



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2024 – 05:05 PM JST

PDB ID : 7E81
EMDB ID : EMD-31007
Title : Cryo-EM structure of the flagellar MS ring with FlgB-Dc loop and FliE-helix 1 from Salmonella
Authors : Tan, J.X.; Chang, S.H.; Wang, X.F.; Xu, C.H.; Zhou, Y.; Zhang, X.; Zhu, Y.Q.
Deposited on : 2021-02-28
Resolution : 4.50 Å(reported)

This is a wwPDB EM Validation Summary 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.dev70
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

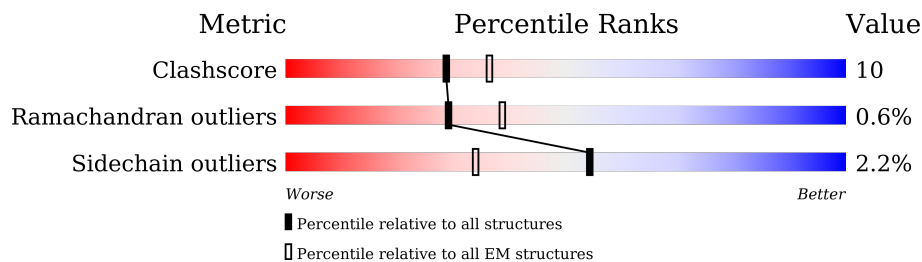
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.50 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.
















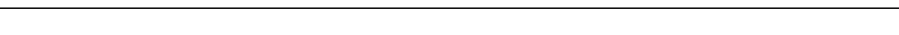
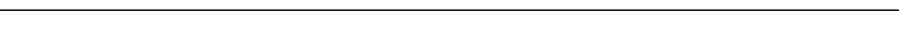
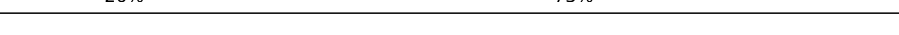

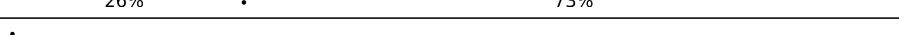







Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	Ca	560	
1	Cb	560	
1	Cc	560	
1	Cd	560	
1	Ce	560	
1	Cf	560	
1	Ch	560	
1	Ci	560	




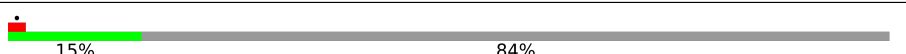

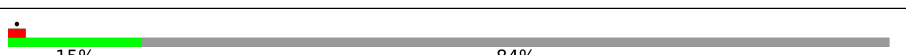
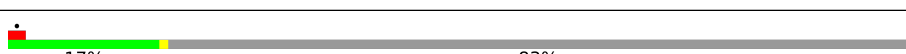


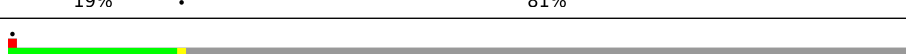


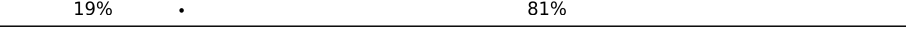












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Mol	Chain	Length	Quality of chain	
1	Cj	560		
1	Ck	560		
1	Cl	560		
1	Cm	560		
1	Cn	560		
1	Co	560		
1	Cp	560		
1	Cq	560		
1	Cr	560		
1	Cs	560		
1	Ct	560		
1	Cu	560		
1	Cv	560		
1	Cw	560		
1	Cx	560		
1	Cy	560		
1	Cz	560		
1	Da	560		
1	Db	560		
1	Dc	560		
1	Dd	560		
1	De	560		
1	Df	560		
1	Dg	560		
1	Dh	560		


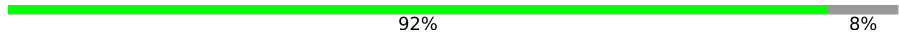



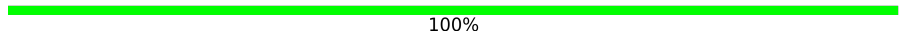
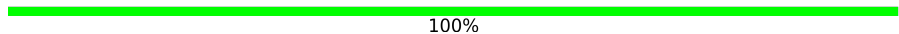

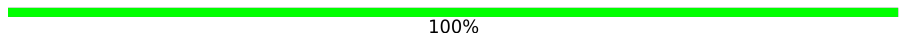
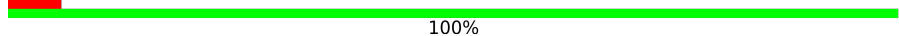
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Mol	Chain	Length	Quality of chain
1	Di	560	 15% 84%
1	Dj	560	 15% 84%
1	Dk	560	 15% 84%
1	Dl	560	 15% 84%
1	Dm	560	 15% 84%
1	Dn	560	 15% 84%
1	Do	560	 17% 83%
1	Dp	560	 19% 81%
1	Dq	560	 19% 81%
1	Dr	560	 19% 81%
1	Ds	560	 19% 81%
1	Dt	560	 19% 81%
1	Du	560	 19% 81%
1	Dv	560	 18% 81%
1	Dw	560	 18% 81%
1	Ea	560	 26% 73%
1	Eb	560	 26% 73%
1	Ec	560	 26% 73%
1	Ed	560	 26% 73%
1	Ee	560	 26% 73%
1	Ef	560	 26% 73%
1	Eg	560	 26% 73%
1	Fh	560	 26% 73%
1	cg	560	 26% 73%
2	GA	12	 92% 8%

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Mol	Chain	Length	Quality of chain
2	GB	12	 42% 58%
2	GC	12	 92% 8%
2	GD	12	 83% 17%
2	GE	12	 83% 17%
3	GF	18	 89% 11%
3	GG	18	 100%
3	GH	18	 100%
3	GI	18	 11% 83% 17%
3	GJ	18	 100%
3	GK	18	 6% 100%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 57178 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 Flagellar M-ring protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	Da	109	746	462	135	148	1	0	0
1	Db	109	746	462	135	148	1	0	0
1	Dc	109	746	462	135	148	1	0	0
1	Dd	109	746	462	135	148	1	0	0
1	De	99	696	432	125	138	1	0	0
1	Df	97	687	427	123	136	1	0	0
1	Dg	87	637	397	113	126	1	0	0
1	Dh	87	637	397	113	126	1	0	0
1	Di	87	637	397	113	126	1	0	0
1	Dj	87	637	397	113	126	1	0	0
1	Dk	87	637	397	113	126	1	0	0
1	Dl	87	637	397	113	126	1	0	0
1	Dm	87	637	397	113	126	1	0	0
1	Dn	87	637	397	113	126	1	0	0
1	Do	97	687	427	123	136	1	0	0
1	Dp	109	746	462	135	148	1	0	0
1	Dq	109	746	462	135	148	1	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	Dr	109	746	462	135	148	1	0	0
1	Ds	109	746	462	135	148	1	0	0
1	Dt	109	746	462	135	148	1	0	0
1	Du	109	746	462	135	148	1	0	0
1	Dv	109	746	462	135	148	1	0	0
1	Dw	109	746	462	135	148	1	0	0
1	Ca	150	1185	722	221	239	3	0	0
1	Cb	150	1185	722	221	239	3	0	0
1	Cc	150	1185	722	221	239	3	0	0
1	Cd	150	1185	722	221	239	3	0	0
1	Ce	150	1185	722	221	239	3	0	0
1	Cf	150	1185	722	221	239	3	0	0
1	cg	150	1185	722	221	239	3	0	0
1	Ch	150	1185	722	221	239	3	0	0
1	Ci	150	1185	722	221	239	3	0	0
1	Cj	150	1185	722	221	239	3	0	0
1	Ck	150	1185	722	221	239	3	0	0
1	Cl	150	1185	722	221	239	3	0	0
1	Cm	150	1185	722	221	239	3	0	0
1	Cn	150	1185	722	221	239	3	0	0
1	Co	150	1185	722	221	239	3	0	0

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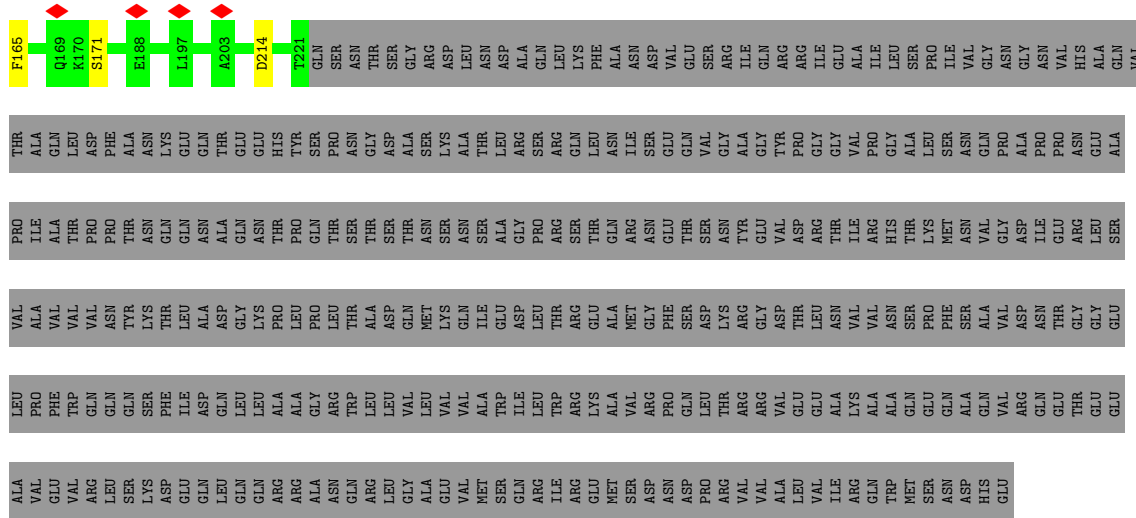
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	Cp	150	1185	722	221	239	3	0	0
1	Cq	150	1185	722	221	239	3	0	0
1	Cr	150	1185	722	221	239	3	0	0
1	Cs	150	1185	722	221	239	3	0	0
1	Ct	150	1185	722	221	239	3	0	0
1	Cu	150	1185	722	221	239	3	0	0
1	Cv	150	1185	722	221	239	3	0	0
1	Cw	150	1185	722	221	239	3	0	0
1	Cx	150	1185	722	221	239	3	0	0
1	Cy	150	1185	722	221	239	3	0	0
1	Cz	150	1185	722	221	239	3	0	0
1	Ea	150	1185	722	221	239	3	0	0
1	Eb	150	1185	722	221	239	3	0	0
1	Ec	150	1185	722	221	239	3	0	0
1	Ed	150	1185	722	221	239	3	0	0
1	Ee	150	1185	722	221	239	3	0	0
1	Ef	150	1185	722	221	239	3	0	0
1	Eg	150	1185	722	221	239	3	0	0
1	Fh	150	1185	722	221	239	3	0	0

- Molecule 2 is a protein called FlgB-Dc loop.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	GA	11	Total	C	N	O	0	0
			55	33	11	11		
2	GC	11	Total	C	N	O	0	0
			55	33	11	11		
2	GE	12	Total	C	N	O	0	0
			60	36	12	12		
2	GD	10	Total	C	N	O	0	0
			50	30	10	10		
2	GB	5	Total	C	N	O	0	0
			25	15	5	5		

- Molecule 3 is a protein called FliE helix 1.

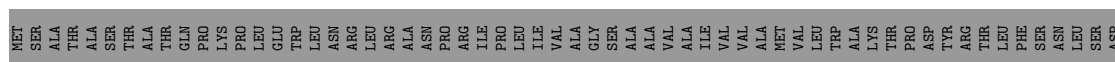
Mol	Chain	Residues	Atoms				AltConf	Trace
3	GF	18	Total	C	N	O	0	0
			90	54	18	18		
3	GG	18	Total	C	N	O	0	0
			90	54	18	18		
3	GH	18	Total	C	N	O	0	0
			90	54	18	18		
3	GI	15	Total	C	N	O	0	0
			75	45	15	15		
3	GJ	18	Total	C	N	O	0	0
			90	54	18	18		
3	GK	18	Total	C	N	O	0	0
			90	54	18	18		

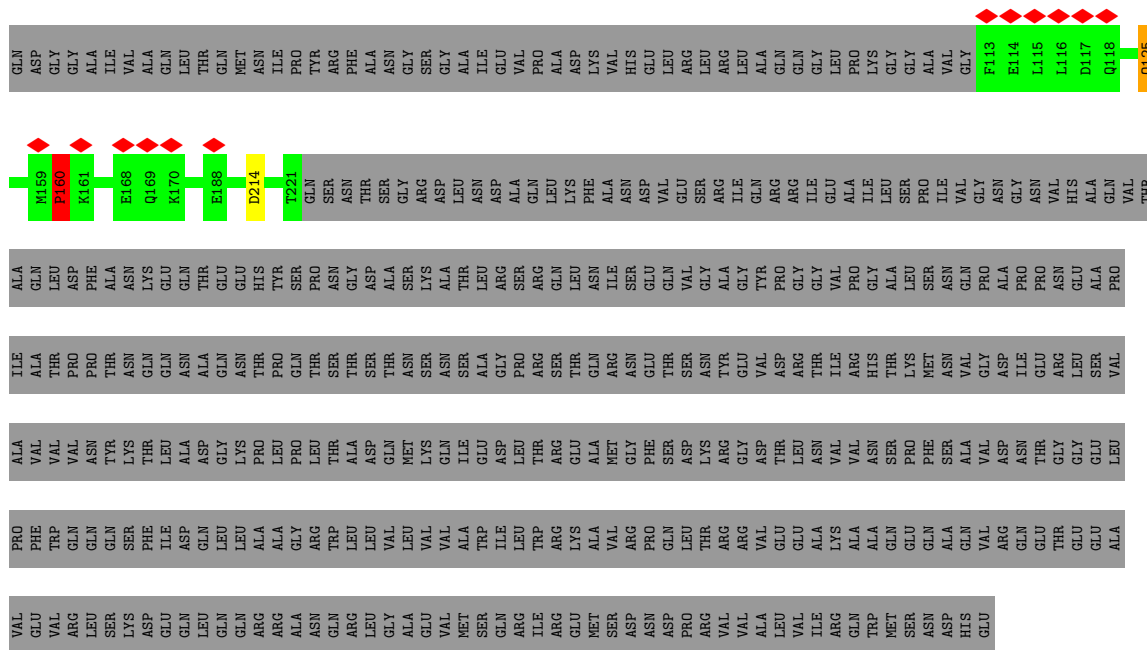


• Molecule 1: Flagellar M-ring protein

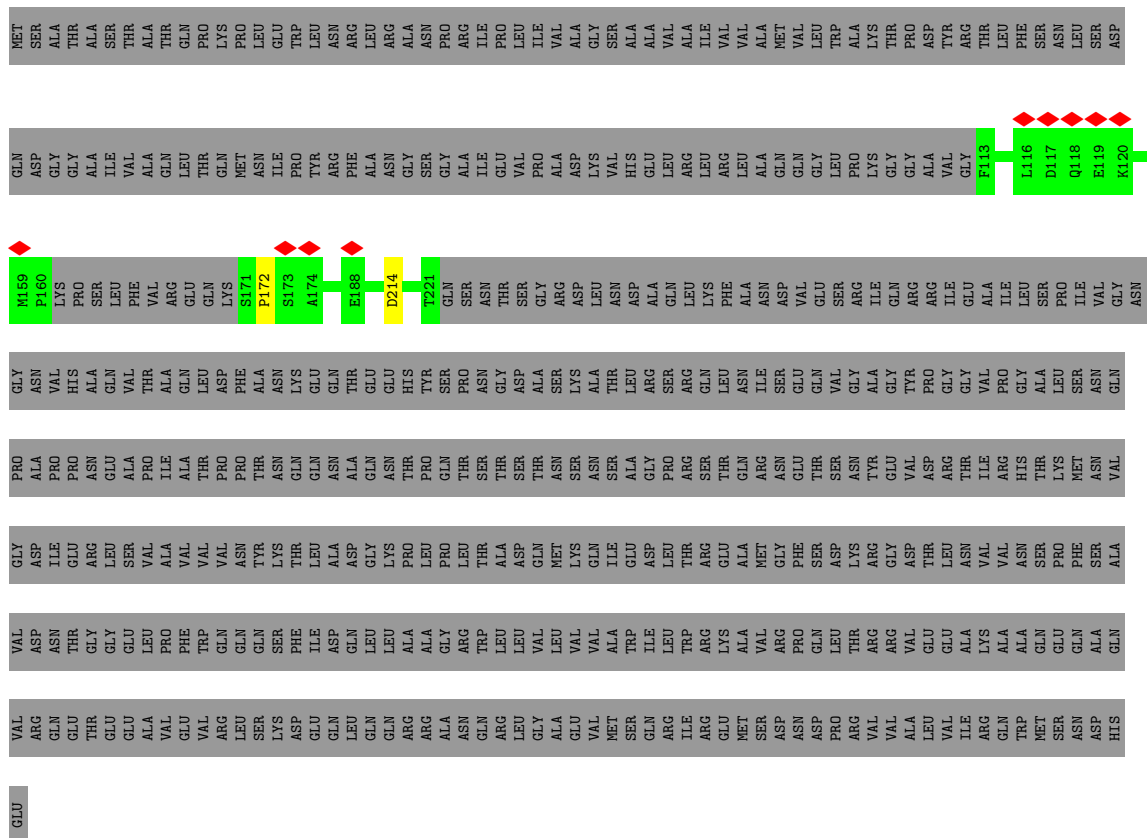


• Molecule 1: Flagellar M-ring protein

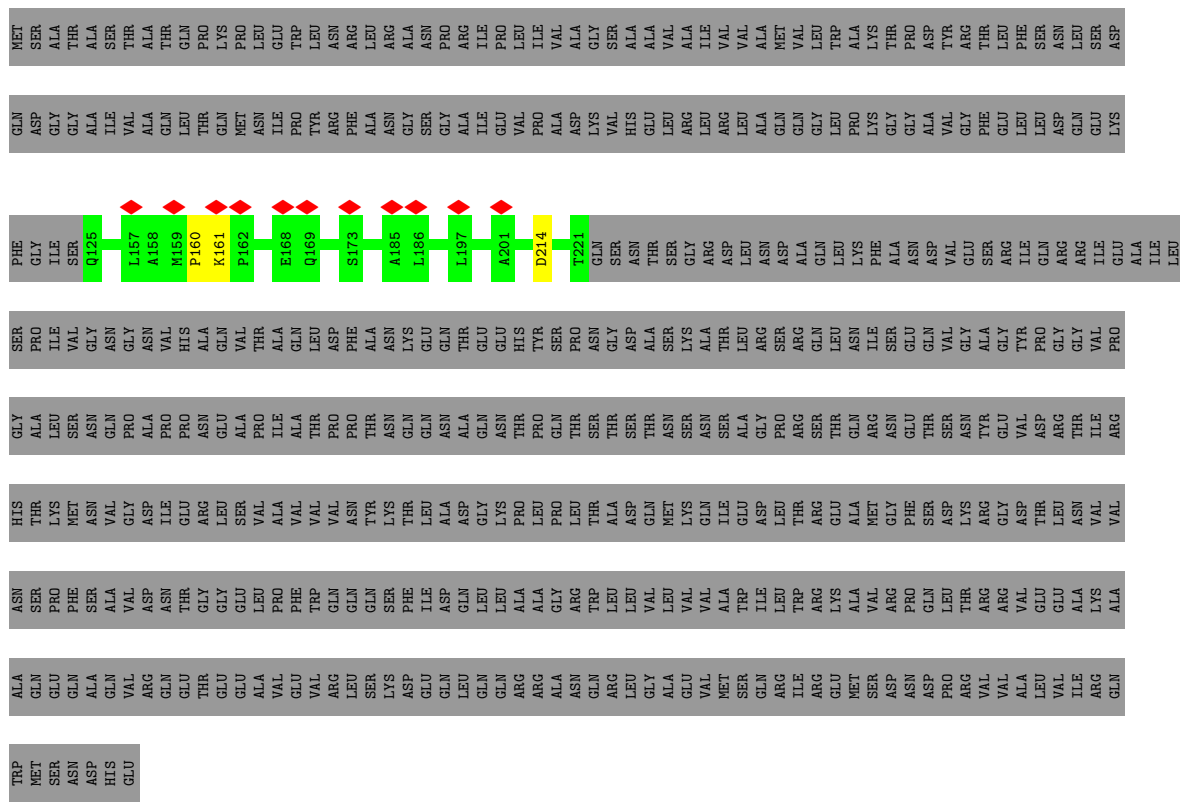




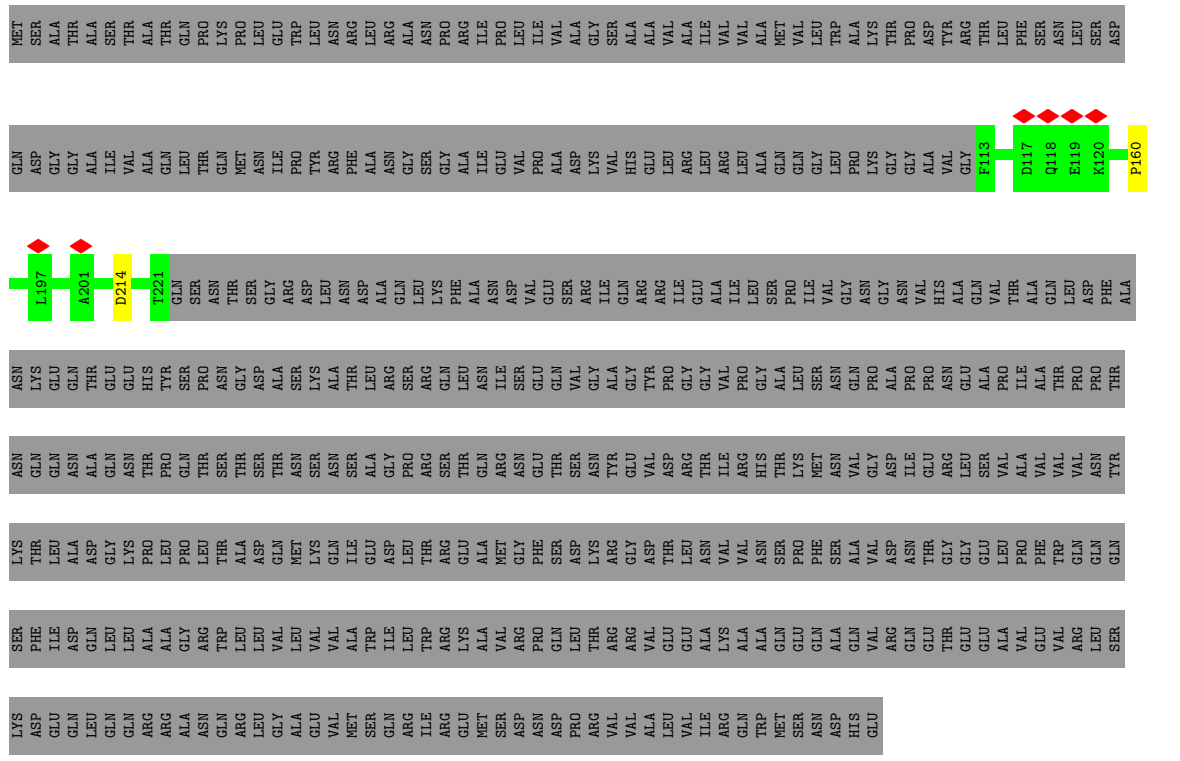
• Molecule 1: Flagellar M-ring protein



• Molecule 1: Flagellar M-ring protein



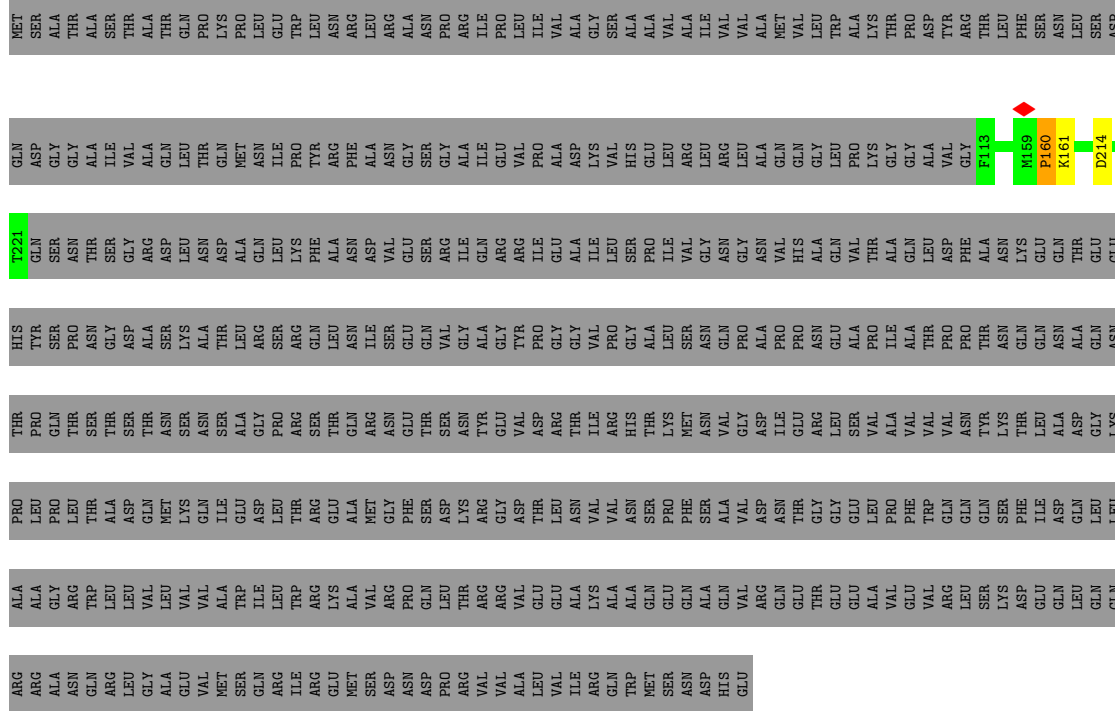
- Molecule 1: Flagellar M-ring protein



- Molecule 1: Flagellar M-ring protein

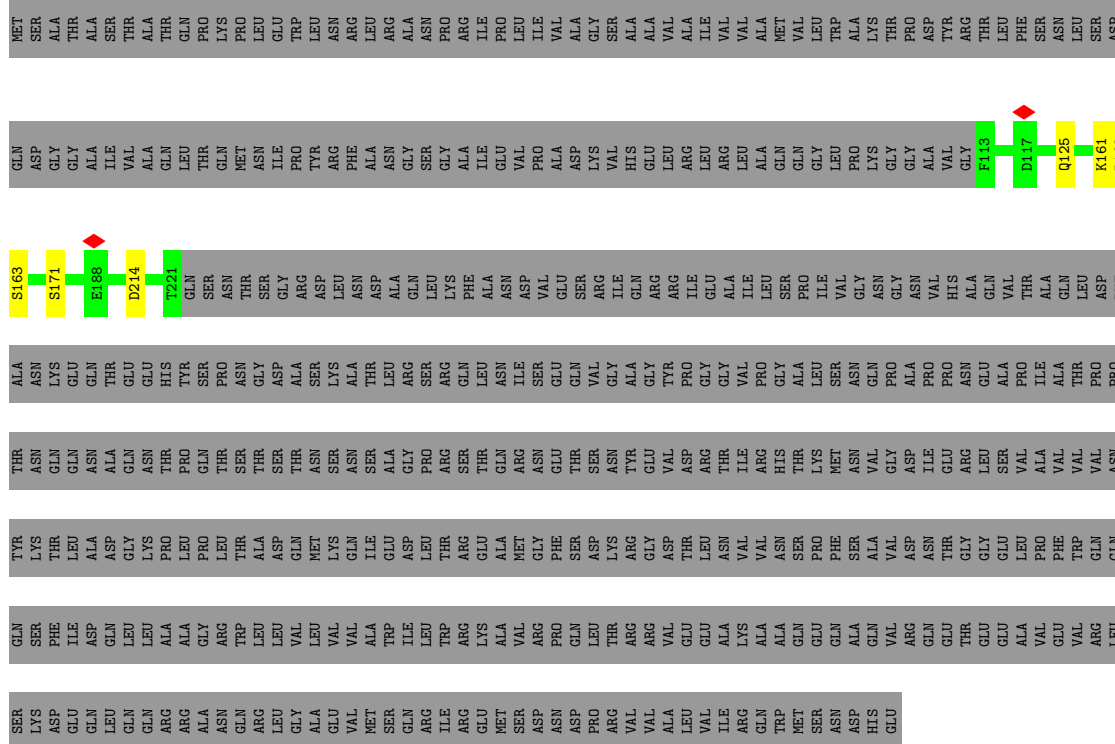
• Molecule 1: Flagellar M-ring protein

Chain Du: 19% 81%



• Molecule 1: Flagellar M-ring protein

Chain Dv: 18% 81%



- Molecule 2: FlgB-Dc loop

Chain GA:  92% 8%




- Molecule 2: FlgB-Dc loop

Chain GC:  92% 8%




- Molecule 2: FlgB-Dc loop

Chain GE:  83% 17%




- Molecule 2: FlgB-Dc loop

Chain GD:  83% 17%



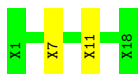
- Molecule 2: FlgB-Dc loop

Chain GB:  42% 58%



- Molecule 3: FliE helix 1

Chain GF:  89% 11%



- Molecule 3: FliE helix 1

Chain GG:  100%

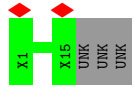
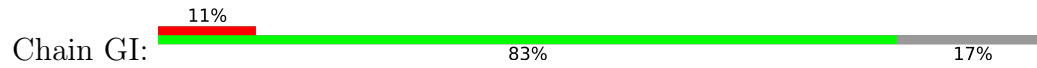
There are no outlier residues recorded for this chain.

- Molecule 3: FliE helix 1

Chain GH:  100%

There are no outlier residues recorded for this chain.

- Molecule 3: FliE helix 1



- Molecule 3: FliE helix 1



There are no outlier residues recorded for this chain.

- Molecule 3: FliE helix 1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	52714	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 ($e^-/\text{\AA}^2$)	47	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.123	Depositor
Minimum map value	-0.372	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.040	Depositor
Recommended contour level	0.238	Depositor
Map size (Å)	669.184, 669.184, 669.184	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.307, 1.307, 1.307	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	Ca	0.31	0/1197	0.45	0/1613
1	Cb	0.31	0/1197	0.45	0/1613
1	Cc	0.31	0/1197	0.45	0/1613
1	Cd	0.31	0/1197	0.45	0/1613
1	Ce	0.31	0/1197	0.45	0/1613
1	Cf	0.32	0/1197	0.45	0/1613
1	Ch	0.32	0/1197	0.45	0/1613
1	Ci	0.31	0/1197	0.45	0/1613
1	Cj	0.31	0/1197	0.45	0/1613
1	Ck	0.31	0/1197	0.45	0/1613
1	Cl	0.32	0/1197	0.45	0/1613
1	Cm	0.31	0/1197	0.45	0/1613
1	Cn	0.31	0/1197	0.45	0/1613
1	Co	0.31	0/1197	0.45	0/1613
1	Cp	0.31	0/1197	0.45	0/1613
1	Cq	0.31	0/1197	0.45	0/1613
1	Cr	0.32	0/1197	0.45	0/1613
1	Cs	0.31	0/1197	0.45	0/1613
1	Ct	0.32	0/1197	0.45	0/1613
1	Cu	0.31	0/1197	0.45	0/1613
1	Cv	0.31	0/1197	0.45	0/1613
1	Cw	0.31	0/1197	0.45	0/1613
1	Cx	0.31	0/1197	0.45	0/1613
1	Cy	0.31	0/1197	0.45	0/1613
1	Cz	0.31	0/1197	0.45	0/1613
1	Da	0.45	0/756	0.59	0/1036
1	Db	0.76	3/756 (0.4%)	0.67	1/1036 (0.1%)
1	Dc	0.46	0/756	0.56	0/1036
1	Dd	0.45	0/756	0.66	1/1036 (0.1%)
1	De	0.40	0/705	0.53	0/963
1	Df	0.76	3/697 (0.4%)	0.68	1/954 (0.1%)
1	Dg	0.37	0/646	0.52	0/881
1	Dh	0.37	0/646	0.52	0/881
1	Di	0.37	0/646	0.52	0/881

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	Dj	0.37	0/646	0.52	0/881
1	Dk	0.37	0/646	0.52	0/881
1	Dl	0.37	0/646	0.52	0/881
1	Dm	0.37	0/646	0.52	0/881
1	Dn	0.37	0/646	0.52	0/881
1	Do	0.38	0/697	0.53	0/954
1	Dp	0.44	0/756	0.58	0/1036
1	Dq	0.46	0/756	0.73	3/1036 (0.3%)
1	Dr	0.55	1/756 (0.1%)	0.59	0/1036
1	Ds	0.55	1/756 (0.1%)	0.66	2/1036 (0.2%)
1	Dt	0.45	0/756	0.59	0/1036
1	Du	0.45	0/756	0.62	1/1036 (0.1%)
1	Dv	0.44	0/756	0.58	0/1036
1	Dw	0.45	0/756	0.66	1/1036 (0.1%)
1	Ea	0.31	0/1197	0.45	0/1613
1	Eb	0.31	0/1197	0.45	0/1613
1	Ec	0.32	0/1197	0.45	0/1613
1	Ed	0.31	0/1197	0.45	0/1613
1	Ee	0.31	0/1197	0.45	0/1613
1	Ef	0.31	0/1197	0.45	0/1613
1	Eg	0.31	0/1197	0.45	0/1613
1	Fh	0.31	0/1197	0.45	0/1613
1	cg	0.31	0/1197	0.45	0/1613
All	All	0.37	8/57037 (0.0%)	0.50	10/77193 (0.0%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	Db	160	PRO	N-CA	13.20	1.69	1.47
1	Df	160	PRO	N-CA	13.19	1.69	1.47
1	Df	171	SER	C-N	8.88	1.51	1.34
1	Dr	171	SER	C-N	8.68	1.50	1.34
1	Ds	171	SER	C-N	8.50	1.50	1.34

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	Df	160	PRO	CA-N-CD	-10.68	96.54	111.50
1	Dq	160	PRO	N-CA-CB	-10.52	90.67	103.30
1	Db	160	PRO	CA-N-CD	-10.51	96.78	111.50
1	Dd	160	PRO	N-CA-CB	-9.96	91.34	103.30
1	Dw	160	PRO	N-CA-CB	-8.37	93.25	103.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	Ca	1185	0	1167	0	0
1	Cb	1185	0	1167	0	0
1	Cc	1185	0	1167	0	0
1	Cd	1185	0	1167	0	0
1	Ce	1185	0	1167	0	0
1	Cf	1185	0	1167	0	0
1	Ch	1185	0	1167	0	0
1	Ci	1185	0	1167	0	0
1	Cj	1185	0	1167	0	0
1	Ck	1185	0	1167	0	0
1	Cl	1185	0	1167	0	0
1	Cm	1185	0	1167	0	0
1	Cn	1185	0	1167	0	0
1	Co	1185	0	1167	0	0
1	Cp	1185	0	1167	0	0
1	Cq	1185	0	1167	0	0
1	Cr	1185	0	1167	0	0
1	Cs	1185	0	1167	0	0
1	Ct	1185	0	1167	0	0
1	Cu	1185	0	1167	0	0
1	Cv	1185	0	1167	0	0
1	Cw	1185	0	1167	0	0
1	Cx	1185	0	1167	0	0
1	Cy	1185	0	1167	0	0
1	Cz	1185	0	1167	0	0
1	Da	746	0	689	0	0
1	Db	746	0	689	0	0
1	Dc	746	0	689	0	0
1	Dd	746	0	689	0	0
1	De	696	0	669	0	0
1	Df	687	0	664	0	0
1	Dg	637	0	644	0	0
1	Dh	637	0	644	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	Di	637	0	644	0	0
1	Dj	637	0	644	0	0
1	Dk	637	0	644	0	0
1	Dl	637	0	644	0	0
1	Dm	637	0	644	0	0
1	Dn	637	0	644	0	0
1	Do	687	0	664	0	0
1	Dp	746	0	689	0	0
1	Dq	746	0	689	0	0
1	Dr	746	0	689	0	0
1	Ds	746	0	689	0	0
1	Dt	746	0	689	0	0
1	Du	746	0	689	0	0
1	Dv	746	0	689	0	0
1	Dw	746	0	689	0	0
1	Ea	1185	0	1167	0	0
1	Eb	1185	0	1167	0	0
1	Ec	1185	0	1167	0	0
1	Ed	1185	0	1167	0	0
1	Ee	1185	0	1167	0	0
1	Ef	1185	0	1167	0	0
1	Eg	1185	0	1167	0	0
1	Fh	1185	0	1167	0	0
1	cg	1185	0	1167	0	0
2	GA	55	0	14	0	0
2	GB	25	0	7	0	0
2	GC	55	0	14	0	0
2	GD	50	0	12	0	0
2	GE	60	0	15	1	0
3	GF	90	0	20	1	0
3	GG	90	0	20	0	0
3	GH	90	0	20	0	0
3	GI	75	0	17	0	0
3	GJ	90	0	20	0	0
3	GK	90	0	20	0	0
All	All	57178	0	55274	2	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 10.

All (2) 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:GE:11:UNK:O	2:GE:12:UNK:C	2.35	0.74
3:GF:7:UNK:O	3:GF:11:UNK:N	2.49	0.45

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	Ca	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cb	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cc	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cd	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ce	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cf	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ch	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ci	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cj	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ck	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cl	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cm	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cn	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Co	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cp	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cq	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cr	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cs	144/560 (26%)	136 (94%)	8 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	Ct	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cu	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cv	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cw	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cx	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cy	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Cz	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Da	107/560 (19%)	94 (88%)	10 (9%)	3 (3%)	5	33
1	Db	107/560 (19%)	95 (89%)	10 (9%)	2 (2%)	8	41
1	Dc	107/560 (19%)	93 (87%)	10 (9%)	4 (4%)	3	28
1	Dd	107/560 (19%)	93 (87%)	12 (11%)	2 (2%)	8	41
1	De	95/560 (17%)	86 (90%)	8 (8%)	1 (1%)	14	52
1	Df	95/560 (17%)	83 (87%)	12 (13%)	0	100	100
1	Dg	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Dh	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Di	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Dj	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Dk	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Dl	83/560 (15%)	76 (92%)	6 (7%)	1 (1%)	13	50
1	Dm	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Dn	83/560 (15%)	75 (90%)	7 (8%)	1 (1%)	13	50
1	Do	95/560 (17%)	86 (90%)	7 (7%)	2 (2%)	7	39
1	Dp	107/560 (19%)	94 (88%)	12 (11%)	1 (1%)	17	56
1	Dq	107/560 (19%)	96 (90%)	8 (8%)	3 (3%)	5	33
1	Dr	107/560 (19%)	96 (90%)	10 (9%)	1 (1%)	17	56
1	Ds	107/560 (19%)	93 (87%)	11 (10%)	3 (3%)	5	33
1	Dt	107/560 (19%)	93 (87%)	11 (10%)	3 (3%)	5	33
1	Du	107/560 (19%)	94 (88%)	11 (10%)	2 (2%)	8	41
1	Dv	107/560 (19%)	96 (90%)	8 (8%)	3 (3%)	5	33
1	Dw	107/560 (19%)	90 (84%)	13 (12%)	4 (4%)	3	28
1	Ea	144/560 (26%)	136 (94%)	8 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	Eb	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ec	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ed	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ee	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Ef	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Eg	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	Fh	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
1	cg	144/560 (26%)	136 (94%)	8 (6%)	0	100	100
All	All	7129/31920 (22%)	6607 (93%)	480 (7%)	42 (1%)	29	65

5 of 42 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	Dc	124	SER
1	Dc	125	GLN
1	Dd	160	PRO
1	Dq	124	SER
1	Dq	160	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	Ca	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cb	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cc	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cd	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ce	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cf	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ch	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ci	133/467 (28%)	130 (98%)	3 (2%)	50	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	Cj	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ck	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cl	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cm	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cn	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Co	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cp	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cq	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cr	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cs	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ct	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cu	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cv	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cw	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cx	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cy	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Cz	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Da	71/467 (15%)	69 (97%)	2 (3%)	43	65
1	Db	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dc	71/467 (15%)	69 (97%)	2 (3%)	43	65
1	Dd	71/467 (15%)	68 (96%)	3 (4%)	30	55
1	De	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Df	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dg	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dh	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Di	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dj	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dk	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dl	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dm	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dn	71/467 (15%)	70 (99%)	1 (1%)	67	81

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	Do	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dp	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dq	71/467 (15%)	69 (97%)	2 (3%)	43	65
1	Dr	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Ds	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dt	71/467 (15%)	69 (97%)	2 (3%)	43	65
1	Du	71/467 (15%)	70 (99%)	1 (1%)	67	81
1	Dv	71/467 (15%)	68 (96%)	3 (4%)	30	55
1	Dw	71/467 (15%)	68 (96%)	3 (4%)	30	55
1	Ea	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Eb	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ec	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ed	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ee	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Ef	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Eg	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	Fh	133/467 (28%)	130 (98%)	3 (2%)	50	70
1	cg	133/467 (28%)	130 (98%)	3 (2%)	50	70
All	All	6155/26619 (23%)	6020 (98%)	135 (2%)	54	71

5 of 135 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	Eb	295	SER
1	Ec	425	LYS
1	Eg	295	SER
1	Cf	243	SER
1	Ce	425	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	Ea	365	ASN
1	Ed	374	HIS
1	Cc	374	HIS

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Mol	Chain	Res	Type
1	Cd	374	HIS
1	Cf	365	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 monosaccharides 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.

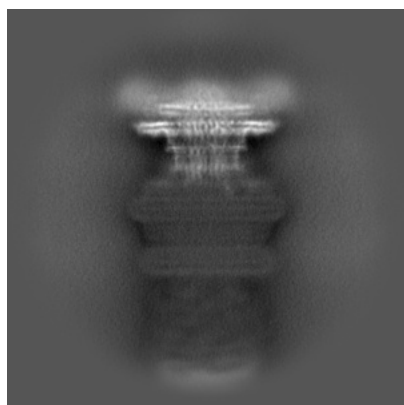
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31007. These allow visual inspection of the internal detail of the map and identification of artifacts.

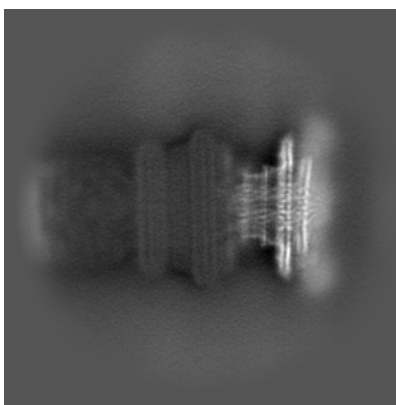
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

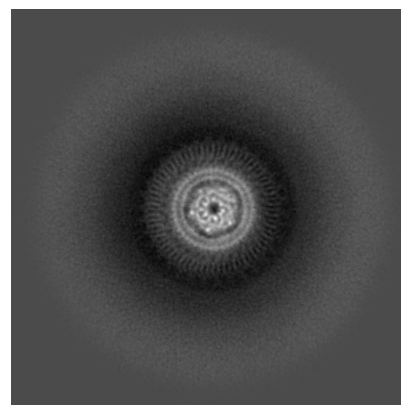
6.1.1 Primary map



X



Y

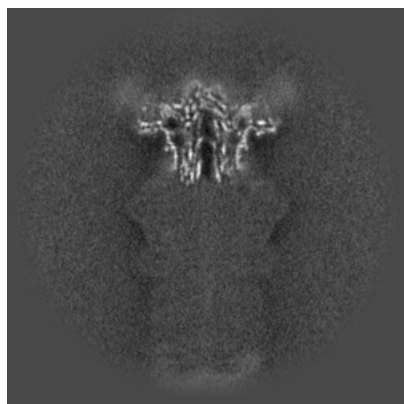


Z

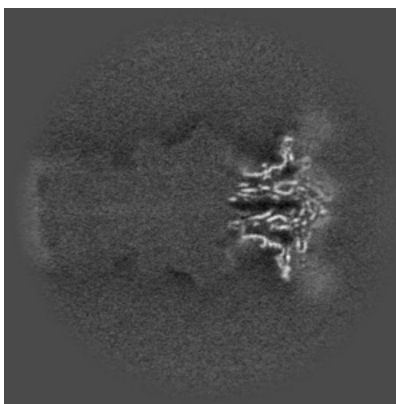
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

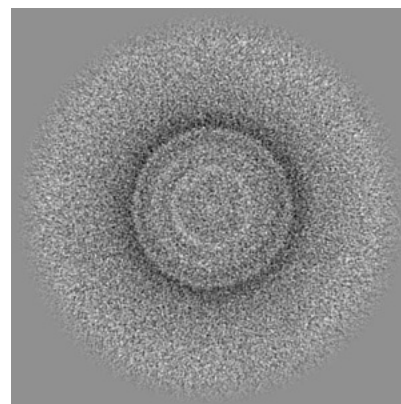
6.2.1 Primary map



X Index: 256



Y Index: 256

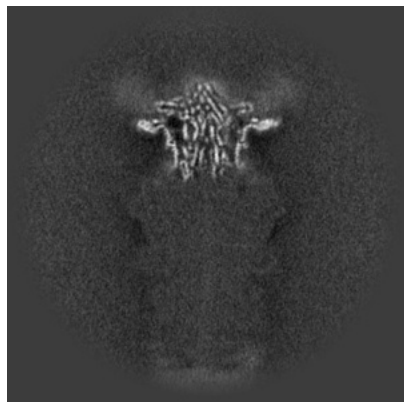


Z Index: 256

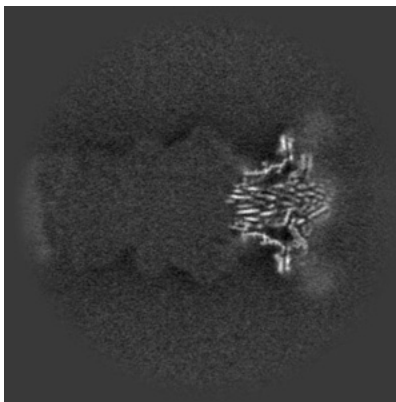
The images above show central slices of the map in three orthogonal directions.

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

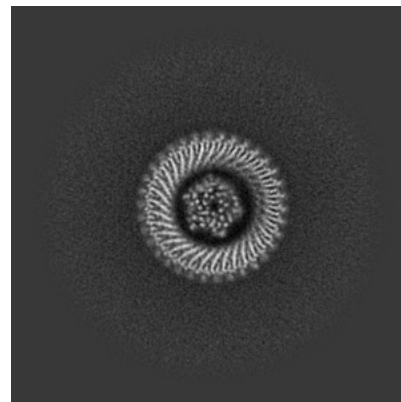
6.3.1 Primary map



X Index: 251



Y Index: 247

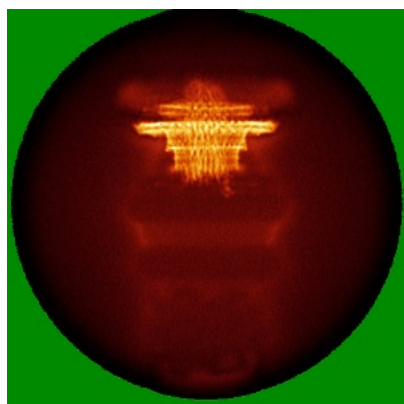


Z Index: 364

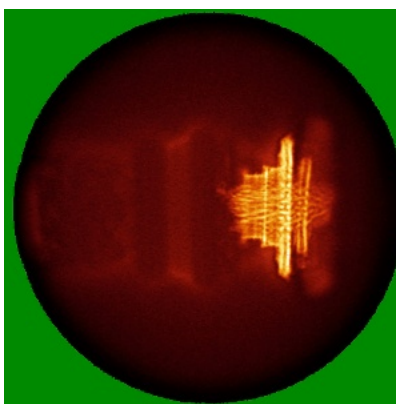
The images above show the largest variance slices of the map in three orthogonal directions.

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

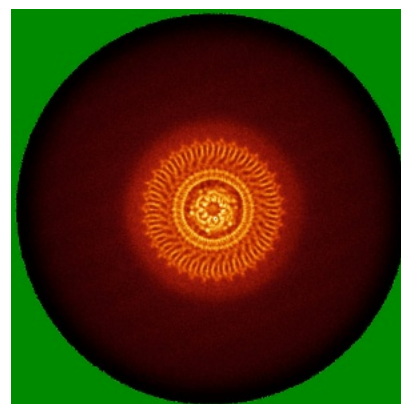
6.4.1 Primary map



X



Y

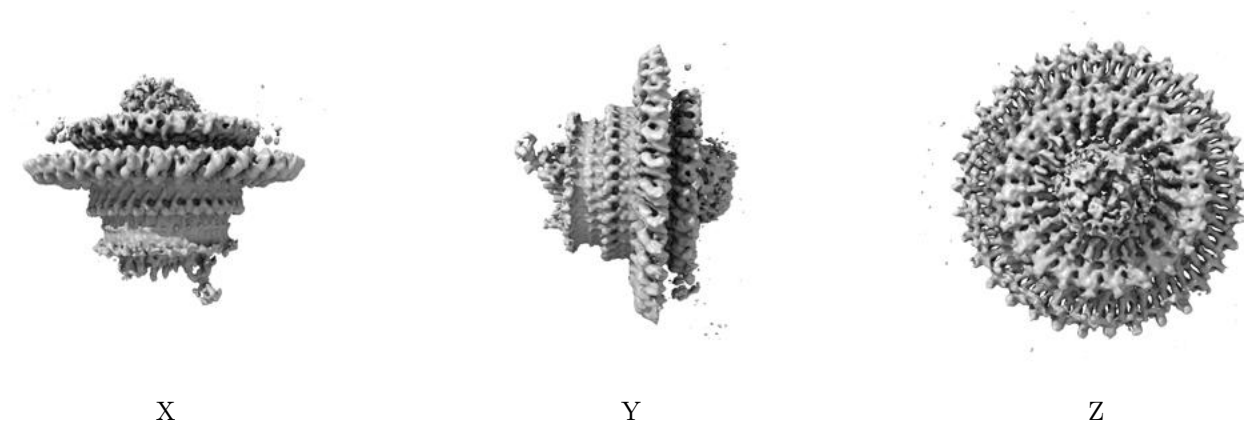


Z

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 0.238. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

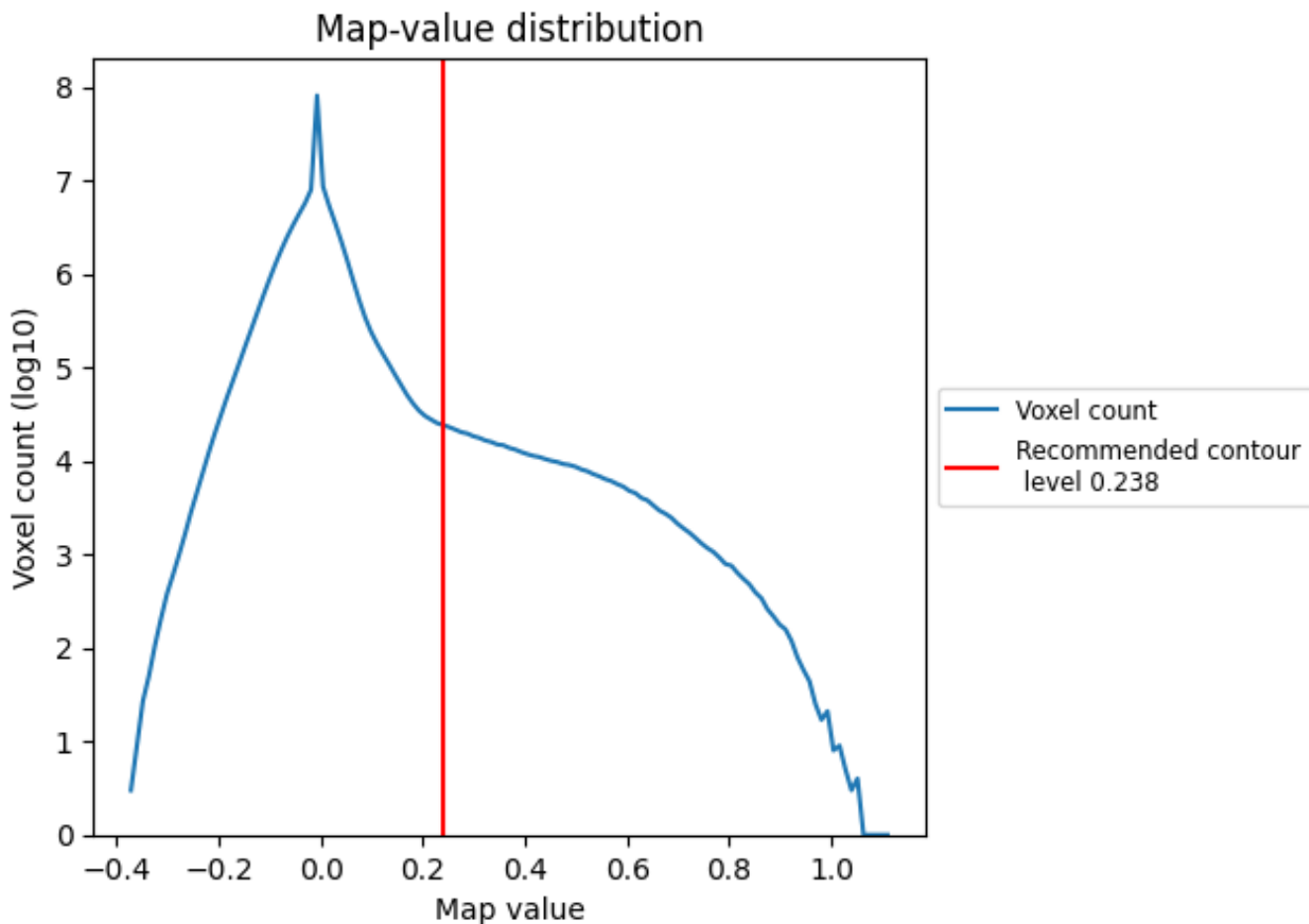
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

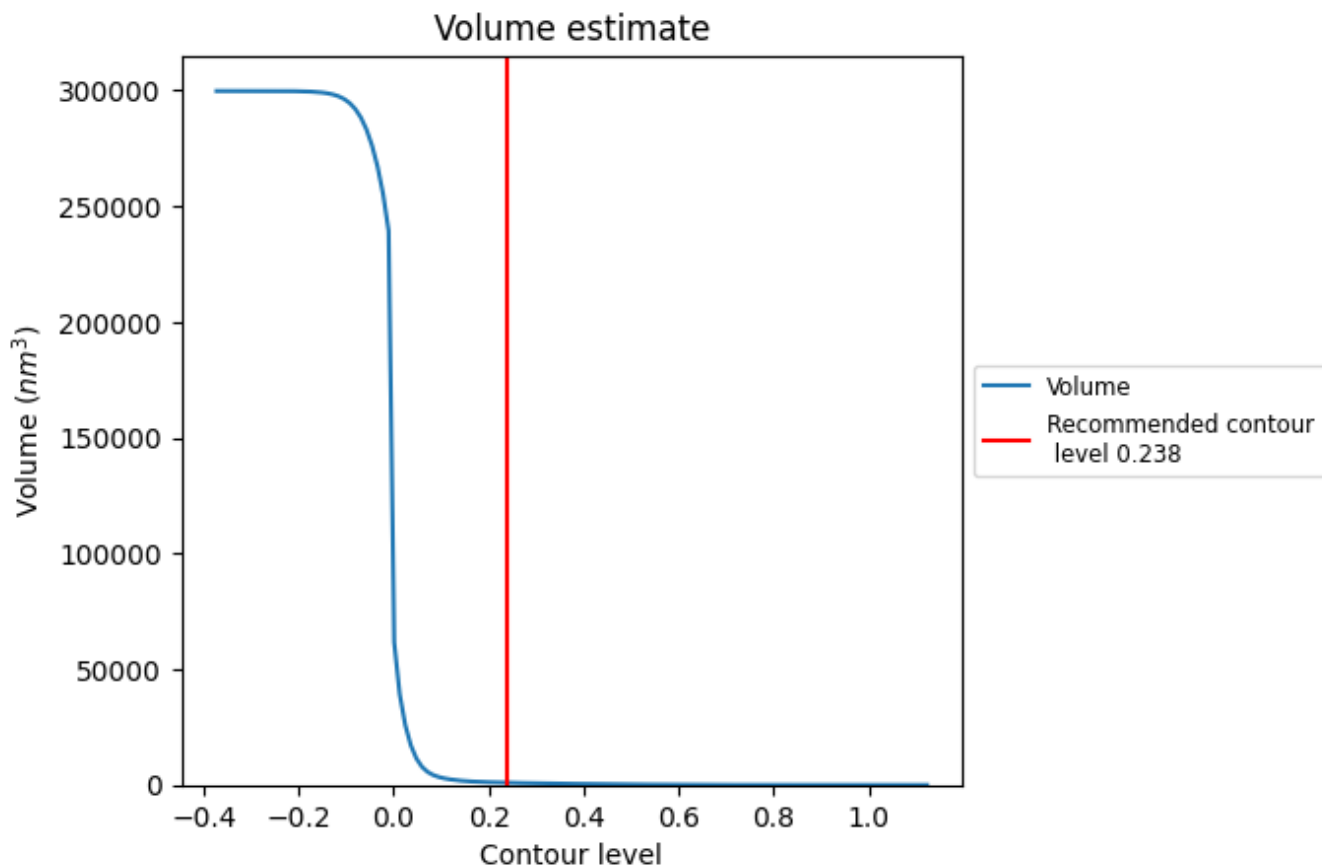
This section contains the results of statistical analysis of the map.

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.

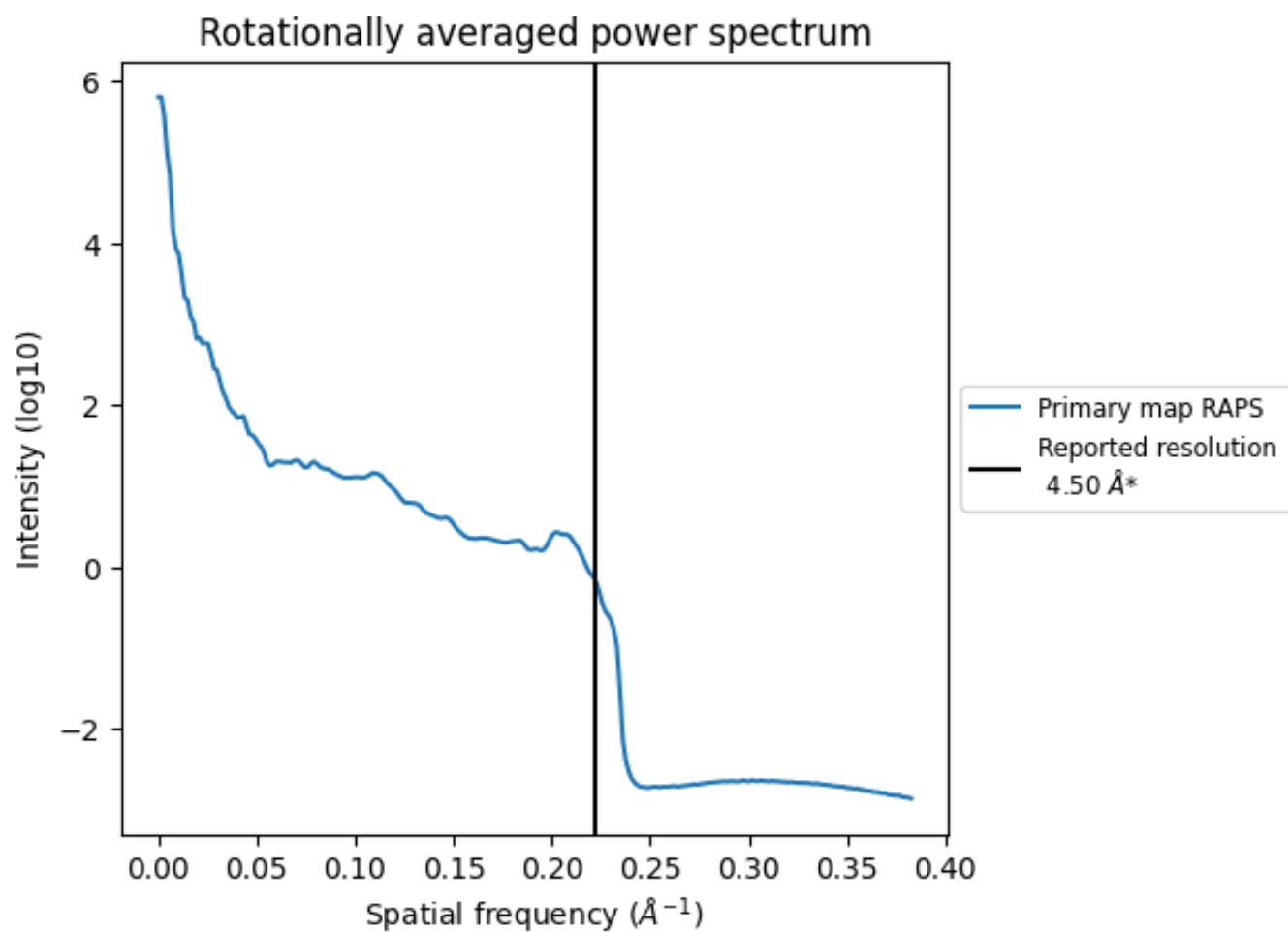
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 982 nm³; this corresponds to an approximate mass of 887 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum [i](#)



*Reported resolution corresponds to spatial frequency of 0.222\AA^{-1}

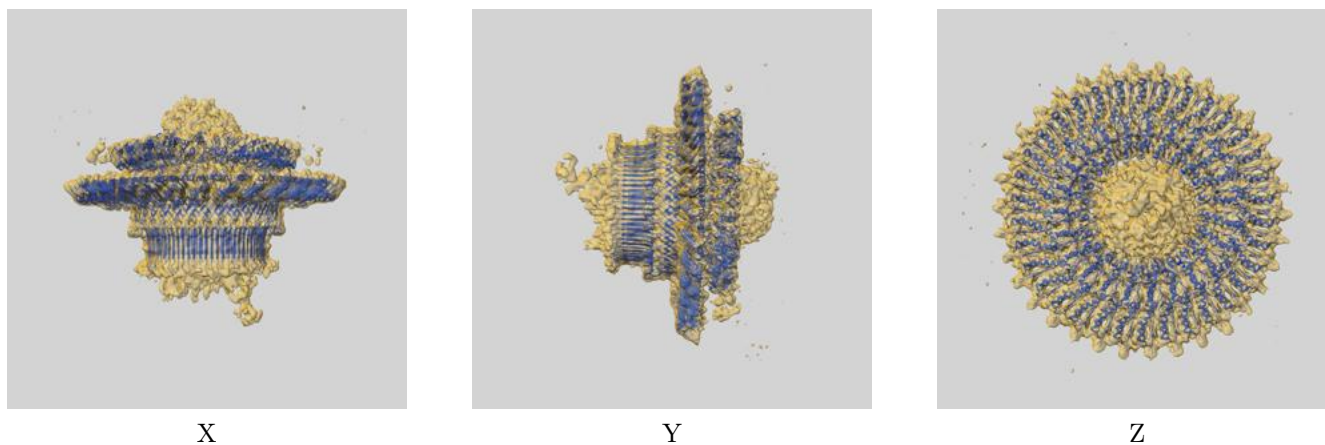
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

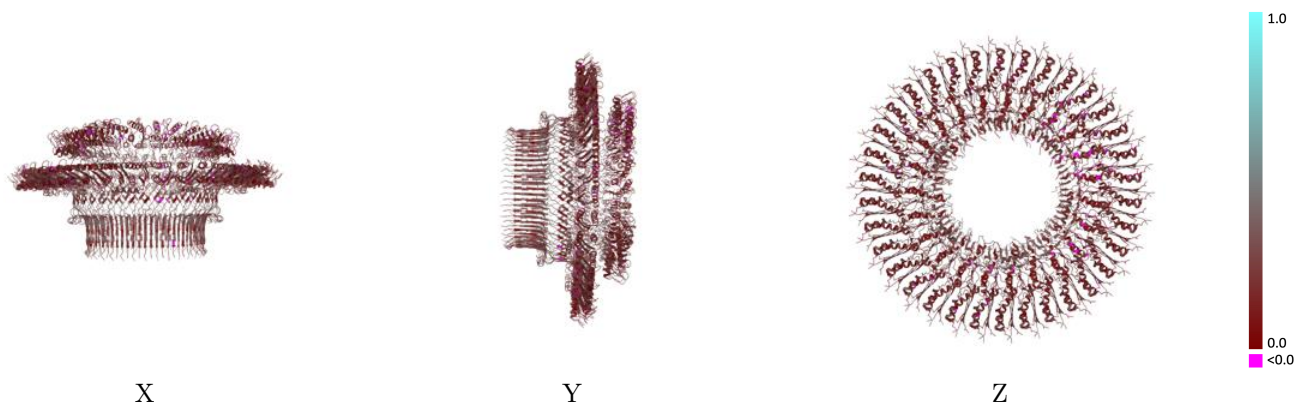
This section contains information regarding the fit between EMDB map EMD-31007 and PDB model 7E81. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay [i](#)



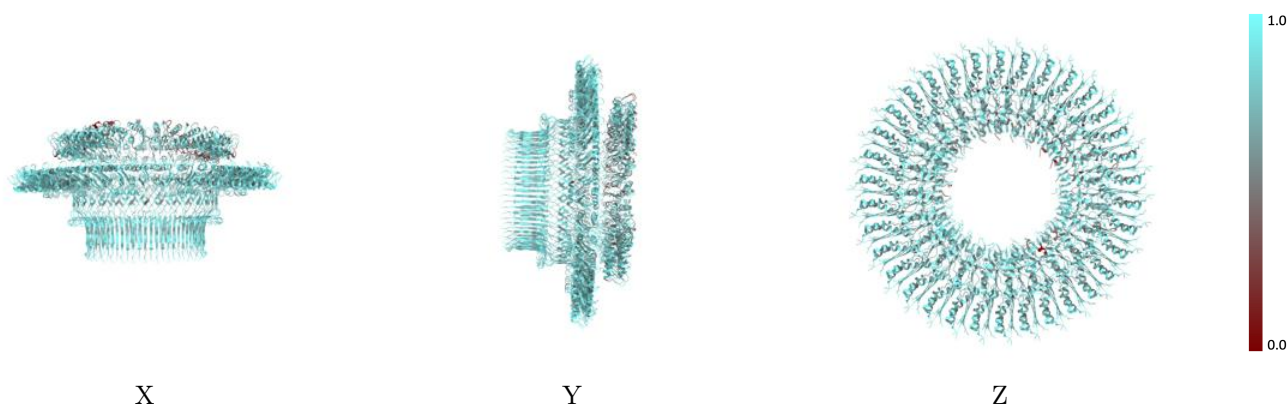
The images above show the 3D surface view of the map at the recommended contour level 0.238 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



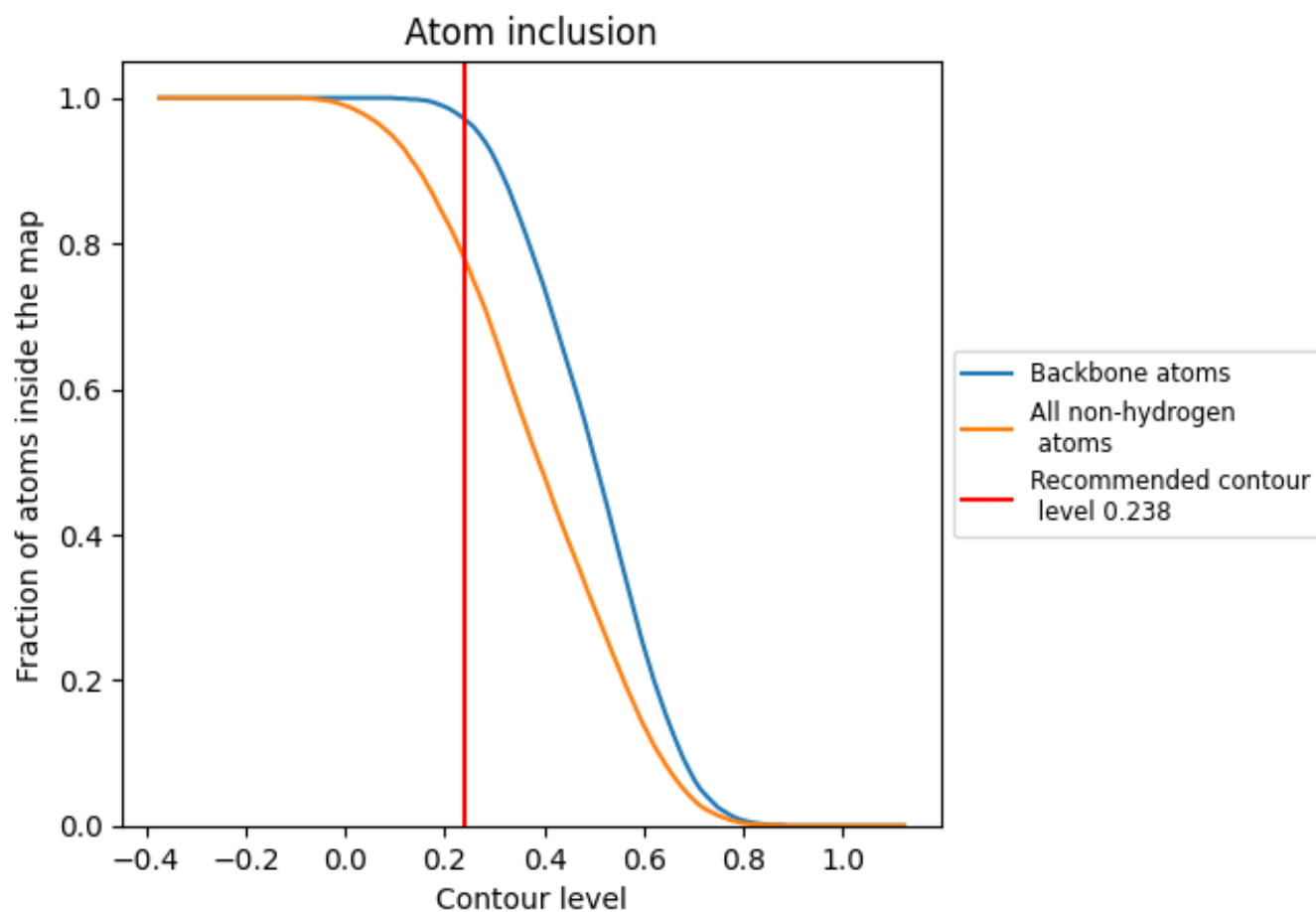
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.238).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 97% 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 (0.238) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7820	 0.2350
Ca	 0.8060	 0.2360
Cb	 0.8030	 0.2450
Cc	 0.8070	 0.2380
Cd	 0.8160	 0.2420
Ce	 0.8070	 0.2310
Cf	 0.8040	 0.2370
Ch	 0.8070	 0.2360
Ci	 0.8030	 0.2450
Cj	 0.8040	 0.2490
Ck	 0.8000	 0.2470
Cl	 0.7980	 0.2440
Cm	 0.7960	 0.2500
Cn	 0.7920	 0.2400
Co	 0.8070	 0.2450
Cp	 0.7880	 0.2390
Cq	 0.7930	 0.2240
Cr	 0.8020	 0.2320
Cs	 0.7890	 0.2310
Ct	 0.8070	 0.2370
Cu	 0.8070	 0.2390
Cv	 0.8120	 0.2440
Cw	 0.8070	 0.2480
Cx	 0.8070	 0.2460
Cy	 0.8030	 0.2410
Cz	 0.8190	 0.2530
Da	 0.7650	 0.2190
Db	 0.7680	 0.2250
Dc	 0.7460	 0.2260
Dd	 0.7100	 0.2090
De	 0.7020	 0.2110
Df	 0.7270	 0.1850
Dg	 0.7330	 0.1780
Dh	 0.6880	 0.1570
Di	 0.6320	 0.1730



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Chain	Atom inclusion	Q-score
Dj	 0.6230	 0.1630
Dk	 0.6500	 0.1750
Dl	 0.6310	 0.1630
Dm	 0.6130	 0.1790
Dn	 0.6720	 0.1880
Do	 0.6890	 0.2070
Dp	 0.7450	 0.2260
Dq	 0.7570	 0.2460
Dr	 0.7450	 0.2330
Ds	 0.7560	 0.2490
Dt	 0.7900	 0.2440
Du	 0.7790	 0.2500
Dv	 0.7690	 0.2300
Dw	 0.7800	 0.2340
Ea	 0.8190	 0.2600
Eb	 0.8140	 0.2520
Ec	 0.8110	 0.2520
Ed	 0.8100	 0.2520
Ee	 0.8000	 0.2590
Ef	 0.8170	 0.2570
Eg	 0.8020	 0.2540
Fh	 0.8030	 0.2460
GA	 0.9090	 0.4060
GB	 0.9200	 0.4010
GC	 0.8910	 0.3930
GD	 0.8800	 0.3640
GE	 0.9330	 0.4570
GF	 0.8670	 0.3010
GG	 0.8780	 0.3500
GH	 0.8560	 0.3180
GI	 0.7470	 0.2920
GJ	 0.9330	 0.2640
GK	 0.8560	 0.3030
cg	 0.8020	 0.2340