



Full wwPDB EM Validation Report ⓘ

Mar 29, 2026 – 09:23 PM UTC

PDB ID : 6XQN / pdb_00006xqn
EMDB ID : EMD-22290
Title : Structure of a mitochondrial calcium uniporter holocomplex (MICU1, MICU2, MCU, EMRE) in low Ca²⁺
Authors : Long, S.B.; Wang, C.; Baradaran, R.; Jacewicz, A.; Delgado, B.
Deposited on : 2020-07-09
Resolution : 3.30 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

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

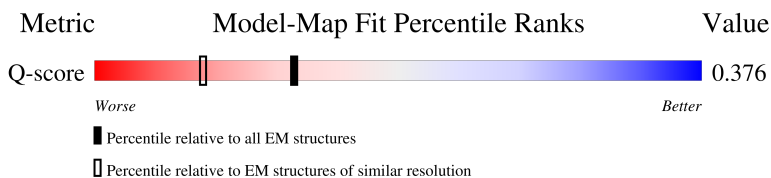
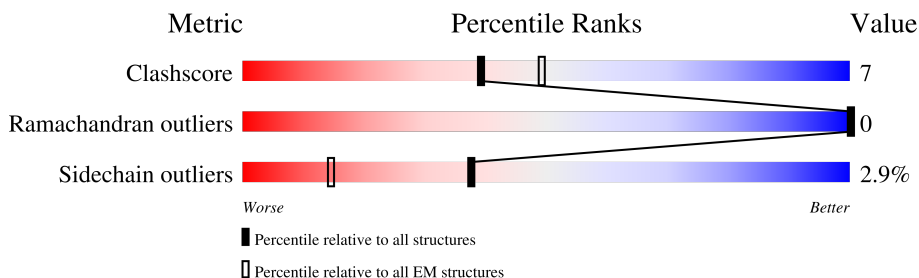
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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.



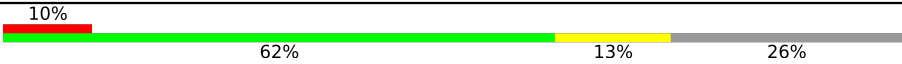
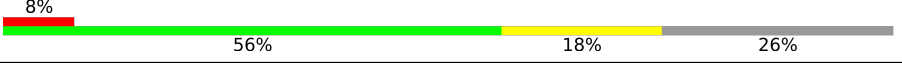
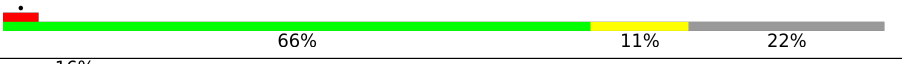
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	15087 (2.80 - 3.80)

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	E	70	
1	G	70	
1	H	70	
2	A	203	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	B	203	
2	C	203	
2	D	203	
3	I	394	
4	J	383	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 9433 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 Protein EMRE homolog, mitochondrial-like Protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	E	31	Total	C	N	O	0	0
			223	147	38	38		
1	G	25	Total	C	N	O	0	0
			174	118	27	29		
1	H	26	Total	C	N	O	0	0
			186	127	29	30		

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	39	GLY	-	expression tag	UNP D6X268
E	40	PRO	-	expression tag	UNP D6X268
E	41	THR	-	expression tag	UNP D6X268
E	42	ALA	-	expression tag	UNP D6X268
E	43	ALA	-	expression tag	UNP D6X268
E	44	ALA	-	expression tag	UNP D6X268
E	45	LEU	-	expression tag	UNP D6X268
E	46	GLU	-	expression tag	UNP D6X268
G	39	GLY	-	expression tag	UNP D6X268
G	40	PRO	-	expression tag	UNP D6X268
G	41	THR	-	expression tag	UNP D6X268
G	42	ALA	-	expression tag	UNP D6X268
G	43	ALA	-	expression tag	UNP D6X268
G	44	ALA	-	expression tag	UNP D6X268
G	45	LEU	-	expression tag	UNP D6X268
G	46	GLU	-	expression tag	UNP D6X268
H	39	GLY	-	expression tag	UNP D6X268
H	40	PRO	-	expression tag	UNP D6X268
H	41	THR	-	expression tag	UNP D6X268
H	42	ALA	-	expression tag	UNP D6X268
H	43	ALA	-	expression tag	UNP D6X268
H	44	ALA	-	expression tag	UNP D6X268
H	45	LEU	-	expression tag	UNP D6X268
H	46	GLU	-	expression tag	UNP D6X268

- Molecule 2 is a protein called Calcium uniporter protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	154	Total	C	N	O	S	0	0
			1166	762	194	206	4		
2	B	151	Total	C	N	O	S	0	0
			1128	738	185	201	4		
2	C	154	Total	C	N	O	S	0	0
			1156	757	191	204	4		
2	D	151	Total	C	N	O	S	0	0
			1137	745	186	202	4		

There are 68 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	159	GLY	-	expression tag	UNP D6WIX5
A	160	PRO	-	expression tag	UNP D6WIX5
A	161	THR	-	expression tag	UNP D6WIX5
A	162	ALA	-	expression tag	UNP D6WIX5
A	163	ALA	-	expression tag	UNP D6WIX5
A	164	ALA	-	expression tag	UNP D6WIX5
A	165	LEU	-	expression tag	UNP D6WIX5
A	352	GLY	-	expression tag	UNP D6WIX5
A	353	GLY	-	expression tag	UNP D6WIX5
A	354	TRP	-	expression tag	UNP D6WIX5
A	355	SER	-	expression tag	UNP D6WIX5
A	356	HIS	-	expression tag	UNP D6WIX5
A	357	PRO	-	expression tag	UNP D6WIX5
A	358	GLN	-	expression tag	UNP D6WIX5
A	359	PHE	-	expression tag	UNP D6WIX5
A	360	GLU	-	expression tag	UNP D6WIX5
A	361	LYS	-	expression tag	UNP D6WIX5
B	159	GLY	-	expression tag	UNP D6WIX5
B	160	PRO	-	expression tag	UNP D6WIX5
B	161	THR	-	expression tag	UNP D6WIX5
B	162	ALA	-	expression tag	UNP D6WIX5
B	163	ALA	-	expression tag	UNP D6WIX5
B	164	ALA	-	expression tag	UNP D6WIX5
B	165	LEU	-	expression tag	UNP D6WIX5
B	352	GLY	-	expression tag	UNP D6WIX5
B	353	GLY	-	expression tag	UNP D6WIX5
B	354	TRP	-	expression tag	UNP D6WIX5
B	355	SER	-	expression tag	UNP D6WIX5
B	356	HIS	-	expression tag	UNP D6WIX5
B	357	PRO	-	expression tag	UNP D6WIX5

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	358	GLN	-	expression tag	UNP D6WIX5
B	359	PHE	-	expression tag	UNP D6WIX5
B	360	GLU	-	expression tag	UNP D6WIX5
B	361	LYS	-	expression tag	UNP D6WIX5
C	159	GLY	-	expression tag	UNP D6WIX5
C	160	PRO	-	expression tag	UNP D6WIX5
C	161	THR	-	expression tag	UNP D6WIX5
C	162	ALA	-	expression tag	UNP D6WIX5
C	163	ALA	-	expression tag	UNP D6WIX5
C	164	ALA	-	expression tag	UNP D6WIX5
C	165	LEU	-	expression tag	UNP D6WIX5
C	352	GLY	-	expression tag	UNP D6WIX5
C	353	GLY	-	expression tag	UNP D6WIX5
C	354	TRP	-	expression tag	UNP D6WIX5
C	355	SER	-	expression tag	UNP D6WIX5
C	356	HIS	-	expression tag	UNP D6WIX5
C	357	PRO	-	expression tag	UNP D6WIX5
C	358	GLN	-	expression tag	UNP D6WIX5
C	359	PHE	-	expression tag	UNP D6WIX5
C	360	GLU	-	expression tag	UNP D6WIX5
C	361	LYS	-	expression tag	UNP D6WIX5
D	159	GLY	-	expression tag	UNP D6WIX5
D	160	PRO	-	expression tag	UNP D6WIX5
D	161	THR	-	expression tag	UNP D6WIX5
D	162	ALA	-	expression tag	UNP D6WIX5
D	163	ALA	-	expression tag	UNP D6WIX5
D	164	ALA	-	expression tag	UNP D6WIX5
D	165	LEU	-	expression tag	UNP D6WIX5
D	352	GLY	-	expression tag	UNP D6WIX5
D	353	GLY	-	expression tag	UNP D6WIX5
D	354	TRP	-	expression tag	UNP D6WIX5
D	355	SER	-	expression tag	UNP D6WIX5
D	356	HIS	-	expression tag	UNP D6WIX5
D	357	PRO	-	expression tag	UNP D6WIX5
D	358	GLN	-	expression tag	UNP D6WIX5
D	359	PHE	-	expression tag	UNP D6WIX5
D	360	GLU	-	expression tag	UNP D6WIX5
D	361	LYS	-	expression tag	UNP D6WIX5

- Molecule 3 is a protein called Calcium uptake protein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	307	Total	C	N	O	S	0	0
			2243	1451	380	401	11		

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	86	GLY	-	expression tag	UNP Q9BPX6
I	87	PRO	-	expression tag	UNP Q9BPX6
I	88	THR	-	expression tag	UNP Q9BPX6
I	89	ALA	-	expression tag	UNP Q9BPX6
I	90	ALA	-	expression tag	UNP Q9BPX6
I	91	ALA	-	expression tag	UNP Q9BPX6
I	92	LEU	-	expression tag	UNP Q9BPX6
I	93	GLU	-	expression tag	UNP Q9BPX6
I	477	SER	-	expression tag	UNP Q9BPX6
I	478	ASN	-	expression tag	UNP Q9BPX6
I	479	TRP	-	expression tag	UNP Q9BPX6

- Molecule 4 is a protein called Calcium uptake protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	J	291	Total	C	N	O	S	0	0
			2019	1325	331	353	10		

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

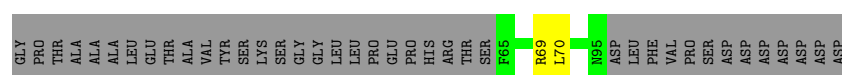
Mol	Chain	Residues	Atoms		AltConf
5	B	1	Total	Ca	0
			1	1	

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.

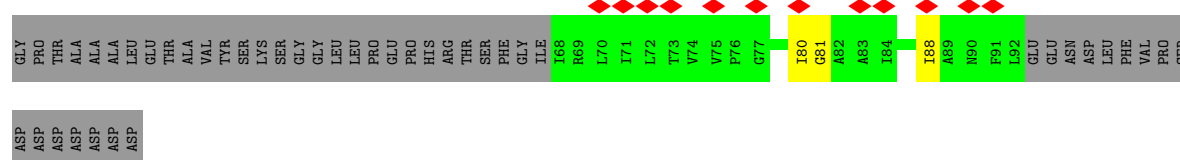
- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain E: 



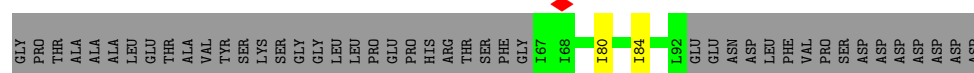
- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain G: 



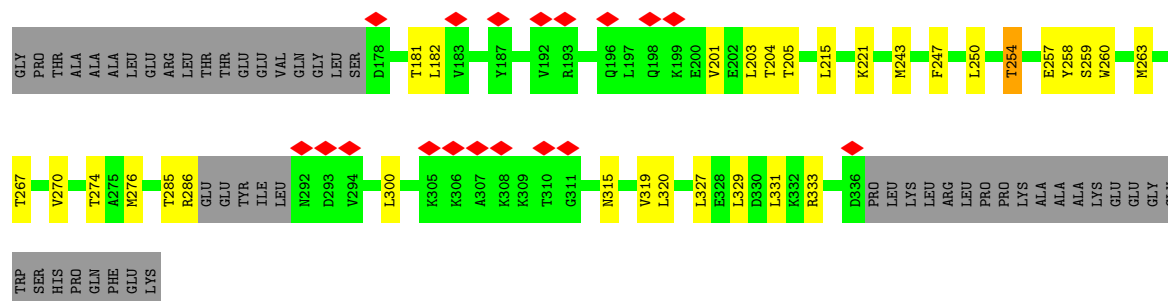
- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain H: 

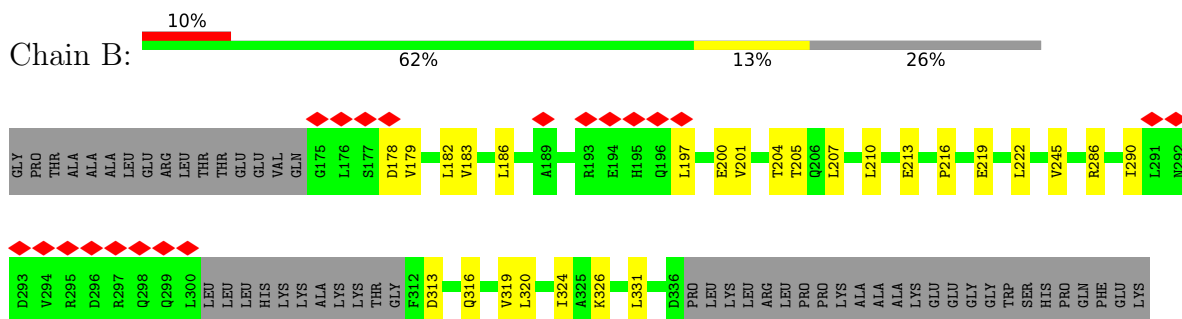


- Molecule 2: Calcium uniporter protein

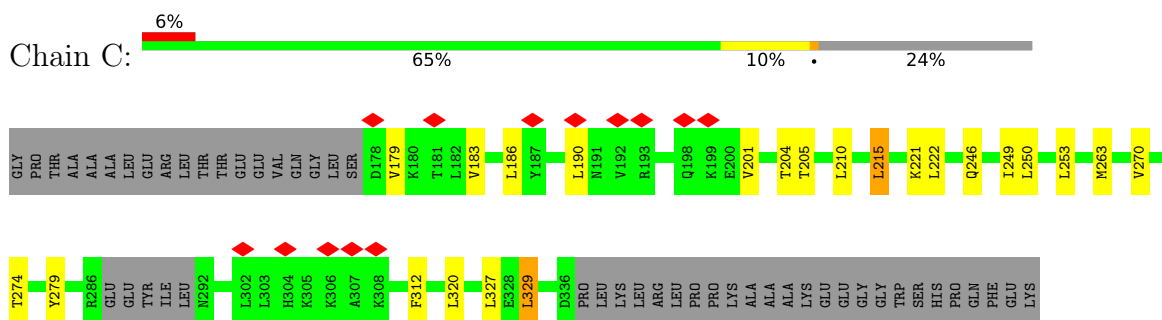
Chain A: 



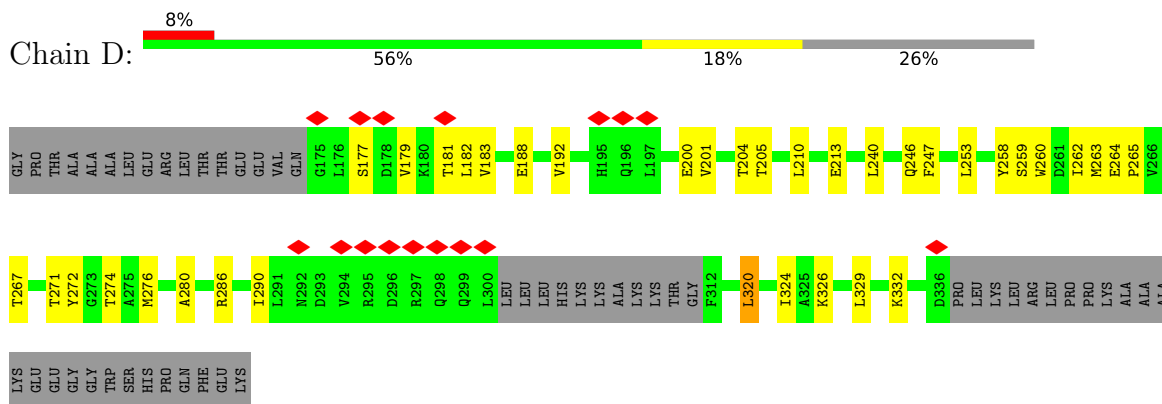
- Molecule 2: Calcium uniporter protein



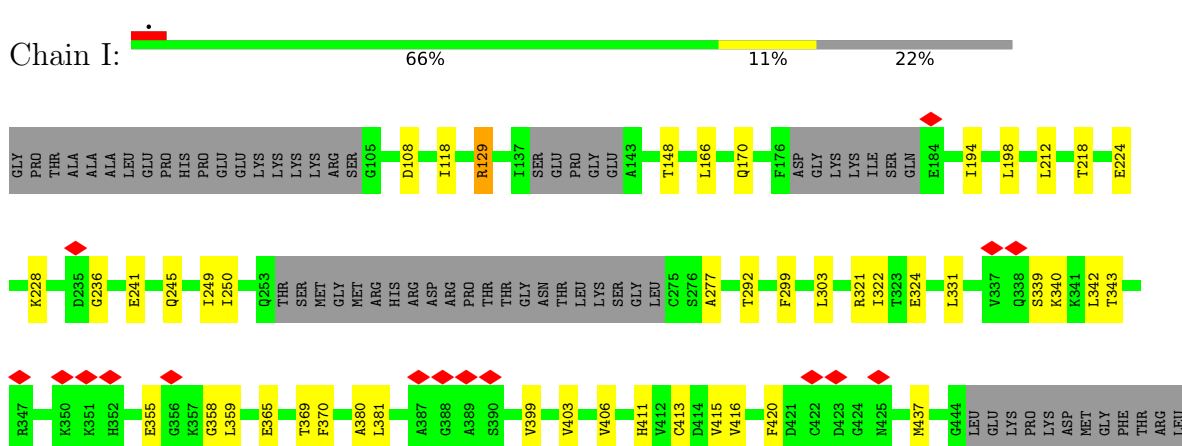
- Molecule 2: Calcium uniporter protein

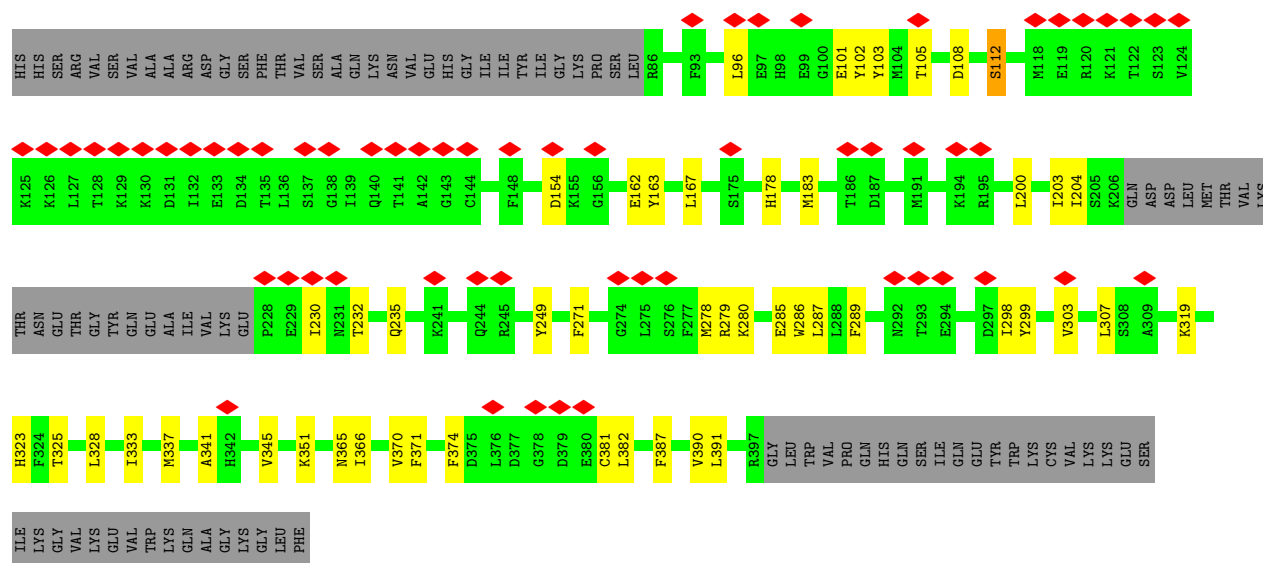


- Molecule 2: Calcium uniporter protein



- Molecule 3: Calcium uptake protein 1, mitochondrial





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	350160	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 ($e^-/\text{\AA}^2$)	71	Depositor
Minimum defocus (nm)	-1000	Depositor
Maximum defocus (nm)	-3000	Depositor
Magnification	22500	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.154	Depositor
Minimum map value	-0.097	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.015	Depositor
Map size (Å)	319.2, 319.2, 319.2	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.064, 1.064, 1.064	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: CA

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	E	0.19	0/224	0.36	0/304
1	G	0.16	0/175	0.37	0/240
1	H	0.17	0/187	0.36	0/255
2	A	0.23	0/1189	0.36	0/1625
2	B	0.19	0/1150	0.34	0/1574
2	C	0.23	0/1179	0.36	0/1613
2	D	0.22	0/1159	0.38	0/1586
3	I	0.26	0/2283	0.43	1/3092 (0.0%)
4	J	0.20	0/2065	0.44	0/2814
All	All	0.22	0/9611	0.40	1/13103 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	I	129	ARG	N-CA-CB	5.43	119.55	110.32

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	E	223	0	244	2	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	174	0	192	1	0
1	H	186	0	214	0	0
2	A	1166	0	1096	17	0
2	B	1128	0	1038	18	0
2	C	1156	0	1081	19	0
2	D	1137	0	1060	27	0
3	I	2243	0	2057	25	0
4	J	2019	0	1670	33	0
5	B	1	0	0	0	0
All	All	9433	0	8652	130	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 (130) 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)
2:B:210:LEU:HB2	2:B:324:ILE:HD13	1.67	0.76
2:B:320:LEU:HD13	2:C:329:LEU:HD21	1.74	0.69
2:D:210:LEU:HB3	2:D:324:ILE:HG12	1.76	0.68
3:I:370:PHE:HB2	3:I:406:VAL:HG21	1.81	0.63
3:I:249:ILE:HD11	4:J:341:ALA:HB2	1.83	0.60
4:J:319:LYS:O	4:J:323:HIS:ND1	2.26	0.60
3:I:212:LEU:HD22	3:I:303:LEU:HD11	1.83	0.59
2:A:257:GLU:HB3	2:A:258:TYR:HD1	1.70	0.57
2:C:246:GLN:NE2	2:C:274:THR:OG1	2.35	0.57
4:J:108:ASP:O	4:J:112:SER:OG	2.24	0.56
4:J:163:TYR:CE2	4:J:167:LEU:HD11	2.41	0.55
2:C:210:LEU:HD22	2:C:320:LEU:HD11	1.89	0.55
3:I:399:VAL:O	3:I:403:VAL:HG22	2.06	0.55
2:A:285:THR:HG23	2:A:286:ARG:HG3	1.89	0.54
2:B:201:VAL:O	2:B:205:THR:HG23	2.06	0.54
3:I:166:LEU:O	3:I:170:GLN:HB2	2.08	0.54
2:D:201:VAL:O	2:D:205:THR:HG23	2.08	0.54
2:D:200:GLU:O	2:D:204:THR:HG23	2.08	0.53
3:I:413:CYS:HA	3:I:416:VAL:HG22	1.89	0.53
3:I:411:HIS:O	3:I:415:VAL:HG23	2.09	0.53
4:J:200:LEU:O	4:J:204:ILE:HG13	2.09	0.53
4:J:371:PHE:CD1	4:J:382:LEU:HD13	2.44	0.53
2:B:179:VAL:O	2:B:183:VAL:HG23	2.09	0.52
3:I:194:ILE:HD11	3:I:299:PHE:CE2	2.44	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:J:345:VAL:O	4:J:381:CYS:HA	2.09	0.52
3:I:236:GLY:O	3:I:292:THR:HA	2.09	0.52
4:J:203:ILE:HG13	4:J:204:ILE:N	2.24	0.52
2:B:197:LEU:O	2:B:201:VAL:HG23	2.09	0.52
4:J:366:ILE:O	4:J:370:VAL:HG23	2.10	0.52
2:B:178:ASP:O	2:B:182:LEU:HG	2.10	0.52
3:I:365:GLU:O	3:I:369:THR:HG23	2.10	0.51
4:J:96:LEU:HB2	4:J:103:TYR:HB2	1.91	0.51
4:J:303:VAL:HG22	4:J:307:LEU:HD23	1.92	0.51
3:I:331:LEU:HD11	3:I:437:MET:SD	2.51	0.50
2:C:201:VAL:HA	2:C:204:THR:HG22	1.92	0.50
2:D:258:TYR:HD2	2:D:263:MET:HE1	1.77	0.49
2:B:207:LEU:HD23	2:B:324:ILE:HD11	1.95	0.49
4:J:287:LEU:HD21	4:J:374:PHE:HE1	1.77	0.49
2:D:253:LEU:HB3	2:D:263:MET:SD	2.53	0.48
2:C:179:VAL:O	2:C:183:VAL:HG22	2.13	0.48
3:I:224:GLU:O	3:I:228:LYS:HG2	2.14	0.48
2:A:201:VAL:HA	2:A:204:THR:HG22	1.96	0.48
2:A:247:PHE:HD2	2:D:272:TYR:CD1	2.32	0.48
2:C:279:TYR:HE2	2:D:240:LEU:HB2	1.77	0.48
2:A:315:ASN:O	2:A:319:VAL:HG12	2.14	0.47
4:J:162:GLU:OE2	4:J:232:THR:HG21	2.14	0.47
2:A:201:VAL:O	2:A:205:THR:HG22	2.15	0.47
2:D:246:GLN:HE22	2:D:274:THR:HG1	1.54	0.47
2:D:263:MET:O	2:D:267:THR:HG23	2.14	0.47
4:J:232:THR:HG23	4:J:235:GLN:H	1.80	0.47
1:E:70:LEU:HD11	2:D:280:ALA:HB1	1.97	0.47
2:A:221:LYS:HE2	2:A:221:LYS:HB3	1.76	0.47
2:B:316:GLN:HA	2:B:319:VAL:HG12	1.97	0.47
2:C:327:LEU:HD23	2:C:327:LEU:HA	1.74	0.47
3:I:218:THR:HG21	3:I:250:ILE:HG23	1.97	0.47
3:I:322:ILE:HG22	3:I:359:LEU:O	2.15	0.47
3:I:324:GLU:HG3	3:I:355:GLU:HA	1.97	0.47
2:B:213:GLU:O	2:B:216:PRO:HD2	2.14	0.47
4:J:105:THR:HB	4:J:154:ASP:HA	1.97	0.47
3:I:339:SER:HA	3:I:342:LEU:HD13	1.97	0.46
2:B:186:LEU:HB2	2:D:182:LEU:HD22	1.98	0.46
2:B:320:LEU:CD1	2:C:329:LEU:HD21	2.45	0.46
2:D:213:GLU:HG2	2:D:320:LEU:HD21	1.97	0.46
3:I:340:LYS:O	3:I:343:THR:OG1	2.28	0.46
4:J:271:PHE:CE1	4:J:286:TRP:HD1	2.33	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:210:LEU:HD22	2:D:320:LEU:HD11	1.97	0.46
4:J:101:GLU:OE2	4:J:102:TYR:N	2.48	0.46
2:D:247:PHE:C	2:D:247:PHE:CD1	2.94	0.45
4:J:387:PHE:CZ	4:J:391:LEU:HD11	2.52	0.45
1:E:69:ARG:HA	1:E:69:ARG:HD2	1.82	0.45
2:A:181:THR:HG23	2:A:182:LEU:HD12	1.98	0.45
2:C:210:LEU:HD12	2:C:327:LEU:HD12	1.97	0.45
2:C:215:LEU:HD12	2:C:215:LEU:HA	1.83	0.45
2:B:286:ARG:O	2:B:290:ILE:HG12	2.17	0.45
2:C:221:LYS:HE2	2:C:221:LYS:HB3	1.88	0.45
2:D:264:GLU:N	2:D:265:PRO:HD2	2.31	0.45
3:I:381:LEU:HD23	3:I:381:LEU:HA	1.83	0.45
2:A:243:MET:HE2	2:D:276:MET:HG3	1.99	0.44
2:B:201:VAL:O	2:B:204:THR:OG1	2.25	0.44
2:B:326:LYS:HB2	2:B:326:LYS:HE3	1.78	0.44
2:C:201:VAL:O	2:C:205:THR:HG23	2.18	0.44
2:D:326:LYS:HE3	2:D:326:LYS:HB2	1.71	0.44
4:J:278:MET:HG2	4:J:279:ARG:H	1.81	0.44
2:A:263:MET:HE3	2:A:263:MET:HB3	1.83	0.44
2:C:250:LEU:HD23	2:C:250:LEU:HA	1.85	0.44
3:I:380:ALA:O	4:J:183:MET:HE2	2.18	0.44
2:B:313:ASP:HB3	2:B:316:GLN:HG2	1.98	0.44
2:A:329:LEU:HG	2:A:333:ARG:NH2	2.32	0.43
3:I:321:ARG:NH1	3:I:358:GLY:O	2.52	0.43
3:I:380:ALA:HB1	4:J:183:MET:SD	2.58	0.43
3:I:198:LEU:O	3:I:277:ALA:HB3	2.18	0.43
4:J:285:GLU:O	4:J:289:PHE:HB2	2.18	0.43
4:J:325:THR:O	4:J:328:LEU:HG	2.19	0.43
2:D:177:SER:O	2:D:181:THR:HG23	2.18	0.43
4:J:365:ASN:OD1	4:J:366:ILE:N	2.50	0.43
4:J:374:PHE:HZ	4:J:390:VAL:HG11	1.83	0.43
4:J:178:HIS:HB2	4:J:249:TYR:OH	2.19	0.43
2:B:200:GLU:O	2:B:204:THR:HG23	2.19	0.43
4:J:333:ILE:O	4:J:337:MET:HG3	2.18	0.43
4:J:163:TYR:CZ	4:J:167:LEU:HD11	2.54	0.42
2:C:279:TYR:HD2	2:D:240:LEU:HD13	1.84	0.42
2:D:320:LEU:O	2:D:324:ILE:HG13	2.20	0.42
2:A:257:GLU:HB3	2:A:258:TYR:CD1	2.50	0.42
2:D:286:ARG:O	2:D:290:ILE:HG12	2.20	0.42
1:G:81:GLY:O	2:C:249:ILE:HG12	2.20	0.42
2:C:221:LYS:HB2	2:C:312:PHE:CE1	2.55	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:J:230:ILE:HD12	4:J:230:ILE:H	1.85	0.42
2:A:250:LEU:O	2:A:254:THR:HG23	2.19	0.41
2:B:331:LEU:HD12	2:B:331:LEU:HA	1.82	0.41
3:I:108:ASP:N	3:I:108:ASP:OD1	2.51	0.41
4:J:298:ILE:HG13	4:J:299:TYR:N	2.34	0.41
2:A:203:LEU:HD21	2:A:331:LEU:HA	2.02	0.41
2:A:250:LEU:HD13	2:A:267:THR:HG22	2.03	0.41
2:D:210:LEU:HA	2:D:210:LEU:HD23	1.72	0.41
2:D:188:GLU:O	2:D:192:VAL:HG13	2.20	0.41
3:I:241:GLU:O	3:I:245:GLN:HG3	2.21	0.41
2:C:222:LEU:HD12	2:C:222:LEU:HA	1.91	0.41
2:D:259:SER:OG	2:D:260:TRP:N	2.53	0.41
4:J:351:LYS:HE3	4:J:351:LYS:HB2	1.60	0.41
2:A:327:LEU:HA	2:A:327:LEU:HD12	1.80	0.41
2:D:332:LYS:HB2	2:D:332:LYS:HE3	1.79	0.41
3:I:416:VAL:O	3:I:420:PHE:HB2	2.21	0.41
4:J:280:LYS:HZ1	4:J:365:ASN:HB2	1.86	0.41
2:B:219:GLU:O	2:B:222:LEU:HG	2.21	0.41
2:C:263:MET:HE3	2:C:263:MET:HB3	1.93	0.41
2:C:186:LEU:O	2:C:190:LEU:HG	2.20	0.40
2:A:259:SER:OG	2:A:260:TRP:N	2.53	0.40
2:D:179:VAL:O	2:D:183:VAL:HG23	2.21	0.40
2:D:253:LEU:HD23	2:D:253:LEU:HA	1.79	0.40
4:J:96:LEU:HD11	4:J:105:THR:HG22	2.02	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	E	29/70 (41%)	29 (100%)	0	0	100 100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	23/70 (33%)	23 (100%)	0	0	100	100
1	H	24/70 (34%)	24 (100%)	0	0	100	100
2	A	150/203 (74%)	146 (97%)	4 (3%)	0	100	100
2	B	147/203 (72%)	145 (99%)	2 (1%)	0	100	100
2	C	150/203 (74%)	146 (97%)	4 (3%)	0	100	100
2	D	147/203 (72%)	145 (99%)	2 (1%)	0	100	100
3	I	299/394 (76%)	288 (96%)	11 (4%)	0	100	100
4	J	287/383 (75%)	278 (97%)	9 (3%)	0	100	100
All	All	1256/1799 (70%)	1224 (98%)	32 (2%)	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	E	23/57 (40%)	23 (100%)	0	100	100
1	G	18/57 (32%)	16 (89%)	2 (11%)	6	22
1	H	20/57 (35%)	18 (90%)	2 (10%)	7	27
2	A	107/177 (60%)	100 (94%)	7 (6%)	15	43
2	B	100/177 (56%)	99 (99%)	1 (1%)	68	76
2	C	105/177 (59%)	101 (96%)	4 (4%)	29	57
2	D	103/177 (58%)	99 (96%)	4 (4%)	28	56
3	I	205/346 (59%)	202 (98%)	3 (2%)	57	72
4	J	156/345 (45%)	155 (99%)	1 (1%)	78	81
All	All	837/1570 (53%)	813 (97%)	24 (3%)	38	62

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	215	LEU
2	A	254	THR
2	A	270	VAL
2	A	274	THR
2	A	276	MET
2	A	300	LEU
2	A	320	LEU
2	B	245	VAL
1	G	80	ILE
1	G	88	ILE
2	C	215	LEU
2	C	253	LEU
2	C	270	VAL
2	C	329	LEU
1	H	80	ILE
1	H	84	ILE
2	D	262	ILE
2	D	271	THR
2	D	320	LEU
2	D	329	LEU
3	I	118	ILE
3	I	129	ARG
3	I	148	THR
4	J	112	SER

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

Mol	Chain	Res	Type
2	B	318	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

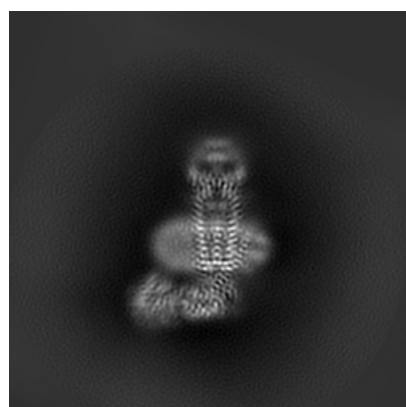
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-22290. These allow visual inspection of the internal detail of the map and identification of artifacts.

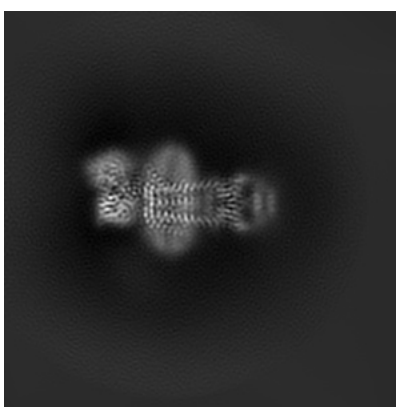
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

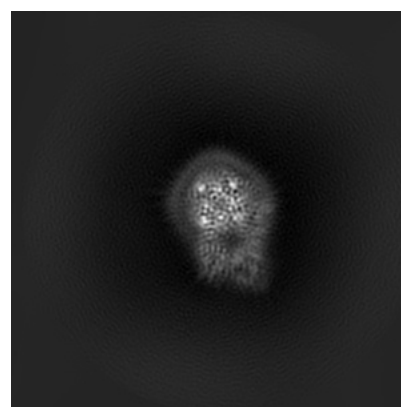
6.1.1 Primary map



X



Y

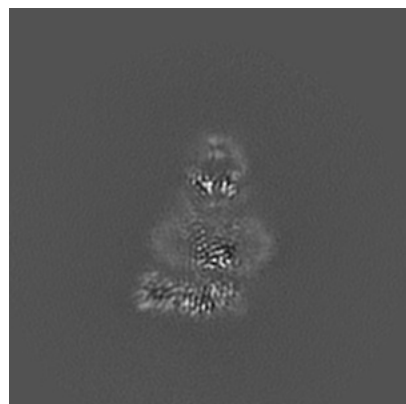


Z

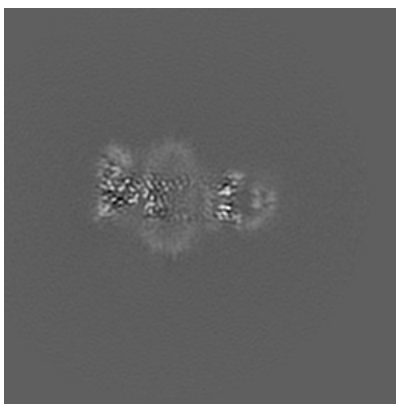
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

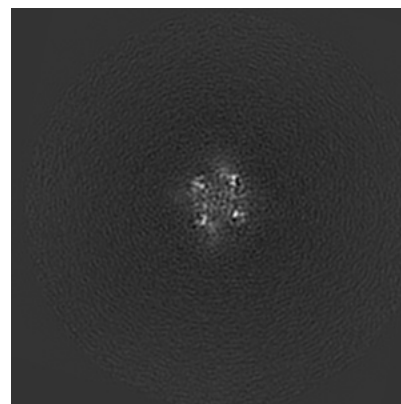
6.2.1 Primary map



X Index: 150



Y Index: 150

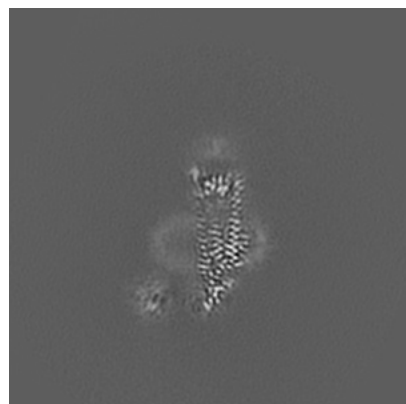


Z Index: 150

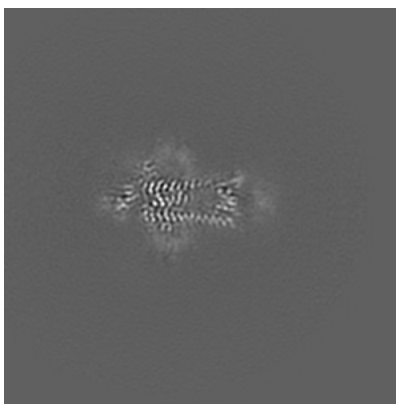
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

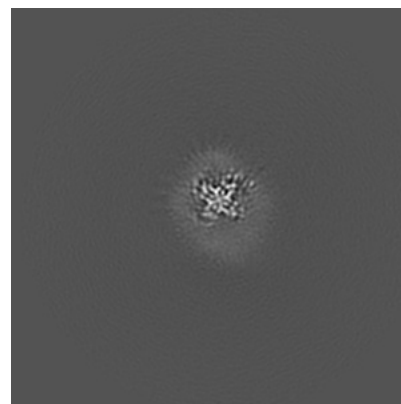
6.3.1 Primary map



X Index: 165



Y Index: 166

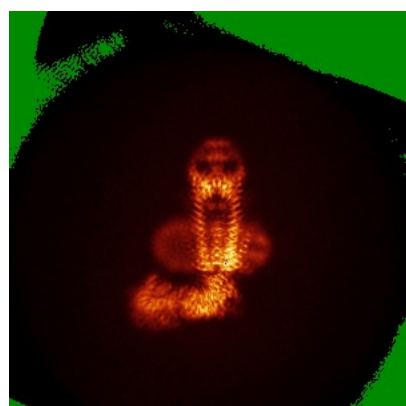


Z Index: 110

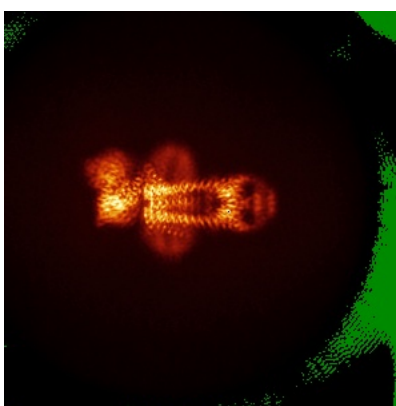
The images above show the largest variance slices of the map in three orthogonal directions.

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

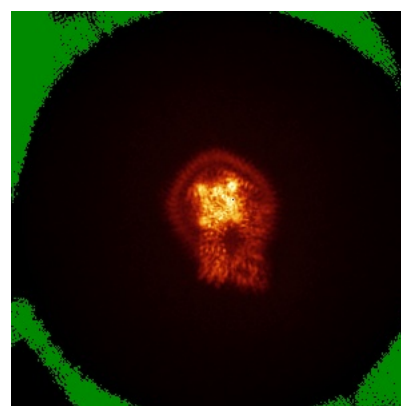
6.4.1 Primary map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.015. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

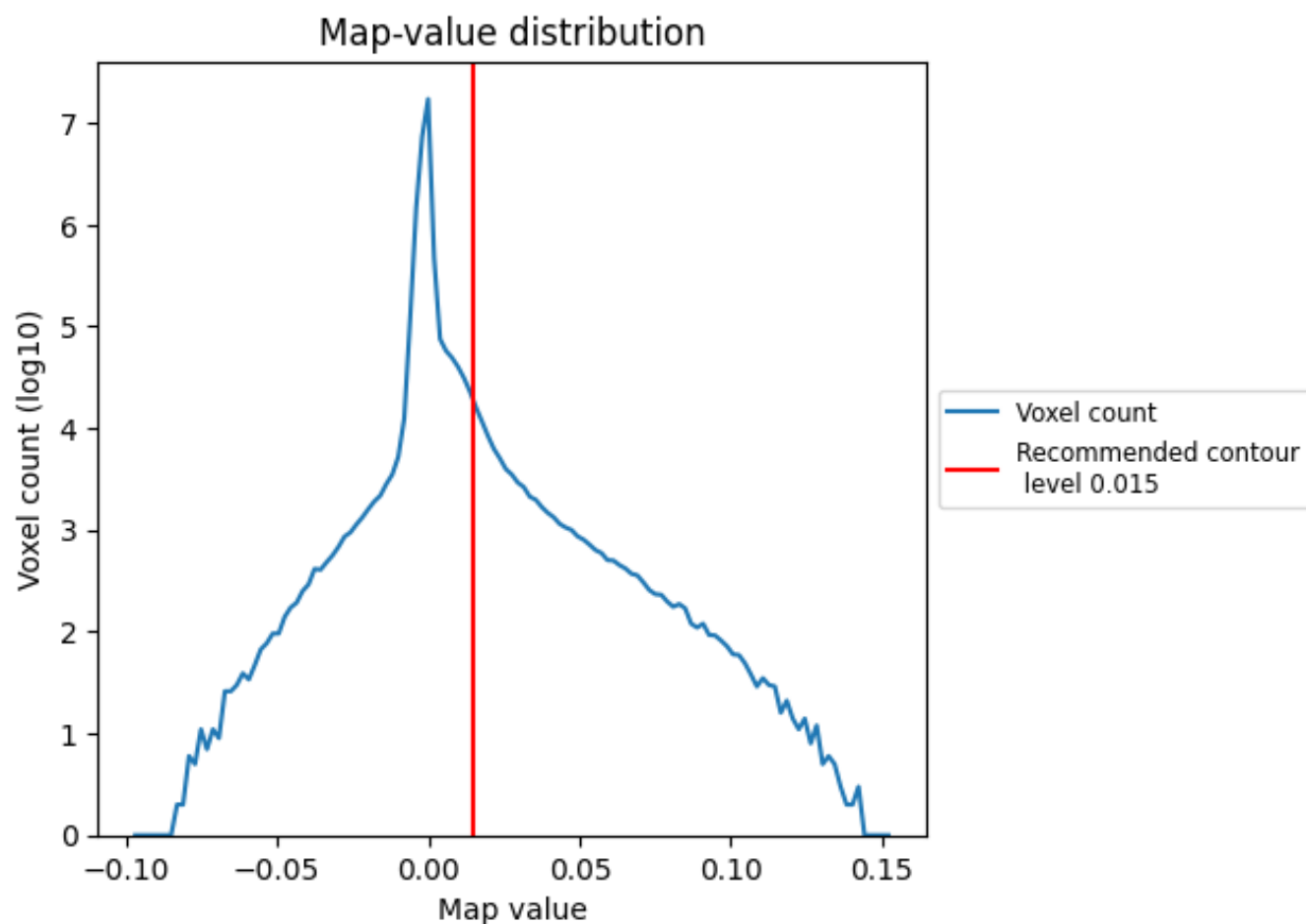
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

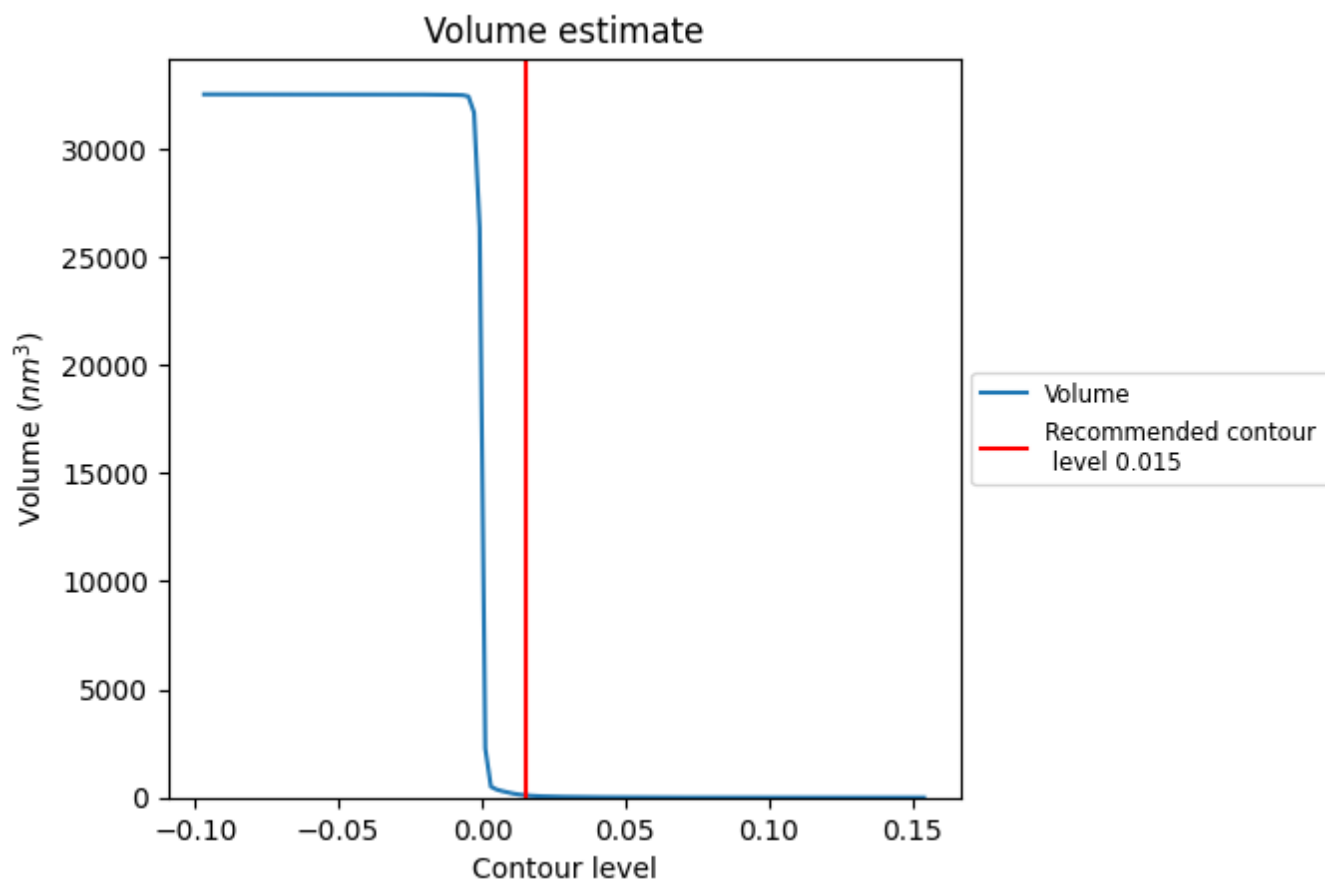
This section contains the results of statistical analysis of the map.

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.

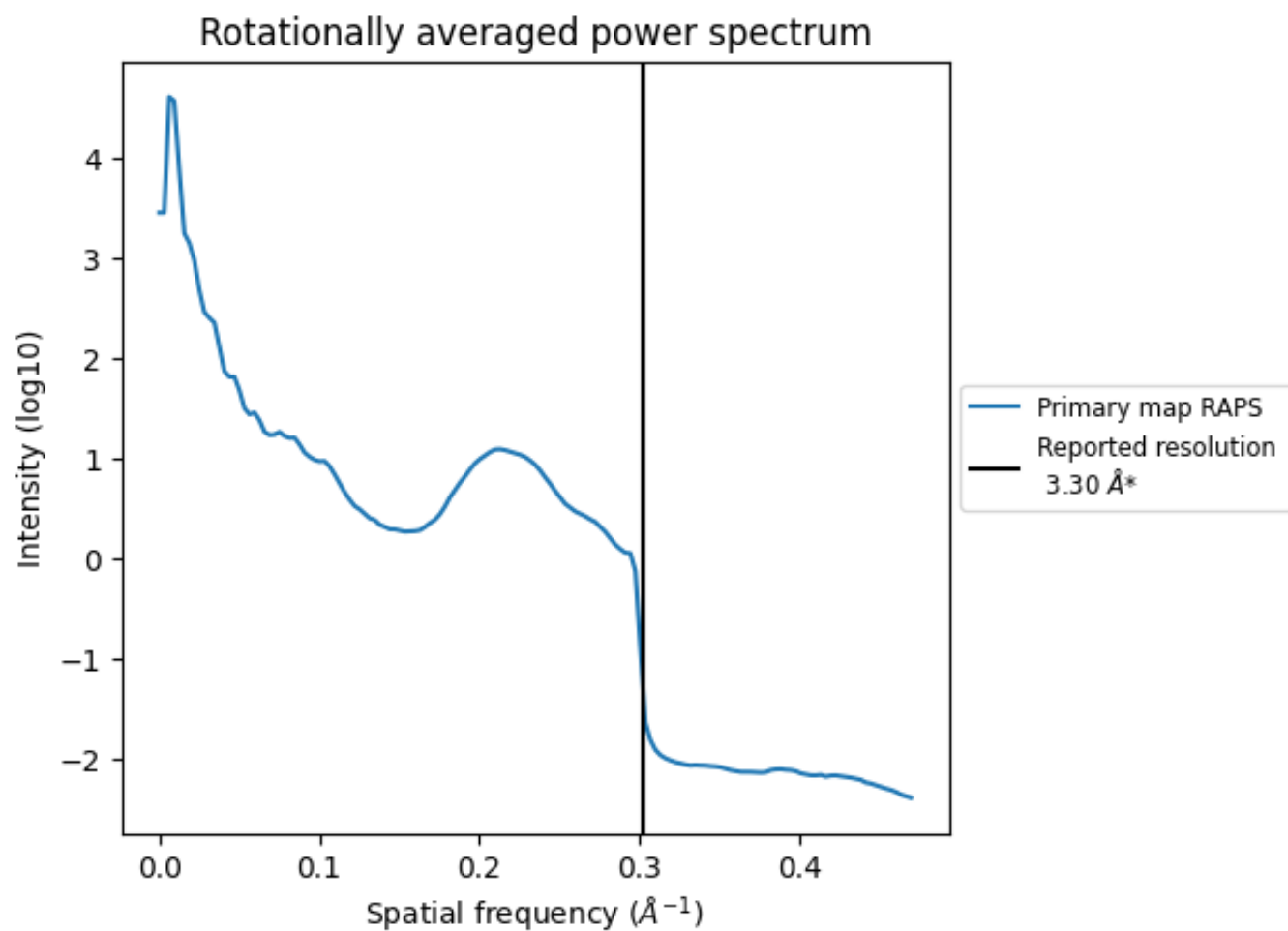
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 108 nm³; this corresponds to an approximate mass of 98 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 0.303 Å⁻¹

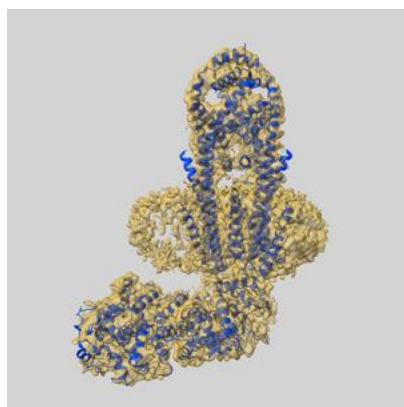
8 Fourier-Shell correlation ⓘ

This section was not generated. No FSC curve or half-maps provided.

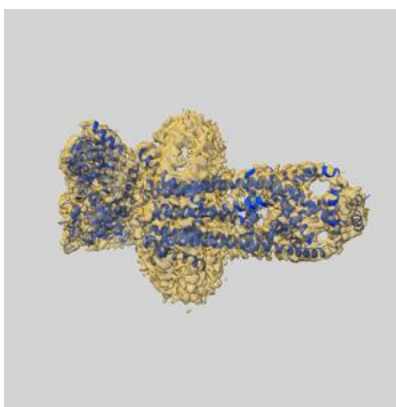
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-22290 and PDB model 6XQN. Per-residue inclusion information can be found in [section 3](#) on [page 8](#).

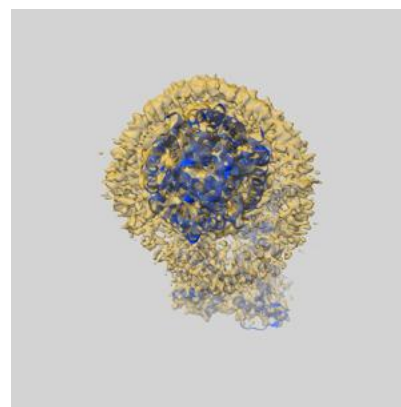
9.1 Map-model overlay [i](#)



X



Y



Z

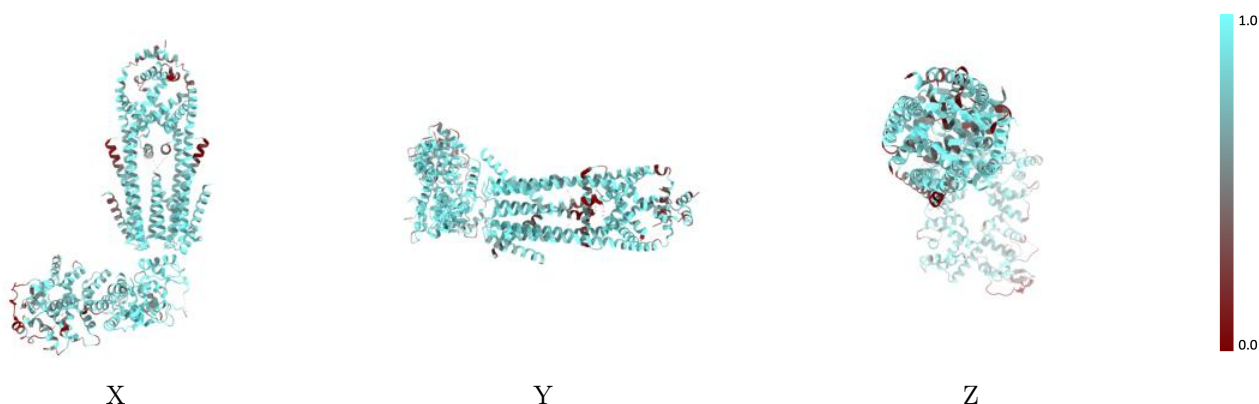
The images above show the 3D surface view of the map at the recommended contour level 0.015 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



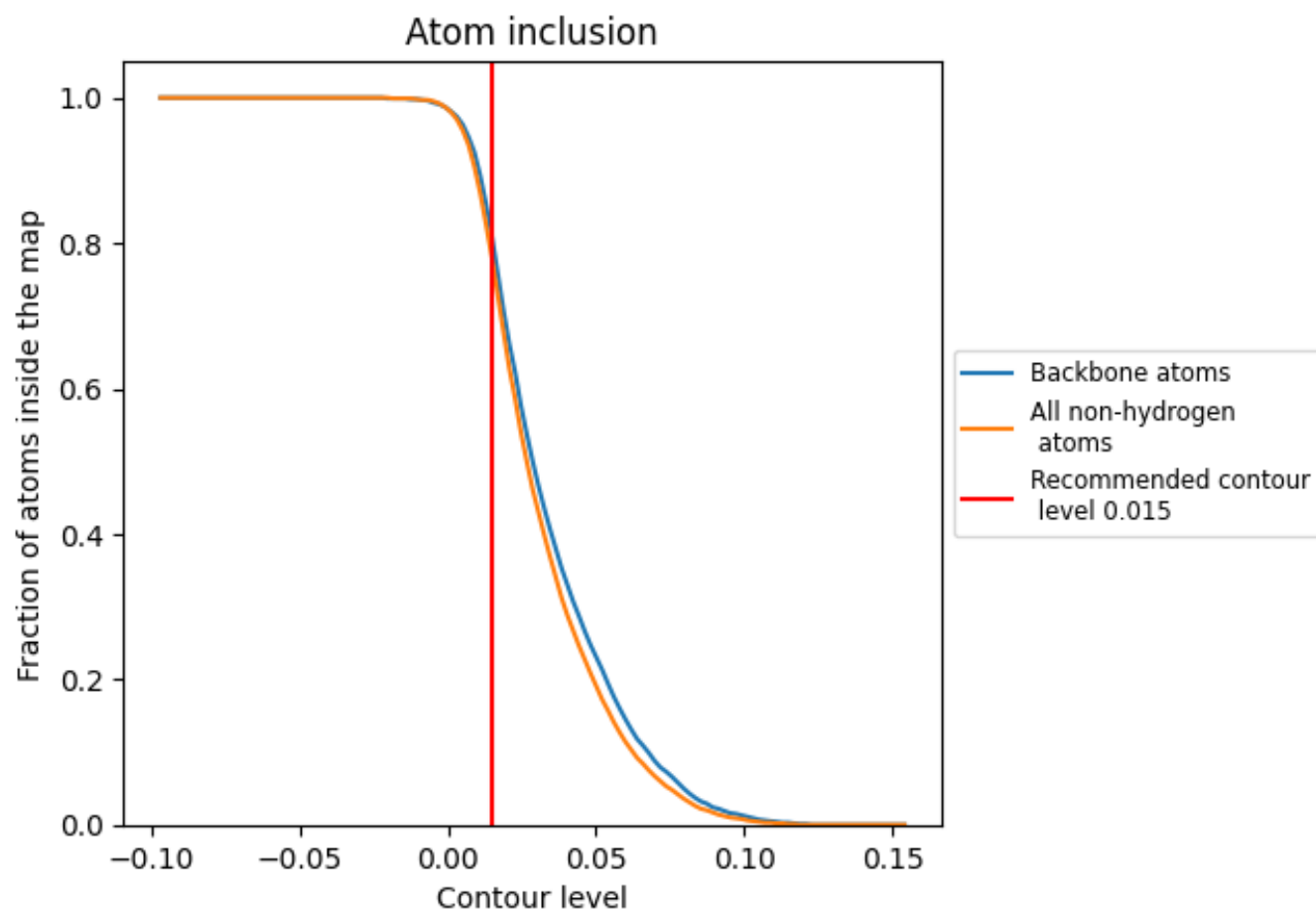
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.015).

9.4 Atom inclusion [i](#)



At the recommended contour level, 81% of all backbone atoms, 78% 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 (0.015) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7780	0.3760
A	0.7850	0.3940
B	0.7740	0.3940
C	0.8020	0.4000
D	0.8020	0.3980
E	0.8050	0.3880
G	0.4770	0.2460
H	0.7370	0.3410
I	0.8450	0.4350
J	0.7010	0.2790

1.0

0.0

<0.0