



wwPDB EM Validation Summary Report ⓘ

Mar 25, 2026 – 10:17 AM UTC

PDB ID : 9JXR / pdb_00009jxr
EMDB ID : EMD-61877
Title : Cryo-EM structure of Drosophila melanogaster Pxo-G604A
Authors : Wang, X.; Bai, Z.; Wallis, C.; Wang, H.; Han, Y.; Jin, R.; Lei, M.; Gu, C.;
Jessen, H.; Shears, S.; Sun, Y.; Corry, B.; Zhang, Y.
Deposited on : 2024-10-11
Resolution : 3.53 Å(reported)

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

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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

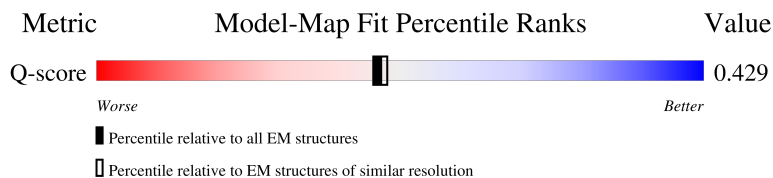
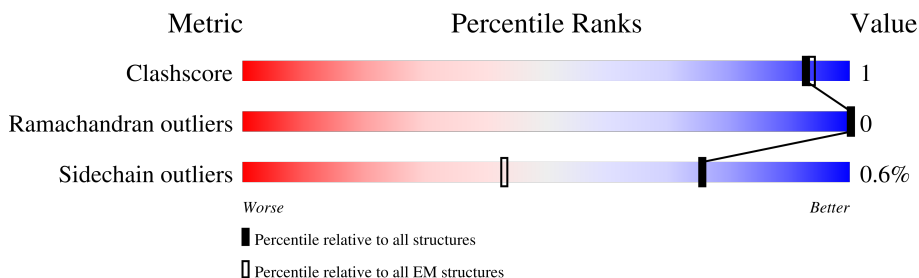
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.53 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	12947 (3.03 - 4.02)

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	671	
1	B	671	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 6350 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 Solute carrier family 53 member 1.

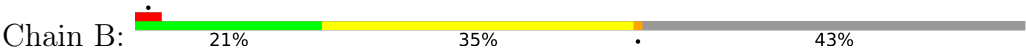
Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	384	Total	C	N	O	S	0	0
			3175	2122	508	522	23		
1	B	384	Total	C	N	O	S	0	0
			3175	2122	508	522	23		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	604	ALA	GLY	engineered mutation	UNP Q9VRR2
B	604	ALA	GLY	engineered mutation	UNP Q9VRR2

LEU
GLN
GLY
GLU
ALA
SER
SER
ILE
GLU
ASP
LEU
CYS
SER

● Molecule 1: Solute carrier family 53 member 1



THR
LYS
ASP
PHE
GLN
GLU
ALA
SER
LEU
HIS
THR
LEU
ALA
THR
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ASP
CYS
MET

TYR
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P223
W224
T225
T226
F227
K228
V229
G230
L231
F232
S233
G234
A235
L239
F240
I241
T242

V243
V244
I245
A246
F249
Y250
G251
F252
G253
F254
N255
W256
R257
A258
G259
N260
M261
M262
F263
R264
F267
L268
L269
L273
F274
L275
W276
G277
W283
R284
V288
N289
H290
V291
L292
I293
F294
E295
L296
D297
P298
R299
N300
H301
L302
S303
E304
N305
N306
D384
F385
N308
E309

V310
A311
S312
V313
F314
G315
V316
I317
W318
A319
V322
L323
S324
Y325
D329
I333
P334
A338
P339
L340
C341
T344
L345
M346
L350
L351
N352
P353
T354
K355
H358
H359
E360
F363
I366
R367
R371
V372
A375
C378
F379
V380
N381
F382
A383
D384
F385
V386

L387
A388
Q389
D390
L391
N392
S393
H394
F398
L399
D400
I401
L404
F407
R410
S411
P412
T413
W414
H415
K416
A417
G418
K419
A420
H423
C424
V425
E426
Y427
V428
S429
L430
L431
H432
V435
H438
R443
F444
A445
Q446
C447
R450
Y451
R452
D453
F458
H460

M463
S470
F471
F472
V473
V474
I475
F476
A477
H478
K479
Y480
H481
T482
T483
T484
D485
T486
Y487
L488
S490
K491
E492
M493
F494
W495
F496
Y497
C498
W499
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T501
A502
A503
I504
F505
C508
Y509
A510
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W513
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K516
M517
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W519
G520
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D523
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K525
A526
N529

R530
F531
L532
R533
E534
E535
I536
V537
Y538
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F543
Y544
Y545
F546
L552
I553
L554
R555
F556
S557
W558
T559
L560
S561
M562
S563
L564
G568
Y569
I570
E571
O572
D573
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F581
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E583
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M601
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LEU
ASN
ARG
ARG
GLY
LYS
ALA
GLY
LYS
SER
ALA
THR
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ARG
LEU
LEU

GLN
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GLU
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GLU
ASP
LEU
CYS
SER

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	58767	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 ($e^-/\text{\AA}^2$)	49.41	Depositor
Minimum defocus (nm)	1400	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOCONTINUUM (6k x 4k)	Depositor
Maximum map value	4.794	Depositor
Minimum map value	-2.483	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.071	Depositor
Recommended contour level	0.6	Depositor
Map size (Å)	337.59998, 337.59998, 337.59998	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.055, 1.055, 1.055	Depositor

5 Model quality

5.1 Standard geometry

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	2.61	200/3291 (6.1%)	2.32	208/4483 (4.6%)
1	B	2.61	202/3291 (6.1%)	2.32	209/4483 (4.7%)
All	All	2.61	402/6582 (6.1%)	2.32	417/8966 (4.7%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	6
1	B	0	6
All	All	0	12

The worst 5 of 402 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	511	TYR	CA-C	-8.95	1.41	1.52
1	A	511	TYR	CA-C	-8.91	1.41	1.52
1	B	393	SER	CA-C	-8.85	1.41	1.52
1	A	393	SER	CA-C	-8.84	1.41	1.52
1	B	574	VAL	CA-C	8.64	1.63	1.52

The worst 5 of 417 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	229	VAL	N-CA-C	-11.42	99.18	110.72
1	A	229	VAL	N-CA-C	-11.40	99.20	110.72
1	B	544	TYR	N-CA-C	-10.15	100.30	111.36
1	A	544	TYR	N-CA-C	-10.14	100.31	111.36
1	B	542	TRP	N-CA-C	-10.11	100.09	111.82

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	294	PHE	Sidechain
1	A	358	HIS	Sidechain
1	A	460	HIS	Sidechain
1	A	487	TYR	Sidechain
1	A	496	PHE	Sidechain

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	3175	0	3094	9	0
1	B	3175	0	3094	9	0
All	All	6350	0	6188	17	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 1.

The worst 5 of 17 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:A:571:GLU:CD	1:A:572:GLY:N	2.42	0.77
1:B:571:GLU:CD	1:B:572:GLY:N	2.42	0.77
1:A:571:GLU:CG	1:A:572:GLY:N	2.73	0.52
1:B:571:GLU:CD	1:B:572:GLY:CA	2.84	0.51
1:B:571:GLU:CG	1:B:572:GLY:N	2.73	0.50

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	382/671 (57%)	369 (97%)	13 (3%)	0	100	100
1	B	382/671 (57%)	369 (97%)	13 (3%)	0	100	100
All	All	764/1342 (57%)	738 (97%)	26 (3%)	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	A	334/583 (57%)	332 (99%)	2 (1%)	78	80
1	B	334/583 (57%)	332 (99%)	2 (1%)	78	80
All	All	668/1166 (57%)	664 (99%)	4 (1%)	76	80

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	301	HIS
1	A	476	PHE
1	B	301	HIS
1	B	476	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	289	ASN
1	B	290	HIS
1	B	390	GLN
1	B	335	GLN
1	A	335	GLN

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.

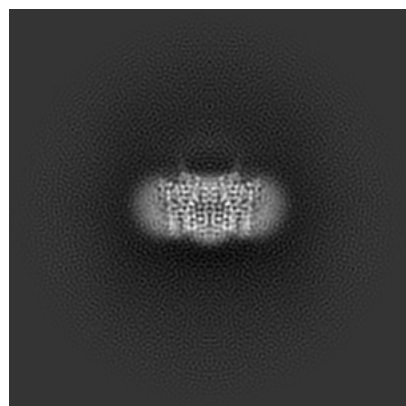
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-61877. These allow visual inspection of the internal detail of the map and identification of artifacts.

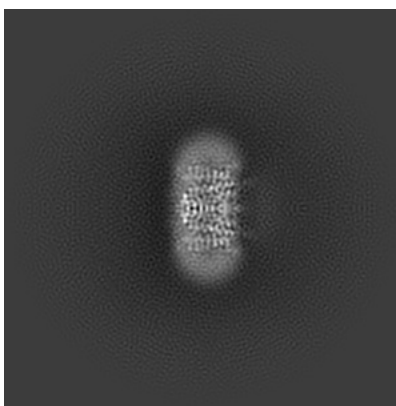
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

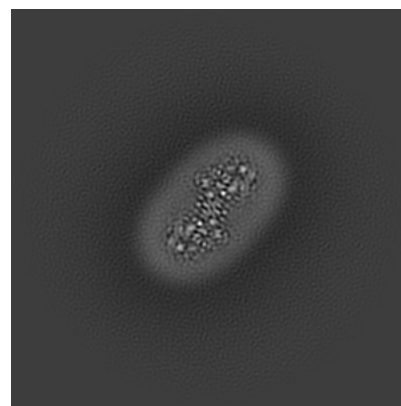
6.1.1 Primary map



X

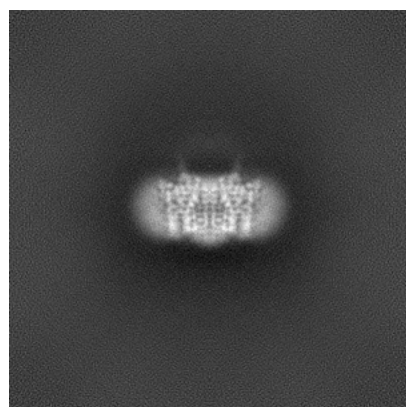


Y

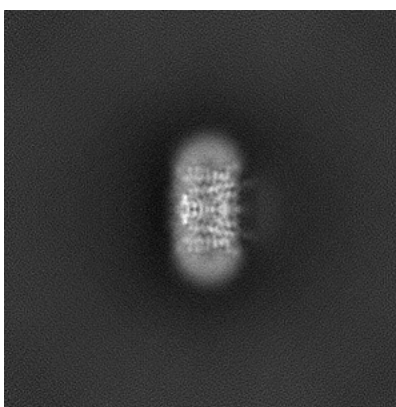


Z

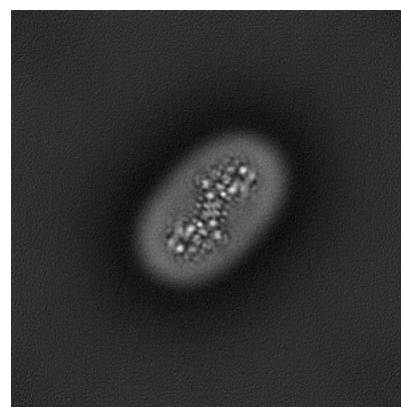
6.1.2 Raw map



X



Y

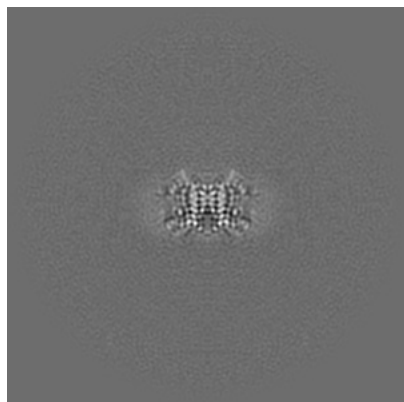


Z

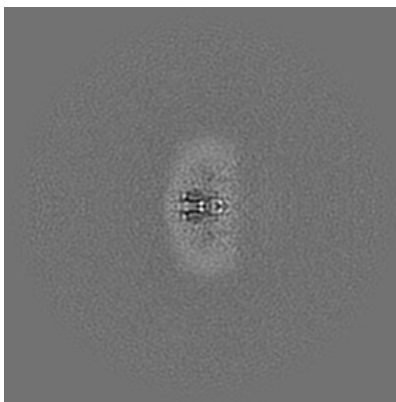
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

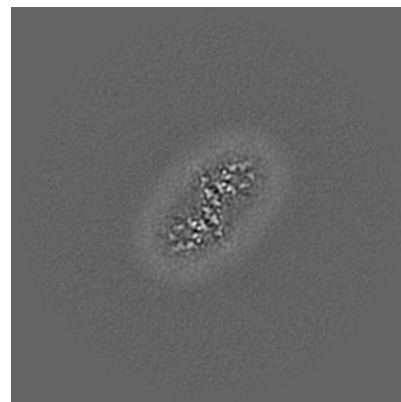
6.2.1 Primary map



X Index: 160

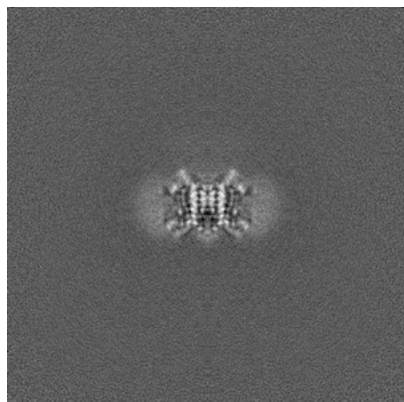


Y Index: 160

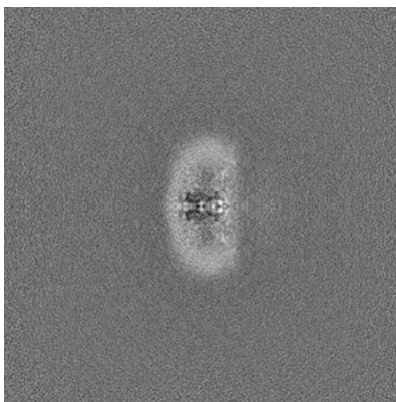


Z Index: 160

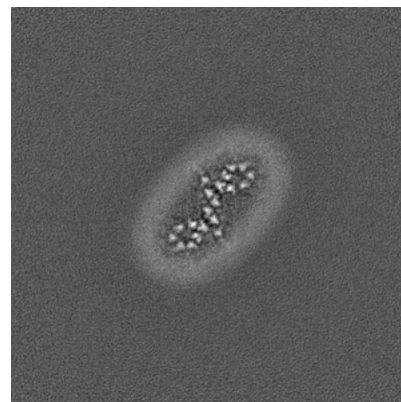
6.2.2 Raw map



X Index: 160



Y Index: 160

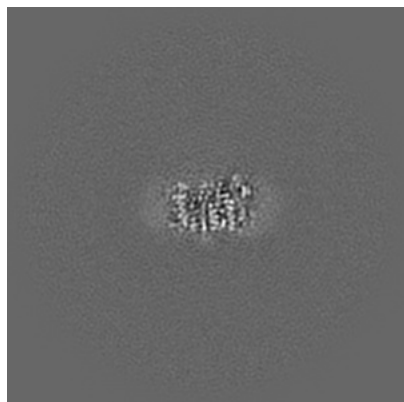


Z Index: 160

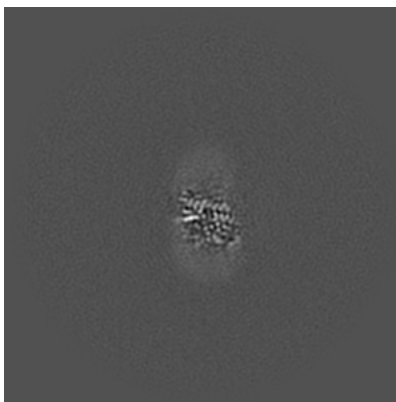
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

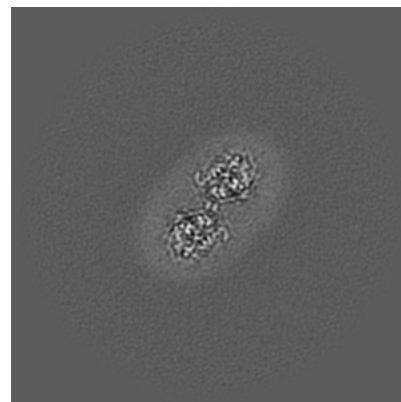
6.3.1 Primary map



X Index: 165

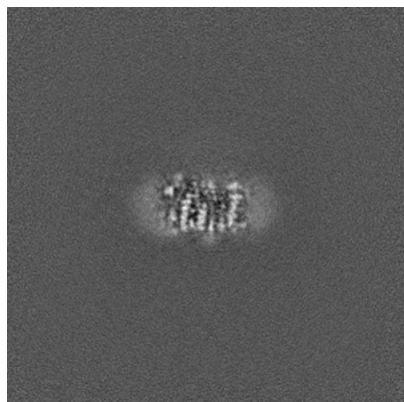


Y Index: 148

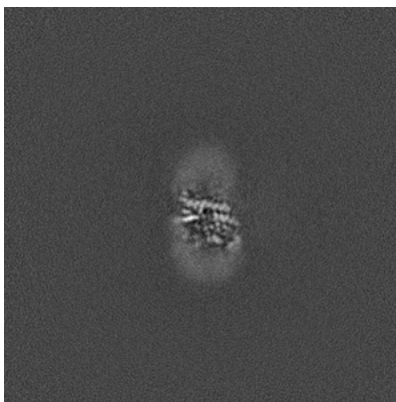


Z Index: 173

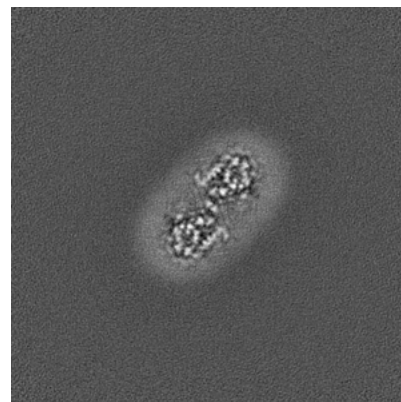
6.3.2 Raw map



X Index: 155



Y Index: 148

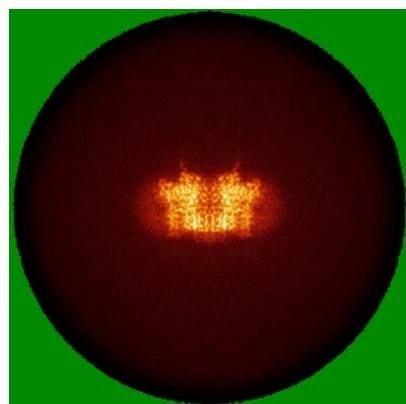


Z Index: 174

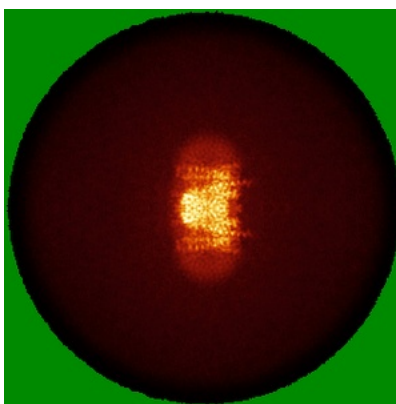
The images above show the largest variance slices of the map in three orthogonal directions.

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

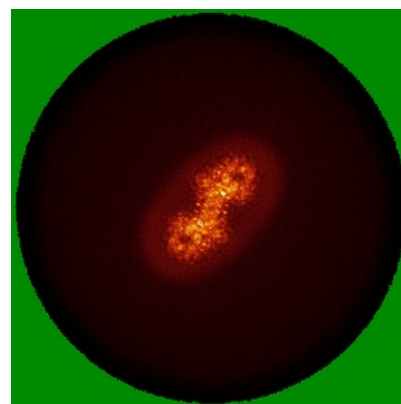
6.4.1 Primary map



X

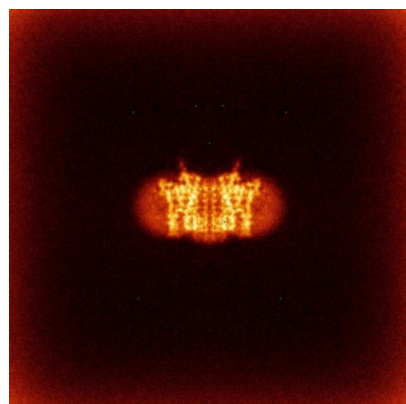


Y

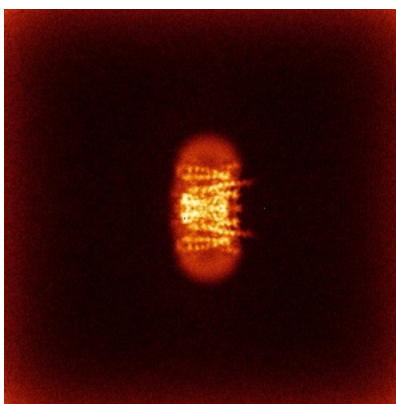


Z

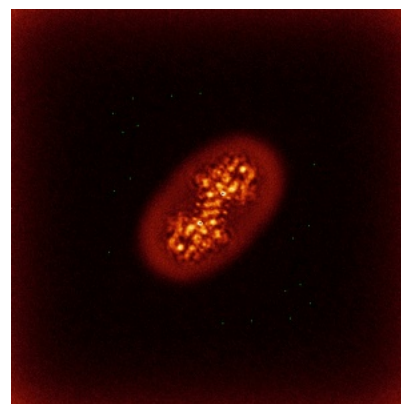
6.4.2 Raw map



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.

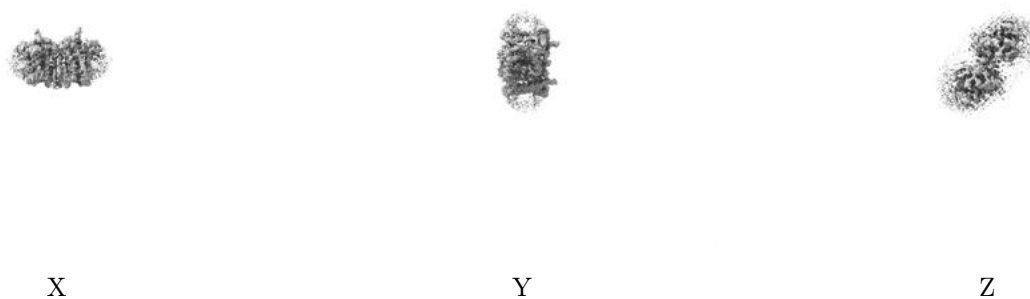
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.6. 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.

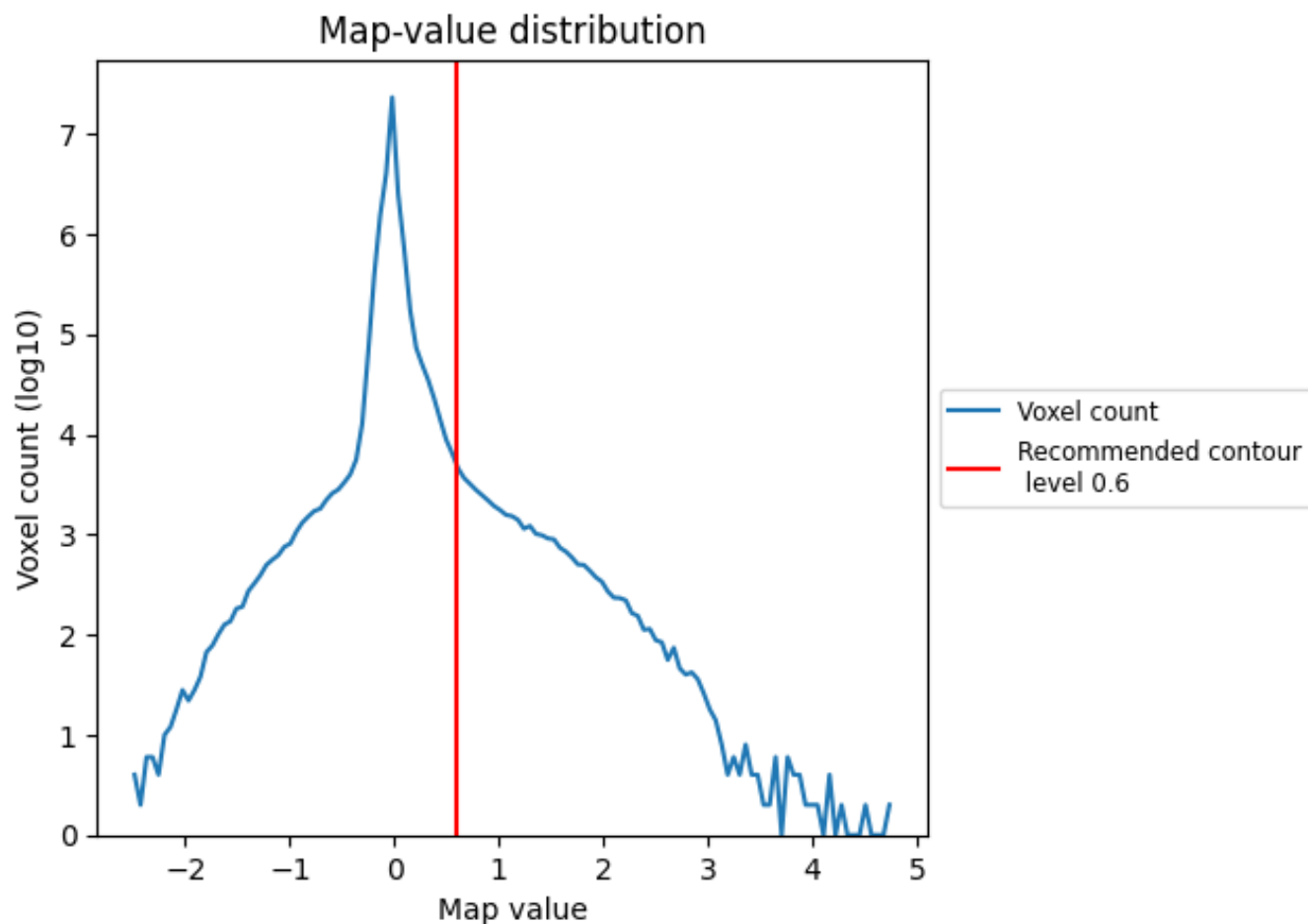
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

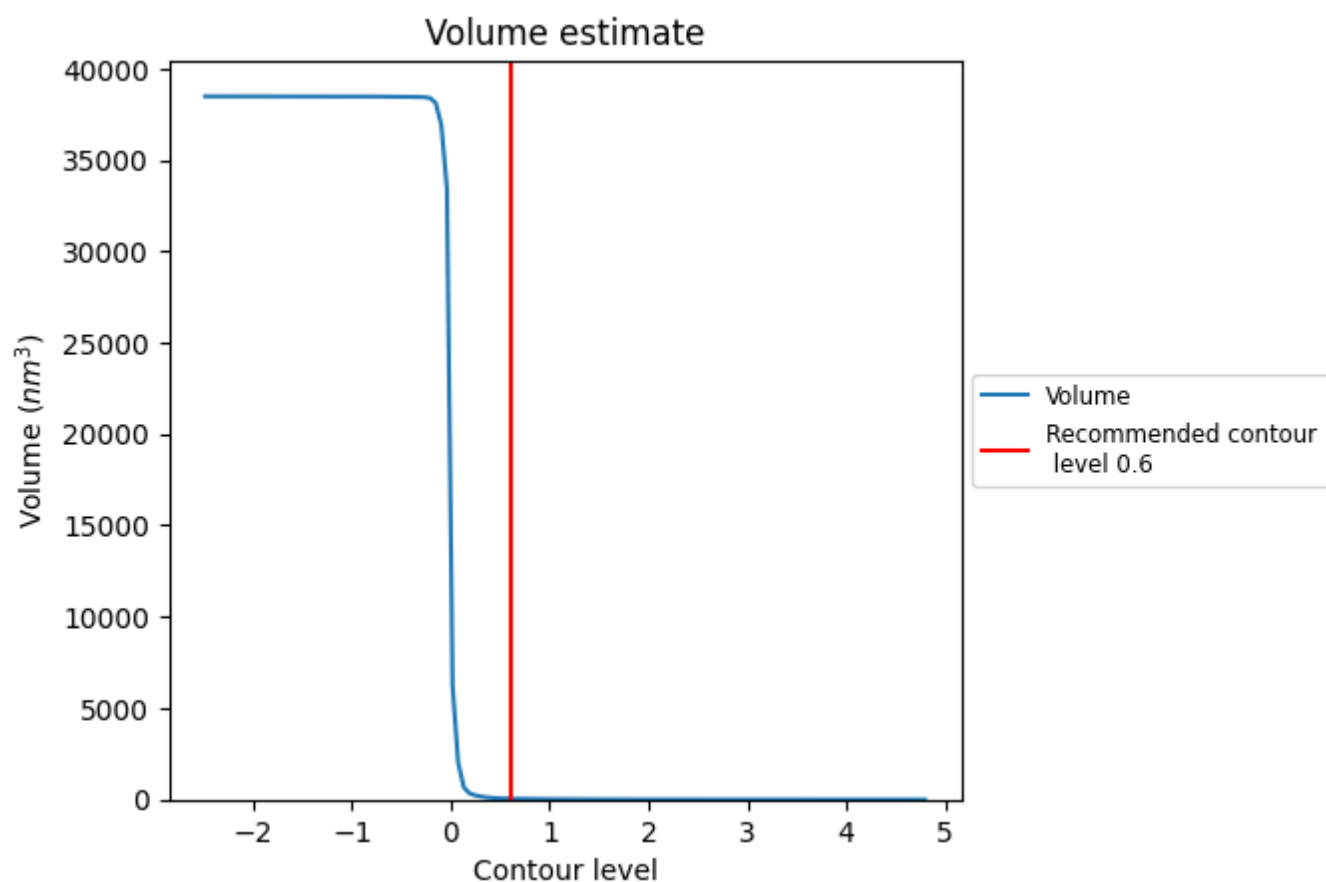
This section contains the results of statistical analysis of the map.

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.

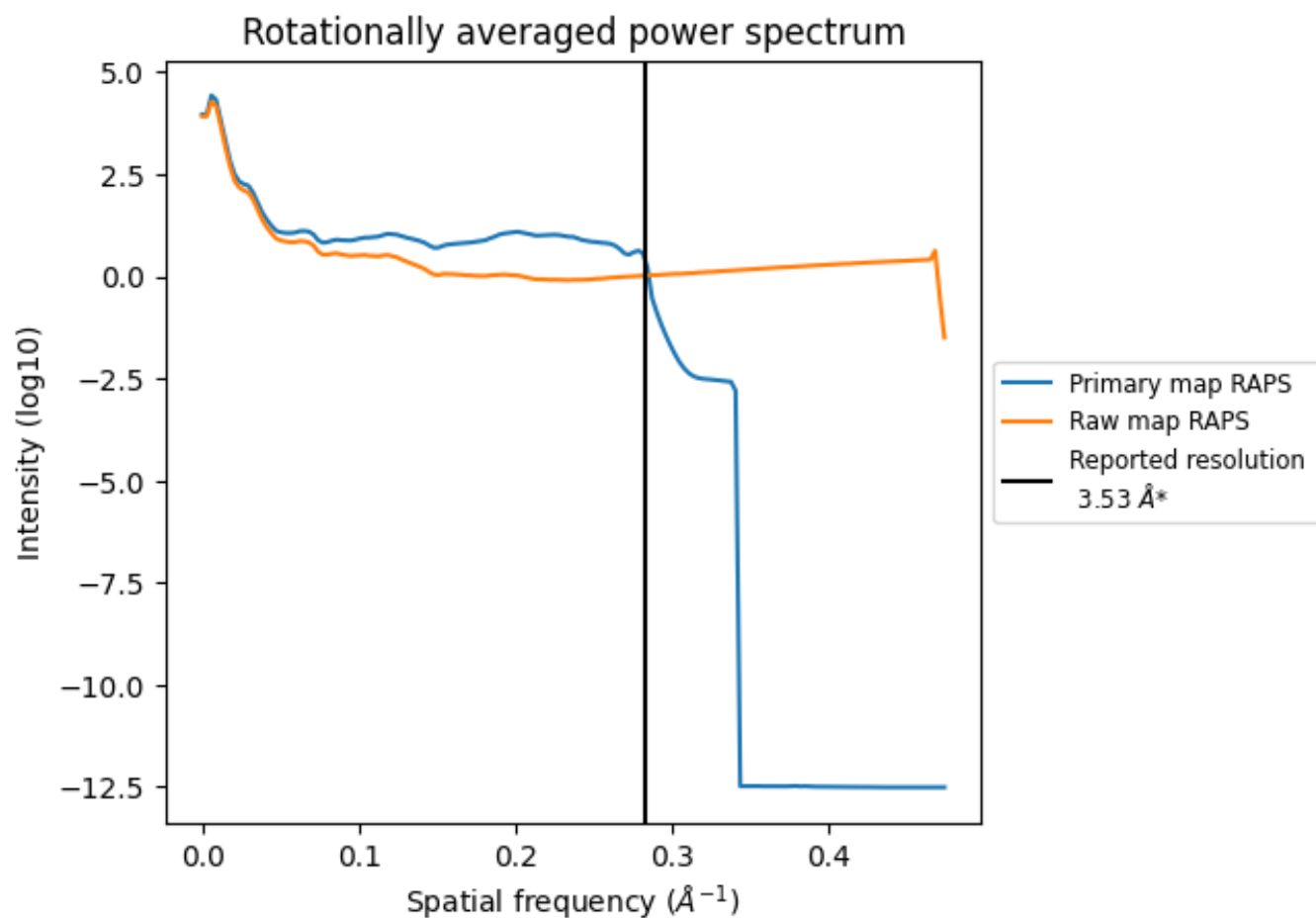
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 48 nm³; this corresponds to an approximate mass of 43 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 ⓘ

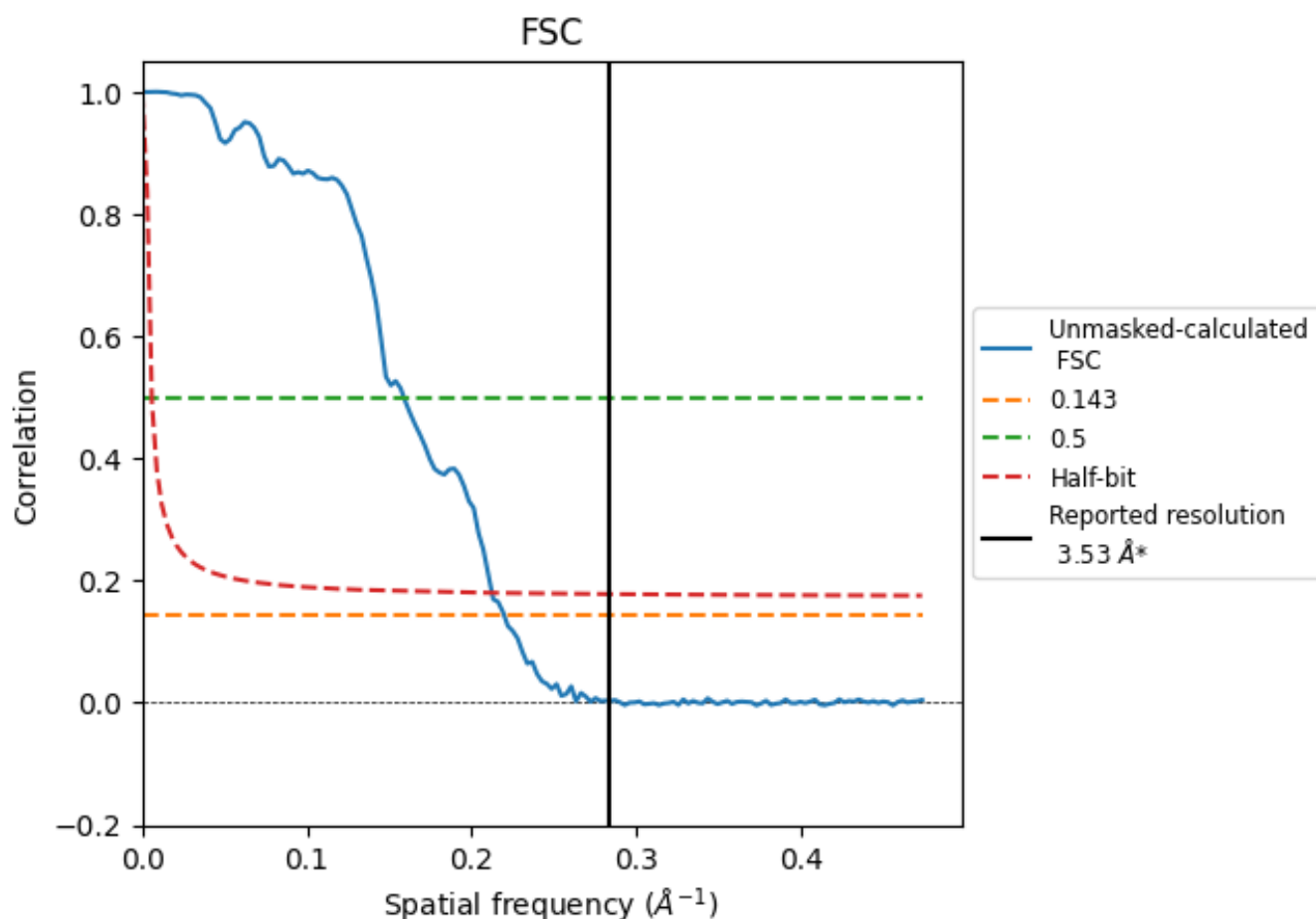


*Reported resolution corresponds to spatial frequency of 0.283 Å⁻¹

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 0.283 Å⁻¹

8.2 Resolution estimates [i](#)

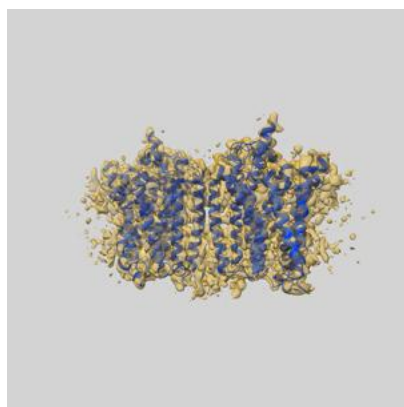
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.53	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.55	6.29	4.71

*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 4.55 differs from the reported value 3.53 by more than 10 %

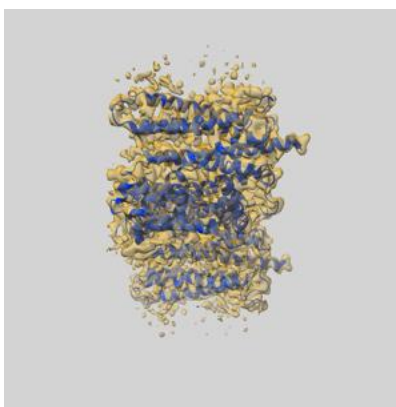
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-61877 and PDB model 9JXR. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

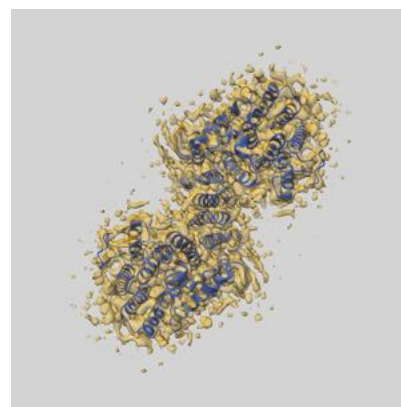
9.1 Map-model overlay [i](#)



X



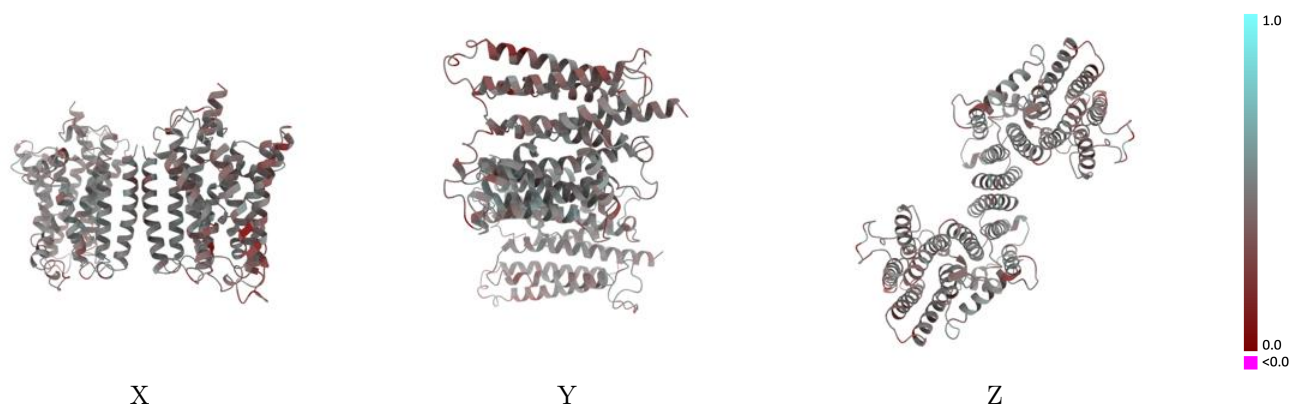
Y



Z

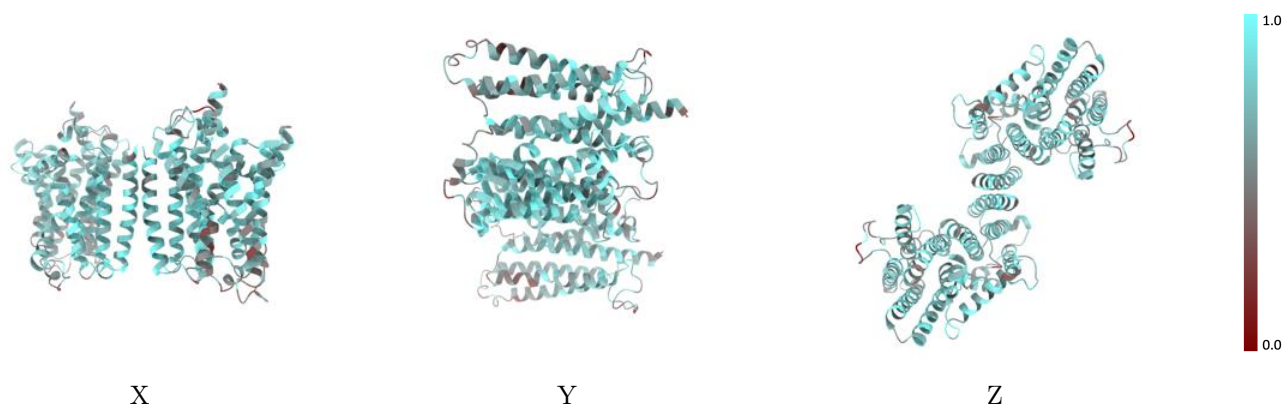
The images above show the 3D surface view of the map at the recommended contour level 0.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



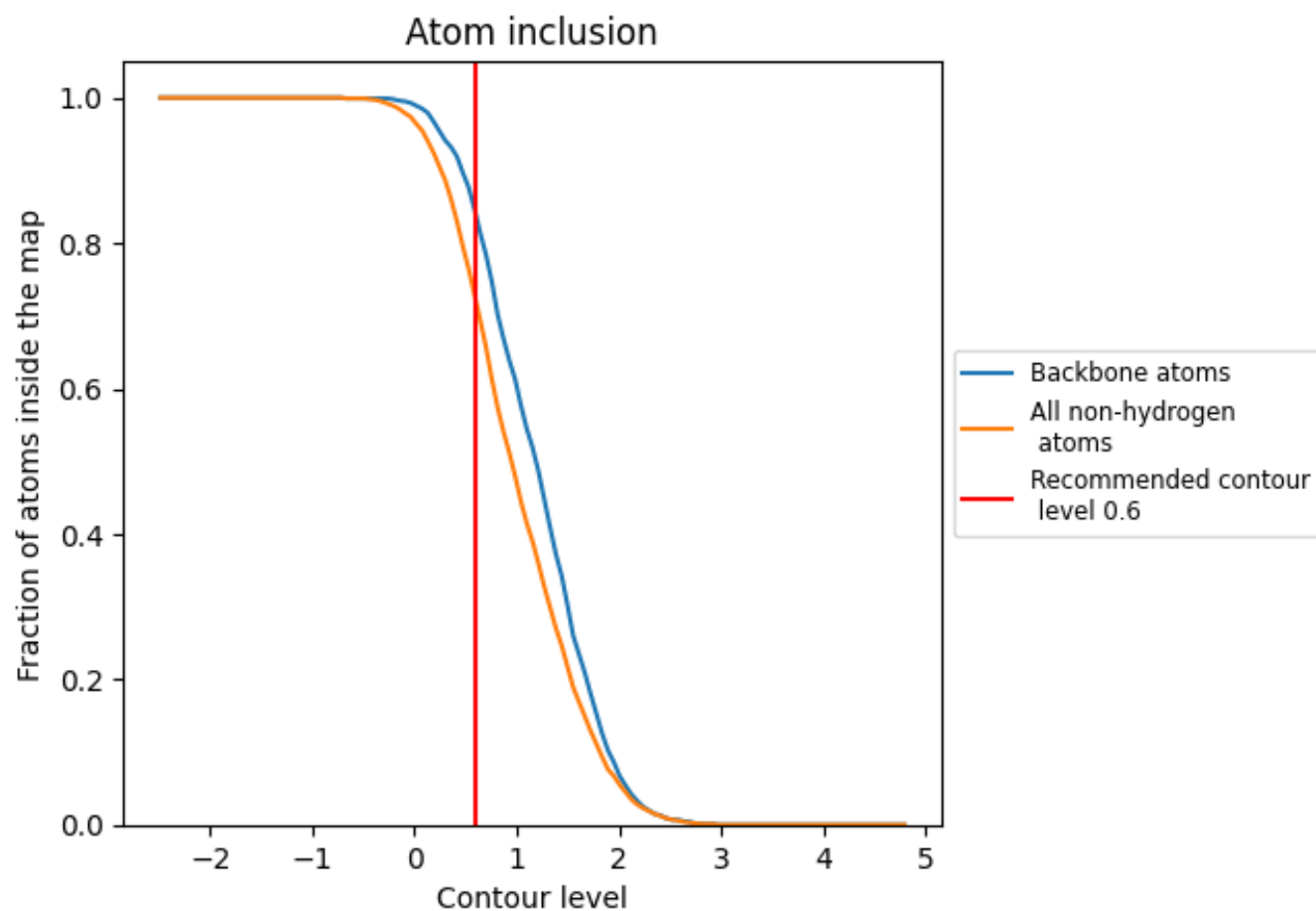
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.6).

9.4 Atom inclusion [i](#)



At the recommended contour level, 84% of all backbone atoms, 72% 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 (0.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7220	0.4290
A	0.7210	0.4300
B	0.7230	0.4280

