



Full wwPDB EM Validation Report ⓘ

Oct 16, 2025 – 10:24 AM JST

PDB ID : 9UJP / pdb_00009ujp
EMDB ID : EMD-64219
Title : CryoEM structure of the T.thermophilus transcription initiation complex in the presence of Up4A
Authors : Duan, W.; Kaushik, A.; Serganov, A.
Deposited on : 2025-04-17
Resolution : 2.53 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
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) : 2.46

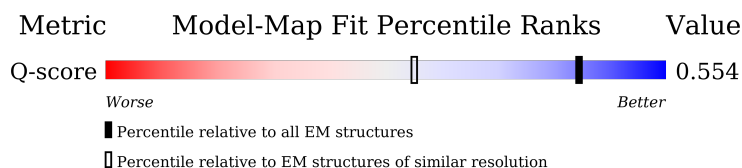
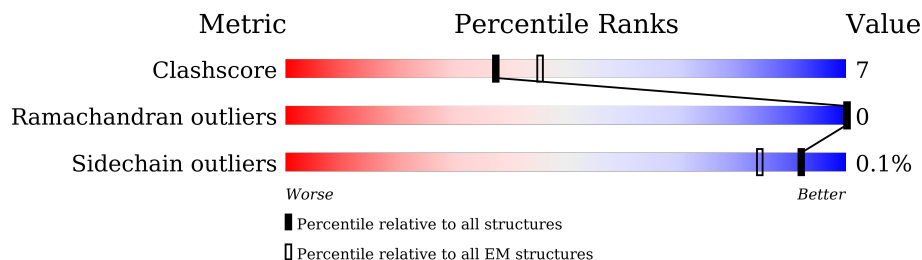
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.53 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	7309 (2.03 - 3.03)

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	315	
1	B	315	
2	C	1119	
3	D	1524	

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Mol	Chain	Length	Quality of chain
4	E	99	 81% 14% 5%
5	G	48	 46% 42% 12%
6	H	48	 46% 54%
7	F	444	 62% 13% 25%

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 28438 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 DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	224	Total	C	N	O	S	0	0
			1767	1129	307	329	2		
1	B	225	Total	C	N	O	S	0	0
			1776	1135	309	330	2		

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	1114	Total	C	N	O	S	0	0
			8794	5561	1570	1639	24		

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	1362	Total	C	N	O	S	1	0
			10755	6805	1909	2007	34		

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	94	Total	C	N	O	S	0	0
			761	486	132	139	4		

- Molecule 5 is a DNA chain called template DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	G	42	Total	C	N	O	P	0	0
			861	412	161	247	41		

- Molecule 6 is a DNA chain called non-template DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	48	Total	C	N	O	P	0	0
			987	471	183	286	47		

- Molecule 7 is a protein called RNA polymerase sigma factor SigA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	F	333	Total	C	N	O	S	0	0
			2703	1704	487	508	4		

There are 21 discrepancies between the modelled and reference sequences:

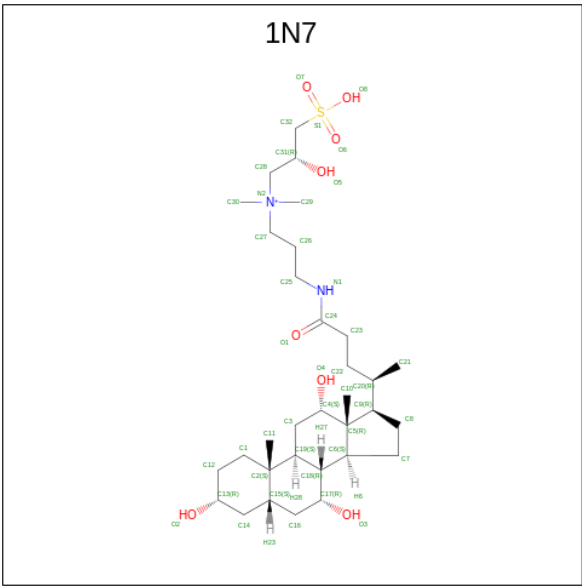
Chain	Residue	Modelled	Actual	Comment	Reference
F	-20	MET	-	initiating methionine	UNP Q5SKW1
F	-19	GLY	-	expression tag	UNP Q5SKW1
F	-18	SER	-	expression tag	UNP Q5SKW1
F	-17	SER	-	expression tag	UNP Q5SKW1
F	-16	HIS	-	expression tag	UNP Q5SKW1
F	-15	HIS	-	expression tag	UNP Q5SKW1
F	-14	HIS	-	expression tag	UNP Q5SKW1
F	-13	HIS	-	expression tag	UNP Q5SKW1
F	-12	HIS	-	expression tag	UNP Q5SKW1
F	-11	HIS	-	expression tag	UNP Q5SKW1
F	-10	SER	-	expression tag	UNP Q5SKW1
F	-9	SER	-	expression tag	UNP Q5SKW1
F	-8	GLY	-	expression tag	UNP Q5SKW1
F	-7	LEU	-	expression tag	UNP Q5SKW1
F	-6	VAL	-	expression tag	UNP Q5SKW1
F	-5	PRO	-	expression tag	UNP Q5SKW1
F	-4	ARG	-	expression tag	UNP Q5SKW1
F	-3	GLY	-	expression tag	UNP Q5SKW1
F	-2	SER	-	expression tag	UNP Q5SKW1
F	-1	HIS	-	expression tag	UNP Q5SKW1
F	0	MET	-	expression tag	UNP Q5SKW1

- Molecule 8 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
8	A	1	Total	Mg	0
			1	1	
8	D	2	Total	Mg	0
			2	2	

- Molecule 9 is CHAPSO (CCD ID: 1N7) (formula: C₃₂H₅₉N₂O₈S) (labeled as "Ligand of

Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
9	B	1	Total	C	N	O	0
			29	24	1	4	

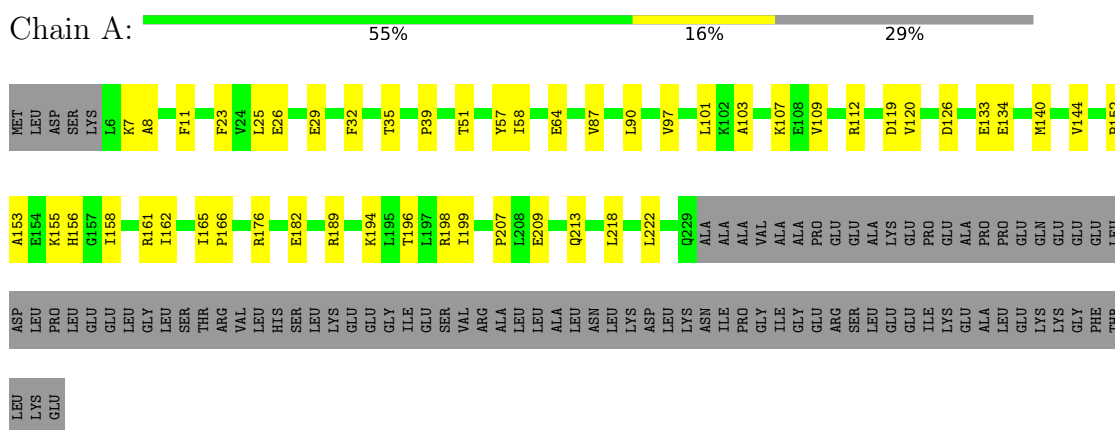
- Molecule 10 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
10	D	2	Total	Zn	0
			2	2	

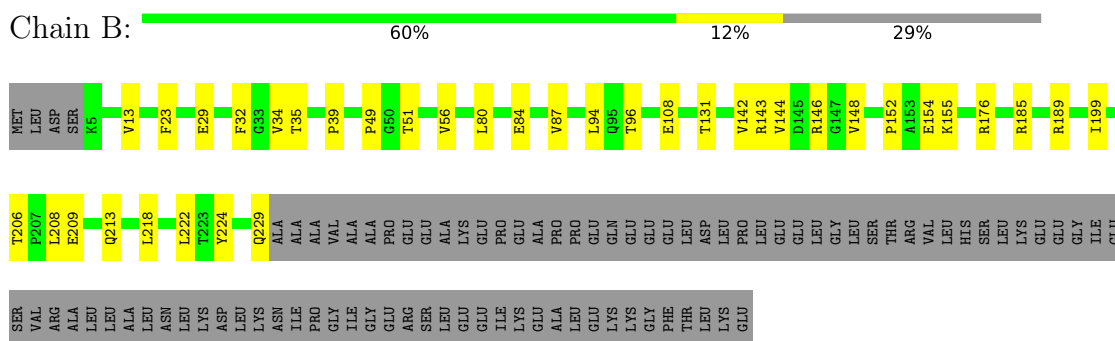
3 Residue-property plots [i](#)

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.

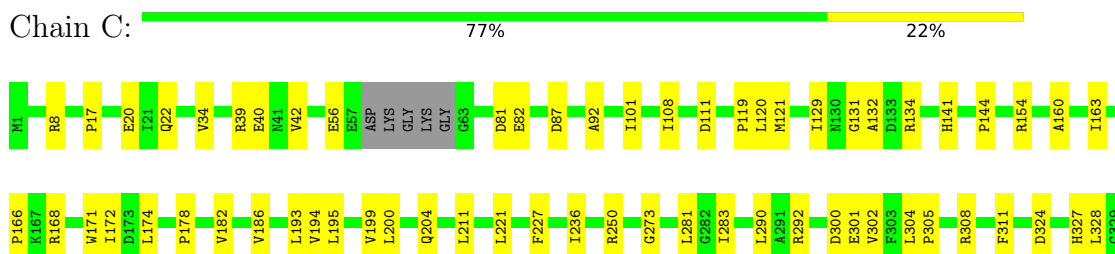
- Molecule 1: DNA-directed RNA polymerase subunit alpha



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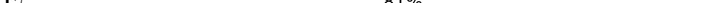
- Molecule 2: DNA-directed RNA polymerase subunit beta





Y1207	S945	L711	R493	THR	ARG	V213	MET
M1211	I949	L720	K494	PHE	GLU	K3	LYS
A1212	D952	L724	L496	LEU	GLU	K217	E4
R1213	E966	Q724	R508	TRP	PRO	LYS	V5
I1229	E966	D741	P509	THR	VAL	GLU	R6
L1236	K970	H748	E510	E341	ALA	ARG	S20
T1237	K996	R748	W511	Q348	TYR	LEU	Y23
M1238	K996	A759	F335	K351	PHE	ARG	N33
ARG	K1009	R760	A536	T357	LEU	LEU	T36
THR	N1010	M763	T357	V361	VAL	PRO	L37
PHE	E1013	L778	N541	D365	GLY	ALA	K38
HIS	N1014	L778	R553	K366	THR	ALA	
THR	N1014	L778	L554	I367	PRO	TRP	
GLY	A1028	R783	L554	V385	LEU	VAL	Y66
GLY	A1028	R783	G561	I371	VAL	GLU	E57
VAL	R1029	T793	A562	A379	HIS	LYS	
ALA	R1042	E798	P563	V385	GLY	ALA	K64
ALA	G1043	E798	L566	I385	GLU	ALA	R65
ALA	L1044	N824	I567	I393	ILE	TYR	Q66
ASP	M1045	K840	R568	V400	VAL	PRO	
ILE	K1047	E840	N569	I393	GLU	GLY	C73
T1253	P1048	Y841	E570	V400	GLY	GLU	E74
		V842	K571	F403	GLN	ILE	C76
K1271	F1053	N845	R572	F403	PRO	LEU	
		N845			LEU	ALA	A86
I1274	P1056	R867	D579	V407	ALA	GLU	T97
V1280	V1281	R867		E408	GLU	LEU	
R1282	R1062	K871	R587	V409	ALA	PRO	H101
					ALA	GLU	I102
	L1068	R879	D624	R414	LYS	PRO	H103
F1293	I1072	F882	Y625	R414	GLY	TYR	F104
V1294				A422	LEU	LEU	V105
E1295			S629	D423	LEU	PHE	K106
S1296	R1078				ARG	ARG	
		I885	V633	K426	MET	ALA	I112
F1299	V1099	E888	G634	K426	PRO	GLU	
E1302	D1100	A889	P635	V444	ARG	GLU	Y132
Y1303	T1102		G336	R445	GLN	GLY	R162
K1304		W897	L637	R455	VAL	VAL	
	L1122	L902	L644	R455	ARG	VAL	K165
G1322	V1128		P645	A460	ALA	LEU	
P1324	T1129	Q905	K646	A460	GLN	LEU	L171
I1330		Q906	P655	L465	VAL	LYS	K187
T1331	G1146	M924	R679	E474	GLU	GLU	E190
	L1149	L930	R881	R481	GLY	GLU	L191
P1341	Y1165	Y936	E692	R488	GLY	GLY	A192
E1342	A1178		E693	A490	GLU	ALA	V195
R1346		F941			THR	PHE	V196
					VAL	VAL	S197
					VAL	LEU	V198
					TYR	LEU	L199
					LEU	ASP	

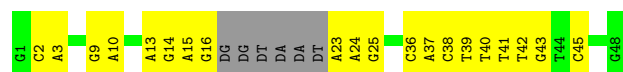
- Molecule 4: DNA-directed RNA polymerase subunit omega

Chain E:  81% 14% 5%

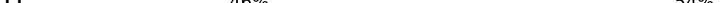


- Molecule 5: template DNA strand

Chain G:  46% 42% 12%



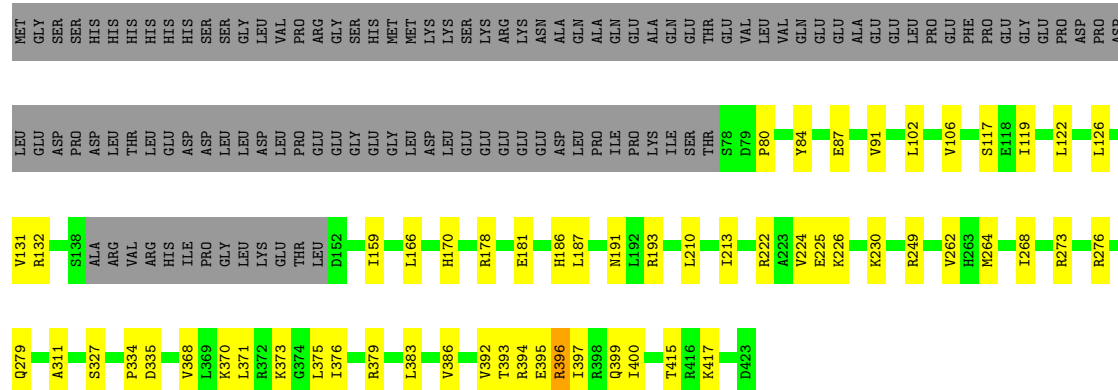
- Molecule 6: non-template DNA strand

Chain H:  46% 54%



- Molecule 7: RNA polymerase sigma factor SigA

Chain F: 62% 13% 25%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	270845	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 ($e^-/\text{\AA}^2$)	51.8	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.050	Depositor
Minimum map value	-0.381	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.036	Depositor
Recommended contour level	0.105	Depositor
Map size ($\text{\AA}$)	330.0, 330.0, 330.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.825, 0.825, 0.825	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN, 1N7

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	0.09	0/1799	0.24	0/2447
1	B	0.09	0/1808	0.23	0/2458
2	C	0.16	1/8961 (0.0%)	0.27	0/12118
3	D	0.13	0/10941	0.26	0/14783
4	E	0.08	0/775	0.22	0/1045
5	G	0.19	0/966	0.38	0/1487
6	H	0.24	0/1108	0.45	0/1710
7	F	0.16	0/2745	0.27	0/3691
All	All	0.15	1/29103 (0.0%)	0.27	0/39739

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	376	ARG	C-O	-6.30	1.18	1.24

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	1767	0	1816	33	0
1	B	1776	0	1829	27	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	8794	0	8896	165	0
3	D	10755	0	10983	143	0
4	E	761	0	778	9	0
5	G	861	0	476	22	0
6	H	987	0	543	28	0
7	F	2703	0	2765	48	0
8	A	1	0	0	0	0
8	D	2	0	0	0	0
9	B	29	0	39	1	0
10	D	2	0	0	0	0
All	All	28438	0	28125	414	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 7.

All (414) 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)
6:H:34:DA:H2''	6:H:35:DG:H5''	1.37	1.07
3:D:1165:TYR:HB3	3:D:1207:TYR:CE1	2.07	0.89
3:D:1146:GLY:HA2	3:D:1207:TYR:CD2	2.11	0.84
6:H:34:DA:C2'	6:H:35:DG:H5''	2.13	0.79
3:D:1146:GLY:HA2	3:D:1207:TYR:CE2	2.17	0.78
3:D:1165:TYR:HB3	3:D:1207:TYR:HE1	1.48	0.76
3:D:132:TYR:OH	3:D:568:ARG:NH2	2.20	0.74
5:G:24:DA:H2''	5:G:25:DG:H5''	1.71	0.72
3:D:97:THR:HG21	3:D:571:LYS:HE2	1.71	0.71
6:H:3:DT:H2''	6:H:4:DG:H5'	1.70	0.71
3:D:508:ARG:HE	3:D:509:PRO:HD2	1.57	0.70
6:H:23:DG:N7	7:F:249:ARG:NH2	2.39	0.70
3:D:711:LEU:HD22	3:D:778:LEU:HD23	1.73	0.69
5:G:39:DT:H2''	5:G:40:DT:H5'	1.75	0.69
2:C:160:ALA:HB3	2:C:174:LEU:HB2	1.74	0.69
2:C:397:GLU:HG3	2:C:631:SER:HB2	1.74	0.69
2:C:683:ASN:HB3	2:C:872:ASN:HB2	1.76	0.68
2:C:1054:THR:HG22	2:C:1082:PRO:HG3	1.76	0.68
1:B:84:GLU:OE2	3:D:845:ASN:ND2	2.23	0.68
3:D:1324:PRO:HG3	3:D:1330:ILE:HD11	1.76	0.68
2:C:56:GLU:HB2	2:C:359:MET:HE2	1.75	0.67
2:C:409:ARG:HH21	2:C:452:ILE:HG21	1.59	0.67
5:G:38:DC:O2	6:H:11:DG:N2	2.27	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:PRO:HD2	1:A:155:LYS:HD2	1.76	0.66
2:C:290:LEU:HD22	2:C:302:VAL:HG11	1.78	0.66
7:F:383:LEU:HB2	7:F:394:ARG:HG3	1.77	0.65
2:C:577:PRO:HG2	2:C:580:MET:HG2	1.78	0.65
6:H:4:DG:H4'	6:H:5:DA:H5'	1.77	0.65
3:D:561:GLY:HA3	7:F:132:ARG:HD3	1.79	0.65
3:D:481:MET:HE1	3:D:493:ARG:HB2	1.79	0.64
2:C:996:LYS:HE2	2:C:1000:MET:HE2	1.78	0.64
2:C:628:PHE:H	2:C:638:ASP:HB3	1.63	0.64
2:C:101:ILE:HG12	2:C:108:ILE:HG22	1.80	0.63
1:A:26:GLU:HB3	1:A:194:LYS:HG3	1.81	0.63
3:D:1101:VAL:HG13	3:D:1102:THR:HG23	1.79	0.63
3:D:760:ARG:NH1	4:E:59:ASN:OD1	2.32	0.63
1:A:29:GLU:OE1	1:A:189:ARG:NH2	2.31	0.62
1:A:39:PRO:HG3	1:B:39:PRO:HG3	1.80	0.62
6:H:3:DT:H2'	6:H:4:DG:C8	2.33	0.62
2:C:874:LEU:HB3	3:D:1029:ARG:HG3	1.81	0.62
3:D:165:LYS:HG2	3:D:199:LEU:HD22	1.81	0.62
5:G:41:DT:H2''	5:G:42:DT:H5''	1.80	0.62
2:C:462:ASP:HB3	2:C:468:ARG:HD2	1.80	0.62
3:D:423:ASP:HB3	3:D:426:LYS:HB2	1.81	0.61
6:H:37:DC:H6	6:H:37:DC:O5'	1.82	0.61
3:D:171:LEU:HD11	3:D:393:ILE:HG12	1.82	0.61
1:B:185:ARG:HH22	3:D:692:GLU:HG3	1.65	0.61
1:A:112:ARG:NH2	1:A:126:ASP:OD1	2.34	0.61
5:G:24:DA:H5'	7:F:273:ARG:NH2	2.15	0.61
3:D:793:THR:HG21	3:D:906:GLN:HG2	1.82	0.61
1:A:58:ILE:HG12	1:A:140:MET:HG2	1.83	0.61
3:D:474:GLU:HG3	3:D:496:LEU:HD11	1.82	0.61
2:C:413:LEU:HD21	2:C:451:LEU:HD13	1.82	0.60
3:D:407:VAL:HG12	3:D:409:VAL:H	1.67	0.60
3:D:1496:GLU:OE1	3:D:1499:ARG:NH2	2.35	0.60
2:C:324:ASP:O	2:C:330:ASN:ND2	2.34	0.60
2:C:541:SER:O	2:C:545:ASN:ND2	2.34	0.60
2:C:486:MET:HE3	2:C:490:GLU:HG2	1.82	0.59
7:F:222:ARG:NH1	7:F:225:GLU:OE1	2.35	0.59
3:D:693:GLU:HA	4:E:48:MET:HE1	1.84	0.59
3:D:1146:GLY:CA	3:D:1207:TYR:CD2	2.83	0.59
7:F:126:LEU:HD21	7:F:159:ILE:HD13	1.84	0.59
6:H:35:DG:H2''	6:H:36:DC:C6	2.38	0.59
1:B:154:GLU:OE2	3:D:840:LYS:NZ	2.34	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:1128:VAL:HG23	3:D:1129:THR:HG23	1.84	0.59
6:H:47:DG:H2'	6:H:48:DC:C6	2.37	0.59
2:C:40:GLU:HG3	2:C:42:VAL:HG22	1.85	0.59
2:C:604:ALA:HB2	2:C:614:ARG:HG3	1.85	0.59
3:D:1410:GLU:HG3	3:D:1412:LYS:HG2	1.84	0.59
2:C:740:GLU:HB3	2:C:805:ARG:HH12	1.68	0.59
2:C:1092:LEU:HD13	2:C:1099:VAL:HG21	1.85	0.59
3:D:73:CYS:HB3	3:D:76:CYS:SG	2.43	0.58
3:D:162:ARG:O	3:D:414:ARG:NH2	2.26	0.58
3:D:563:PRO:HD2	3:D:566:ILE:HD12	1.83	0.58
2:C:402:SER:OG	2:C:566:THR:O	2.20	0.58
1:B:206:THR:HG22	1:B:208:LEU:H	1.67	0.58
7:F:371:LEU:HD23	7:F:386:VAL:HG13	1.84	0.58
2:C:486:MET:HE2	2:C:491:GLU:HA	1.86	0.58
1:B:94:LEU:O	1:B:146:ARG:NH1	2.37	0.58
2:C:1012:PRO:HB3	7:F:334:PRO:HB3	1.85	0.58
3:D:924:MET:HE1	3:D:1211:MET:HE3	1.84	0.57
2:C:418:LEU:HD21	6:H:38:DG:C8	2.39	0.57
2:C:182:VAL:HG23	2:C:193:LEU:HB3	1.87	0.57
5:G:14:DG:H2''	5:G:15:DA:H5'	1.86	0.57
2:C:707:ARG:HD2	2:C:824:ARG:HD2	1.86	0.57
3:D:106:LYS:HE3	3:D:587:ARG:HG3	1.86	0.57
2:C:843:HIS:NE2	2:C:887:GLU:OE1	2.34	0.57
1:A:101:LEU:HD21	1:A:109:VAL:HG21	1.87	0.56
1:A:218:LEU:HD23	1:B:222:LEU:HD21	1.87	0.56
2:C:171:TRP:CD2	6:H:37:DC:H5''	2.40	0.56
7:F:80:PRO:HB2	7:F:210:LEU:HD11	1.85	0.56
3:D:1462:LEU:HD22	3:D:1472:ILE:HB	1.87	0.56
1:A:97:VAL:HG21	1:A:120:VAL:HG21	1.86	0.56
3:D:102:ILE:HD12	3:D:579:ASP:HB3	1.88	0.56
2:C:710:ILE:HG21	2:C:756:VAL:HG11	1.86	0.56
2:C:939:ARG:HD2	2:C:982:PRO:HD3	1.88	0.56
5:G:16:DG:H1	7:F:327:SER:HG	1.54	0.56
3:D:508:ARG:HB3	3:D:511:TRP:CE2	2.40	0.56
2:C:343:GLN:HG3	2:C:385:PHE:HB2	1.87	0.55
2:C:420:ARG:NH2	2:C:448:ASN:OD1	2.40	0.55
3:D:1383:ASP:HB3	3:D:1416:ALA:HB3	1.88	0.55
2:C:363:SER:OG	2:C:366:SER:OG	2.20	0.55
2:C:768:THR:HG23	2:C:771:GLU:H	1.71	0.55
6:H:42:DC:H2'	6:H:43:DG:C8	2.41	0.55
2:C:283:ILE:HD13	2:C:305:PRO:HG2	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:F:91:VAL:O	7:F:193:ARG:NH1	2.40	0.55
1:A:11:PHE:O	1:B:229:GLN:N	2.36	0.54
2:C:572:ILE:HG13	2:C:573:ARG:HG3	1.88	0.54
3:D:1353:GLN:NE2	3:D:1365:ASP:OD1	2.39	0.54
7:F:393:THR:O	7:F:397:ILE:HD12	2.06	0.54
2:C:172:ILE:HD12	2:C:186:VAL:HG22	1.89	0.54
2:C:971:LYS:HB3	2:C:986:PRO:HB2	1.90	0.54
1:B:108:GLU:HG2	1:B:131:THR:HG23	1.89	0.54
3:D:793:THR:HG23	3:D:879:ARG:HG2	1.89	0.54
7:F:187:LEU:O	7:F:191:ASN:ND2	2.38	0.54
2:C:434:HIS:HD2	2:C:438:ILE:HB	1.73	0.53
3:D:101:HIS:HB3	3:D:104:PHE:HD2	1.71	0.53
3:D:572:ARG:NH2	7:F:87:GLU:OE2	2.41	0.53
3:D:1450:ALA:HA	3:D:1455:LYS:HG3	1.89	0.53
2:C:671:ASN:HB3	2:C:991:GLN:HE21	1.73	0.53
3:D:1042:ARG:HG3	3:D:1045:MET:HE3	1.90	0.53
4:E:57:ASP:O	4:E:63:TRP:NE1	2.41	0.53
2:C:607:ASP:OD1	2:C:608:GLY:N	2.42	0.53
2:C:1037:VAL:HG13	2:C:1049:LEU:HD11	1.91	0.53
7:F:396:ARG:HH21	7:F:399:GLN:HG2	1.73	0.53
2:C:462:ASP:OD1	2:C:466:PHE:N	2.41	0.52
3:D:793:THR:HG22	3:D:905:PRO:HA	1.91	0.52
3:D:882:PHE:HA	3:D:885:ILE:HD12	1.92	0.52
3:D:213:VAL:HG22	3:D:385:VAL:HG22	1.92	0.52
5:G:45:DC:H42	6:H:4:DG:H1	1.56	0.52
2:C:200:LEU:HD23	2:C:300:ASP:HA	1.91	0.52
2:C:429:ASP:OD1	2:C:430:VAL:N	2.43	0.52
3:D:5:VAL:O	3:D:1470:ARG:NH1	2.43	0.52
3:D:190:GLU:HG2	3:D:196:VAL:HG12	1.92	0.52
2:C:683:ASN:HD21	2:C:870:ILE:HG22	1.74	0.52
2:C:787:ASP:OD2	2:C:791:ARG:NH2	2.43	0.52
2:C:121:MET:HE1	2:C:336:VAL:HG11	1.92	0.52
3:D:489:ARG:NH1	3:D:1391:GLU:OE1	2.42	0.52
3:D:1281:VAL:HG12	3:D:1294:VAL:HG22	1.90	0.51
1:B:13:VAL:HG12	1:B:23:PHE:HD1	1.74	0.51
3:D:1296:SER:HB3	3:D:1299:PHE:HB2	1.92	0.51
2:C:376:ARG:NH2	7:F:279:GLN:OE1	2.41	0.51
3:D:37:LEU:HD13	3:D:535:PHE:CE1	2.46	0.51
2:C:724:ARG:NH2	2:C:734:LEU:O	2.42	0.51
3:D:361:VAL:HG13	3:D:365:ASP:HB2	1.93	0.51
1:B:80:LEU:HB3	3:D:867:ARG:NH1	2.26	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:152:PRO:HD2	1:B:155:LYS:HD3	1.92	0.51
2:C:512:ARG:HE	2:C:523:ILE:HG21	1.75	0.51
2:C:715:THR:HG22	2:C:717:LEU:H	1.75	0.51
2:C:773:LEU:HD22	7:F:375:LEU:HD11	1.93	0.51
2:C:34:VAL:HG13	2:C:39:ARG:HG2	1.93	0.51
2:C:847:GLY:HA2	3:D:741:ASP:HA	1.91	0.51
2:C:675:ALA:HB2	2:C:867:VAL:HG11	1.92	0.51
2:C:1118:LYS:HE2	3:D:20:SER:O	2.11	0.51
7:F:119:ILE:HD13	7:F:170:HIS:CD2	2.46	0.51
2:C:537:LYS:HD2	2:C:583:LEU:HD11	1.92	0.51
1:A:222:LEU:HD21	1:B:218:LEU:HD23	1.93	0.50
2:C:726:ILE:HD11	2:C:757:GLY:HA3	1.92	0.50
3:D:1364:HIS:CE1	3:D:1366:LYS:HG3	2.47	0.50
6:H:5:DA:H4'	6:H:6:DC:OP1	2.10	0.50
7:F:132:ARG:NE	7:F:181:GLU:OE2	2.32	0.50
3:D:633:VAL:O	3:D:635:PRO:HD3	2.10	0.50
3:D:455:ARG:HB2	3:D:460:ALA:HB2	1.93	0.50
1:A:90:LEU:HD12	1:A:119:ASP:HA	1.93	0.50
2:C:751:PRO:HB3	2:C:794:PRO:HA	1.94	0.50
1:B:56:VAL:HG23	1:B:142:VAL:HG12	1.94	0.49
2:C:691:SER:HB2	2:C:858:MET:HE2	1.94	0.49
2:C:876:VAL:HG11	3:D:949:ILE:HG21	1.93	0.49
3:D:1122:LEU:HD13	3:D:1178:ALA:HB2	1.94	0.49
3:D:1480:PHE:O	4:E:18:ARG:NH2	2.46	0.49
2:C:708:TYR:HB3	2:C:790:LEU:HD21	1.93	0.49
3:D:367:ILE:HD11	3:D:379:ALA:HB2	1.94	0.49
2:C:344:PHE:HD1	2:C:382:ILE:HD11	1.78	0.49
2:C:486:MET:HE1	2:C:494:TYR:CD2	2.47	0.49
3:D:701:LEU:HB2	3:D:748:HIS:HB2	1.95	0.49
3:D:783:ARG:NH1	3:D:1028:ALA:O	2.39	0.49
3:D:1068:LEU:O	3:D:1072:ILE:HG12	2.11	0.49
3:D:1044:LEU:HD23	3:D:1056:PRO:HB3	1.95	0.49
1:A:32:PHE:HA	1:A:35:THR:HB	1.95	0.49
2:C:425:PHE:O	2:C:429:ASP:HB2	2.13	0.49
2:C:936:VAL:HG21	2:C:959:PRO:HB2	1.94	0.49
2:C:163:ILE:HG23	2:C:171:TRP:CE2	2.48	0.48
3:D:1236:LEU:HD13	3:D:1359:GLN:HG3	1.95	0.48
6:H:45:DA:H2''	6:H:46:DT:H5'	1.95	0.48
2:C:565:GLN:HG2	2:C:995:MET:HE1	1.95	0.48
7:F:117:SER:OG	7:F:122:LEU:O	2.29	0.48
1:A:182:GLU:HB2	1:A:194:LYS:HE3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:49:PRO:HA	1:B:148:VAL:HG12	1.94	0.48
2:C:87:ASP:HA	2:C:131:GLY:HA3	1.94	0.48
2:C:92:ALA:HB2	2:C:120:LEU:HD11	1.95	0.48
2:C:670:GLN:HG3	2:C:699:PHE:HB3	1.95	0.48
3:D:400:VAL:HG12	3:D:445:ARG:HG2	1.96	0.48
6:H:7:DA:H2''	6:H:8:DA:C8	2.48	0.48
3:D:625:TYR:HE1	3:D:655:PRO:HG2	1.79	0.48
7:F:119:ILE:HG21	7:F:170:HIS:CD2	2.48	0.48
1:B:51:THR:OG1	1:B:87:VAL:O	2.29	0.48
3:D:941:PHE:O	3:D:945:SER:OG	2.24	0.48
2:C:422:ARG:O	6:H:39:DT:H5'	2.14	0.47
1:A:25:LEU:HD11	1:B:224:TYR:HB3	1.95	0.47
1:A:133:GLU:HG2	1:A:134:GLU:N	2.28	0.47
3:D:192:ALA:HB3	3:D:195:VAL:HG22	1.95	0.47
2:C:376:ARG:NH1	7:F:279:GLN:OE1	2.46	0.47
2:C:1119:ARG:HE	2:C:1119:ARG:HB2	1.51	0.47
3:D:488:ARG:HH21	3:D:491:LYS:HD3	1.79	0.47
3:D:679:ARG:HH21	3:D:681:ARG:HD2	1.80	0.47
3:D:966:GLU:HG2	3:D:970:LYS:HE2	1.95	0.47
5:G:23:DA:H3'	5:G:23:DA:H8	1.79	0.47
1:B:87:VAL:HG11	1:B:144:VAL:HG11	1.96	0.47
2:C:698:ASP:OD1	2:C:832:LYS:NZ	2.46	0.47
3:D:1341:PRO:HG3	3:D:1419:PRO:HG3	1.95	0.47
3:D:553:ARG:HD2	3:D:570:GLU:OE1	2.15	0.47
6:H:4:DG:H1'	6:H:5:DA:C8	2.49	0.47
2:C:808:ARG:NH2	2:C:816:LYS:O	2.48	0.47
1:B:32:PHE:HA	1:B:35:THR:HB	1.96	0.47
3:D:371:ILE:HG23	7:F:230:LYS:HD2	1.96	0.47
3:D:798:GLU:HG2	3:D:824:ASN:HB2	1.97	0.47
5:G:45:DC:N4	6:H:4:DG:H1	2.13	0.47
7:F:187:LEU:HD23	7:F:224:VAL:HG13	1.96	0.47
6:H:16:DA:H2'	6:H:17:DA:C8	2.50	0.47
4:E:8:LYS:HD3	4:E:69:LEU:HD22	1.97	0.47
3:D:1282:ARG:N	3:D:1293:PHE:O	2.48	0.47
2:C:171:TRP:CG	6:H:37:DC:H5''	2.50	0.46
2:C:715:THR:HB	2:C:718:GLY:O	2.15	0.46
3:D:112:ILE:HG23	3:D:465:LEU:HD11	1.96	0.46
2:C:674:VAL:HG22	2:C:869:VAL:HB	1.96	0.46
1:A:209:GLU:O	1:A:213:GLN:HG3	2.15	0.46
3:D:1165:TYR:CB	3:D:1207:TYR:HE1	2.24	0.46
2:C:81:ASP:OD1	2:C:82:GLU:N	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:1302:GLU:HB3	3:D:1304:LYS:NZ	2.31	0.46
2:C:194:VAL:HG22	2:C:221:LEU:HD12	1.98	0.46
3:D:1380:GLU:HB2	3:D:1420:LEU:HD11	1.96	0.46
7:F:119:ILE:HD13	7:F:170:HIS:HD2	1.79	0.46
3:D:1047:LYS:HG2	3:D:1053:PHE:CZ	2.50	0.46
2:C:440:PRO:O	3:D:1078:ARG:NH2	2.48	0.46
3:D:629:SER:OG	3:D:724:GLN:O	2.33	0.46
3:D:1353:GLN:O	3:D:1357:ARG:HG3	2.15	0.46
5:G:41:DT:H3	6:H:8:DA:H61	1.64	0.46
2:C:468:ARG:HG2	2:C:487:THR:HG22	1.98	0.46
2:C:769:PRO:HB2	7:F:375:LEU:HD23	1.97	0.45
5:G:2:DC:H2''	5:G:3:DA:C8	2.51	0.45
2:C:726:ILE:HG22	2:C:729:LEU:HD13	1.99	0.45
2:C:846:LYS:HG3	3:D:741:ASP:HB2	1.97	0.45
3:D:1009:LYS:O	3:D:1013:GLU:HG2	2.16	0.45
2:C:374:ASN:OD1	7:F:276:ARG:HD2	2.17	0.45
3:D:1010:ASN:OD1	3:D:1014:ASN:ND2	2.49	0.45
1:A:199:ILE:HB	1:A:207:PRO:HB3	1.99	0.45
2:C:501:THR:HB	2:C:532:MET:HE3	1.98	0.45
2:C:1038:TRP:CE2	3:D:1099:VAL:HG11	2.52	0.45
2:C:1118:LYS:HG2	3:D:23:TYR:CZ	2.52	0.45
5:G:9:DG:H2'	5:G:10:DA:C8	2.51	0.45
2:C:814:GLU:O	2:C:814:GLU:HG3	2.15	0.45
2:C:236:ILE:HD11	2:C:250:ARG:HG2	1.99	0.45
2:C:281:LEU:O	2:C:308:ARG:NH2	2.49	0.45
7:F:396:ARG:O	7:F:399:GLN:HB3	2.17	0.45
1:A:51:THR:OG1	1:A:87:VAL:O	2.28	0.45
2:C:772:ARG:HG2	7:F:373:LYS:HD3	1.99	0.45
3:D:1146:GLY:HA2	3:D:1207:TYR:CG	2.51	0.45
3:D:1379:VAL:HG21	3:D:1400:VAL:HG11	1.99	0.45
3:D:633:VAL:C	3:D:635:PRO:HD3	2.42	0.44
3:D:1274:ILE:HD12	3:D:1322:GLY:HA2	1.98	0.44
3:D:1271:LYS:HE2	3:D:1331:ASP:HB2	1.99	0.44
2:C:281:LEU:HD13	2:C:305:PRO:HB2	2.00	0.44
6:H:2:DT:C6	6:H:3:DT:H72	2.52	0.44
2:C:340:MET:HE3	2:C:340:MET:HB3	1.90	0.44
2:C:439:CYS:HB2	2:C:541:SER:HB3	1.99	0.44
2:C:805:ARG:HG3	2:C:823:VAL:HG22	1.99	0.44
2:C:1018:GLN:HG3	2:C:1060:ILE:HD11	1.98	0.44
3:D:1211:MET:HE2	3:D:1213:ARG:HD2	1.99	0.44
7:F:264:MET:O	7:F:268:ILE:HG13	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:644:LEU:HD12	3:D:645:PRO:HD2	1.99	0.44
2:C:8:ARG:HH22	2:C:910:LYS:HE2	1.83	0.44
2:C:1103:ASP:OD1	2:C:1107:ASN:N	2.48	0.44
7:F:166:LEU:HB3	7:F:170:HIS:HB2	2.00	0.44
3:D:187:LYS:NZ	3:D:198:ARG:O	2.36	0.44
1:B:29:GLU:OE2	1:B:189:ARG:NH2	2.51	0.44
2:C:132:ALA:HB1	2:C:394:PHE:HE1	1.83	0.44
5:G:23:DA:H3'	5:G:23:DA:C8	2.52	0.44
2:C:405:ARG:O	2:C:409:ARG:HG3	2.18	0.44
2:C:534:VAL:H	2:C:538:GLN:NE2	2.16	0.44
7:F:370:LYS:HB3	7:F:376:ILE:HG12	1.99	0.44
2:C:938:LYS:O	2:C:942:GLU:HG3	2.17	0.43
3:D:74:GLU:CD	3:D:74:GLU:H	2.26	0.43
4:E:40:LEU:HG	4:E:67:GLU:HG2	1.99	0.43
1:A:57:TYR:CG	1:A:161:ARG:HD2	2.52	0.43
2:C:535:SER:O	2:C:538:GLN:HG2	2.17	0.43
2:C:1104:GLU:HG3	3:D:6:ARG:HG3	2.00	0.43
5:G:16:DG:N1	7:F:327:SER:OG	2.48	0.43
7:F:392:VAL:HB	7:F:396:ARG:HG2	1.99	0.43
2:C:717:LEU:CD1	2:C:763:GLY:HA2	2.48	0.43
3:D:65:ARG:HD2	7:F:379:ARG:HA	2.00	0.43
4:E:84:ARG:HD2	4:E:84:ARG:HA	1.75	0.43
6:H:15:DT:H2''	6:H:16:DA:C8	2.54	0.43
7:F:102:LEU:O	7:F:106:VAL:HG23	2.18	0.43
2:C:1090:LYS:HD3	2:C:1090:LYS:HA	1.80	0.43
3:D:490:ALA:O	3:D:494:LYS:HG2	2.18	0.43
3:D:783:ARG:HD2	3:D:1029:ARG:HD3	2.00	0.43
3:D:952:ASP:HA	3:D:1062:ARG:HH21	1.83	0.43
2:C:211:LEU:HD23	2:C:311:PHE:CD2	2.54	0.43
2:C:324:ASP:HB3	2:C:327:HIS:HB2	2.01	0.43
2:C:406:HIS:HD2	2:C:409:ARG:HD3	1.82	0.43
3:D:408:GLU:H	3:D:422:ALA:HA	1.84	0.43
3:D:996:TRP:CD2	3:D:1056:PRO:HG3	2.54	0.43
2:C:540:PHE:HB3	2:C:544:THR:HB	1.99	0.43
3:D:33:ASN:HB3	3:D:36:THR:OG1	2.19	0.43
3:D:889:ALA:HB1	3:D:930:LEU:HA	2.00	0.43
1:A:87:VAL:HG21	1:A:144:VAL:HG21	1.99	0.43
1:A:107:LYS:HB2	1:A:107:LYS:HE3	1.72	0.43
1:A:198:ARG:HD3	2:C:934:PHE:CZ	2.53	0.43
2:C:716:LYS:HE3	3:D:37:LEU:HG	2.00	0.43
2:C:1020:PRO:HD3	2:C:1057:SER:O	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:1403:LEU:HA	3:D:1406:ARG:HH21	1.84	0.43
1:A:64:GLU:OE1	2:C:830:LYS:NZ	2.36	0.43
2:C:304:LEU:HB3	2:C:305:PRO:HD3	2.00	0.43
2:C:670:GLN:HB2	2:C:700:TYR:CZ	2.53	0.43
3:D:1229:ILE:HG12	3:D:1363:LEU:HD21	2.00	0.43
5:G:43:DG:OP2	7:F:383:LEU:N	2.50	0.43
6:H:13:DG:H2''	6:H:14:DT:H5''	2.00	0.43
7:F:268:ILE:HD13	7:F:311:ALA:HB2	2.00	0.43
3:D:646:LYS:HG2	3:D:720:LEU:HB3	2.01	0.42
3:D:897:TRP:CH2	3:D:902:LEU:HD22	2.53	0.42
5:G:43:DG:N7	7:F:394:ARG:NH1	2.67	0.42
1:A:196:THR:HG21	2:C:934:PHE:HE1	1.84	0.42
2:C:119:PRO:HG2	2:C:386:PHE:CD2	2.54	0.42
3:D:871:LYS:HE2	3:D:871:LYS:HB2	1.91	0.42
1:B:96:THR:HG21	1:B:143:ARG:NH1	2.34	0.42
3:D:488:ARG:HA	3:D:488:ARG:NE	2.35	0.42
1:A:156:HIS:ND1	1:A:158:ILE:HG13	2.35	0.42
1:B:34:VAL:HG11	2:C:978:ARG:HB3	2.02	0.42
7:F:368:VAL:HG21	7:F:400:ILE:HD11	2.01	0.42
1:B:80:LEU:HD21	3:D:842:VAL:HG12	2.01	0.42
2:C:584:GLU:N	2:C:584:GLU:OE1	2.53	0.42
2:C:1055:LEU:HG	2:C:1079:PRO:HB3	2.01	0.42
3:D:1342:GLU:HB3	3:D:1346:ARG:HH21	1.84	0.42
7:F:131:VAL:HG13	7:F:178:ARG:HD3	2.01	0.42
1:A:153:ALA:HB1	1:A:166:PRO:HB2	2.01	0.42
2:C:756:VAL:HG12	2:C:790:LEU:HB3	2.02	0.42
7:F:415:THR:HB	7:F:417:LYS:HE2	2.02	0.42
2:C:166:PRO:O	2:C:168:ARG:HG2	2.20	0.42
2:C:195:LEU:O	2:C:199:VAL:HG23	2.20	0.42
2:C:328:LEU:HD12	2:C:328:LEU:HA	1.94	0.42
2:C:429:ASP:OD2	3:D:1048:PRO:HB3	2.20	0.42
2:C:813:VAL:HG12	2:C:815:LEU:HG	2.01	0.42
3:D:1280:VAL:O	3:D:1295:GLU:N	2.46	0.42
6:H:36:DC:H5''	6:H:37:DC:C5	2.54	0.42
1:A:103:ALA:HB1	1:A:107:LYS:HD3	2.02	0.42
2:C:593:ALA:HB1	2:C:659:PRO:HD2	2.02	0.42
1:A:7:LYS:HG3	1:A:8:ALA:H	1.84	0.41
9:B:401:1N7:H2	3:D:936:TYR:CD2	2.55	0.41
2:C:111:ASP:OD1	2:C:111:ASP:N	2.50	0.41
2:C:141:HIS:CD2	2:C:334:ARG:HD2	2.55	0.41
3:D:36:THR:HB	3:D:38:LYS:HE2	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:1236:LEU:HA	3:D:1359:GLN:HG3	2.02	0.41
1:A:162:ILE:H	1:A:162:ILE:HD12	1.83	0.41
2:C:194:VAL:HG13	2:C:227:PHE:HE1	1.86	0.41
2:C:344:PHE:CD1	2:C:382:ILE:HD11	2.56	0.41
2:C:408:ARG:NH1	2:C:455:LEU:O	2.52	0.41
2:C:434:HIS:CD2	2:C:438:ILE:HB	2.53	0.41
3:D:57:GLU:HG3	3:D:64:LYS:HG2	2.01	0.41
3:D:191:LEU:HD13	3:D:393:ILE:HB	2.01	0.41
5:G:39:DT:C2'	5:G:40:DT:H5'	2.48	0.41
6:H:35:DG:C2'	6:H:36:DC:C6	3.03	0.41
2:C:365:ASP:OD1	2:C:366:SER:N	2.54	0.41
2:C:551:GLU:HG2	2:C:552:HIS:CD2	2.55	0.41
4:E:88:GLU:OE2	4:E:91:ARG:NH2	2.48	0.41
2:C:630:ARG:HD2	2:C:705:ILE:HG22	2.01	0.41
2:C:689:VAL:HB	2:C:870:ILE:HB	2.02	0.41
2:C:1031:ARG:HG2	5:G:13:DA:H5'	2.03	0.41
5:G:42:DT:H2''	5:G:43:DG:H8	1.86	0.41
7:F:249:ARG:HH11	7:F:262:VAL:HG11	1.85	0.41
2:C:17:PRO:HB2	2:C:20:GLU:HB3	2.02	0.41
2:C:22:GLN:HG3	2:C:407:LYS:HB3	2.03	0.41
2:C:129:ILE:HB	2:C:134:ARG:HD2	2.02	0.41
2:C:204:GLN:HB3	2:C:227:PHE:HD2	1.85	0.41
3:D:56:TYR:CD2	3:D:66:GLN:HG2	2.56	0.41
3:D:634:GLY:HA3	3:D:637:LEU:HD12	2.02	0.41
4:E:80:VAL:HG21	4:E:85:LEU:HD13	2.02	0.41
7:F:226:LYS:HE3	7:F:226:LYS:HB3	1.93	0.41
1:B:176:ARG:NH1	3:D:888:GLU:OE2	2.32	0.41
2:C:611:ILE:HD11	2:C:641:PRO:HB3	2.03	0.41
2:C:860:HIS:HA	2:C:866:PRO:HA	2.03	0.41
5:G:45:DC:H41	7:F:395:GLU:CD	2.28	0.41
1:B:23:PHE:HE2	1:B:199:ILE:HD12	1.86	0.41
1:B:155:LYS:HB3	1:B:155:LYS:HE2	1.76	0.41
2:C:154:ARG:HH12	2:C:178:PRO:HB3	1.86	0.41
2:C:1078:GLU:HA	2:C:1078:GLU:OE1	2.21	0.41
3:D:96:ALA:HB3	3:D:554:LEU:HD23	2.03	0.41
3:D:348:GLN:HB2	3:D:351:MET:HG3	2.02	0.41
3:D:403:PHE:CD2	3:D:444:VAL:HG23	2.56	0.41
3:D:759:ALA:HA	3:D:763:MET:HB2	2.03	0.41
3:D:1149:LEU:HD23	3:D:1149:LEU:HA	1.90	0.41
5:G:36:DC:H2'	5:G:37:DA:C8	2.55	0.41
2:C:693:GLU:O	2:C:697:ARG:HG2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:1456:LYS:HB2	3:D:1456:LYS:HE3	1.79	0.41
1:A:23:PHE:CE2	1:A:199:ILE:HD12	2.55	0.40
2:C:144:PRO:HB2	2:C:273:GLY:HA3	2.04	0.40
2:C:1009:SER:O	3:D:624:ASP:HB3	2.20	0.40
2:C:1102:LEU:HD12	3:D:1456:LYS:HD3	2.03	0.40
3:D:537:THR:OG1	3:D:541:ASN:ND2	2.53	0.40
1:A:64:GLU:HB3	1:A:165:ILE:HG21	2.03	0.40
2:C:937:ASP:OD2	2:C:975:TYR:OH	2.37	0.40
3:D:1192:LEU:HG	3:D:1369:GLU:HB3	2.02	0.40
1:A:176:ARG:NH1	2:C:863:ASP:O	2.54	0.40
2:C:598:GLU:OE1	2:C:619:ARG:NH2	2.55	0.40
7:F:102:LEU:HD11	7:F:186:HIS:CD2	2.57	0.40
1:B:209:GLU:O	1:B:213:GLN:HG3	2.22	0.40
2:C:607:ASP:HB3	2:C:610:ARG:NH1	2.37	0.40
2:C:684:PHE:CE1	3:D:783:ARG:HB2	2.57	0.40
3:D:952:ASP:OD1	3:D:1062:ARG:NH2	2.54	0.40
7:F:84:TYR:CE2	7:F:213:ILE:HG21	2.57	0.40
2:C:292:ARG:NH2	2:C:301:GLU:OE2	2.54	0.40
2:C:474:VAL:HG22	2:C:479:VAL:HG22	2.03	0.40
2:C:486:MET:HE1	2:C:494:TYR:HD2	1.84	0.40
2:C:1015:LEU:HA	7:F:335:ASP:HB2	2.03	0.40
3:D:1165:TYR:HB3	3:D:1207:TYR:CZ	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	222/315 (70%)	221 (100%)	1 (0%)	0	100	100
1	B	223/315 (71%)	223 (100%)	0	0	100	100
2	C	1110/1119 (99%)	1089 (98%)	21 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	D	1357/1524 (89%)	1334 (98%)	23 (2%)	0	100	100
4	E	92/99 (93%)	92 (100%)	0	0	100	100
7	F	329/444 (74%)	327 (99%)	2 (1%)	0	100	100
All	All	3333/3816 (87%)	3286 (99%)	47 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	197/273 (72%)	197 (100%)	0	100	100
1	B	198/273 (72%)	198 (100%)	0	100	100
2	C	938/941 (100%)	935 (100%)	3 (0%)	91	96
3	D	1152/1279 (90%)	1152 (100%)	0	100	100
4	E	83/88 (94%)	83 (100%)	0	100	100
7	F	290/389 (75%)	289 (100%)	1 (0%)	91	96
All	All	2858/3243 (88%)	2854 (100%)	4 (0%)	92	97

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	442	GLU
2	C	610	ARG
2	C	1119	ARG
7	F	396	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	ASN

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Mol	Chain	Res	Type
1	B	188	GLN
2	C	117	HIS
2	C	130	ASN
2	C	567	GLN
2	C	683	ASN
2	C	834	GLN
2	C	1100	GLN
2	C	1107	ASN
3	D	388	HIS
3	D	680	GLN
3	D	703	ASN
3	D	724	GLN
3	D	748	HIS
3	D	1124	GLN
3	D	1172	HIS
7	F	170	HIS
7	F	186	HIS
7	F	411	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 5 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
9	1N7	B	401	-	32,32,46	0.83	0	51,51,72	0.55	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	1N7	B	401	-	-	4/9/74/92	0/4/4/4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	B	401	1N7	C21-C20-C9-C8
9	B	401	1N7	C22-C20-C9-C8
9	B	401	1N7	C21-C20-C9-C5
9	B	401	1N7	C22-C20-C9-C5

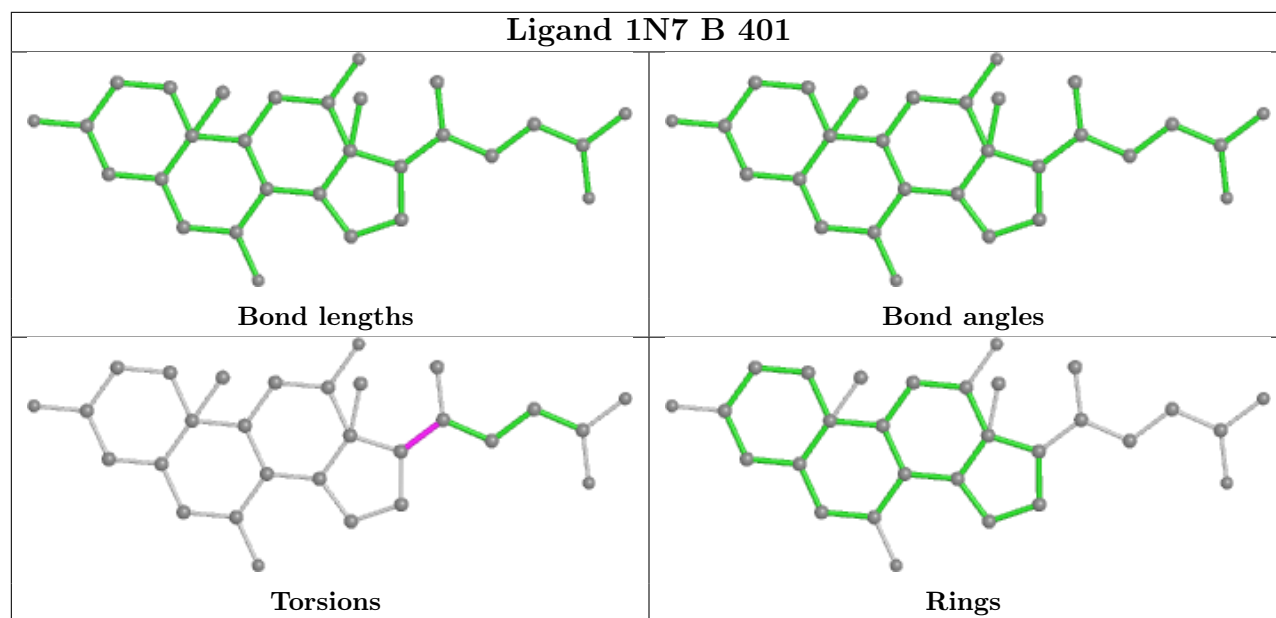
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	B	401	1N7	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient

equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

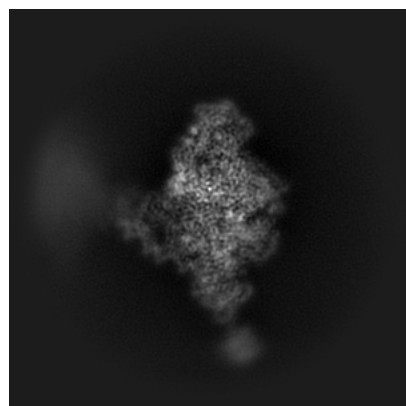
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-64219. These allow visual inspection of the internal detail of the map and identification of artifacts.

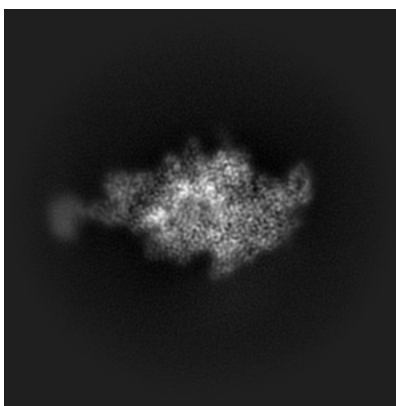
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

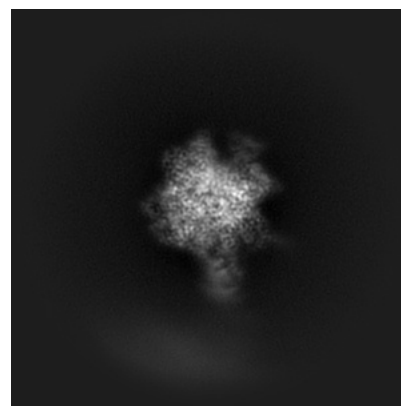
6.1.1 Primary map



X

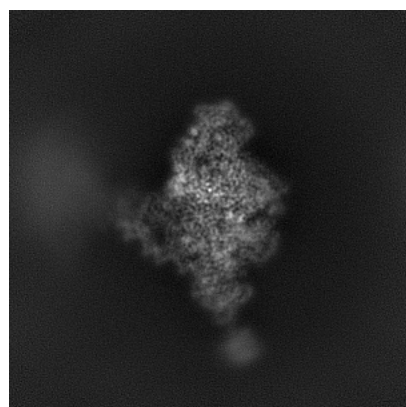


Y

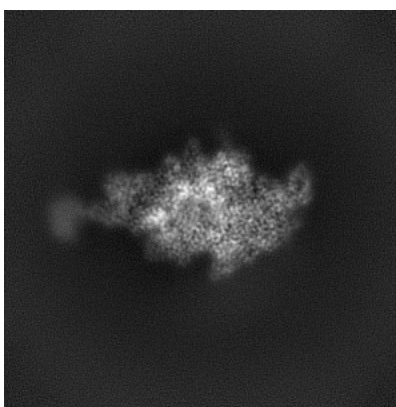


Z

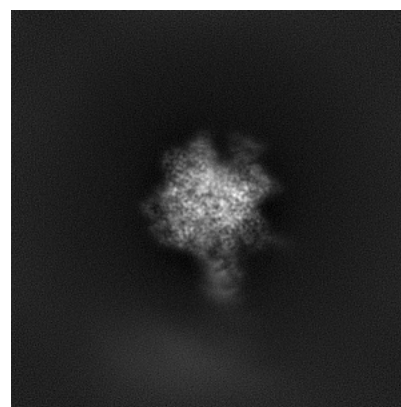
6.1.2 Raw map



X



Y

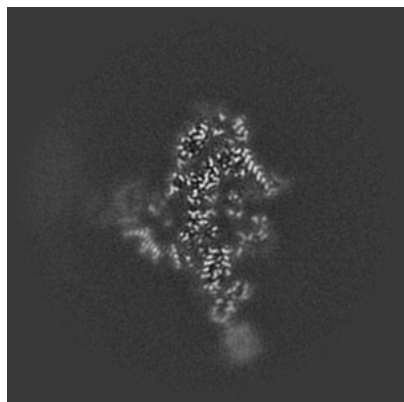


Z

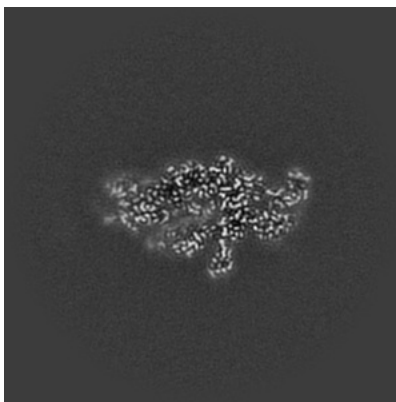
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

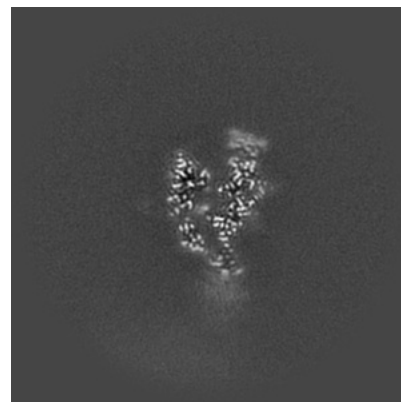
6.2.1 Primary map



X Index: 200

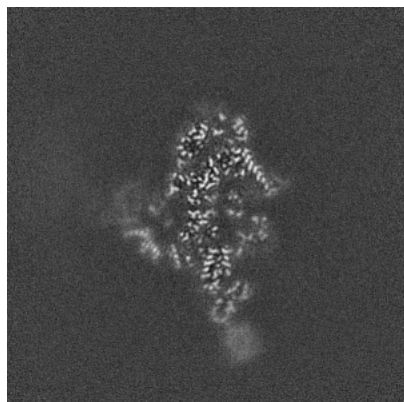


Y Index: 200

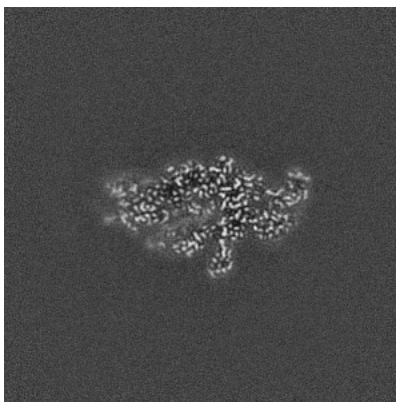


Z Index: 200

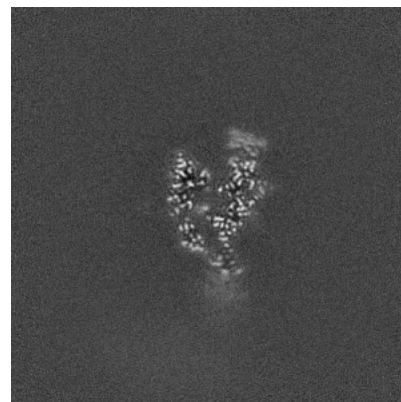
6.2.2 Raw map



X Index: 200



Y Index: 200

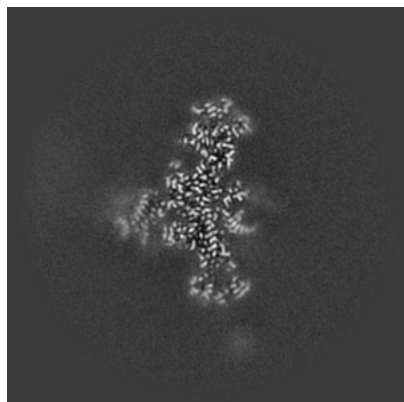


Z Index: 200

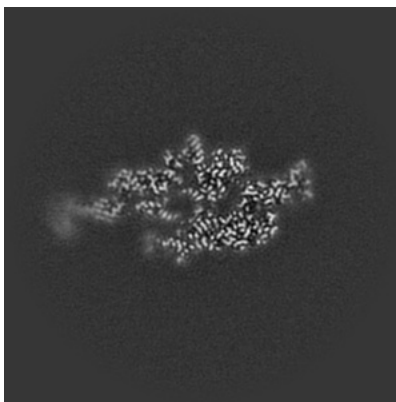
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

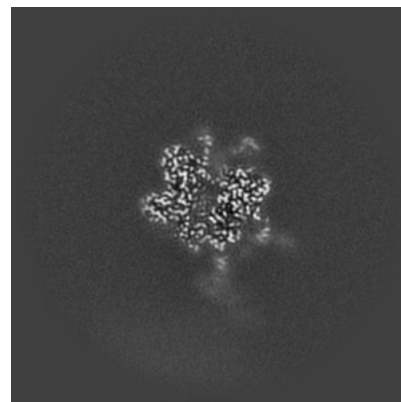
6.3.1 Primary map



X Index: 214

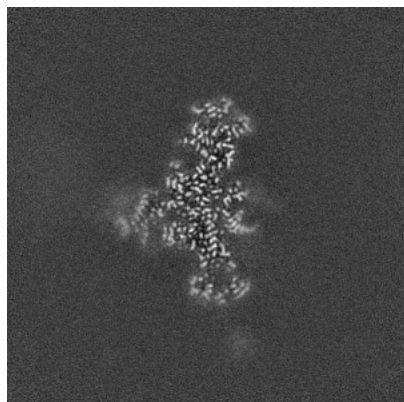


Y Index: 221

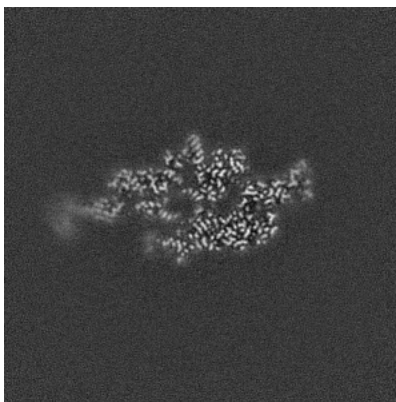


Z Index: 215

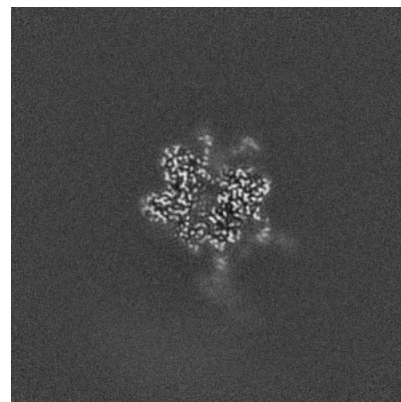
6.3.2 Raw map



X Index: 214



Y Index: 221

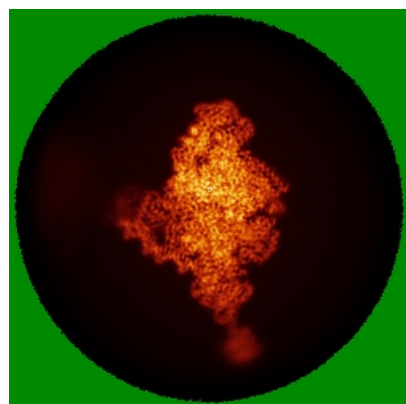


Z Index: 215

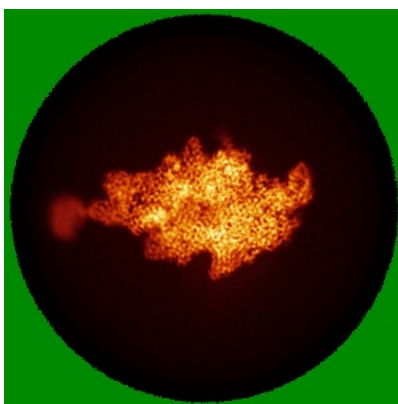
The images above show the largest variance slices of the map in three orthogonal directions.

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

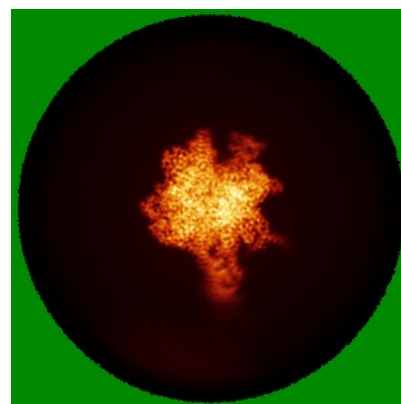
6.4.1 Primary map



X

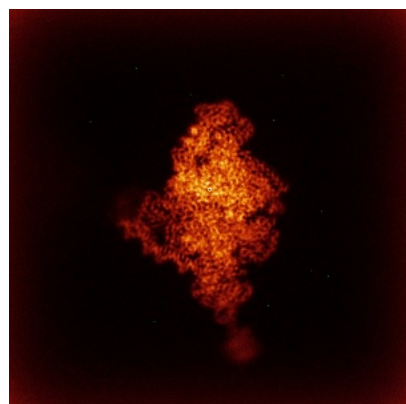


Y

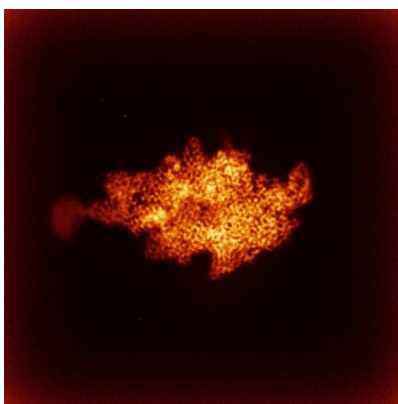


Z

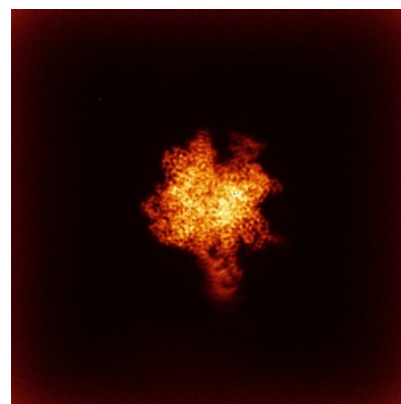
6.4.2 Raw map



X



Y

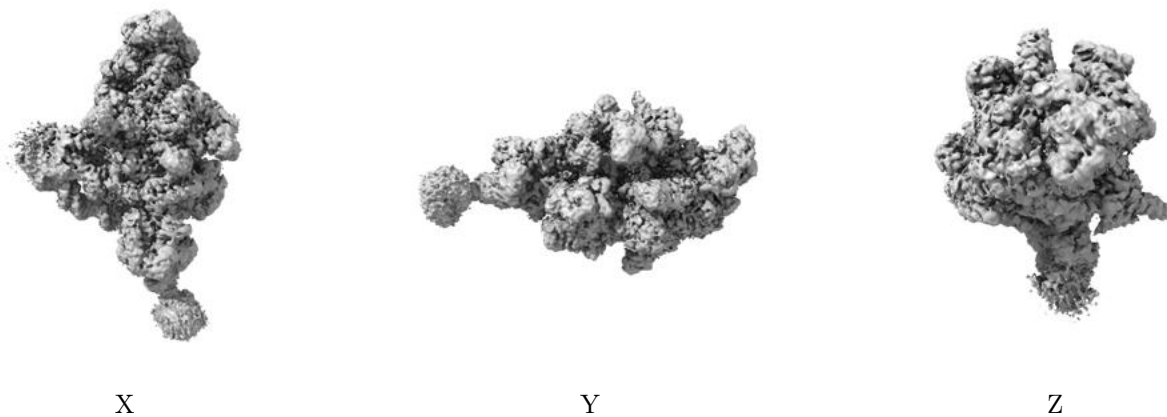


Z

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.

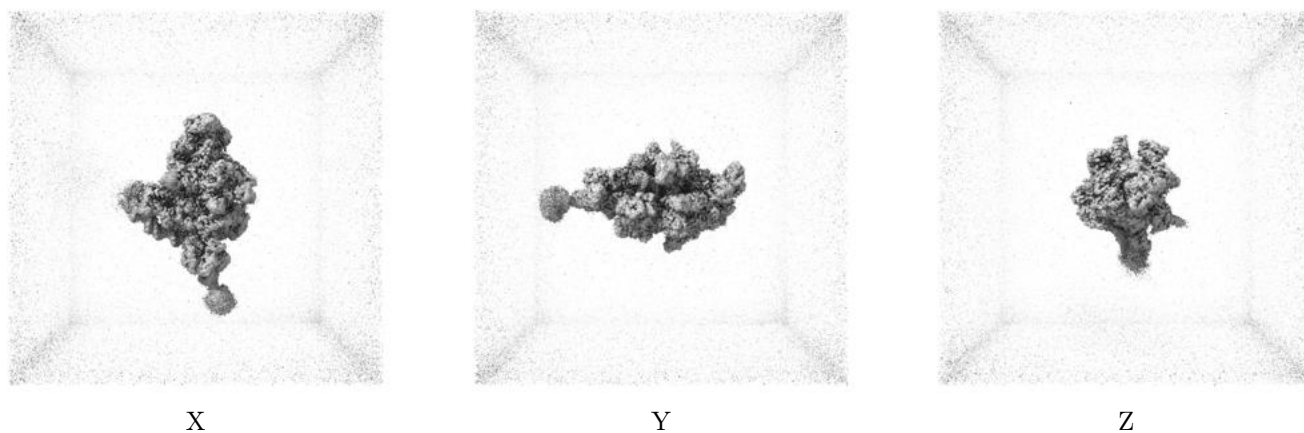
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.105. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

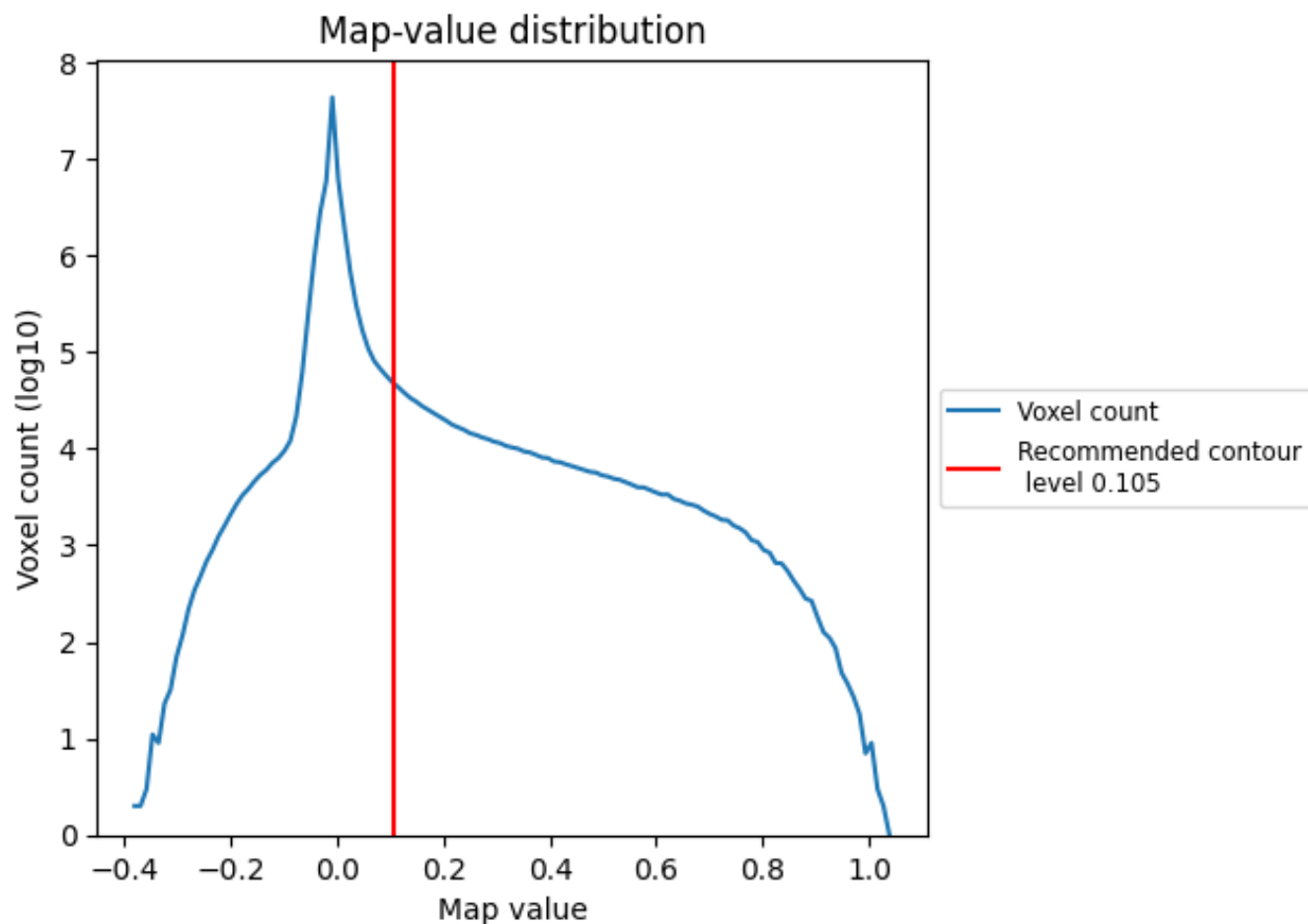
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

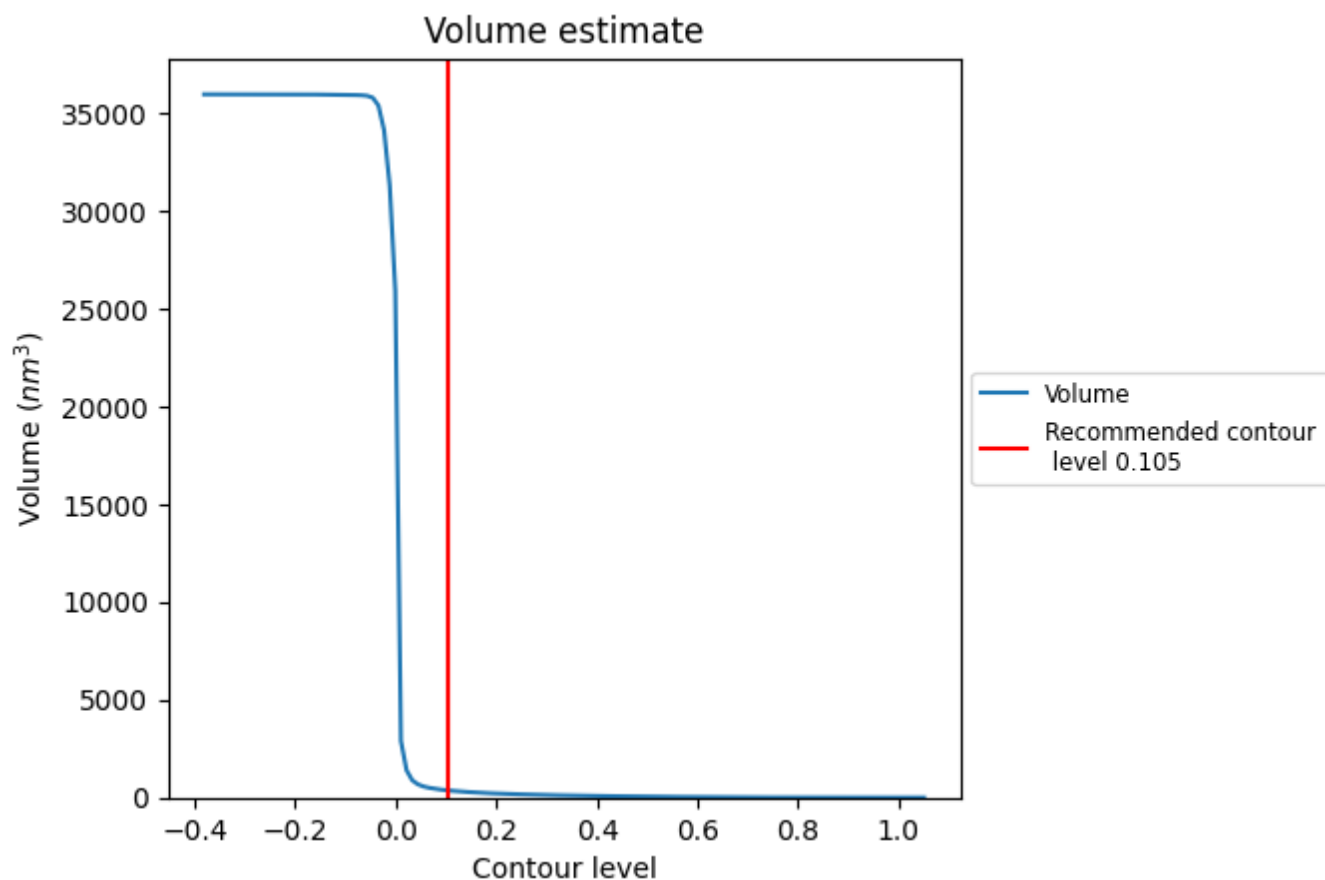
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

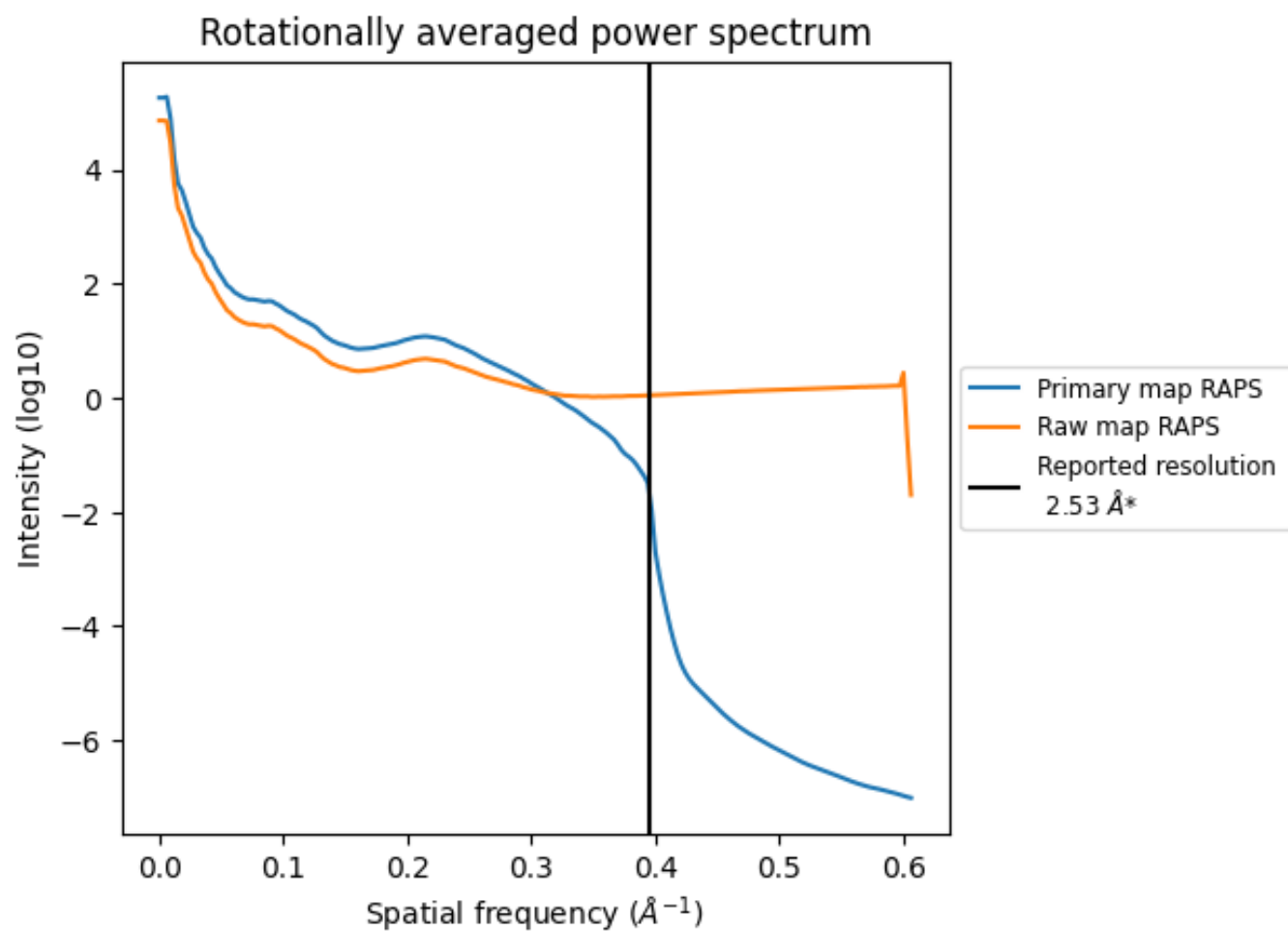
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 364 nm^3 ; this corresponds to an approximate mass of 329 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 ⓘ

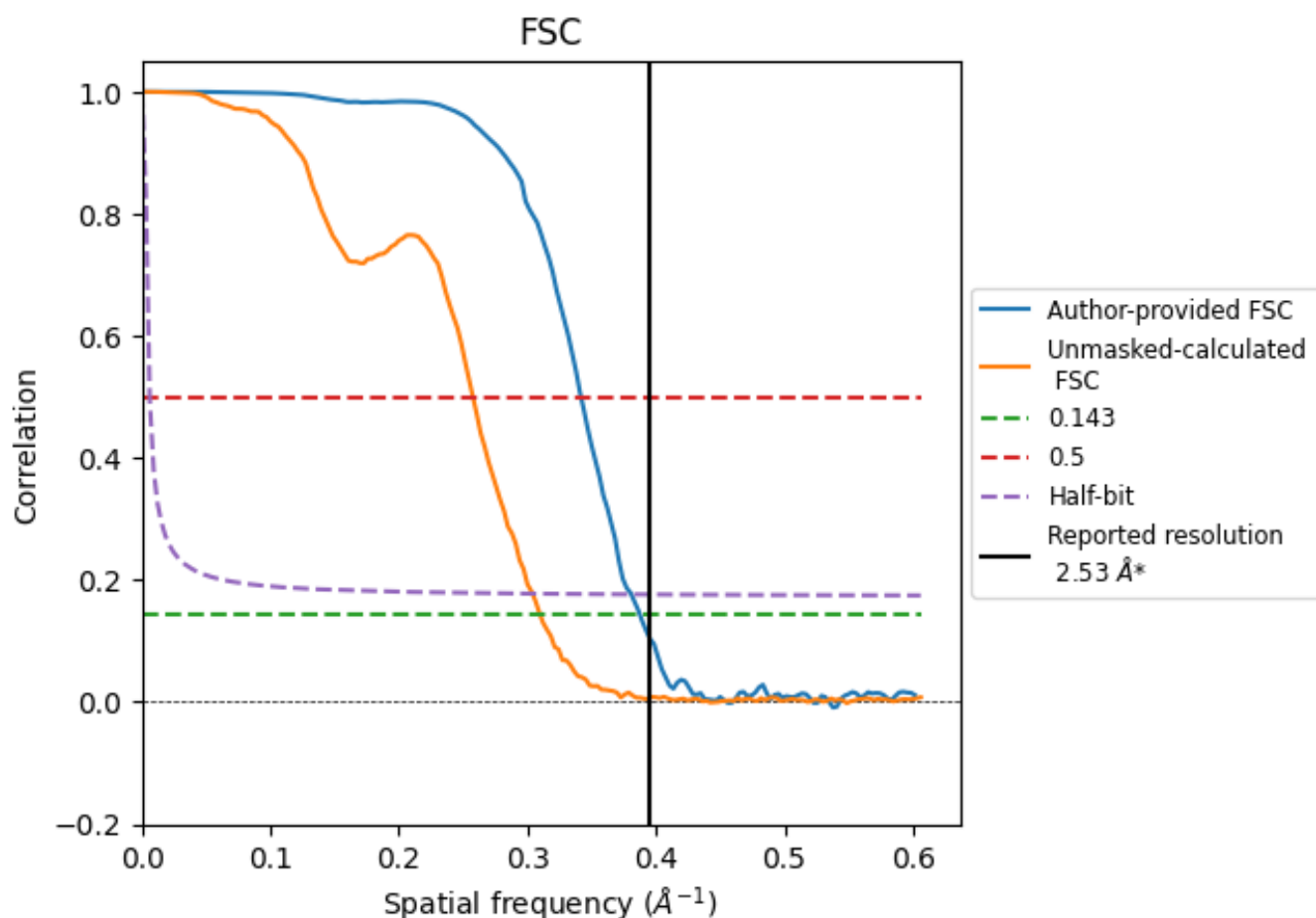


*Reported resolution corresponds to spatial frequency of 0.395 Å⁻¹

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 0.395 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

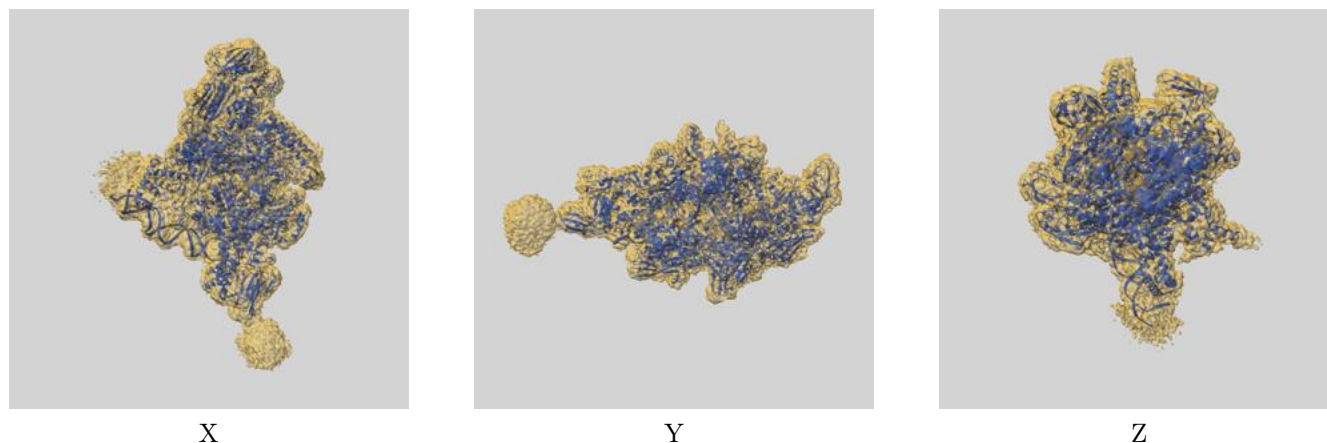
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.53	-	-
Author-provided FSC curve	2.58	2.93	2.63
Unmasked-calculated*	3.23	3.88	3.29

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.23 differs from the reported value 2.53 by more than 10 %

9 Map-model fit [i](#)

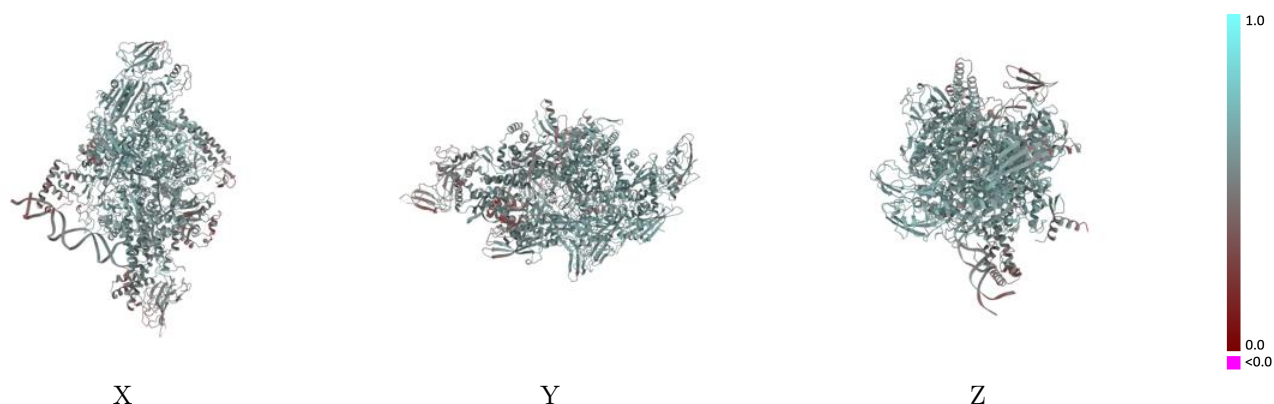
This section contains information regarding the fit between EMDB map EMD-64219 and PDB model 9UJP. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

9.1 Map-model overlay [i](#)



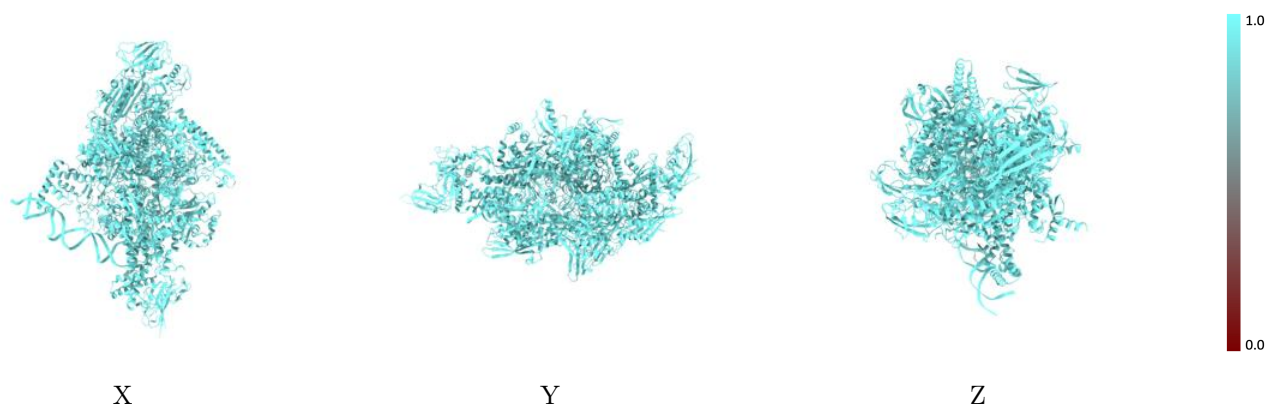
The images above show the 3D surface view of the map at the recommended contour level 0.105 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



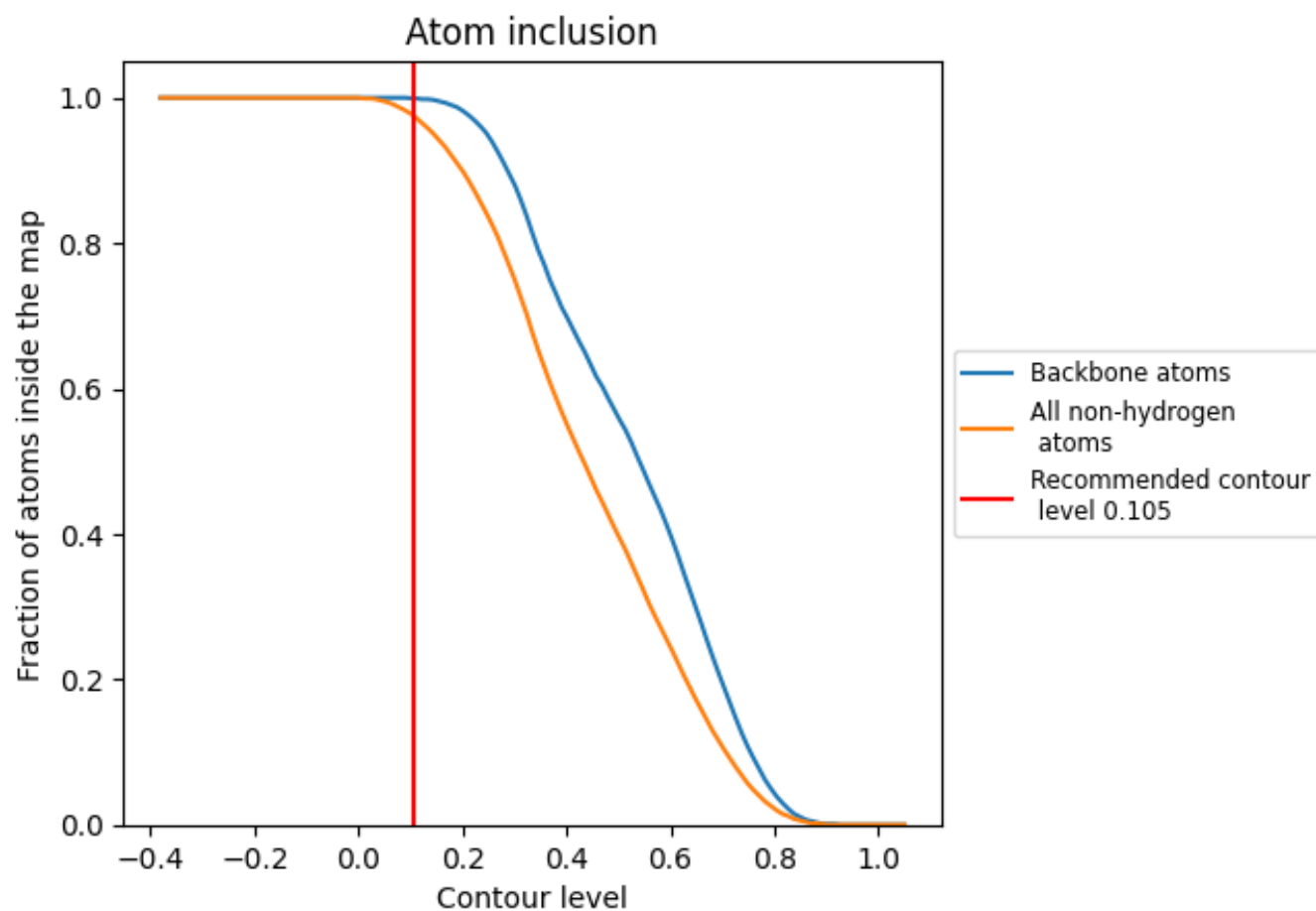
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.105).

9.4 Atom inclusion ⓘ



At the recommended contour level, 100% of all backbone atoms, 98% 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 (0.105) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9760	0.5540
A	0.9850	0.5930
B	0.9770	0.5600
C	0.9760	0.5670
D	0.9760	0.5550
E	0.9760	0.5680
F	0.9610	0.5040
G	0.9970	0.5080
H	0.9970	0.5030

1.0

0.0

<0.0