



## Full wwPDB EM Validation Report ⓘ

Apr 1, 2025 – 10:25 pm BST

PDB ID : 6ZIT / pdb\_00006zit  
EMDB ID : EMD-11229  
Title : bovine ATP synthase Stator domain, state 2  
Authors : Spikes, T.E.; Montgomery, M.G.; Walker, J.E.  
Deposited on : 2020-06-26  
Resolution : 3.49 Å (reported)  
Based on initial models : 2CLY, 2V7Q, 2WSS

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev117  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.42

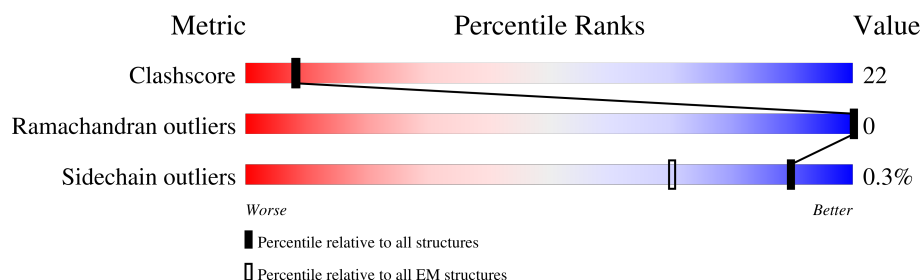
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.49 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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  $\geq 3$ , 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	8	66	<div> <div>14%</div> <div>42%</div> <div>15%</div> <div>42%</div> </div>
2	a	226	<div> <div>19%</div> <div>100%</div> </div>
3	d	160	<div> <div>19%</div> <div>95%</div> <div>..</div> </div>
4	e	70	<div> <div>26%</div> <div>59%</div> <div>41%</div> </div>
5	f	87	<div> <div>17%</div> <div>95%</div> <div>5%</div> </div>
6	g	102	<div> <div>37%</div> <div>77%</div> <div>23%</div> </div>
7	j	60	<div> <div>40%</div> <div>80%</div> <div>20%</div> </div>
8	k	57	<div> <div>46%</div> <div>63%</div> <div>37%</div> </div>

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Mol	Chain	Length	Quality of chain
9	K	75	
9	L	75	
9	R	75	
10	b	214	
11	h	76	
12	S	190	
13	C	510	

## 2 Entry composition [i](#)

There are 13 unique types of molecules in this entry. The entry contains 20683 atoms, of which 10483 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 ATP synthase protein 8.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	8	38	Total	C	H	N	O	S	0	0
			649	216	327	49	54	3		

- Molecule 2 is a protein called ATP synthase subunit a.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	a	226	Total	C	H	N	O	S	0	0
			3611	1155	1870	276	298	12		

- Molecule 3 is a protein called ATP synthase subunit d, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	d	154	Total	C	H	N	O	S	0	0
			2534	817	1268	206	240	3		

- Molecule 4 is a protein called ATP synthase subunit e, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	e	41	Total	C	H	N	O	S	0	0
			687	218	352	61	55	1		

- Molecule 5 is a protein called ATP synthase subunit f, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	f	83	Total	C	H	N	O	S	0	0
			1411	456	718	120	114	3		

- Molecule 6 is a protein called ATP synthase subunit g, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	g	79	Total	C	H	N	O	S	0	0
			1291	420	662	100	108	1		

- Molecule 7 is a protein called ATP synthase subunit ATP5MPL, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	j	48	Total	C	H	N	O	S	0	0
			828	267	428	66	65	2		

- Molecule 8 is a protein called ATP synthase membrane subunit DAPIT, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	k	36	Total	C	H	N	O	S	0	0
			257	105	80	36	36			

- Molecule 9 is a protein called ATP synthase F(0) complex subunit C2, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	R	57	Total	C	H	N	O	S	0	0
			858	282	438	64	70	4		
9	K	58	Total	C	H	N	O	S	0	0
			873	287	446	65	71	4		
9	L	31	Total	C	H	N	O	S	0	0
			487	166	247	33	38	3		

- Molecule 10 is a protein called ATP synthase F(0) complex subunit B1, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	b	209	Total	C	H	N	O	S	0	0
			3457	1095	1756	292	308	6		

- Molecule 11 is a protein called ATP synthase-coupling factor 6, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
11	h	62	Total	C	H	N	O	S	0	0
			1009	326	495	87	99	2		

- Molecule 12 is a protein called ATP synthase subunit O, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
12	S	89	Total	C	H	N	O	S	0	0
			1398	425	725	114	127	7		

- Molecule 13 is a protein called ATP synthase subunit alpha, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
13	C	89	Total	C	H	N	O	S	0	0
			1333	409	671	115	136	2		

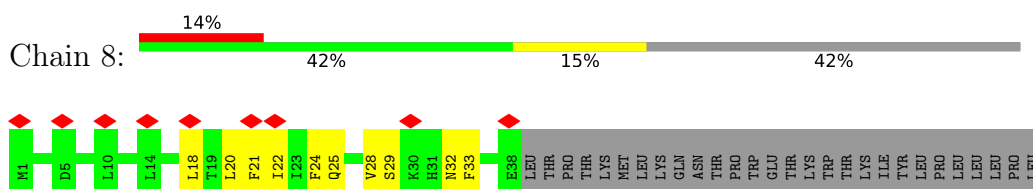
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	1	GLU	GLN	microheterogeneity	UNP P19483

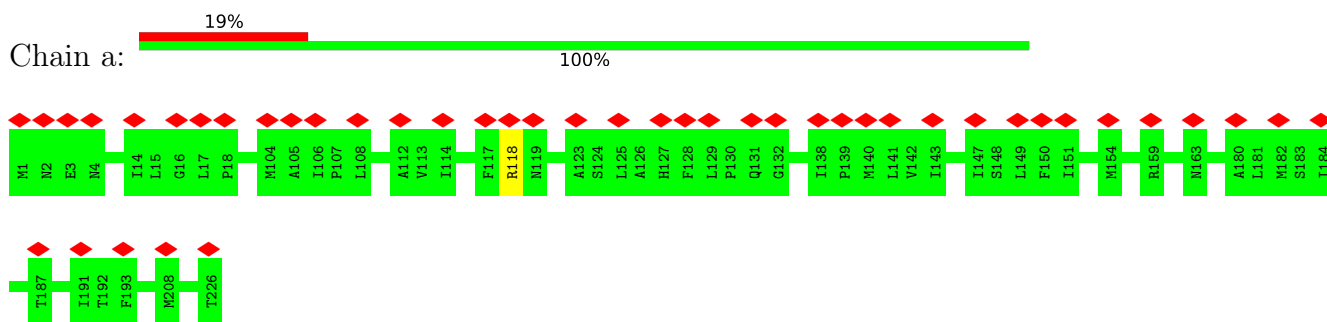
### 3 Residue-property plots [i](#)

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.

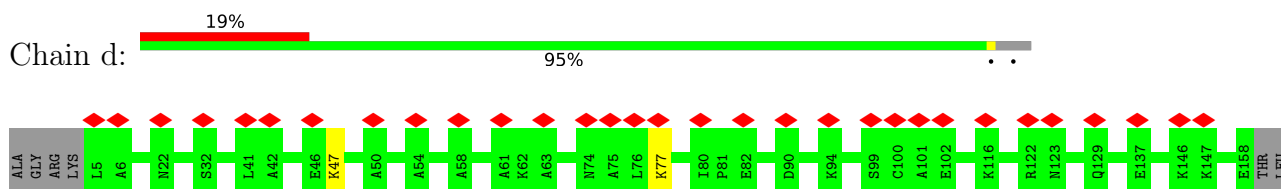
- Molecule 1: ATP synthase protein 8



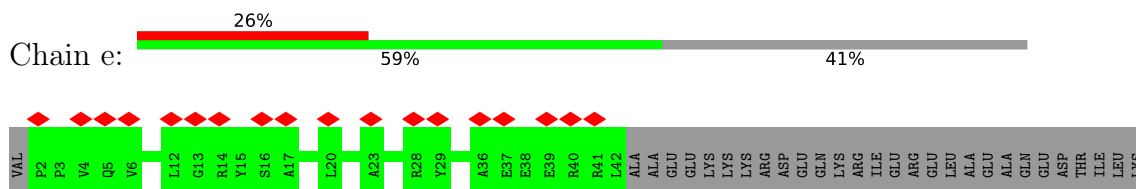
- Molecule 2: ATP synthase subunit a



- Molecule 3: ATP synthase subunit d, mitochondrial

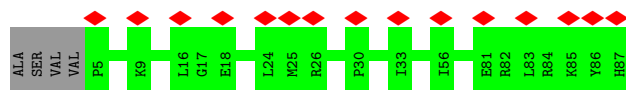


- Molecule 4: ATP synthase subunit e, mitochondrial

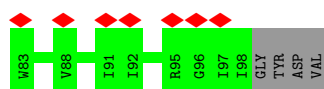
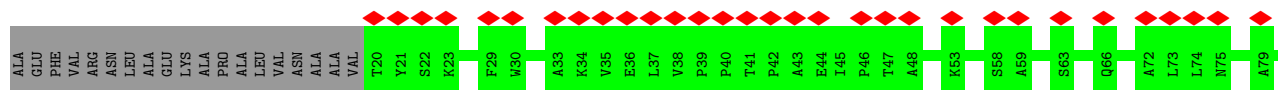
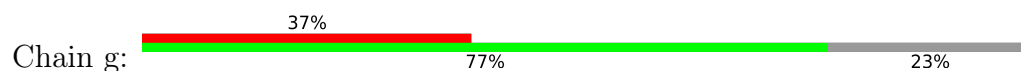


- Molecule 5: ATP synthase subunit f, mitochondrial

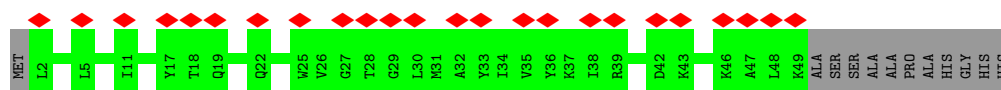
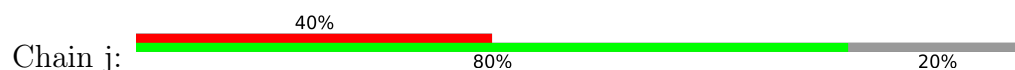




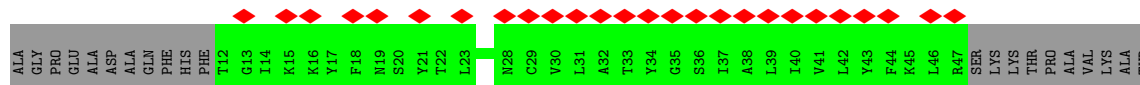
- Molecule 6: ATP synthase subunit g, mitochondrial



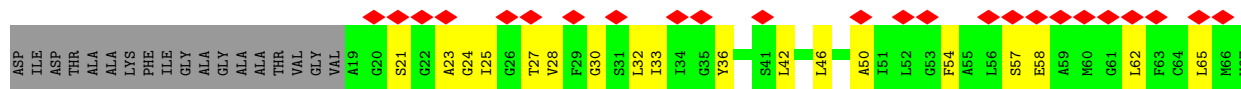
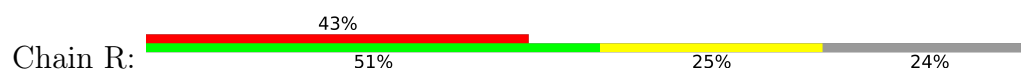
- Molecule 7: ATP synthase subunit ATP5MPL, mitochondrial



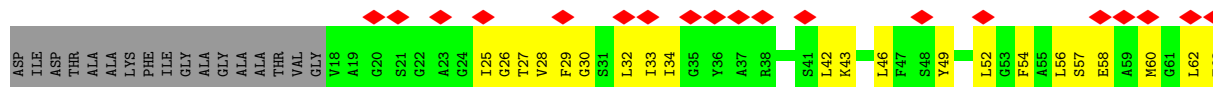
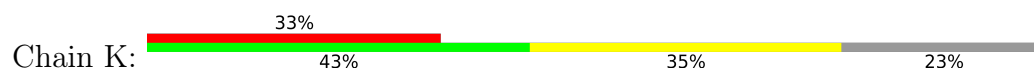
- Molecule 8: ATP synthase membrane subunit DAPIT, mitochondrial



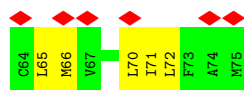
- Molecule 9: ATP synthase F(0) complex subunit C2, mitochondrial



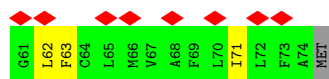
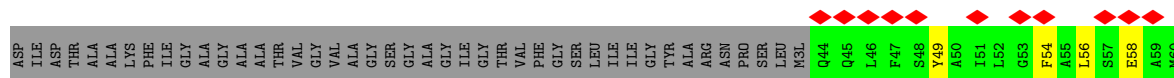
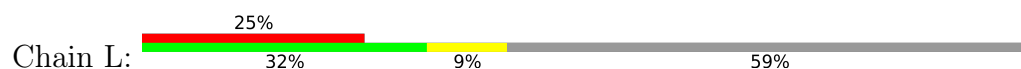
- Molecule 9: ATP synthase F(0) complex subunit C2, mitochondrial



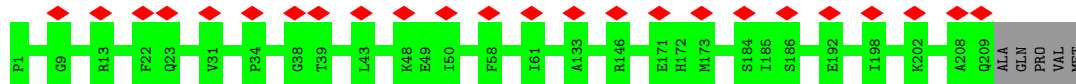




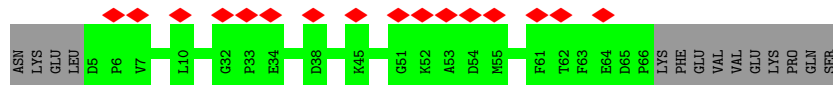
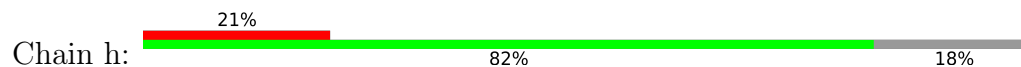
- Molecule 9: ATP synthase F(0) complex subunit C2, mitochondrial



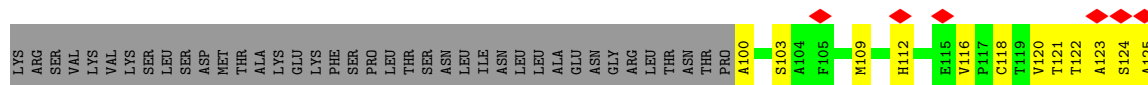
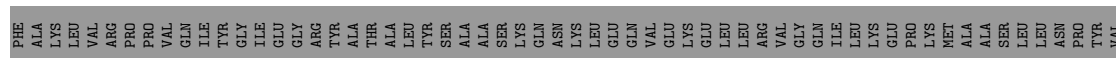
- Molecule 10: ATP synthase F(0) complex subunit B1, mitochondrial



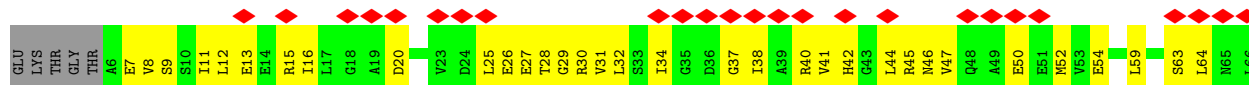
- Molecule 11: ATP synthase-coupling factor 6, mitochondrial



- Molecule 12: ATP synthase subunit O, mitochondrial



- Molecule 13: ATP synthase subunit alpha, mitochondrial



[illegible]

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	90850	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	4.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.053	Depositor
Minimum map value	-0.025	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.0178	Depositor
Map size (Å)	524.0, 524.0, 524.0	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.048, 1.048, 1.048	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: M3L

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	8	0.37	0/332	0.45	0/450
2	a	0.33	0/1779	0.49	0/2433
3	d	0.34	0/1297	0.47	0/1758
4	e	0.27	0/343	0.43	0/460
5	f	0.39	0/711	0.48	0/952
6	g	0.29	0/646	0.44	0/879
7	j	0.35	0/410	0.49	0/552
8	k	0.22	0/176	0.36	0/243
9	K	0.39	0/423	0.52	0/570
9	L	0.35	0/245	0.43	0/329
9	R	0.32	0/416	0.50	0/560
10	b	0.34	0/1733	0.48	0/2334
11	h	0.34	0/526	0.48	0/707
12	S	0.28	0/678	0.48	0/908
13	C	0.28	0/665	0.49	0/894
All	All	0.33	0/10380	0.48	0/14029

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	8	322	327	327	6	0
2	a	1741	1870	1870	0	0
3	d	1266	1268	1268	0	0
4	e	335	352	352	0	0
5	f	693	718	718	0	0
6	g	629	662	662	0	0
7	j	400	428	428	0	0
8	k	177	80	80	0	0
9	K	427	446	446	28	0
9	L	240	247	247	9	0
9	R	420	438	438	21	0
10	b	1701	1756	1755	0	0
11	h	514	495	495	0	0
12	S	673	725	725	46	0
13	C	662	671	671	40	0
All	All	10200	10483	10482	129	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 22.

All (129) 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)
12:S:138:LEU:HD13	12:S:148:LEU:HD13	1.37	1.02
13:C:78:ASN:OD1	13:C:79:ASP:N	2.17	0.78
13:C:32:LEU:HD21	13:C:42:HIS:HB2	1.67	0.76
9:K:30:GLY:O	9:K:34:ILE:HD12	1.87	0.75
12:S:118:CYS:HB3	12:S:148:LEU:HD21	1.68	0.75
12:S:172:ASP:OD1	12:S:174:SER:N	2.21	0.73
1:8:32:ASN:OD1	1:8:33:PHE:N	2.22	0.71
13:C:41:VAL:HG11	13:C:88:VAL:HG11	1.70	0.71
9:R:32:LEU:HD13	9:R:50:ALA:HB2	1.73	0.71
12:S:158:ILE:HD13	12:S:163:ILE:CD1	2.23	0.69
13:C:41:VAL:HG11	13:C:88:VAL:CG1	2.23	0.69
9:R:25:ILE:HD11	9:K:57:SER:N	2.08	0.69
9:K:54:PHE:CE1	9:L:56:LEU:HD13	2.28	0.69
9:R:24:GLY:O	9:R:28:VAL:HG23	1.95	0.66
12:S:142:LEU:HD22	12:S:146:GLN:HB3	1.76	0.65
13:C:34:ILE:HG22	13:C:84:GLU:OE2	1.98	0.64
12:S:168:GLU:OE2	13:C:28:THR:N	2.30	0.64
9:R:36:TYR:CE2	9:K:42:LEU:HD21	2.33	0.64
12:S:151:GLU:OE1	12:S:153:LYS:N	2.30	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:K:43:M3L:O	9:K:46:LEU:N	2.30	0.63
13:C:31:VAL:O	13:C:85:GLY:N	2.32	0.63
13:C:32:LEU:HD21	13:C:42:HIS:CB	2.28	0.62
9:K:43:M3L:HM32	9:L:49:TYR:OH	1.99	0.62
9:R:42:LEU:O	9:R:46:LEU:HD13	1.99	0.62
12:S:118:CYS:CB	12:S:148:LEU:HD21	2.29	0.61
13:C:54:GLU:CD	13:C:91:THR:HG23	2.21	0.60
13:C:34:ILE:N	13:C:84:GLU:OE2	2.35	0.59
13:C:30:ARG:C	13:C:41:VAL:HG13	2.23	0.58
9:R:27:THR:HA	9:K:27:THR:HG21	1.87	0.57
9:R:58:GLU:O	9:R:62:LEU:HD12	2.06	0.56
13:C:37:GLY:O	13:C:38:ILE:HD13	2.06	0.56
13:C:54:GLU:OE1	13:C:91:THR:HG23	2.06	0.55
12:S:109:MET:O	12:S:112:HIS:N	2.39	0.55
12:S:138:LEU:HD12	12:S:139:LYS:N	2.22	0.54
9:K:65:LEU:HD21	9:L:63:PHE:CZ	2.43	0.54
12:S:125:ALA:C	12:S:126:LEU:HD22	2.29	0.53
13:C:32:LEU:N	13:C:40:ARG:O	2.41	0.53
9:R:36:TYR:HE2	9:K:42:LEU:HD21	1.73	0.53
9:K:58:GLU:O	9:K:62:LEU:HD23	2.08	0.53
12:S:127:ASP:O	12:S:131:LEU:N	2.37	0.53
12:S:138:LEU:HD13	12:S:148:LEU:CD1	2.26	0.53
13:C:54:GLU:OE1	13:C:54:GLU:N	2.42	0.52
12:S:122:THR:HA	12:S:158:ILE:HD11	1.92	0.52
9:R:30:GLY:O	9:R:33:ILE:HG22	2.09	0.52
9:R:21:SER:C	9:K:60:MET:HE3	2.31	0.51
12:S:121:THR:HG23	12:S:153:LYS:HG3	1.92	0.51
12:S:120:VAL:HG21	12:S:134:LEU:HD21	1.92	0.51
13:C:9:SER:O	13:C:13:GLU:HG2	2.10	0.51
13:C:32:LEU:HD11	13:C:42:HIS:HB2	1.93	0.51
9:K:60:MET:O	9:K:63:PHE:HB2	2.11	0.51
12:S:177:THR:HG23	12:S:178:LYS:N	2.27	0.50
13:C:27:GLU:OE2	13:C:45:ARG:N	2.44	0.50
9:R:32:LEU:HD21	9:K:49:TYR:HE1	1.76	0.50
9:L:54:PHE:O	9:L:58:GLU:HG2	2.11	0.50
12:S:122:THR:HG23	12:S:161:GLY:O	2.11	0.49
13:C:30:ARG:O	13:C:41:VAL:HG13	2.13	0.49
13:C:64:LEU:HD23	13:C:64:LEU:H	1.78	0.48
9:R:54:PHE:CE1	9:K:56:LEU:HD23	2.48	0.48
12:S:185:ALA:O	13:C:15:ARG:NH1	2.46	0.48
1:8:25:GLN:O	1:8:29:SER:N	2.46	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:C:67:GLU:OE1	13:C:70:ASN:N	2.39	0.47
12:S:131:LEU:CD2	12:S:152:VAL:HG21	2.44	0.47
1:8:20:LEU:HD22	1:8:21:PHE:CD2	2.49	0.47
9:R:32:LEU:HD22	9:R:50:ALA:CB	2.44	0.47
13:C:27:GLU:HG2	13:C:44:LEU:HD23	1.97	0.47
9:K:43:M3L:HM32	9:L:49:TYR:HH	1.79	0.47
9:R:25:ILE:HD11	9:K:57:SER:CA	2.46	0.46
9:K:66:MET:O	9:K:70:LEU:HD13	2.15	0.46
12:S:116:VAL:HG21	12:S:142:LEU:HD21	1.98	0.46
12:S:109:MET:HA	12:S:112:HIS:HB3	1.97	0.46
12:S:124:SER:OG	12:S:125:ALA:N	2.48	0.46
9:R:65:LEU:O	9:R:69:PHE:CD2	2.68	0.46
9:R:58:GLU:HG2	9:R:62:LEU:HD13	1.97	0.46
1:8:24:PHE:O	1:8:28:VAL:HG22	2.16	0.45
12:S:100:ALA:O	12:S:103:SER:N	2.45	0.45
9:K:52:LEU:O	9:K:56:LEU:HD13	2.17	0.45
9:K:72:LEU:HD11	9:L:71:ILE:HD11	1.98	0.45
12:S:148:LEU:HD23	12:S:148:LEU:C	2.37	0.45
9:R:33:ILE:HD13	9:K:32:LEU:HA	1.99	0.45
9:K:28:VAL:HG23	9:K:29:PHE:HD2	1.82	0.45
12:S:166:ILE:HG13	12:S:166:ILE:O	2.17	0.44
9:R:32:LEU:HD11	9:R:46:LEU:HB3	1.99	0.44
12:S:122:THR:HG22	12:S:123:ALA:N	2.31	0.44
12:S:122:THR:O	12:S:155:ASP:N	2.50	0.44
12:S:178:LYS:O	12:S:182:LEU:HD23	2.18	0.44
12:S:134:LEU:HA	12:S:137:VAL:HG22	1.99	0.44
12:S:158:ILE:HD13	12:S:163:ILE:HD12	1.98	0.44
1:8:20:LEU:HD22	1:8:21:PHE:CE2	2.53	0.43
13:C:31:VAL:HA	13:C:41:VAL:HG22	1.98	0.43
12:S:161:GLY:HA3	12:S:174:SER:HA	2.00	0.43
13:C:8:VAL:HA	13:C:11:ILE:HG12	2.00	0.43
12:S:126:LEU:HD12	12:S:130:THR:HG21	1.99	0.43
13:C:27:GLU:HB3	13:C:90:ARG:HD3	2.01	0.43
13:C:78:ASN:OD1	13:C:80:LYS:N	2.49	0.43
9:R:32:LEU:HD21	9:K:49:TYR:CE1	2.53	0.43
12:S:172:ASP:OD1	12:S:174:SER:CB	2.66	0.43
13:C:12:LEU:O	13:C:16:ILE:HG13	2.18	0.43
9:R:25:ILE:HG22	9:R:57:SER:OG	2.19	0.43
13:C:82:ILE:HG22	13:C:83:LYS:N	2.34	0.43
13:C:29:GLY:O	13:C:88:VAL:HG12	2.19	0.42
12:S:142:LEU:HD22	12:S:146:GLN:CB	2.46	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:8:18:LEU:HA	1:8:22:ILE:HD13	2.01	0.42
13:C:50:GLU:CA	13:C:63:SER:O	2.67	0.42
9:R:23:ALA:O	9:R:27:THR:HG23	2.19	0.42
13:C:59:LEU:HD22	13:C:75:VAL:HG13	2.02	0.42
13:C:11:ILE:HG13	13:C:12:LEU:N	2.34	0.42
9:K:72:LEU:HD11	9:L:71:ILE:CD1	2.50	0.42
12:S:158:ILE:HG21	12:S:163:ILE:HD11	2.01	0.42
12:S:128:GLU:HG2	12:S:129:ALA:N	2.35	0.42
12:S:186:MET:SD	12:S:186:MET:O	2.78	0.42
12:S:152:VAL:O	12:S:152:VAL:HG12	2.20	0.41
12:S:160:GLY:CA	12:S:175:ALA:HB2	2.50	0.41
13:C:50:GLU:N	13:C:63:SER:O	2.52	0.41
13:C:52:MET:N	13:C:93:ALA:O	2.50	0.41
12:S:116:VAL:N	12:S:147:VAL:O	2.52	0.41
9:K:54:PHE:CZ	9:L:56:LEU:HD22	2.55	0.41
12:S:181:LYS:NZ	13:C:20:ASP:O	2.45	0.41
13:C:7:GLU:OE2	13:C:11:ILE:HG23	2.20	0.41
12:S:131:LEU:HD22	12:S:152:VAL:HG21	2.03	0.41
12:S:120:VAL:HG22	12:S:164:VAL:HG13	2.03	0.40
12:S:175:ALA:O	12:S:179:ILE:HD12	2.21	0.40
13:C:46:ASN:O	13:C:47:VAL:C	2.58	0.40
9:K:30:GLY:HA2	9:K:33:ILE:HD12	2.04	0.40
9:K:62:LEU:CD1	9:K:65:LEU:HD23	2.51	0.40
12:S:170:TYR:O	13:C:25:LEU:HD13	2.22	0.40
13:C:26:GLU:OE1	13:C:26:GLU:N	2.54	0.40
9:K:25:ILE:HG13	9:K:26:GLY:N	2.36	0.40
9:K:71:ILE:HG13	9:K:72:LEU:N	2.36	0.40
9:L:62:LEU:O	9:L:62:LEU:HD23	2.22	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	8	36/66 (54%)	28 (78%)	8 (22%)	0	100	100
2	a	224/226 (99%)	192 (86%)	32 (14%)	0	100	100
3	d	152/160 (95%)	127 (84%)	25 (16%)	0	100	100
4	e	39/70 (56%)	35 (90%)	4 (10%)	0	100	100
5	f	81/87 (93%)	73 (90%)	8 (10%)	0	100	100
6	g	77/102 (76%)	71 (92%)	6 (8%)	0	100	100
7	j	46/60 (77%)	42 (91%)	4 (9%)	0	100	100
8	k	34/57 (60%)	34 (100%)	0	0	100	100
9	K	55/75 (73%)	50 (91%)	5 (9%)	0	100	100
9	L	29/75 (39%)	28 (97%)	1 (3%)	0	100	100
9	R	54/75 (72%)	52 (96%)	2 (4%)	0	100	100
10	b	207/214 (97%)	197 (95%)	10 (5%)	0	100	100
11	h	60/76 (79%)	47 (78%)	13 (22%)	0	100	100
12	S	87/190 (46%)	78 (90%)	9 (10%)	0	100	100
13	C	87/510 (17%)	79 (91%)	8 (9%)	0	100	100
All	All	1268/2043 (62%)	1133 (89%)	135 (11%)	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	8	38/66 (58%)	38 (100%)	0	100	100
2	a	200/200 (100%)	199 (100%)	1 (0%)	86	93
3	d	138/142 (97%)	136 (99%)	2 (1%)	62	79
4	e	34/59 (58%)	34 (100%)	0	100	100
5	f	72/75 (96%)	72 (100%)	0	100	100
6	g	67/83 (81%)	67 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
7	j	42/49 (86%)	42 (100%)	0	100	100
9	K	41/50 (82%)	41 (100%)	0	100	100
9	L	24/50 (48%)	24 (100%)	0	100	100
9	R	40/50 (80%)	40 (100%)	0	100	100
10	b	186/190 (98%)	186 (100%)	0	100	100
11	h	56/70 (80%)	56 (100%)	0	100	100
12	S	77/165 (47%)	77 (100%)	0	100	100
13	C	73/413 (18%)	73 (100%)	0	100	100
All	All	1088/1662 (66%)	1085 (100%)	3 (0%)	90	96

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	a	118	ARG
3	d	47	LYS
3	d	77	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	a	168	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
9	M3L	R	43	9	10,11,12	0.50	0	9,14,16	0.43	0
9	M3L	K	43	9	10,11,12	0.53	0	9,14,16	0.52	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	M3L	R	43	9	-	1/9/10/12	-
9	M3L	K	43	9	-	0/9/10/12	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	R	43	M3L	CG-CD-CE-NZ

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	K	43	M3L	3	0

## 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 ⓘ

There are no chain breaks in this entry.

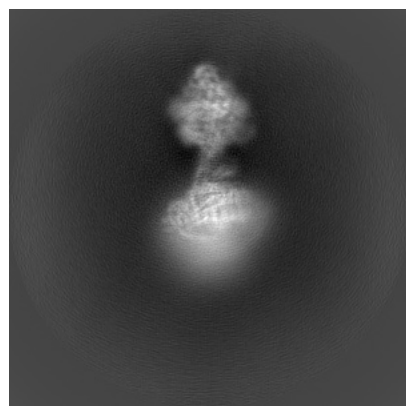
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-11229. These allow visual inspection of the internal detail of the map and identification of artifacts.

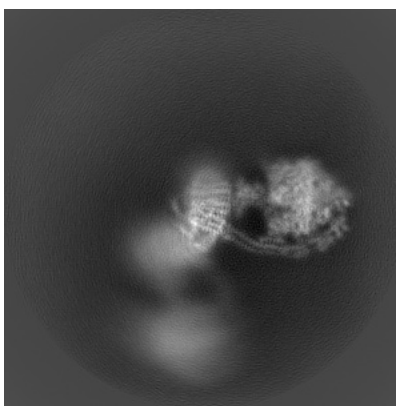
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

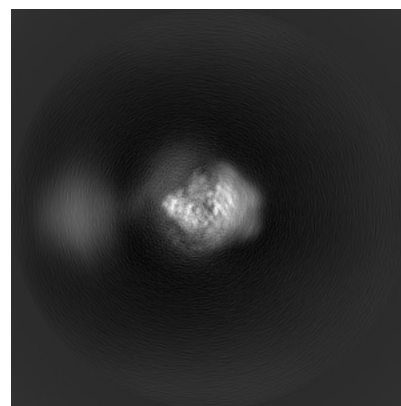
#### 6.1.1 Primary map



X

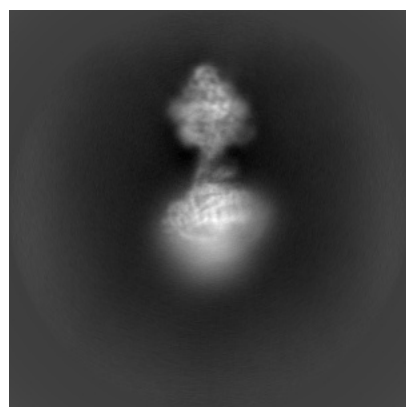


Y

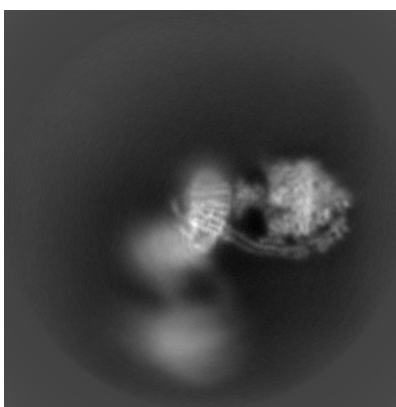


Z

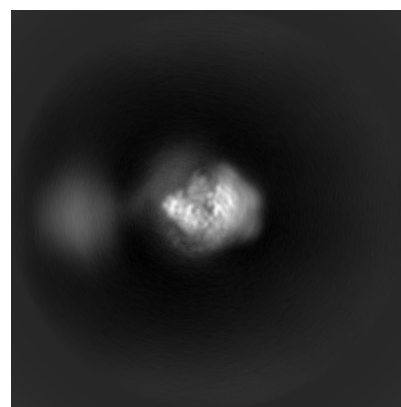
#### 6.1.2 Raw map



X



Y

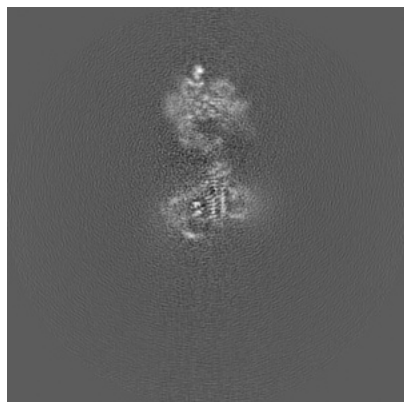


Z

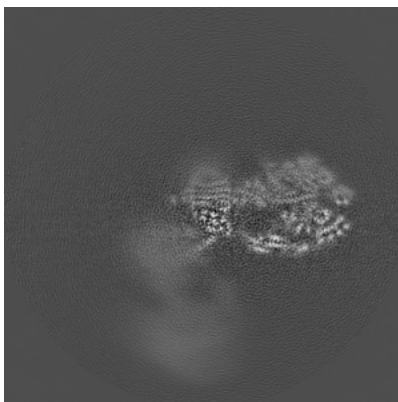
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

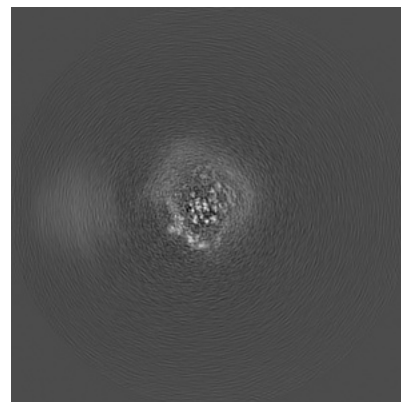
### 6.2.1 Primary map



X Index: 250

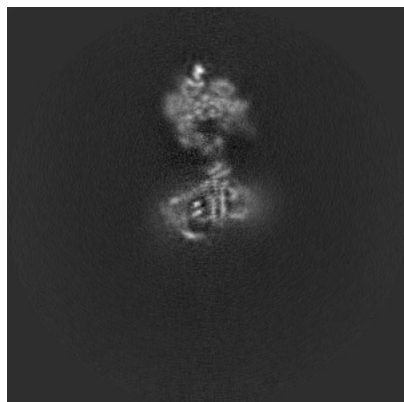


Y Index: 250

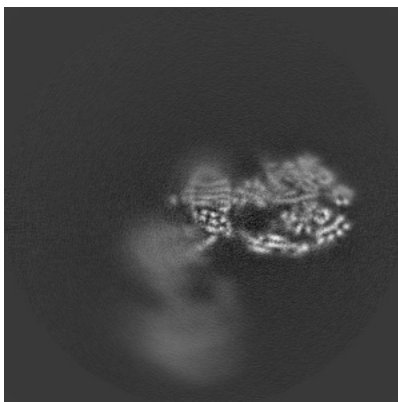


Z Index: 250

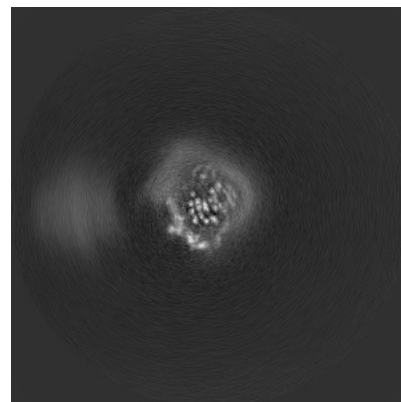
### 6.2.2 Raw map



X Index: 250



Y Index: 250

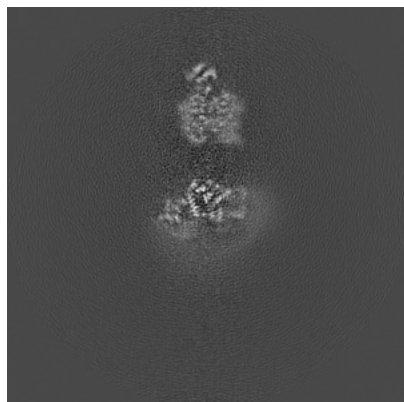


Z Index: 250

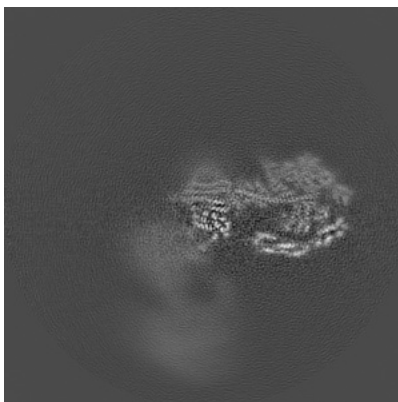
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

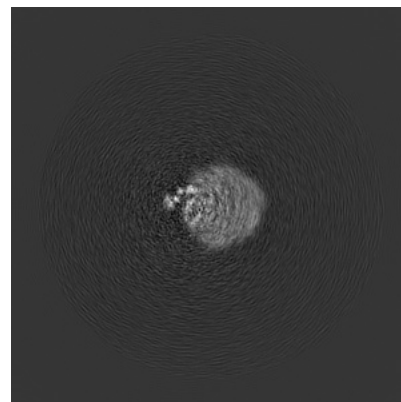
### 6.3.1 Primary map



X Index: 230

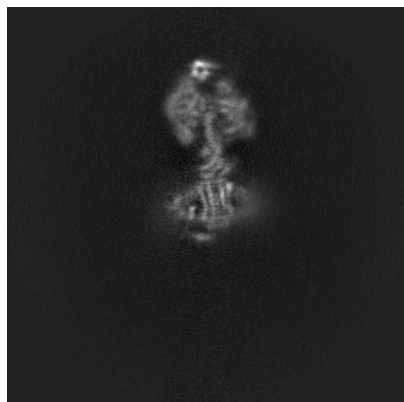


Y Index: 254

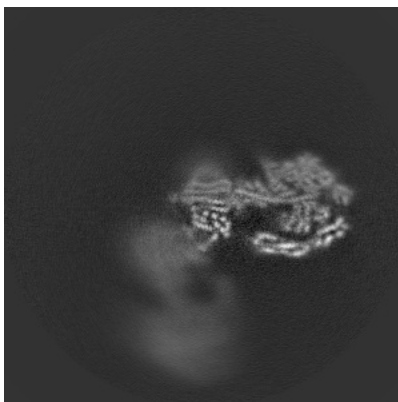


Z Index: 379

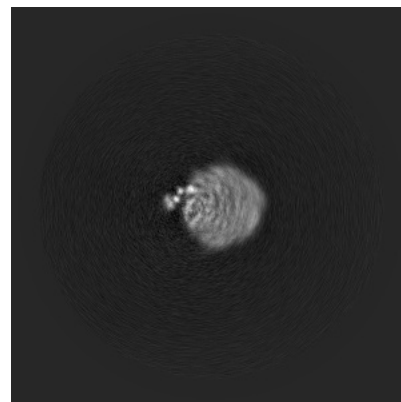
### 6.3.2 Raw map



X Index: 257



Y Index: 254



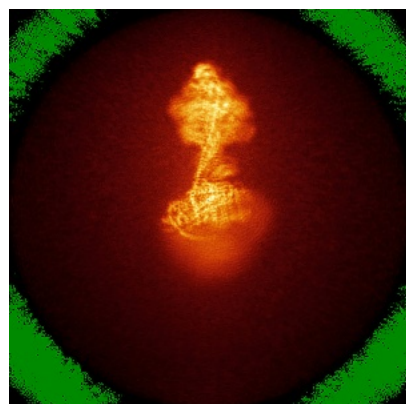
Z Index: 379

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

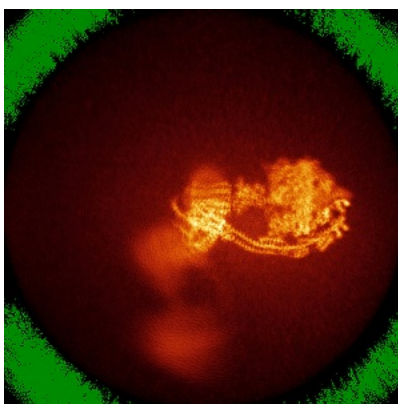


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

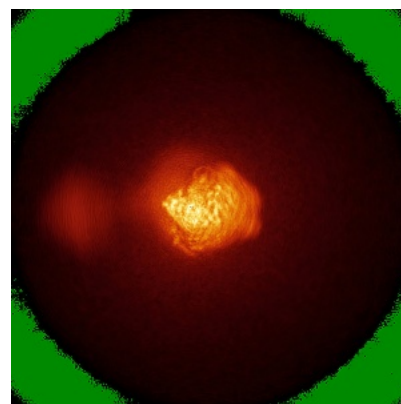
### 6.4.1 Primary map



X



Y



Z

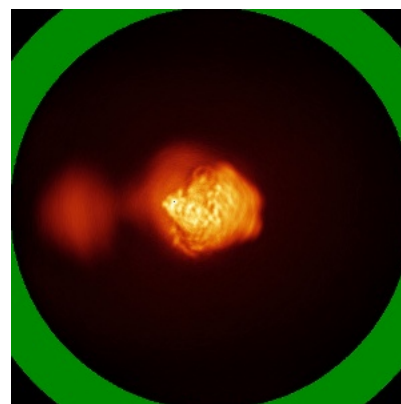
### 6.4.2 Raw map



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



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0178. 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



X



Y



Z

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.

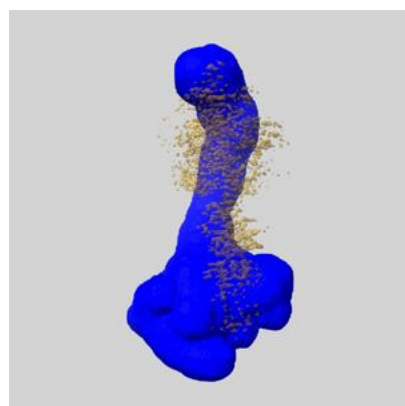
## 6.6 Mask visualisation [i](#)

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

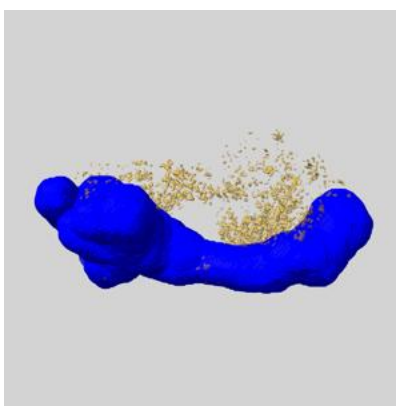
A mask typically either:

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

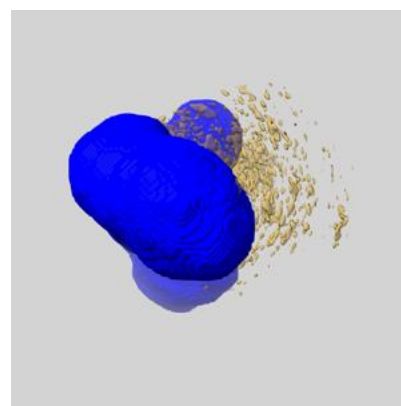
### 6.6.1 emd\_11229\_msk\_1.map [i](#)



X



Y

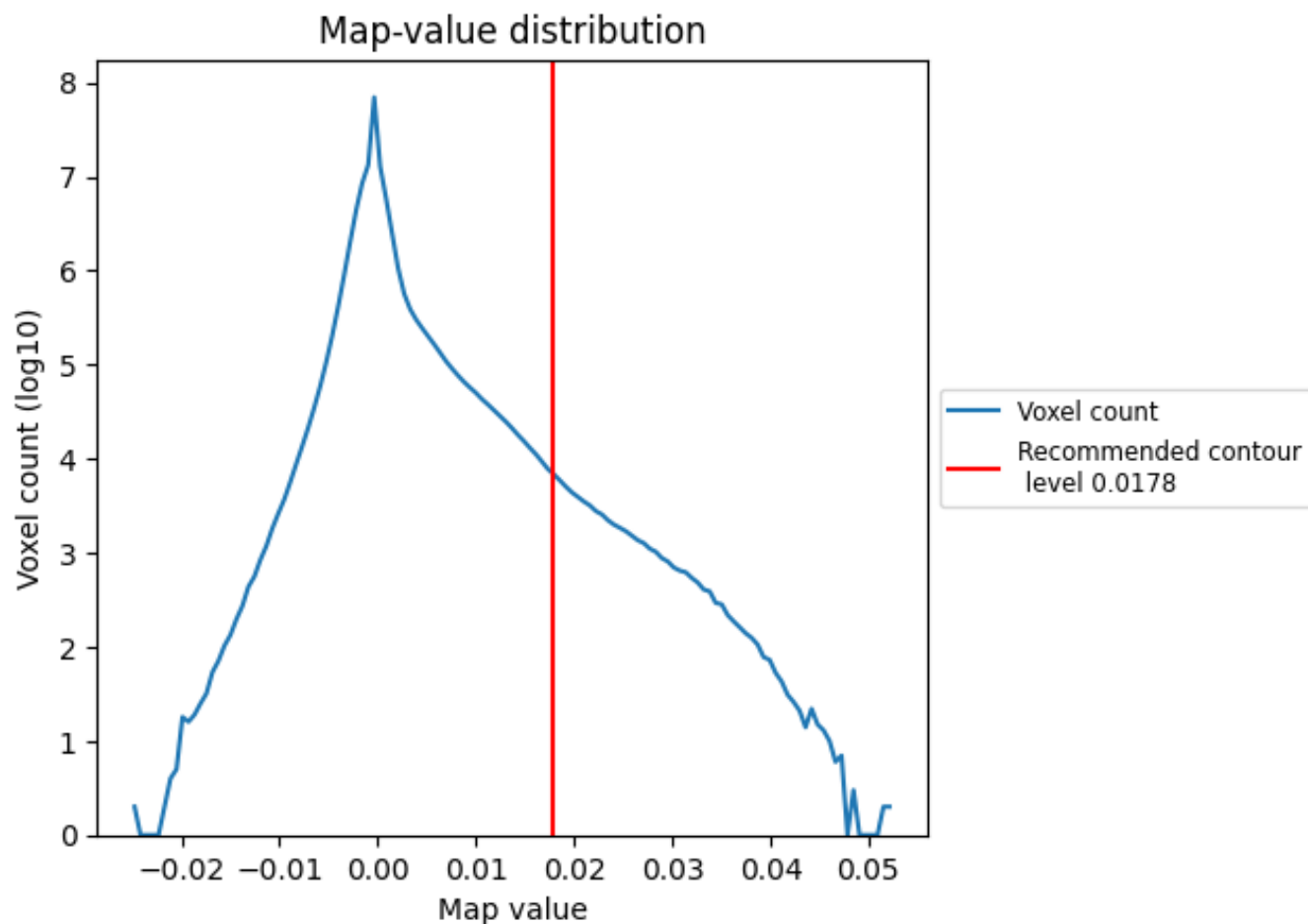


Z

## 7 Map analysis [i](#)

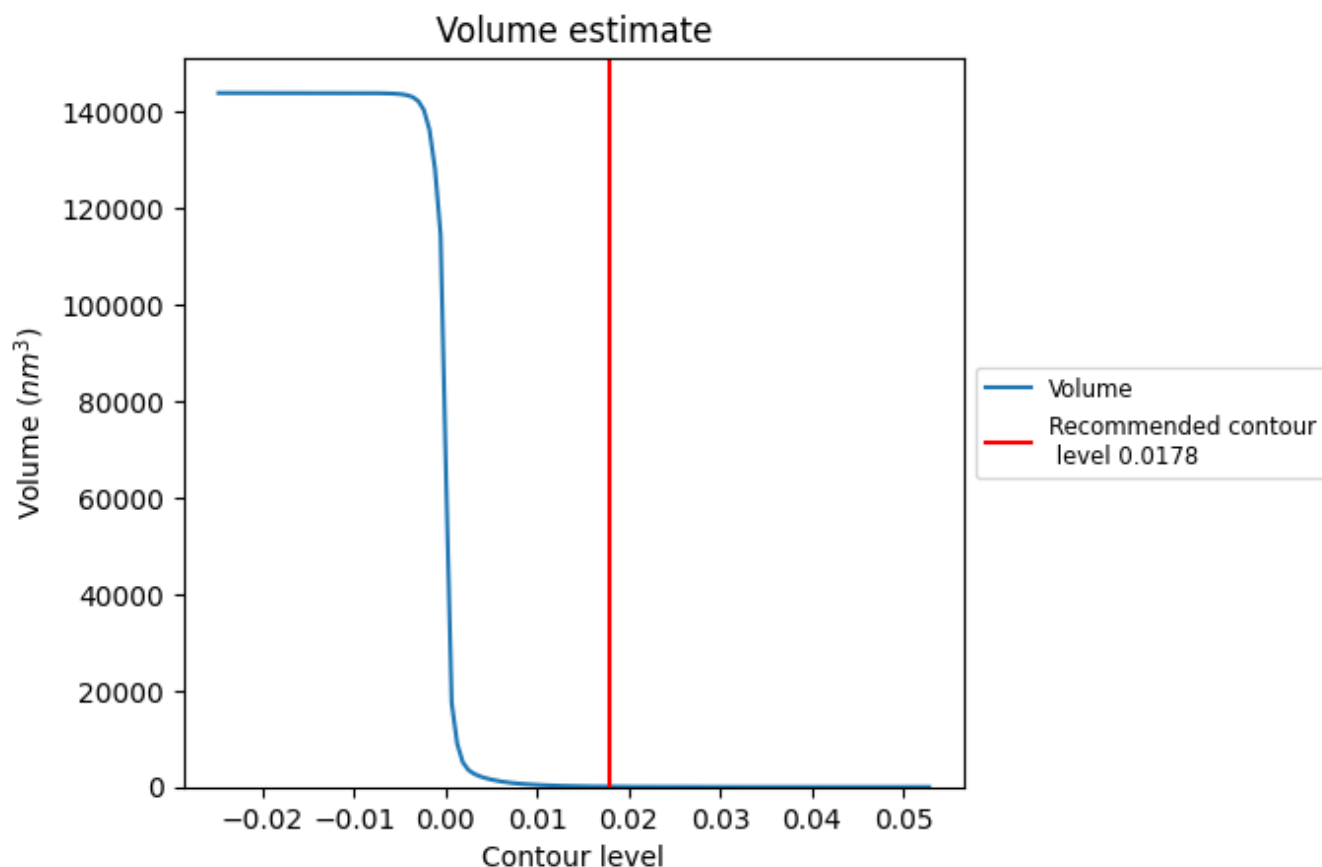
This section contains the results of statistical analysis of the map.

### 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.

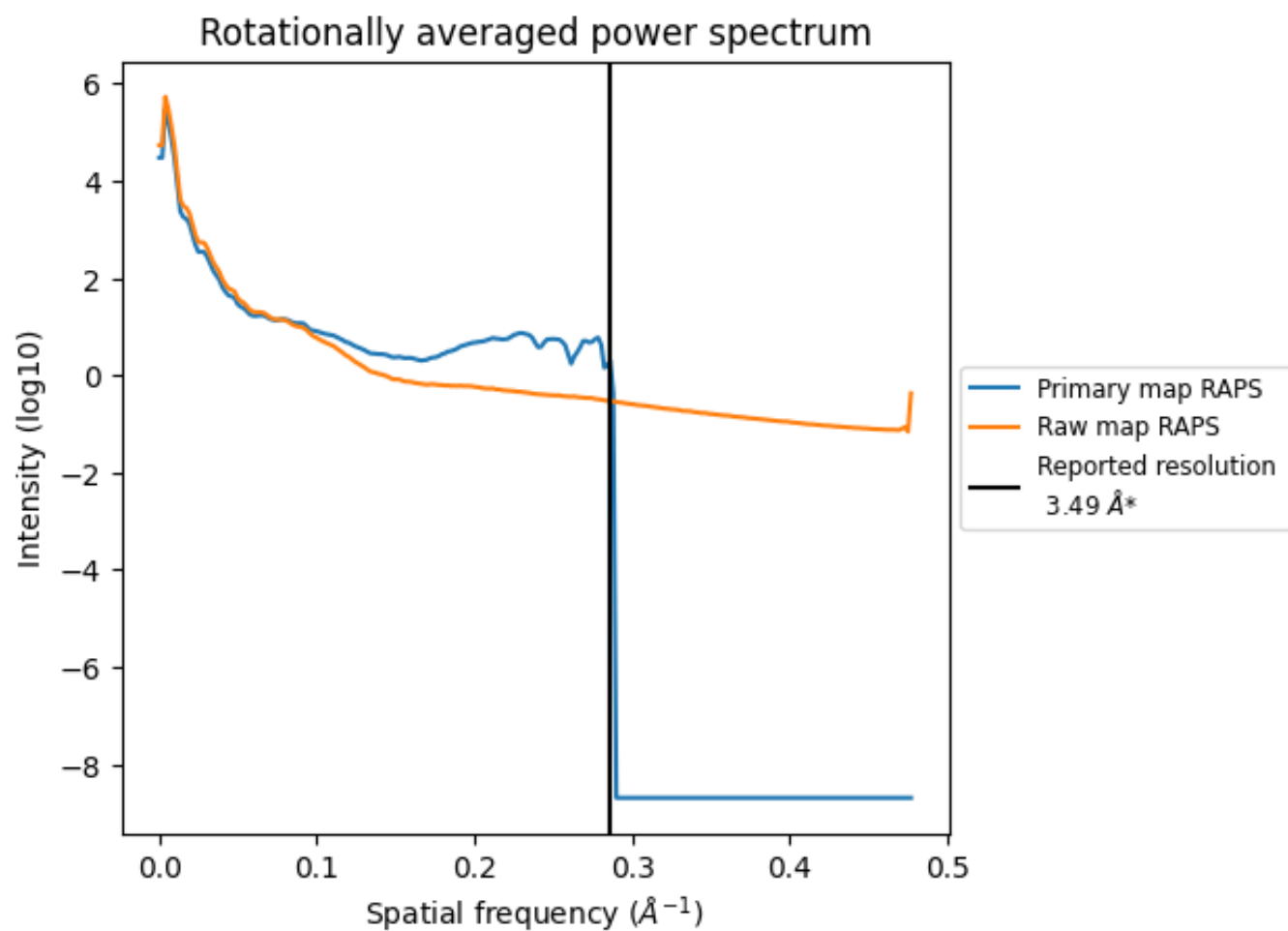
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 71  $\text{nm}^3$ ; this corresponds to an approximate mass of 64 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 ⓘ

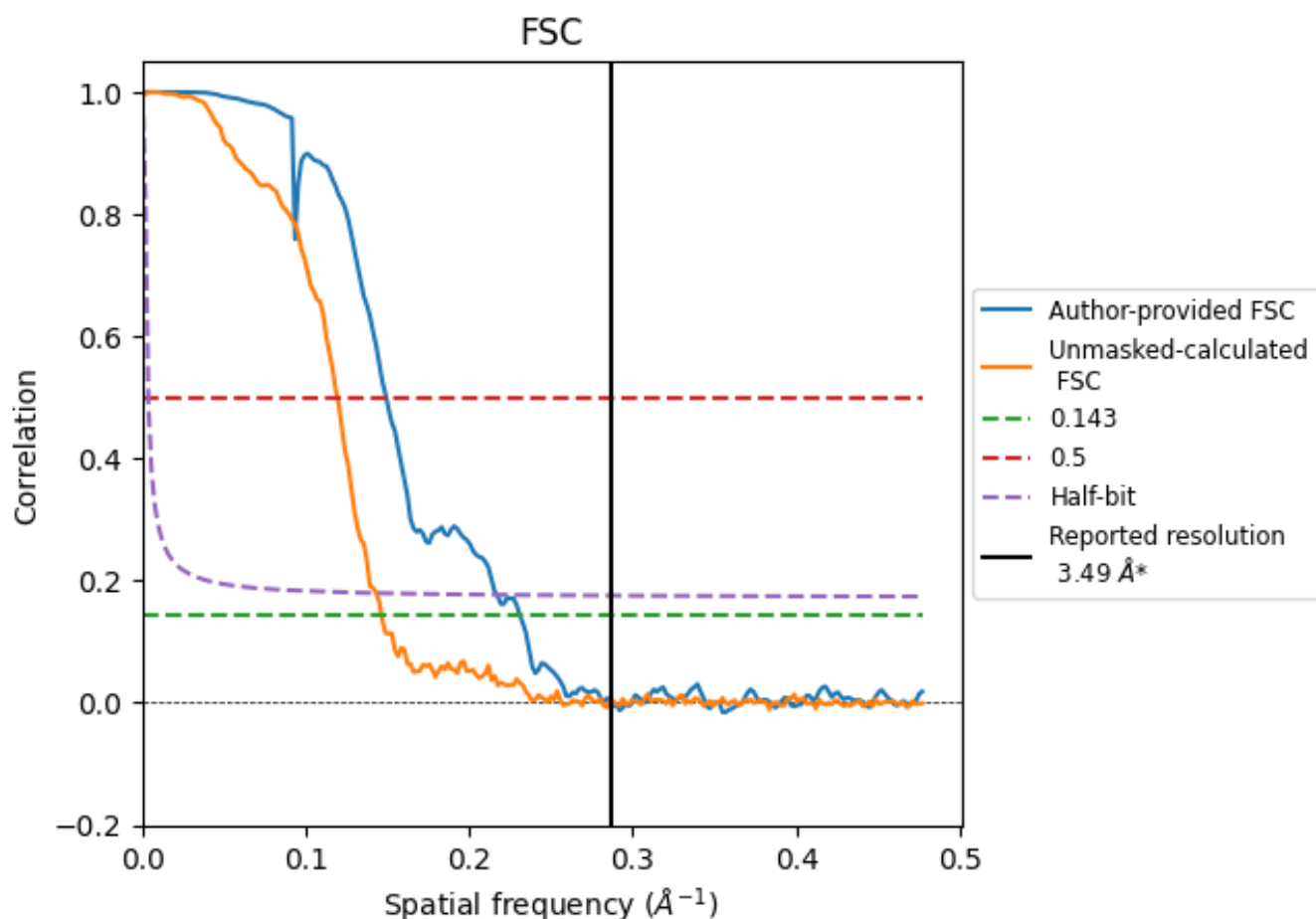


\*Reported resolution corresponds to spatial frequency of 0.287 Å<sup>-1</sup>

## 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  $0.287 \text{ \AA}^{-1}$

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.49	-	-
Author-provided FSC curve	4.33	6.70	4.61
Unmasked-calculated*	6.83	8.38	6.98

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 4.33 differs from the reported value 3.49 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 6.83 differs from the reported value 3.49 by more than 10 %

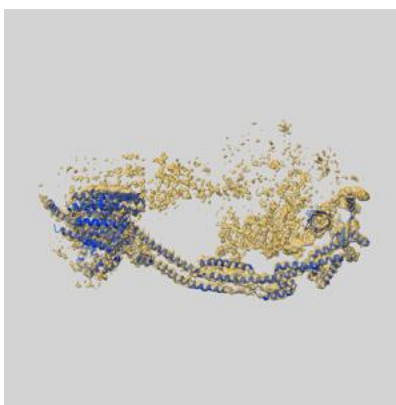
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-11229 and PDB model 6ZIT. Per-residue inclusion information can be found in section [3](#) on page [7](#).

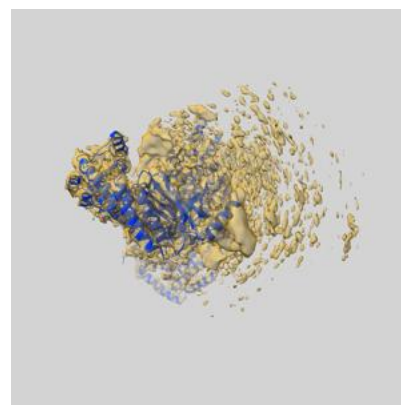
### 9.1 Map-model overlay [i](#)



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0178 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.

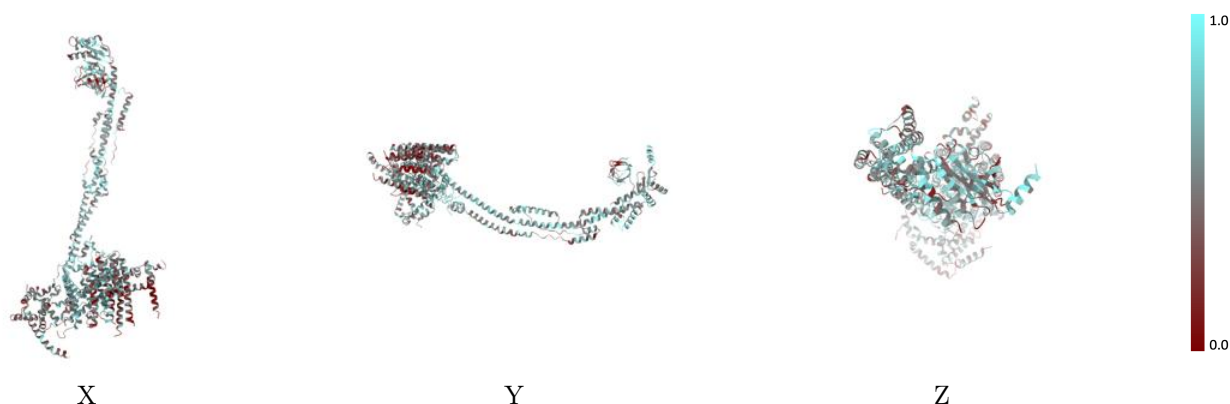


## 9.2 Q-score mapped to coordinate model [i](#)



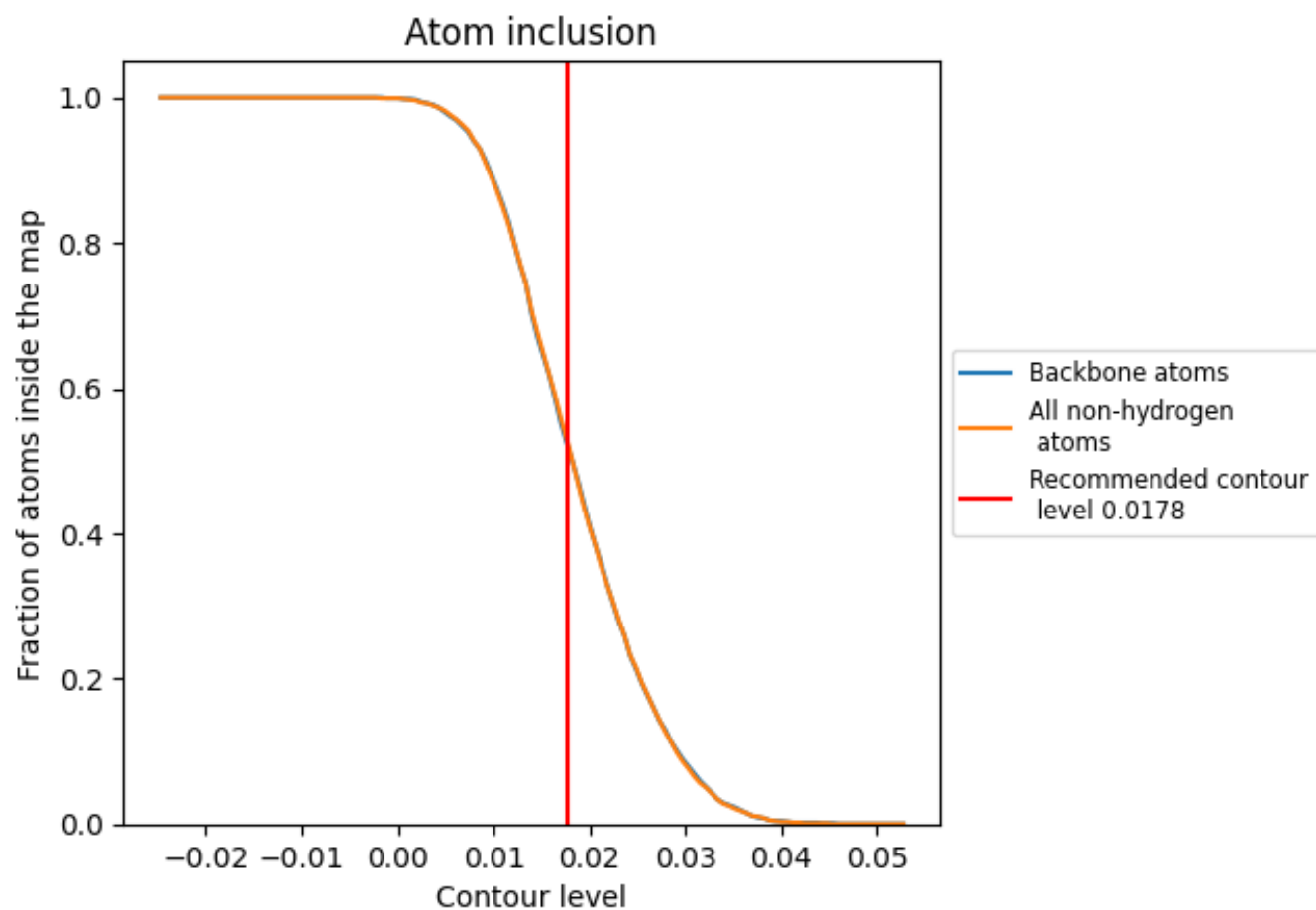
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0178).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 52% of all backbone atoms, 52% 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 (0.0178) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.5220	<div></div> 0.3710
8	<div></div> 0.6090	<div></div> 0.4620
C	<div></div> 0.4770	<div></div> 0.3570
K	<div></div> 0.4630	<div></div> 0.3920
L	<div></div> 0.3640	<div></div> 0.3630
R	<div></div> 0.3870	<div></div> 0.3420
S	<div></div> 0.5470	<div></div> 0.3270
a	<div></div> 0.5750	<div></div> 0.4250
b	<div></div> 0.5960	<div></div> 0.3740
d	<div></div> 0.5590	<div></div> 0.3590
e	<div></div> 0.4520	<div></div> 0.3110
f	<div></div> 0.6010	<div></div> 0.4260
g	<div></div> 0.4210	<div></div> 0.3090
h	<div></div> 0.5110	<div></div> 0.3120
j	<div></div> 0.3810	<div></div> 0.3420
k	<div></div> 0.3220	<div></div> 0.3330

