



Full wwPDB EM Validation Report ⓘ

Feb 3, 2026 – 03:14 pm GMT

PDB ID : 9IBL / pdb_00009ibl
EMDB ID : EMD-52811
Title : PhiC31 integrative synapse: attB x attP with an S12A integrase variant
Authors : Spagnolo, L.; Sun, Y.E.; Joseph, A.P.
Deposited on : 2025-02-12
Resolution : 7.21 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.dev129
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.47

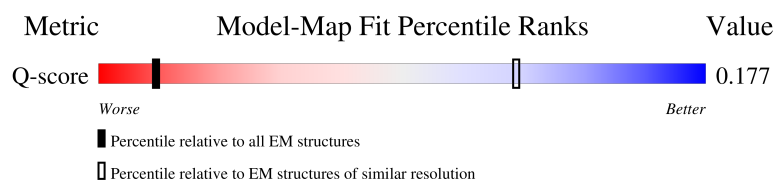
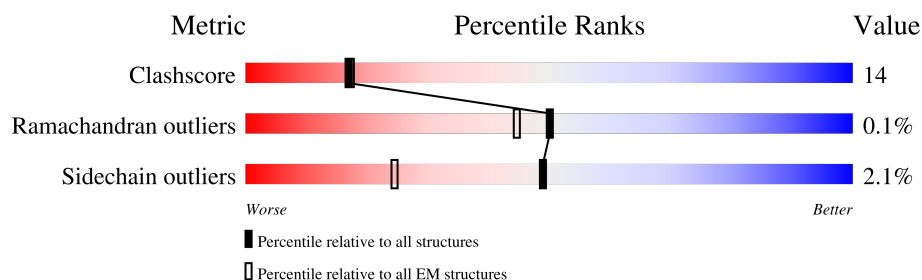
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 7.21 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.



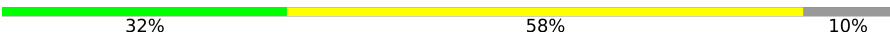
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	408 (6.72 - 7.70)

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	625	9% 54% 19% 26%
1	B	625	9% 52% 21% 26%
1	C	625	8% 54% 19% 26%
1	D	625	52% 21% 26%

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Mol	Chain	Length	Quality of chain
2	F	60	 25% 65% 10%
3	E	60	 32% 58% 10%
4	G	53	 9% 19% 81%
5	H	53	 8% 36% 64%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 18811 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 Integrase.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	B	461	Total	C	N	O	S	0	0
			3608	2268	656	670	14		
1	A	461	Total	C	N	O	S	0	0
			3608	2268	656	670	14		
1	C	461	Total	C	N	O	S	0	0
			3608	2268	656	670	14		
1	D	461	Total	C	N	O	S	0	0
			3608	2268	656	670	14		

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-19	MET	-	initiating methionine	UNP Q9T221
B	-18	GLY	-	expression tag	UNP Q9T221
B	-17	SER	-	expression tag	UNP Q9T221
B	-16	SER	-	expression tag	UNP Q9T221
B	-15	HIS	-	expression tag	UNP Q9T221
B	-14	HIS	-	expression tag	UNP Q9T221
B	-13	HIS	-	expression tag	UNP Q9T221
B	-12	HIS	-	expression tag	UNP Q9T221
B	-11	HIS	-	expression tag	UNP Q9T221
B	-10	HIS	-	expression tag	UNP Q9T221
B	-9	SER	-	expression tag	UNP Q9T221
B	-8	SER	-	expression tag	UNP Q9T221
B	-7	GLY	-	expression tag	UNP Q9T221
B	-6	LEU	-	expression tag	UNP Q9T221
B	-5	VAL	-	expression tag	UNP Q9T221
B	-4	PRO	-	expression tag	UNP Q9T221
B	-3	ARG	-	expression tag	UNP Q9T221
B	-2	GLY	-	expression tag	UNP Q9T221
B	-1	SER	-	expression tag	UNP Q9T221
B	0	HIS	-	expression tag	UNP Q9T221
A	-19	MET	-	initiating methionine	UNP Q9T221
A	-18	GLY	-	expression tag	UNP Q9T221

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-17	SER	-	expression tag	UNP Q9T221
A	-16	SER	-	expression tag	UNP Q9T221
A	-15	HIS	-	expression tag	UNP Q9T221
A	-14	HIS	-	expression tag	UNP Q9T221
A	-13	HIS	-	expression tag	UNP Q9T221
A	-12	HIS	-	expression tag	UNP Q9T221
A	-11	HIS	-	expression tag	UNP Q9T221
A	-10	HIS	-	expression tag	UNP Q9T221
A	-9	SER	-	expression tag	UNP Q9T221
A	-8	SER	-	expression tag	UNP Q9T221
A	-7	GLY	-	expression tag	UNP Q9T221
A	-6	LEU	-	expression tag	UNP Q9T221
A	-5	VAL	-	expression tag	UNP Q9T221
A	-4	PRO	-	expression tag	UNP Q9T221
A	-3	ARG	-	expression tag	UNP Q9T221
A	-2	GLY	-	expression tag	UNP Q9T221
A	-1	SER	-	expression tag	UNP Q9T221
A	0	HIS	-	expression tag	UNP Q9T221
C	-19	MET	-	initiating methionine	UNP Q9T221
C	-18	GLY	-	expression tag	UNP Q9T221
C	-17	SER	-	expression tag	UNP Q9T221
C	-16	SER	-	expression tag	UNP Q9T221
C	-15	HIS	-	expression tag	UNP Q9T221
C	-14	HIS	-	expression tag	UNP Q9T221
C	-13	HIS	-	expression tag	UNP Q9T221
C	-12	HIS	-	expression tag	UNP Q9T221
C	-11	HIS	-	expression tag	UNP Q9T221
C	-10	HIS	-	expression tag	UNP Q9T221
C	-9	SER	-	expression tag	UNP Q9T221
C	-8	SER	-	expression tag	UNP Q9T221
C	-7	GLY	-	expression tag	UNP Q9T221
C	-6	LEU	-	expression tag	UNP Q9T221
C	-5	VAL	-	expression tag	UNP Q9T221
C	-4	PRO	-	expression tag	UNP Q9T221
C	-3	ARG	-	expression tag	UNP Q9T221
C	-2	GLY	-	expression tag	UNP Q9T221
C	-1	SER	-	expression tag	UNP Q9T221
C	0	HIS	-	expression tag	UNP Q9T221
D	-19	MET	-	initiating methionine	UNP Q9T221
D	-18	GLY	-	expression tag	UNP Q9T221
D	-17	SER	-	expression tag	UNP Q9T221
D	-16	SER	-	expression tag	UNP Q9T221

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-15	HIS	-	expression tag	UNP Q9T221
D	-14	HIS	-	expression tag	UNP Q9T221
D	-13	HIS	-	expression tag	UNP Q9T221
D	-12	HIS	-	expression tag	UNP Q9T221
D	-11	HIS	-	expression tag	UNP Q9T221
D	-10	HIS	-	expression tag	UNP Q9T221
D	-9	SER	-	expression tag	UNP Q9T221
D	-8	SER	-	expression tag	UNP Q9T221
D	-7	GLY	-	expression tag	UNP Q9T221
D	-6	LEU	-	expression tag	UNP Q9T221
D	-5	VAL	-	expression tag	UNP Q9T221
D	-4	PRO	-	expression tag	UNP Q9T221
D	-3	ARG	-	expression tag	UNP Q9T221
D	-2	GLY	-	expression tag	UNP Q9T221
D	-1	SER	-	expression tag	UNP Q9T221
D	0	HIS	-	expression tag	UNP Q9T221

- Molecule 2 is a DNA chain called attP_Rv.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	F	54	Total	C	N	O	P	0	0
			1093	520	203	317	53		

- Molecule 3 is a DNA chain called attP_Fw.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	E	54	Total	C	N	O	P	0	0
			1115	529	206	327	53		

- Molecule 4 is a DNA chain called attB_Fw.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	53	Total	C	N	O	P	0	0
			1081	509	199	321	52		

- Molecule 5 is a DNA chain called attB_Rv.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	H	53	Total	C	N	O	P	0	0
			1086	509	214	311	52		

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by

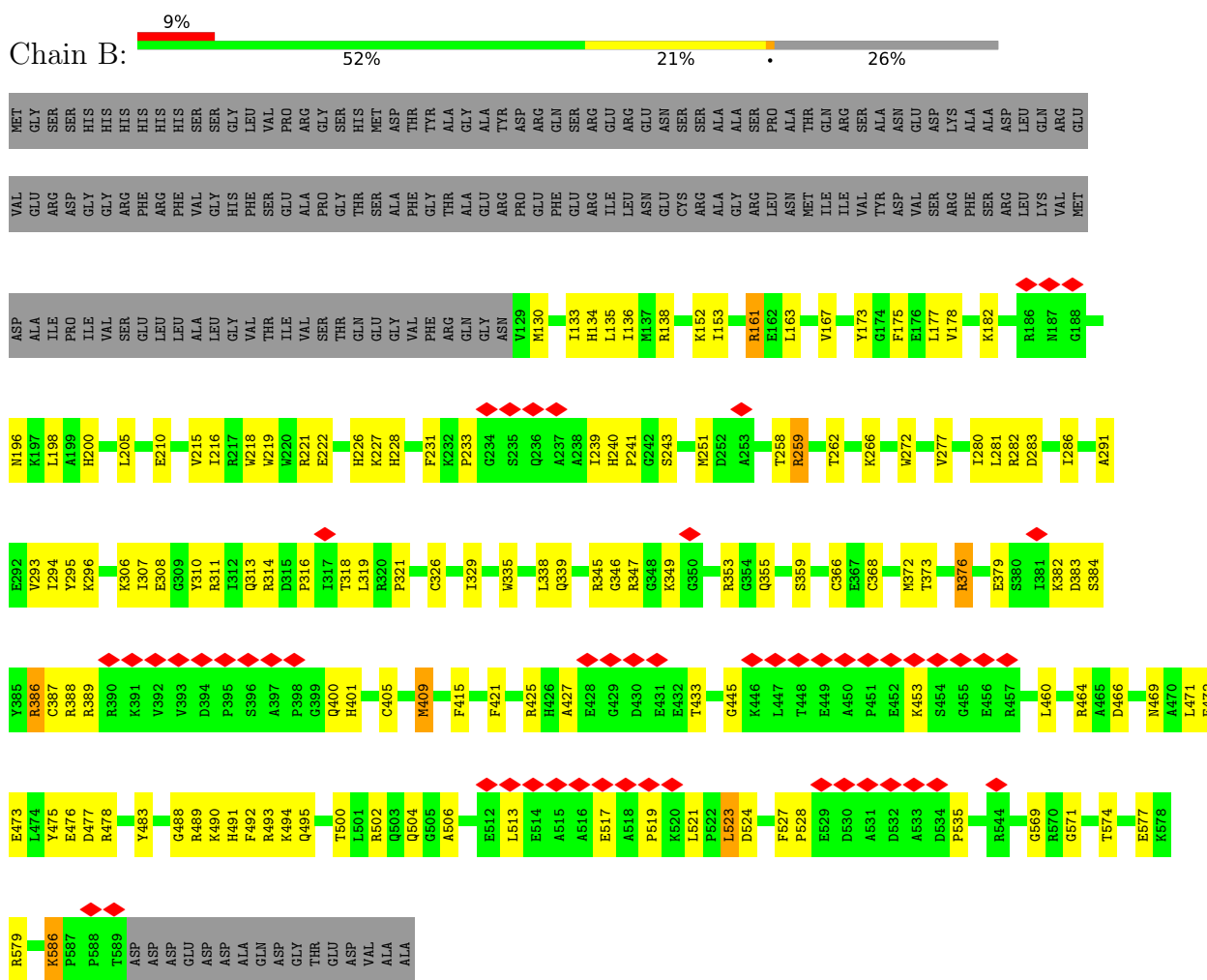
depositor).

Mol	Chain	Residues	Atoms		AltConf
6	B	1	Total 1	Zn 1	0
6	A	1	Total 1	Zn 1	0
6	C	1	Total 1	Zn 1	0
6	D	1	Total 1	Zn 1	0

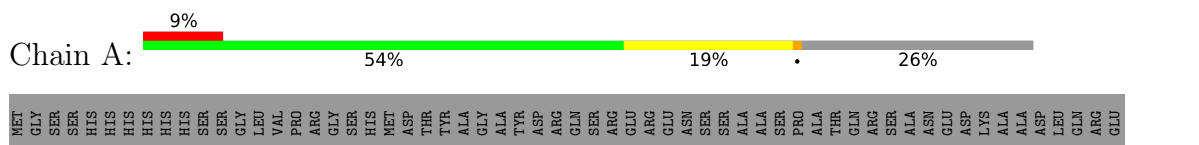
3 Residue-property plots

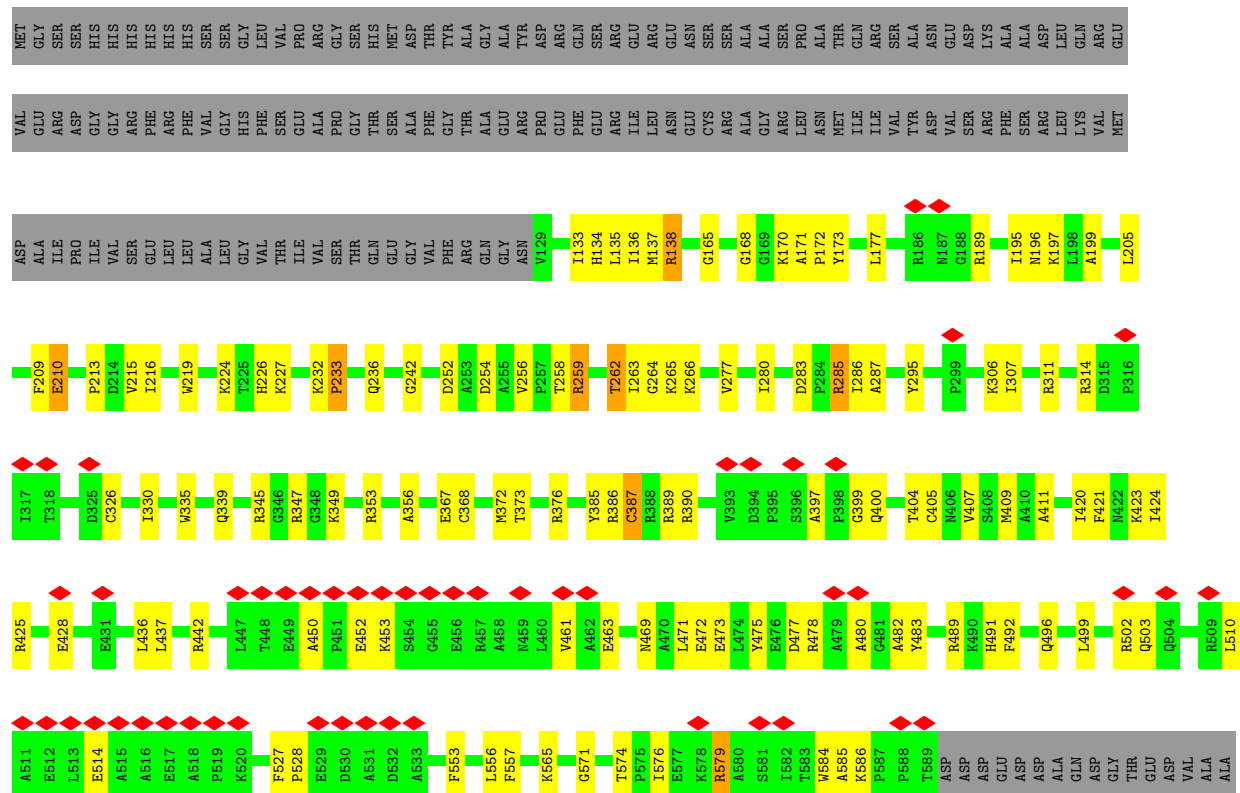
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Integrase

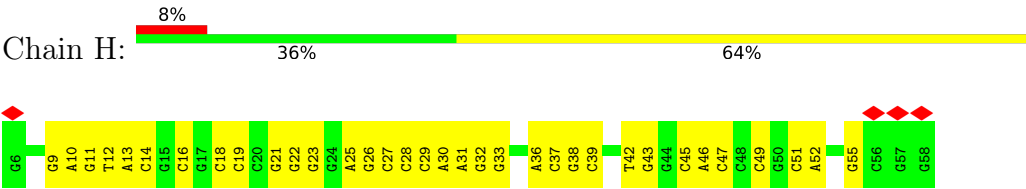


• Molecule 1: Integrase





• Molecule 5: attB_Rv



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	11085	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	59.8	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	2300	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.046	Depositor
Minimum map value	-0.009	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.0135	Depositor
Map size ($\text{\AA}$)	374.72, 374.72, 374.72	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.171, 1.171, 1.171	Depositor

5 Model quality

5.1 Standard geometry

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

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	0/3687	0.46	0/4984
1	B	0.20	0/3687	0.46	0/4984
1	C	0.20	0/3687	0.46	0/4984
1	D	0.20	0/3687	0.45	0/4984
2	F	0.35	0/1225	0.79	0/1885
3	E	0.35	0/1251	0.74	0/1933
4	G	0.38	0/1210	0.79	0/1866
5	H	0.38	0/1220	0.78	0/1881
All	All	0.25	0/19654	0.57	0/27501

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	9
1	B	0	9
1	C	0	11
1	D	0	4
All	All	0	33

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (33) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	186	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	189	ARG	Sidechain
1	A	217	ARG	Sidechain
1	A	282	ARG	Sidechain
1	A	285	ARG	Sidechain
1	A	388	ARG	Sidechain
1	A	390	ARG	Sidechain
1	A	489	ARG	Sidechain
1	A	579	ARG	Sidechain
1	B	161	ARG	Sidechain
1	B	221	ARG	Sidechain
1	B	259	ARG	Sidechain
1	B	282	ARG	Sidechain
1	B	353	ARG	Sidechain
1	B	376	ARG	Sidechain
1	B	386	ARG	Sidechain
1	B	388	ARG	Sidechain
1	B	502	ARG	Sidechain
1	C	138	ARG	Sidechain
1	C	189	ARG	Sidechain
1	C	233	PRO	Peptide
1	C	259	ARG	Sidechain
1	C	285	ARG	Sidechain
1	C	314	ARG	Sidechain
1	C	390	ARG	Sidechain
1	C	442	ARG	Sidechain
1	C	478	ARG	Sidechain
1	C	489	ARG	Sidechain
1	C	579	ARG	Sidechain
1	D	230	PRO	Peptide
1	D	259	ARG	Sidechain
1	D	386	ARG	Sidechain
1	D	457	ARG	Sidechain

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3608	0	3619	90	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3608	0	3619	97	0
1	C	3608	0	3619	91	0
1	D	3608	0	3619	105	0
2	F	1093	0	605	39	0
3	E	1115	0	610	44	0
4	G	1081	0	593	55	0
5	H	1086	0	588	44	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
All	All	18811	0	16872	480	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 14.

All (480) 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:A:319:LEU:HD23	1:A:502:ARG:HH21	1.34	0.90
1:B:368:CYS:SG	1:B:401:HIS:CD2	2.67	0.87
1:D:165:GLY:HA3	1:D:195:ILE:HB	1.64	0.80
3:E:28:DC:H2'	3:E:29:DT:C6	2.20	0.76
1:A:366:CYS:SG	1:A:401:HIS:HE1	2.09	0.75
3:E:7:DT:H2''	3:E:8:DA:C8	2.23	0.73
1:D:209:PHE:HB2	1:D:215:VAL:HG22	1.72	0.71
5:H:32:DG:H2''	5:H:33:DG:C8	2.24	0.71
1:D:199:ALA:HA	1:D:326:CYS:HB3	1.73	0.71
1:B:401:HIS:HE1	1:B:405:CYS:HB2	1.56	0.70
2:F:19:DT:H2''	2:F:20:DG:C8	2.27	0.70
5:H:51:DC:H2''	5:H:52:DA:C8	2.26	0.70
1:A:266:LYS:HE3	3:E:25:DA:H3'	1.73	0.68
1:C:199:ALA:HA	1:C:326:CYS:HB3	1.75	0.67
2:F:45:DT:H2''	2:F:46:DG:C8	2.29	0.67
1:A:358:LEU:HD21	1:A:554:VAL:HG11	1.77	0.67
1:C:170:LYS:HG2	1:C:171:ALA:H	1.59	0.67
1:A:281:LEU:HB3	1:A:338:LEU:HD21	1.78	0.66
4:G:23:DC:H2''	4:G:24:DG:OP2	1.94	0.66
1:B:177:LEU:HD22	1:B:196:ASN:HB3	1.78	0.66
1:C:306:LYS:HE3	4:G:21:DG:C8	2.32	0.65
1:B:571:GLY:HA2	3:E:55:DG:H21	1.59	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:177:LEU:HD22	1:A:196:ASN:HB3	1.79	0.65
1:C:450:ALA:HB3	1:C:453:LYS:HE3	1.79	0.65
1:D:368:CYS:HA	1:D:400:GLN:HA	1.80	0.64
1:D:443:ARG:HA	1:D:446:LYS:HD2	1.79	0.64
1:D:471:LEU:HD21	1:D:496:GLN:HA	1.80	0.64
1:D:367:GLU:HB2	1:D:564:THR:HA	1.79	0.64
3:E:22:DG:H2''	3:E:23:DG:C8	2.33	0.64
1:A:173:TYR:HD2	1:A:259:ARG:HD3	1.62	0.64
1:D:569:GLY:O	5:H:13:DA:H4'	1.98	0.63
1:B:368:CYS:HA	1:B:400:GLN:HA	1.80	0.63
5:H:32:DG:H2''	5:H:33:DG:H8	1.62	0.63
1:B:383:ASP:HB3	1:B:409:MET:HE2	1.80	0.62
1:A:265:LYS:HE3	3:E:26:DA:H3'	1.80	0.62
4:G:50:DC:H2'	4:G:51:DT:C5	2.35	0.62
1:A:496:GLN:HG2	1:C:482:ALA:HB1	1.81	0.62
1:C:424:ILE:HG22	1:C:527:PHE:HZ	1.64	0.62
1:D:406:ASN:HB3	5:H:13:DA:H2''	1.82	0.61
4:G:23:DC:H1'	4:G:24:DG:H5'	1.81	0.61
4:G:14:DG:H2'	4:G:15:DT:C6	2.36	0.61
1:A:495:GLN:O	1:A:499:LEU:HG	2.00	0.61
1:D:140:ASP:O	1:D:144:LYS:HD3	2.01	0.60
2:F:43:DG:H2''	2:F:44:DT:C6	2.35	0.60
1:D:160:GLN:HA	1:D:163:LEU:HD12	1.83	0.60
3:E:41:DC:H1'	3:E:42:DA:C8	2.36	0.60
1:C:483:TYR:CD2	1:C:492:PHE:HB2	2.36	0.60
1:D:173:TYR:HA	1:D:259:ARG:NH2	2.17	0.60
1:D:372:MET:HG3	1:D:386:ARG:C	2.27	0.60
1:D:372:MET:HG2	1:D:385:TYR:HB3	1.84	0.60
4:G:9:DT:H2''	4:G:10:DG:N7	2.17	0.59
1:D:161:ARG:HH21	1:D:167:VAL:H	1.51	0.59
1:D:156:THR:HG21	5:H:30:DA:OP1	2.02	0.58
1:D:575:PRO:HD2	1:D:578:LYS:HE2	1.86	0.58
5:H:36:DA:H2''	5:H:37:DC:C5	2.38	0.58
1:A:165:GLY:HA3	1:A:195:ILE:HB	1.84	0.58
1:B:316:PRO:HB2	1:B:495:GLN:HE21	1.68	0.58
1:A:134:HIS:HB3	1:A:138:ARG:HH21	1.69	0.57
1:D:281:LEU:HB3	1:D:338:LEU:HD21	1.87	0.57
1:B:346:GLY:C	2:F:18:DC:H4'	2.30	0.56
1:A:319:LEU:HD22	1:A:499:LEU:HD22	1.86	0.56
1:D:169:GLY:HA3	5:H:26:DG:N2	2.21	0.56
1:B:477:ASP:HB3	1:B:483:TYR:CE1	2.39	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:259:ARG:O	1:A:263:ILE:HG12	2.05	0.56
1:C:165:GLY:HA3	1:C:195:ILE:HB	1.88	0.56
1:C:421:PHE:O	1:C:425:ARG:HG2	2.06	0.56
1:C:177:LEU:HD22	1:C:196:ASN:HB3	1.87	0.56
1:A:314:ARG:HH11	1:A:319:LEU:HG	1.69	0.56
1:C:436:LEU:HD21	1:C:557:PHE:HB3	1.88	0.56
5:H:22:DG:H2''	5:H:23:DG:C8	2.41	0.56
4:G:22:DG:H2''	4:G:23:DC:C6	2.40	0.56
1:B:372:MET:HA	1:B:386:ARG:O	2.06	0.55
1:A:445:GLY:HA2	1:A:519:PRO:HD2	1.88	0.55
2:F:27:DC:C6	2:F:28:DT:H72	2.42	0.55
1:D:373:THR:HG22	4:G:42:DG:H5''	1.89	0.55
1:C:353:ARG:HB2	1:C:376:ARG:HB3	1.89	0.55
1:B:489:ARG:HD3	1:D:473:GLU:HB2	1.88	0.55
1:A:168:GLY:HA3	2:F:36:DT:H5'	1.88	0.55
2:F:38:DC:H2''	2:F:39:DC:C5	2.42	0.55
1:B:464:ARG:HG2	1:B:506:ALA:HB1	1.89	0.55
1:D:373:THR:HG23	1:D:388:ARG:HG3	1.87	0.54
1:C:236:GLN:HE22	5:H:49:DC:H4'	1.73	0.54
1:B:453:LYS:HE3	1:B:517:GLU:HB3	1.90	0.54
1:A:421:PHE:HB3	1:A:425:ARG:NH1	2.21	0.54
1:D:220:TRP:CD1	1:D:224:LYS:HE3	2.43	0.54
2:F:46:DG:H2'	2:F:47:DG:C8	2.42	0.54
5:H:45:DC:H2''	5:H:46:DA:OP2	2.06	0.54
4:G:22:DG:H2''	4:G:23:DC:C5	2.43	0.54
1:C:372:MET:HE2	1:C:387:CYS:HB3	1.89	0.54
1:D:163:LEU:HD21	1:D:184:ILE:HD13	1.89	0.54
1:A:266:LYS:HD2	3:E:25:DA:H5'	1.89	0.54
1:A:570:ARG:HG2	3:E:9:DG:H1'	1.90	0.54
2:F:55:DC:H4'	2:F:56:DT:OP1	2.09	0.53
1:D:235:SER:N	4:G:47:DG:H21	2.06	0.53
1:B:491:HIS:HA	1:B:494:LYS:HE2	1.89	0.53
1:C:173:TYR:HD2	1:C:259:ARG:HB2	1.73	0.53
1:B:571:GLY:HA2	3:E:55:DG:N2	2.23	0.53
1:D:235:SER:HB3	4:G:48:DT:O2	2.09	0.53
1:C:205:LEU:HB2	1:C:209:PHE:O	2.08	0.53
1:A:464:ARG:HG2	1:A:506:ALA:HB1	1.90	0.53
1:D:293:VAL:HG22	1:D:310:TYR:HE1	1.73	0.53
1:B:521:LEU:O	1:B:523:LEU:HD22	2.09	0.53
1:A:500:THR:O	1:A:504:GLN:HG2	2.08	0.53
1:C:195:ILE:HD12	1:C:197:LYS:HE3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:425:ARG:HG3	1:D:527:PHE:CZ	2.44	0.53
1:C:349:LYS:HE3	5:H:43:DG:N3	2.24	0.53
1:B:477:ASP:HB3	1:B:483:TYR:HE1	1.72	0.52
1:A:347:ARG:NH1	2:F:43:DG:H21	2.07	0.52
5:H:26:DG:C4	5:H:27:DC:C5	2.97	0.52
1:B:347:ARG:HG2	2:F:18:DC:H1'	1.91	0.52
1:D:298:LYS:HB2	1:D:300:ASP:OD1	2.08	0.52
1:D:314:ARG:HA	1:D:321:PRO:HA	1.90	0.52
1:B:266:LYS:HD2	2:F:25:DA:H3'	1.91	0.52
1:A:291:ALA:HB1	1:A:310:TYR:HB3	1.90	0.52
4:G:25:DT:H2'	4:G:26:DG:C8	2.44	0.52
1:D:134:HIS:HB2	1:D:138:ARG:HH21	1.75	0.52
4:G:24:DG:C2	5:H:38:DG:C2	2.97	0.52
1:B:500:THR:O	1:B:504:GLN:HG2	2.08	0.52
1:B:574:THR:HG21	1:B:579:ARG:HD2	1.92	0.52
1:A:475:TYR:HB3	1:C:491:HIS:CD2	2.44	0.52
4:G:38:DC:H4'	4:G:39:DC:OP1	2.08	0.52
1:B:483:TYR:CE2	1:B:491:HIS:HD2	2.28	0.52
1:D:527:PHE:HB3	1:D:531:ALA:HA	1.91	0.52
1:B:472:GLU:O	1:B:476:GLU:HG2	2.10	0.52
3:E:28:DC:H2'	3:E:29:DT:C5	2.45	0.51
3:E:37:DC:H2''	3:E:38:DT:C6	2.45	0.51
5:H:38:DG:H2''	5:H:39:DC:C6	2.45	0.51
1:A:372:MET:HA	1:A:386:ARG:O	2.10	0.51
1:A:483:TYR:CG	1:A:492:PHE:HB2	2.44	0.51
1:C:173:TYR:HA	1:C:259:ARG:NH2	2.25	0.51
1:C:471:LEU:HD21	1:C:496:GLN:HA	1.92	0.51
1:B:134:HIS:CE1	1:B:138:ARG:HE	2.29	0.51
1:B:368:CYS:HB3	1:B:389:ARG:HE	1.75	0.51
1:C:386:ARG:HE	1:C:404:THR:HG21	1.73	0.51
1:D:368:CYS:H	1:D:401:HIS:CD2	2.27	0.51
1:A:453:LYS:HZ2	1:A:517:GLU:HB3	1.75	0.51
2:F:20:DG:H8	2:F:20:DG:OP2	1.92	0.51
1:C:216:ILE:HA	1:C:219:TRP:CE3	2.46	0.51
1:A:521:LEU:HD21	1:A:557:PHE:CZ	2.46	0.51
1:C:436:LEU:HD11	1:C:557:PHE:HA	1.93	0.51
1:C:571:GLY:H	5:H:51:DC:H4'	1.76	0.51
1:D:229:LEU:HB2	1:D:240:HIS:HE2	1.76	0.51
1:A:311:ARG:NH1	1:A:313:GLN:HA	2.26	0.51
1:A:319:LEU:HD21	1:A:470:ALA:HB3	1.93	0.51
5:H:36:DA:H2''	5:H:37:DC:C6	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:23:DG:H8	3:E:23:DG:OP2	1.94	0.50
1:B:258:THR:HA	1:B:272:TRP:CZ2	2.46	0.50
2:F:14:DC:H2''	2:F:15:DC:C6	2.45	0.50
1:C:287:ALA:HB2	1:C:335:TRP:CG	2.46	0.50
1:D:418:GLU:HG3	1:D:536:THR:HG21	1.92	0.50
1:B:349:LYS:HE2	3:E:46:DG:H5''	1.93	0.50
1:A:226:HIS:HB2	1:A:242:GLY:N	2.26	0.50
2:F:36:DT:H2''	2:F:37:DA:C8	2.45	0.50
4:G:20:DG:H2'	4:G:21:DG:C8	2.47	0.50
1:A:258:THR:HA	1:A:272:TRP:CE2	2.46	0.50
3:E:27:DC:H2'	3:E:28:DC:C5	2.46	0.50
1:B:294:ILE:HD11	1:B:311:ARG:HB2	1.94	0.49
1:A:368:CYS:SG	1:A:401:HIS:CD2	3.06	0.49
1:D:293:VAL:HG22	1:D:310:TYR:CE1	2.47	0.49
1:A:156:THR:HG21	3:E:29:DT:O3'	2.12	0.49
1:C:372:MET:HB3	1:C:385:TYR:HB3	1.94	0.49
1:C:367:GLU:HG3	1:C:399:GLY:O	2.11	0.49
4:G:19:DA:C6	5:H:43:DG:C6	3.00	0.49
4:G:50:DC:H2'	4:G:51:DT:C6	2.46	0.49
1:C:170:LYS:HG2	1:C:171:ALA:N	2.25	0.49
3:E:9:DG:H2'	3:E:10:DT:H71	1.93	0.49
1:D:153:ILE:HD11	4:G:32:DG:H21	1.77	0.49
1:D:259:ARG:HD3	1:D:263:ILE:HD12	1.94	0.49
3:E:34:DG:H2''	3:E:35:DT:OP2	2.12	0.49
1:B:216:ILE:HA	1:B:219:TRP:CE3	2.48	0.49
1:B:240:HIS:HB3	1:B:243:SER:HB3	1.95	0.49
1:A:521:LEU:O	1:A:523:LEU:HD22	2.13	0.49
1:B:415:PHE:CE1	1:B:577:GLU:HA	2.48	0.49
1:A:478:ARG:HH21	1:A:489:ARG:HG2	1.78	0.49
1:C:306:LYS:HE3	4:G:21:DG:N7	2.28	0.48
4:G:19:DA:C4	4:G:20:DG:C8	3.01	0.48
1:B:293:VAL:HG22	1:B:310:TYR:CE2	2.48	0.48
1:B:401:HIS:CE1	1:B:405:CYS:HB2	2.42	0.48
1:C:133:ILE:HA	1:C:136:ILE:HD12	1.94	0.48
1:C:407:VAL:HA	1:C:579:ARG:HH21	1.79	0.48
1:D:471:LEU:HD22	1:D:475:TYR:CZ	2.47	0.48
2:F:19:DT:C2	3:E:43:DG:N2	2.81	0.48
1:A:483:TYR:HB3	1:A:488:GLY:C	2.38	0.48
1:A:217:ARG:HB3	1:A:221:ARG:NH2	2.28	0.48
1:C:471:LEU:HD22	1:C:475:TYR:CZ	2.48	0.48
5:H:11:DG:H2''	5:H:12:DT:OP2	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:571:GLY:HA2	3:E:55:DG:N3	2.28	0.48
1:A:405:CYS:HB2	1:A:565:LYS:HA	1.96	0.48
1:B:226:HIS:CD2	1:B:241:PRO:HB2	2.48	0.48
1:B:355:GLN:HB3	1:B:376:ARG:HH21	1.78	0.48
1:B:466:ASP:HA	1:B:469:ASN:OD1	2.13	0.48
1:C:224:LYS:O	1:C:227:LYS:HE2	2.13	0.48
1:D:277:VAL:HA	1:D:280:ILE:HD12	1.96	0.48
1:D:370:ALA:HB3	1:D:387:CYS:SG	2.54	0.48
1:D:471:LEU:HD22	1:D:475:TYR:OH	2.14	0.48
1:B:291:ALA:HB1	1:B:310:TYR:HB3	1.96	0.47
1:B:347:ARG:HD2	3:E:44:DT:O2	2.14	0.47
1:B:490:LYS:O	1:B:494:LYS:HG2	2.15	0.47
1:A:296:LYS:HA	1:A:308:GLU:OE2	2.15	0.47
1:C:233:PRO:HG2	5:H:47:DC:H5'	1.96	0.47
1:C:263:ILE:HG13	1:C:264:GLY:N	2.27	0.47
1:D:566:SER:HB2	1:D:579:ARG:NH1	2.28	0.47
1:C:565:LYS:HG2	4:G:14:DG:OP1	2.14	0.47
1:D:156:THR:HG21	5:H:30:DA:P	2.55	0.47
1:D:205:LEU:HG	1:D:210:GLU:O	2.13	0.47
1:D:367:GLU:HB3	1:D:401:HIS:HD2	1.78	0.47
1:B:475:TYR:HB3	1:D:491:HIS:CD2	2.50	0.47
1:B:296:LYS:HA	1:B:308:GLU:OE2	2.13	0.47
1:B:347:ARG:HA	2:F:18:DC:H1'	1.95	0.47
1:C:345:ARG:HE	4:G:18:DC:P	2.36	0.47
1:C:469:ASN:O	1:C:472:GLU:HG2	2.13	0.47
1:C:471:LEU:HG	1:C:499:LEU:HB2	1.97	0.47
1:D:574:THR:HG23	1:D:578:LYS:HE3	1.96	0.47
4:G:14:DG:H2'	4:G:15:DT:C5	2.49	0.47
1:C:420:ILE:HG21	1:C:553:PHE:HE1	1.80	0.47
5:H:29:DC:H2''	5:H:30:DA:OP2	2.14	0.47
1:C:424:ILE:HG23	1:C:437:LEU:HD21	1.97	0.47
1:D:287:ALA:HB2	1:D:335:TRP:CG	2.49	0.47
1:D:417:ALA:HB2	1:D:542:TRP:CZ2	2.49	0.47
5:H:13:DA:H2''	5:H:14:DC:H5''	1.95	0.47
1:D:335:TRP:O	1:D:339:GLN:HG2	2.15	0.47
3:E:30:DT:H2''	3:E:31:DT:H71	1.96	0.47
1:A:160:GLN:HE22	3:E:29:DT:H5''	1.80	0.47
2:F:38:DC:H2''	2:F:39:DC:H5	1.79	0.47
1:A:357:ILE:HG13	1:A:358:LEU:H	1.79	0.47
1:A:421:PHE:CD2	1:A:535:PRO:HB2	2.49	0.47
1:C:571:GLY:N	5:H:51:DC:H4'	2.30	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:130:MET:O	1:B:133:ILE:HG22	2.16	0.46
1:B:445:GLY:HA2	1:B:519:PRO:HD2	1.97	0.46
4:G:30:DT:H2'	4:G:31:DT:C6	2.50	0.46
1:B:205:LEU:HG	1:B:210:GLU:O	2.16	0.46
1:B:384:SER:HA	1:B:409:MET:N	2.30	0.46
1:C:335:TRP:O	1:C:339:GLN:HG2	2.15	0.46
1:C:461:VAL:HG23	1:C:510:LEU:HD21	1.97	0.46
1:D:133:ILE:HA	1:D:136:ILE:HD12	1.97	0.46
1:C:553:PHE:HA	1:C:556:LEU:HD12	1.96	0.46
4:G:7:DG:C2	5:H:55:DG:C2	3.03	0.46
4:G:12:DG:C2	4:G:13:DG:C4	3.04	0.46
1:B:173:TYR:HA	1:B:259:ARG:NH2	2.30	0.46
1:B:483:TYR:HE2	1:B:491:HIS:HD2	1.62	0.46
1:C:386:ARG:HH21	1:C:404:THR:HG21	1.80	0.46
1:C:397:ALA:HB3	1:C:400:GLN:HG3	1.98	0.46
1:D:471:LEU:HG	1:D:499:LEU:HB2	1.98	0.46
1:D:470:ALA:O	1:D:473:GLU:HG2	2.16	0.46
3:E:26:DA:H2''	3:E:27:DC:C6	2.51	0.46
1:A:173:TYR:CD2	1:A:259:ARG:HD3	2.46	0.46
1:A:277:VAL:O	1:A:281:LEU:HG	2.16	0.46
1:A:345:ARG:HA	1:A:345:ARG:HD2	1.71	0.46
1:C:277:VAL:HA	1:C:280:ILE:HD12	1.98	0.46
2:F:9:DC:H2''	2:F:10:DG:H5'	1.98	0.46
1:A:295:TYR:HA	1:A:307:ILE:HA	1.97	0.45
2:F:52:DC:H2'	2:F:53:DT:H72	1.98	0.45
1:C:134:HIS:HA	1:C:137:MET:HE3	1.98	0.45
3:E:25:DA:C6	3:E:26:DA:C6	3.05	0.45
4:G:50:DC:H2'	4:G:51:DT:C4	2.52	0.45
1:B:175:PHE:HB3	1:B:198:LEU:HB3	1.97	0.45
1:B:306:LYS:HD2	1:B:306:LYS:HA	1.78	0.45
1:A:443:ARG:HH21	1:A:556:LEU:C	2.25	0.45
5:H:30:DA:H2''	5:H:31:DA:OP2	2.16	0.45
1:B:258:THR:HG22	1:B:272:TRP:CD2	2.52	0.45
1:D:284:PRO:HB3	1:D:312:ILE:HG12	1.98	0.45
1:B:283:ASP:O	1:B:286:ILE:HG12	2.16	0.45
1:B:421:PHE:HB3	1:B:425:ARG:NH1	2.31	0.45
1:B:421:PHE:CD2	1:B:535:PRO:HB2	2.52	0.45
1:C:226:HIS:HB2	1:C:242:GLY:HA3	1.98	0.45
1:D:223:ILE:O	1:D:227:LYS:HE3	2.17	0.45
5:H:27:DC:H2''	5:H:28:DC:OP2	2.17	0.45
1:A:277:VAL:HA	1:A:280:ILE:HD12	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:368:CYS:HB2	1:D:400:GLN:HG3	1.99	0.45
1:D:383:ASP:HB3	1:D:409:MET:SD	2.55	0.45
1:B:295:TYR:HA	1:B:307:ILE:HA	1.98	0.45
1:B:427:ALA:HA	1:B:433:THR:OG1	2.17	0.45
1:D:208:PRO:HD2	1:D:256:VAL:HG22	1.99	0.45
1:B:314:ARG:NH1	1:B:321:PRO:HD3	2.31	0.45
1:B:335:TRP:O	1:B:339:GLN:HG2	2.16	0.45
1:A:314:ARG:NH1	1:A:470:ALA:HB2	2.32	0.45
1:D:415:PHE:O	1:D:419:ARG:HG2	2.17	0.45
4:G:7:DG:C2	4:G:8:DG:C5	3.05	0.45
4:G:13:DG:C6	4:G:14:DG:C5	3.05	0.45
1:B:227:LYS:HE3	1:B:228:HIS:NE2	2.32	0.45
1:A:209:PHE:HB3	1:A:215:VAL:HG22	2.00	0.45
1:C:205:LEU:HG	1:C:210:GLU:O	2.17	0.45
1:C:579:ARG:HH11	1:C:579:ARG:HG2	1.81	0.45
1:A:263:ILE:HG21	3:E:26:DA:H5'	1.98	0.44
1:C:262:THR:HB	1:C:263:ILE:HG23	1.99	0.44
1:D:467:ALA:HB3	1:D:503:GLN:HB3	1.98	0.44
2:F:34:DG:C8	2:F:35:DT:H72	2.52	0.44
3:E:56:DG:H2''	3:E:57:DG:C8	2.51	0.44
5:H:9:DG:H2''	5:H:10:DA:C8	2.52	0.44
1:D:295:TYR:HA	1:D:307:ILE:HA	1.99	0.44
1:D:453:LYS:HB3	1:D:457:ARG:NH2	2.32	0.44
1:B:318:THR:O	1:B:319:LEU:HG	2.17	0.44
1:B:524:ASP:HA	1:B:527:PHE:HB2	1.99	0.44
1:D:134:HIS:CB	1:D:138:ARG:HH21	2.30	0.44
1:D:152:LYS:HE3	5:H:31:DA:OP1	2.18	0.44
1:D:385:TYR:CE2	1:D:409:MET:HG2	2.52	0.44
1:D:461:VAL:HG23	1:D:510:LEU:HD21	1.99	0.44
4:G:25:DT:H2'	4:G:26:DG:H8	1.82	0.44
1:A:226:HIS:HA	1:A:229:LEU:HD12	2.00	0.44
1:D:296:LYS:HA	1:D:308:GLU:OE2	2.17	0.44
1:D:421:PHE:CD2	1:D:535:PRO:HB2	2.52	0.44
1:D:521:LEU:HB3	1:D:526:TRP:CH2	2.53	0.44
1:D:564:THR:OG1	1:D:579:ARG:HA	2.18	0.44
1:B:133:ILE:HA	1:B:136:ILE:HD12	1.99	0.44
1:A:294:ILE:HD11	1:A:311:ARG:HB2	1.99	0.44
1:C:345:ARG:CZ	4:G:18:DC:H3'	2.48	0.44
1:C:471:LEU:HD22	1:C:475:TYR:OH	2.17	0.44
2:F:52:DC:H2''	2:F:53:DT:H5'	2.00	0.44
1:B:200:HIS:NE2	1:B:329:ILE:HG13	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:184:ILE:HG23	1:A:191:VAL:HG23	1.99	0.44
1:C:215:VAL:HG12	1:C:219:TRP:CE2	2.52	0.44
1:C:368:CYS:SG	1:C:389:ARG:HD3	2.57	0.44
1:C:411:ALA:HB1	1:C:576:ILE:HB	1.98	0.44
1:D:217:ARG:HH21	1:D:329:ILE:HA	1.82	0.44
1:B:218:TRP:O	1:B:222:GLU:HG2	2.17	0.44
1:D:361:MET:HE2	1:D:551:ARG:HG3	2.00	0.44
5:H:25:DA:H2''	5:H:26:DG:C8	2.52	0.44
1:B:153:ILE:HD11	3:E:32:DG:H21	1.82	0.44
1:B:478:ARG:HH12	1:B:489:ARG:HG2	1.83	0.44
4:G:29:DC:H2'	4:G:30:DT:C6	2.52	0.44
4:G:41:DG:N2	5:H:21:DG:C2	2.86	0.44
1:B:215:VAL:HG11	1:B:251:MET:HE3	1.99	0.44
1:A:159:LEU:HD13	1:A:186:ARG:CZ	2.47	0.44
1:A:358:LEU:HD13	1:A:561:ILE:HD12	1.99	0.44
1:A:430:ASP:HB3	1:A:433:THR:OG1	2.18	0.44
1:A:483:TYR:O	1:A:489:ARG:HG3	2.18	0.44
1:C:172:PRO:HG3	1:C:285:ARG:NH1	2.33	0.44
1:C:283:ASP:O	1:C:286:ILE:HG12	2.17	0.44
1:C:405:CYS:O	1:C:405:CYS:SG	2.76	0.44
2:F:30:DA:C6	2:F:31:DA:C6	3.06	0.43
1:B:386:ARG:NH1	2:F:11:DC:H41	2.17	0.43
1:A:405:CYS:CB	1:A:565:LYS:HA	2.47	0.43
1:B:366:CYS:HB2	1:B:387:CYS:HB3	1.99	0.43
1:B:483:TYR:HD2	1:B:488:GLY:O	2.01	0.43
1:A:449:GLU:HB3	1:A:454:SER:HB3	2.00	0.43
1:C:471:LEU:HD12	1:C:503:GLN:OE1	2.18	0.43
1:D:283:ASP:O	1:D:286:ILE:HG12	2.18	0.43
1:C:265:LYS:HD2	1:C:265:LYS:N	2.33	0.43
1:D:287:ALA:HA	1:D:330:ILE:O	2.18	0.43
4:G:28:DC:H2''	4:G:29:DC:C6	2.54	0.43
4:G:47:DG:C8	4:G:48:DT:H72	2.53	0.43
1:A:331:GLU:OE1	1:A:332:PRO:HD2	2.18	0.43
4:G:26:DG:C2	5:H:36:DA:C2	3.07	0.43
1:B:460:LEU:HD12	1:B:513:LEU:HD12	2.01	0.43
1:D:376:ARG:NH2	1:D:409:MET:HE1	2.34	0.43
3:E:8:DA:C4	3:E:9:DG:C8	3.06	0.43
1:B:135:LEU:HA	1:B:138:ARG:HD2	2.00	0.43
1:B:277:VAL:HA	1:B:280:ILE:HD12	2.00	0.43
1:C:349:LYS:HD2	4:G:19:DA:N3	2.34	0.43
1:B:243:SER:HB3	1:B:345:ARG:HH22	1.83	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:347:ARG:NE	4:G:18:DC:H4'	2.34	0.43
1:D:352:SER:HA	4:G:44:DC:H5'	2.00	0.43
1:D:559:ASP:CG	1:D:585:ALA:HA	2.43	0.43
1:A:364:LEU:HG	1:A:372:MET:HB3	2.01	0.43
1:A:586:LYS:O	1:A:587:PRO:C	2.60	0.43
1:D:215:VAL:HG12	1:D:219:TRP:CE2	2.54	0.43
1:D:235:SER:OG	4:G:48:DT:H1'	2.19	0.43
1:B:200:HIS:CD2	1:B:326:CYS:HB2	2.54	0.43
1:B:586:LYS:HD3	1:B:586:LYS:HA	1.61	0.43
1:A:218:TRP:O	1:A:222:GLU:HG2	2.19	0.43
1:D:235:SER:CB	4:G:48:DT:H1'	2.49	0.42
1:D:486:PRO:N	1:D:489:ARG:HH21	2.17	0.42
4:G:43:DG:H2'	4:G:44:DC:O4'	2.19	0.42
1:D:236:GLN:O	5:H:16:DC:H5''	2.20	0.42
2:F:51:DA:C2	3:E:11:DG:C2	3.07	0.42
4:G:21:DG:H2''	4:G:22:DG:C8	2.54	0.42
1:B:425:ARG:HH22	1:B:528:PRO:HD2	1.85	0.42
1:A:513:LEU:HD23	1:A:513:LEU:HA	1.83	0.42
1:C:347:ARG:NH2	4:G:17:DC:H1'	2.34	0.42
1:C:585:ALA:O	1:C:586:LYS:HD2	2.19	0.42
1:D:233:PRO:HB2	4:G:46:DC:H2''	2.01	0.42
1:D:524:ASP:HA	1:D:527:PHE:HB2	2.00	0.42
1:D:570:ARG:HH21	4:G:49:DA:H4'	1.84	0.42
3:E:30:DT:C2'	3:E:31:DT:H71	2.50	0.42
1:A:287:ALA:HB2	1:A:335:TRP:CG	2.55	0.42
1:C:266:LYS:HD3	4:G:25:DT:H5'	2.01	0.42
1:C:372:MET:HA	1:C:386:ARG:O	2.19	0.42
1:C:385:TYR:CE2	1:C:409:MET:HG3	2.54	0.42
1:D:224:LYS:HA	1:D:227:LYS:NZ	2.34	0.42
1:D:502:ARG:NE	1:D:502:ARG:HA	2.34	0.42
2:F:26:DA:H2''	2:F:27:DC:C6	2.54	0.42
1:B:311:ARG:NH1	1:B:473:GLU:HB3	2.35	0.42
1:B:386:ARG:HH12	2:F:11:DC:H41	1.67	0.42
1:A:295:TYR:OH	2:F:36:DT:H2'	2.19	0.42
1:C:287:ALA:HA	1:C:330:ILE:O	2.20	0.42
1:C:347:ARG:HH22	4:G:17:DC:H1'	1.85	0.42
2:F:53:DT:H6	2:F:53:DT:H2'	1.67	0.42
1:B:167:VAL:HG12	3:E:35:DT:H4'	2.00	0.42
1:A:157:LYS:HD2	2:F:35:DT:H5''	2.01	0.42
1:A:293:VAL:HG22	1:A:310:TYR:HE1	1.84	0.42
1:B:281:LEU:HB3	1:B:338:LEU:HD21	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:569:GLY:O	2:F:8:DA:H4'	2.20	0.42
1:A:213:PRO:HB2	1:A:217:ARG:NH2	2.34	0.42
1:C:424:ILE:HG22	1:C:527:PHE:CZ	2.50	0.42
1:D:524:ASP:HA	1:D:527:PHE:HD2	1.85	0.42
3:E:19:DT:C2	3:E:20:DG:N7	2.88	0.42
5:H:11:DG:H4'	5:H:12:DT:H5'	2.01	0.42
1:B:313:GLN:O	1:B:321:PRO:HA	2.20	0.42
1:B:475:TYR:HB3	1:D:491:HIS:CE1	2.55	0.42
1:A:266:LYS:CE	3:E:25:DA:H3'	2.46	0.42
1:A:561:ILE:HD13	1:A:582:ILE:HG12	2.01	0.42
1:C:356:ALA:HA	1:C:376:ARG:HH21	1.84	0.42
2:F:23:DA:H2''	2:F:24:DG:H8	1.85	0.42
4:G:52:DC:H2''	4:G:53:DC:C5	2.53	0.42
1:D:523:LEU:HD23	1:D:526:TRP:CZ3	2.55	0.42
1:B:478:ARG:HH22	1:B:489:ARG:HG2	1.85	0.42
1:A:281:LEU:HD13	1:A:338:LEU:HD11	2.01	0.42
1:C:134:HIS:HB3	1:C:138:ARG:HH12	1.84	0.42
1:D:367:GLU:CD	1:D:564:THR:HG22	2.45	0.42
5:H:51:DC:H6	5:H:51:DC:H2'	1.69	0.42
1:B:163:LEU:HD22	1:B:182:LYS:HB3	2.02	0.41
1:A:460:LEU:HD12	1:A:513:LEU:HD12	2.01	0.41
1:C:502:ARG:HA	1:C:502:ARG:NE	2.35	0.41
1:D:350:GLY:HA3	4:G:45:DG:O5'	2.20	0.41
3:E:52:DG:H2''	3:E:53:DT:OP2	2.19	0.41
1:B:283:ASP:HB3	1:B:286:ILE:HG23	2.01	0.41
1:A:348:GLY:H	3:E:17:DA:H1'	1.85	0.41
1:C:172:PRO:HG3	1:C:285:ARG:HH12	1.85	0.41
1:A:314:ARG:CZ	1:A:470:ALA:HB2	2.50	0.41
1:D:471:LEU:HD23	1:D:471:LEU:HA	1.95	0.41
2:F:10:DG:C6	3:E:52:DG:N1	2.87	0.41
2:F:20:DG:H2''	2:F:21:DA:C8	2.56	0.41
1:B:161:ARG:HG3	1:B:167:VAL:HG21	2.03	0.41
1:A:374:SER:HB3	2:F:48:DG:OP2	2.20	0.41
1:C:483:TYR:HD2	1:C:492:PHE:HB2	1.83	0.41
1:D:173:TYR:CE1	1:D:259:ARG:HB2	2.55	0.41
3:E:41:DC:H4'	3:E:42:DA:H5'	2.03	0.41
4:G:4:DC:H4'	4:G:5:DG:OP1	2.21	0.41
4:G:19:DA:N1	5:H:42:DT:O2	2.53	0.41
1:B:231:PHE:O	1:B:233:PRO:HD3	2.20	0.41
1:B:489:ARG:HB3	1:B:493:ARG:HH21	1.86	0.41
1:A:494:LYS:HG3	1:A:495:GLN:OE1	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:172:PRO:HA	5:H:37:DC:O3'	2.20	0.41
1:C:295:TYR:HA	1:C:307:ILE:HA	2.03	0.41
1:C:477:ASP:O	1:C:480:ALA:HB3	2.20	0.41
3:E:29:DT:H2'	3:E:30:DT:H71	2.01	0.41
1:A:209:PHE:CE1	1:A:218:TRP:HB2	2.56	0.41
1:C:423:LYS:HE3	1:C:584:TRP:CZ2	2.56	0.41
2:F:10:DG:H1'	2:F:11:DC:H5'	2.02	0.41
5:H:18:DC:C2	5:H:19:DC:C5	3.09	0.41
1:B:163:LEU:HB3	1:B:182:LYS:HD2	2.02	0.41
1:A:160:GLN:HA	1:A:163:LEU:HD12	2.03	0.41
1:C:168:GLY:HA3	5:H:36:DA:H5'	2.02	0.41
1:D:373:THR:CG2	1:D:388:ARG:HG3	2.51	0.41
1:B:359:SER:HB2	1:B:373:THR:HA	2.02	0.41
1:C:213:PRO:HA	1:C:216:ILE:HD12	2.02	0.41
1:D:254:ASP:HB2	1:D:256:VAL:HG23	2.02	0.41
1:D:346:GLY:HA2	5:H:19:DC:OP1	2.21	0.41
1:B:379:GLU:HB3	1:B:382:LYS:HB2	2.03	0.41
1:A:306:LYS:NZ	3:E:20:DG:H2'	2.36	0.41
1:A:330:ILE:HG23	1:A:334:GLU:HB2	2.03	0.41
1:C:283:ASP:HB3	1:C:286:ILE:HG23	2.03	0.41
1:D:218:TRP:O	1:D:222:GLU:HG2	2.21	0.41
2:F:16:DA:H2''	2:F:17:DA:C8	2.56	0.41
2:F:32:DA:H1'	2:F:33:DG:C8	2.56	0.41
4:G:19:DA:H61	5:H:42:DT:H3	1.68	0.41
4:G:26:DG:C4	4:G:27:DC:C4	3.09	0.41
4:G:34:DG:C2	4:G:35:DC:C2	3.09	0.41
5:H:26:DG:H2''	5:H:27:DC:C6	2.55	0.41
1:D:277:VAL:O	1:D:281:LEU:HG	2.21	0.41
1:B:489:ARG:HD3	1:D:473:GLU:OE1	2.21	0.40
1:B:513:LEU:HD23	1:B:513:LEU:HA	1.85	0.40
1:D:324:LEU:HD23	1:D:324:LEU:HA	1.86	0.40
1:A:265:LYS:CE	3:E:26:DA:H3'	2.50	0.40
1:A:358:LEU:HD23	1:A:361:MET:SD	2.62	0.40
1:D:440:ALA:HB1	1:D:556:LEU:HB3	2.02	0.40
3:E:47:DG:C4	3:E:48:DG:C8	3.09	0.40
1:A:335:TRP:O	1:A:339:GLN:HG2	2.21	0.40
1:C:373:THR:O	1:C:385:TYR:HA	2.21	0.40
1:C:527:PHE:HB3	1:C:528:PRO:HD2	2.03	0.40
1:D:152:LYS:HG3	5:H:30:DA:H4'	2.04	0.40
1:D:173:TYR:CD1	1:D:259:ARG:HB2	2.56	0.40
1:A:572:GLN:NE2	3:E:6:DG:H21	2.18	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:135:LEU:HD12	1:C:135:LEU:HA	1.93	0.40
1:C:254:ASP:HB2	1:C:256:VAL:HG23	2.03	0.40
2:F:43:DG:N2	3:E:19:DT:C2	2.90	0.40
1:B:483:TYR:CD2	1:B:492:PHE:HB2	2.57	0.40
1:A:226:HIS:CG	1:A:241:PRO:HB2	2.56	0.40
1:A:319:LEU:HD21	1:A:470:ALA:CB	2.51	0.40
1:C:258:THR:HB	5:H:39:DC:OP2	2.21	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	459/625 (73%)	438 (95%)	20 (4%)	1 (0%)	44	78
1	B	459/625 (73%)	448 (98%)	11 (2%)	0	100	100
1	C	459/625 (73%)	444 (97%)	15 (3%)	0	100	100
1	D	459/625 (73%)	450 (98%)	9 (2%)	0	100	100
All	All	1836/2500 (73%)	1780 (97%)	55 (3%)	1 (0%)	50	83

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	587	PRO

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	375/508 (74%)	368 (98%)	7 (2%)	52	69
1	B	375/508 (74%)	367 (98%)	8 (2%)	48	66
1	C	375/508 (74%)	363 (97%)	12 (3%)	34	53
1	D	375/508 (74%)	371 (99%)	4 (1%)	70	80
All	All	1500/2032 (74%)	1469 (98%)	31 (2%)	49	66

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	152	LYS
1	B	178	VAL
1	B	239	ILE
1	B	262	THR
1	B	409	MET
1	B	471	LEU
1	B	523	LEU
1	B	586	LYS
1	A	191	VAL
1	A	232	LYS
1	A	244	ILE
1	A	262	THR
1	A	302	THR
1	A	474	LEU
1	A	495	GLN
1	C	210	GLU
1	C	232	LYS
1	C	252	ASP
1	C	262	THR
1	C	311	ARG
1	C	387	CYS
1	C	428	GLU
1	C	452	GLU
1	C	463	GLU
1	C	473	GLU
1	C	514	GLU
1	C	574	THR
1	D	244	ILE
1	D	390	ARG
1	D	514	GLU

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Mol	Chain	Res	Type
1	D	561	ILE

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

Mol	Chain	Res	Type
1	B	158	ASN
1	B	196	ASN
1	B	226	HIS
1	B	401	HIS
1	B	406	ASN
1	B	459	ASN
1	B	491	HIS
1	B	503	GLN
1	A	134	HIS
1	A	158	ASN
1	A	160	GLN
1	A	196	ASN
1	A	400	GLN
1	A	401	HIS
1	A	503	GLN
1	A	572	GLN
1	C	158	ASN
1	C	160	GLN
1	C	355	GLN
1	C	406	ASN
1	C	504	GLN
1	D	313	GLN
1	D	406	ASN

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

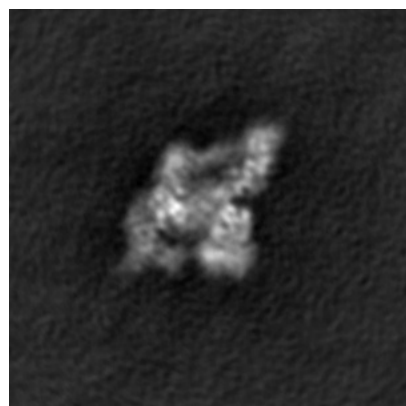
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-52811. These allow visual inspection of the internal detail of the map and identification of artifacts.

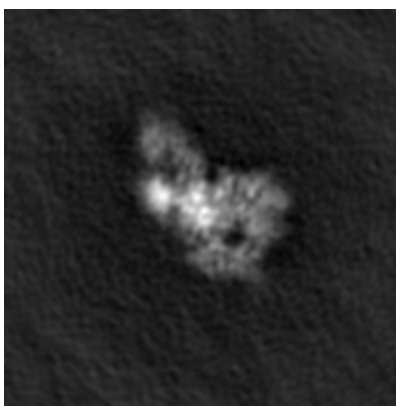
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

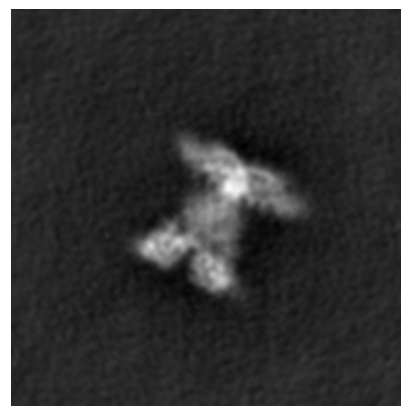
6.1.1 Primary map



X

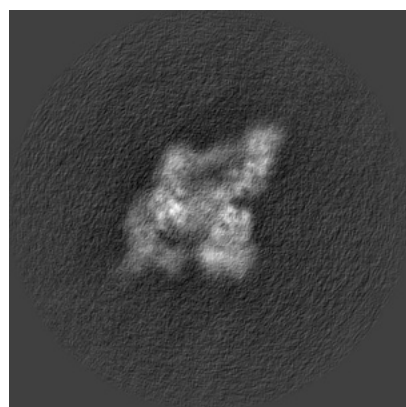


Y

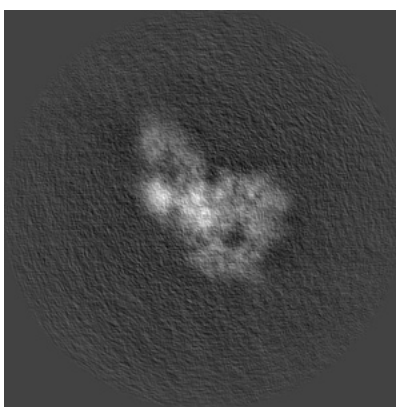


Z

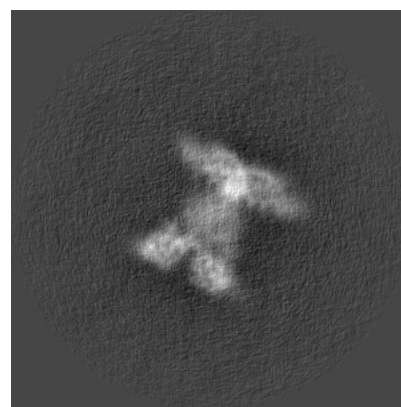
6.1.2 Raw map



X



Y

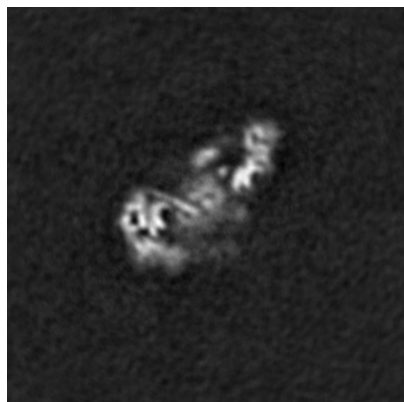


Z

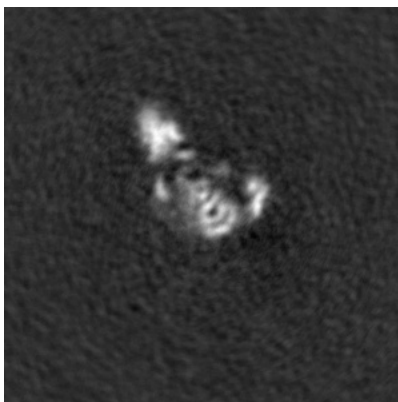
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 160

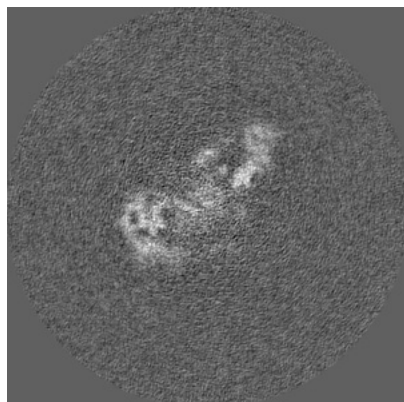


Y Index: 160

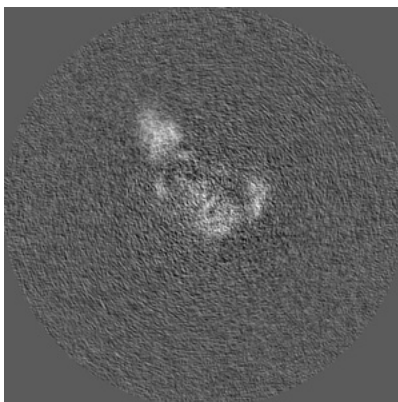


Z Index: 160

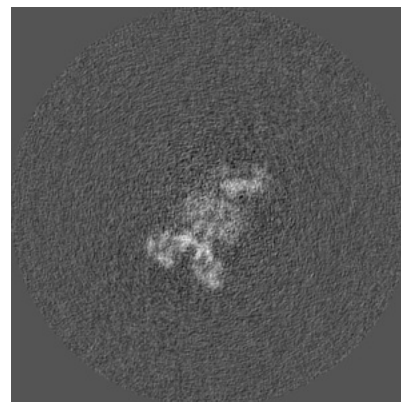
6.2.2 Raw map



X Index: 160



Y Index: 160

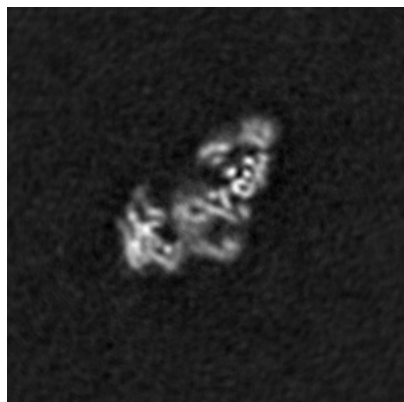


Z Index: 160

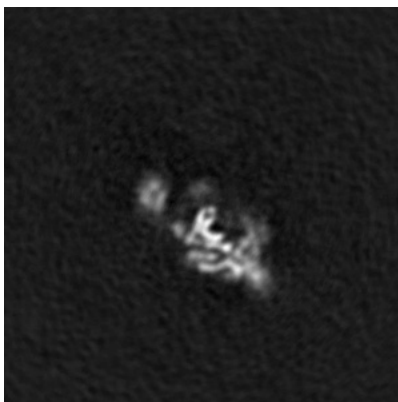
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

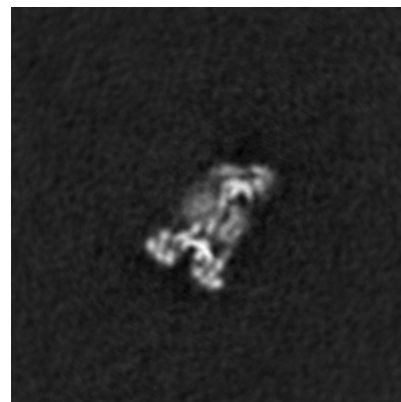
6.3.1 Primary map



X Index: 169

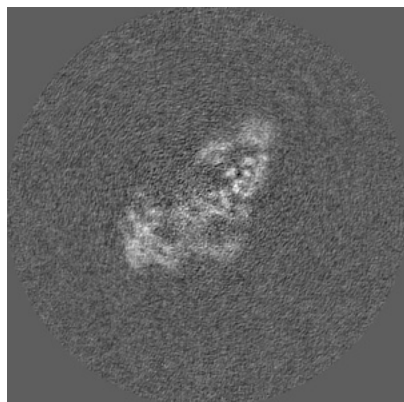


Y Index: 131

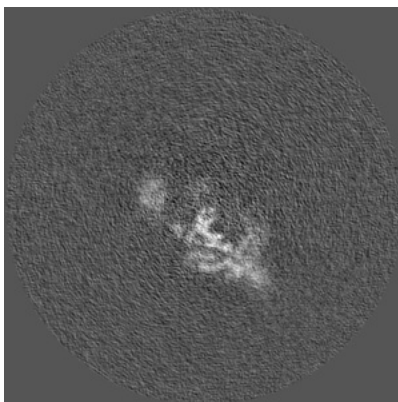


Z Index: 158

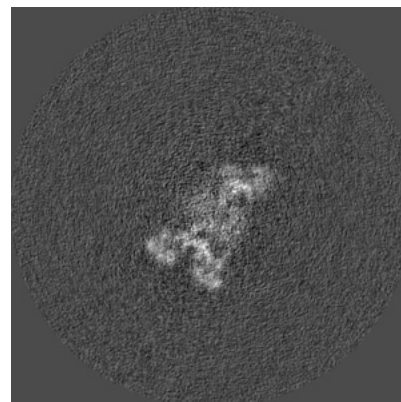
6.3.2 Raw map



X Index: 169



Y Index: 131

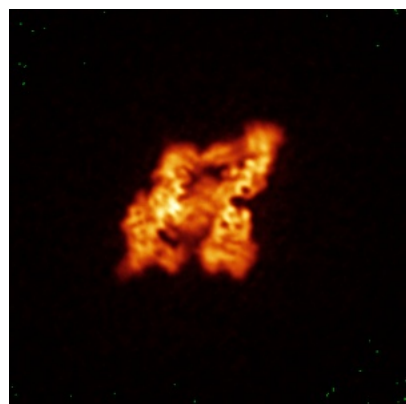


Z Index: 158

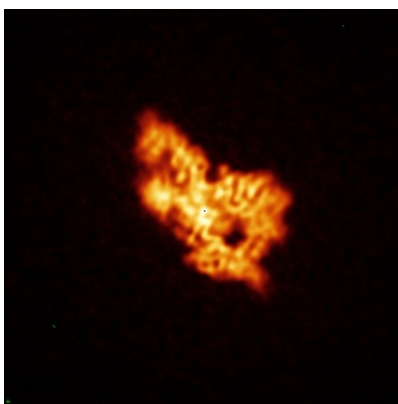
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



X

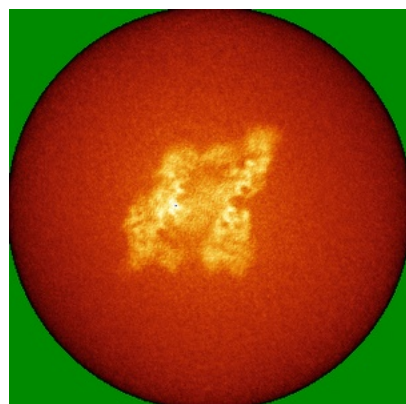


Y

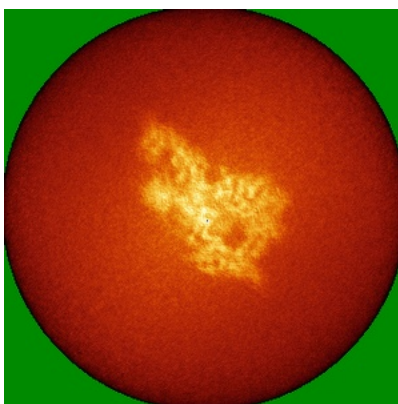


Z

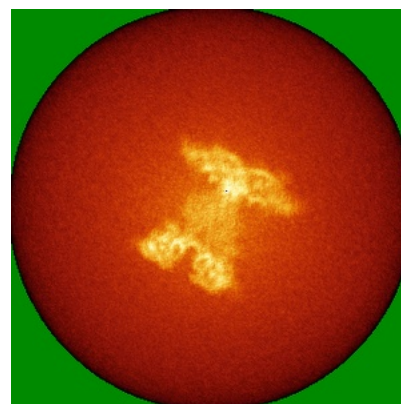
6.4.2 Raw map



X



Y

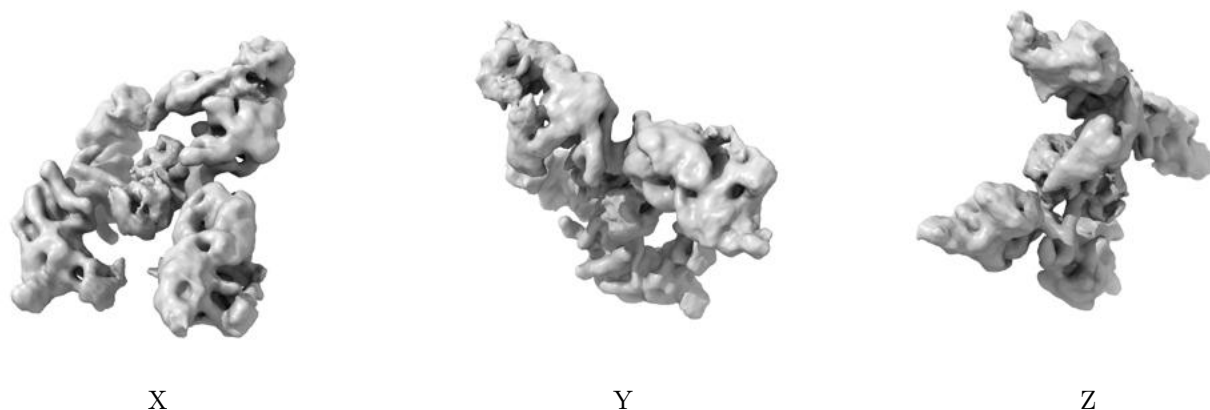


Z

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.

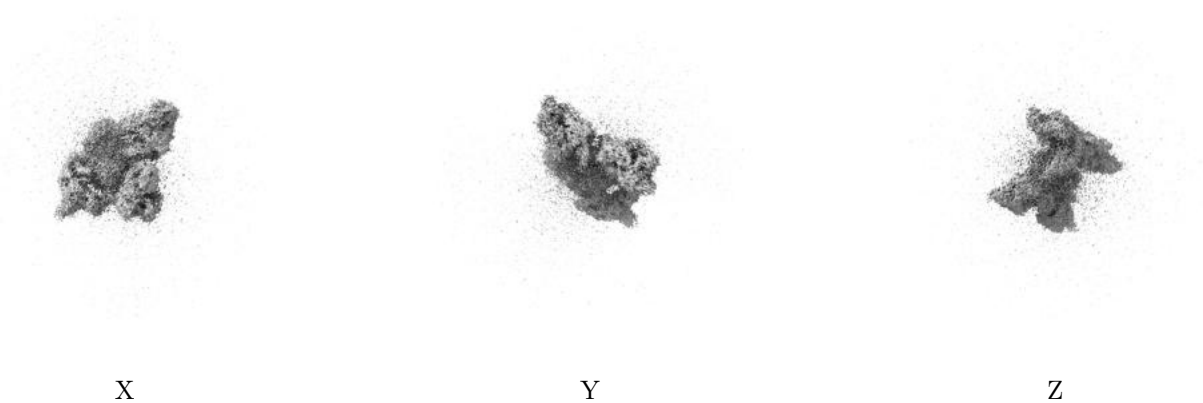
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0135. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

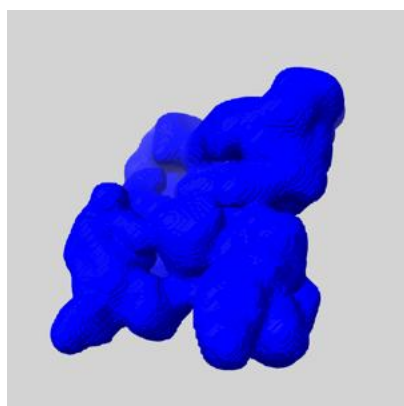
6.6 Mask visualisation [i](#)

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

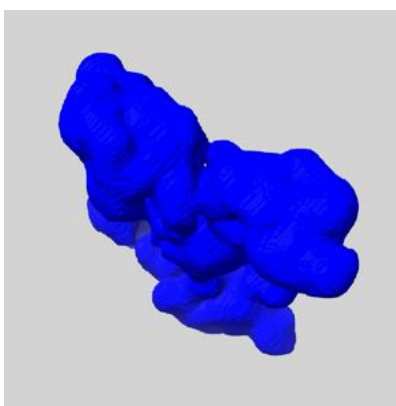
A mask typically either:

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

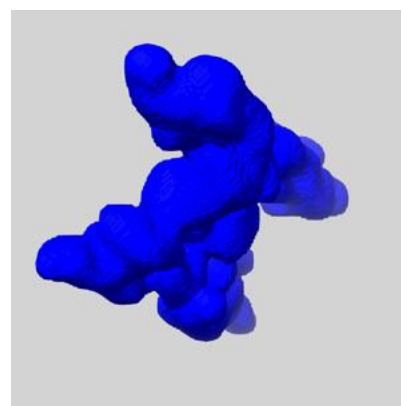
6.6.1 emd_52811_msk_1.map [i](#)



X



Y

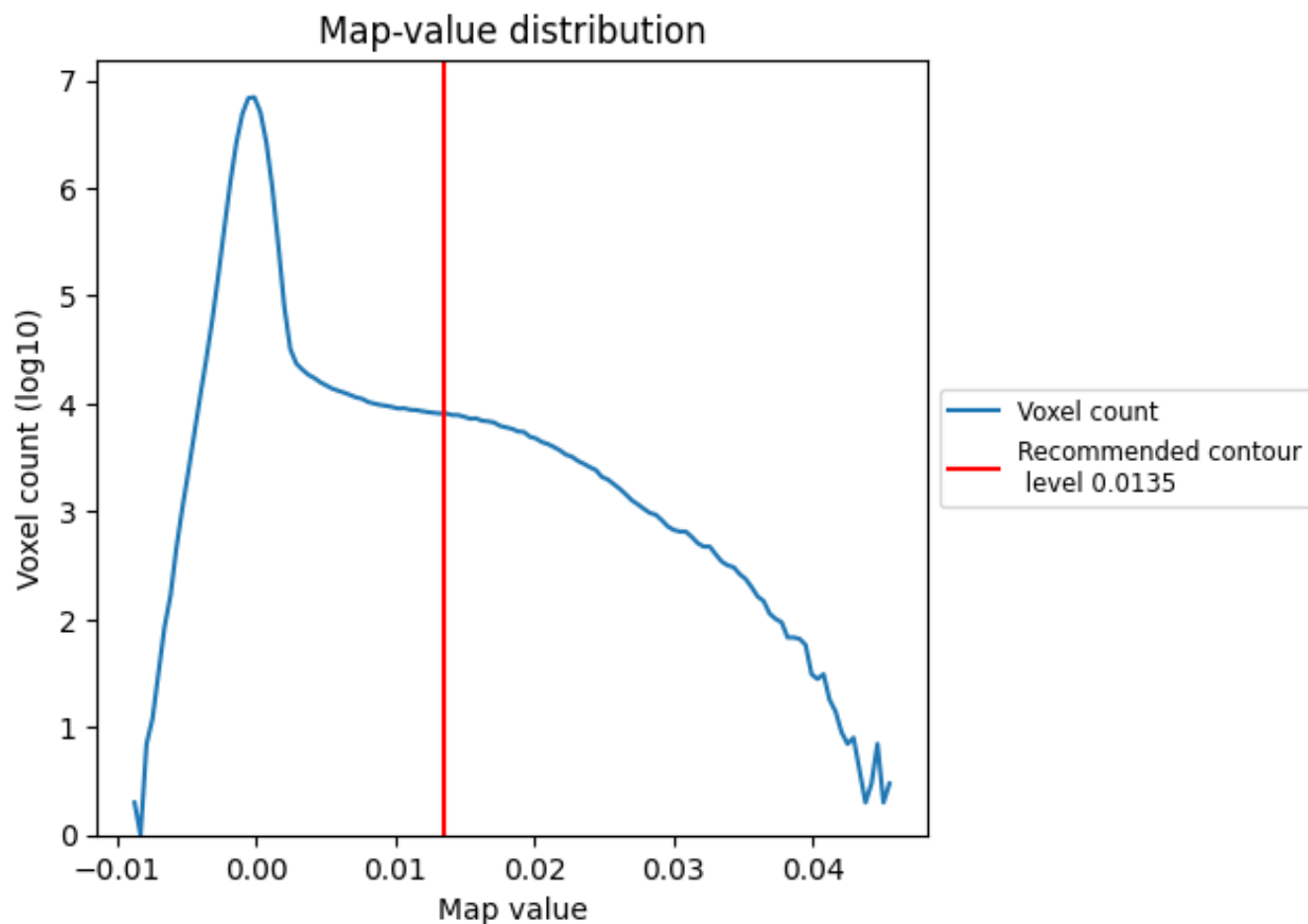


Z

7 Map analysis [i](#)

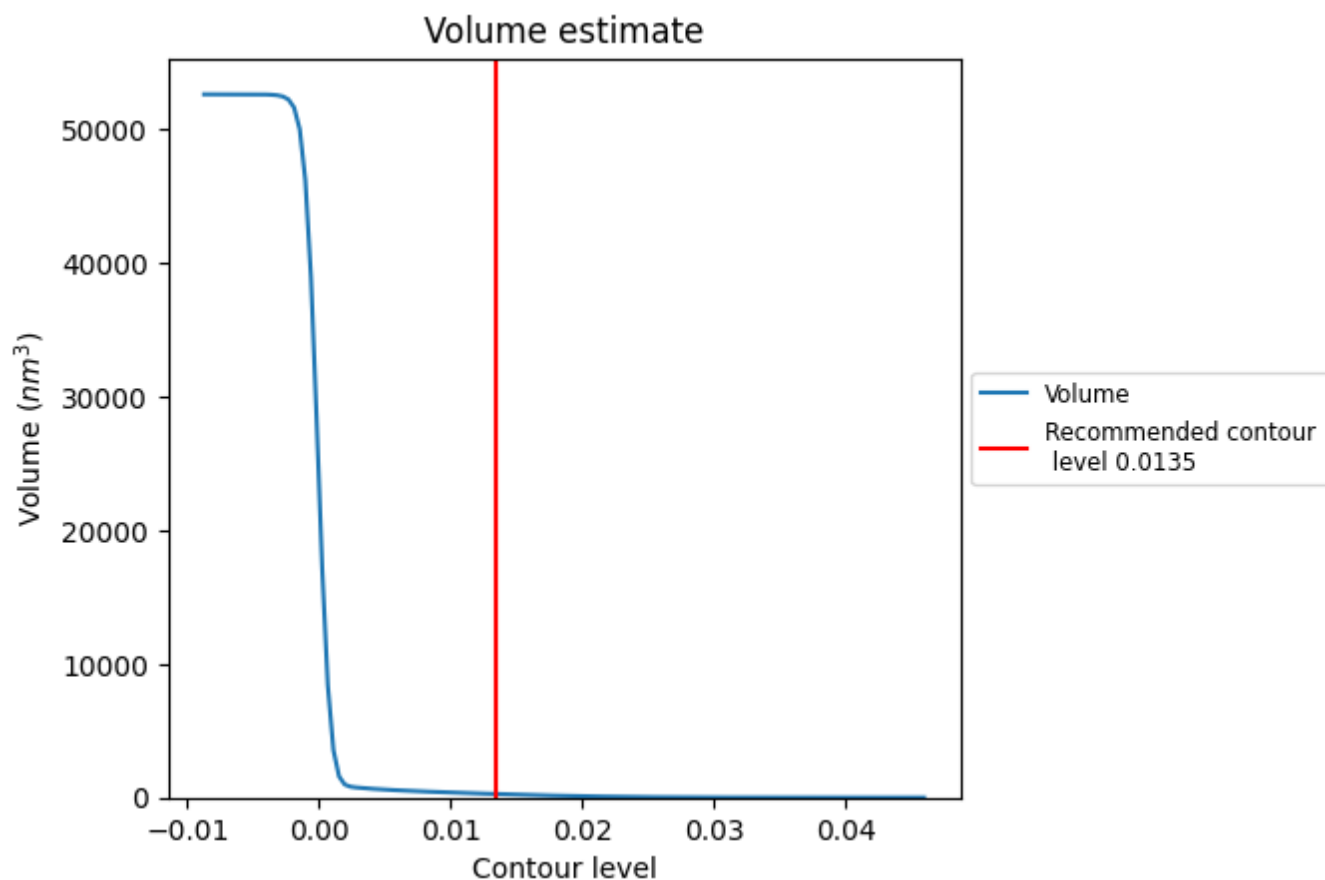
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

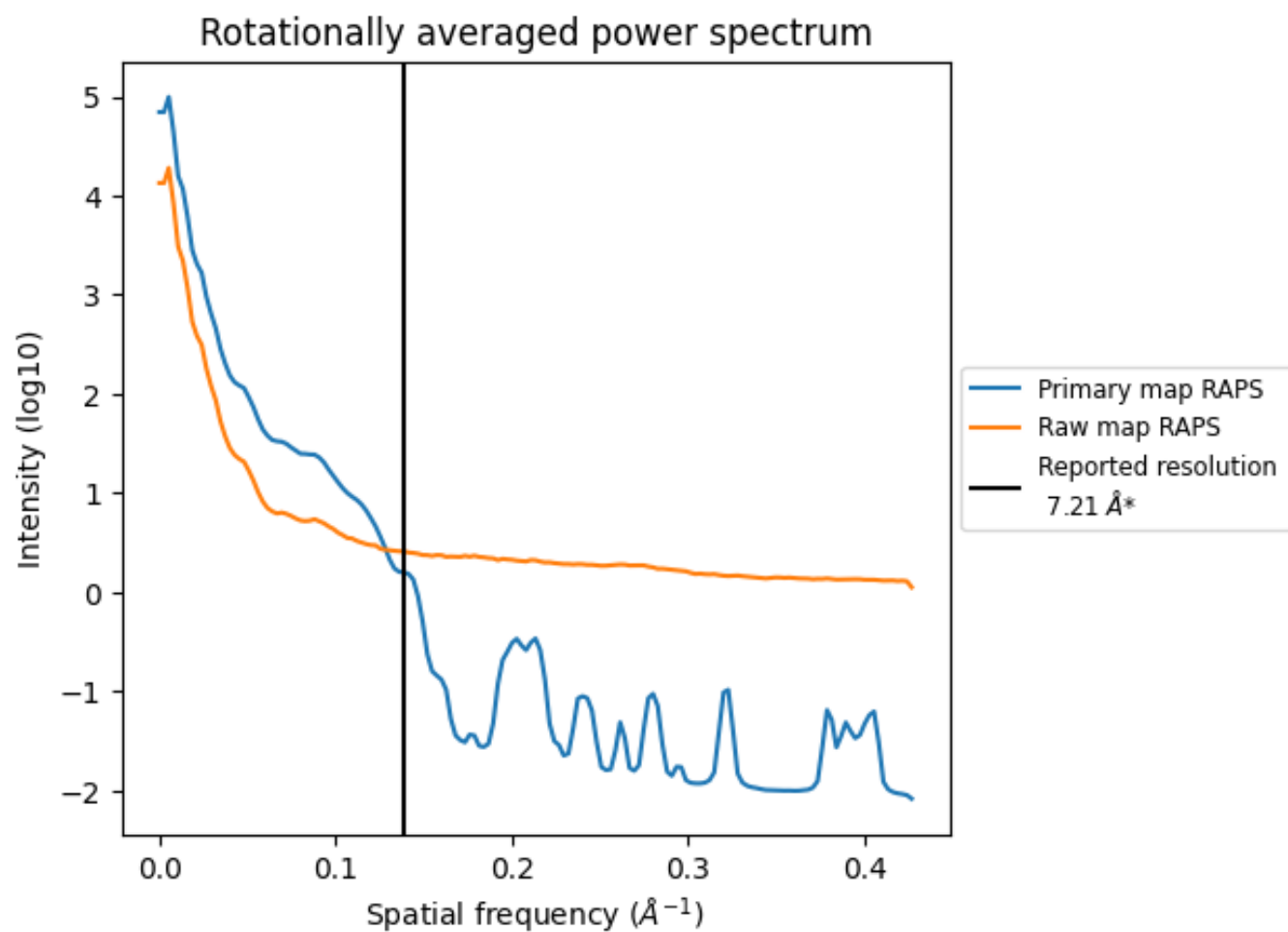
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 266 nm^3 ; this corresponds to an approximate mass of 240 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](#)

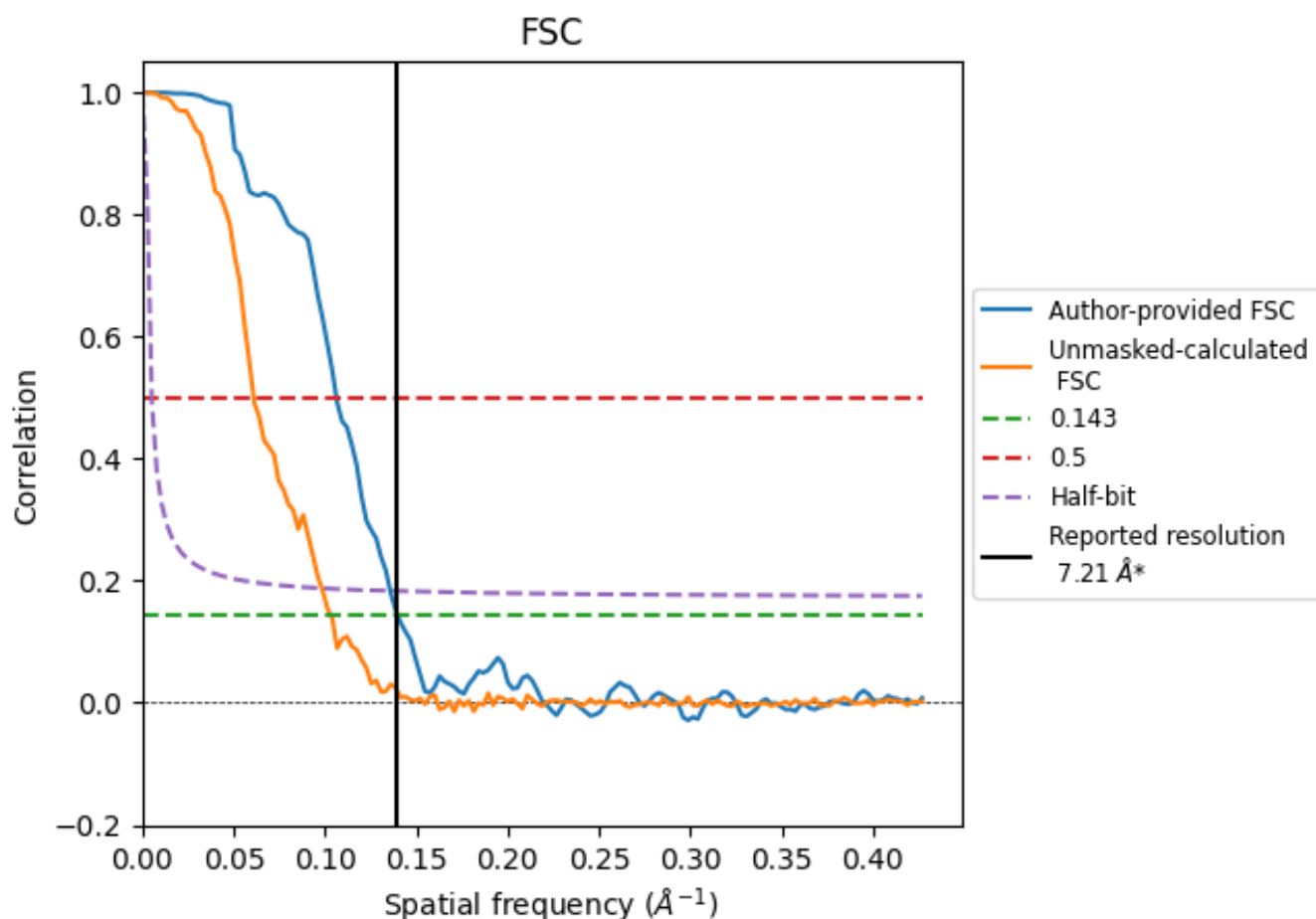


*Reported resolution corresponds to spatial frequency of 0.139 $\text{\AA}^{-1}$

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.139 Å⁻¹

8.2 Resolution estimates [i](#)

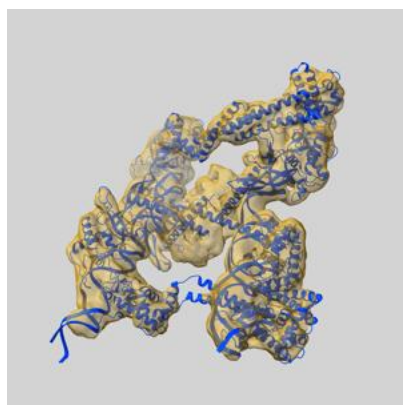
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	7.21	-	-
Author-provided FSC curve	7.15	9.40	7.36
Unmasked-calculated*	9.69	16.39	10.16

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 9.69 differs from the reported value 7.21 by more than 10 %

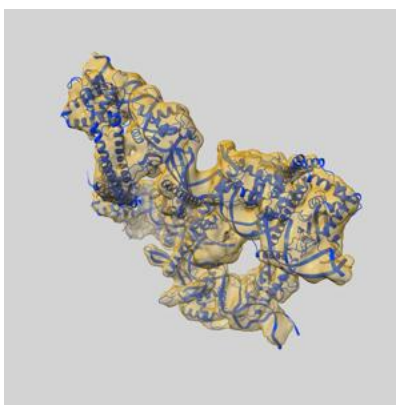
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-52811 and PDB model 9IBL. Per-residue inclusion information can be found in section [3](#) on page [8](#).

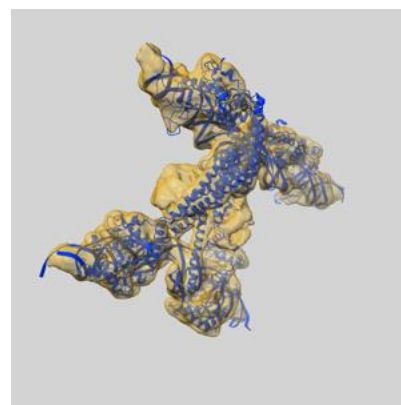
9.1 Map-model overlay [i](#)



X



Y



Z

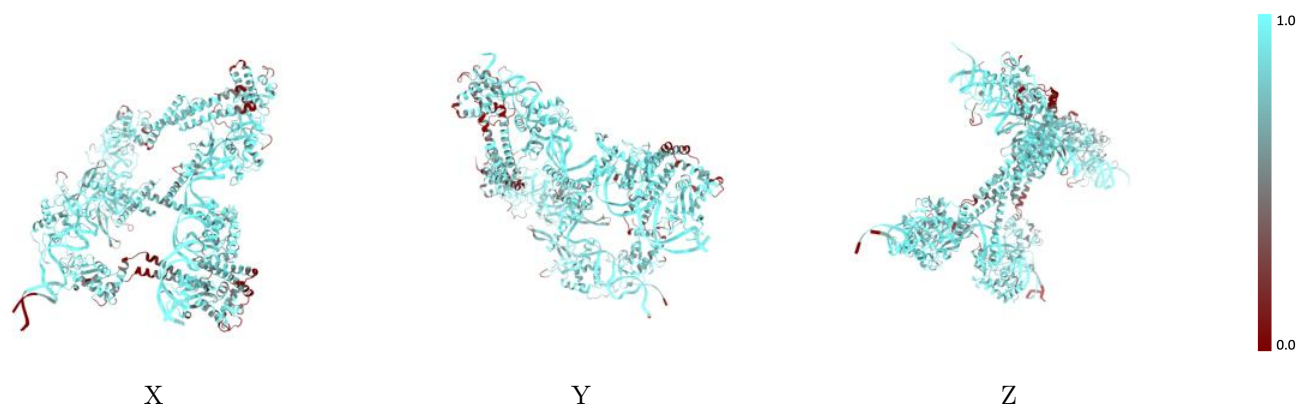
The images above show the 3D surface view of the map at the recommended contour level 0.0135 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



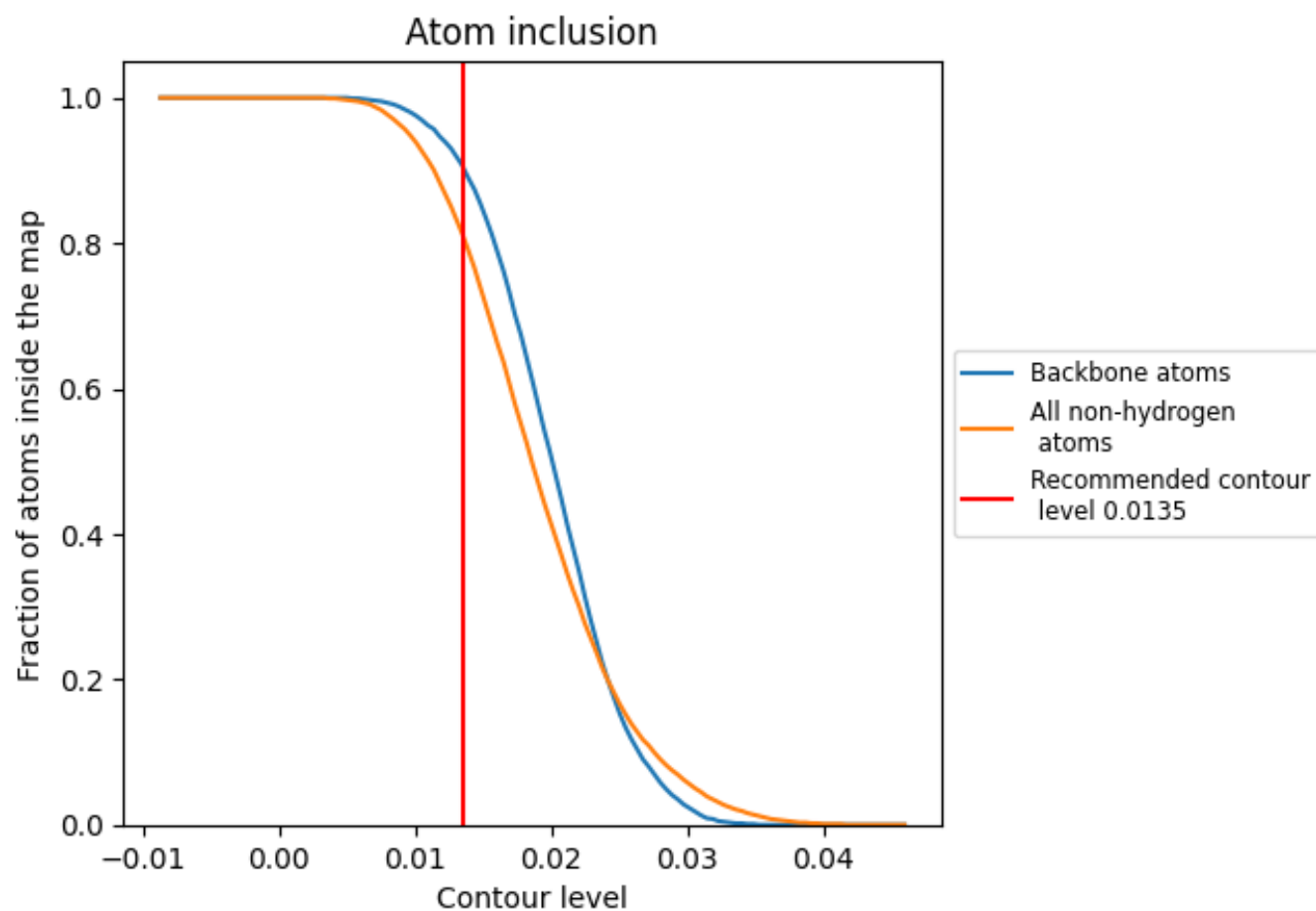
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0135).

9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 81% 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 (0.0135) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8120	0.1770
A	0.7500	0.1550
B	0.7930	0.1560
C	0.7660	0.1560
D	0.8090	0.1660
E	0.9530	0.2410
F	0.9620	0.2360
G	0.8630	0.2340
H	0.8820	0.2380

