



Full wwPDB EM Validation Report ⓘ

Oct 8, 2026 – 03:07 PM EDT

PDB ID : 9ZXL / pdb_00009zxl
EMDB ID : EMD-74928
Title : Nucleosome with an SSB at SHL +5.3 in complex with human PARP2, Class 14
Authors : Gregory-Lott, E.; Jayathilake, C.; Virk, R.K.; Kim, T.H.
Deposited on : 2026-01-05
Resolution : 2.48 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.dev133
MolProbity : 4-5-2 with Phenix2.2
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.51

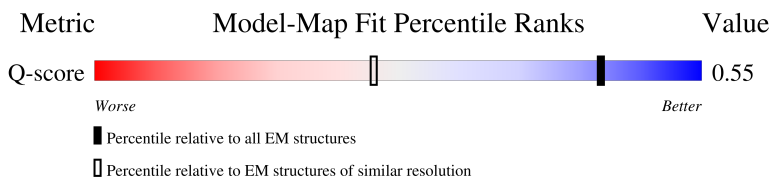
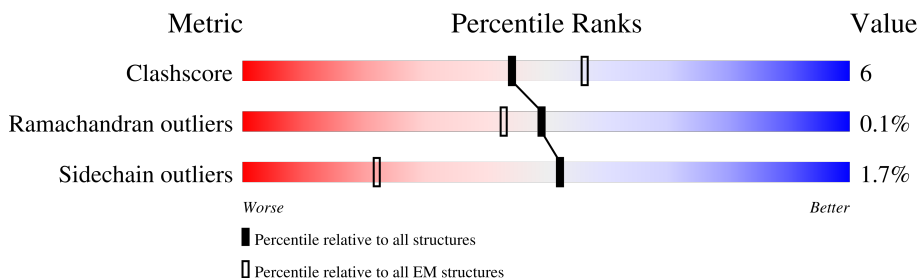
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.48 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	6178 (1.98 - 2.98)

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	124	
1	B	124	
2	C	125	
2	D	125	

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Mol	Chain	Length	Quality of chain
3	E	136	
3	F	136	
4	G	104	
4	H	104	
5	I	274	
5	J	274	
6	K	130	
7	L	23	
8	M	153	
9	P	494	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 32539 atoms, of which 14985 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 Histone H2A.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	107	Total	C	H	N	O	S	0	0
			1701	518	880	160	142	1		
1	B	107	Total	C	H	N	O	S	0	0
			1701	518	880	160	142	1		

- Molecule 2 is a protein called Histone H2B.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	C	97	Total	C	H	N	O	S	0	0
			1584	486	813	141	142	2		
2	D	97	Total	C	H	N	O	S	0	0
			1583	486	812	141	142	2		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	0	GLY	-	expression tag	UNP P02283
C	2	ILE	-	insertion	UNP P02283
D	0	GLY	-	expression tag	UNP P02283
D	2	ILE	-	insertion	UNP P02283

- Molecule 3 is a protein called Histone H3.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	E	99	Total	C	H	N	O	S	0	0
			1673	514	857	158	142	2		
3	F	99	Total	C	H	N	O	S	0	0
			1673	514	857	158	142	2		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	111	SER	CYS	engineered mutation	UNP P02299

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Chain	Residue	Modelled	Actual	Comment	Reference
F	111	SER	CYS	engineered mutation	UNP P02299

- Molecule 4 is a protein called Histone H4.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	G	83	Total	C	H	N	O	S	0	0
			1372	418	710	129	114	1		
4	H	83	Total	C	H	N	O	S	0	0
			1372	418	710	129	114	1		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	2	ILE	-	insertion	UNP P84040
H	2	ILE	-	insertion	UNP P84040

- Molecule 5 is a protein called PL2-6 scFv.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	I	230	Total	C	H	N	O	S	0	0
			3543	1132	1743	296	363	9		
5	J	230	Total	C	H	N	O	S	0	0
			3542	1132	1742	296	363	9		

- Molecule 6 is a DNA chain called DNA 130-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	K	130	Total	C	H	N	O	P	0	0
			4103	1255	1458	479	781	130		

- Molecule 7 is a DNA chain called DNA 23-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	L	23	Total	C	H	N	O	P	0	0
			734	226	262	83	140	23		

- Molecule 8 is a DNA chain called DNA 153-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	M	153	Total	C	H	N	O	P	0	0
			4874	1494	1717	594	916	153		

- Molecule 9 is a protein called Poly [ADP-ribose] polymerase 2.

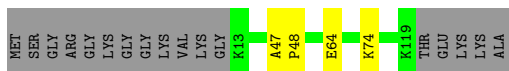
Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
9	P	190	3084	974	1544	274	281	11	0	0

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.

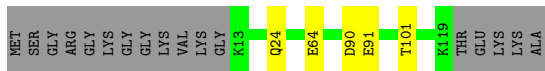
• Molecule 1: Histone H2A

Chain A:  83% 14%



• Molecule 1: Histone H2A

Chain B:  82% 14%



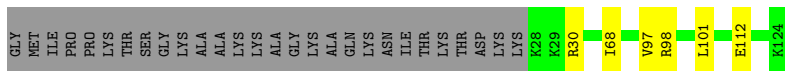
• Molecule 2: Histone H2B

Chain C:  66% 12% 22%



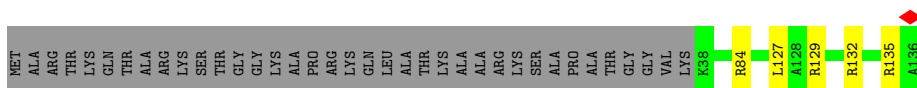
• Molecule 2: Histone H2B

Chain D:  73% 5% 22%

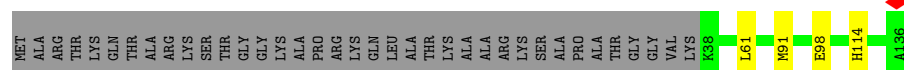


• Molecule 3: Histone H3

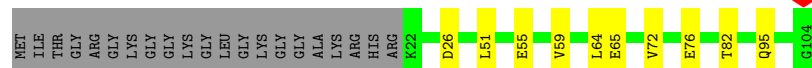
Chain E:  69% 27%



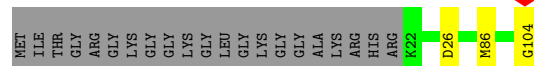
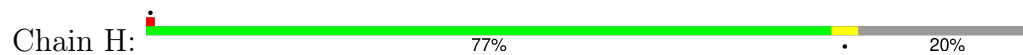
• Molecule 3: Histone H3



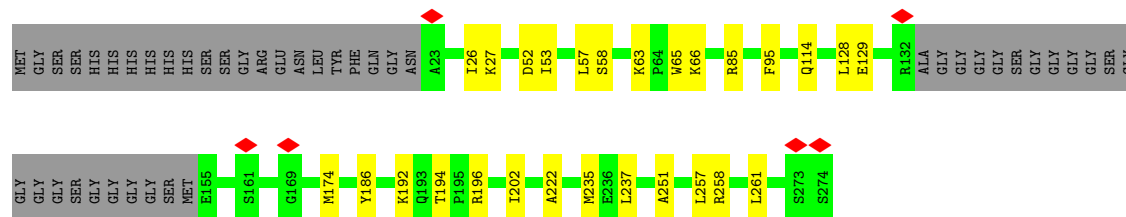
- Molecule 4: Histone H4



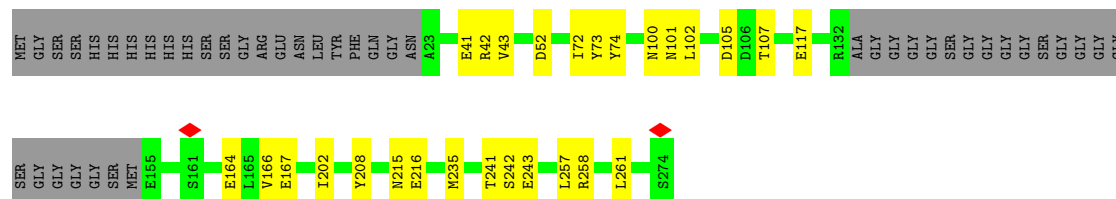
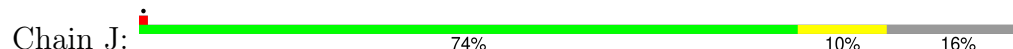
- Molecule 4: Histone H4



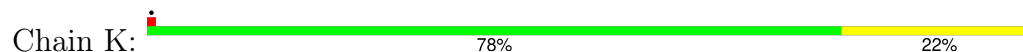
- Molecule 5: PL2-6 scFv



- Molecule 5: PL2-6 scFv



- Molecule 6: DNA 130-mer



- Molecule 7: DNA 23-mer

G1		C13		T20	A22
T2		A14		G21	
C3		T15			T23
A4		C16			
G5					

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| A1 | T2 | C3 | A4 | C5 | A6 | G11 | T14 | A15 | A17 | T18 | C19 | T20 | T53 | T54 | G85 | T86 | T90 | T91 | G100 | C101 | T102 | C114 | G115 | C145 | T146 | C147 | C148 | A149 | T153 |
|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|

- | | | | | | | |
|-----|-----|-----|-----|-----|-----|------|
| GLY | A91 | A92 | P93 | V94 | C98 | V102 | G103 | K104 | A105 | H106 | V107 | Y108 | C109 | V114 | D115 | V117 | M118 | L119 | N120 | N123 | L124 | Q125 | F126 | N127 | N128 | N129 | K130 | L133 | I134 | Q135 | L136 | L137 | E138 | D139 | Q142 | R143 | N144 | F145 | A146 | V147 | W148 | M149 | V154 | G155 | K156 | M157 | L162 | V163 | N168 |
|-----|-----|-----|-----|-----|-----|------|

[illegible]

CYS	ASN	VAL	GLN	ALA	MET	GLU	GLU	MET	MET	MET	GLU	MET	LYS	TYR	THR	THR	K263	K264	A265	L266	L267	G268	K269	L270	Q274	L275	K276	A277	K278	Y279	K280	S281	L282	C288	L289	A296	A297	L298	M299	C302	N303	E304	T307	K308	L309	L315	R316	T317	P318	P319	L320	T321	R322
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L327 K330 I331 Q332 LEU LEU ALA ALA GLY ASP ILE LEU ILE ILE ALA ILE LYS LEU VAL LYS THR LEU GLN SER PRO GLU HIS LEU LEU ASP GLN HIS TYR ARG ASN LEU HIS CYS ALA LEU ARG PRO LEU ASP HIS LEU PHE LYS VAL ILE SER GLN TYR

GLN	SER	THR	HIS	ALA	PRO	THR	HIS	SER	ASP	TYR	THR	MET	THR	LEU	LEU	ASP	LEU	PHE	GLU	VAL	GLU	LYS	ASP	GLY	GLU	GLU	ALA	PHE	ARG	GLU	ASP	LEU	HIS	ASN	ARG	MET	LEU	LEU	TRP	HIS	GLY	SER	ARG	MET	SER	ASN	TRP	VAL	GLY	ILE	LEU	SER	HIS	GLY	HIS	LEU	ARG	ILE
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PRO	PRO	GLU	ALA	PRO	ILE	THR	GLY	TYR	MET	PHE	GLY	LYS	ILE	TYR	PHE	ALA	ASP	MET	SER	SER	LYS	SER	ALA	ASN	TYR	CYS	PHE	ALA	SER	ARG	LEU	LYS	ASN	THR	GLY	LEU	LEU	LEU	SER	GLU	VAL	LEU	ALA	GLY	GLN	CYS	ASN	GLU	LEU	LEU	GLU	ALA	ASN	PRO	LYS	ALA
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GLY	LEU	LEU	GLN	GLY	LYS	HIS	SER	THR	LYS	GLY	LEU	GLY	LYS	MET	ALA	ALA	SER	SER	PRO	SER	THR	SER	THR	VAL	PRO	LEU	PRO	GLY	GLY	GLY	SER	SER	THR	THR	GLY	ILE	LEU	ASN	PRO	ASP	GLY	TYR	THR	THR	GLU	ILE	VAL	TYR	ASN	PRO	ASN	ASN
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VAL
ARG
MET
ARG
TYR
LEU
LEU
LYS
VAL
GLN
PHE
ASN
PHE
LEU
GLN
LEU
TRP

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	70630	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	48	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.351	Depositor
Minimum map value	-0.047	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.018	Depositor
Map size (Å)	331.2, 331.2, 331.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.828, 0.828, 0.828	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0/831	0.34	0/1119
1	B	0.19	0/831	0.38	0/1119
2	C	0.21	0/782	0.48	2/1046 (0.2%)
2	D	0.17	0/782	0.33	0/1046
3	E	0.17	0/828	0.30	0/1109
3	F	0.18	0/828	0.31	0/1109
4	G	0.17	0/669	0.34	0/894
4	H	0.19	0/669	0.32	0/894
5	I	0.14	0/1842	0.36	0/2493
5	J	0.17	0/1842	0.37	0/2493
6	K	0.76	0/2962	0.88	0/4564
7	L	0.72	0/528	0.93	0/811
8	M	0.73	0/3546	0.87	0/5476
9	P	0.20	0/1570	0.54	0/2107
All	All	0.48	0/18510	0.64	2/26280 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	107	LYS	CB-CA-C	-6.10	101.56	110.96
2	C	107	LYS	CD-CE-NZ	5.55	129.65	111.90

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	821	880	879	2	0
1	B	821	880	879	3	0
2	C	771	813	811	10	0
2	D	771	812	811	6	0
3	E	816	857	856	5	0
3	F	816	857	856	3	0
4	G	662	710	709	11	0
4	H	662	710	709	2	0
5	I	1800	1743	1740	21	0
5	J	1800	1742	1740	25	0
6	K	2645	1458	1458	22	0
7	L	472	262	262	8	0
8	M	3157	1717	1717	16	0
9	P	1540	1544	1542	91	0
All	All	17554	14985	14969	209	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (209) 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)
9:P:204:LEU:HD22	9:P:270:LEU:HD11	1.50	0.93
9:P:205:GLN:C	9:P:206:MET:HE3	2.19	0.68
9:P:204:LEU:HB3	9:P:206:MET:HE1	1.77	0.66
5:J:72:ILE:HG22	5:J:74:TYR:O	1.96	0.66
3:E:84:ARG:HB2	4:G:82:THR:HG22	1.78	0.65
9:P:94:VAL:HG22	9:P:137:LEU:HD12	1.78	0.65
9:P:298:LEU:HD11	9:P:321:ILE:HB	1.77	0.65
9:P:303:ASN:O	9:P:307:THR:HG23	1.98	0.64
5:J:41:GLU:O	5:J:102:LEU:HD12	1.97	0.64
9:P:162:LEU:HD13	9:P:163:VAL:N	2.13	0.63
9:P:124:LEU:HD11	9:P:302:CYS:HB3	1.82	0.61
9:P:282:LEU:HD11	9:P:327:LEU:HD13	1.83	0.60
9:P:118:MET:O	9:P:119:LEU:HD23	2.01	0.60
9:P:299:MET:HE1	9:P:320:LEU:HD21	1.83	0.60
9:P:299:MET:CE	9:P:320:LEU:HD11	2.33	0.59
9:P:315:LEU:HD12	9:P:315:LEU:O	2.03	0.58
3:E:84:ARG:CB	4:G:82:THR:HG22	2.34	0.57
9:P:203:MET:HA	9:P:203:MET:HE2	1.87	0.57
9:P:98:CYS:SG	9:P:98:CYS:O	2.64	0.56
1:B:64:GLU:OE2	5:J:257:LEU:HD12	2.06	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:202:ILE:HG21	5:J:235:MET:HE1	1.88	0.56
6:K:108:DT:H2'	6:K:109:DA:C8	2.40	0.56
5:J:41:GLU:C	5:J:102:LEU:HD12	2.30	0.55
9:P:299:MET:HE3	9:P:299:MET:HA	1.87	0.55
5:I:57:LEU:HD23	5:I:58:SER:N	2.21	0.54
8:M:53:DT:H2'	8:M:54:DT:H71	1.87	0.54
9:P:265:ALA:HB1	9:P:268:GLY:C	2.32	0.54
6:K:14:DC:H2'	6:K:15:DC:C6	2.42	0.54
9:P:124:LEU:HD11	9:P:302:CYS:CB	2.37	0.54
9:P:169:LEU:HD13	9:P:169:LEU:C	2.33	0.53
9:P:119:LEU:HB3	9:P:201:TYR:HB3	1.90	0.53
9:P:154:VAL:HG22	9:P:267:LEU:HD11	1.91	0.53
9:P:171:LYS:HE2	9:P:171:LYS:N	2.24	0.53
9:P:206:MET:CE	9:P:270:LEU:HD13	2.38	0.53
9:P:317:THR:HG22	9:P:318:PRO:O	2.08	0.52
5:J:43:VAL:HG13	5:J:102:LEU:HD11	1.91	0.52
8:M:148:DC:H2''	8:M:149:DA:C8	2.45	0.52
9:P:282:LEU:HD23	9:P:282:LEU:O	2.09	0.52
5:J:117:GLU:OE2	5:J:117:GLU:N	2.43	0.52
9:P:133:LEU:C	9:P:133:LEU:HD23	2.35	0.52
1:A:64:GLU:HG2	5:I:257:LEU:CD1	2.41	0.51
2:D:98:ARG:HG2	2:D:98:ARG:HH11	1.76	0.51
9:P:94:VAL:HG11	9:P:102:VAL:HA	1.92	0.51
3:F:91:MET:HE2	3:F:91:MET:HA	1.93	0.51
4:G:76:GLU:OE1	4:G:76:GLU:HA	2.10	0.51
5:J:166:VAL:HG12	5:J:167:GLU:H	1.74	0.51
9:P:171:LYS:O	9:P:172:ALA:C	2.54	0.51
2:D:97:VAL:HG13	2:D:101:LEU:HD22	1.93	0.50
9:P:120:ASN:HB2	9:P:204:LEU:HD11	1.92	0.50
5:I:26:ILE:HG21	5:I:114:GLN:HG2	1.94	0.50
9:P:270:LEU:HD12	9:P:274:GLN:CG	2.41	0.50
9:P:116:ASP:C	9:P:116:ASP:OD2	2.55	0.49
3:E:127:LEU:HD22	3:F:114:HIS:CG	2.46	0.49
6:K:73:DC:H2''	6:K:74:DG:C8	2.47	0.49
2:C:113:GLY:O	2:C:117:VAL:HG23	2.12	0.49
9:P:94:VAL:HG22	9:P:137:LEU:CD1	2.42	0.48
6:K:106:DA:H4'	6:K:107:DT:OP1	2.12	0.48
8:M:19:DC:H2''	8:M:20:DT:C6	2.49	0.48
5:J:52:ASP:OD1	5:J:52:ASP:C	2.57	0.48
9:P:118:MET:O	9:P:204:LEU:HB2	2.13	0.48
6:K:20:DC:H2''	6:K:21:DC:C6	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:G:51:LEU:N	4:G:51:LEU:HD22	2.29	0.48
6:K:114:DC:C2'	6:K:115:DT:H72	2.44	0.47
4:G:64:LEU:O	4:G:65:GLU:C	2.56	0.47
5:J:41:GLU:HG2	5:J:42:ARG:H	1.80	0.47
6:K:39:DC:H2''	6:K:40:DG:C8	2.49	0.47
9:P:206:MET:HE2	9:P:270:LEU:HD22	1.97	0.47
9:P:282:LEU:HD23	9:P:282:LEU:C	2.40	0.47
7:L:4:DA:H1'	7:L:5:DG:C8	2.50	0.47
9:P:118:MET:HE2	9:P:267:LEU:HB3	1.97	0.47
9:P:270:LEU:HD12	9:P:274:GLN:HG3	1.97	0.47
9:P:278:GLY:HA2	9:P:309:ILE:HD13	1.96	0.47
9:P:298:LEU:HD23	9:P:320:LEU:HD12	1.96	0.47
9:P:308:ARG:C	9:P:309:ILE:HD12	2.39	0.47
6:K:112:DC:H2''	6:K:113:DC:C6	2.50	0.47
9:P:117:VAL:O	9:P:134:ILE:HG22	2.14	0.47
1:B:91:GLU:OE2	5:J:208:TYR:CD1	2.68	0.47
9:P:147:VAL:HG12	9:P:163:VAL:O	2.15	0.47
9:P:169:LEU:HD13	9:P:169:LEU:O	2.14	0.46
5:J:241:THR:HG22	5:J:242:SER:H	1.81	0.46
5:I:128:LEU:HD13	5:I:129:GLU:N	2.30	0.46
9:P:105:ALA:HA	9:P:139:ASP:HA	1.96	0.46
5:J:216:GLU:N	5:J:216:GLU:OE2	2.49	0.46
8:M:114:DC:H2''	8:M:115:DG:C8	2.50	0.46
5:J:101:ASN:OD1	5:J:101:ASN:O	2.34	0.46
9:P:107:VAL:HG23	9:P:107:VAL:O	2.16	0.46
5:I:192:LYS:HB2	5:I:202:ILE:HD11	1.98	0.46
2:D:30:ARG:H	2:D:30:ARG:HE	1.64	0.46
4:G:26:ASP:OD1	4:G:26:ASP:O	2.34	0.46
5:I:52:ASP:OD2	5:I:52:ASP:C	2.59	0.46
8:M:90:DT:H4'	8:M:91:DT:OP1	2.15	0.46
5:I:174:MET:HE1	5:I:237:LEU:HD12	1.98	0.45
6:K:106:DA:H2'	6:K:107:DT:H71	1.99	0.45
5:I:63:LYS:HB2	5:I:66:LYS:HD3	1.99	0.45
5:J:164:GLU:N	5:J:164:GLU:OE1	2.49	0.45
7:L:1:DG:H2'	7:L:2:DT:C6	2.52	0.45
9:P:92:ALA:HB2	9:P:114:VAL:HG21	1.98	0.45
9:P:175:ILE:HD12	9:P:175:ILE:H	1.81	0.45
3:E:84:ARG:HD3	4:G:82:THR:HG22	1.98	0.45
2:D:30:ARG:CZ	6:K:128:DT:OP1	2.65	0.45
9:P:128:ASN:OD1	9:P:130:LYS:HD3	2.16	0.45
9:P:205:GLN:N	9:P:205:GLN:OE1	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:G:82:THR:HG23	6:K:105:DG:OP1	2.17	0.44
9:P:118:MET:HG2	9:P:204:LEU:HD12	1.98	0.44
9:P:137:LEU:N	9:P:137:LEU:HD22	2.32	0.44
9:P:276:LYS:HD2	9:P:276:LYS:N	2.32	0.44
5:J:167:GLU:OE2	5:J:167:GLU:N	2.49	0.44
8:M:5:DC:H2''	8:M:6:DA:C8	2.53	0.44
9:P:171:LYS:HE2	9:P:171:LYS:CA	2.48	0.44
5:J:105:ASP:OD1	5:J:105:ASP:O	2.35	0.44
7:L:3:DC:H2''	7:L:4:DA:C8	2.53	0.44
3:E:129:ARG:NH1	4:G:59:VAL:HG12	2.33	0.44
9:P:123:ASN:HA	9:P:303:ASN:HD22	1.82	0.44
9:P:125:GLN:OE1	9:P:125:GLN:O	2.36	0.44
9:P:299:MET:C	9:P:303:ASN:OD1	2.60	0.44
7:L:15:DT:H2''	7:L:16:DC:C6	2.53	0.44
5:I:261:LEU:HD12	5:I:261:LEU:H	1.83	0.43
5:J:73:TYR:CD1	5:J:74:TYR:N	2.86	0.43
8:M:145:DC:H2'	8:M:146:DT:H71	2.00	0.43
9:P:309:ILE:HD12	9:P:309:ILE:N	2.32	0.43
9:P:156:LYS:C	9:P:156:LYS:HD2	2.42	0.43
9:P:194:PHE:CD1	9:P:308:ARG:CZ	3.01	0.43
2:C:104:GLU:OE1	5:I:186:TYR:OH	2.31	0.43
9:P:134:ILE:HD13	9:P:149:MET:HG3	1.99	0.43
9:P:148:TRP:HB2	9:P:162:LEU:HD23	2.01	0.43
8:M:53:DT:C2'	8:M:54:DT:H71	2.48	0.43
4:G:55:GLU:O	4:G:59:VAL:HG13	2.18	0.43
5:J:107:THR:HG23	5:J:107:THR:O	2.19	0.43
6:K:106:DA:H2''	6:K:107:DT:O5'	2.19	0.43
2:C:53:ILE:HG21	2:C:58:MET:HE2	1.99	0.43
2:C:66:ASN:O	2:C:70:GLU:HG2	2.19	0.43
5:I:85:ARG:HB2	5:I:85:ARG:NH1	2.33	0.43
9:P:299:MET:HE1	9:P:320:LEU:HD11	2.00	0.43
6:K:107:DT:H2'	6:K:108:DT:C6	2.53	0.43
2:C:28:LYS:HD2	2:C:28:LYS:C	2.44	0.43
4:H:86:MET:HE1	4:H:104:GLY:N	2.33	0.43
5:I:57:LEU:HD13	5:I:95:PHE:CG	2.54	0.43
6:K:81:DC:H2''	6:K:82:DC:C5	2.53	0.43
2:C:117:VAL:O	2:C:121:THR:HG23	2.19	0.42
2:C:29:LYS:O	2:C:30:ARG:C	2.63	0.42
4:H:26:ASP:OD1	4:H:26:ASP:O	2.37	0.42
6:K:40:DG:H2''	6:K:41:DT:C6	2.54	0.42
6:K:93:DA:H1'	6:K:94:DA:C8	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:251:ALA:HB3	5:I:261:LEU:HD23	2.00	0.42
9:P:94:VAL:HB	9:P:102:VAL:HG23	2.01	0.42
9:P:139:ASP:HB2	9:P:144:ASN:HB3	2.02	0.42
3:F:61:LEU:HD22	3:F:98:GLU:OE2	2.19	0.42
9:P:136:LEU:C	9:P:136:LEU:HD13	2.44	0.42
9:P:162:LEU:HD13	9:P:162:LEU:C	2.45	0.42
6:K:92:DT:H2''	6:K:93:DA:C8	2.55	0.42
8:M:3:DC:H2''	8:M:4:DA:C8	2.55	0.42
2:C:112:GLU:OE2	5:I:258:ARG:NH1	2.53	0.42
2:C:29:LYS:HB3	6:K:107:DT:H4'	2.02	0.42
7:L:20:DT:H2''	7:L:21:DG:C8	2.54	0.42
9:P:154:VAL:HG12	9:P:266:PRO:HB2	2.02	0.42
5:J:166:VAL:HG12	5:J:167:GLU:N	2.35	0.42
9:P:130:LYS:N	9:P:154:VAL:HG23	2.35	0.42
8:M:101:DC:H2''	8:M:102:DT:C6	2.55	0.42
9:P:309:ILE:N	9:P:309:ILE:CD1	2.83	0.42
2:C:28:LYS:C	2:C:28:LYS:CD	2.93	0.41
9:P:322:ARG:HA	9:P:322:ARG:CZ	2.50	0.41
5:J:100:ASN:O	5:J:101:ASN:C	2.63	0.41
6:K:108:DT:H2''	6:K:109:DA:O5'	2.20	0.41
9:P:120:ASN:HB2	9:P:204:LEU:CD1	2.50	0.41
9:P:175:ILE:O	9:P:176:PHE:C	2.61	0.41
5:I:202:ILE:HG21	5:I:235:MET:HE1	2.02	0.41
5:J:243:GLU:OE2	5:J:243:GLU:N	2.51	0.41
9:P:139:ASP:O	9:P:142:GLN:O	2.38	0.41
2:D:98:ARG:HG2	2:D:98:ARG:NH1	2.34	0.41
5:J:261:LEU:N	5:J:261:LEU:HD22	2.35	0.41
5:I:222:ALA:HB1	5:I:235:MET:HE1	2.03	0.41
9:P:194:PHE:CD1	9:P:194:PHE:O	2.73	0.41
9:P:146:SER:HB2	9:P:162:LEU:HD21	2.03	0.41
2:D:112:GLU:OE2	5:J:258:ARG:NH1	2.54	0.41
7:L:13:DC:H2''	7:L:14:DA:C8	2.55	0.41
9:P:279:TYR:O	9:P:279:TYR:CD1	2.73	0.41
5:J:215:ASN:OD1	5:J:216:GLU:OE2	2.39	0.41
9:P:168:ASN:CG	9:P:171:LYS:HG2	2.46	0.41
5:I:27:LYS:HE2	5:I:27:LYS:HA	2.02	0.41
5:I:53:ILE:HD11	5:I:114:GLN:OE1	2.20	0.41
5:I:194:THR:HG22	5:I:196:ARG:HG2	2.03	0.41
7:L:3:DC:C2'	7:L:4:DA:C8	3.04	0.41
8:M:15:DA:H2'	8:M:16:DT:H72	2.02	0.41
9:P:133:LEU:HD23	9:P:133:LEU:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:P:157:MET:SD	9:P:157:MET:C	3.04	0.41
9:P:203:MET:SD	9:P:204:LEU:N	2.94	0.41
9:P:270:LEU:HD12	9:P:274:GLN:CB	2.50	0.41
9:P:289:ILE:HD12	9:P:289:ILE:N	2.36	0.41
5:I:65:TRP:HE3	5:I:65:TRP:O	2.03	0.41
6:K:29:DC:H2''	6:K:30:DT:H71	2.03	0.41
9:P:185:LYS:O	9:P:185:LYS:CD	2.69	0.41
9:P:205:GLN:NE2	9:P:274:GLN:HG2	2.36	0.41
1:B:90:ASP:OD1	1:B:90:ASP:C	2.64	0.40
5:I:95:PHE:CD1	5:I:95:PHE:N	2.89	0.40
9:P:109:CYS:HA	9:P:114:VAL:HA	2.03	0.40
6:K:117:DC:H2'	6:K:118:DT:H71	2.03	0.40
9:P:124:LEU:H	9:P:303:ASN:ND2	2.19	0.40
9:P:208:TYR:O	9:P:209:ALA:C	2.64	0.40
4:G:72:VAL:O	4:G:76:GLU:HG2	2.22	0.40
7:L:14:DA:C2	8:M:11:DG:C2	3.09	0.40
8:M:14:DT:C2	8:M:15:DA:C8	3.09	0.40
8:M:18:DT:H2''	8:M:19:DC:C5	2.57	0.40
9:P:197:VAL:HG23	9:P:304:GLU:HB2	2.02	0.40
1:A:47:ALA:N	1:A:48:PRO:HD2	2.37	0.40
6:K:30:DT:H2''	6:K:31:DC:C5	2.56	0.40
8:M:85:DG:H2'	8:M:86:DT:H71	2.02	0.40
8:M:100:DG:OP2	9:P:296:ARG:HG2	2.22	0.40
9:P:102:VAL:HG13	9:P:103:GLY:N	2.37	0.40
9:P:302:CYS:O	9:P:303:ASN:C	2.64	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	105/124 (85%)	103 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	105/124 (85%)	104 (99%)	1 (1%)	0	100	100
2	C	95/125 (76%)	92 (97%)	3 (3%)	0	100	100
2	D	95/125 (76%)	94 (99%)	1 (1%)	0	100	100
3	E	97/136 (71%)	95 (98%)	2 (2%)	0	100	100
3	F	97/136 (71%)	95 (98%)	2 (2%)	0	100	100
4	G	81/104 (78%)	77 (95%)	4 (5%)	0	100	100
4	H	81/104 (78%)	80 (99%)	1 (1%)	0	100	100
5	I	226/274 (82%)	215 (95%)	11 (5%)	0	100	100
5	J	226/274 (82%)	222 (98%)	4 (2%)	0	100	100
9	P	186/494 (38%)	157 (84%)	28 (15%)	1 (0%)	24	40
All	All	1394/2020 (69%)	1334 (96%)	59 (4%)	1 (0%)	49	66

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
9	P	145	PHE

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	83/94 (88%)	82 (99%)	1 (1%)	63	81
1	B	83/94 (88%)	81 (98%)	2 (2%)	43	67
2	C	84/105 (80%)	82 (98%)	2 (2%)	43	67
2	D	84/105 (80%)	83 (99%)	1 (1%)	63	81
3	E	86/111 (78%)	84 (98%)	2 (2%)	44	69
3	F	86/111 (78%)	86 (100%)	0	100	100
4	G	68/80 (85%)	67 (98%)	1 (2%)	57	78
4	H	68/80 (85%)	68 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	I	202/226 (89%)	202 (100%)	0	100	100
5	J	202/226 (89%)	202 (100%)	0	100	100
9	P	165/433 (38%)	154 (93%)	11 (7%)	15	29
All	All	1211/1665 (73%)	1191 (98%)	20 (2%)	52	75

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	74	LYS
1	B	24	GLN
1	B	101	THR
2	C	50	ASP
2	C	122	SER
2	D	68	ILE
3	E	132	ARG
3	E	135	ARG
4	G	95	GLN
9	P	91	LYS
9	P	104	LYS
9	P	126	PHE
9	P	133	LEU
9	P	135	GLN
9	P	137	LEU
9	P	142	GLN
9	P	143	ARG
9	P	193	LYS
9	P	280	GLN
9	P	322	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	84	GLN
2	C	48	HIS
2	D	83	ASN
3	E	86	GLN
5	I	36	HIS
5	I	61	GLN
5	J	101	ASN
5	J	157	GLN

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Mol	Chain	Res	Type
9	P	120	ASN
9	P	170	ASN

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](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

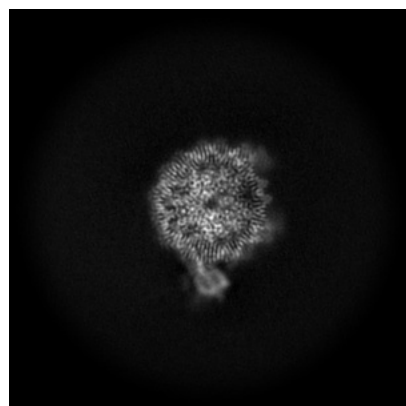
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-74928. These allow visual inspection of the internal detail of the map and identification of artifacts.

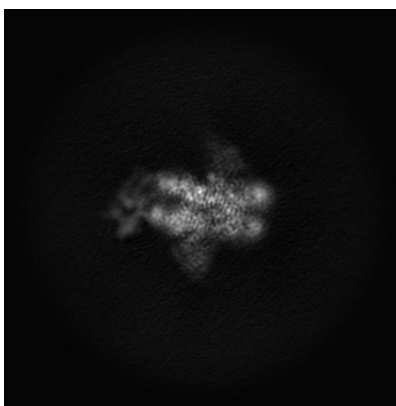
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

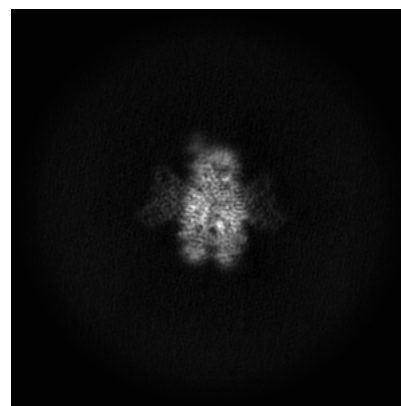
6.1.1 Primary map



X

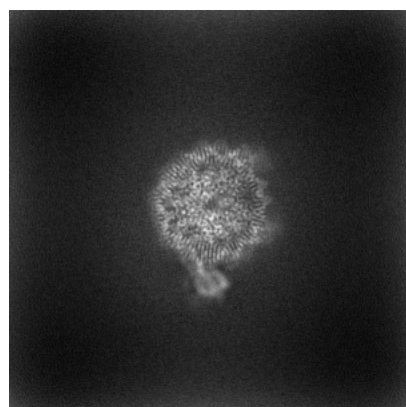


Y

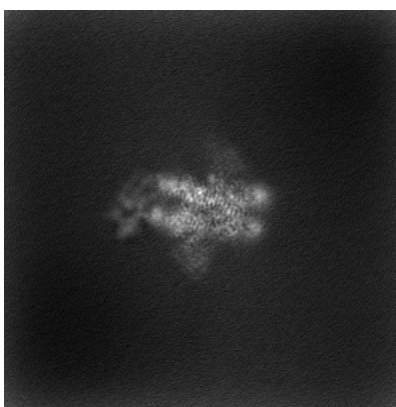


Z

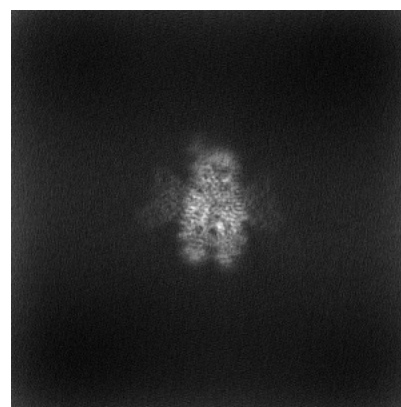
6.1.2 Raw map



X



Y

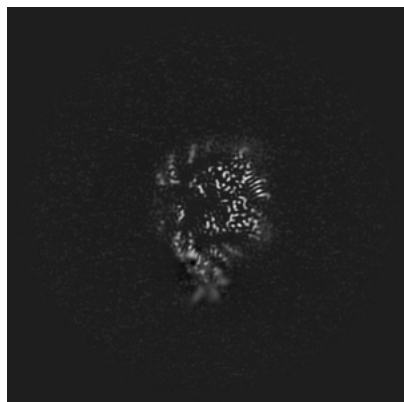


Z

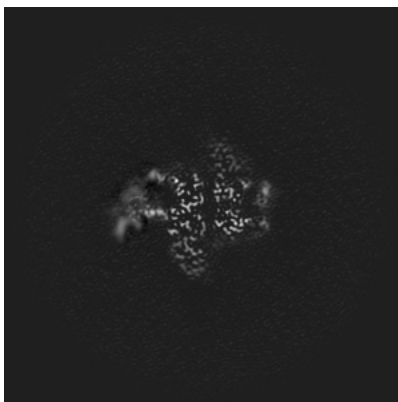
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

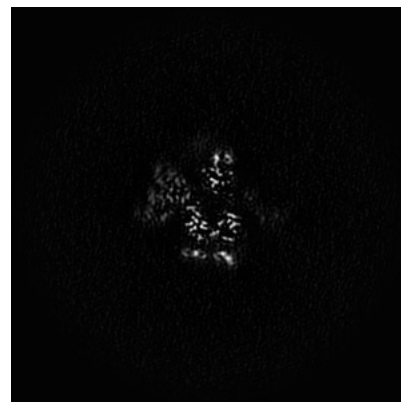
6.2.1 Primary map



X Index: 200

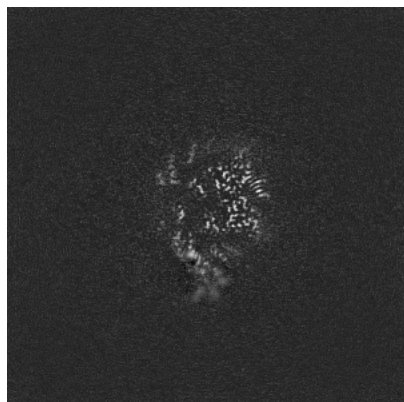


Y Index: 200

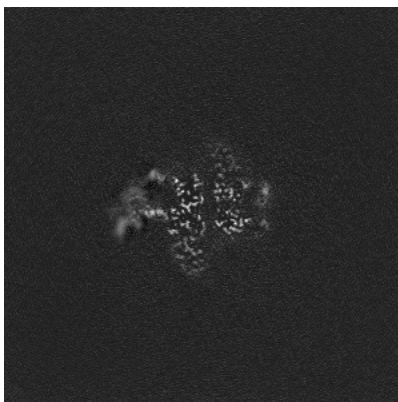


Z Index: 200

6.2.2 Raw map



X Index: 200



Y Index: 200

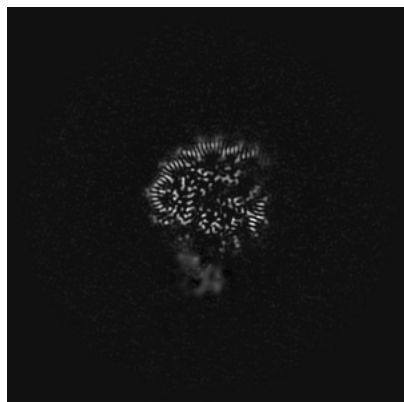


Z Index: 200

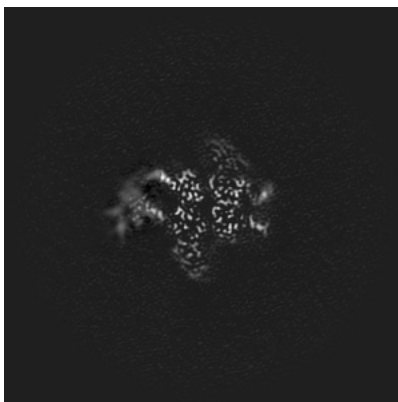
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

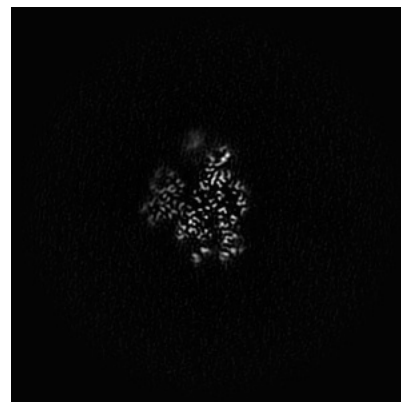
6.3.1 Primary map



X Index: 212

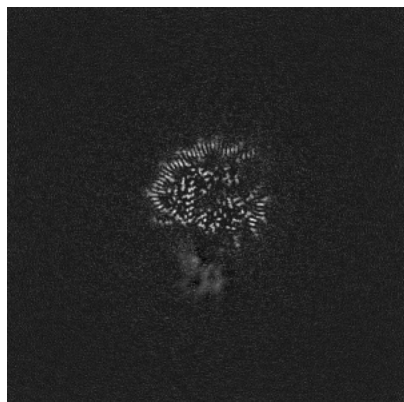


Y Index: 197

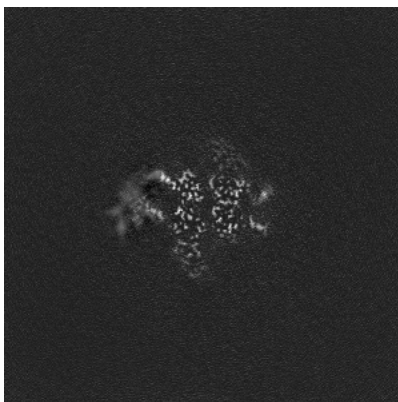


Z Index: 186

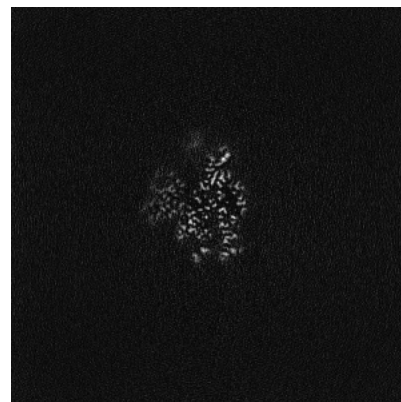
6.3.2 Raw map



X Index: 211



Y Index: 197

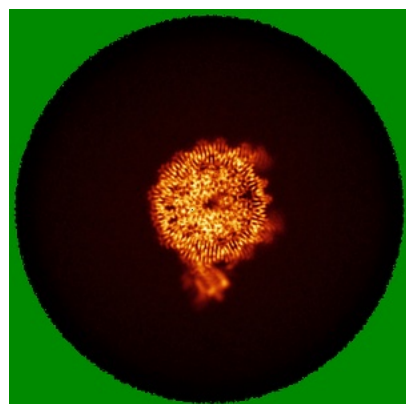


Z Index: 186

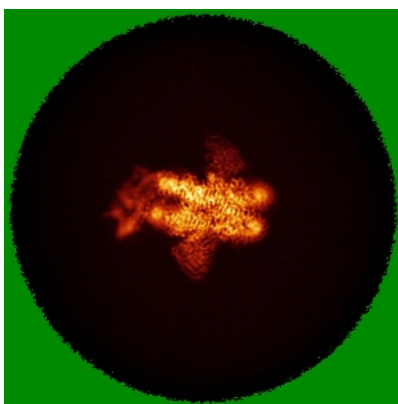
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

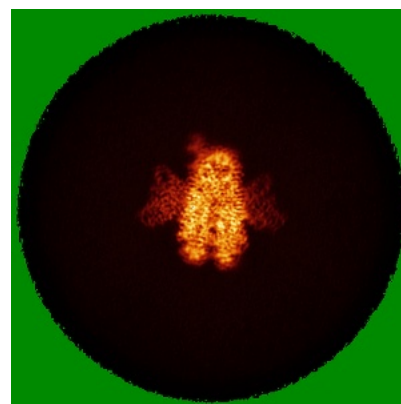
6.4.1 Primary map



X

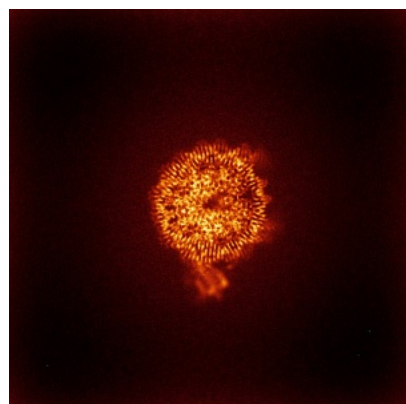


Y

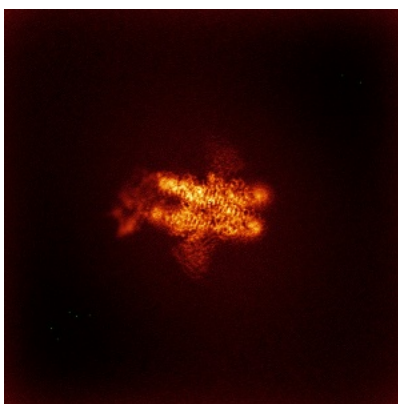


Z

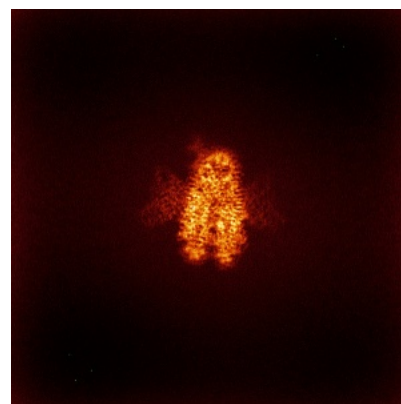
6.4.2 Raw map



X



Y

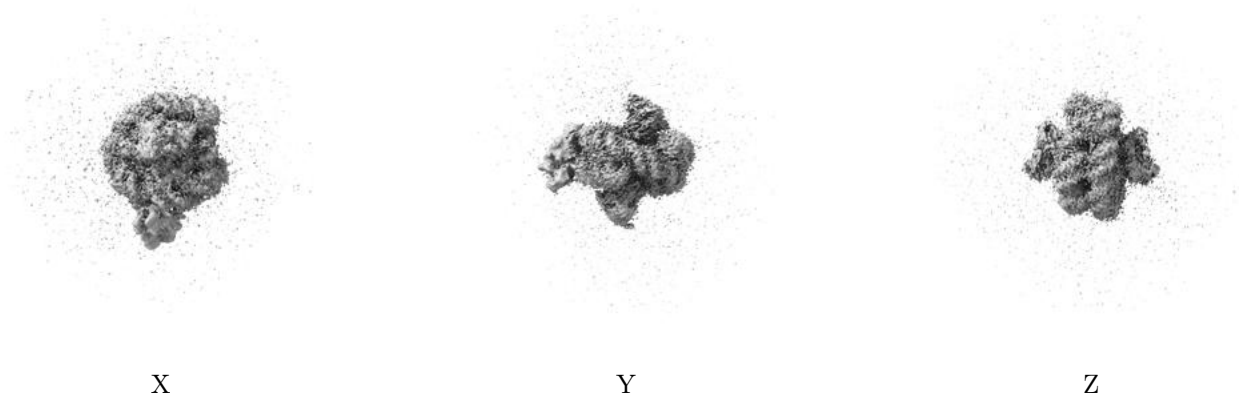


Z

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.

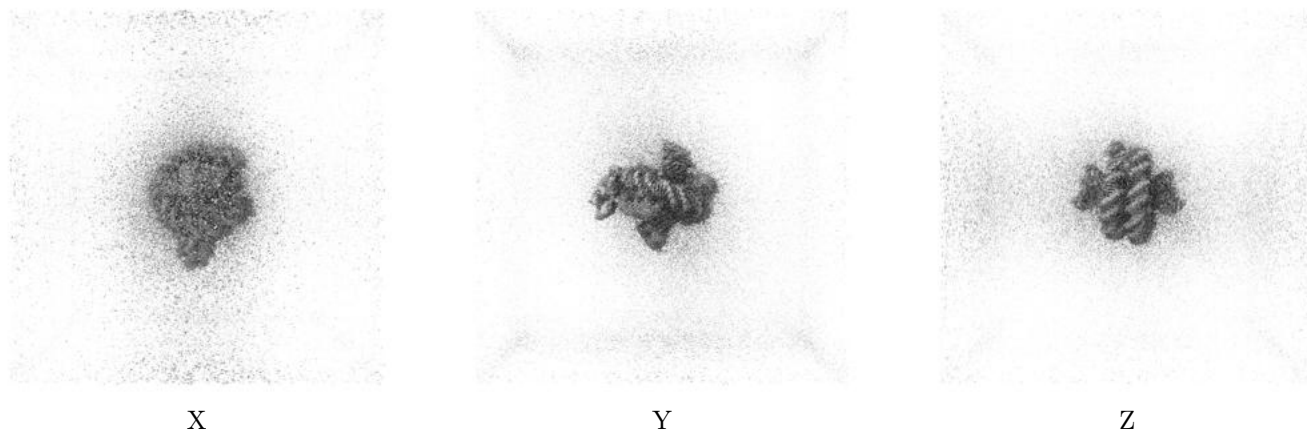
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.018. 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.

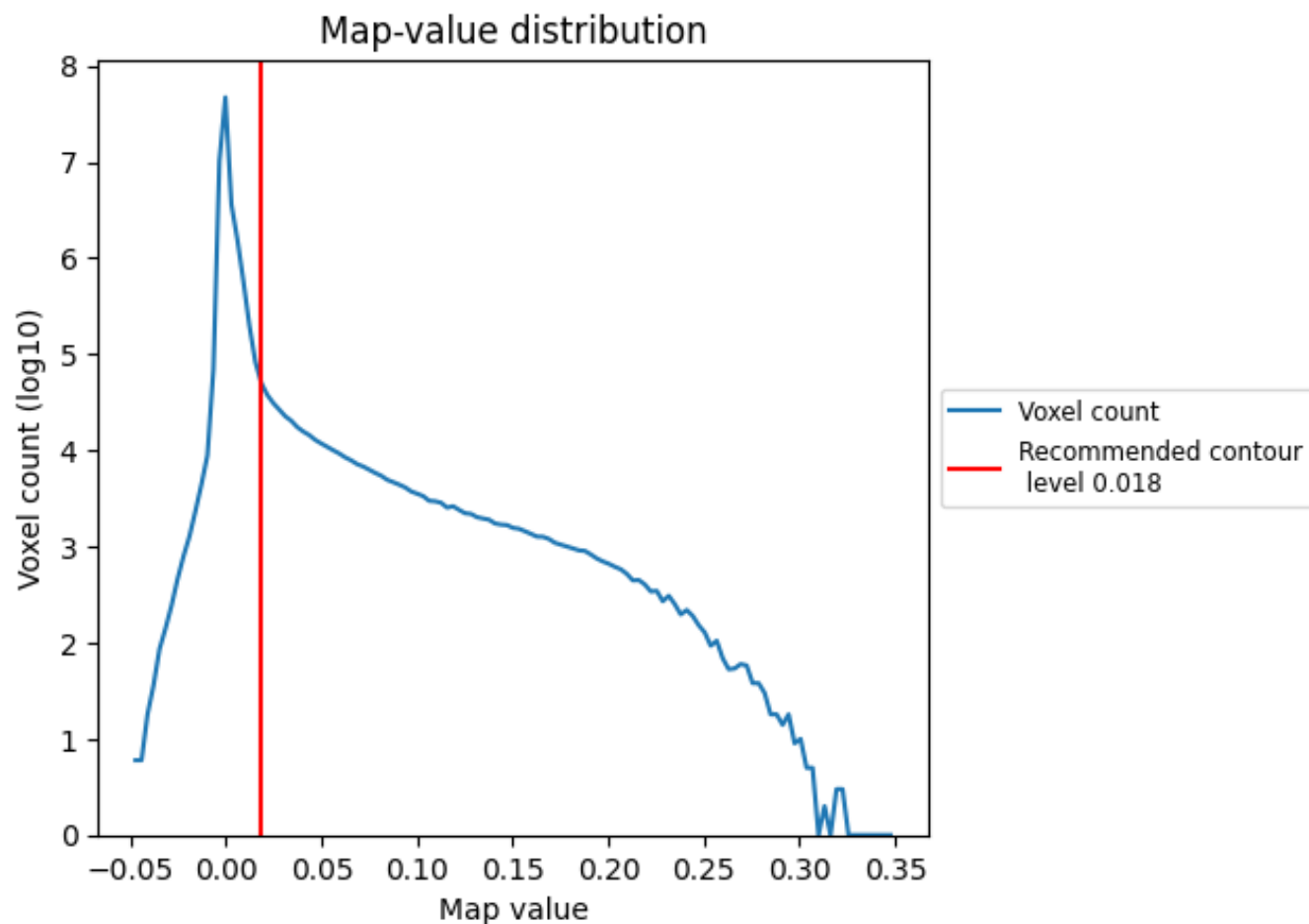
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

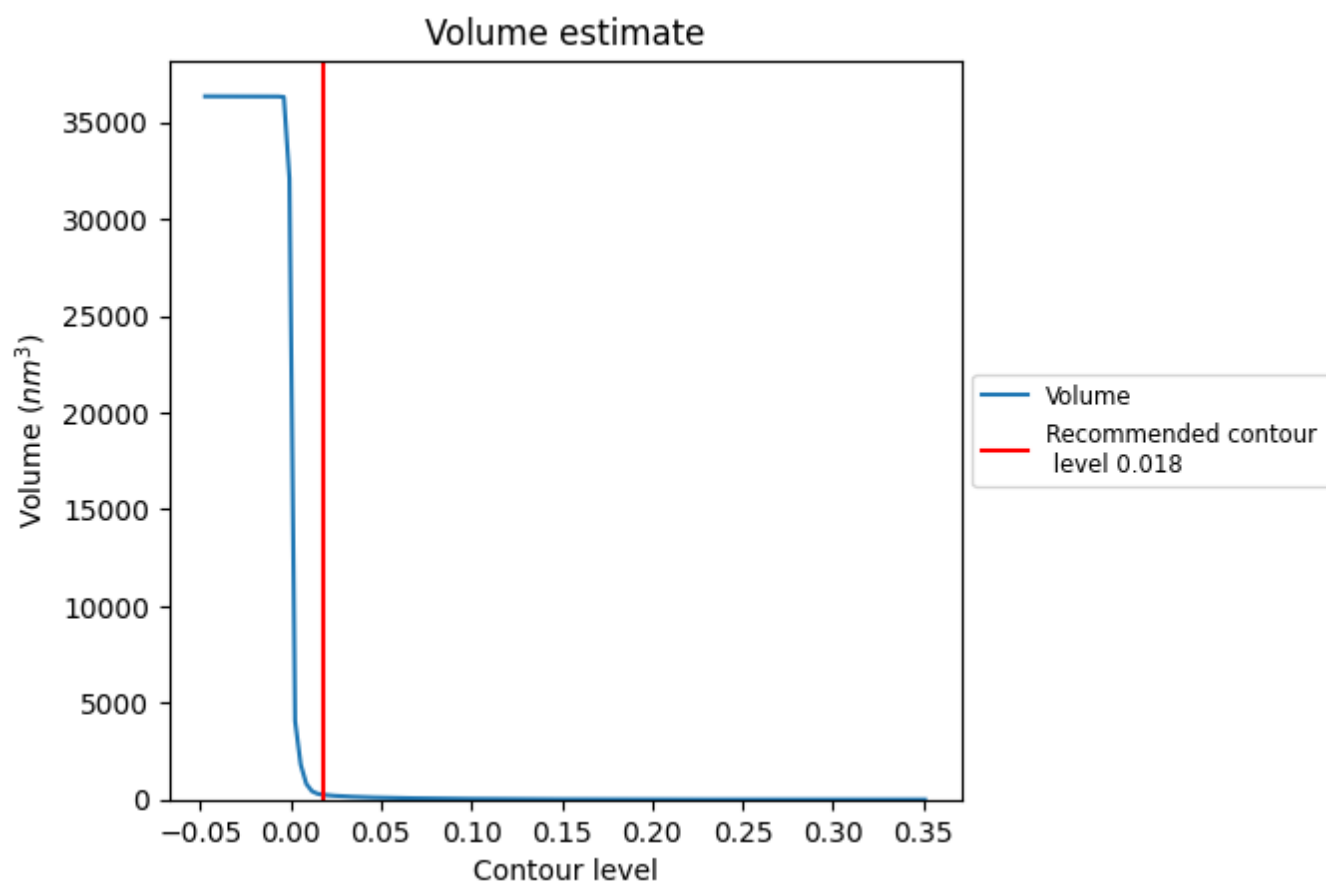
This section contains the results of statistical analysis of the map.

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.

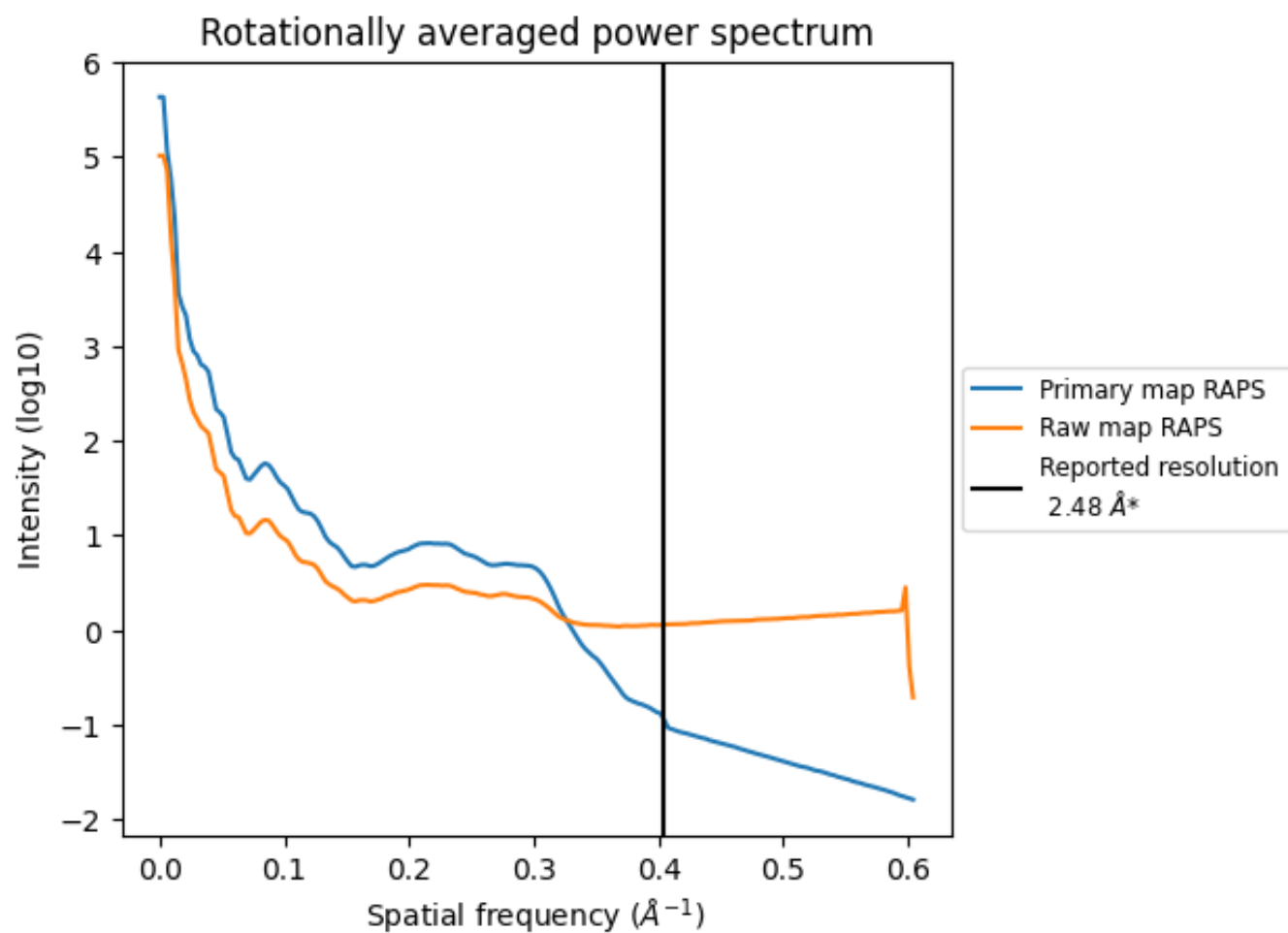
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 248 nm³; this corresponds to an approximate mass of 224 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 ⓘ

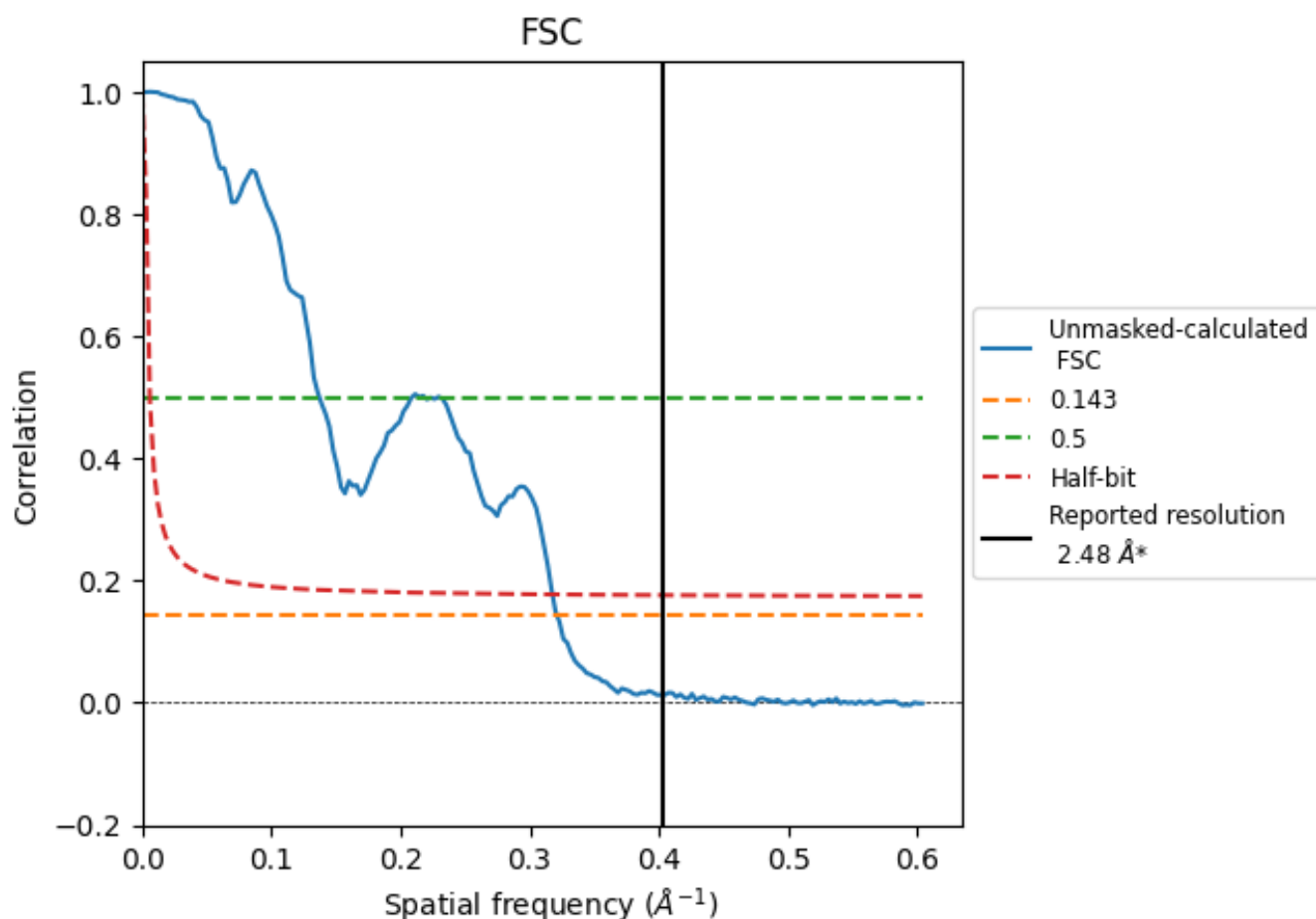


*Reported resolution corresponds to spatial frequency of $0.403 \text{ \AA}^{-1}$

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 $0.403 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

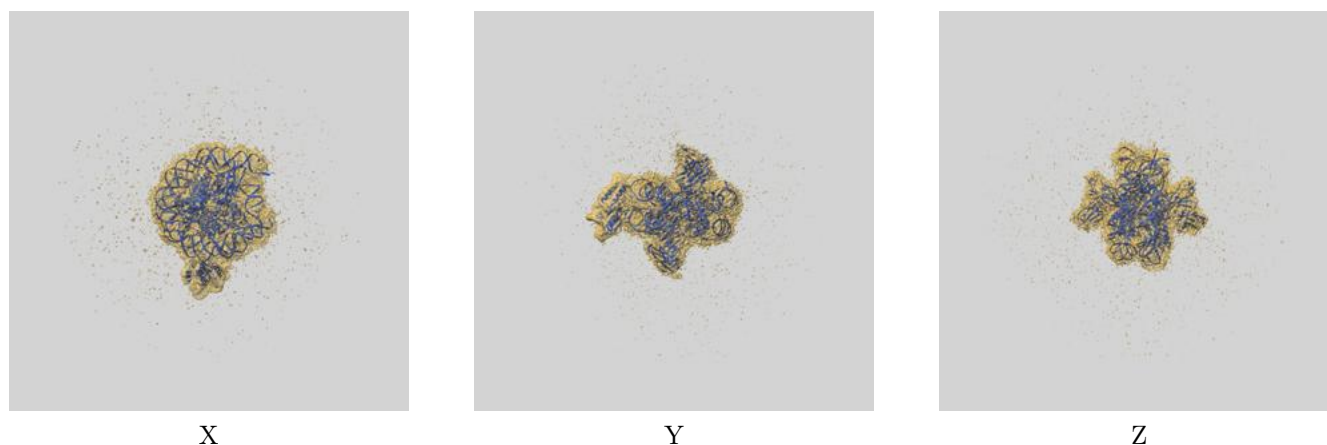
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.48	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.11	7.29	3.15

*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 3.11 differs from the reported value 2.48 by more than 10 %

9 Map-model fit [i](#)

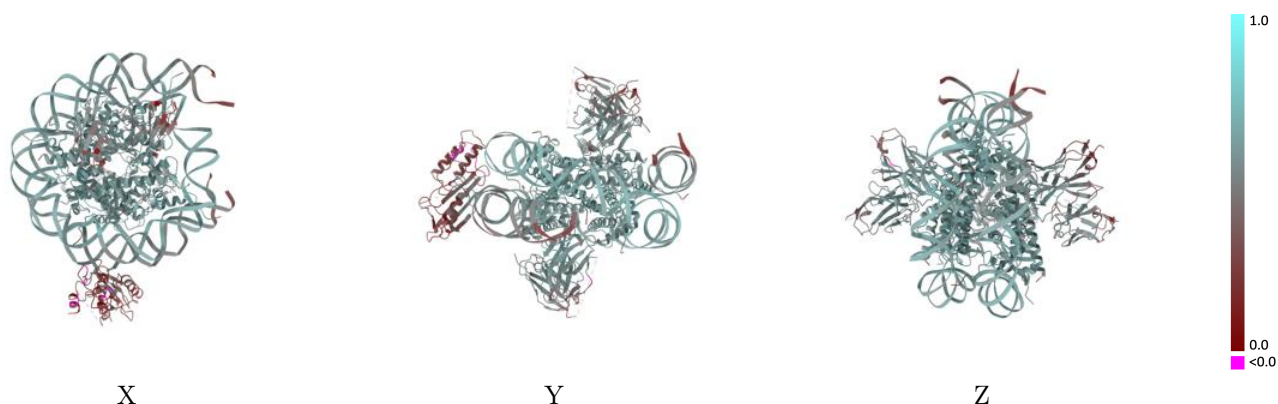
This section contains information regarding the fit between EMDB map EMD-74928 and PDB model 9ZXL. Per-residue inclusion information can be found in section [3](#) on page [7](#).

9.1 Map-model overlay [i](#)



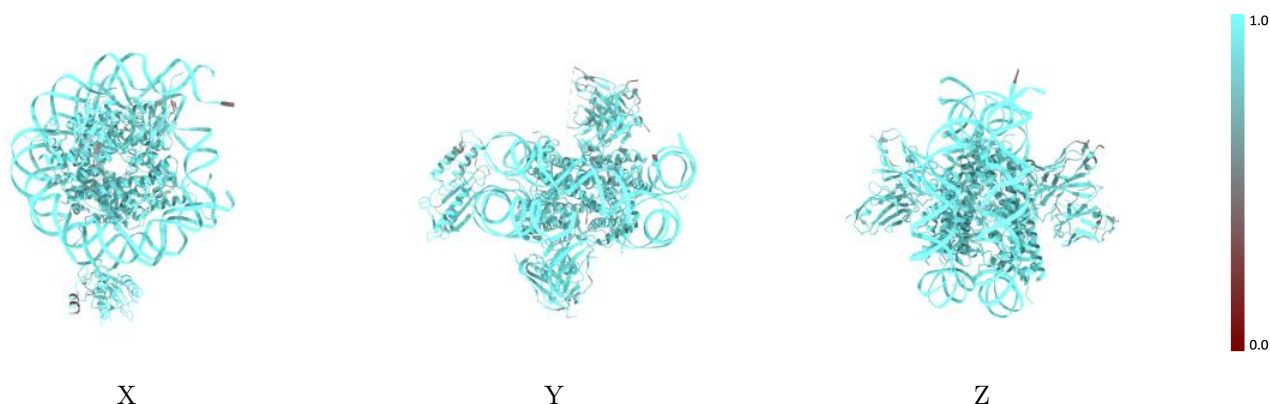
The images above show the 3D surface view of the map at the recommended contour level 0.018 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



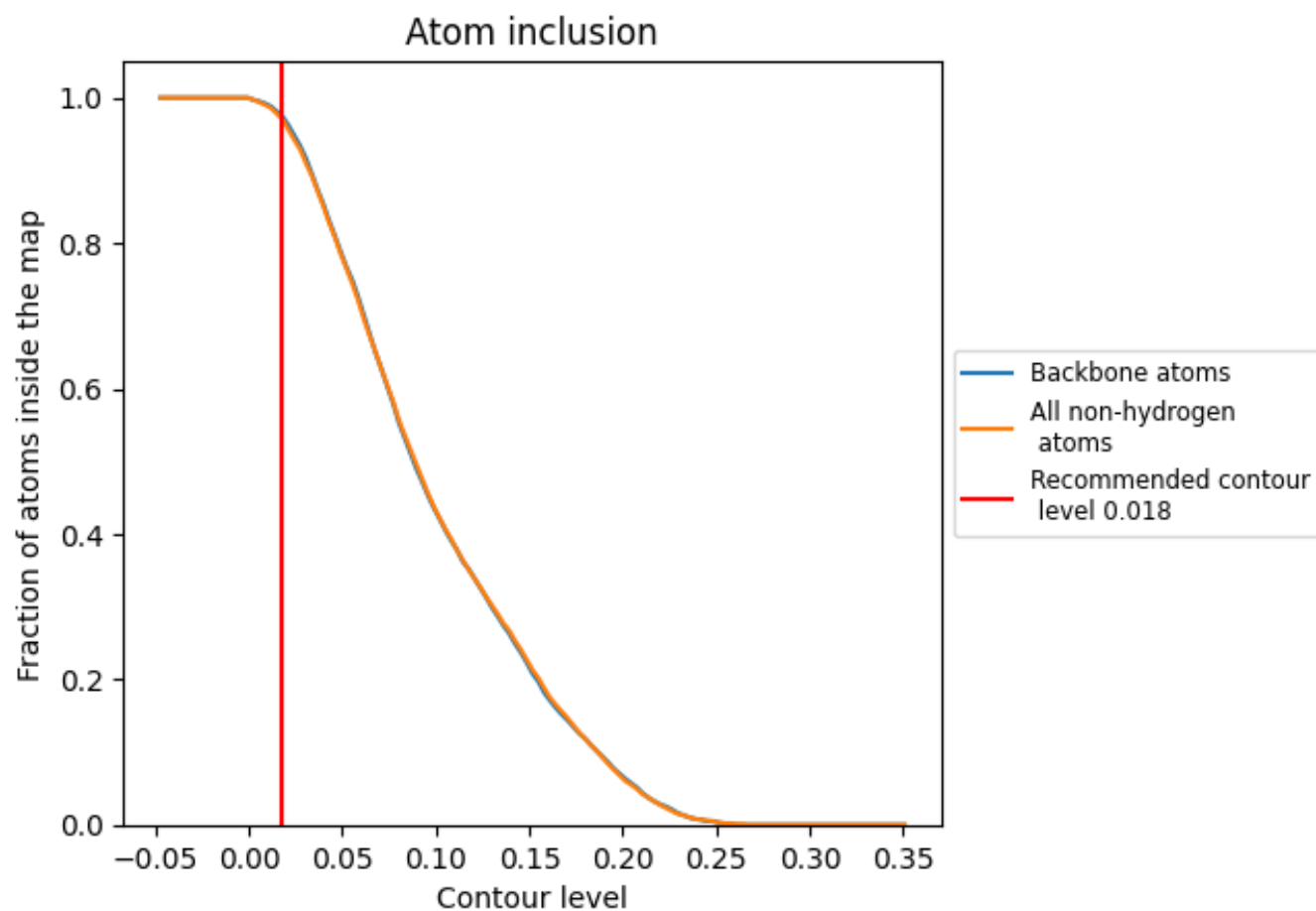
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.018).

9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 97% 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 (0.018) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9700	0.5500
A	0.9980	0.6270
B	0.9890	0.6230
C	0.9890	0.5990
D	0.9840	0.6030
E	0.9810	0.6230
F	0.9760	0.6220
G	0.9910	0.6240
H	0.9860	0.6260
I	0.8800	0.4920
J	0.9630	0.5400
K	0.9950	0.5910
L	0.9960	0.4930
M	0.9970	0.5700
P	0.9220	0.2630

