



wwPDB EM Validation Summary Report ⓘ

Oct 28, 2024 – 07:00 pm GMT

PDB ID : 9GO9
EMDB ID : EMD-51494
Title : Prepore state of alpha-Latrotoxin
Authors : Klink, B.U.; Gatsogiannis, C.; Kalyankumar, K.S.
Deposited on : 2024-09-05
Resolution : 2.70 Å(reported)
Based on initial model : .

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:

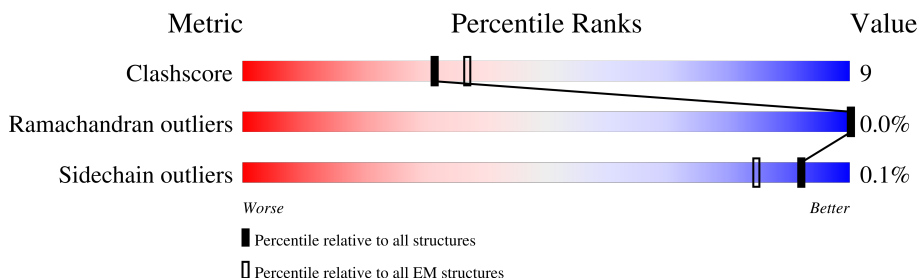
EMDB validation analysis : 0.0.1.dev113
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.70 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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1401	<div style="display: flex; align-items: center;"> <div style="width: 20%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 67%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 17%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: grey;"></div> </div>
1	B	1401	<div style="display: flex; align-items: center;"> <div style="width: 10%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 65%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: grey;"></div> </div>
1	C	1401	<div style="display: flex; align-items: center;"> <div style="width: 14%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 67%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 17%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: grey;"></div> </div>
1	D	1401	<div style="display: flex; align-items: center;"> <div style="width: 11%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 64%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: grey;"></div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 36972 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.

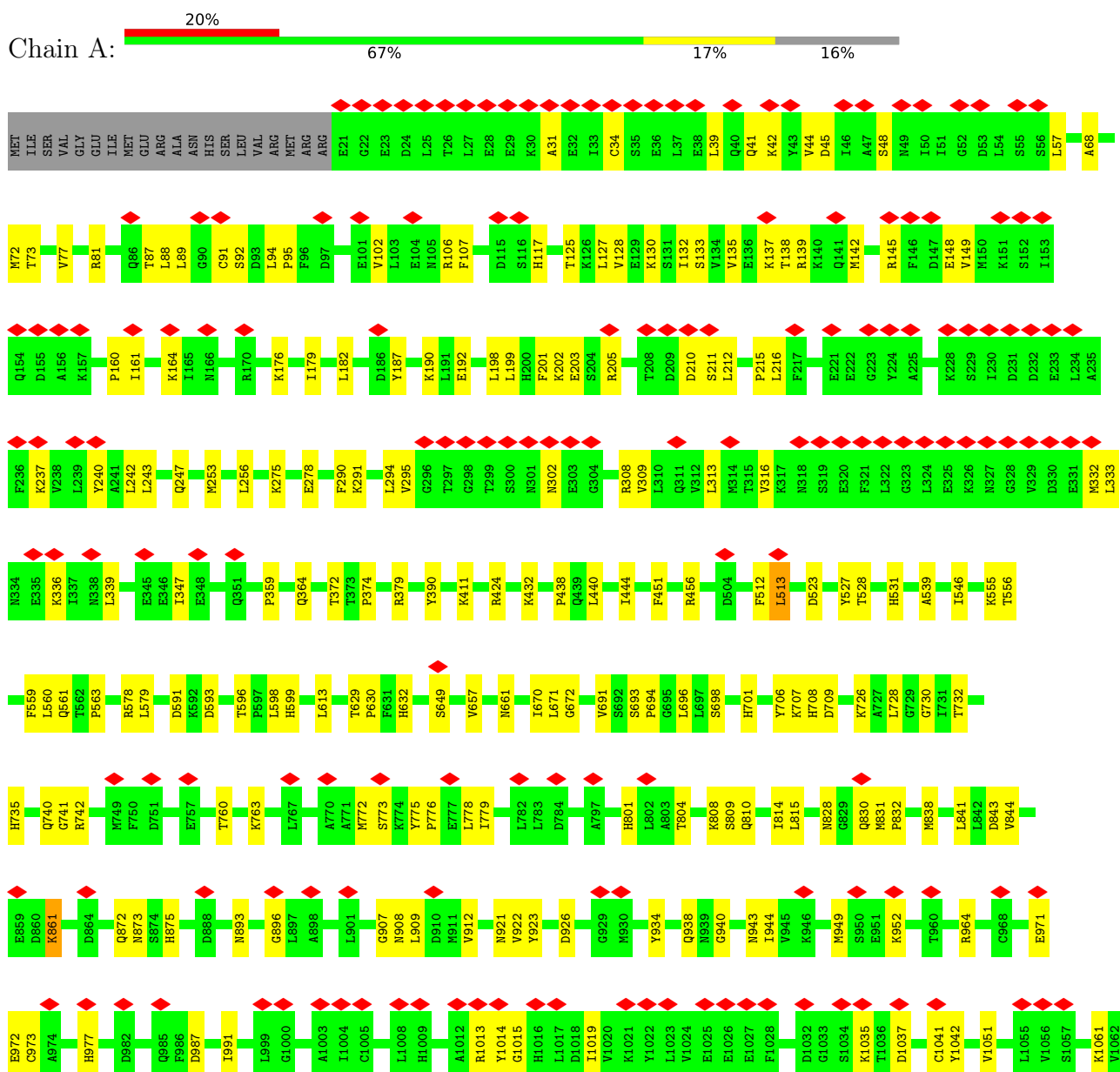
- Molecule 1 is a protein called Alpha-latrotoxin-Lt1a.

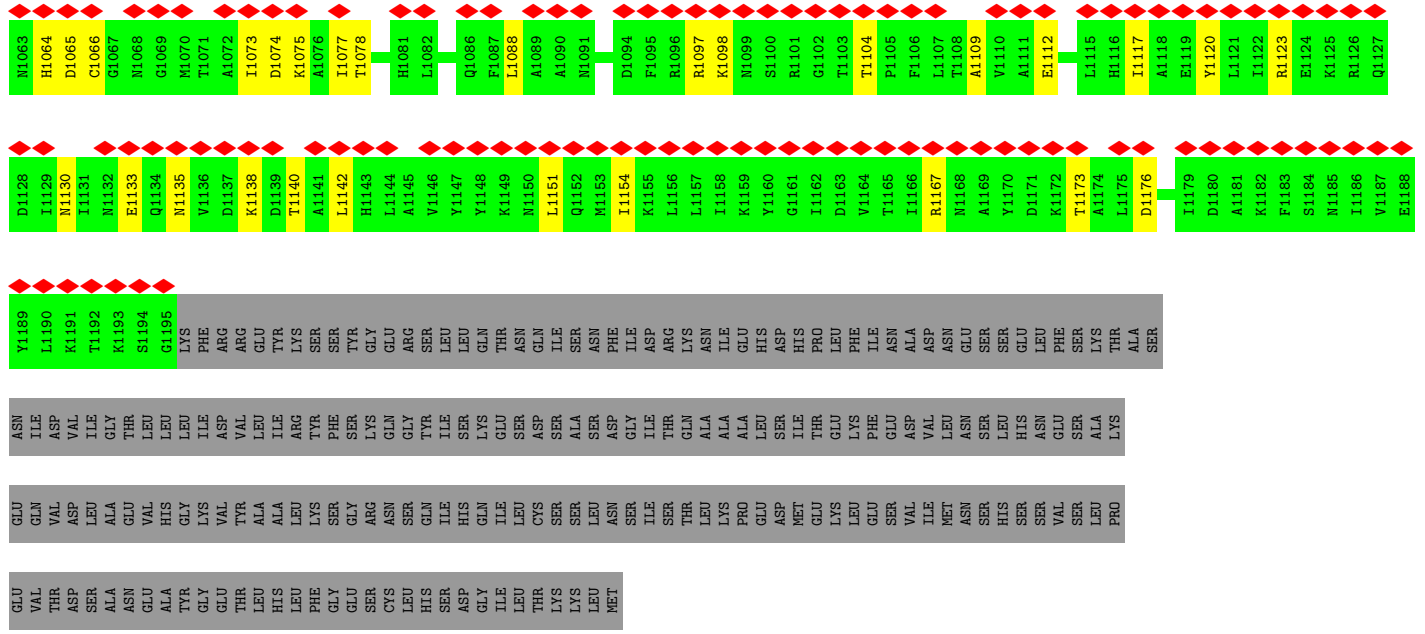
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1175	Total 9243	C 5869	N 1570	O 1775	S 29	0	0
1	B	1175	Total 9243	C 5869	N 1570	O 1775	S 29	0	0
1	C	1175	Total 9243	C 5869	N 1570	O 1775	S 29	0	0
1	D	1175	Total 9243	C 5869	N 1570	O 1775	S 29	0	0

3 Residue-property plots

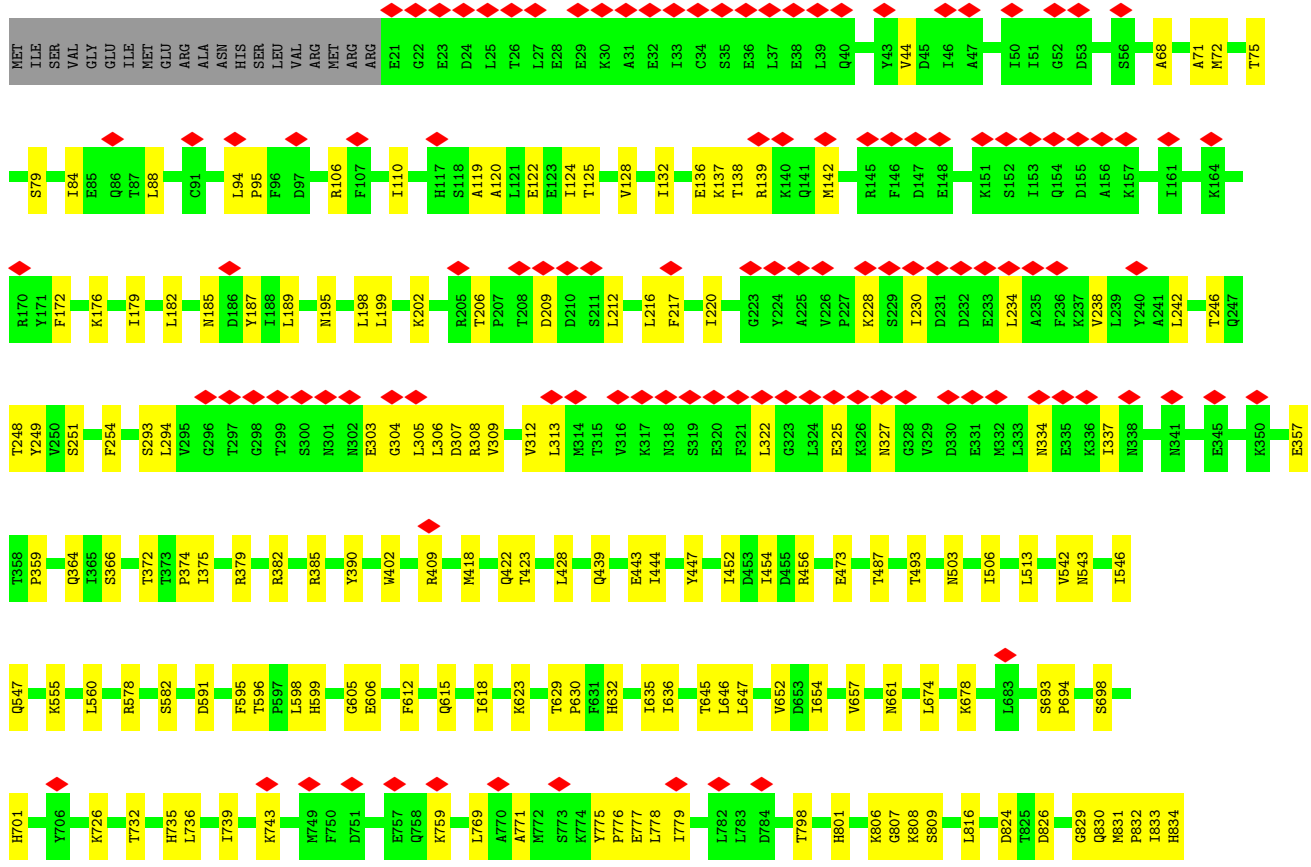
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

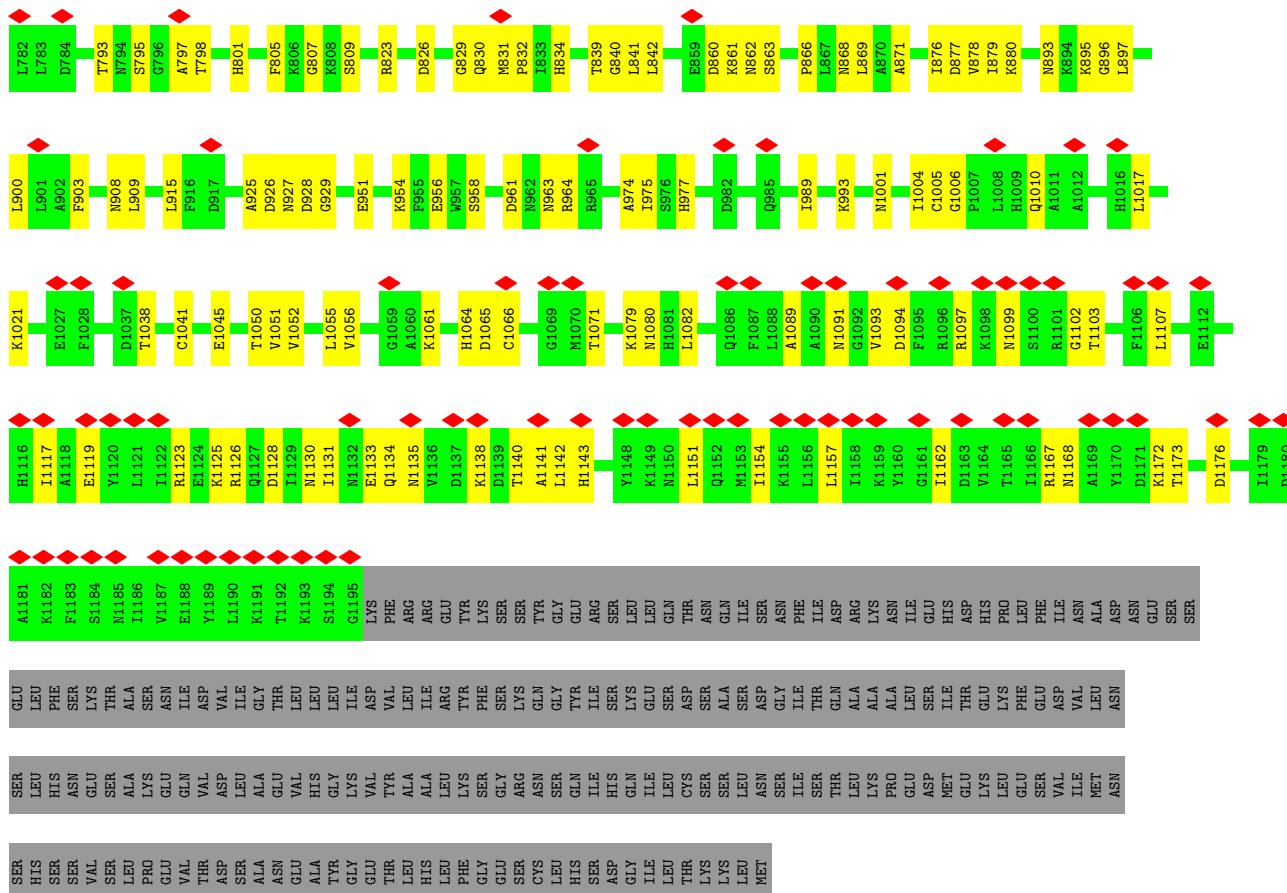
- Molecule 1: Alpha-latrotoxin-Lt1a



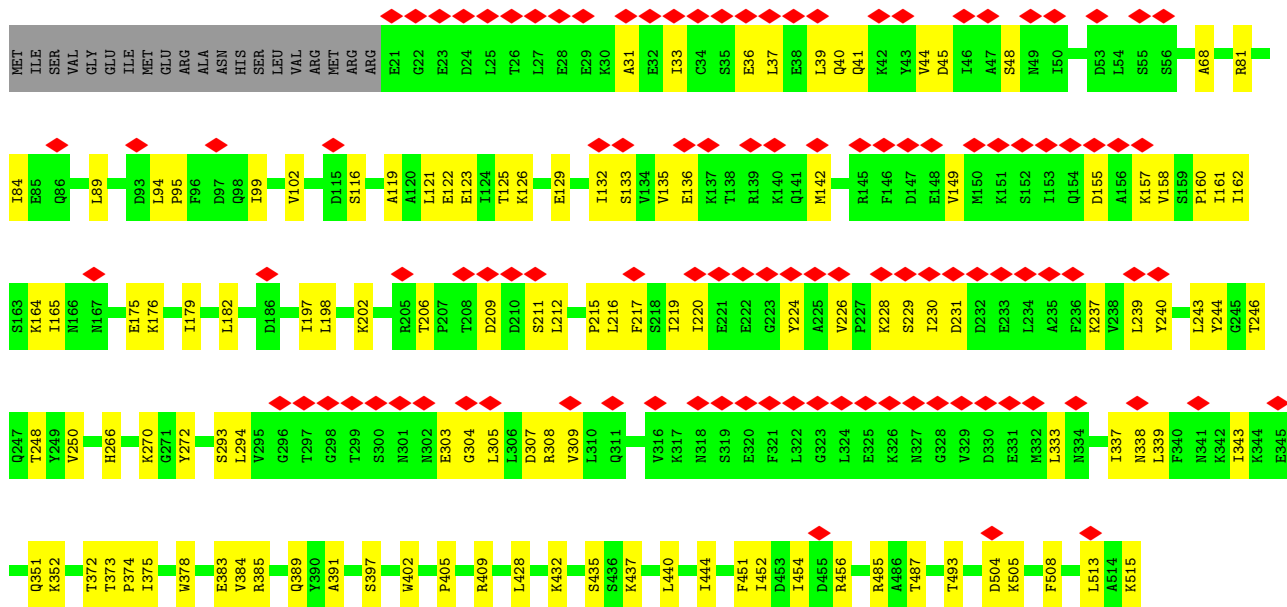


• Molecule 1: Alpha-latrotoxin-Lt1a





• Molecule 1: Alpha-latrotoxin-Lt1a



ILE	MET	VAL	GLU	I1177	I1077	V937	L802	S693	H531
LEU	ASN	LEU	SER	A1178	T1078	N943	D824	L700	D535
SER	ASN	SER	GLU	I1179	K1079	I944	T825	L704	V542
HIS	HIS	LEU	LEU	D1180	V1085	F955	N828	I705	N543
SER	ASN	LEU	PHE	A1181	A1089	E956	Q829	L706	N544
SER	ASN	LEU	SER	K1182	A1090	W957	Q830	Y706	L545
VAL	VAL	SER	THR	F1183	A1090	T960	M831	K707	I546
SER	LEU	ALA	ALA	S1184	K1098	D966	P832	F714	Q547
LEU	PRO	GLU	SER	I1186	N1099	M837	A837	K726	K555
GLU	GLU	GLU	ASN	I1189	S1100	E967	M838	A727	F559
VAL	THR	VAL	ASP	Y1189	I1101	T839	G840	L728	L560
ASP	ASP	VAL	VAL	L1190	G1102	G840	G840	G729	L561
SER	SER	LEU	ILE	K1191	A974	A974	D843	G730	Q561
SER	SER	ALA	GLY	T1192	T1103	T975	V844	G731	T562
ASN	ASN	GLU	THR	T1192	T1104	S976	D844	I731	P563
GLU	GLU	VAL	LEU	K1193	L1107	H977	D857	T732	P601
ALA	ALA	HIS	LEU	S1194	T1108	A1109	D860	L734	R570
ALA	TYR	GLY	LEU	G1195	A1109	A983	H735	H735	R578
GLY	GLY	VAL	ILE	LYS	A1114	V984	D864	G741	T596
THR	THR	VAL	VAL	ARG	L1115	Q984	T865	R742	F587
LEU	LEU	ALA	VAL	ARG	H1116	F986	N868	L746	L598
HIS	LEU	ALA	ILE	GLU	I1117	D987	M869	M749	H599
LEU	LEU	ALA	ILE	TYR	A1118	R988	A870	F750	Y600
PHE	GLY	LEU	ARG	TYR	E1119	I989	N873	D751	A601
GLY	GLY	SER	PHE	SER	Y1120	E990	V878	Q758	G604
GLU	GLU	GLY	SER	SER	Q1127	V992	N890	E757	G605
SER	ARG	ASN	LYS	TYR	D1128	I1129	T891	Q758	E606
CYS	ASN	GLN	GLN	GLY	N1130	M1130	K759	K759	R607
LEU	LEU	GLN	LYS	LEU	E1133	Q1134	E762	E762	I608
HIS	HIS	GLN	LYS	LEU	M1135	M1135	K763	K763	E610
SER	SER	ILE	ILE	LEU	D1139	D1139	H768	H768	A611
ASP	ASP	HIS	ILE	LEU	L1142	L1142	L769	L769	L609
GLY	GLY	GLN	ILE	LEU	Y1148	Y1148	A770	A770	E611
ILE	ILE	LEU	ILE	LEU	K1149	K1149	A771	A771	F612
LEU	LEU	THR	THR	THR	I1154	I1154	S773	S773	T629
LEU	LEU	GLN	THR	THR	K1155	K1155	P776	P776	P630
LEU	LEU	ALA	ALA	ALA	L1156	L1156	E777	E777	H631
LYS	LYS	ALA	ALA	ALA	L1157	L1157	L778	L778	H632
LYS	LYS	LEU	LEU	LEU	I1158	I1158	I779	I779	I635
THR	THR	ASP	ASP	ASP	K1159	K1159	G786	G786	I636
LEU	LEU	THR	THR	THR	I1166	I1166	A791	A791	L647
LEU	LEU	GLY	GLY	GLY	R1167	R1167	L794	L794	I654
LEU	LEU	LYS	LYS	LYS	G1066	G1066	P799	P799	V657
GLU	GLU	LEU	LEU	LEU	G1069	G1069	L800	L800	N661
VAL	VAL	VAL	ASP	ASP	A1072	A1072	H801	H801	A664
ASP	ASP	ASP	ASP	ASP	K1075	K1075			K678
					A1076	A1076			
					D1171	D1171			
					K1172	K1172			
					T1173	T1173			
					D1176	D1176			

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	442105	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	300	Depositor
Maximum defocus (nm)	1700	Depositor
Magnification	215000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	56.783	Depositor
Minimum map value	-38.633	Depositor
Average map value	-0.090	Depositor
Map value standard deviation	1.272	Depositor
Recommended contour level	4.2	Depositor
Map size (Å)	324.8, 324.8, 324.8	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.16, 1.16, 1.16	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.24	0/9413	0.46	1/12743 (0.0%)
1	B	0.24	0/9413	0.47	0/12743
1	C	0.24	0/9413	0.45	1/12743 (0.0%)
1	D	0.24	0/9413	0.47	0/12743
All	All	0.24	0/37652	0.46	2/50972 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	513	LEU	CA-CB-CG	5.83	128.71	115.30
1	C	766	PRO	CA-N-CD	-5.55	103.73	111.50

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	9243	0	9185	141	0
1	B	9243	0	9185	165	0
1	C	9243	0	9185	156	0
1	D	9243	0	9185	173	0
All	All	36972	0	36740	629	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 9.

The worst 5 of 629 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)
1:B:629:THR:HG1	1:B:632:HIS:HD1	1.25	0.82
1:A:559:PHE:HB3	1:A:561:GLN:HE22	1.44	0.82
1:A:741:GLY:HA2	1:A:778:LEU:HD11	1.62	0.81
1:A:1061:LYS:HD3	1:A:1064:HIS:HB3	1.64	0.80
1:B:806:LYS:HE3	1:B:808:LYS:HB2	1.62	0.80

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	1173/1401 (84%)	1133 (97%)	40 (3%)	0	100	100
1	B	1173/1401 (84%)	1128 (96%)	45 (4%)	0	100	100
1	C	1173/1401 (84%)	1128 (96%)	45 (4%)	0	100	100
1	D	1173/1401 (84%)	1121 (96%)	51 (4%)	1 (0%)	48	73
All	All	4692/5604 (84%)	4510 (96%)	181 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	230	ILE

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	A	1006/1218 (83%)	1004 (100%)	2 (0%)	92	98
1	B	1006/1218 (83%)	1006 (100%)	0	100	100
1	C	1006/1218 (83%)	1004 (100%)	2 (0%)	92	98
1	D	1006/1218 (83%)	1004 (100%)	2 (0%)	92	98
All	All	4024/4872 (83%)	4018 (100%)	6 (0%)	92	98

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	861	LYS
1	D	1098	LYS
1	D	1167	ARG
1	A	861	LYS
1	A	364	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	661	ASN
1	D	531	HIS
1	C	1010	GLN
1	C	872	GLN
1	C	1099	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

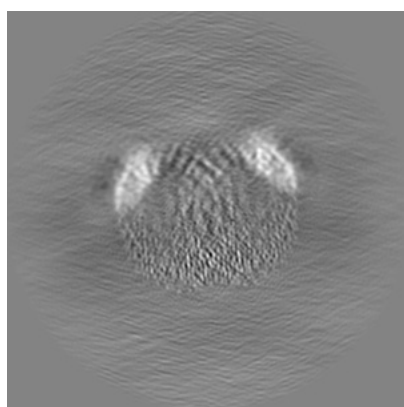
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-51494. These allow visual inspection of the internal detail of the map and identification of artifacts.

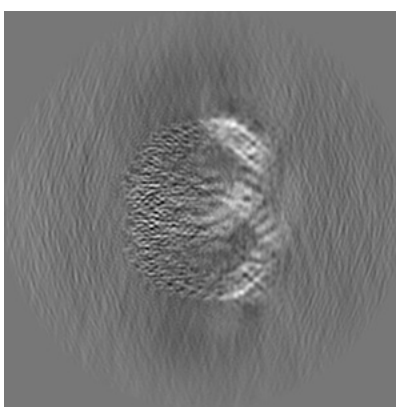
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

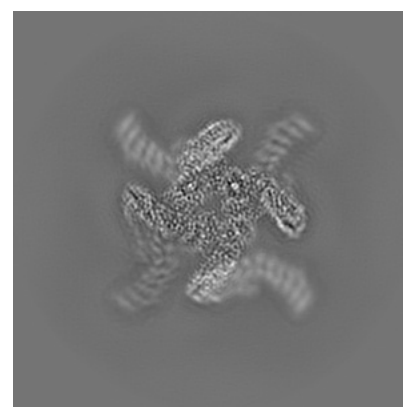
6.1.1 Primary map



X



Y

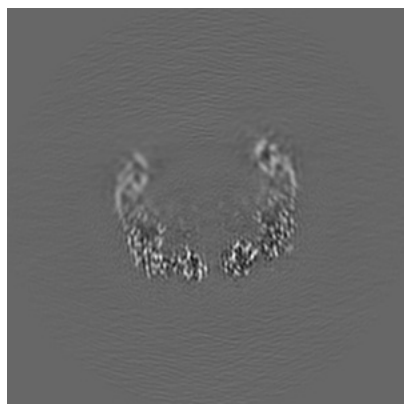


Z

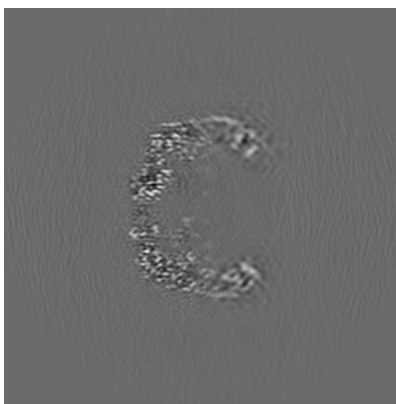
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

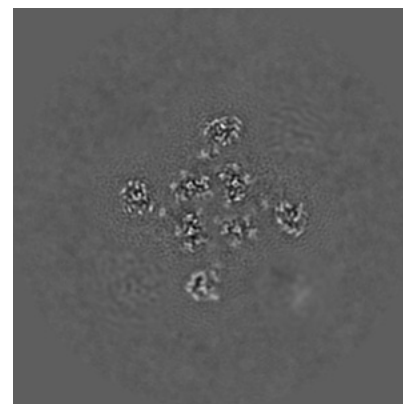
6.2.1 Primary map



X Index: 140



Y Index: 140

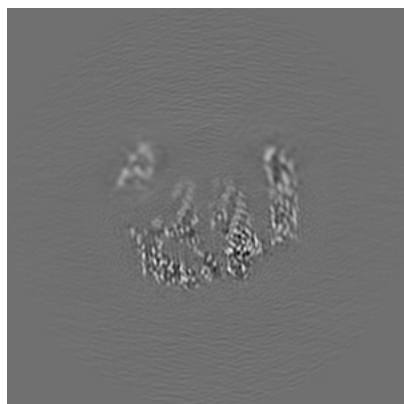


Z Index: 140

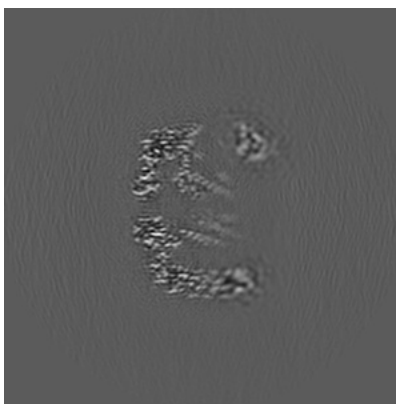
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

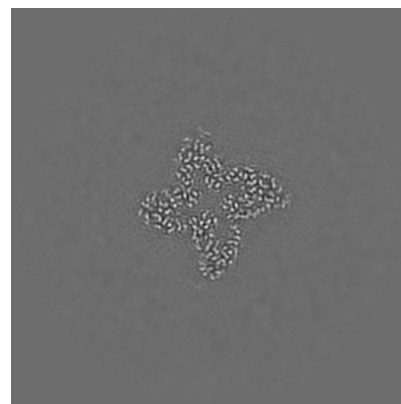
6.3.1 Primary map



X Index: 148



Y Index: 147

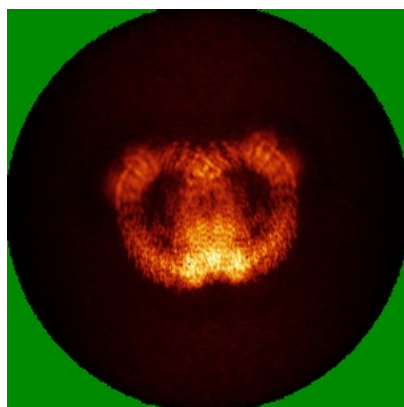


Z Index: 103

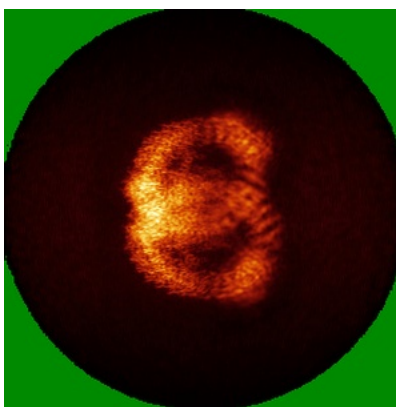
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



X



Y

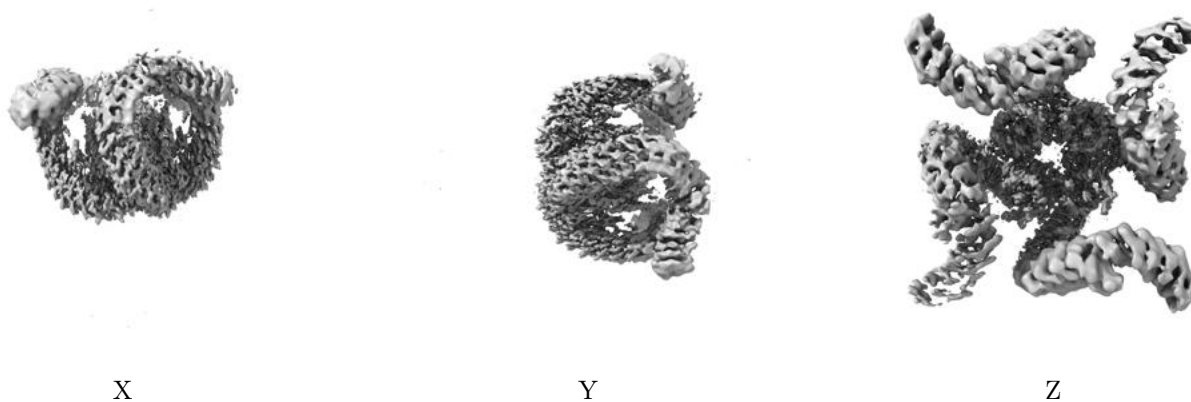


Z

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

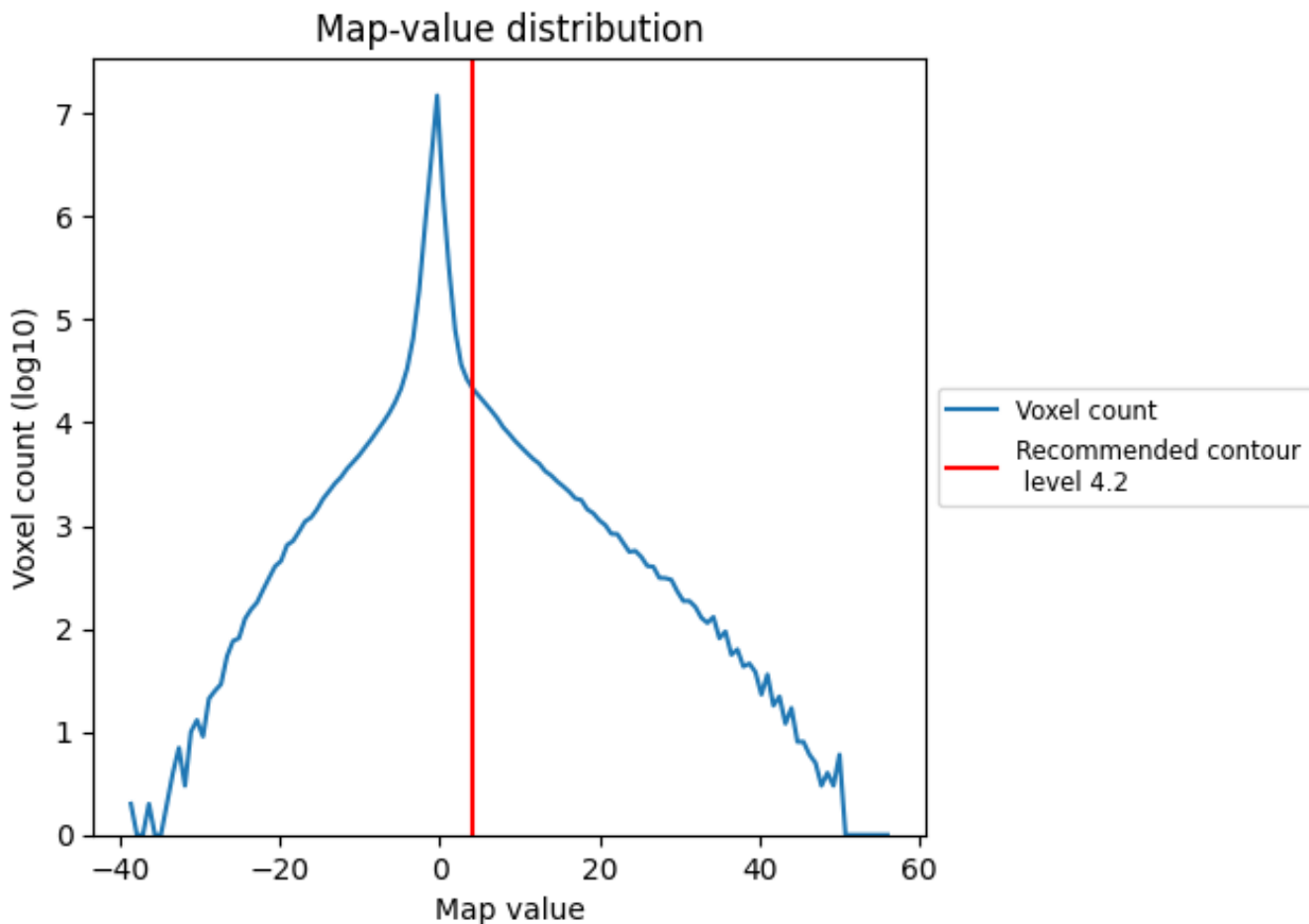
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

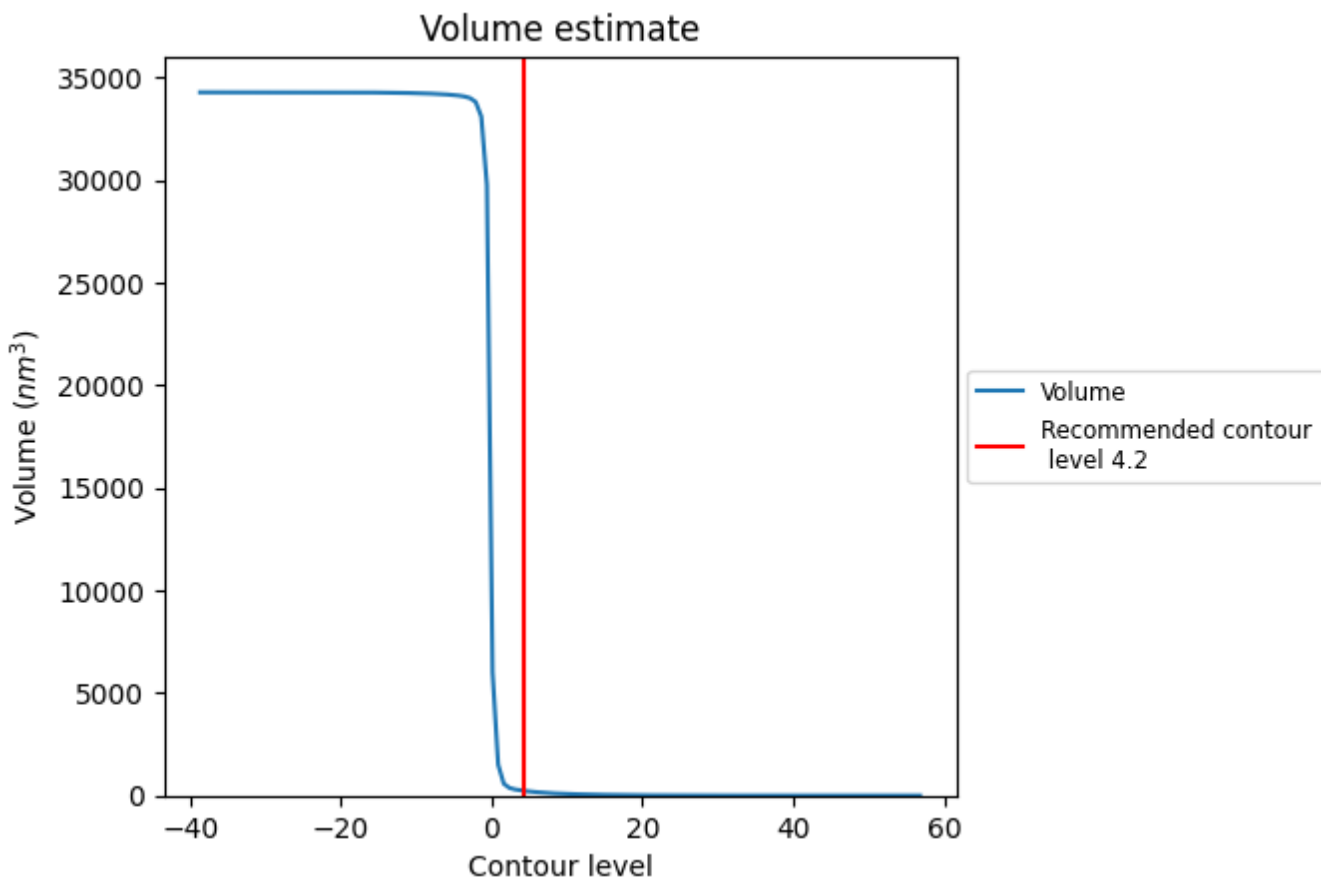
This section contains the results of statistical analysis of the map.

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.

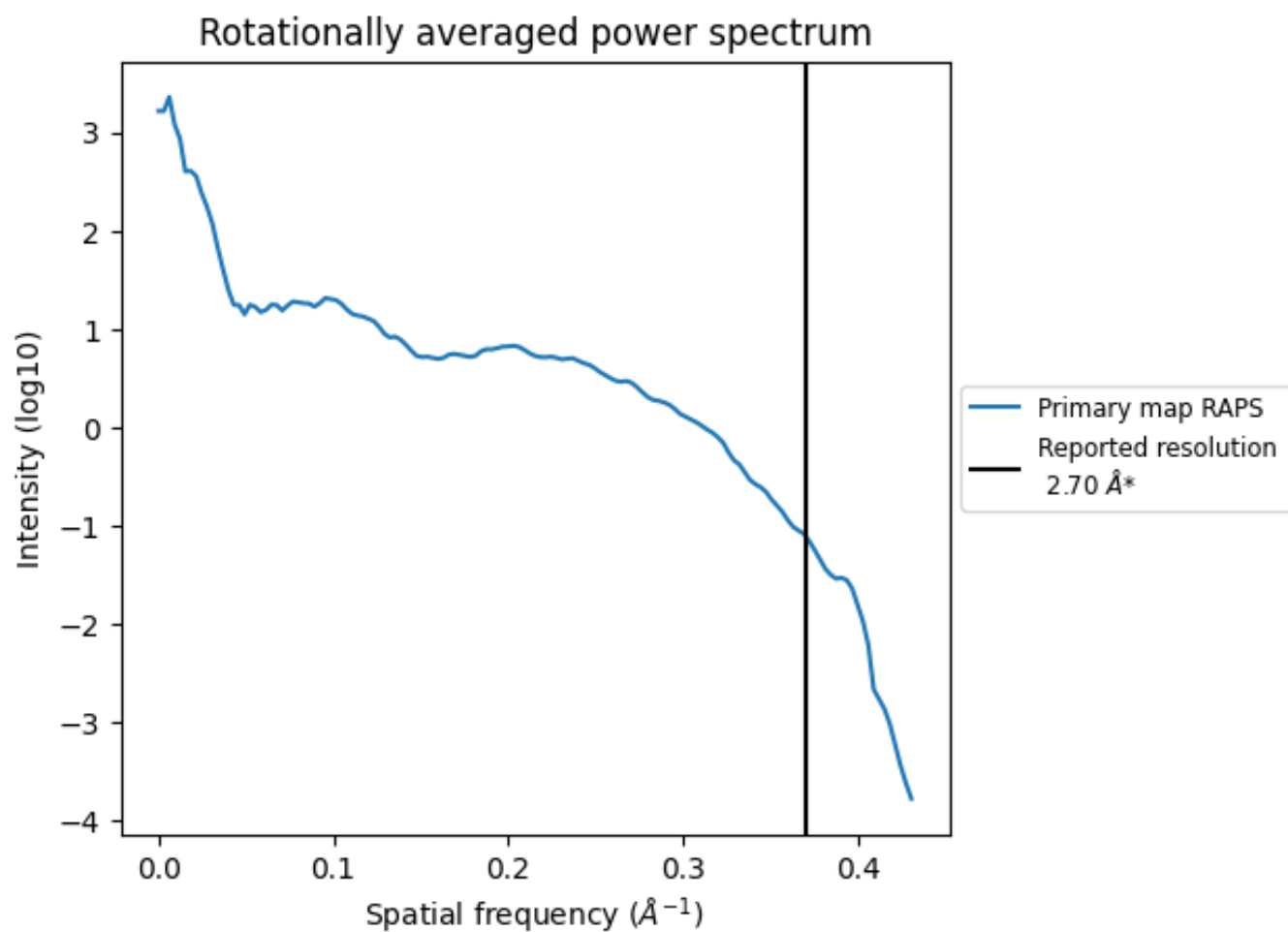
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 237 nm³; this corresponds to an approximate mass of 214 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 0.370 Å⁻¹

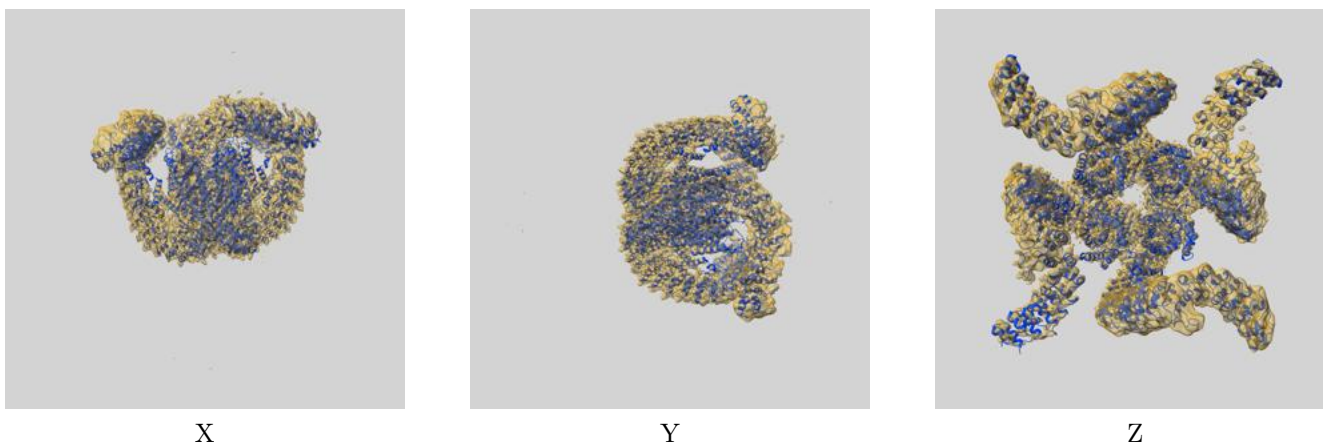
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

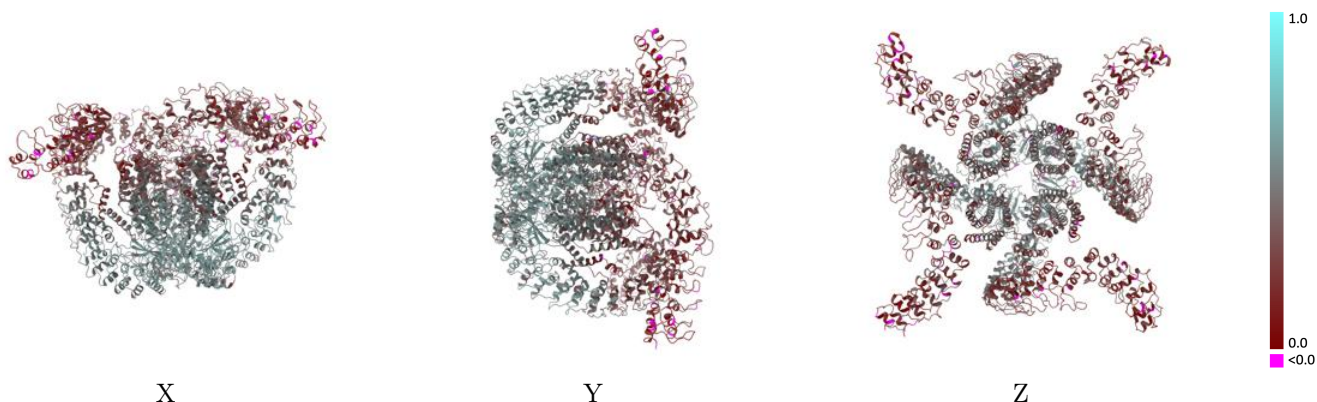
This section contains information regarding the fit between EMDB map EMD-51494 and PDB model 9GO9. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



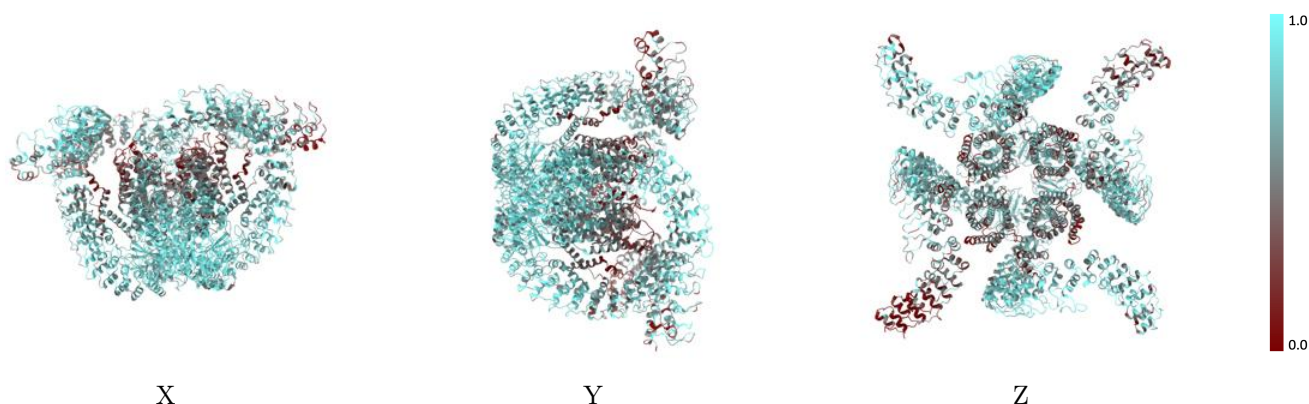
The images above show the 3D surface view of the map at the recommended contour level 4.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



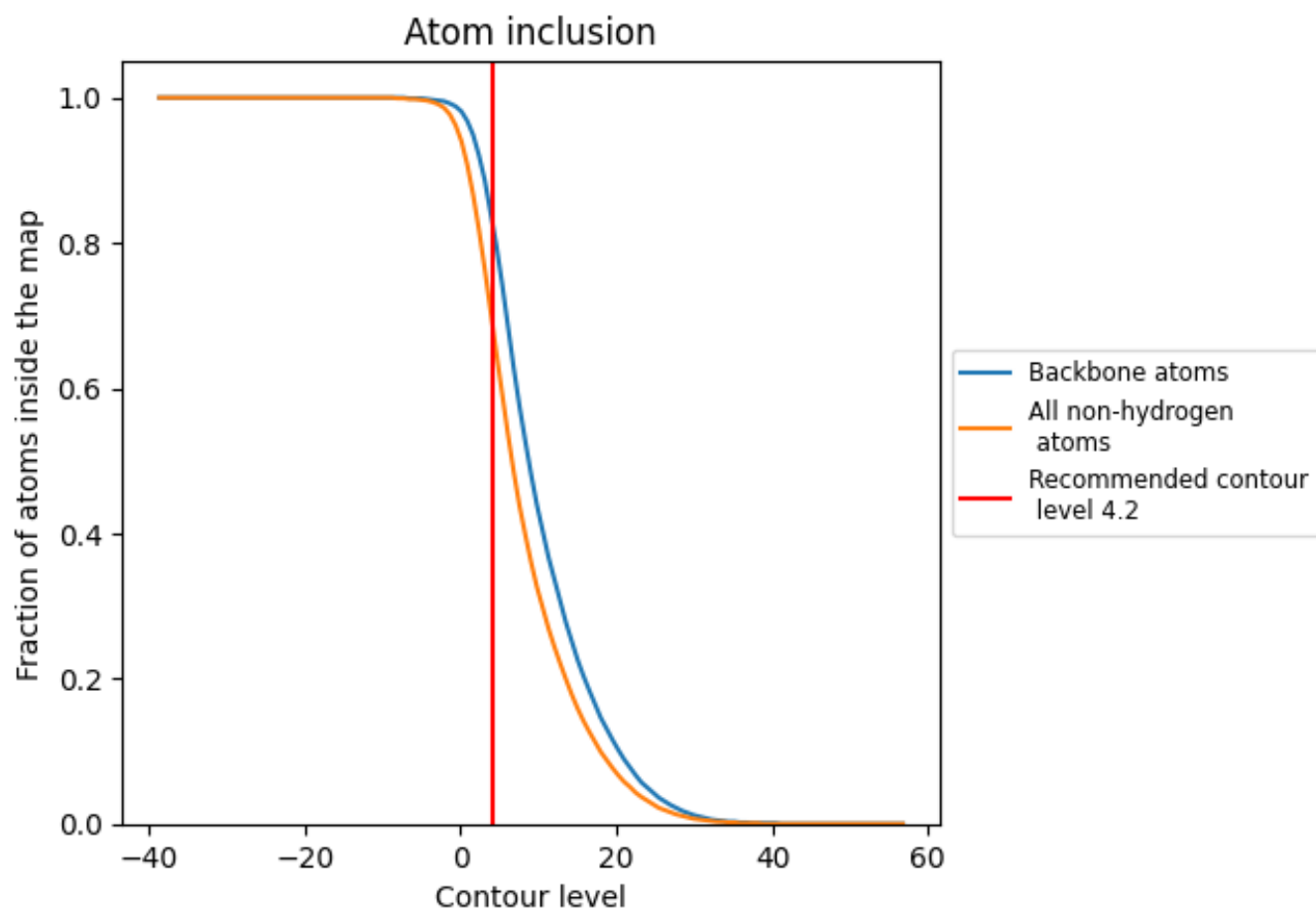
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.2).








9.4 Atom inclusion [i](#)



At the recommended contour level, 82% of all backbone atoms, 68% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (4.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6790	 0.3970
A	 0.6280	 0.4090
B	 0.7090	 0.3760
C	 0.6720	 0.4150
D	 0.7070	 0.3900

