



Full wwPDB EM Validation Report ⓘ

Jul 1, 2025 – 11:21 am BST

PDB ID : 9HPK / pdb_00009hpk
EMDB ID : EMD-52332
Title : Open state TMD-LBD of the GluA3(R439G) with TARP gamma2
Authors : Pokharna, A.; Singh, B.; Krieger, J.
Deposited on : 2024-12-13
Resolution : 2.59 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev118
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) : 2.44

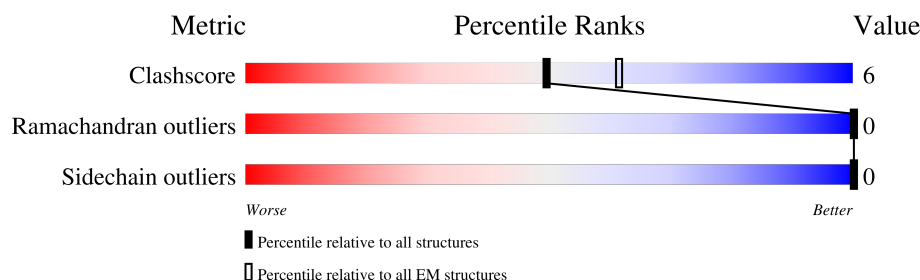
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.59 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	1179	
1	B	1179	
1	C	1179	
1	D	1179	
1	W	1179	
1	X	1179	
1	Y	1179	
1	Z	1179	

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 17705 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 Isoform Flip of Glutamate receptor 3, Voltage-dependent calcium channel gamma-2 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	396	Total	C	N	O	S	0	0
			3113	2026	503	566	18		
1	B	399	Total	C	N	O	S	2	0
			3116	2033	503	561	19		
1	C	397	Total	C	N	O	S	0	0
			3102	2018	501	565	18		
1	D	397	Total	C	N	O	S	1	0
			3107	2028	498	563	18		
1	W	167	Total	C	N	O	S	1	0
			1310	865	215	220	10		
1	X	167	Total	C	N	O	S	1	0
			1310	865	215	220	10		
1	Y	167	Total	C	N	O	S	1	0
			1310	865	215	220	10		
1	Z	167	Total	C	N	O	S	0	0
			1301	860	212	219	10		

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	GLY	-	expression tag	UNP P19492
A	-6	ASP	-	expression tag	UNP P19492
A	-5	TYR	-	expression tag	UNP P19492
A	-4	LYS	-	expression tag	UNP P19492
A	-3	ASP	-	expression tag	UNP P19492
A	-2	ASP	-	expression tag	UNP P19492
A	-1	ASP	-	expression tag	UNP P19492
A	0	ASP	-	expression tag	UNP P19492
A	1	LYS	-	expression tag	UNP P19492
A	844	GLY	-	linker	UNP P19492
A	845	GLY	-	linker	UNP P19492
A	846	SER	-	linker	UNP P19492
A	847	GLY	-	linker	UNP P19492

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Chain	Residue	Modelled	Actual	Comment	Reference
A	848	SER	-	linker	UNP P19492
A	849	GLY	-	linker	UNP P19492
B	-7	GLY	-	expression tag	UNP P19492
B	-6	ASP	-	expression tag	UNP P19492
B	-5	TYR	-	expression tag	UNP P19492
B	-4	LYS	-	expression tag	UNP P19492
B	-3	ASP	-	expression tag	UNP P19492
B	-2	ASP	-	expression tag	UNP P19492
B	-1	ASP	-	expression tag	UNP P19492
B	0	ASP	-	expression tag	UNP P19492
B	1	LYS	-	expression tag	UNP P19492
B	844	GLY	-	linker	UNP P19492
B	845	GLY	-	linker	UNP P19492
B	846	SER	-	linker	UNP P19492
B	847	GLY	-	linker	UNP P19492
B	848	SER	-	linker	UNP P19492
B	849	GLY	-	linker	UNP P19492
C	-7	GLY	-	expression tag	UNP P19492
C	-6	ASP	-	expression tag	UNP P19492
C	-5	TYR	-	expression tag	UNP P19492
C	-4	LYS	-	expression tag	UNP P19492
C	-3	ASP	-	expression tag	UNP P19492
C	-2	ASP	-	expression tag	UNP P19492
C	-1	ASP	-	expression tag	UNP P19492
C	0	ASP	-	expression tag	UNP P19492
C	1	LYS	-	expression tag	UNP P19492
C	844	GLY	-	linker	UNP P19492
C	845	GLY	-	linker	UNP P19492
C	846	SER	-	linker	UNP P19492
C	847	GLY	-	linker	UNP P19492
C	848	SER	-	linker	UNP P19492
C	849	GLY	-	linker	UNP P19492
D	-7	GLY	-	expression tag	UNP P19492
D	-6	ASP	-	expression tag	UNP P19492
D	-5	TYR	-	expression tag	UNP P19492
D	-4	LYS	-	expression tag	UNP P19492
D	-3	ASP	-	expression tag	UNP P19492
D	-2	ASP	-	expression tag	UNP P19492
D	-1	ASP	-	expression tag	UNP P19492
D	0	ASP	-	expression tag	UNP P19492
D	1	LYS	-	expression tag	UNP P19492
D	844	GLY	-	linker	UNP P19492

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Chain	Residue	Modelled	Actual	Comment	Reference
D	845	GLY	-	linker	UNP P19492
D	846	SER	-	linker	UNP P19492
D	847	GLY	-	linker	UNP P19492
D	848	SER	-	linker	UNP P19492
D	849	GLY	-	linker	UNP P19492
W	-855	GLY	-	expression tag	UNP P19492
W	-854	ASP	-	expression tag	UNP P19492
W	-853	TYR	-	expression tag	UNP P19492
W	-852	LYS	-	expression tag	UNP P19492
W	-851	ASP	-	expression tag	UNP P19492
W	-850	ASP	-	expression tag	UNP P19492
W	-849	ASP	-	expression tag	UNP P19492
W	-848	ASP	-	expression tag	UNP P19492
W	-847	LYS	-	expression tag	UNP P19492
W	-4	GLY	-	linker	UNP P19492
W	-3	GLY	-	linker	UNP P19492
W	-2	SER	-	linker	UNP P19492
W	-1	GLY	-	linker	UNP P19492
W	0	SER	-	linker	UNP P19492
W	1	GLY	-	linker	UNP P19492
X	-855	GLY	-	expression tag	UNP P19492
X	-854	ASP	-	expression tag	UNP P19492
X	-853	TYR	-	expression tag	UNP P19492
X	-852	LYS	-	expression tag	UNP P19492
X	-851	ASP	-	expression tag	UNP P19492
X	-850	ASP	-	expression tag	UNP P19492
X	-849	ASP	-	expression tag	UNP P19492
X	-848	ASP	-	expression tag	UNP P19492
X	-847	LYS	-	expression tag	UNP P19492
X	-4	GLY	-	linker	UNP P19492
X	-3	GLY	-	linker	UNP P19492
X	-2	SER	-	linker	UNP P19492
X	-1	GLY	-	linker	UNP P19492
X	0	SER	-	linker	UNP P19492
X	1	GLY	-	linker	UNP P19492
Y	-855	GLY	-	expression tag	UNP P19492
Y	-854	ASP	-	expression tag	UNP P19492
Y	-853	TYR	-	expression tag	UNP P19492
Y	-852	LYS	-	expression tag	UNP P19492
Y	-851	ASP	-	expression tag	UNP P19492
Y	-850	ASP	-	expression tag	UNP P19492
Y	-849	ASP	-	expression tag	UNP P19492

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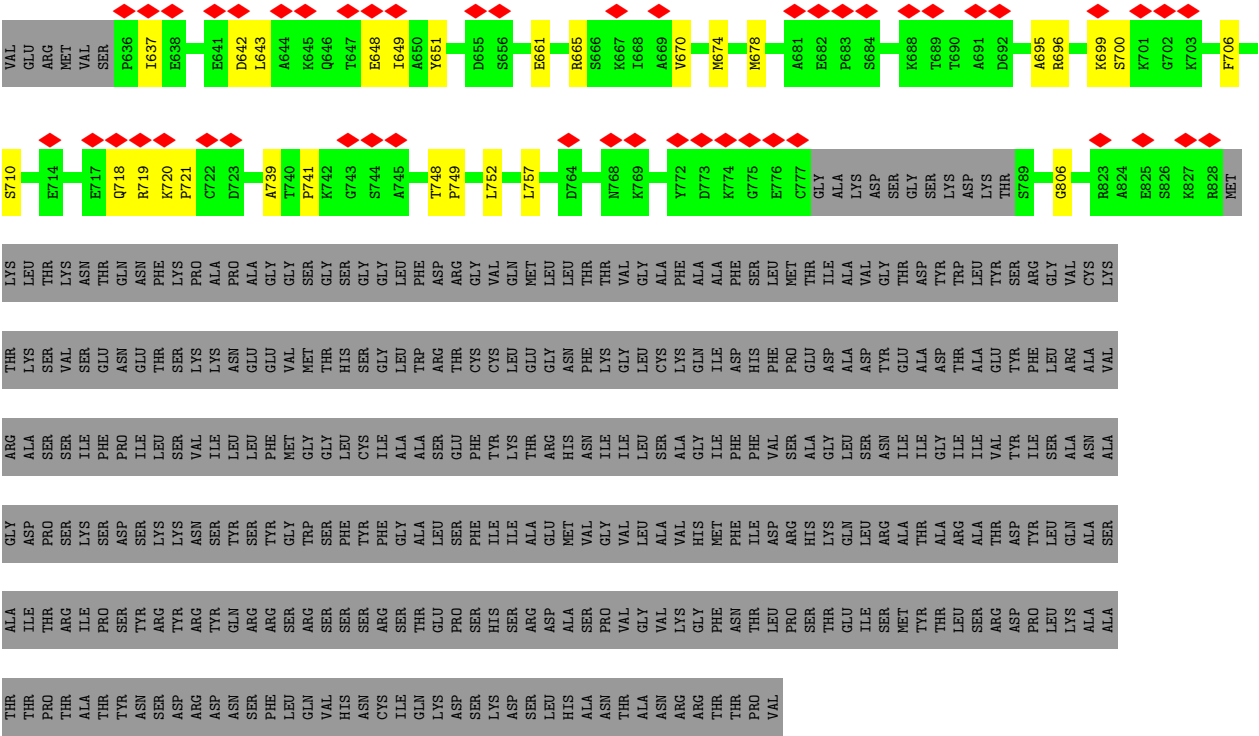
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Chain	Residue	Modelled	Actual	Comment	Reference
Y	-848	ASP	-	expression tag	UNP P19492
Y	-847	LYS	-	expression tag	UNP P19492
Y	-4	GLY	-	linker	UNP P19492
Y	-3	GLY	-	linker	UNP P19492
Y	-2	SER	-	linker	UNP P19492
Y	-1	GLY	-	linker	UNP P19492
Y	0	SER	-	linker	UNP P19492
Y	1	GLY	-	linker	UNP P19492
Z	-855	GLY	-	expression tag	UNP P19492
Z	-854	ASP	-	expression tag	UNP P19492
Z	-853	TYR	-	expression tag	UNP P19492
Z	-852	LYS	-	expression tag	UNP P19492
Z	-851	ASP	-	expression tag	UNP P19492
Z	-850	ASP	-	expression tag	UNP P19492
Z	-849	ASP	-	expression tag	UNP P19492
Z	-848	ASP	-	expression tag	UNP P19492
Z	-847	LYS	-	expression tag	UNP P19492
Z	-4	GLY	-	linker	UNP P19492
Z	-3	GLY	-	linker	UNP P19492
Z	-2	SER	-	linker	UNP P19492
Z	-1	GLY	-	linker	UNP P19492
Z	0	SER	-	linker	UNP P19492
Z	1	GLY	-	linker	UNP P19492

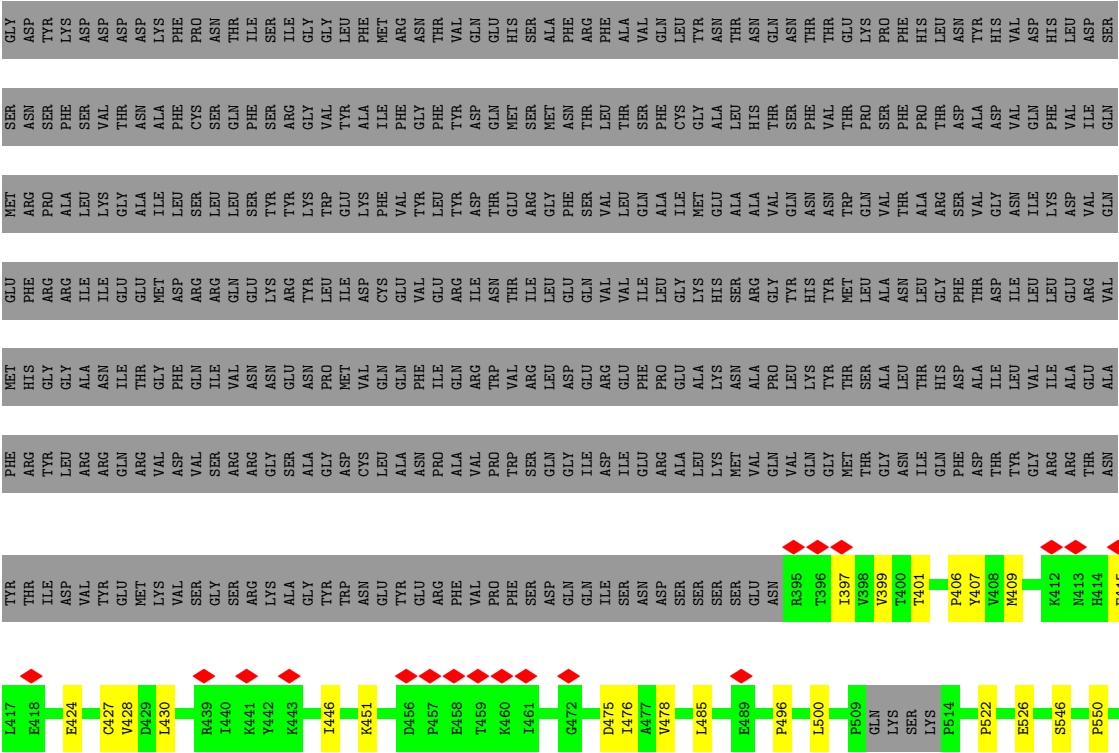
- Molecule 2 is water.

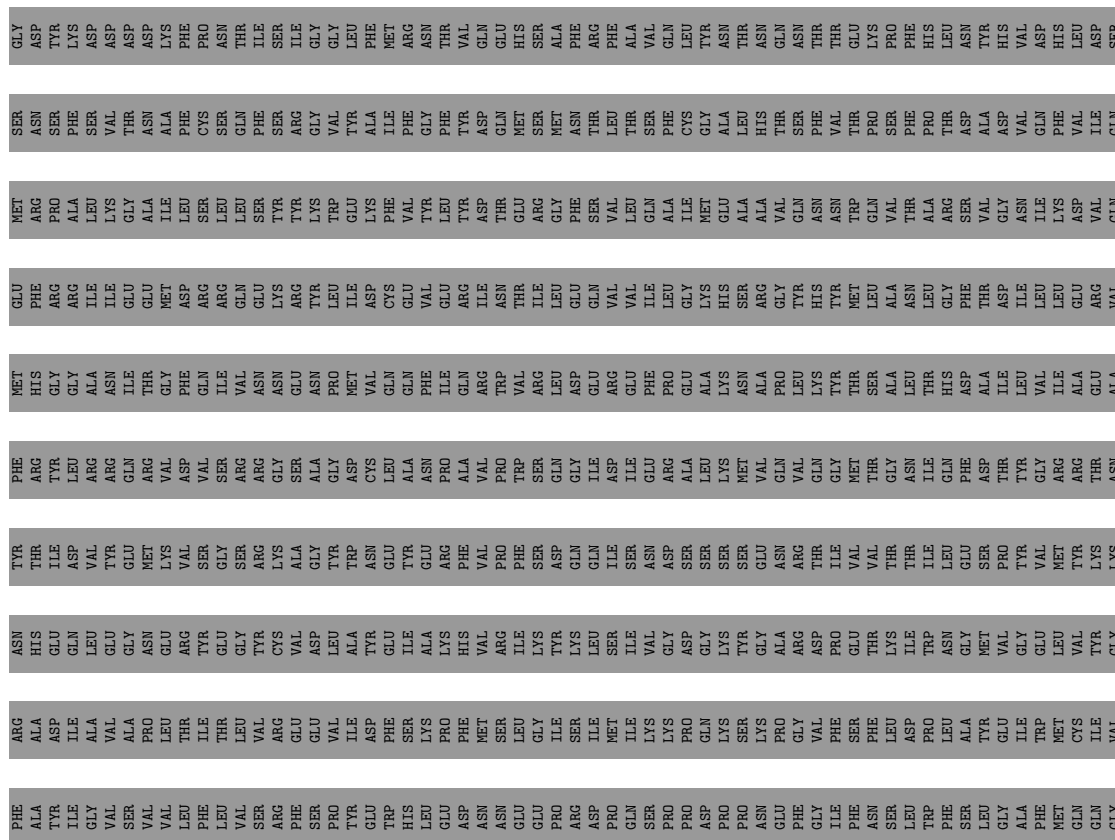
Mol	Chain	Residues	Atoms	AltConf
2	A	6	Total O 6 6	0
2	B	9	Total O 9 9	0
2	C	6	Total O 6 6	0
2	D	7	Total O 7 7	0
2	W	2	Total O 2 2	0
2	X	2	Total O 2 2	0
2	Y	2	Total O 2 2	0
2	Z	2	Total O 2 2	0



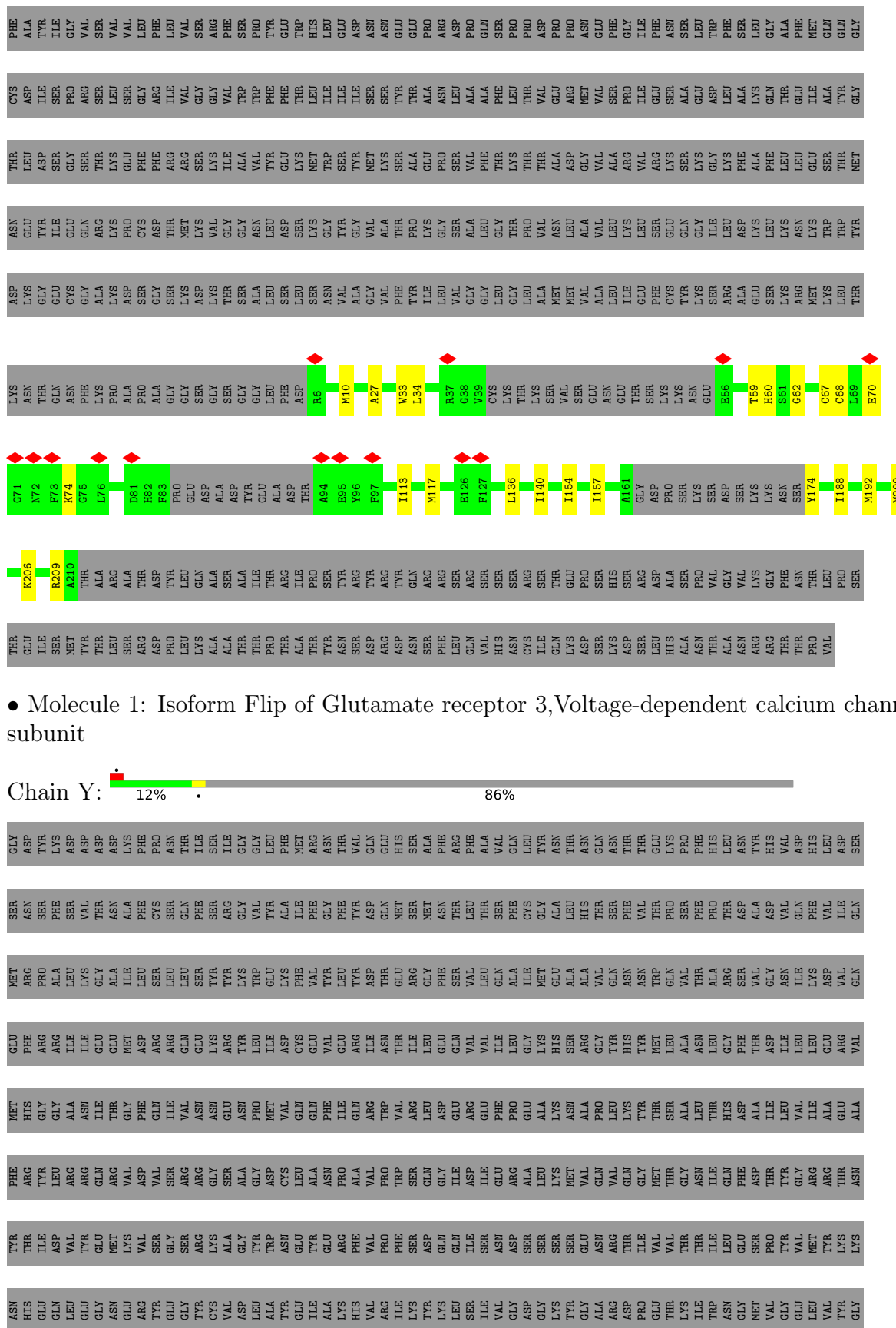


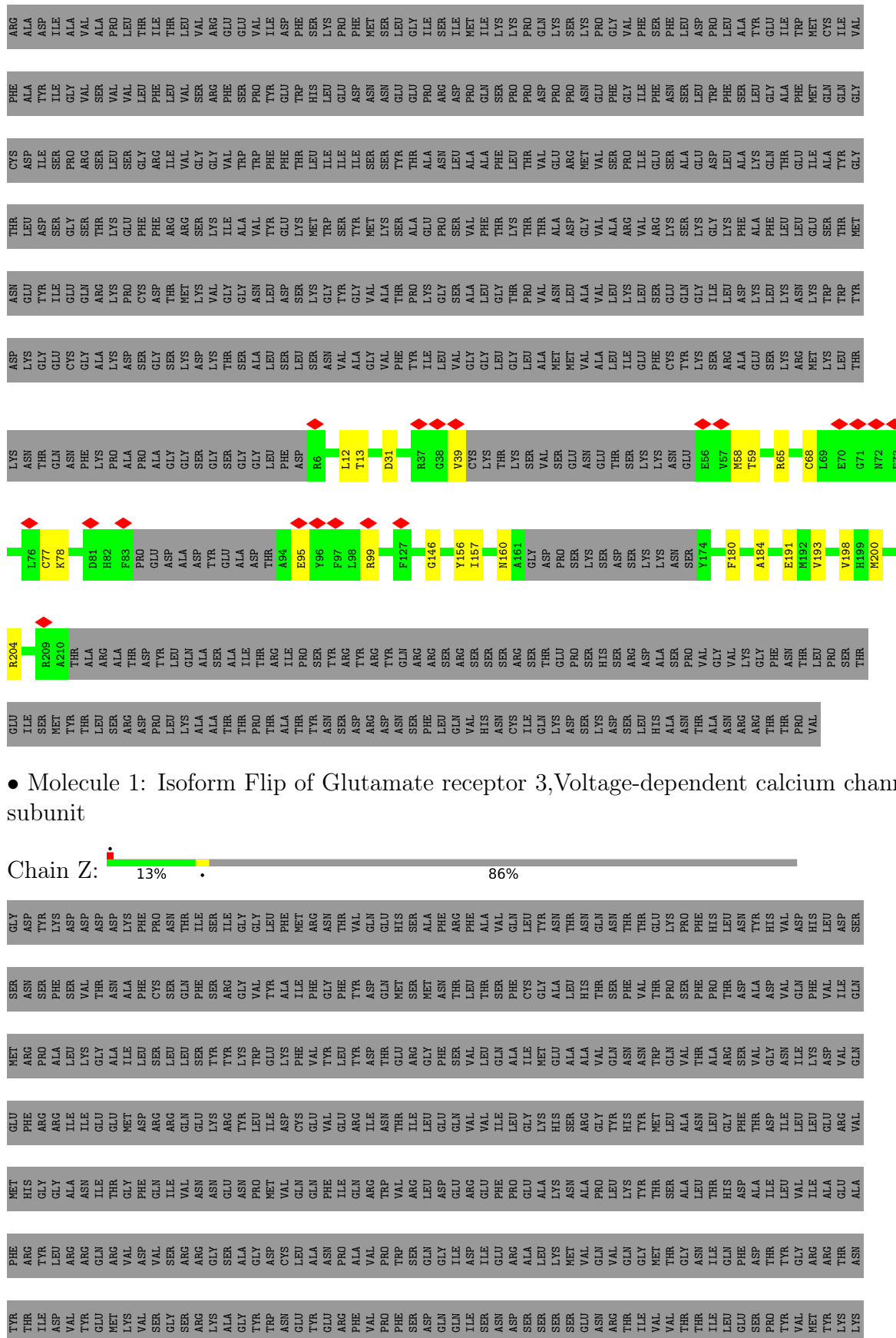
● Molecule 1: Isoform Flip of Glutamate receptor 3, Voltage-dependent calcium channel gamma-2 subunit











[illegible]

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	280853	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 ($e^-/\text{\AA}^2$)	37.6	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	62.047	Depositor
Minimum map value	-41.495	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	10	Depositor
Map size (\AA)	422.912, 422.912, 422.912	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.826, 0.826, 0.826	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	0.17	0/3184	0.34	1/4297 (0.0%)
1	B	0.41	3/3190 (0.1%)	0.56	9/4309 (0.2%)
1	C	0.15	0/3172	0.31	0/4284
1	D	0.13	0/3179	0.30	0/4294
1	W	0.12	0/1343	0.27	0/1811
1	X	0.20	0/1343	0.34	0/1811
1	Y	0.13	0/1343	0.30	0/1811
1	Z	0.13	0/1331	0.25	0/1796
All	All	0.22	3/18085 (0.0%)	0.37	10/24413 (0.0%)

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	B	0	4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	580	SER	CA-CB	-7.77	1.41	1.53
1	B	593[A]	CYS	C-O	5.00	1.31	1.24
1	B	593[B]	CYS	C-O	5.00	1.31	1.24

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	578[A]	PHE	CA-C-O	-7.30	112.68	120.42
1	B	578[B]	PHE	CA-C-O	-7.30	112.68	120.42
1	B	589	MET	N-CA-C	-6.55	105.27	113.20
1	B	576	GLY	CA-C-O	-6.40	115.88	122.28
1	B	590	GLN	CB-CA-C	6.37	121.89	111.26

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	577	ILE	CA-C-O	-5.87	114.62	120.85
1	B	587	ALA	CA-C-O	-5.66	114.42	120.42
1	A	773	ASP	N-CA-C	-5.43	105.47	111.71
1	B	593[A]	CYS	CA-C-O	5.36	128.59	121.46
1	B	593[B]	CYS	CA-C-O	5.36	128.59	121.46

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	577	ILE	Mainchain
1	B	578[A]	PHE	Mainchain
1	B	578[B]	PHE	Mainchain

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	A	3113	0	3130	40	0
1	B	3116	0	3122	42	0
1	C	3102	0	3109	40	0
1	D	3107	0	3112	41	0
1	W	1310	0	1320	12	0
1	X	1310	0	1320	13	0
1	Y	1310	0	1320	17	0
1	Z	1301	0	1304	12	0
2	A	6	0	0	0	0
2	B	9	0	0	0	0
2	C	6	0	0	0	0
2	D	7	0	0	0	0
2	W	2	0	0	0	0
2	X	2	0	0	0	0
2	Y	2	0	0	0	0
2	Z	2	0	0	0	0
All	All	17705	0	17737	195	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 6.

All (195) 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:553:TRP:HA	1:B:572:PRO:HG3	1.68	0.75
1:A:640:ALA:HB1	1:A:674:MET:HE1	1.68	0.74
1:D:553:TRP:HA	1:D:572:PRO:HG3	1.69	0.73
1:C:414:HIS:HB2	1:C:422:ARG:HG3	1.70	0.73
1:D:550:PRO:O	1:W:209:ARG:NH2	2.23	0.71
1:X:59:THR:HG22	1:X:68:CYS:HA	1.75	0.69
1:Z:33:TRP:HB2	1:Z:62:GLY:HA2	1.74	0.68
1:X:10:MET:SD	1:X:200:MET:HE1	2.35	0.67
1:X:33:TRP:HB2	1:X:62:GLY:HA2	1.77	0.67
1:W:59:THR:HG22	1:W:68:CYS:HA	1.78	0.64
1:C:648:GLU:HG2	1:C:649:ILE:HG13	1.81	0.63
1:A:768:ASN:HA	1:A:772:TYR:HD2	1.63	0.62
1:D:648:GLU:OE1	1:D:648:GLU:N	2.28	0.61
1:A:430:LEU:O	1:A:434:ILE:HD12	2.02	0.60
1:X:188:ILE:HG22	1:X:192:MET:HE2	1.84	0.59
1:D:636:PRO:HB2	1:D:637:ILE:HD12	1.85	0.59
1:X:70:GLU:HA	1:X:74:LYS:HG3	1.85	0.59
1:C:720:LYS:HD2	1:C:721:PRO:HA	1.85	0.58
1:D:406:PRO:HA	1:D:409:MET:HE3	1.84	0.58
1:A:806:GLY:HA3	1:D:608:VAL:HG11	1.86	0.57
1:B:718:GLN:NE2	1:B:771:TRP:O	2.38	0.57
1:C:718:GLN:HB2	1:C:719:ARG:NH1	2.20	0.57
1:A:407:TYR:HB3	1:A:427:CYS:SG	2.44	0.57
1:A:409:MET:N	1:A:424:GLU:O	2.38	0.57
1:C:406:PRO:HA	1:C:409:MET:HE3	1.88	0.56
1:D:451:LYS:NZ	1:D:655:ASP:OD2	2.38	0.56
1:B:608:VAL:HG11	1:C:806:GLY:HA3	1.87	0.56
1:Y:95:GLU:HG3	1:Y:99:ARG:HE	1.70	0.56
1:X:206:LYS:HG2	1:X:209:ARG:HH11	1.69	0.56
1:B:407:TYR:HE1	1:B:498:MET:HE1	1.71	0.56
1:B:502:ILE:HG12	1:B:659:THR:HG23	1.88	0.55
1:D:397:ILE:HD13	1:D:746:LEU:HD11	1.88	0.55
1:C:546:SER:HB3	1:C:573:ASN:HD21	1.72	0.55
1:D:661:GLU:O	1:D:665:ARG:HG2	2.07	0.55
1:D:694:VAL:HG21	1:D:716:ILE:HD13	1.88	0.55
1:A:451:LYS:NZ	1:A:655:ASP:OD2	2.40	0.55
1:C:670:VAL:O	1:C:674:MET:HG2	2.07	0.55
1:A:505:MET:HE3	1:A:708:LEU:HD21	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:434:ILE:O	1:A:438:VAL:HG12	2.07	0.54
1:A:755:LEU:O	1:A:759:GLU:HG2	2.08	0.54
1:B:644:ALA:HB1	1:B:673:LYS:HD2	1.90	0.54
1:B:466:VAL:O	1:B:470:VAL:HG23	2.08	0.53
1:C:718:GLN:HB2	1:C:719:ARG:HH11	1.72	0.53
1:B:476:ILE:HD11	1:B:746:LEU:HD13	1.91	0.53
1:Z:31:ASP:OD1	1:Z:65:ARG:NH1	2.42	0.53
1:Z:60:HIS:CE1	1:Z:67:CYS:HB2	2.43	0.53
1:W:132:HIS:CD2	1:W:208:LEU:HD11	2.43	0.53
1:C:465:MET:HE3	1:C:481:LEU:HD13	1.90	0.53
1:C:505:MET:HG2	1:C:706:PHE:HB3	1.90	0.53
1:D:401:THR:HG23	1:D:446:ILE:HD13	1.89	0.53
1:D:430:LEU:HD23	1:D:478:VAL:HG13	1.91	0.53
1:B:422:ARG:HG3	1:B:422:ARG:HH11	1.74	0.53
1:B:402:ILE:HB	1:B:465:MET:HE2	1.92	0.52
1:W:33:TRP:HB2	1:W:62:GLY:HA2	1.91	0.52
1:X:60:HIS:CE1	1:X:67:CYS:HB2	2.45	0.52
1:D:646:GLN:NE2	1:D:649:ILE:O	2.30	0.51
1:A:526:GLU:HG2	1:Z:157:ILE:HD13	1.92	0.51
1:X:113:ILE:O	1:X:117:MET:HG3	2.10	0.51
1:B:756:LYS:O	1:B:760:GLN:HG3	2.10	0.51
1:A:501:GLY:O	1:A:710:SER:N	2.44	0.51
1:D:409:MET:N	1:D:424:GLU:O	2.41	0.50
1:B:694:VAL:HG21	1:B:716:ILE:HD13	1.93	0.50
1:A:438:VAL:HG13	1:A:440:ILE:HG23	1.94	0.50
1:A:694:VAL:HA	1:A:697:VAL:HG12	1.93	0.50
1:A:591:GLN:HG3	1:D:610:TRP:CG	2.47	0.49
1:C:674:MET:O	1:C:678:MET:HG2	2.11	0.49
1:D:546:SER:HB3	1:D:573:ASN:HD21	1.77	0.49
1:A:591:GLN:HG3	1:D:610:TRP:CD1	2.48	0.49
1:D:689:THR:HG22	1:D:691:ALA:H	1.77	0.49
1:C:491:ILE:HD12	1:C:739:ALA:HB1	1.95	0.49
1:B:401:THR:HG21	1:B:408:VAL:HG21	1.94	0.49
1:B:514:PRO:HB2	1:B:518:SER:HB3	1.93	0.49
1:Z:27:ALA:O	1:Z:33:TRP:NE1	2.40	0.49
1:C:598:ARG:NH2	1:D:574:GLU:OE1	2.45	0.48
1:C:547:ARG:NH2	1:C:573:ASN:O	2.42	0.48
1:W:26:ILE:O	1:W:30:THR:HG23	2.13	0.48
1:A:608:VAL:HG11	1:B:806:GLY:HA3	1.96	0.48
1:B:526:GLU:HG2	1:Y:157:ILE:HD13	1.95	0.48
1:B:588:PHE:HA	1:B:613:THR:CG2	2.44	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:X:27:ALA:O	1:X:33:TRP:NE1	2.39	0.47
1:C:409:MET:N	1:C:424:GLU:O	2.43	0.47
1:B:529:MET:HE1	1:Y:180:PHE:CZ	2.49	0.47
1:W:196:LEU:O	1:W:200:MET:HG3	2.14	0.47
1:C:469:LEU:HD22	1:C:741:PRO:HD3	1.96	0.47
1:W:58:MET:HE3	1:W:58:MET:HA	1.97	0.47
1:B:828:ARG:HG2	1:B:828:ARG:HH11	1.81	0.46
1:C:615:ILE:HG21	1:D:799:VAL:HG11	1.97	0.46
1:X:136:LEU:O	1:X:140:ILE:HG12	2.15	0.46
1:A:719:ARG:NH1	1:A:774:LYS:O	2.48	0.46
1:Z:196:LEU:O	1:Z:200:MET:HG3	2.15	0.46
1:C:468:GLU:OE1	1:C:473:ARG:NE	2.48	0.46
1:Y:58:MET:HA	1:Y:58:MET:HE2	1.97	0.46
1:A:404:GLU:HG2	1:A:712:MET:HE2	1.97	0.46
1:C:553:TRP:HA	1:C:572:PRO:HG3	1.98	0.46
1:Z:136:LEU:O	1:Z:140:ILE:HG12	2.16	0.46
1:A:655:ASP:OD1	1:A:656:SER:N	2.48	0.46
1:A:695:ALA:O	1:A:699:LYS:HG2	2.15	0.46
1:Y:65:ARG:NH2	1:Y:77:CYS:SG	2.89	0.46
1:D:526:GLU:HG2	1:W:157:ILE:HD13	1.97	0.46
1:A:504:ILE:O	1:A:713:ASN:ND2	2.48	0.45
1:B:610:TRP:CG	1:C:591:GLN:HG3	2.51	0.45
1:D:424:GLU:HA	1:D:428:VAL:HG21	1.98	0.45
1:B:544:LEU:HD13	1:Y:198:VAL:HG21	1.98	0.45
1:C:407:TYR:HB3	1:C:427:CYS:SG	2.56	0.45
1:D:397:ILE:HG23	1:D:475:ASP:HB2	1.97	0.45
1:B:655:ASP:N	1:B:687:THR:O	2.49	0.45
1:Y:59:THR:HG22	1:Y:68:CYS:HA	1.98	0.45
1:A:544:LEU:O	1:A:548:PHE:HD1	2.00	0.45
1:D:648:GLU:HG2	1:D:649:ILE:HG13	1.97	0.45
1:Y:156:TYR:O	1:Y:160:ASN:ND2	2.50	0.45
1:A:401:THR:HG22	1:A:402:ILE:N	2.32	0.45
1:C:438:VAL:O	1:C:440:ILE:HG12	2.16	0.45
1:A:491:ILE:HD12	1:A:739:ALA:HB1	1.98	0.45
1:B:403:LEU:HG	1:B:446:ILE:HD13	1.98	0.45
1:D:762:ILE:HA	1:D:765:LYS:HE3	1.99	0.44
1:C:443:LYS:HA	1:C:443:LYS:HD2	1.75	0.44
1:C:501:GLY:O	1:C:710:SER:N	2.50	0.44
1:C:748:THR:OG1	1:C:749:PRO:HD3	2.17	0.44
1:B:401:THR:HG22	1:B:402:ILE:N	2.33	0.44
1:Z:64:TRP:C	1:Z:80:ILE:HG12	2.43	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Z:66:THR:HG23	1:Z:80:ILE:HD13	2.00	0.44
1:B:651:TYR:HD2	1:B:678:MET:HE2	1.83	0.44
1:A:496:PRO:HA	1:A:736:TYR:O	2.18	0.44
1:D:476:ILE:HD11	1:D:746:LEU:HD13	1.98	0.44
1:Y:200:MET:O	1:Y:204:ARG:HG3	2.18	0.44
1:A:552:GLU:O	1:A:572:PRO:HB3	2.18	0.44
1:C:748:THR:O	1:C:752:LEU:HG	2.18	0.44
1:D:496:PRO:HA	1:D:736:TYR:O	2.18	0.44
1:A:609:TRP:O	1:A:613:THR:HG22	2.18	0.43
1:Y:31:ASP:OD2	1:Y:65:ARG:NE	2.51	0.43
1:Y:157:ILE:HD11	1:Y:180:PHE:HZ	1.83	0.43
1:C:403:LEU:HA	1:C:408:VAL:HG13	2.00	0.43
1:A:674:MET:O	1:A:678:MET:HG3	2.18	0.43
1:Z:70:GLU:HA	1:Z:74:LYS:HE3	2.00	0.43
1:A:424:GLU:HA	1:A:428:VAL:HG21	2.00	0.43
1:B:469:LEU:HD11	1:B:477:ALA:HB2	2.01	0.43
1:W:136:LEU:O	1:W:140:ILE:HG12	2.18	0.43
1:D:762:ILE:HG12	1:D:765:LYS:HE3	2.00	0.43
1:Y:13:THR:HG23	1:Y:193:VAL:HG13	2.00	0.43
1:A:500:LEU:HD11	1:A:734:LYS:HG3	2.00	0.43
1:B:588:PHE:HA	1:B:613:THR:HG23	2.00	0.43
1:C:433:GLU:HB3	1:C:757:LEU:HD21	2.00	0.43
1:C:637:ILE:HG23	1:C:642:ASP:HB2	2.01	0.43
1:B:646:GLN:HE22	1:B:649:ILE:HB	1.82	0.43
1:D:415:GLU:OE1	1:D:415:GLU:N	2.41	0.43
1:D:768:ASN:HA	1:D:772:TYR:HD2	1.84	0.43
1:C:695:ALA:O	1:C:699:LYS:HG2	2.19	0.42
1:W:57:VAL:O	1:W:59:THR:HG23	2.19	0.42
1:A:748:THR:OG1	1:A:749:PRO:HD3	2.19	0.42
1:B:626:ALA:O	1:B:630:VAL:HG23	2.20	0.42
1:C:522:PRO:HB3	1:C:623:ASN:HB3	2.01	0.42
1:D:522:PRO:HG2	1:D:620:TYR:CE1	2.54	0.42
1:Y:12:LEU:HD23	1:Y:12:LEU:HA	1.90	0.42
1:A:401:THR:HG22	1:A:402:ILE:H	1.84	0.42
1:Y:39:VAL:HG13	1:Y:78:LYS:HE2	2.00	0.42
1:Z:10:MET:SD	1:Z:200:MET:HE1	2.59	0.42
1:A:500:LEU:HD22	1:A:736:TYR:CZ	2.55	0.42
1:B:538:VAL:HG21	1:B:609:TRP:CE3	2.54	0.42
1:B:406:PRO:HG3	1:B:715:TYR:CE1	2.54	0.42
1:D:599:SER:O	1:D:603:ARG:HG3	2.20	0.42
1:B:679:LYS:HB3	1:B:679:LYS:HE2	1.79	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:696:ARG:O	1:C:700:SER:OG	2.33	0.42
1:D:655:ASP:OD1	1:D:656:SER:N	2.52	0.42
1:C:451:LYS:HD3	1:C:463:ASN:HD22	1.85	0.41
1:D:399:VAL:HG22	1:D:476:ILE:HB	2.02	0.41
1:D:476:ILE:HG22	1:D:478:VAL:HG23	2.02	0.41
1:Y:146:GLY:HA3	1:Y:191:GLU:OE2	2.21	0.41
1:A:457:PRO:O	1:A:460:LYS:NZ	2.37	0.41
1:A:670:VAL:O	1:A:674:MET:HG3	2.20	0.41
1:B:800:PHE:HB3	1:Z:154:ILE:HD13	2.02	0.41
1:C:661:GLU:O	1:C:665:ARG:HG3	2.20	0.41
1:W:131:ARG:HH21	1:W:133:ASN:HB2	1.85	0.41
1:B:533:PHE:HZ	1:Y:184:ALA:HB1	1.85	0.41
1:B:529:MET:HE1	1:Y:180:PHE:CE2	2.55	0.41
1:C:523:LEU:HG	1:C:620:TYR:HD1	1.86	0.41
1:D:697:VAL:HG21	1:D:706:PHE:HB2	2.03	0.41
1:A:611:PHE:CE2	1:B:799:VAL:HG23	2.55	0.41
1:D:800:PHE:HB3	1:X:154:ILE:HD13	2.02	0.41
1:A:756:LYS:HG2	1:D:485:LEU:HD22	2.03	0.41
1:B:687:THR:HG21	1:B:693:GLY:N	2.36	0.41
1:C:526:GLU:HG2	1:X:157:ILE:HD13	2.02	0.41
1:D:688:LYS:HE3	1:D:688:LYS:HB3	1.73	0.41
1:W:31:ASP:HA	1:W:62:GLY:HA3	2.03	0.41
1:A:458:GLU:HG2	1:A:459:THR:N	2.36	0.40
1:A:610:TRP:CZ3	1:B:586:GLY:HA2	2.56	0.40
1:B:419:GLY:HA2	1:B:422:ARG:HH12	1.86	0.40
1:B:513:LYS:HA	1:B:514:PRO:HD3	1.90	0.40
1:C:538:VAL:HG21	1:C:609:TRP:CE3	2.57	0.40
1:D:500:LEU:HD22	1:D:736:TYR:CZ	2.56	0.40
1:X:34:LEU:HD11	1:X:174:TYR:HD1	1.87	0.40
1:C:720:LYS:HD3	1:C:720:LYS:HA	1.98	0.40
1:B:774:LYS:HB2	1:B:774:LYS:HE3	1.82	0.40
1:C:643:LEU:HD22	1:C:651:TYR:CD2	2.57	0.40
1:B:646:GLN:NE2	1:B:649:ILE:HB	2.36	0.40
1:D:407:TYR:HB3	1:D:427:CYS:SG	2.61	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	386/1179 (33%)	382 (99%)	4 (1%)	0	100	100
1	B	391/1179 (33%)	383 (98%)	8 (2%)	0	100	100
1	C	387/1179 (33%)	378 (98%)	9 (2%)	0	100	100
1	D	388/1179 (33%)	379 (98%)	9 (2%)	0	100	100
1	W	160/1179 (14%)	158 (99%)	2 (1%)	0	100	100
1	X	160/1179 (14%)	158 (99%)	2 (1%)	0	100	100
1	Y	160/1179 (14%)	155 (97%)	5 (3%)	0	100	100
1	Z	159/1179 (14%)	156 (98%)	3 (2%)	0	100	100
All	All	2191/9432 (23%)	2149 (98%)	42 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	333/1013 (33%)	333 (100%)	0	100	100
1	B	329/1013 (32%)	329 (100%)	0	100	100
1	C	330/1013 (33%)	330 (100%)	0	100	100
1	D	330/1013 (33%)	330 (100%)	0	100	100
1	W	136/1013 (13%)	136 (100%)	0	100	100
1	X	136/1013 (13%)	136 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	Y	136/1013 (13%)	136 (100%)	0	100	100
1	Z	134/1013 (13%)	134 (100%)	0	100	100
All	All	1864/8104 (23%)	1864 (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 (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	623	ASN
1	B	751	ASN
1	C	760	GLN
1	W	82	HIS
1	W	207	GLN
1	X	205	HIS
1	Y	132	HIS
1	Z	205	HIS

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 ⓘ

There are no chain breaks in this entry.

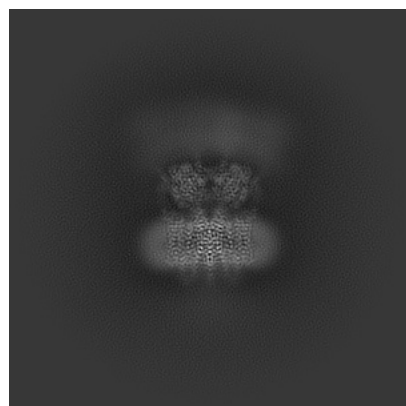
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-52332. These allow visual inspection of the internal detail of the map and identification of artifacts.

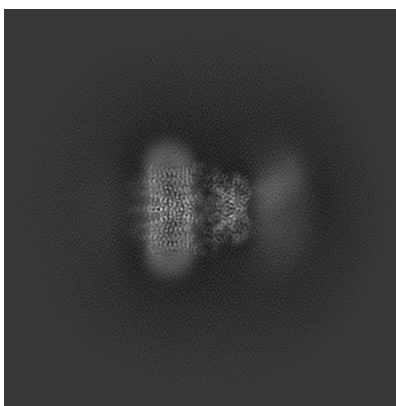
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

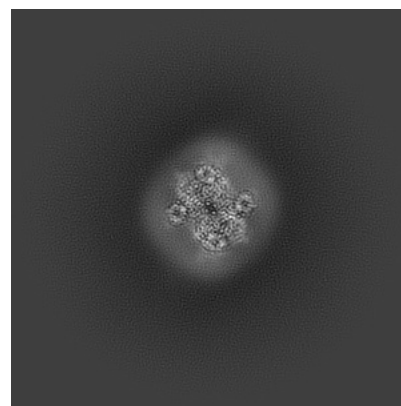
6.1.1 Primary map



X

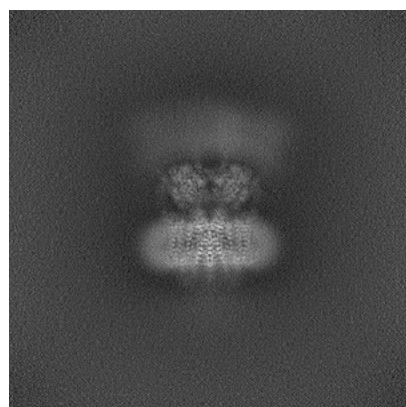


Y

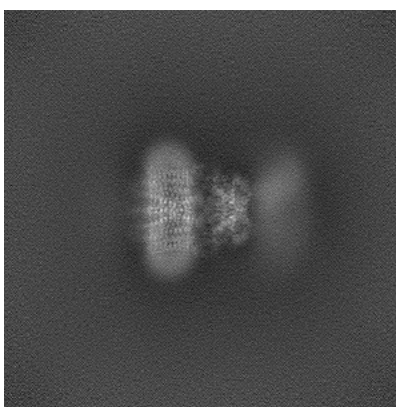


Z

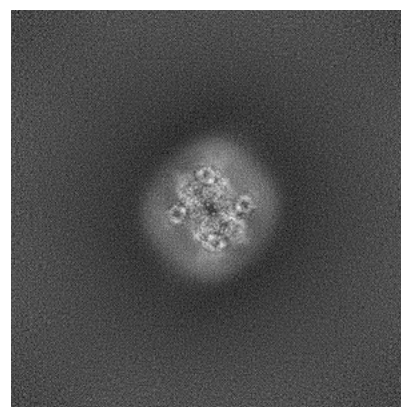
6.1.2 Raw map



X



Y

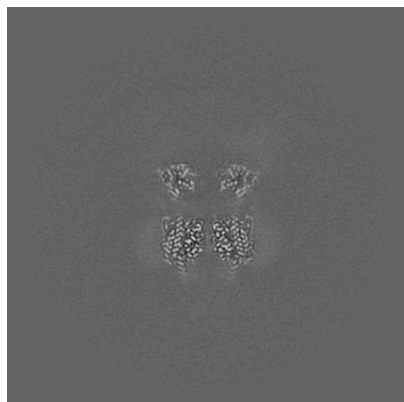


Z

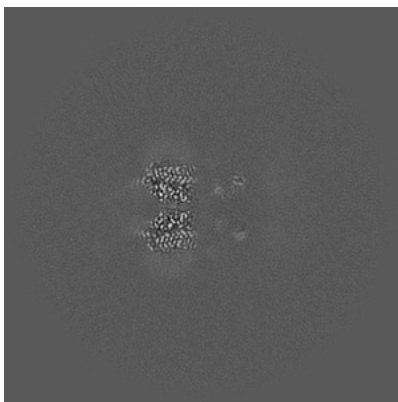
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

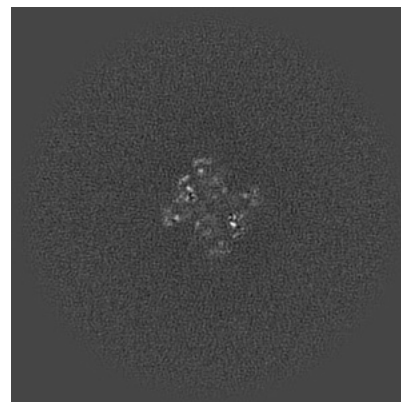
6.2.1 Primary map



X Index: 256

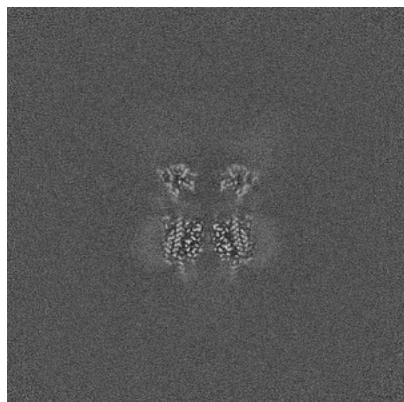


Y Index: 256

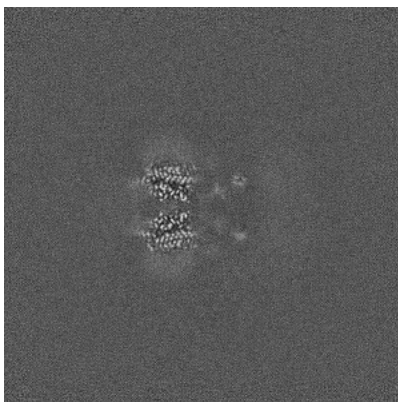


Z Index: 256

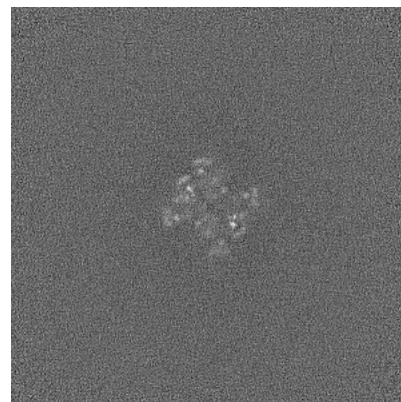
6.2.2 Raw map



X Index: 256



Y Index: 256

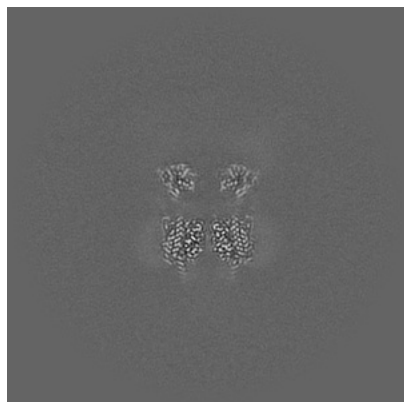


Z Index: 256

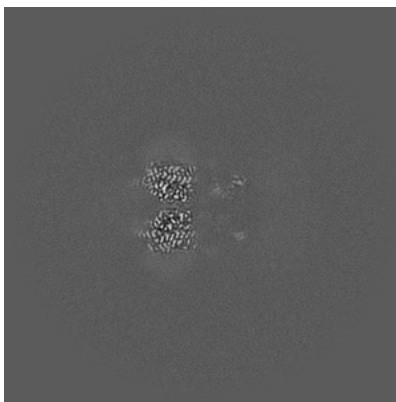
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

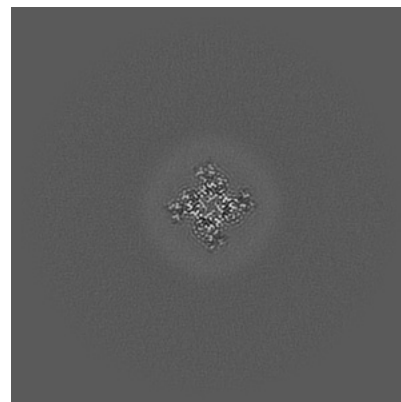
6.3.1 Primary map



X Index: 256

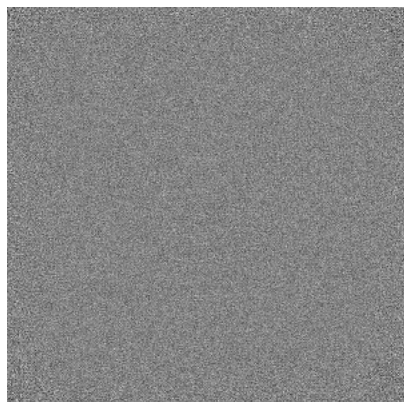


Y Index: 255

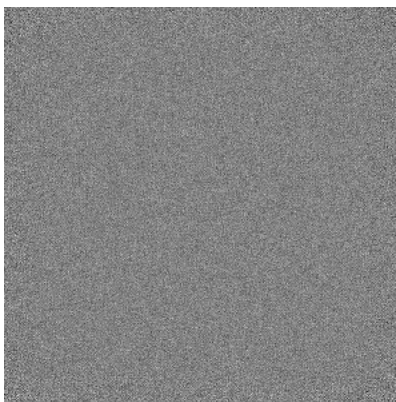


Z Index: 201

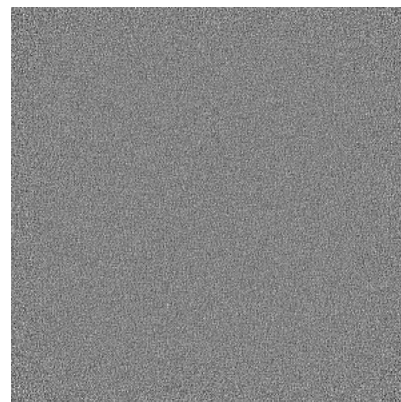
6.3.2 Raw map



X Index: 0



Y Index: 0

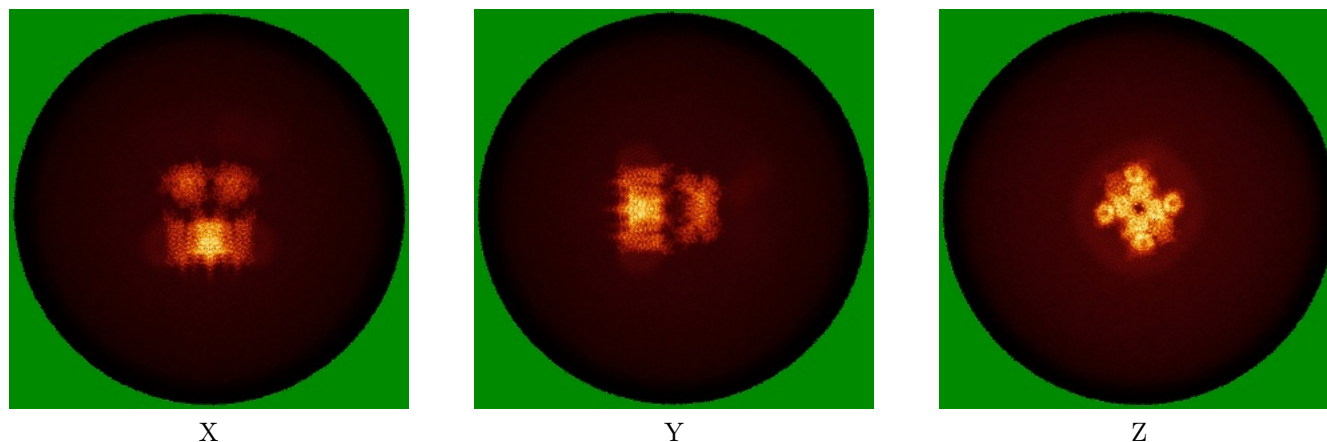


Z Index: 511

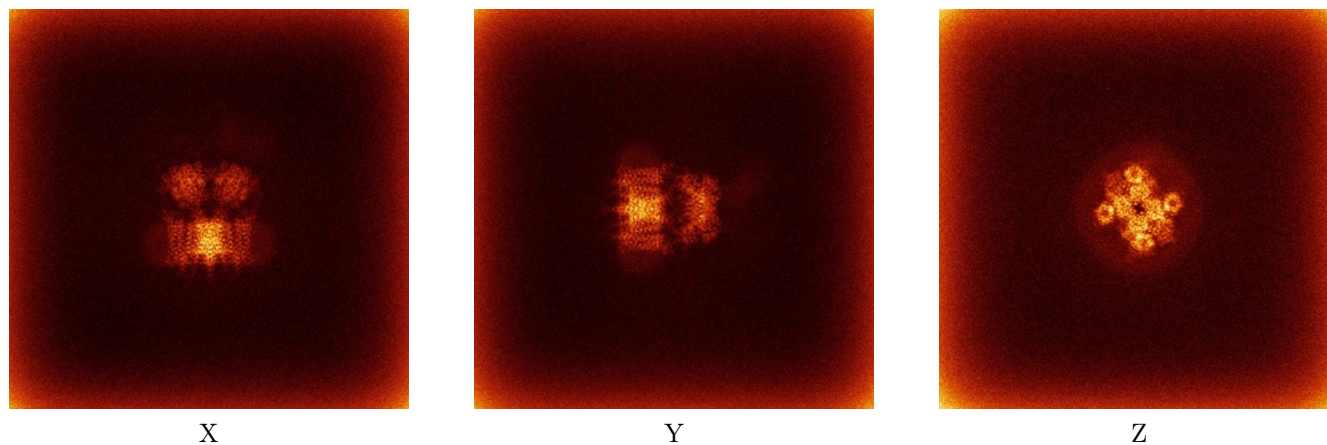
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



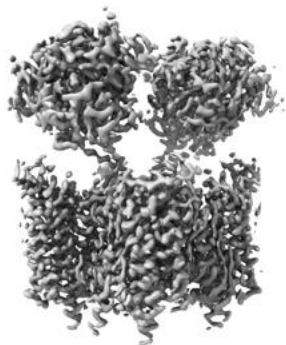
6.4.2 Raw map



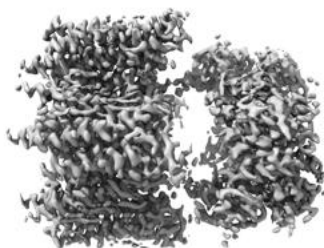
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

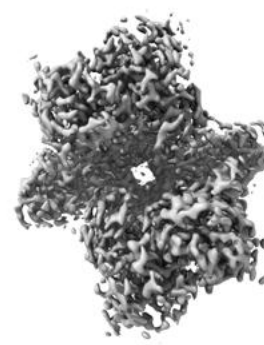
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 10.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

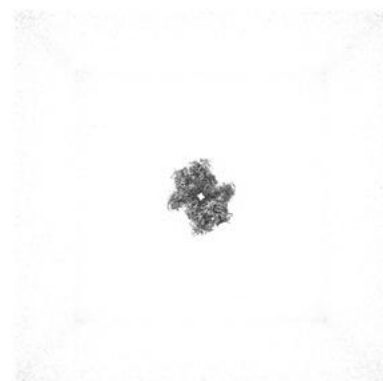
6.5.2 Raw map



X



Y



Z

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.

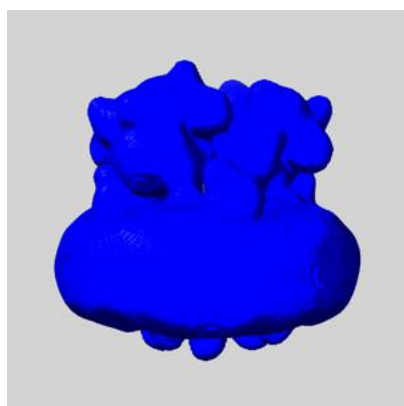
6.6 Mask visualisation [i](#)

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

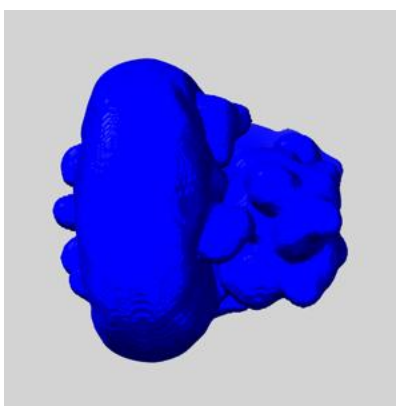
A mask typically either:

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

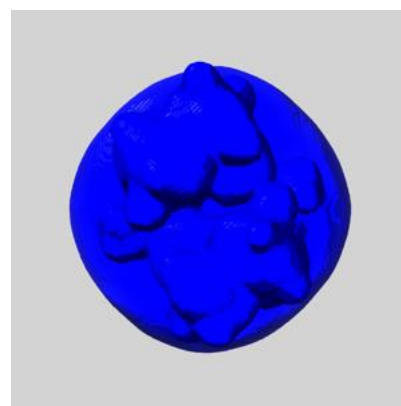
6.6.1 emd_52332_msk_1.map [i](#)



X



Y

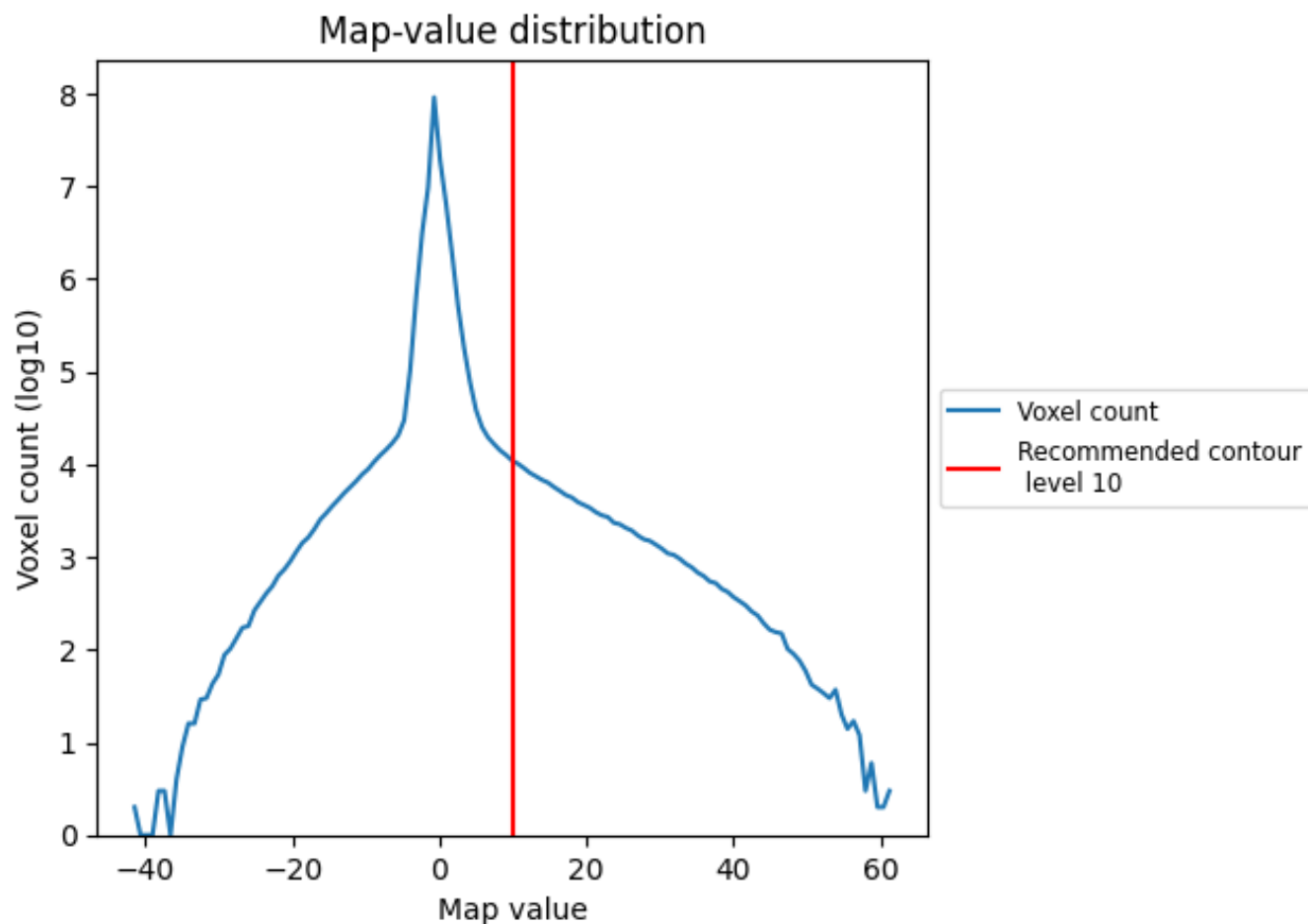


Z

7 Map analysis [i](#)

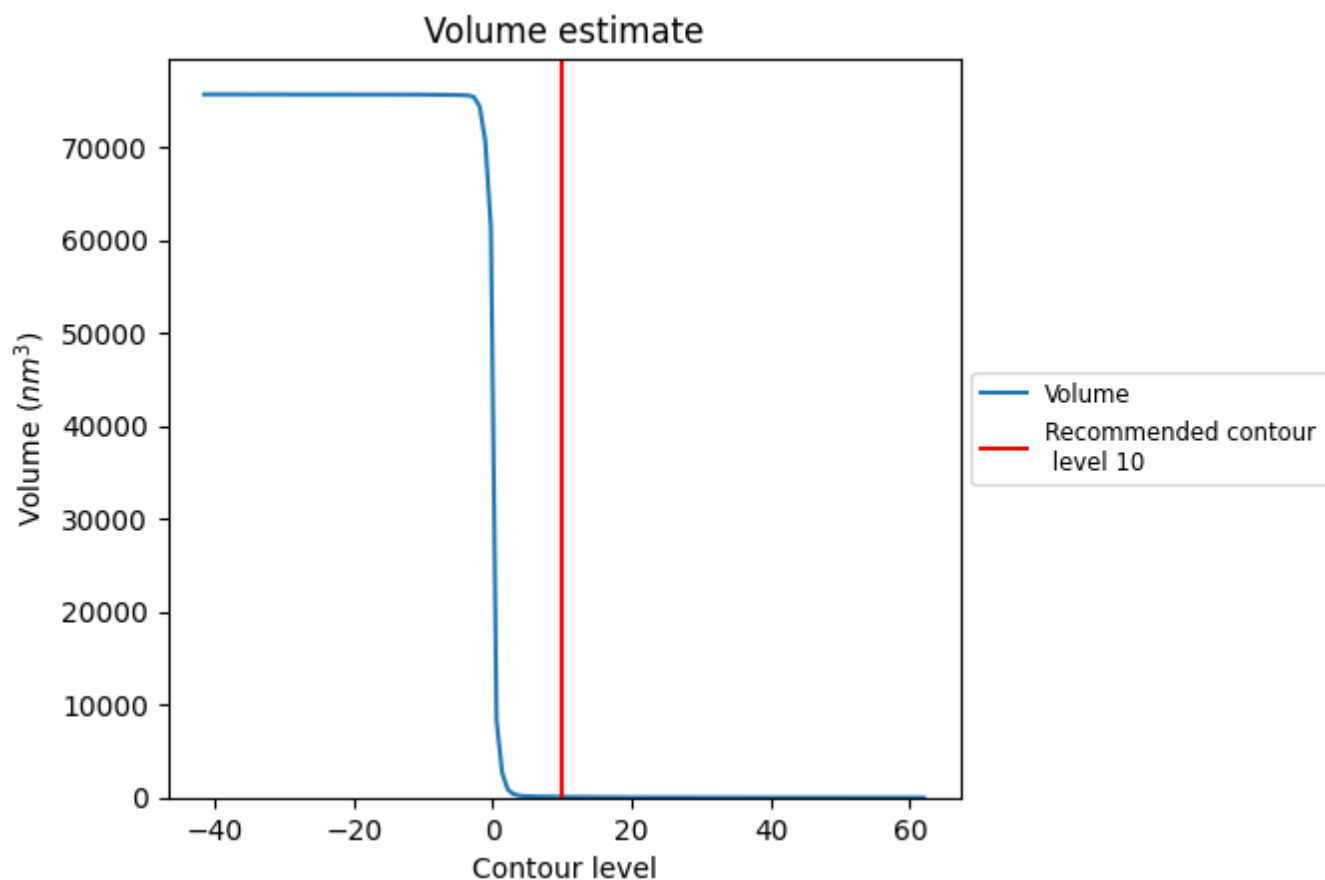
This section contains the results of statistical analysis of the map.

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.

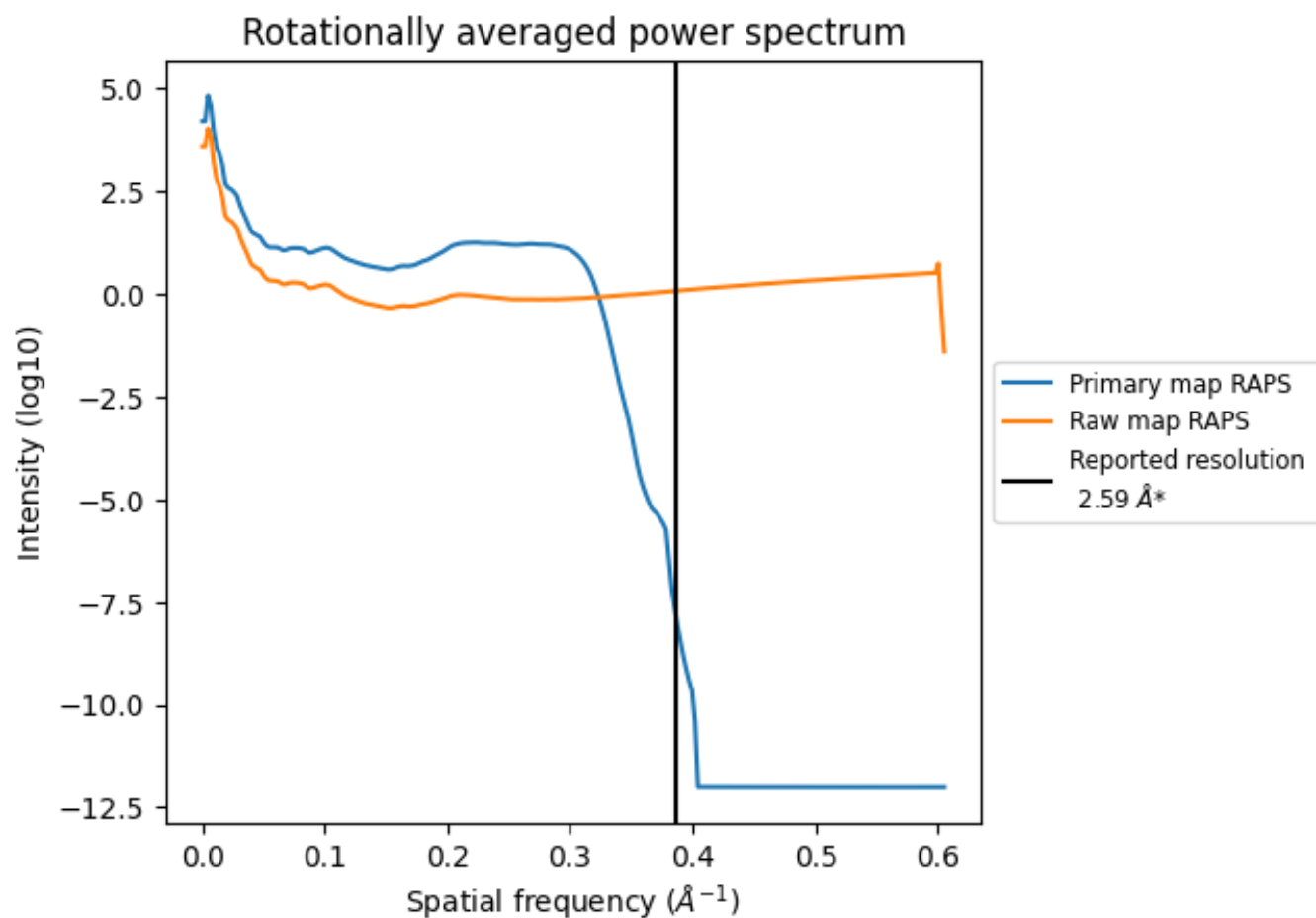
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 70 nm³; this corresponds to an approximate mass of 63 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 ⓘ

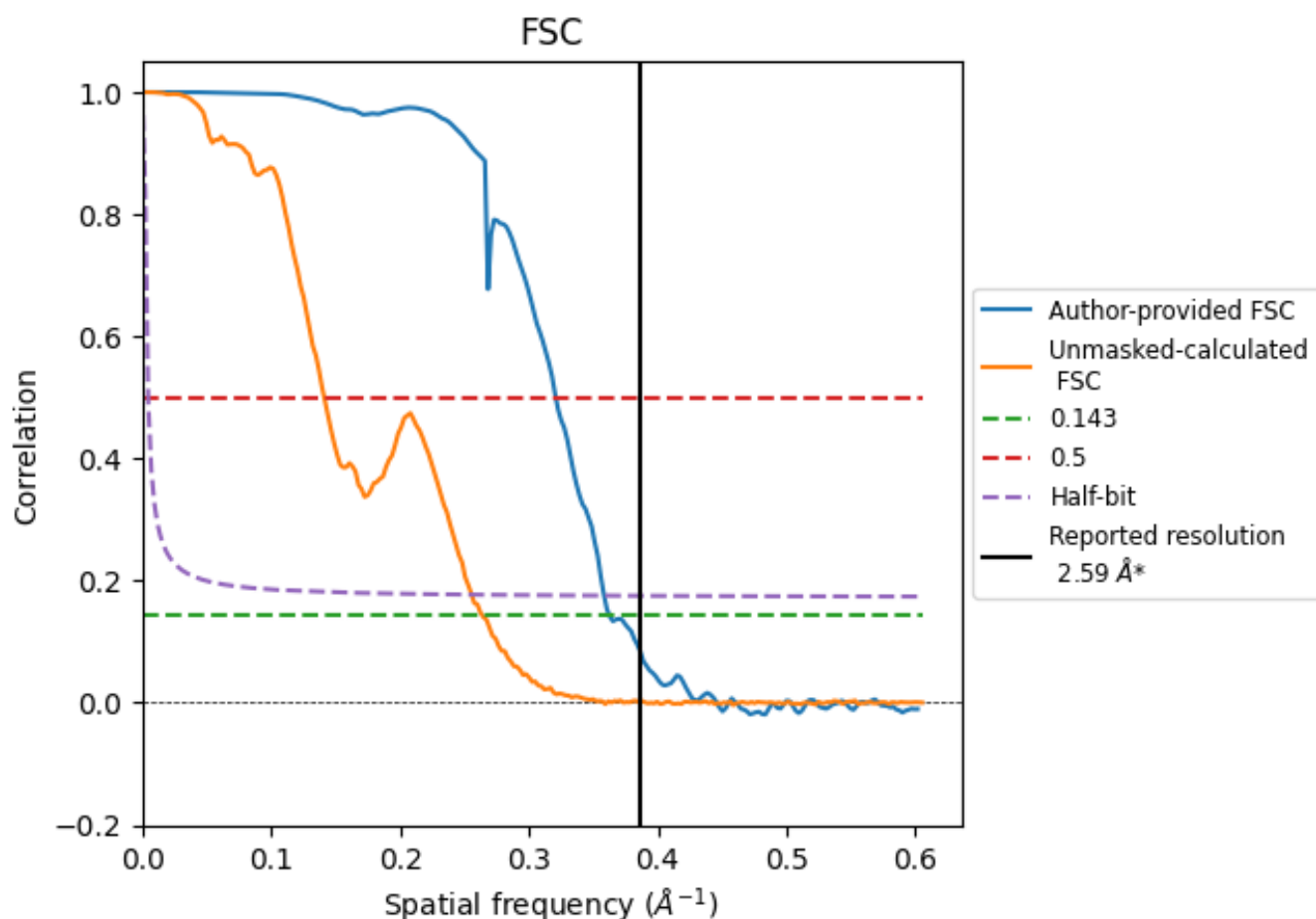


*Reported resolution corresponds to spatial frequency of 0.386 Å⁻¹

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 0.386 \AA^{-1}

8.2 Resolution estimates [i](#)

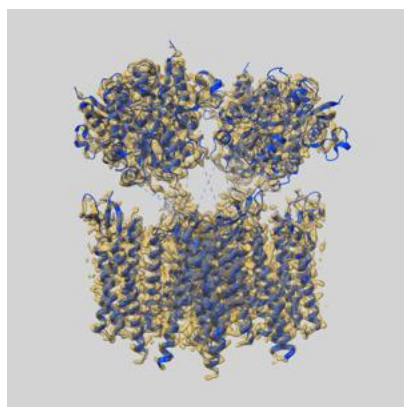
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.59	-	-
Author-provided FSC curve	2.76	3.12	2.79
Unmasked-calculated*	3.79	7.08	3.91

*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 3.79 differs from the reported value 2.59 by more than 10 %

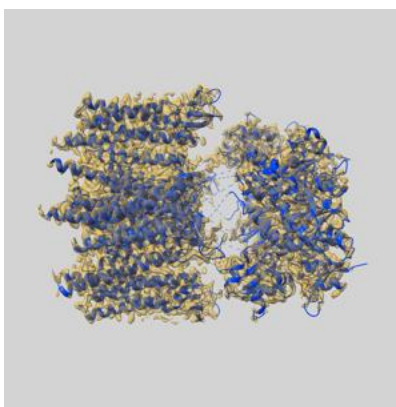
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-52332 and PDB model 9HPK. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

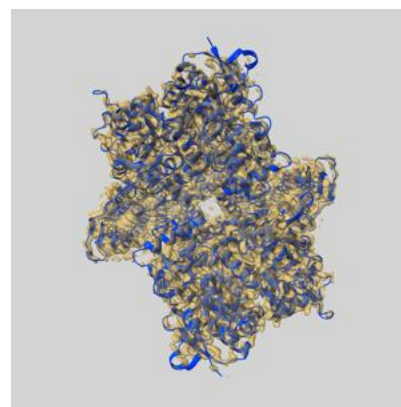
9.1 Map-model overlay [i](#)



X



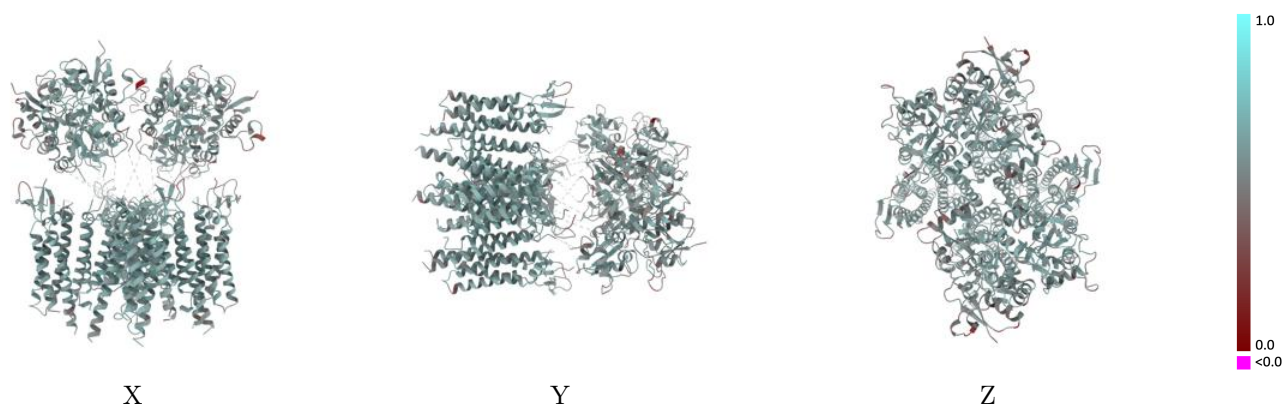
Y



Z

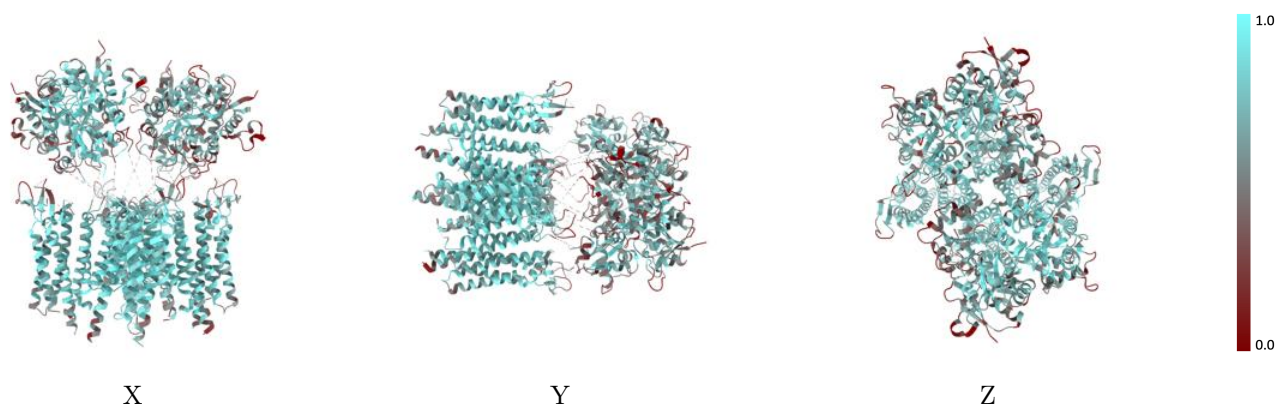
The images above show the 3D surface view of the map at the recommended contour level 10.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



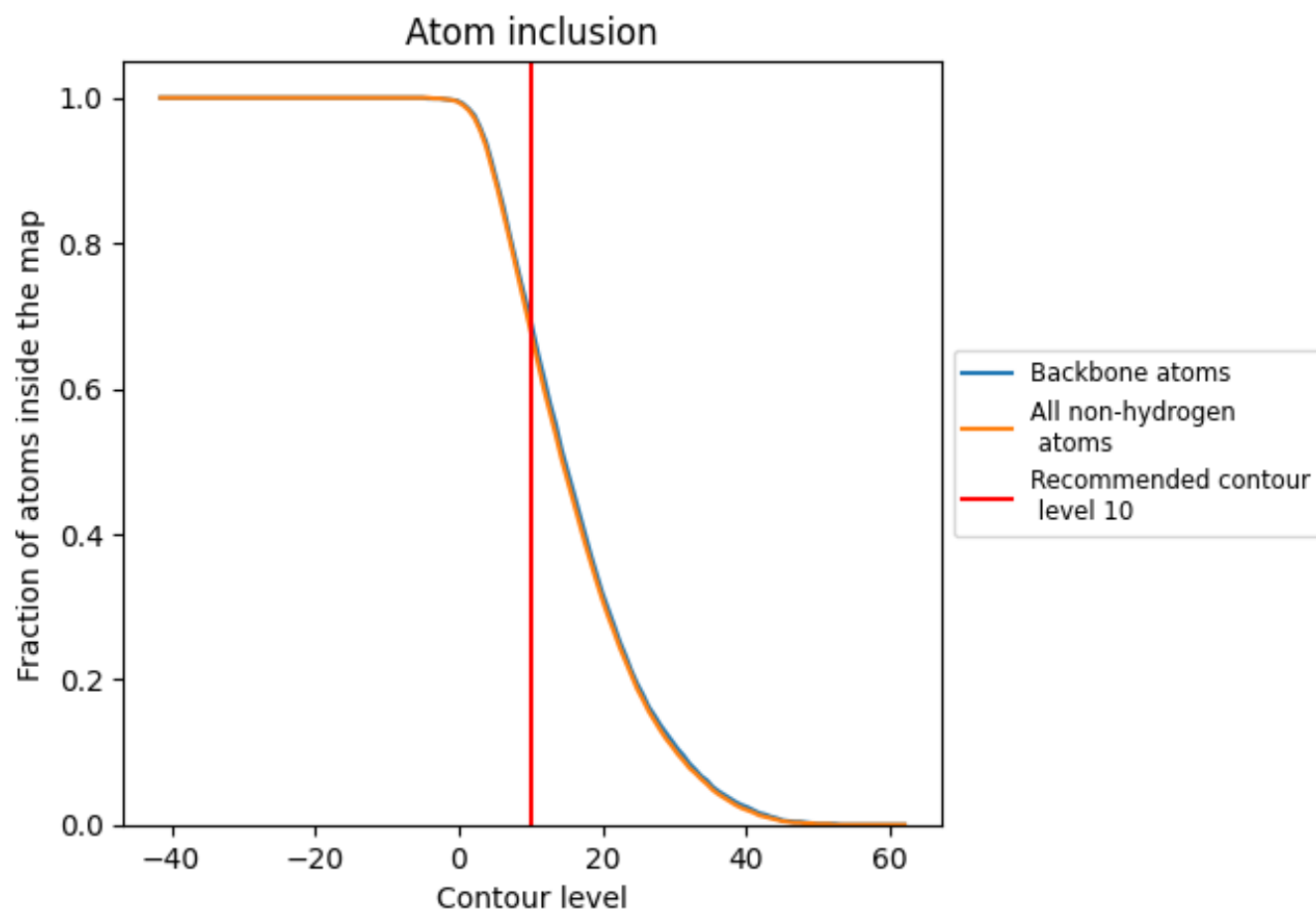
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (10).

9.4 Atom inclusion [i](#)



At the recommended contour level, 70% of all backbone atoms, 68% 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 (10) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div></div> 0.6800	<div><div></div></div> 0.5630
A	<div><div></div></div> 0.6400	<div><div></div></div> 0.5490
B	<div><div></div></div> 0.6790	<div><div></div></div> 0.5650
C	<div><div></div></div> 0.6150	<div><div></div></div> 0.5520
D	<div><div></div></div> 0.7400	<div><div></div></div> 0.5740
W	<div><div></div></div> 0.7040	<div><div></div></div> 0.5670
X	<div><div></div></div> 0.7360	<div><div></div></div> 0.5720
Y	<div><div></div></div> 0.7070	<div><div></div></div> 0.5620
Z	<div><div></div></div> 0.7410	<div><div></div></div> 0.5730

1.0

0.0

<0.0