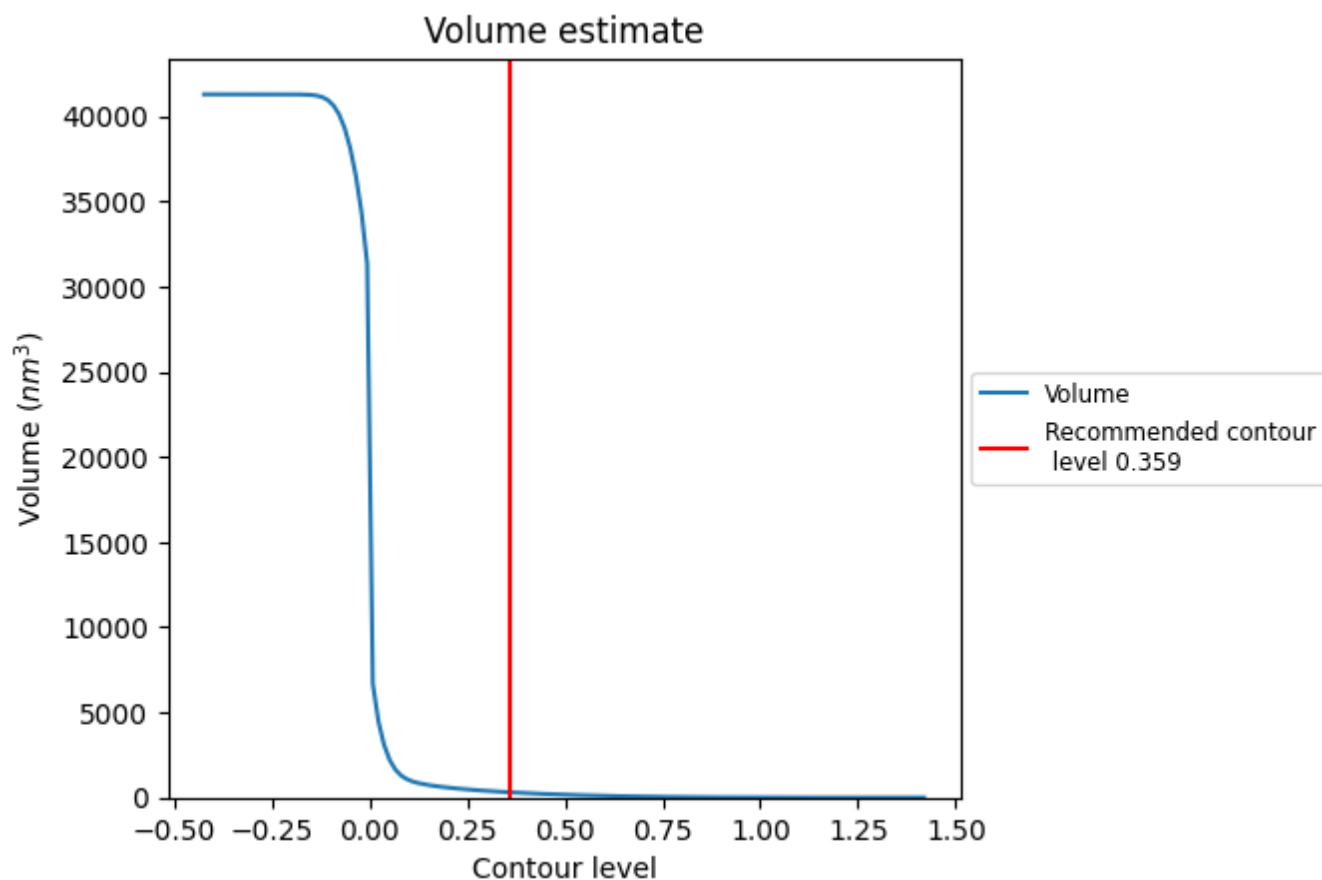
This section contains the results of statistical analysis of the map.

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.

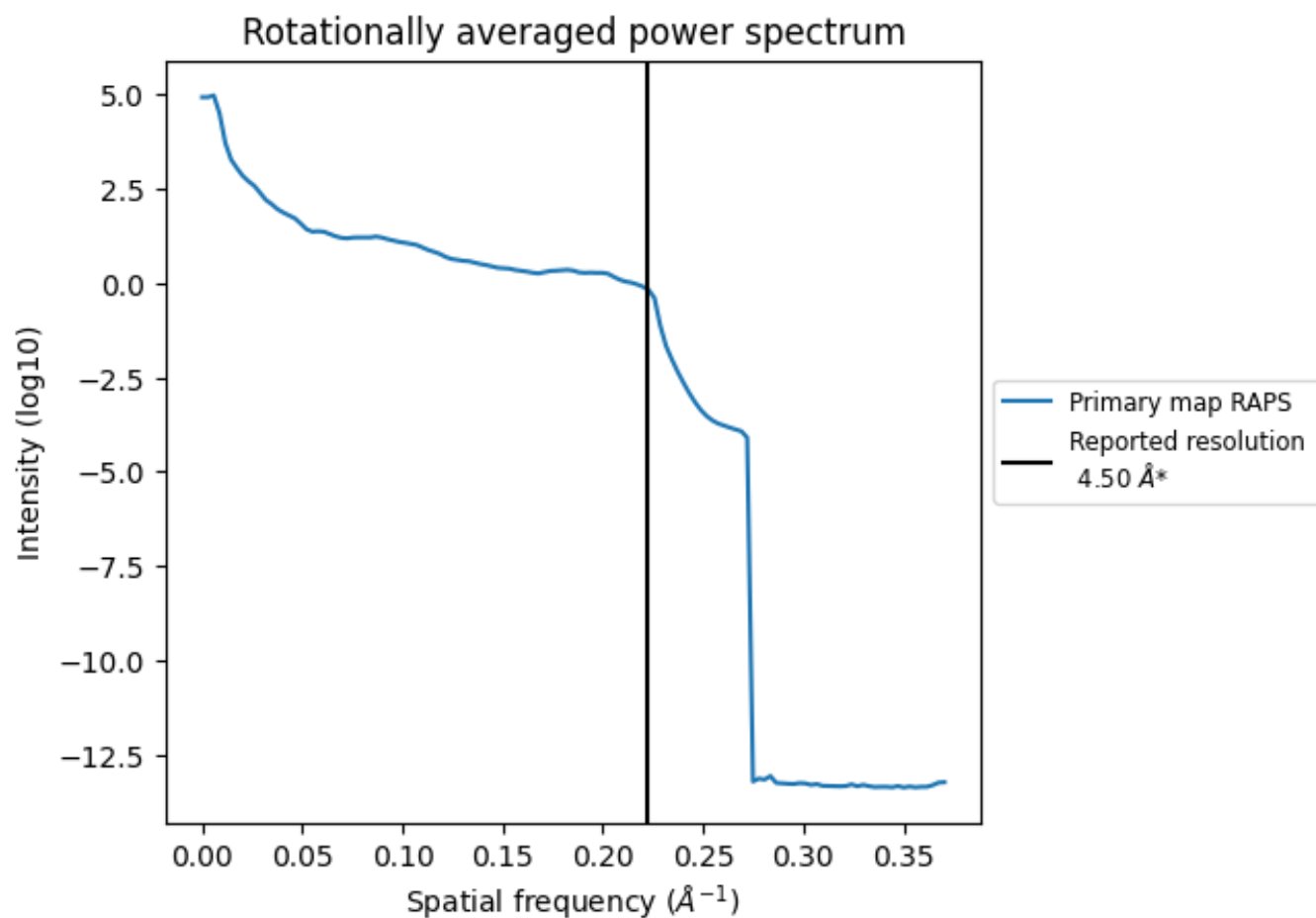
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 309 nm³; this corresponds to an approximate mass of 279 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 ⓘ

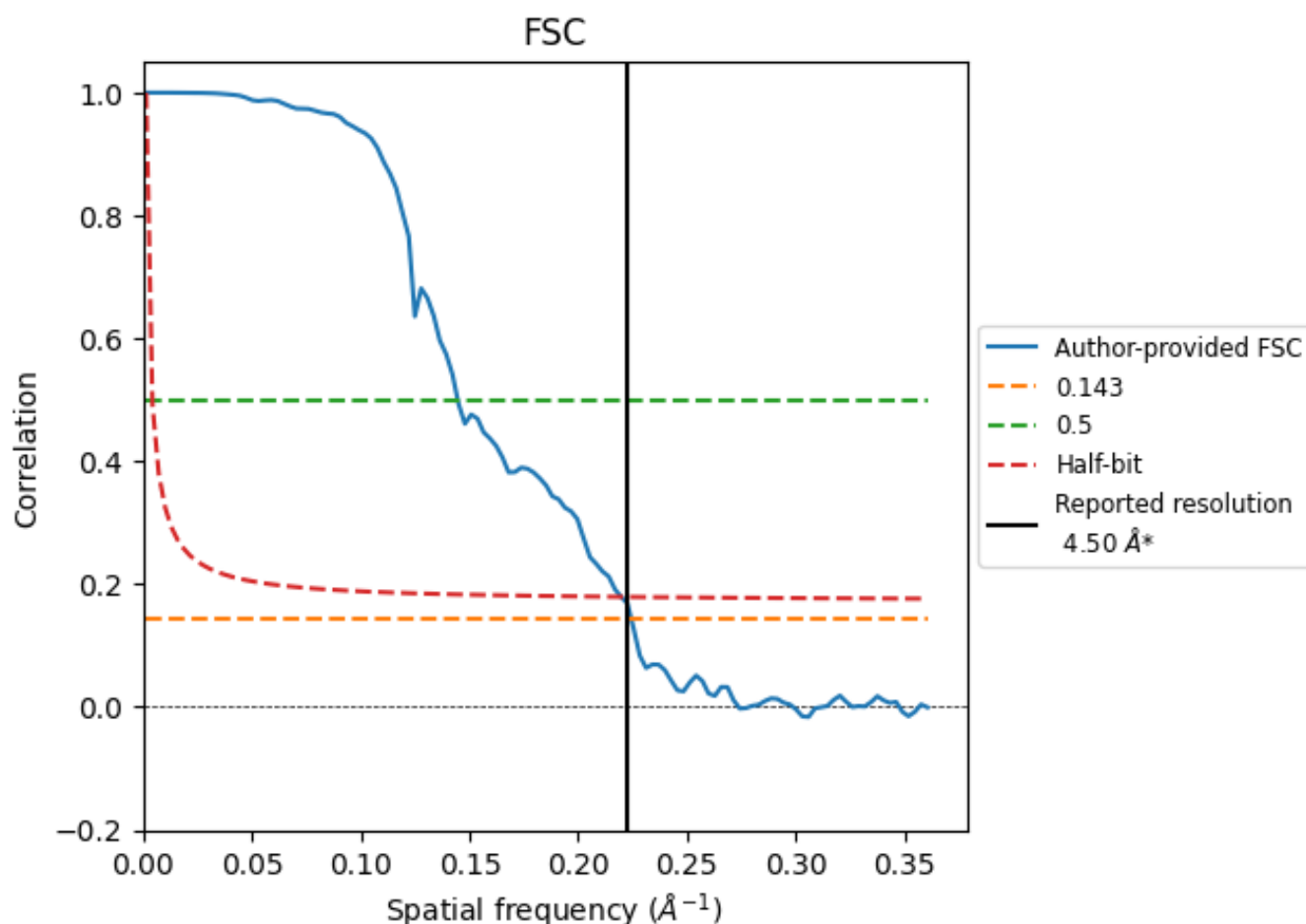


*Reported resolution corresponds to spatial frequency of 0.222 Å⁻¹

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 0.222 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.50	-	-
Author-provided FSC curve	4.46	6.92	4.55
Unmasked-calculated*	-	-	-

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

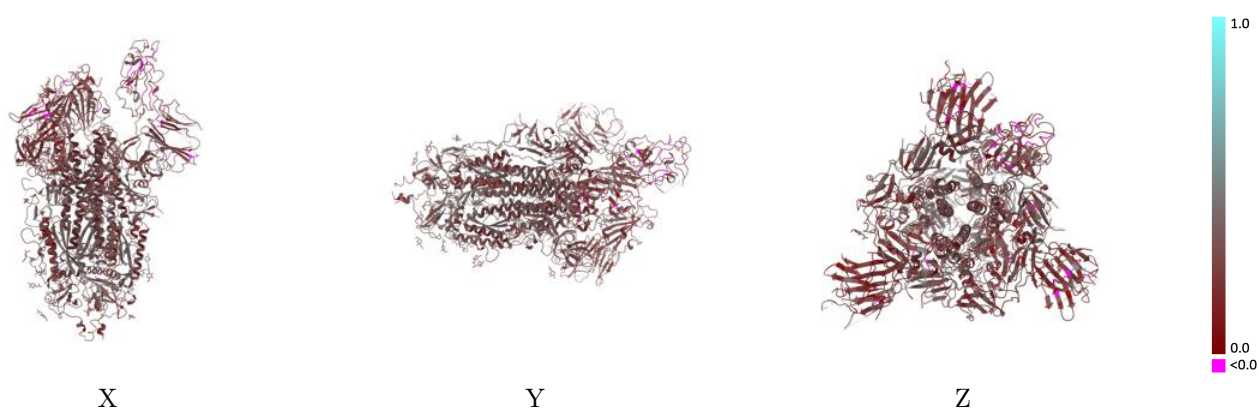
9 Map-model fit [i](#)

This section contains information regarding the fit between EMD map EMD-32493 and PDB model 7WGZ. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)

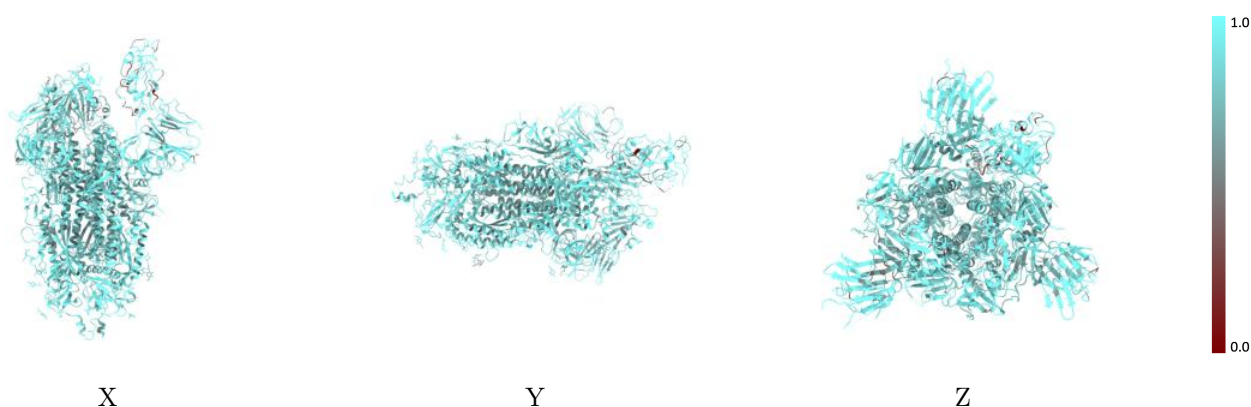
This section was not generated.

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



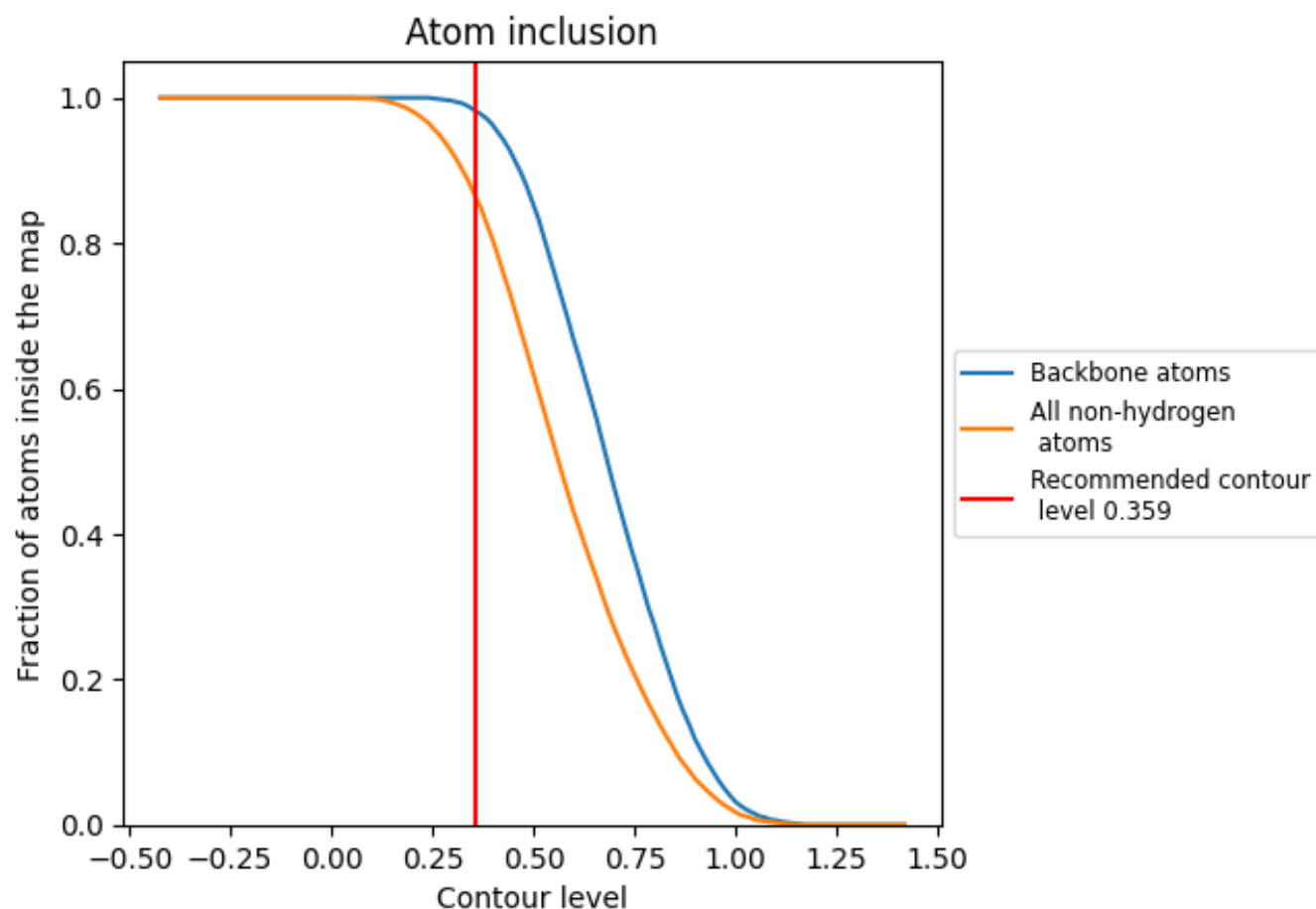
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.359).

9.4 Atom inclusion [i](#)



At the recommended contour level, 98% of all backbone atoms, 86% 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 (0.359) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8610	0.2970
A	0.8530	0.2920
B	0.8650	0.2990
C	0.8680	0.3010
D	0.8930	0.4010
E	0.6790	0.2330
F	0.8210	0.4010
G	0.8570	0.3430
H	0.8210	0.3540

1.0

0.0

<0.0