



wwPDB EM Validation Summary Report i

Sep 1, 2025 – 10:43 am BST

PDB ID : 9GLD / pdb_00009gld
EMDB ID : EMD-51439
Title : NONO/SFPQ filament: local refinement central units (strand 2)
Authors : Rasmussen, T.; Bottcher, B.
Deposited on : 2024-08-27
Resolution : 3.30 Å(reported)
Based on initial model : 6WMZ

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 i 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](#) i) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev126
MolProbity : 4-5-2 with Phenix2.0rc1
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) : 2.45.1

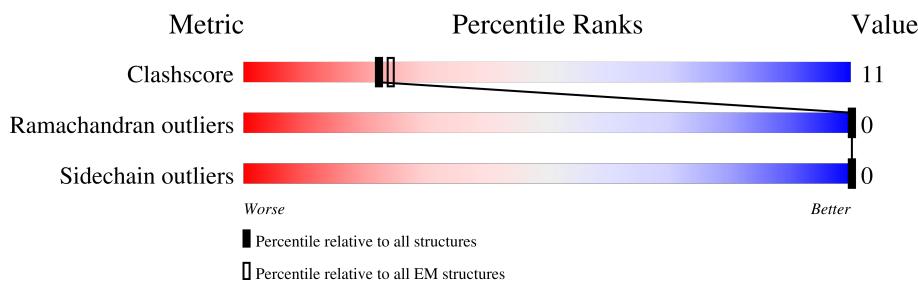
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

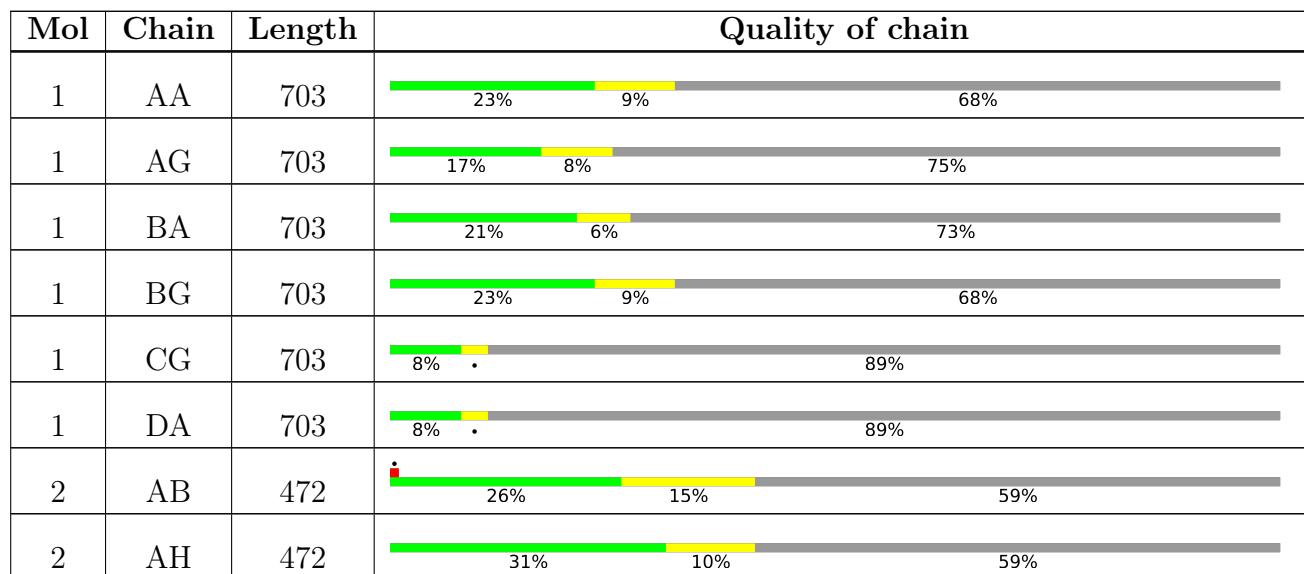
The reported resolution of this entry is 3.30 Å.

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)
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.



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Mol	Chain	Length	Quality of chain		
2	BB	472	31%	10%	59%
2	BH	472	30%	11%	59%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 14629 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 Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated).

Mol	Chain	Residues	Atoms					AltConf	Trace
1	BA	190	Total	C	N	O	S	0	0
			1564	967	282	307	8		
1	BG	228	Total	C	N	O	S	0	0
			1916	1170	356	377	13		
1	AA	228	Total	C	N	O	S	0	0
			1916	1170	356	377	13		
1	AG	178	Total	C	N	O	S	0	0
			1459	905	262	286	6		
1	CG	80	Total	C	N	O	S	0	0
			721	422	147	143	9		
1	DA	75	Total	C	N	O	S	0	0
			681	398	142	133	8		

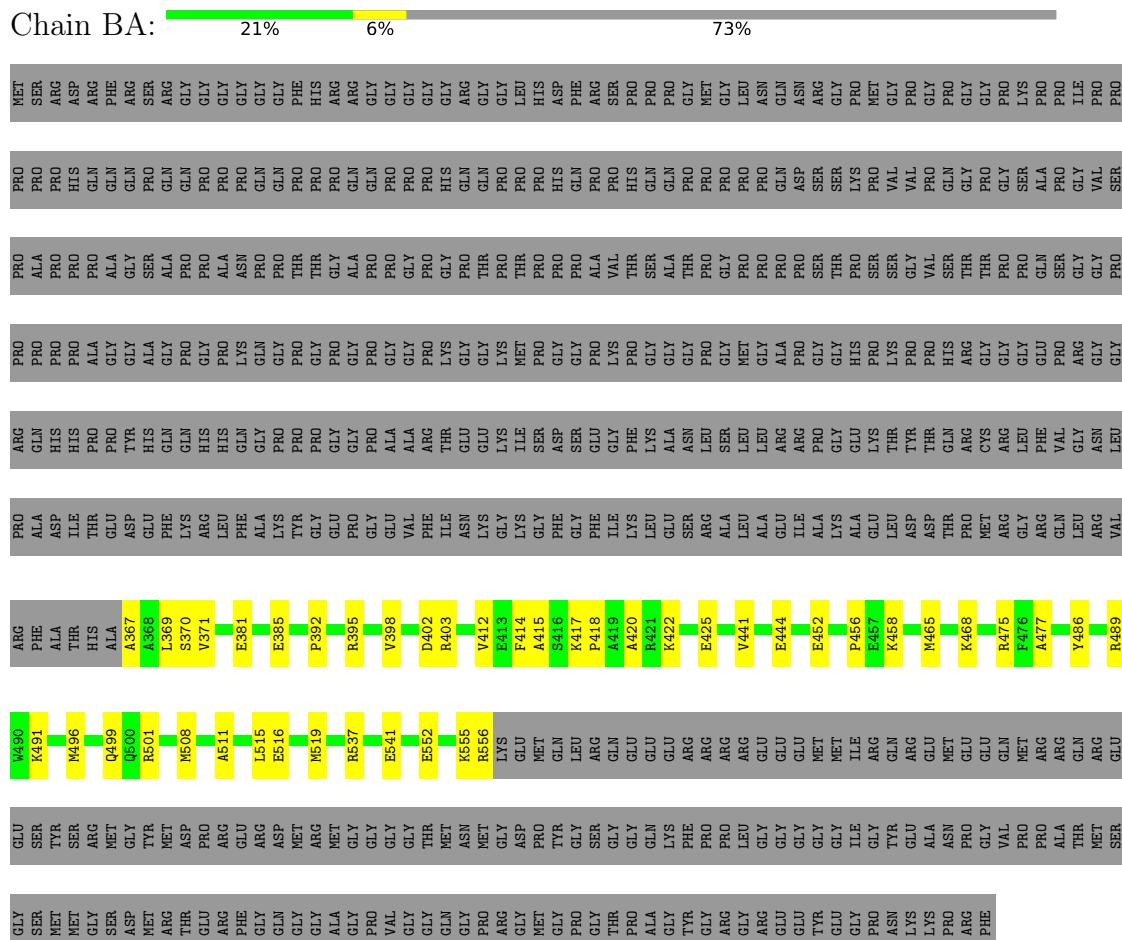
- Molecule 2 is a protein called Non-POU domain containing octamer binding.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	BB	193	Total	C	N	O	S	0	0
			1593	988	293	302	10		
2	BH	193	Total	C	N	O	S	0	0
			1593	988	293	302	10		
2	AB	193	Total	C	N	O	S	0	0
			1593	988	293	302	10		
2	AH	193	Total	C	N	O	S	0	0
			1593	988	293	302	10		

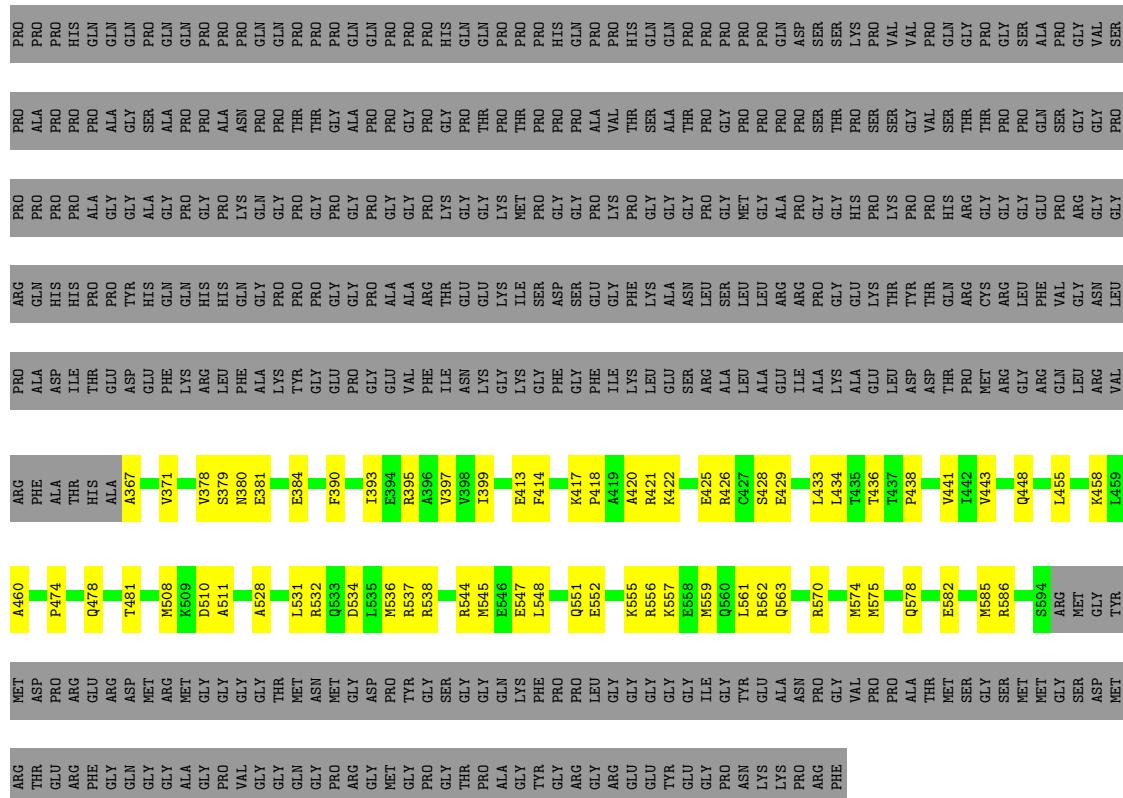
3 Residue-property plots

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.

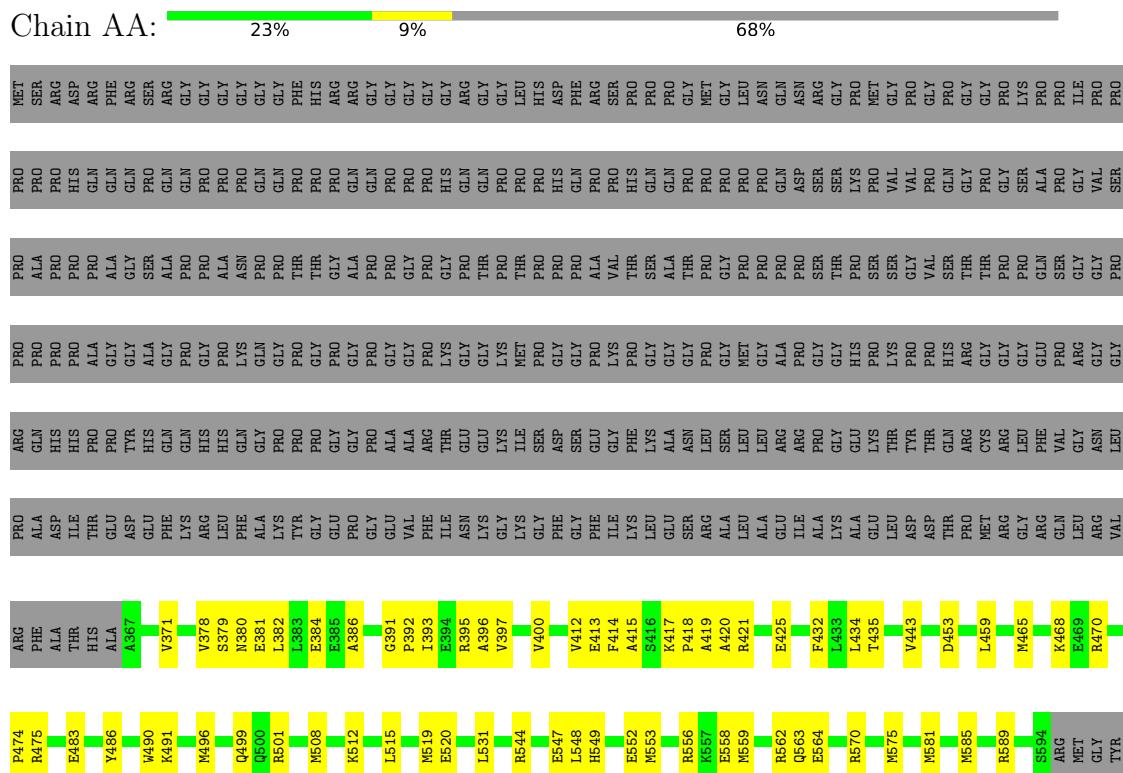
- Molecule 1: Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated)

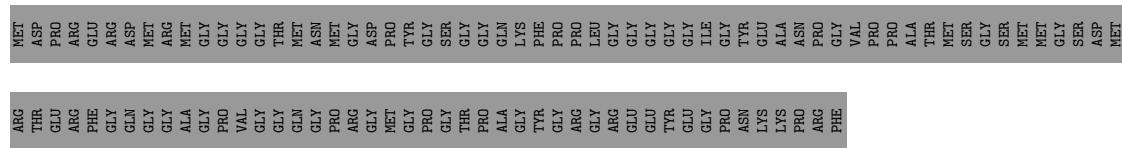


- Molecule 1: Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated)

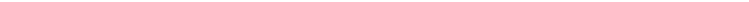


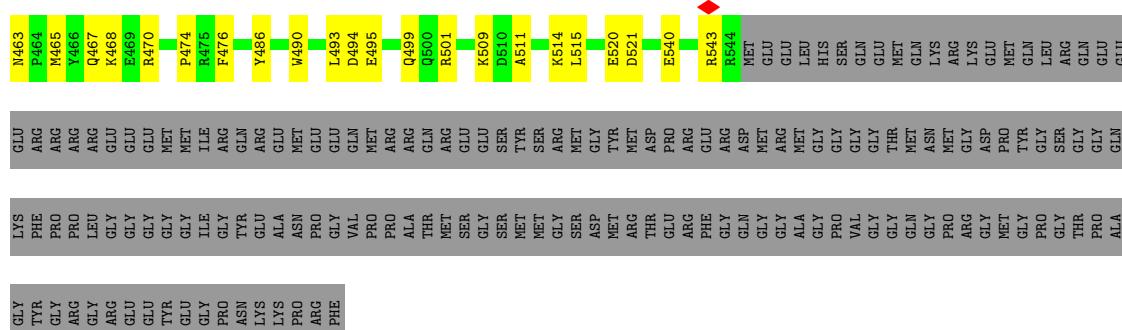
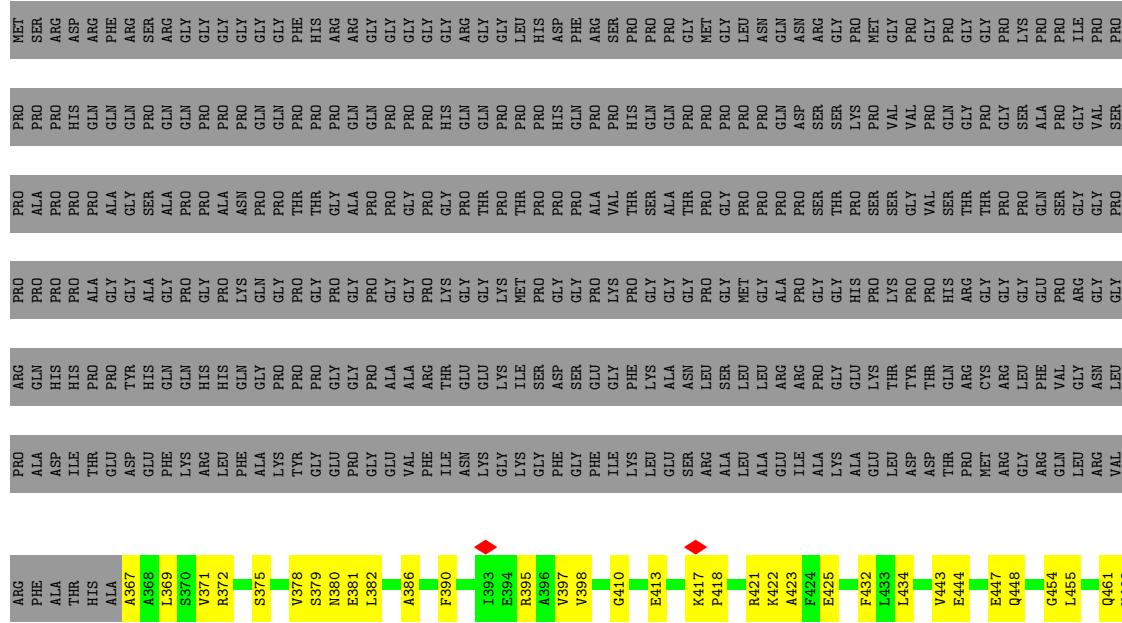
- Molecule 1: Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated)





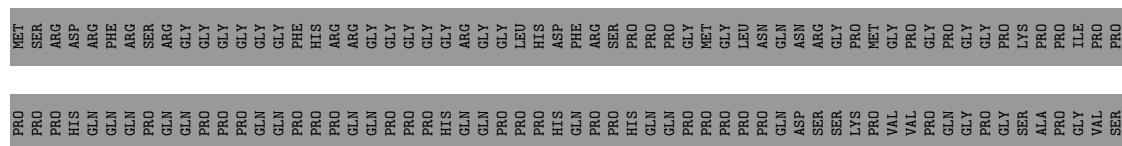
- Molecule 1: Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated)

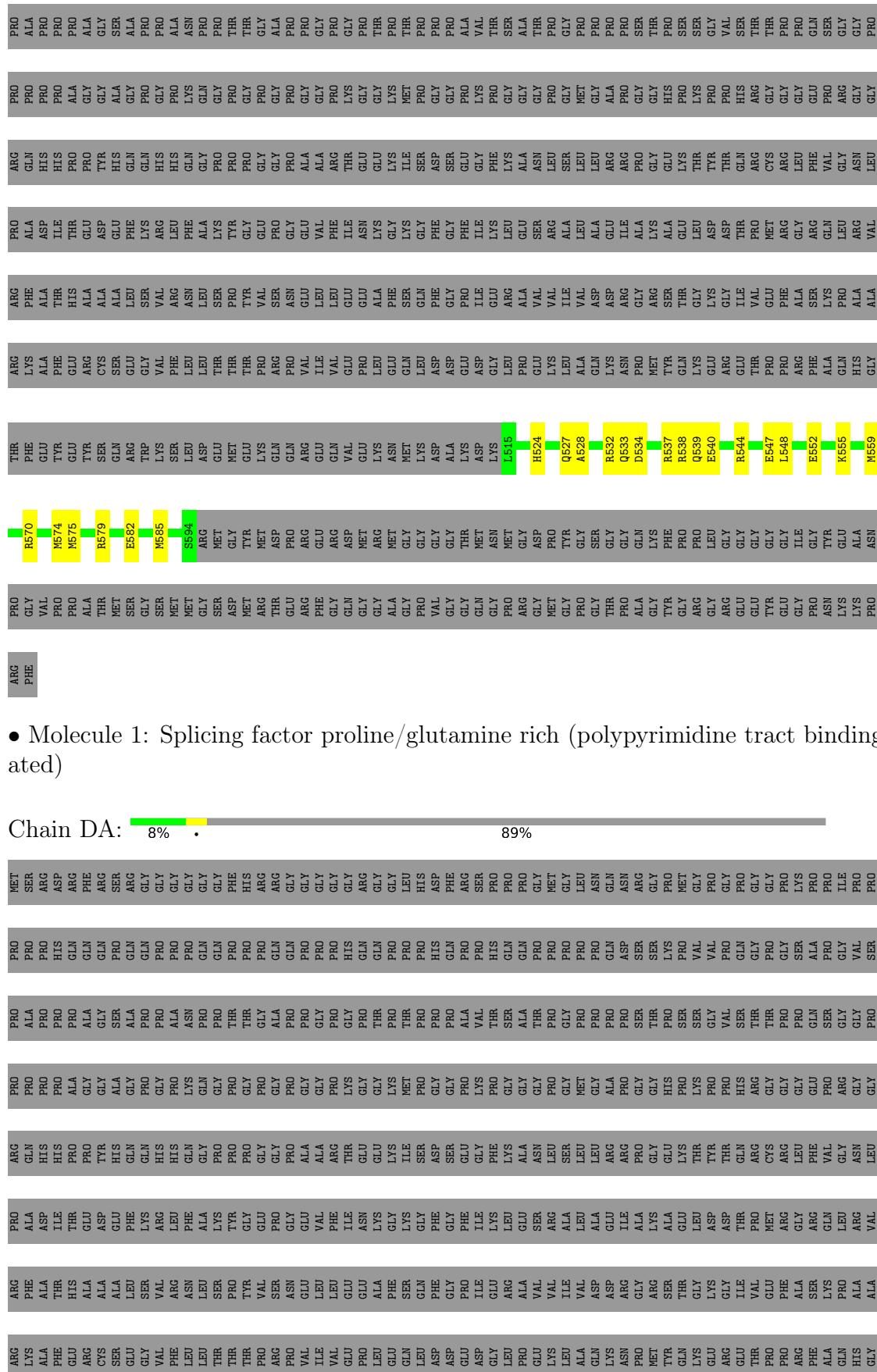
Chain AG:  17% 8% 75%

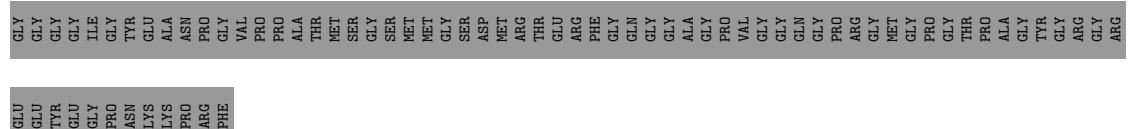


- Molecule 1: Splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated)

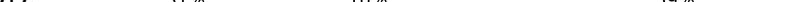
Chain CG: 8% : 89%

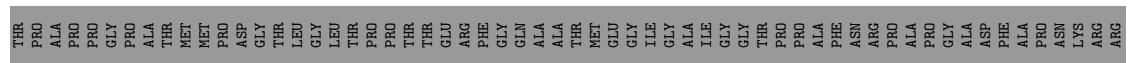






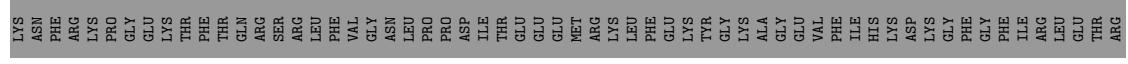
- Molecule 2: Non-POU domain containing octamer binding

Chain BB:  31% 10% 59%



- Molecule 2: Non-POU domain containing octamer binding

Chain BH: 30% 11% 59%



PRO	PHE	ARG	GLN	GLN
ARG	ALA	ASN	GLN	GLU
GLN	ALA	PHE	SER	GLU
GLN	ALA	ARG	ASN	GLU
GLU	ALA	THR	PRO	PRO

PHE	PRO	VAL	ASN	ASN
ALA	ALA	PRO	VAL	VAL
ALA	ALA	PRO	VAL	VAL
ALA	ALA	ARG	ARG	ARG
ALA	ALA	GLY	GLY	GLY

LYS	MET	LYS	LYS	LYS
ASN	ASN	PRO	PRO	PRO
GLN	GLN	GLY	GLY	GLY
SER	PRO	GLY	GLY	GLY
ASN	ASN	GLY	GLY	GLY

- Molecule 2: Non-POU domain containing octamer binding



LYS	MET	LYS	LYS	LYS
ASN	ASN	PRO	PRO	PRO
GLN	GLN	GLY	GLY	GLY
SER	PRO	GLY	GLY	GLY
ASN	ASN	GLY	GLY	GLY

LYS	LYS	LYS	LYS	LYS
ASN	ASN	PRO	PRO	PRO
GLN	GLN	GLY	GLY	GLY
SER	PRO	GLY	GLY	GLY
ASN	ASN	GLY	GLY	GLY

THR	R203	A204	A205	D206
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

R203	A204	A205	D206	R207
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

E231	R232	A233	A234	D235
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

R232	A233	A234	D235	R236
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

E231	R232	A233	A234	D235
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

THR	R236	A237	A238	D239
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

E231	R232	A233	A234	D235
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

THR	R236	A237	A238	D239
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

E231	R232	A233	A234	D235
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

THR	R236	A237	A238	D239
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

E231	R232	A233	A234	D235
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

THR	R236	A237	A238	D239
GLY	THR	ALA	ALA	ALA
GLU	GLU	ALA	ALA	ALA
ARG	ARG	PHE	PHE	PHE
GLN	ALA	PRO	PRO	PRO

PRO	
ALA	
THR	
MET	MET
PRO	
ASP	
GLY	
THR	
LEU	
GLY	
LEU	
THR	
GLU	
ARG	
PRO	
PRO	
PHE	
GLY	
GLN	
ALA	
ALA	
ALA	
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ALA	
PHE	
GLY	
ASN	
ALA	
ASP	
ARG	
PRO	
ALA	
PRO	
ASN	
LYS	
ARG	
ARG	
ARG	
TYR	

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	2974535	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	70	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1400	Depositor
Magnification	130000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	114.848	Depositor
Minimum map value	-71.492	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	6	Depositor
Map size (Å)	484.352, 484.352, 484.352	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.946, 0.946, 0.946	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	AA	0.20	0/1944	0.38	0/2596
1	AG	0.19	0/1485	0.39	0/1996
1	BA	0.20	0/1591	0.37	0/2135
1	BG	0.21	0/1944	0.43	0/2596
1	CG	0.16	0/725	0.37	0/953
1	DA	0.21	0/685	0.50	0/900
2	AB	0.21	0/1619	0.40	0/2170
2	AH	0.20	0/1619	0.40	0/2170
2	BB	0.21	0/1619	0.40	0/2170
2	BH	0.22	0/1619	0.38	0/2170
All	All	0.20	0/14850	0.40	0/19856

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts i

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	AA	1916	0	1868	60	0
1	AG	1459	0	1426	43	0
1	BA	1564	0	1527	32	0
1	BG	1916	0	1868	56	0
1	CG	721	0	691	21	0
1	DA	681	0	654	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	AB	1593	0	1579	58	0
2	AH	1593	0	1579	38	0
2	BB	1593	0	1579	38	0
2	BH	1593	0	1579	43	0
All	All	14629	0	14350	325	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 11.

The worst 5 of 325 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:BH:244:ASN:ND2	2:BH:246:GLN:HE21	1.70	0.89
2:BH:244:ASN:ND2	2:BH:246:GLN:NE2	2.35	0.74
2:AH:216:THR:HG22	2:AH:218:PHE:H	1.53	0.73
1:BA:369:LEU:HD11	1:BA:420:ALA:HB1	1.71	0.73
1:AA:371:VAL:HG12	1:AA:443:VAL:HG12	1.71	0.72

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	AA	226/703 (32%)	219 (97%)	7 (3%)	0	100 100
1	AG	176/703 (25%)	170 (97%)	6 (3%)	0	100 100
1	BA	188/703 (27%)	182 (97%)	6 (3%)	0	100 100
1	BG	226/703 (32%)	218 (96%)	8 (4%)	0	100 100
1	CG	78/703 (11%)	78 (100%)	0	0	100 100
1	DA	73/703 (10%)	73 (100%)	0	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	AB	191/472 (40%)	188 (98%)	3 (2%)	0	100	100
2	AH	191/472 (40%)	188 (98%)	3 (2%)	0	100	100
2	BB	191/472 (40%)	182 (95%)	9 (5%)	0	100	100
2	BH	191/472 (40%)	189 (99%)	2 (1%)	0	100	100
All	All	1731/6106 (28%)	1687 (98%)	44 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	AA	208/557 (37%)	208 (100%)	0	100	100
1	AG	158/557 (28%)	158 (100%)	0	100	100
1	BA	170/557 (30%)	170 (100%)	0	100	100
1	BG	208/557 (37%)	208 (100%)	0	100	100
1	CG	78/557 (14%)	78 (100%)	0	100	100
1	DA	73/557 (13%)	73 (100%)	0	100	100
2	AB	173/406 (43%)	173 (100%)	0	100	100
2	AH	173/406 (43%)	173 (100%)	0	100	100
2	BB	173/406 (43%)	173 (100%)	0	100	100
2	BH	173/406 (43%)	173 (100%)	0	100	100
All	All	1587/4966 (32%)	1587 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
2	BH	244	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.

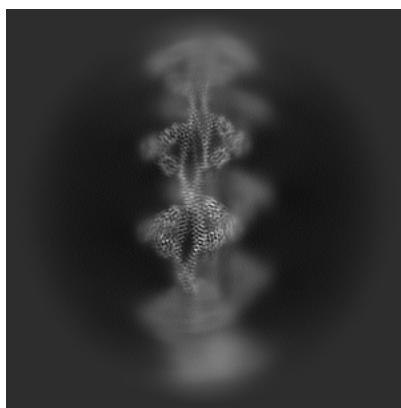
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-51439. These allow visual inspection of the internal detail of the map and identification of artifacts.

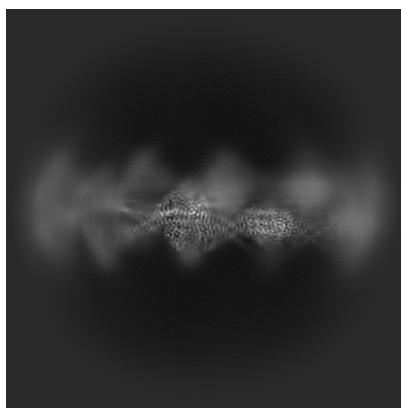
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

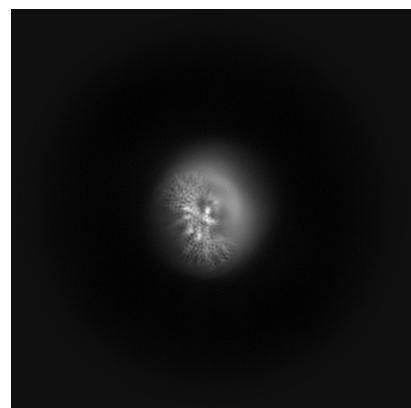
6.1.1 Primary map



X

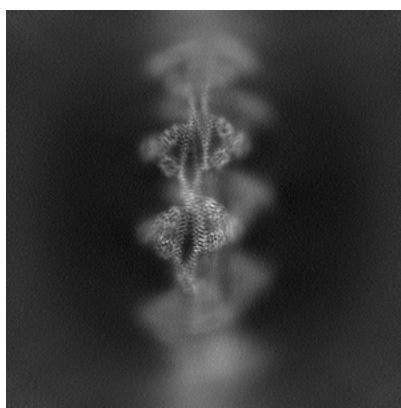


Y

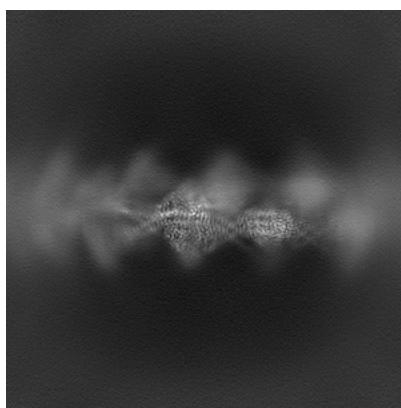


Z

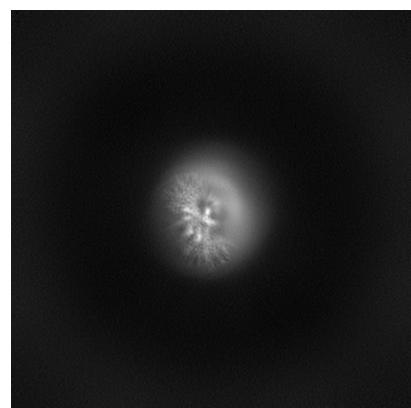
6.1.2 Raw map



X



Y



Z

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

6.2 Central slices [\(i\)](#)

6.2.1 Primary map



X Index: 256

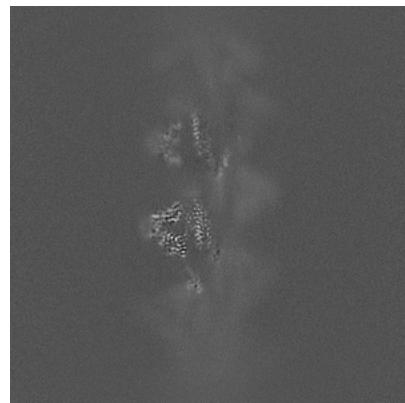


Y Index: 256

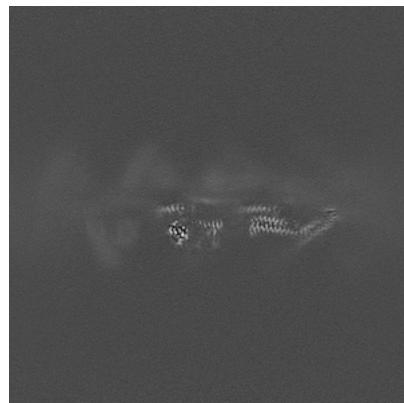


Z Index: 256

6.2.2 Raw map



X Index: 256



Y Index: 256

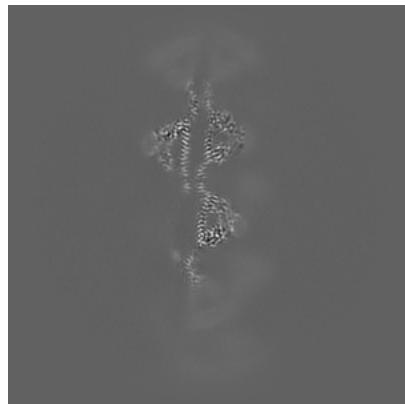


Z Index: 256

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: 229



Y Index: 256



Z Index: 222

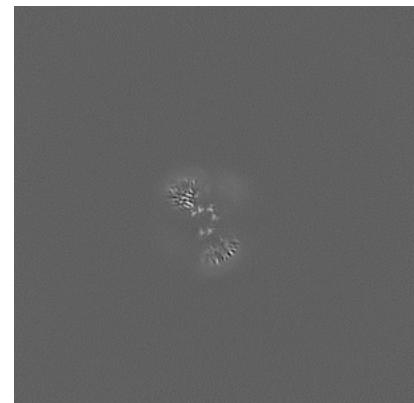
6.3.2 Raw map



X Index: 228



Y Index: 256

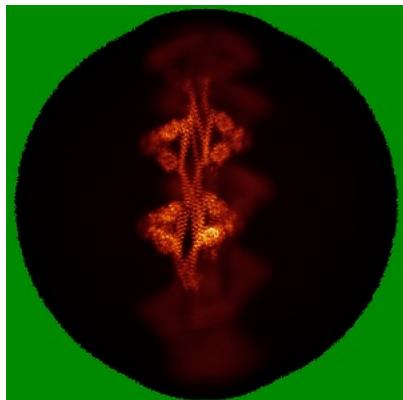


Z Index: 223

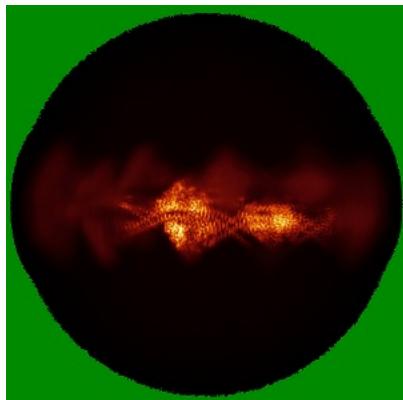
The images above show the largest variance slices of the map in three orthogonal directions.

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

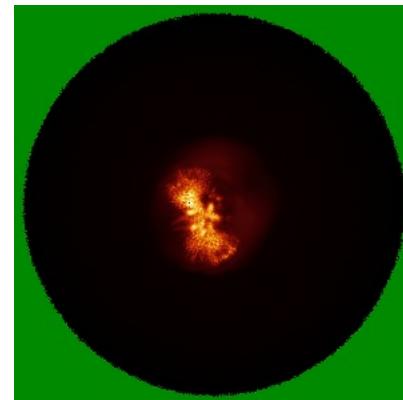
6.4.1 Primary map



X



Y

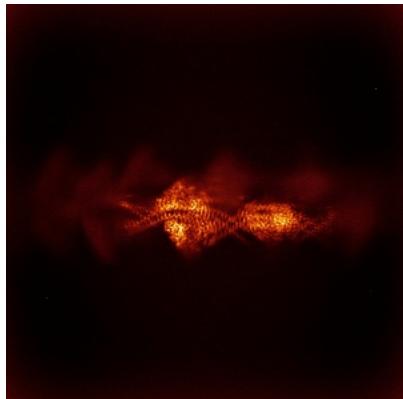


Z

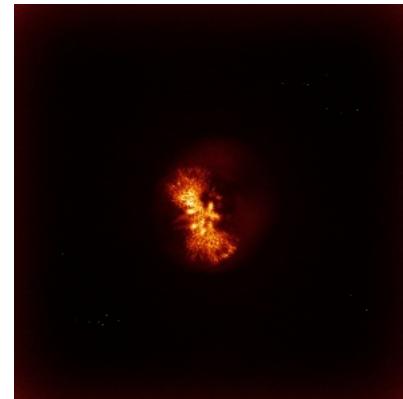
6.4.2 Raw map



X



Y

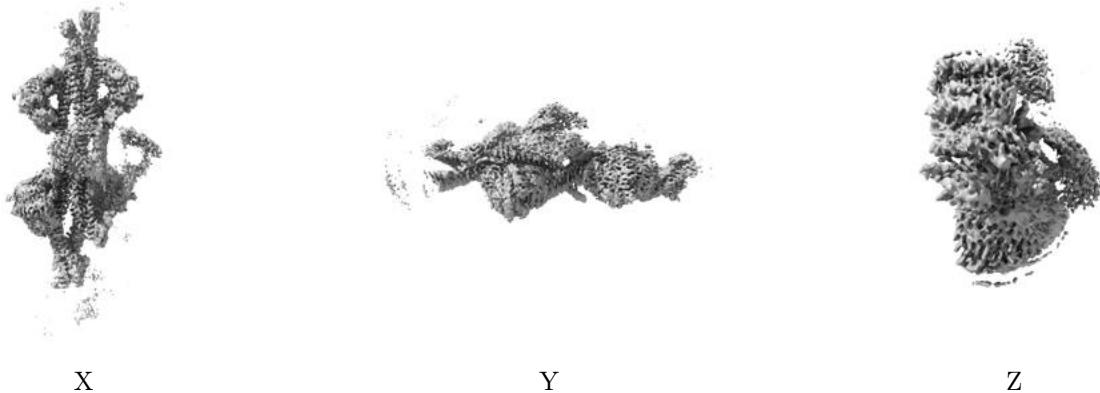


Z

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

6.5 Orthogonal surface views [\(i\)](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 6.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

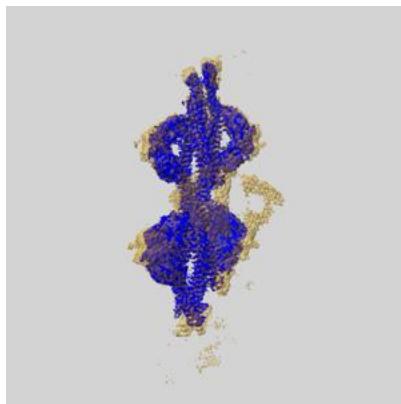
6.6 Mask visualisation [\(i\)](#)

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

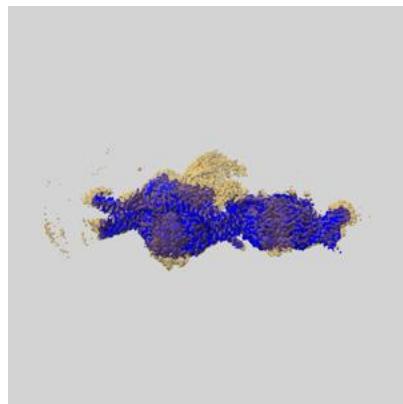
A mask typically either:

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

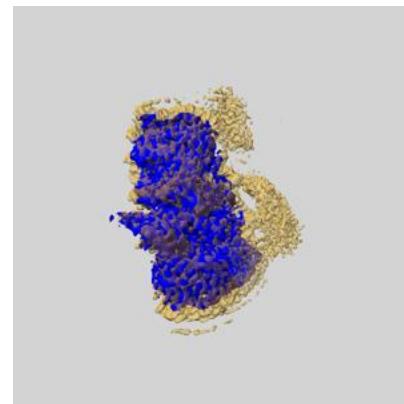
6.6.1 emd_51439_msk_1.map [\(i\)](#)



X



Y

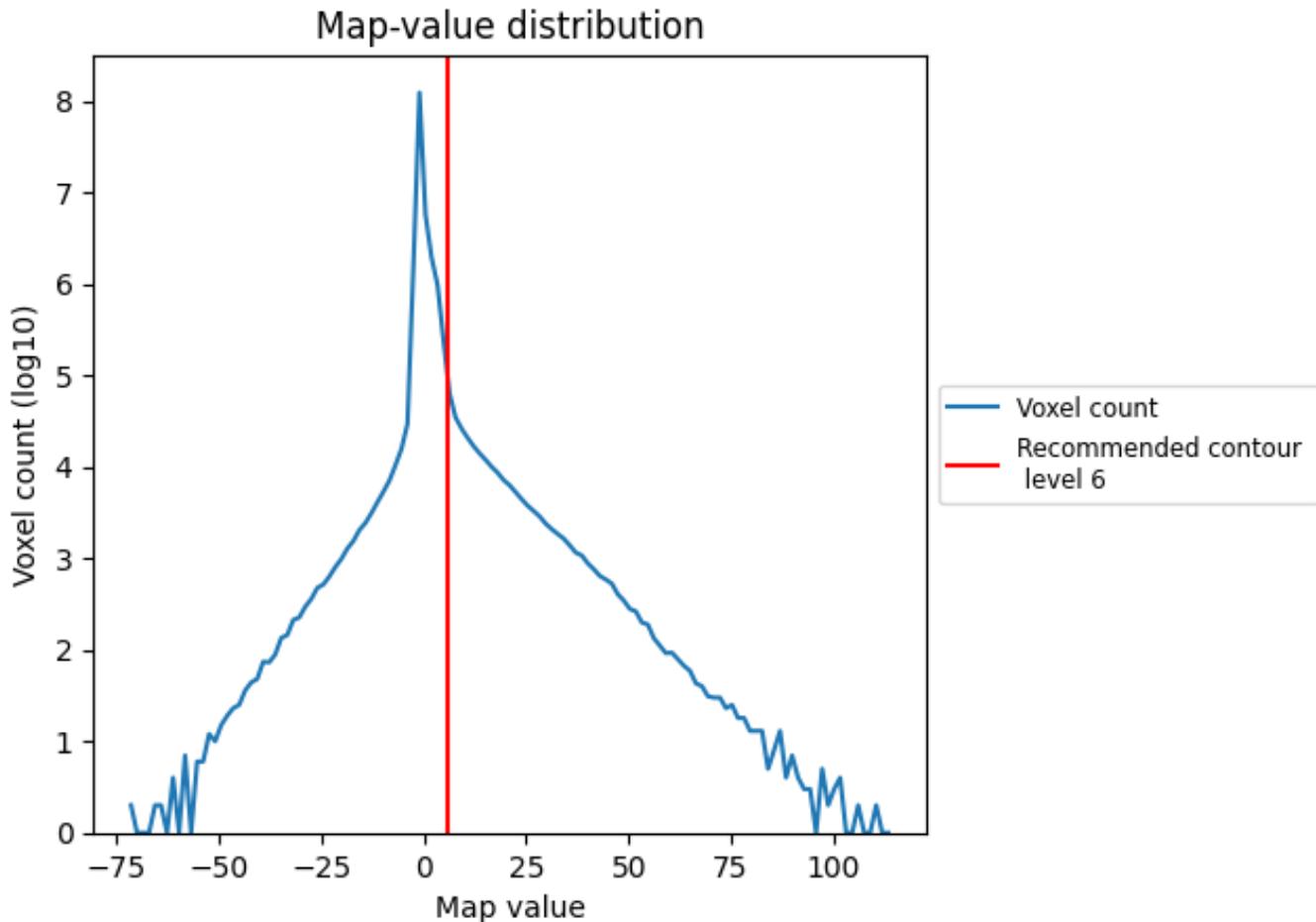


Z

7 Map analysis (i)

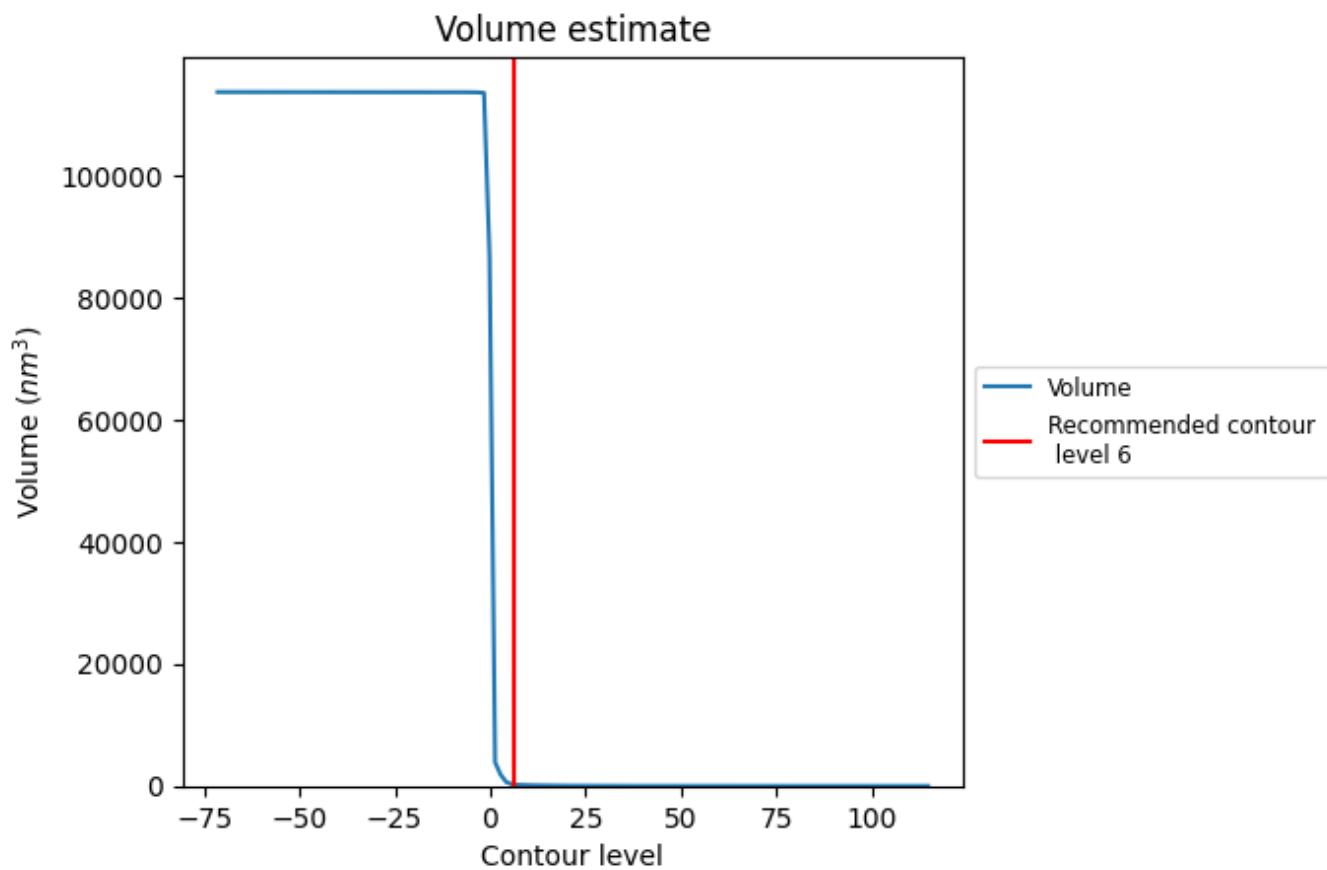
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

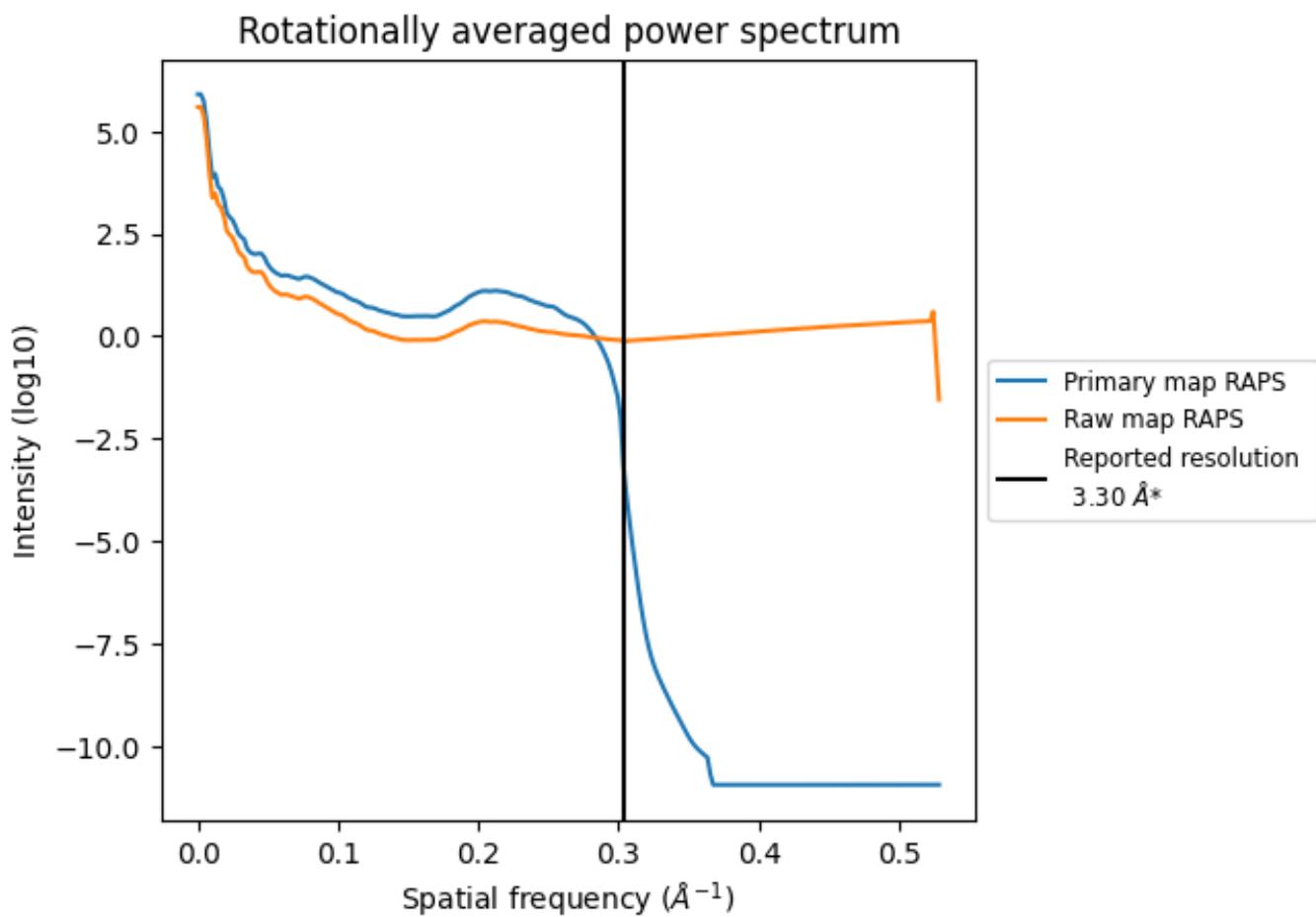
7.2 Volume estimate [\(i\)](#)



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

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

7.3 Rotationally averaged power spectrum (i)

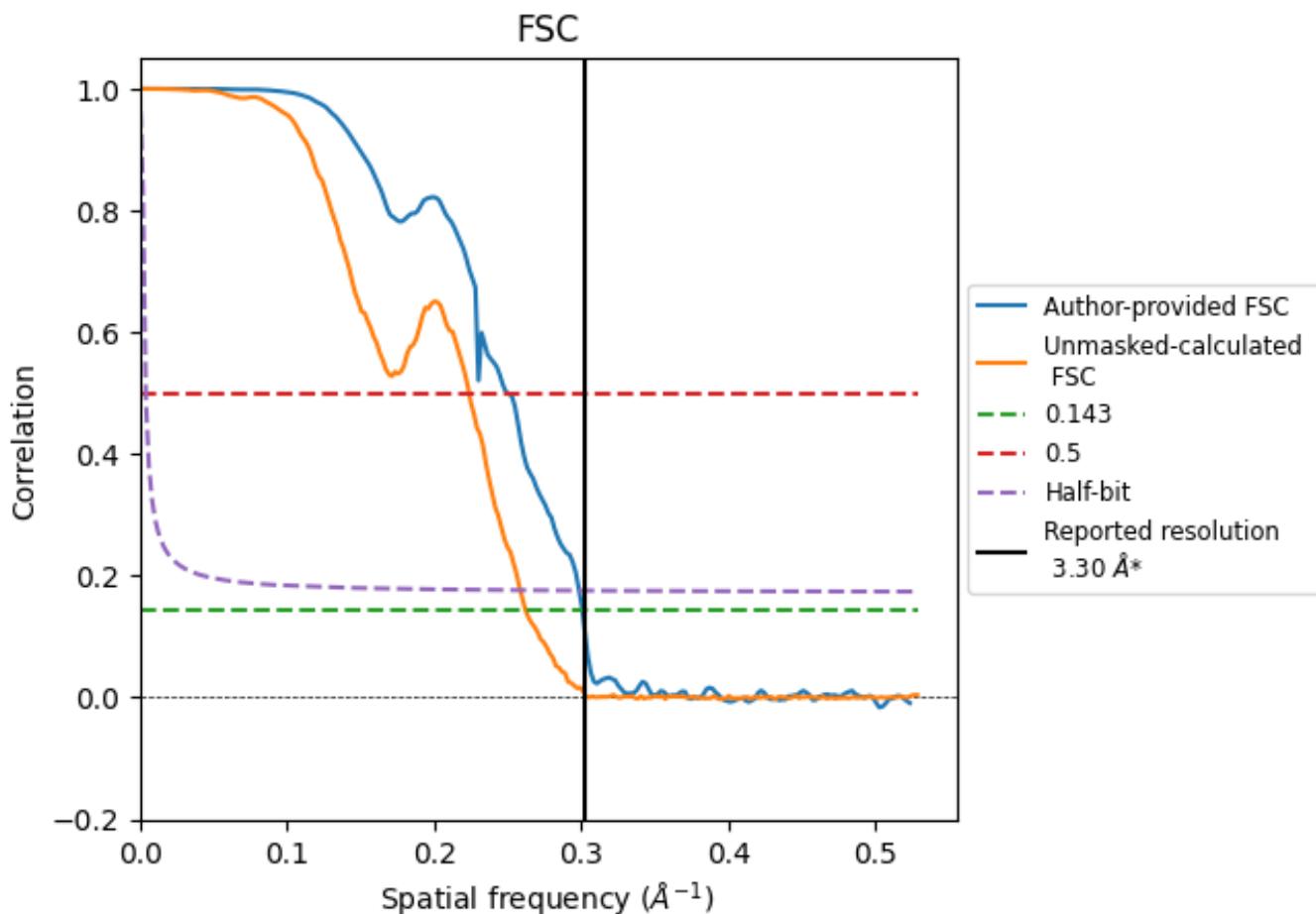


*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

8 Fourier-Shell correlation [\(i\)](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [\(i\)](#)



*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

8.2 Resolution estimates [\(i\)](#)

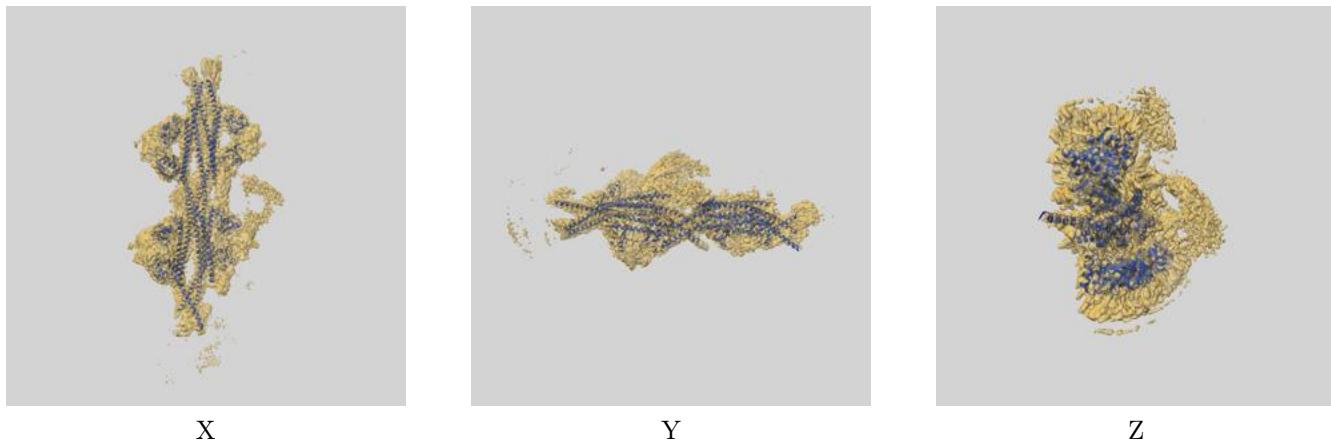
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.32	4.00	3.35
Unmasked-calculated*	3.81	4.47	3.87

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.81 differs from the reported value 3.3 by more than 10 %

9 Map-model fit i

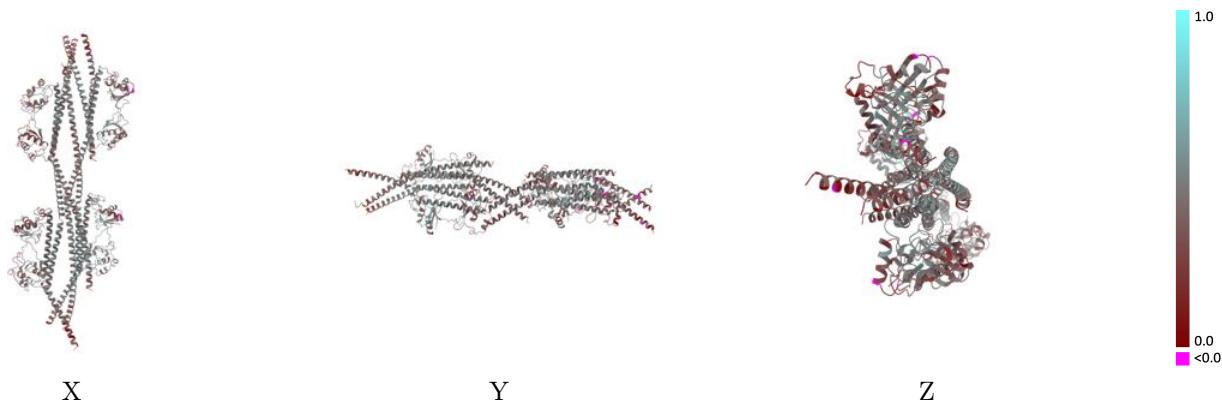
This section contains information regarding the fit between EMDB map EMD-51439 and PDB model 9GLD. Per-residue inclusion information can be found in section 3 on page 5.

9.1 Map-model overlay i



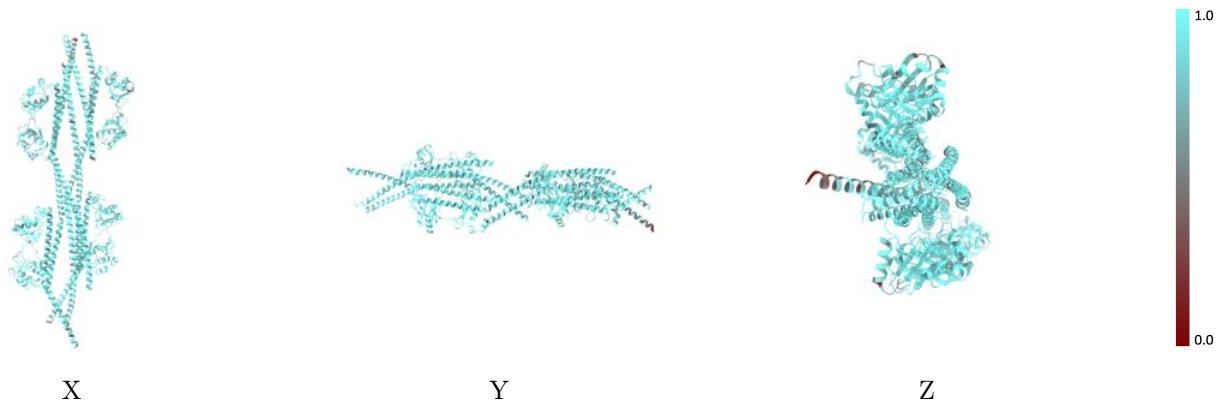
The images above show the 3D surface view of the map at the recommended contour level 6.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



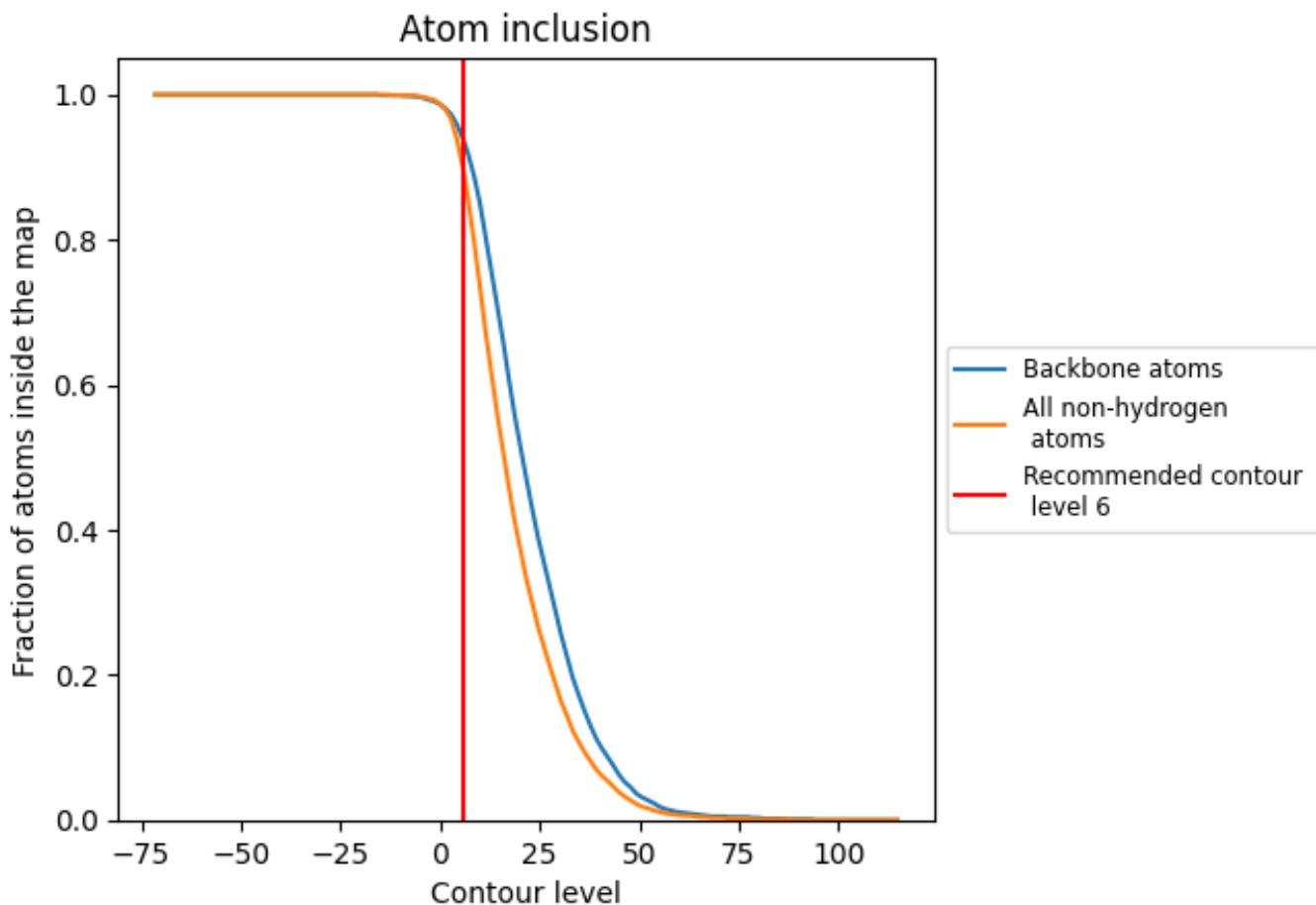
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (6).

9.4 Atom inclusion [\(i\)](#)



At the recommended contour level, 94% of all backbone atoms, 89% 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 (6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8920	0.4150
AA	0.9020	0.4120
AB	0.8320	0.3840
AG	0.8540	0.3820
AH	0.8890	0.4170
BA	0.9050	0.4110
BB	0.9100	0.4180
BG	0.9220	0.4330
BH	0.9120	0.4490
CG	0.8910	0.4310
DA	0.8810	0.4180

