



wwPDB EM Validation Summary Report ⓘ

Jan 22, 2026 – 02:29 PM EST

PDB ID : 9P9C / pdb_00009p9c
EMDB ID : EMD-71406
Title : Active substate 1 of the GluA4 homotetramer.
Authors : Hale, W.D.; Haganir, R.L.; Twomey, E.C.
Deposited on : 2025-06-24
Resolution : 4.01 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev129
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.47

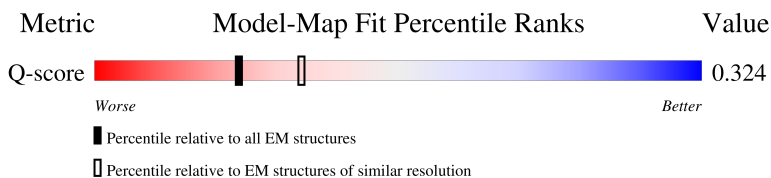
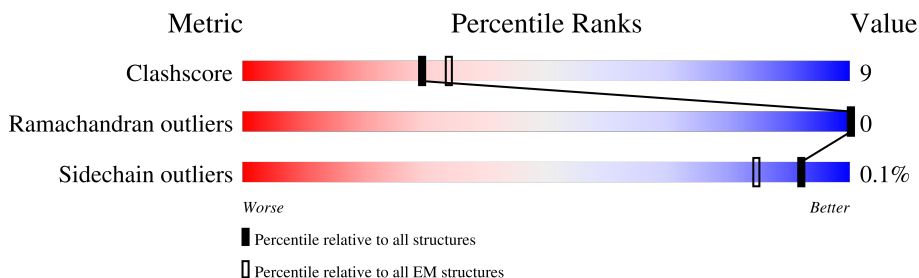
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.01 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	6765 (3.51 - 4.51)

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	846	<div> <div>19%</div> <div>39%</div> <div>9%</div> <div>52%</div> </div>
1	B	846	<div> <div>18%</div> <div>39%</div> <div>9%</div> <div>52%</div> </div>
1	C	846	<div> <div>21%</div> <div>37%</div> <div>11%</div> <div>52%</div> </div>
1	D	846	<div> <div>16%</div> <div>40%</div> <div>8%</div> <div>52%</div> </div>

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Mol	Chain	Length	Quality of chain
2	E	209	<div><div>22%</div><div>69%</div><div>12%</div><div>18%</div></div>
2	F	209	<div><div>26%</div><div>72%</div><div>10%</div><div>18%</div></div>
2	G	209	<div><div>22%</div><div>73%</div><div>9%</div><div>18%</div></div>
2	H	209	<div><div>22%</div><div>73%</div><div>9%</div><div>18%</div></div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 18100 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 2 of Glutamate receptor 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	405	Total	C	N	O	S	0	0
			3164	2058	508	578	20		
1	B	405	Total	C	N	O	S	0	0
			3164	2058	508	578	20		
1	C	405	Total	C	N	O	S	0	0
			3164	2058	508	578	20		
1	D	405	Total	C	N	O	S	0	0
			3164	2058	508	578	20		

There are 92 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	MET	-	initiating methionine	UNP P19493
A	4	GLY	-	expression tag	UNP P19493
A	5	LYS	-	expression tag	UNP P19493
A	6	ILE	-	expression tag	UNP P19493
A	7	MET	-	expression tag	UNP P19493
A	8	HIS	-	expression tag	UNP P19493
A	9	ILE	-	expression tag	UNP P19493
A	10	SER	-	expression tag	UNP P19493
A	11	VAL	-	expression tag	UNP P19493
A	12	LEU	-	expression tag	UNP P19493
A	13	LEU	-	expression tag	UNP P19493
A	14	SER	-	expression tag	UNP P19493
A	15	PRO	-	expression tag	UNP P19493
A	16	VAL	-	expression tag	UNP P19493
A	17	LEU	-	expression tag	UNP P19493
A	18	TRP	-	expression tag	UNP P19493
A	19	GLY	-	expression tag	UNP P19493
A	20	LEU	-	expression tag	UNP P19493
A	21	ILE	-	expression tag	UNP P19493
A	22	PHE	-	expression tag	UNP P19493
A	23	GLY	-	expression tag	UNP P19493
A	24	VAL	-	expression tag	UNP P19493

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Chain	Residue	Modelled	Actual	Comment	Reference
A	734	ILE	THR	conflict	UNP P19493
B	3	MET	-	initiating methionine	UNP P19493
B	4	GLY	-	expression tag	UNP P19493
B	5	LYS	-	expression tag	UNP P19493
B	6	ILE	-	expression tag	UNP P19493
B	7	MET	-	expression tag	UNP P19493
B	8	HIS	-	expression tag	UNP P19493
B	9	ILE	-	expression tag	UNP P19493
B	10	SER	-	expression tag	UNP P19493
B	11	VAL	-	expression tag	UNP P19493
B	12	LEU	-	expression tag	UNP P19493
B	13	LEU	-	expression tag	UNP P19493
B	14	SER	-	expression tag	UNP P19493
B	15	PRO	-	expression tag	UNP P19493
B	16	VAL	-	expression tag	UNP P19493
B	17	LEU	-	expression tag	UNP P19493
B	18	TRP	-	expression tag	UNP P19493
B	19	GLY	-	expression tag	UNP P19493
B	20	LEU	-	expression tag	UNP P19493
B	21	ILE	-	expression tag	UNP P19493
B	22	PHE	-	expression tag	UNP P19493
B	23	GLY	-	expression tag	UNP P19493
B	24	VAL	-	expression tag	UNP P19493
B	734	ILE	THR	conflict	UNP P19493
C	3	MET	-	initiating methionine	UNP P19493
C	4	GLY	-	expression tag	UNP P19493
C	5	LYS	-	expression tag	UNP P19493
C	6	ILE	-	expression tag	UNP P19493
C	7	MET	-	expression tag	UNP P19493
C	8	HIS	-	expression tag	UNP P19493
C	9	ILE	-	expression tag	UNP P19493
C	10	SER	-	expression tag	UNP P19493
C	11	VAL	-	expression tag	UNP P19493
C	12	LEU	-	expression tag	UNP P19493
C	13	LEU	-	expression tag	UNP P19493
C	14	SER	-	expression tag	UNP P19493
C	15	PRO	-	expression tag	UNP P19493
C	16	VAL	-	expression tag	UNP P19493
C	17	LEU	-	expression tag	UNP P19493
C	18	TRP	-	expression tag	UNP P19493
C	19	GLY	-	expression tag	UNP P19493
C	20	LEU	-	expression tag	UNP P19493

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Chain	Residue	Modelled	Actual	Comment	Reference
C	21	ILE	-	expression tag	UNP P19493
C	22	PHE	-	expression tag	UNP P19493
C	23	GLY	-	expression tag	UNP P19493
C	24	VAL	-	expression tag	UNP P19493
C	734	ILE	THR	conflict	UNP P19493
D	3	MET	-	initiating methionine	UNP P19493
D	4	GLY	-	expression tag	UNP P19493
D	5	LYS	-	expression tag	UNP P19493
D	6	ILE	-	expression tag	UNP P19493
D	7	MET	-	expression tag	UNP P19493
D	8	HIS	-	expression tag	UNP P19493
D	9	ILE	-	expression tag	UNP P19493
D	10	SER	-	expression tag	UNP P19493
D	11	VAL	-	expression tag	UNP P19493
D	12	LEU	-	expression tag	UNP P19493
D	13	LEU	-	expression tag	UNP P19493
D	14	SER	-	expression tag	UNP P19493
D	15	PRO	-	expression tag	UNP P19493
D	16	VAL	-	expression tag	UNP P19493
D	17	LEU	-	expression tag	UNP P19493
D	18	TRP	-	expression tag	UNP P19493
D	19	GLY	-	expression tag	UNP P19493
D	20	LEU	-	expression tag	UNP P19493
D	21	ILE	-	expression tag	UNP P19493
D	22	PHE	-	expression tag	UNP P19493
D	23	GLY	-	expression tag	UNP P19493
D	24	VAL	-	expression tag	UNP P19493
D	734	ILE	THR	conflict	UNP P19493

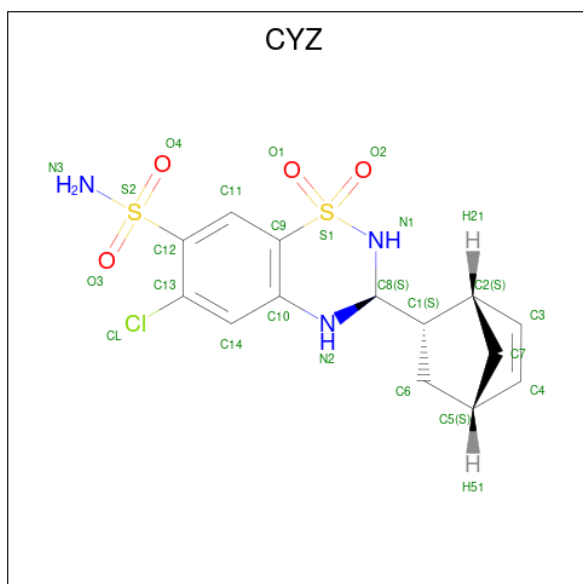
- Molecule 2 is a protein called Voltage-dependent calcium channel gamma-2 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	171	Total	C	N	O	S	0	0
			1327	872	217	227	11		
2	F	171	Total	C	N	O	S	0	0
			1327	872	217	227	11		
2	G	171	Total	C	N	O	S	0	0
			1327	872	217	227	11		
2	E	171	Total	C	N	O	S	0	0
			1327	872	217	227	11		

There are 12 discrepancies between the modelled and reference sequences:

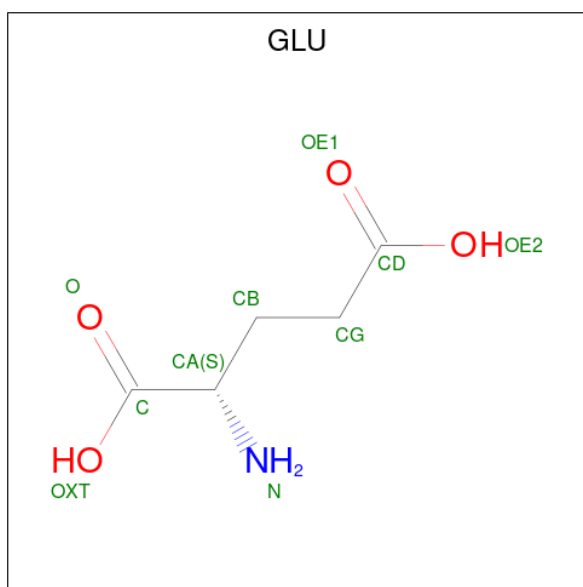
Chain	Residue	Modelled	Actual	Comment	Reference
H	48	ASP	ASN	conflict	UNP O88602
H	209	THR	-	expression tag	UNP O88602
H	210	GLY	-	expression tag	UNP O88602
F	48	ASP	ASN	conflict	UNP O88602
F	209	THR	-	expression tag	UNP O88602
F	210	GLY	-	expression tag	UNP O88602
G	48	ASP	ASN	conflict	UNP O88602
G	209	THR	-	expression tag	UNP O88602
G	210	GLY	-	expression tag	UNP O88602
E	48	ASP	ASN	conflict	UNP O88602
E	209	THR	-	expression tag	UNP O88602
E	210	GLY	-	expression tag	UNP O88602

- Molecule 3 is CYCLOTHIAZIDE (CCD ID: CYZ) (formula: $C_{14}H_{16}ClN_3O_4S_2$).



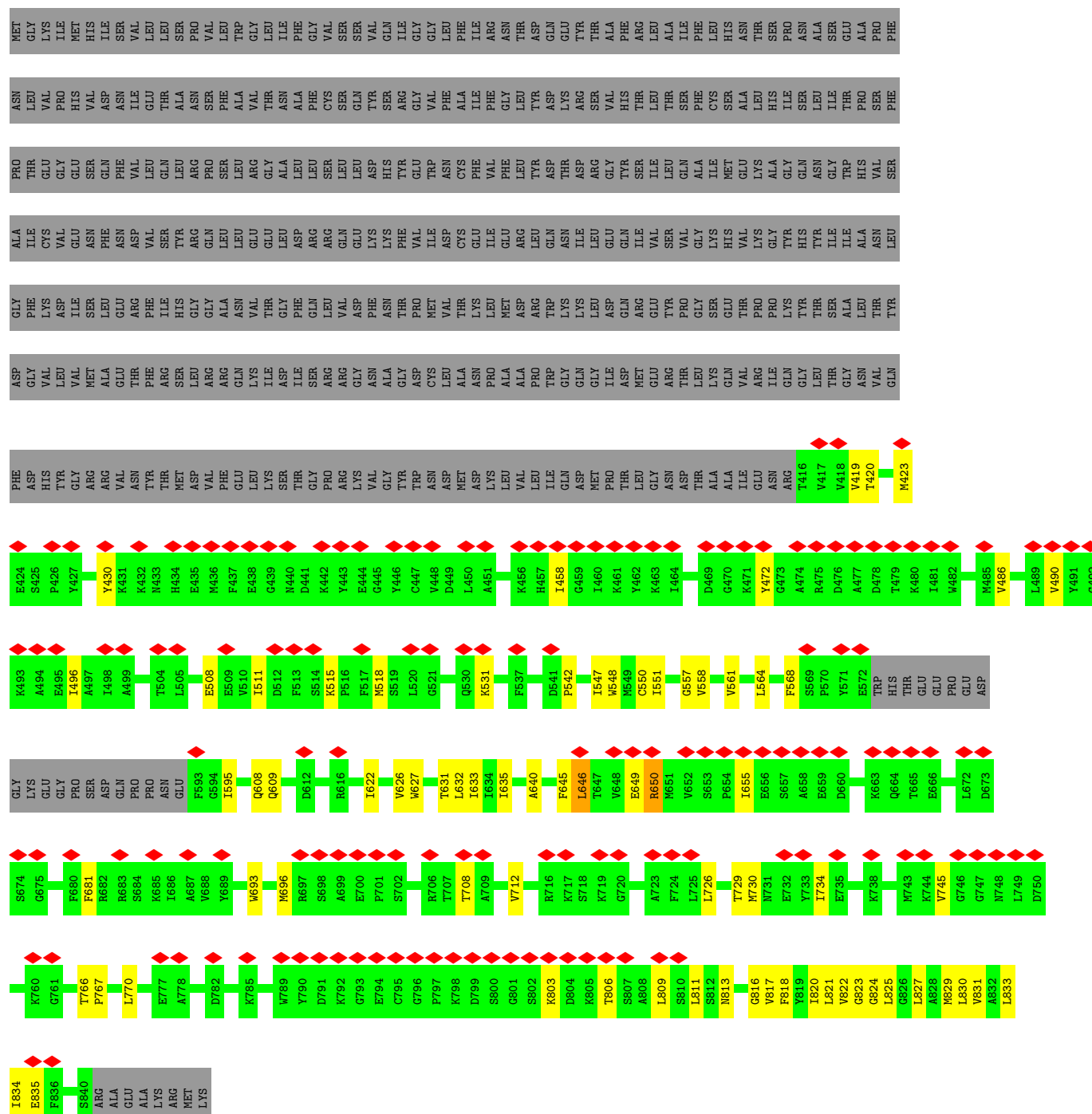
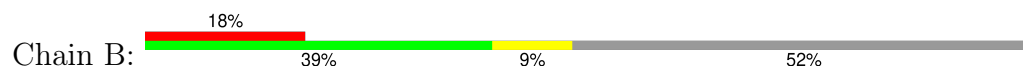
Mol	Chain	Residues	Atoms						AltConf
3	A	1	Total	C	Cl	N	O	S	0
			24	14	1	3	4	2	
3	B	1	Total	C	Cl	N	O	S	0
			24	14	1	3	4	2	
3	C	1	Total	C	Cl	N	O	S	0
			24	14	1	3	4	2	
3	D	1	Total	C	Cl	N	O	S	0
			24	14	1	3	4	2	

- Molecule 4 is GLUTAMIC ACID (CCD ID: GLU) (formula: $C_5H_9NO_4$).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
4	A	1	10	5	1	4	0
4	B	1	10	5	1	4	0
4	C	1	10	5	1	4	0
4	D	1	10	5	1	4	0

- Molecule 1: Isoform 2 of Glutamate receptor 4



Chain C:

[illegible]

PHE	ASP	HIS	TYR	GLY	ARG	ARG	VAL	ASN	TYR	THR	THR	MET	ASP	VAL	PHE	GLU	LEU	LYS	SER	THR	GLY	PRO	ARG	LYS	VAL	GLY	TYR	TRP	ASN	ASP	MET	ASP	LYS	LEU	VAL	LEU	ILE	GLN	ASP	ASP	MET	PRO	THR	LEU	GLY	ASN	ASP	THR	ALA	ALA	ILE	GLU	ASN	ARG	T416	T420	T421	T422	M423	E424
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S425	V428	M429	Y430	K431	K432	M433	H434	F435	M436	F437	E438	G439	N440	D441	K442	Y443	E444	A455	K456	H457	L458	G459	I460	K461	V462	K463	I464	A465	A466	V467	D468	D469	G470	K471	Y472	R475	D476	A477	D478	T479	K480	I481	W482	M485	V486	L489	Y490	G492	K493	A494	E495	I496	L497
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Year	Country	Value
1498	USA	1.00
A499	USA	1.00
P500	USA	1.00
T503	USA	1.00
T504	USA	1.00
L505	USA	1.00
V506	USA	1.00
R507	USA	1.00
E508	USA	1.00
E509	USA	1.00
F513	USA	1.00
S514	USA	1.00
F517	USA	1.00
M518	USA	1.00
S519	USA	1.00
L520	USA	1.00
G521	USA	1.00
I522	USA	1.00
S523	USA	1.00
I524	USA	1.00
M525	USA	1.00
I526	USA	1.00
K527	USA	1.00
K528	USA	1.00
P529	USA	1.00
Q530	USA	1.00
K531	USA	1.00
S532	USA	1.00
K533	USA	1.00
P534	USA	1.00
D641	USA	1.00
P542	USA	1.00
L543	USA	1.00
A544	USA	1.00
Y545	USA	1.00
F546	USA	1.00
I547	USA	1.00
M548	USA	1.00
M549	USA	1.00
I556	USA	1.00
G557	USA	1.00
V558	USA	1.00
V561	USA	1.00
L564	USA	1.00
F568	USA	1.00
S569	USA	1.00
P570	USA	1.00
Y571	USA	1.00
E572	USA	1.00
TRP	USA	1.00
HIS	USA	1.00
TWP	USA	1.00

GLU	GLU	95.93	Red
GLU	PRO	95.94	Green
GLU	GLU	95.95	Green
ASP	ASP	96.06	Green
GLY	LVS	96.07	Green
LVS	GLU	96.08	Green
GLU	GLU	96.11	Red
GLY	PRO	96.26	Green
SER	SER	96.29	Green
ASP	ASP	96.30	Green
GLN	GLN	96.33	Green
PRO	PRO	96.34	Green
PRO	PRO	96.35	Green
GLU	GLU	96.39	Green
ASP	ASP	96.40	Green
GLU	GLU	96.42	Red
GLU	GLU	96.43	Green
GLU	GLU	96.44	Green
L645	L645	96.45	Green
L646	L646	96.47	Green
L647	L647	96.48	Green
L648	L648	96.49	Green
E649	E649	96.50	Green
R650	R650	96.51	Green
V652	V652	96.52	Green
S653	S653	96.53	Red
P654	P654	96.54	Red
P655	P655	96.55	Red
E656	E656	96.57	Red
S657	S657	96.58	Red
A658	A658	96.59	Red
E659	E659	96.60	Red
D660	D660	96.61	Red
L661	L661	96.62	Red
A662	A662	96.63	Red

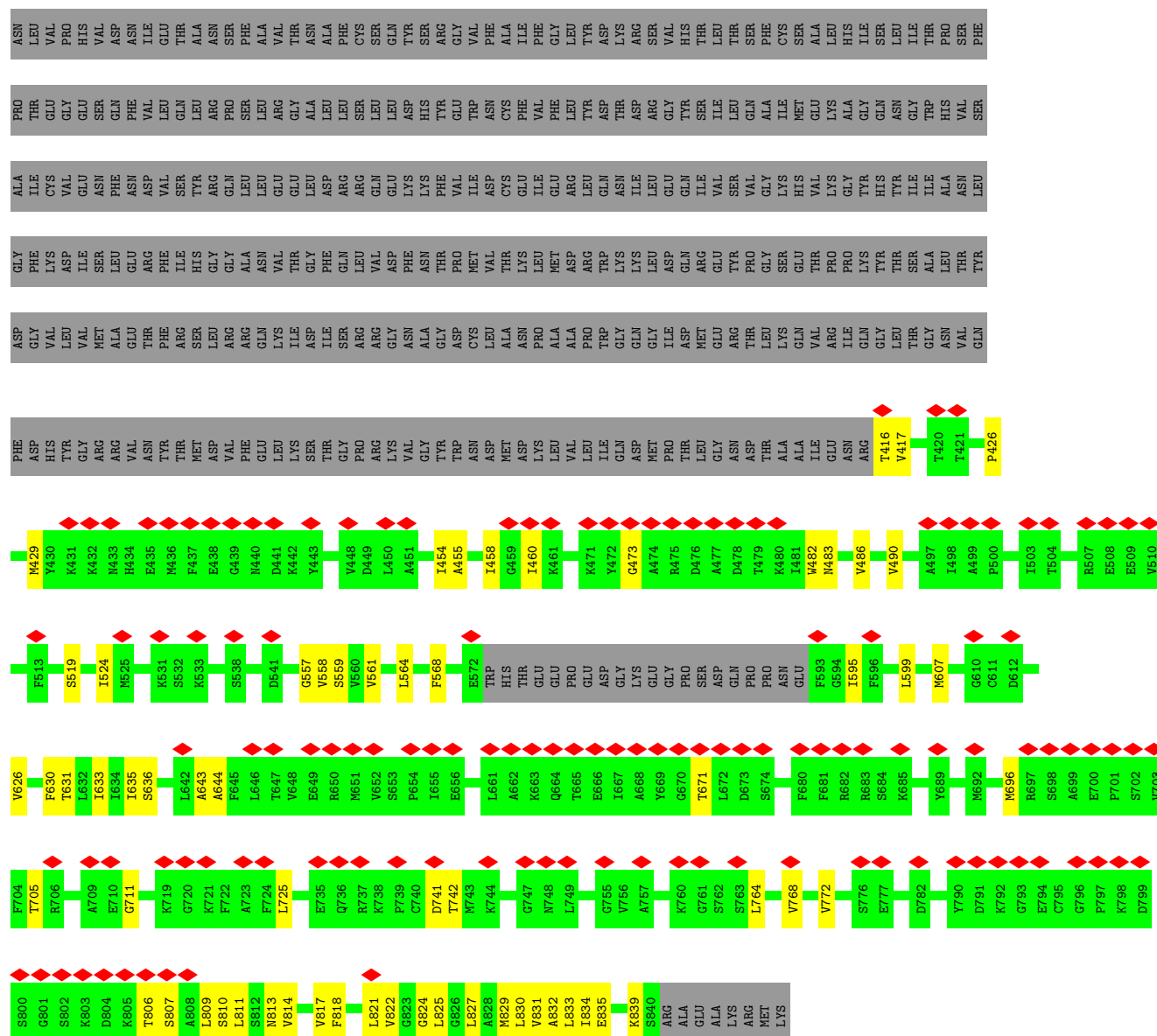
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Category ID	Frequency
W738	10
W739	10
W740	10
W741	10
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W744	10
W745	10
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W749	10
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W751	10
W752	10
W753	10
W754	10
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W808	10
W809	10
W810	10
W811	10
W812	10

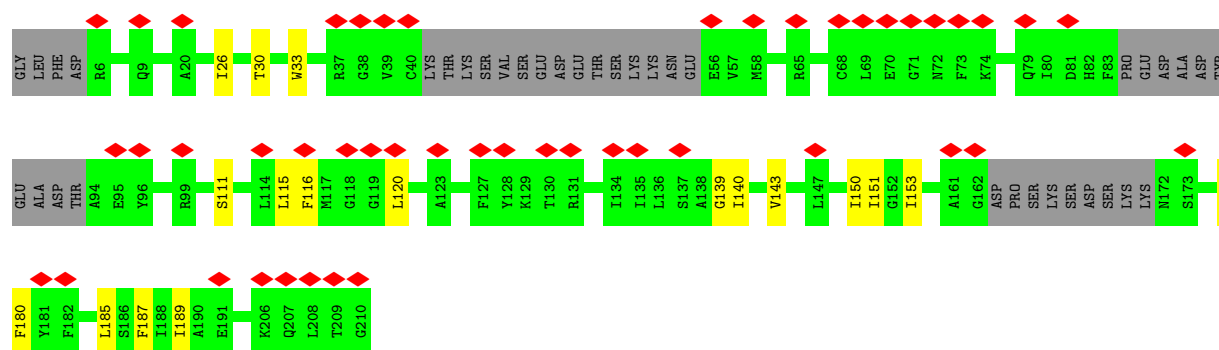
G816	V817		I820	L821		L825	G826	L827		L830	V831	A832	L833	I834	E835	F836	C837				R838	K839	S840	ARG	ALA	GLU	ALA	LYS	ARG	MET	LYS
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Chain D:

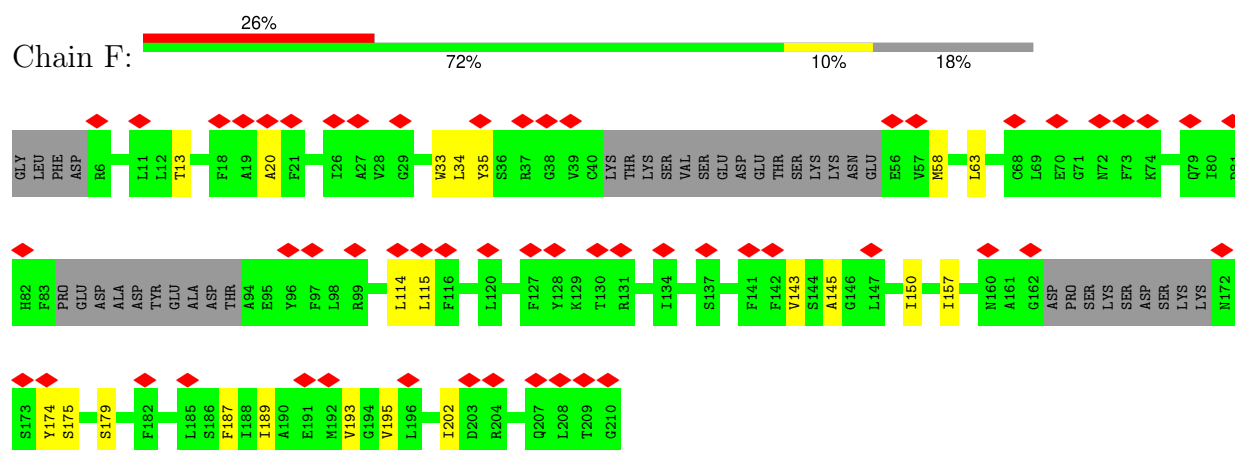
[illegible]



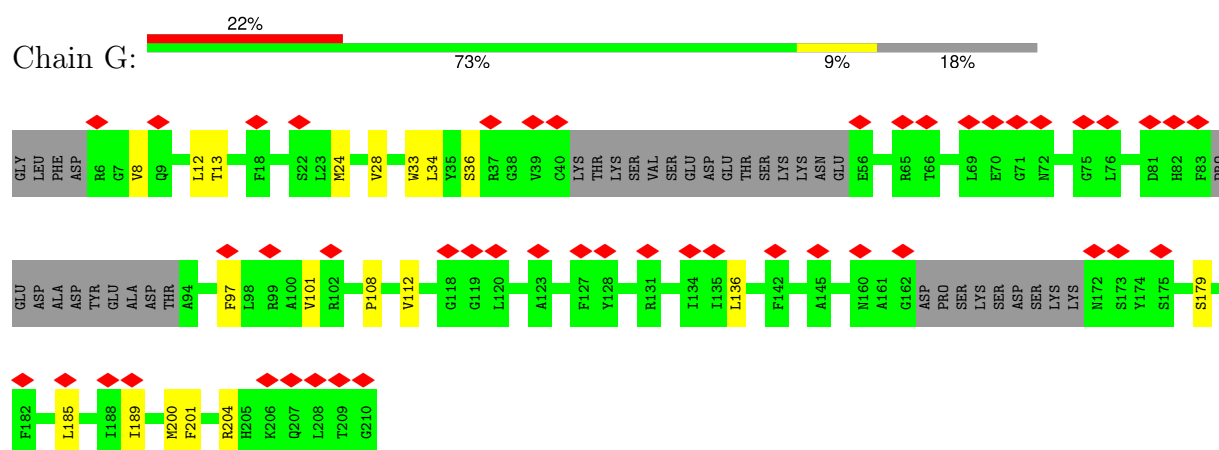
• Molecule 2: Voltage-dependent calcium channel gamma-2 subunit



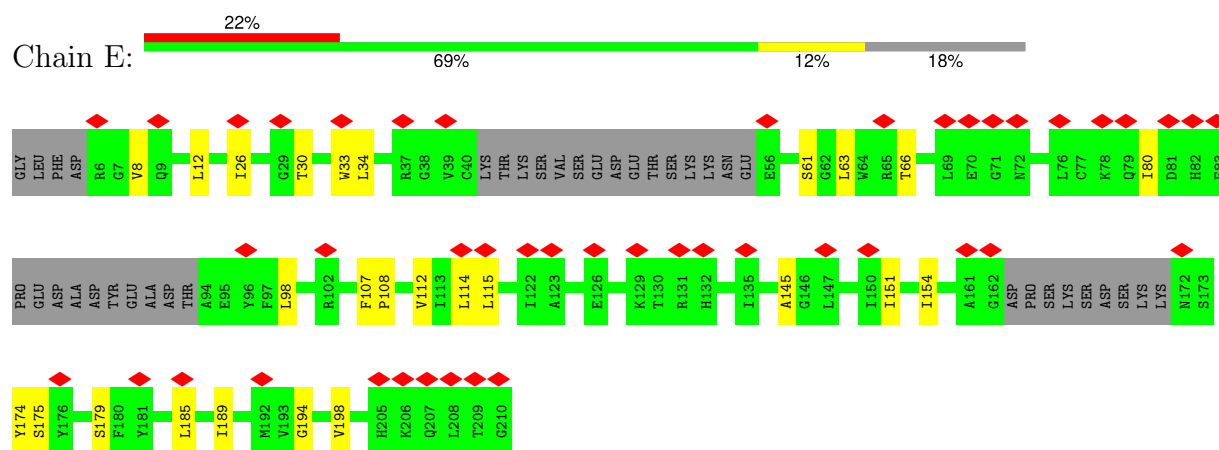
• Molecule 2: Voltage-dependent calcium channel gamma-2 subunit



- Molecule 2: Voltage-dependent calcium channel gamma-2 subunit



- Molecule 2: Voltage-dependent calcium channel gamma-2 subunit



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	21063	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.410	Depositor
Minimum map value	-0.299	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.013	Depositor
Recommended contour level	0.14	Depositor
Map size (\AA)	372.0, 372.0, 372.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.93, 0.93, 0.93	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CYZ

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	0.13	0/3236	0.28	0/4369
1	B	0.26	0/3236	0.42	0/4369
1	C	0.23	0/3236	0.38	0/4369
1	D	0.18	0/3236	0.34	0/4369
2	E	0.13	0/1357	0.24	0/1829
2	F	0.13	0/1357	0.24	0/1829
2	G	0.12	0/1357	0.25	0/1829
2	H	0.13	0/1357	0.26	0/1829
All	All	0.19	0/18372	0.33	0/24792

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	1
1	C	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	650	ARG	Sidechain
1	C	806	THR	Peptide

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	3164	0	3213	74	0
1	B	3164	0	3211	73	0
1	C	3164	0	3208	103	0
1	D	3164	0	3211	70	0
2	E	1327	0	1324	22	0
2	F	1327	0	1324	16	0
2	G	1327	0	1324	11	0
2	H	1327	0	1324	14	0
3	A	24	0	10	1	0
3	B	24	0	10	3	0
3	C	24	0	10	0	0
3	D	24	0	10	2	0
4	A	10	0	5	0	0
4	B	10	0	5	0	0
4	C	10	0	5	0	0
4	D	10	0	5	0	0
All	All	18100	0	18199	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 9.

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)
1:C:423:MET:SD	1:C:428:VAL:HG12	1.94	1.07
1:A:626:VAL:HG12	1:B:821:LEU:HD12	1.38	1.05
1:D:822:VAL:HG11	2:H:151:ILE:HD11	1.32	1.05
1:A:822:VAL:HG11	2:E:151:ILE:HD11	1.53	0.90
1:C:835:GLU:HA	1:C:838:TYR:CE2	2.08	0.89

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	401/846 (47%)	375 (94%)	26 (6%)	0	100	100
1	B	401/846 (47%)	374 (93%)	27 (7%)	0	100	100
1	C	401/846 (47%)	368 (92%)	33 (8%)	0	100	100
1	D	401/846 (47%)	384 (96%)	17 (4%)	0	100	100
2	E	163/209 (78%)	155 (95%)	8 (5%)	0	100	100
2	F	163/209 (78%)	159 (98%)	4 (2%)	0	100	100
2	G	163/209 (78%)	155 (95%)	8 (5%)	0	100	100
2	H	163/209 (78%)	156 (96%)	7 (4%)	0	100	100
All	All	2256/4220 (54%)	2126 (94%)	130 (6%)	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	342/726 (47%)	342 (100%)	0	100	100
1	B	342/726 (47%)	340 (99%)	2 (1%)	84	88
1	C	342/726 (47%)	342 (100%)	0	100	100
1	D	342/726 (47%)	342 (100%)	0	100	100
2	E	138/173 (80%)	138 (100%)	0	100	100
2	F	138/173 (80%)	138 (100%)	0	100	100

Continued on next page...

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	G	138/173 (80%)	138 (100%)	0	100	100
2	H	138/173 (80%)	138 (100%)	0	100	100
All	All	1920/3596 (53%)	1918 (100%)	2 (0%)	92	95

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	646	LEU
1	B	650	ARG

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

Mol	Chain	Res	Type
1	D	608	GLN
1	D	609	GLN
1	B	813	ASN
1	C	433	ASN
1	C	434	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](#)

8 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The

Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	GLU	D	902	-	8,9,9	1.08	1 (12%)	8,11,11	1.19	1 (12%)
3	CYZ	C	901	-	26,27,27	8.77	18 (69%)	38,44,44	3.87	18 (47%)
4	GLU	A	902	-	8,9,9	1.08	1 (12%)	8,11,11	1.17	1 (12%)
3	CYZ	B	901	-	26,27,27	8.72	18 (69%)	38,44,44	3.96	16 (42%)
3	CYZ	A	901	-	26,27,27	8.77	18 (69%)	38,44,44	3.95	17 (44%)
4	GLU	B	902	-	8,9,9	1.10	1 (12%)	8,11,11	1.18	1 (12%)
4	GLU	C	902	-	8,9,9	1.09	1 (12%)	8,11,11	1.20	1 (12%)
3	CYZ	D	901	-	26,27,27	8.68	18 (69%)	38,44,44	4.03	17 (44%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GLU	D	902	-	-	0/9/9/9	-
3	CYZ	C	901	-	-	0/7/42/42	0/5/4/4
4	GLU	A	902	-	-	0/9/9/9	-
3	CYZ	B	901	-	-	3/7/42/42	0/5/4/4
3	CYZ	A	901	-	-	0/7/42/42	0/5/4/4
4	GLU	B	902	-	-	0/9/9/9	-
4	GLU	C	902	-	-	1/9/9/9	-
3	CYZ	D	901	-	-	3/7/42/42	0/5/4/4

The worst 5 of 76 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	901	CYZ	C2-C1	-22.57	1.07	1.55
3	C	901	CYZ	C2-C1	-22.55	1.07	1.55
3	A	901	CYZ	C2-C1	-22.54	1.07	1.55
3	D	901	CYZ	C2-C1	-22.46	1.07	1.55
3	D	901	CYZ	C1-C8	21.24	1.73	1.53

The worst 5 of 72 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	901	CYZ	C9-S1-N1	12.24	118.28	103.42
3	B	901	CYZ	C9-S1-N1	11.85	117.81	103.42
3	D	901	CYZ	C1-C2-C3	11.81	125.09	106.86
3	D	901	CYZ	O4-S2-O3	-11.51	101.09	118.80
3	B	901	CYZ	O4-S2-O3	-11.51	101.09	118.80

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

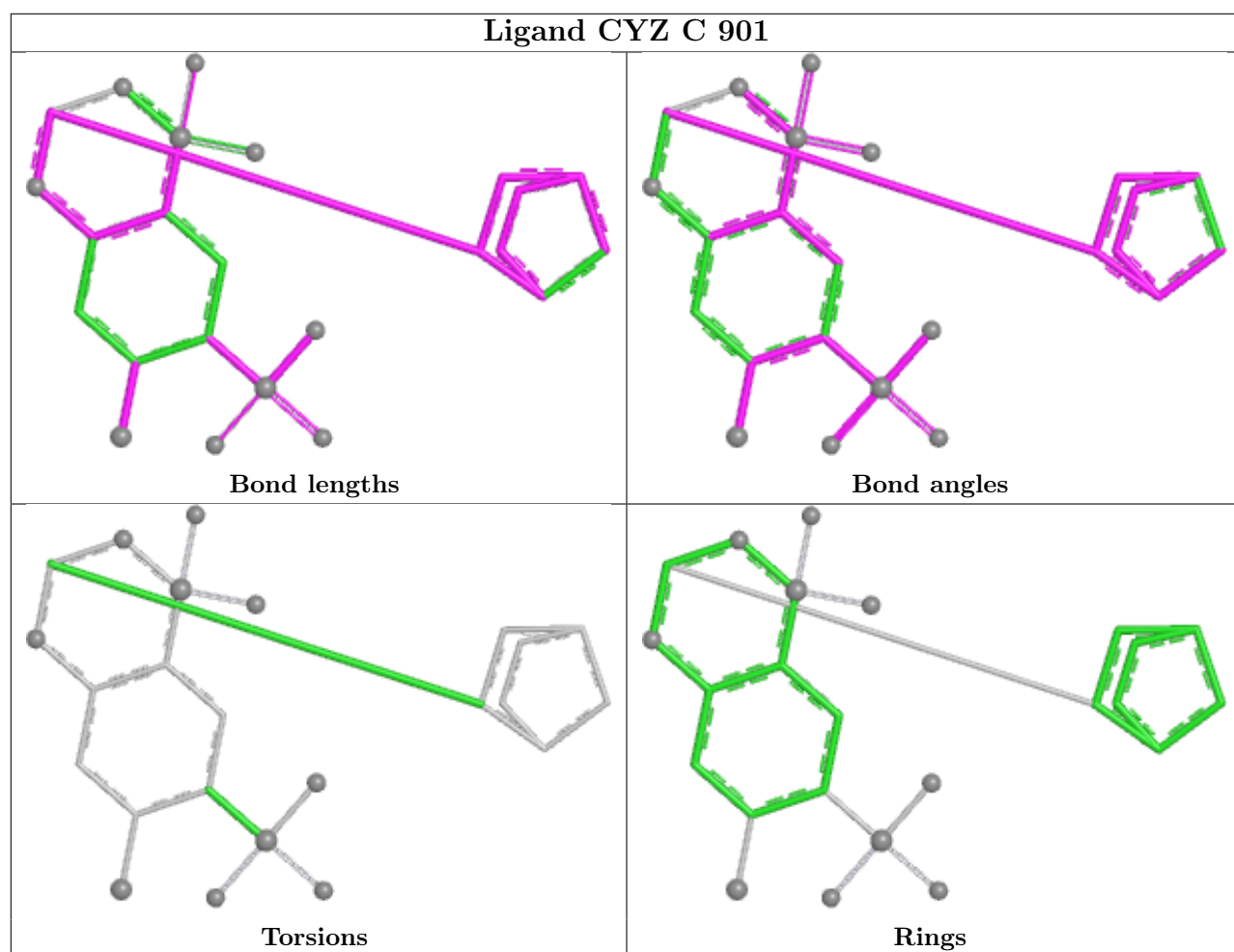
Mol	Chain	Res	Type	Atoms
3	B	901	CYZ	C6-C1-C8-N2
3	B	901	CYZ	C13-C12-S2-O3
3	D	901	CYZ	C13-C12-S2-N3
3	D	901	CYZ	C11-C12-S2-O3
3	B	901	CYZ	C11-C12-S2-O3

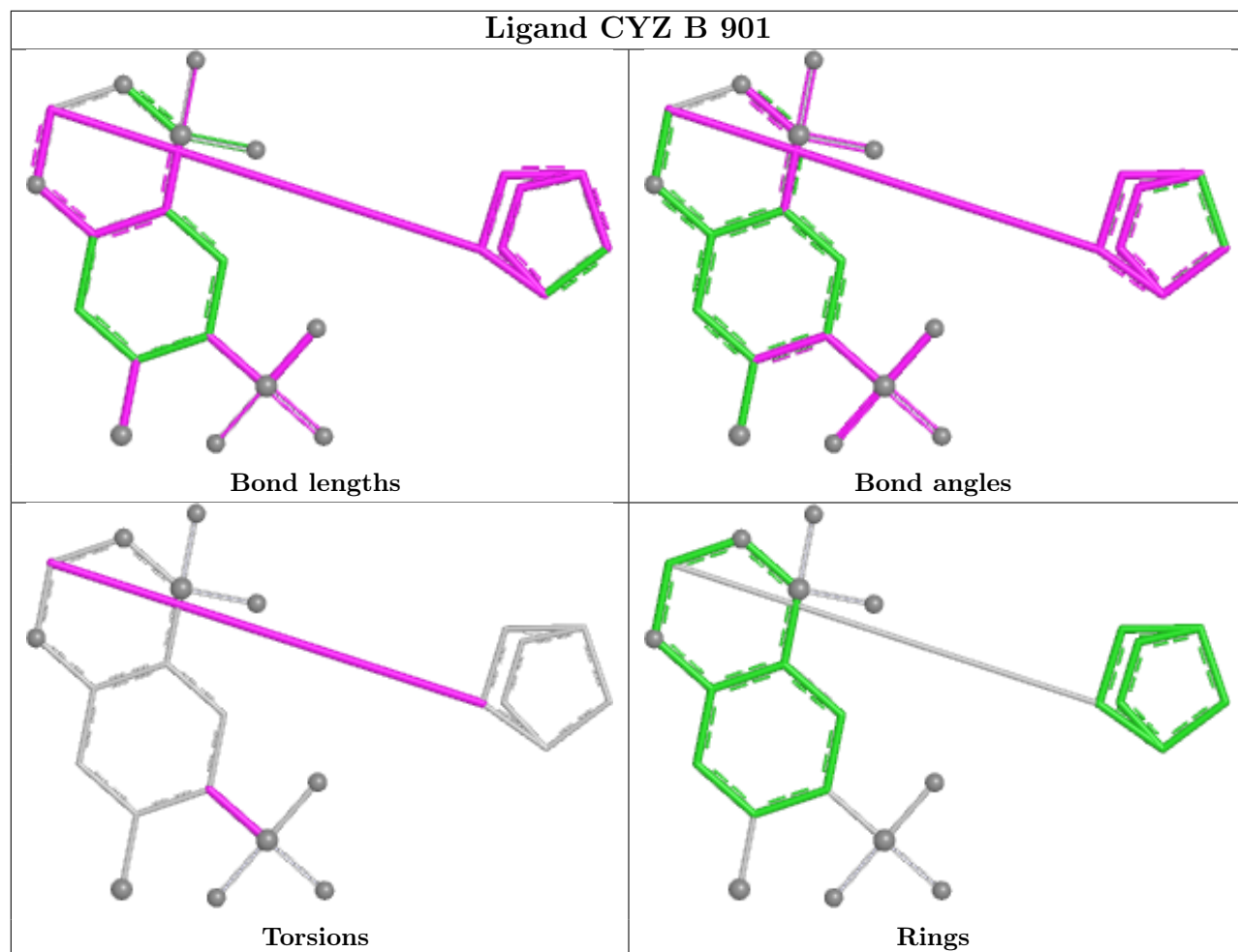
There are no ring outliers.

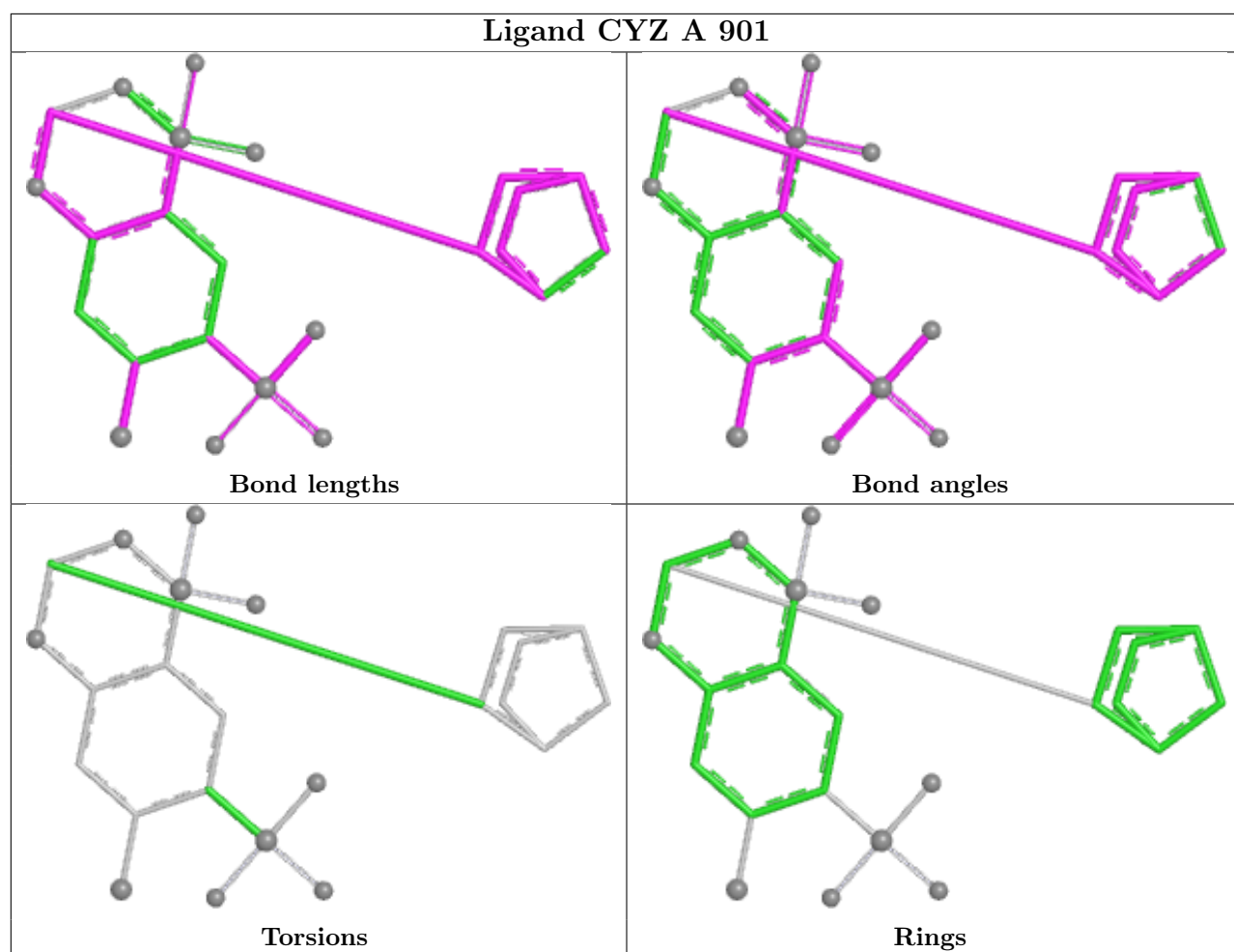
3 monomers are involved in 6 short contacts:

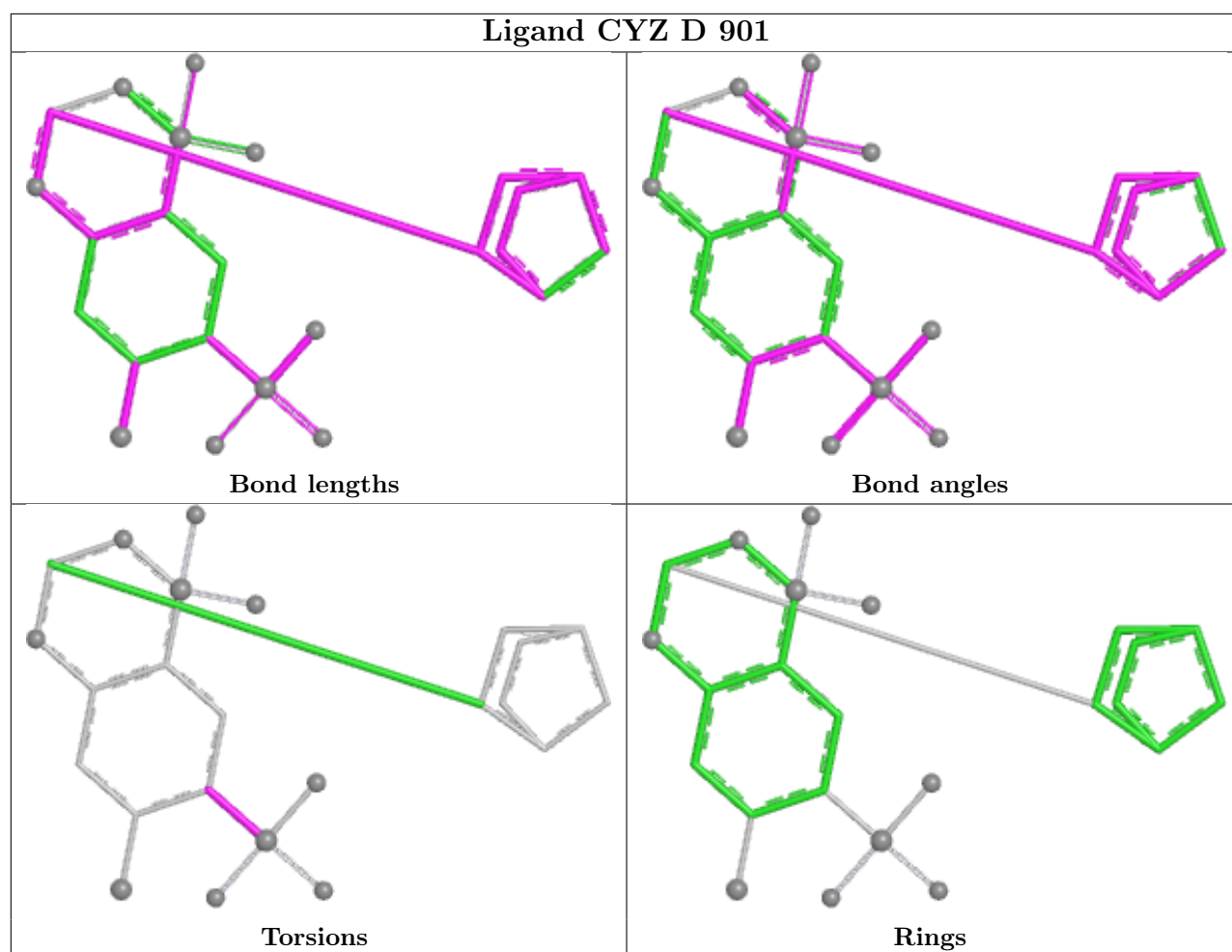
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	901	CYZ	3	0
3	A	901	CYZ	1	0
3	D	901	CYZ	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.









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.

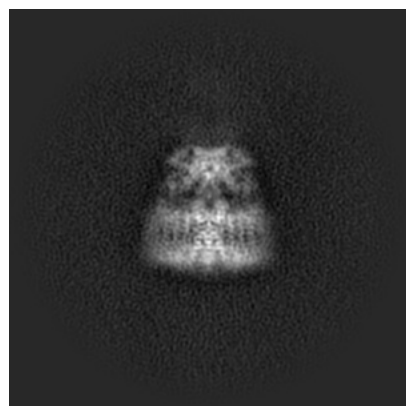
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-71406. These allow visual inspection of the internal detail of the map and identification of artifacts.

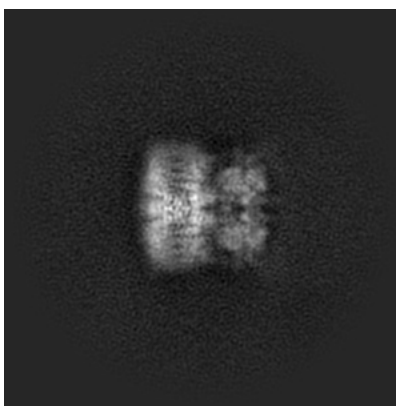
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

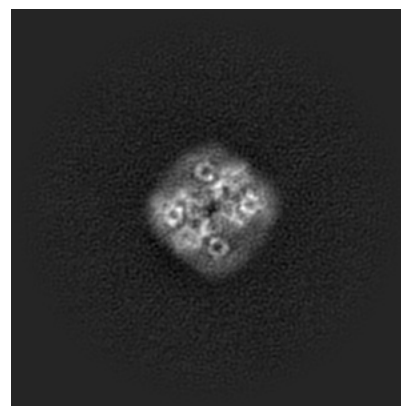
6.1.1 Primary map



X

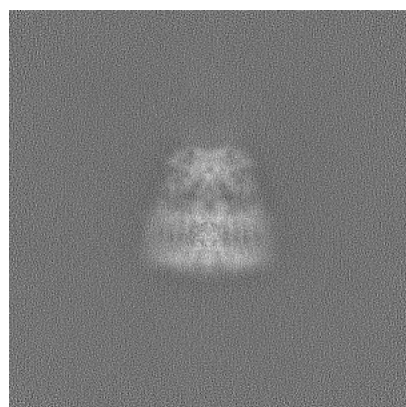


Y

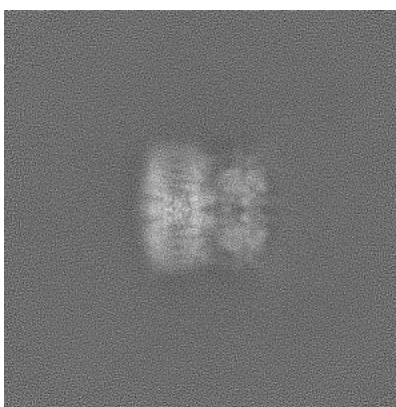


Z

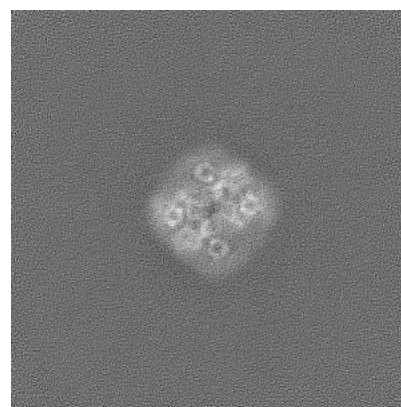
6.1.2 Raw map



X



Y

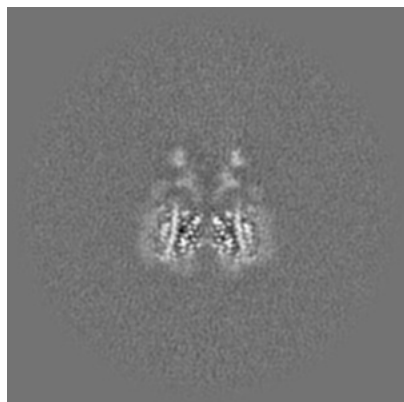


Z

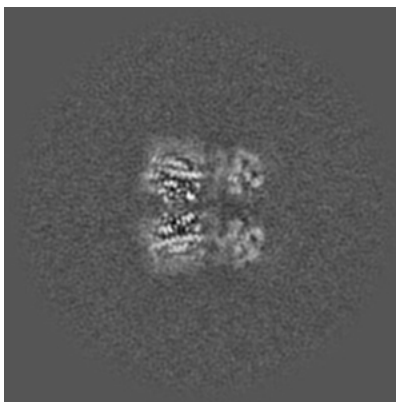
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

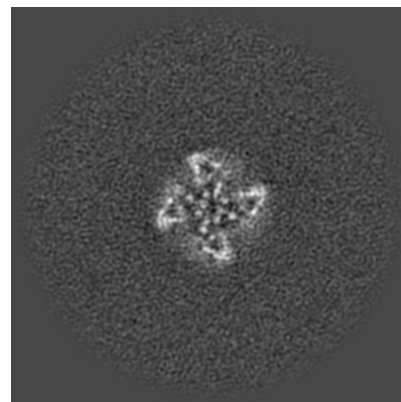
6.2.1 Primary map



X Index: 200

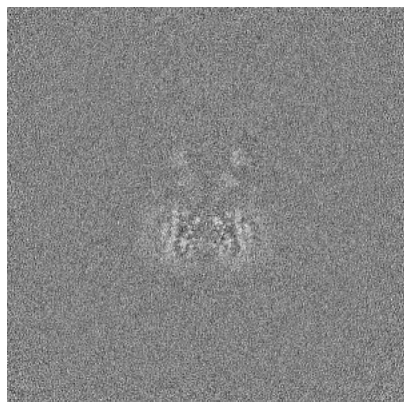


Y Index: 200

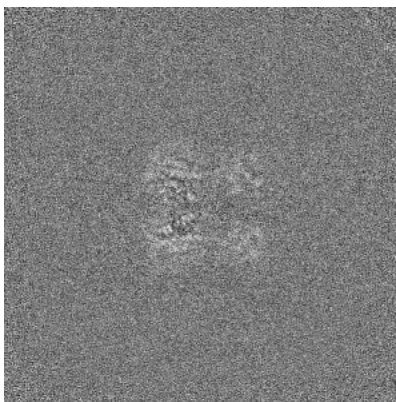


Z Index: 200

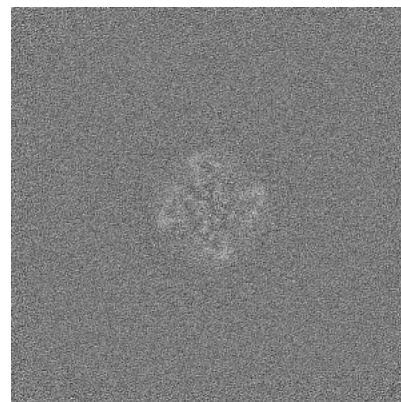
6.2.2 Raw map



X Index: 200



Y Index: 200

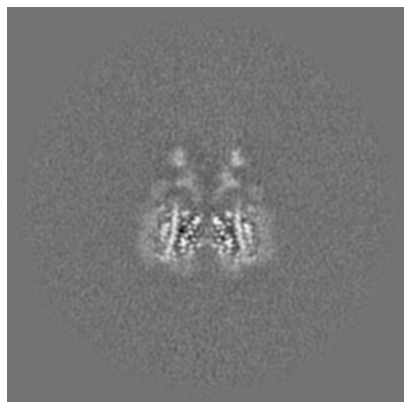


Z Index: 200

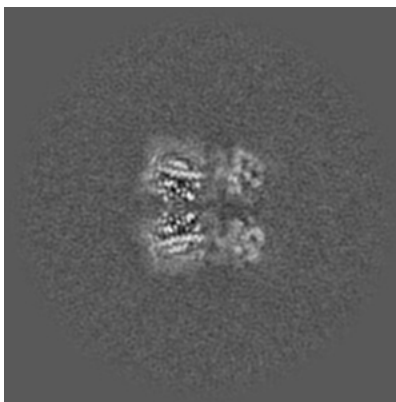
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

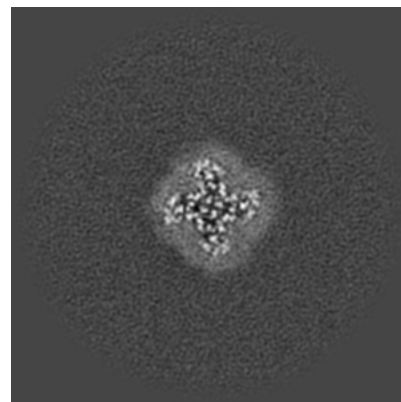
6.3.1 Primary map



X Index: 200

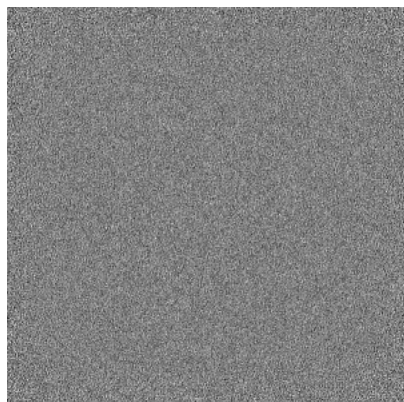


Y Index: 199

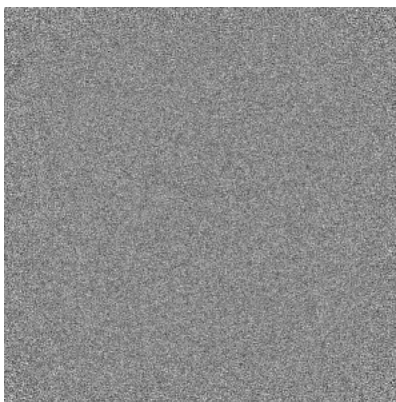


Z Index: 190

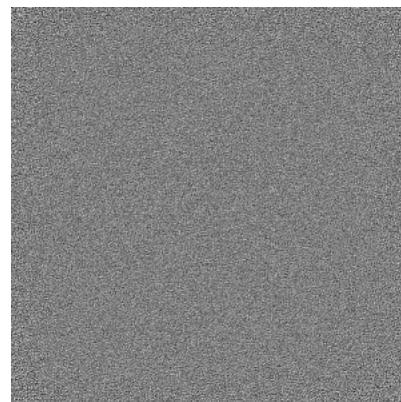
6.3.2 Raw map



X Index: 0



Y Index: 0

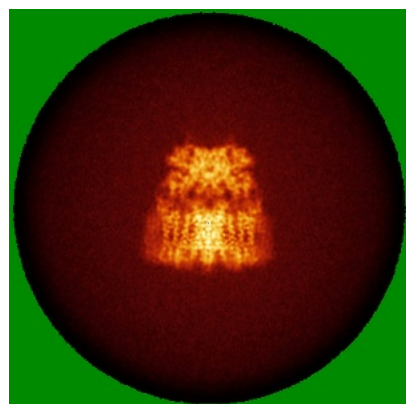


Z Index: 0

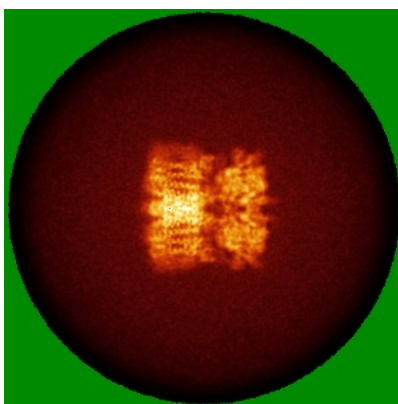
The images above show the largest variance slices of the map in three orthogonal directions.

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

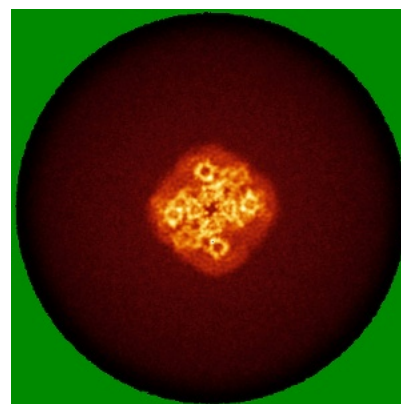
6.4.1 Primary map



X

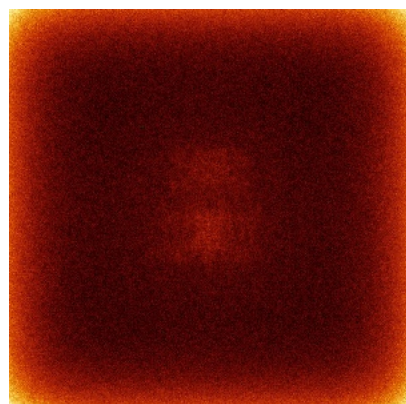


Y

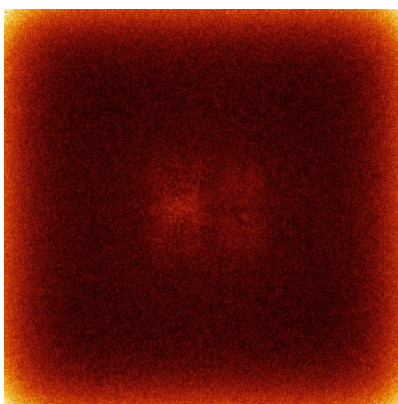


Z

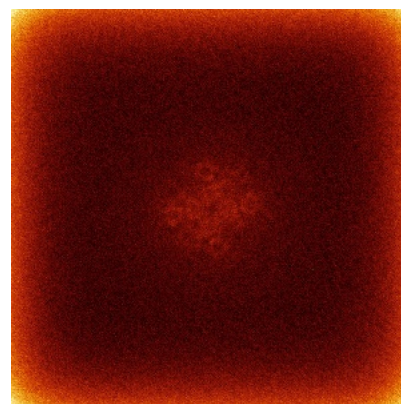
6.4.2 Raw map



X



Y

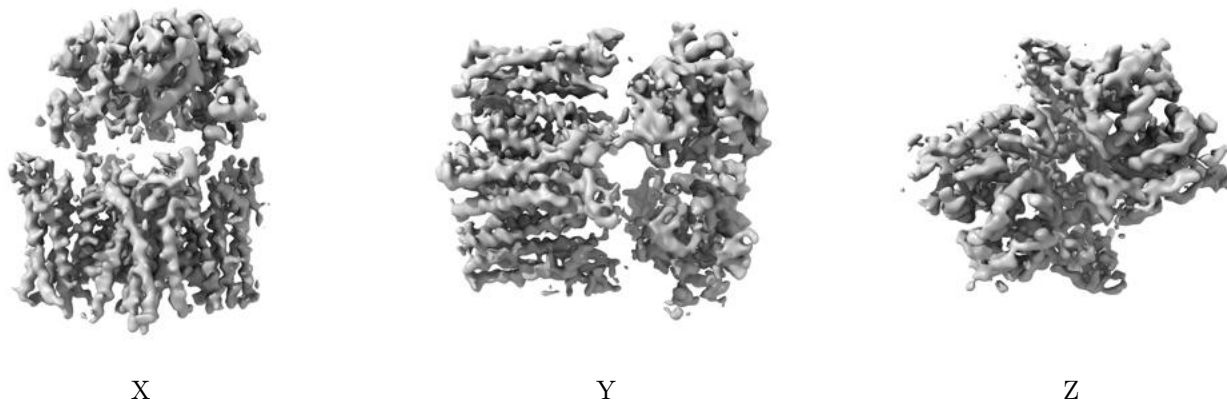


Z

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.

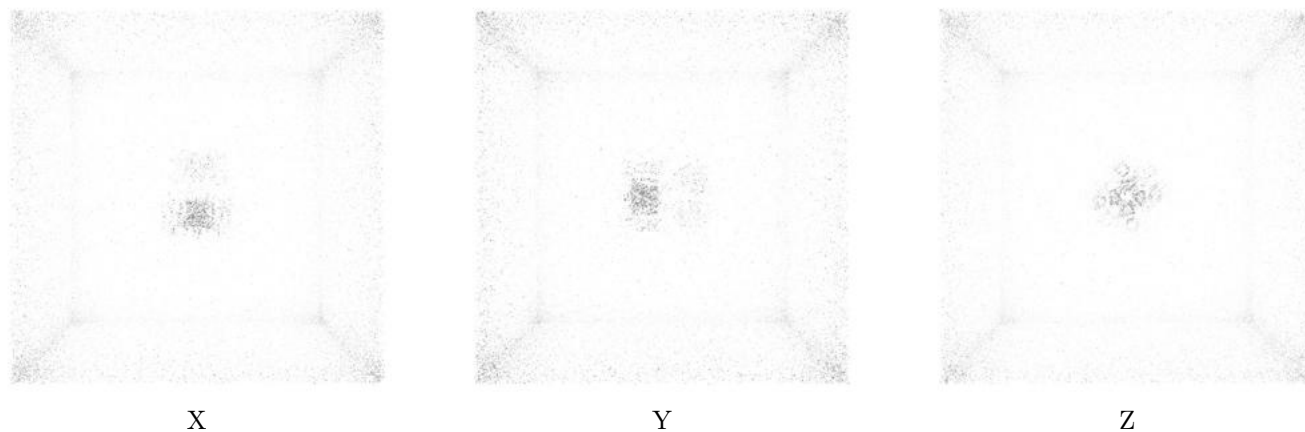
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.14. 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.

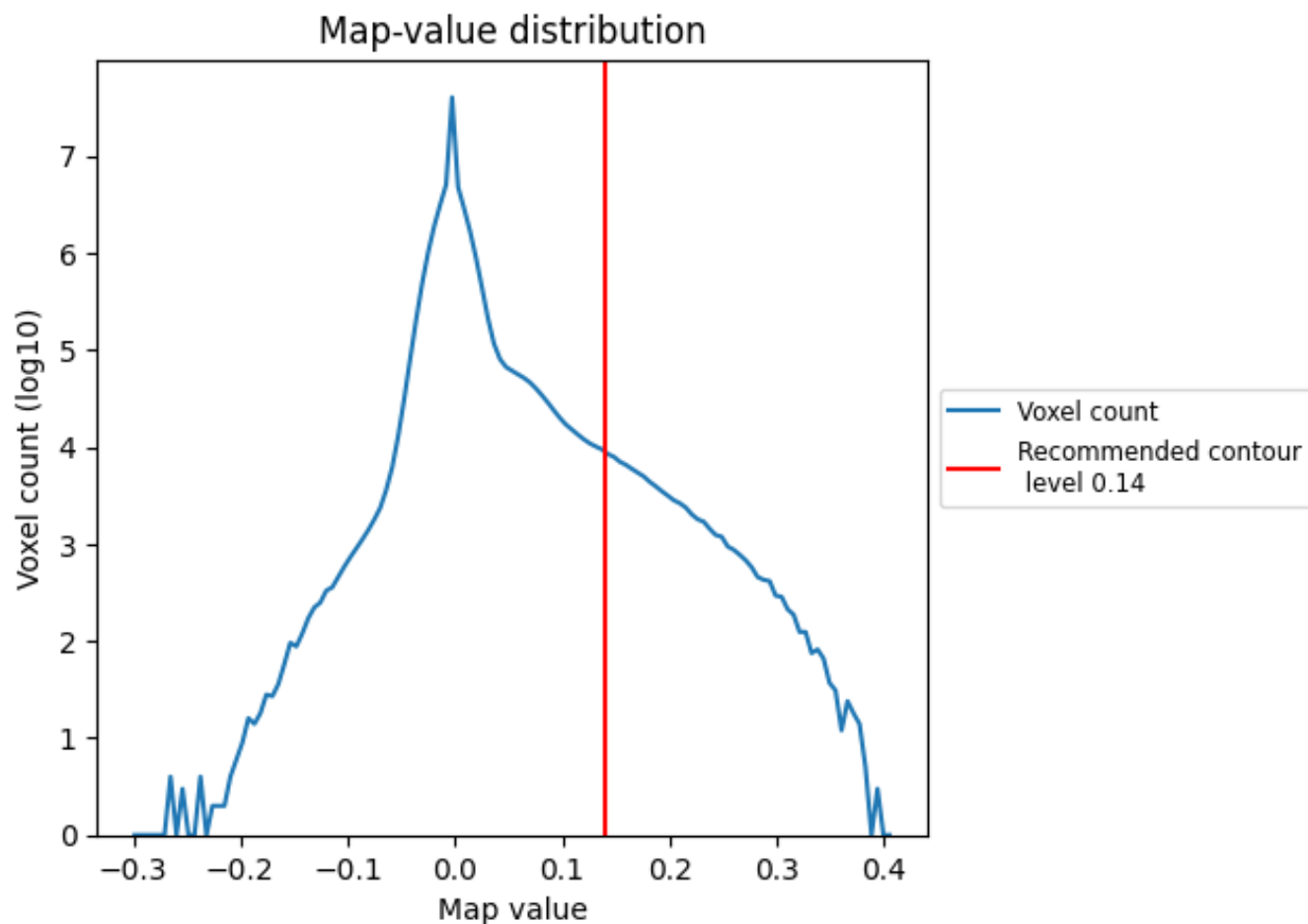
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

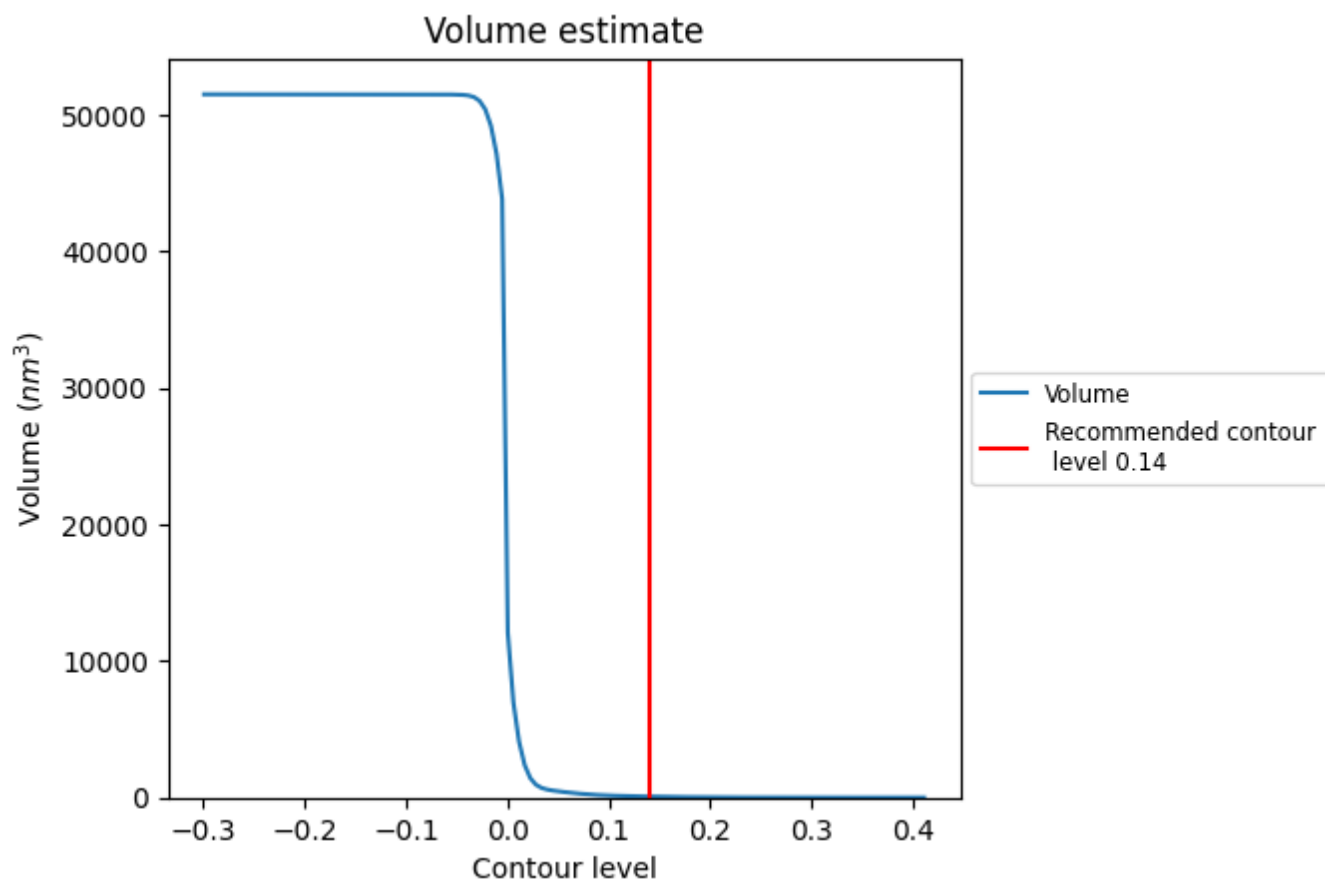
This section contains the results of statistical analysis of the map.

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.

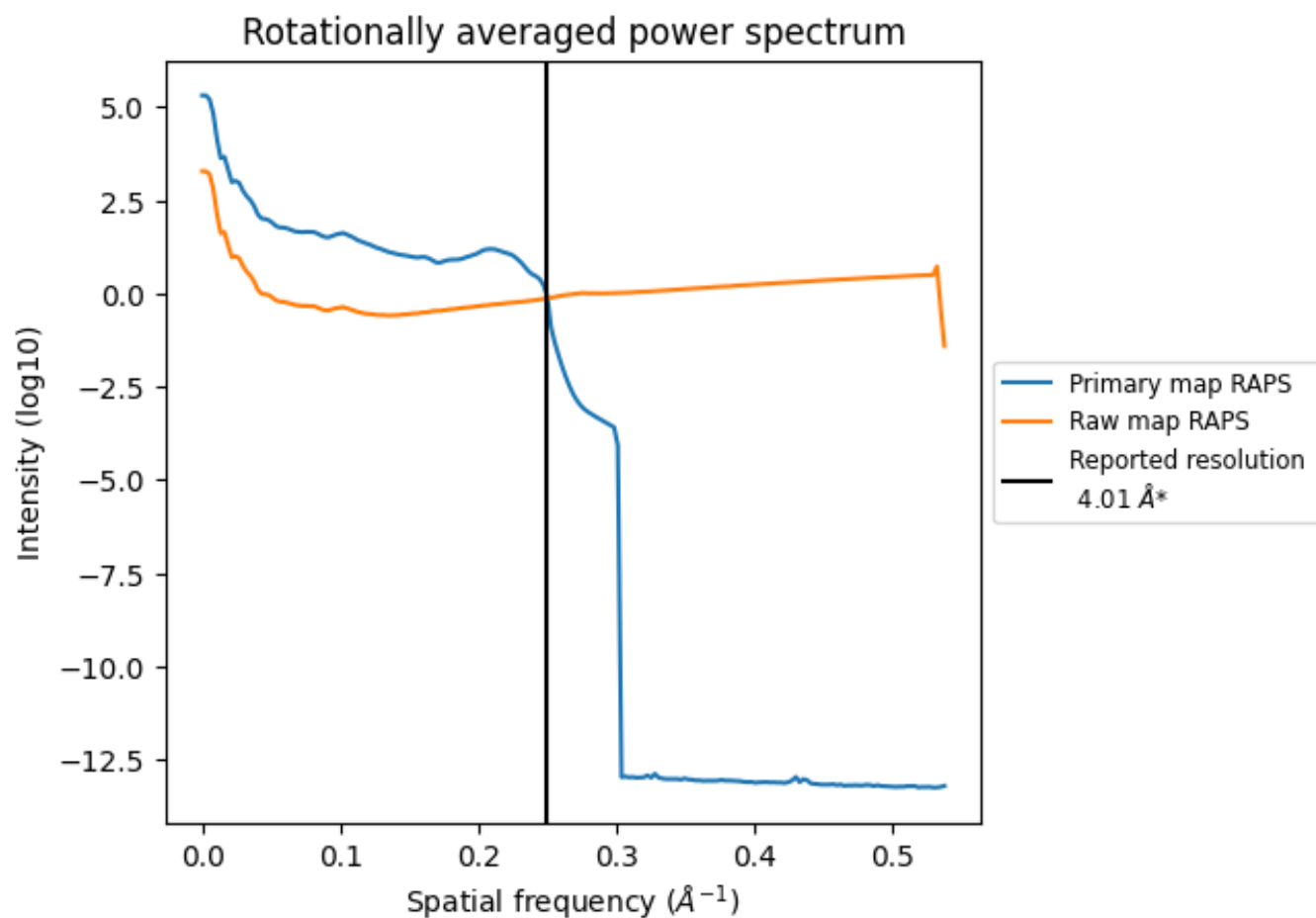
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 72 nm³; this corresponds to an approximate mass of 65 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 ⓘ

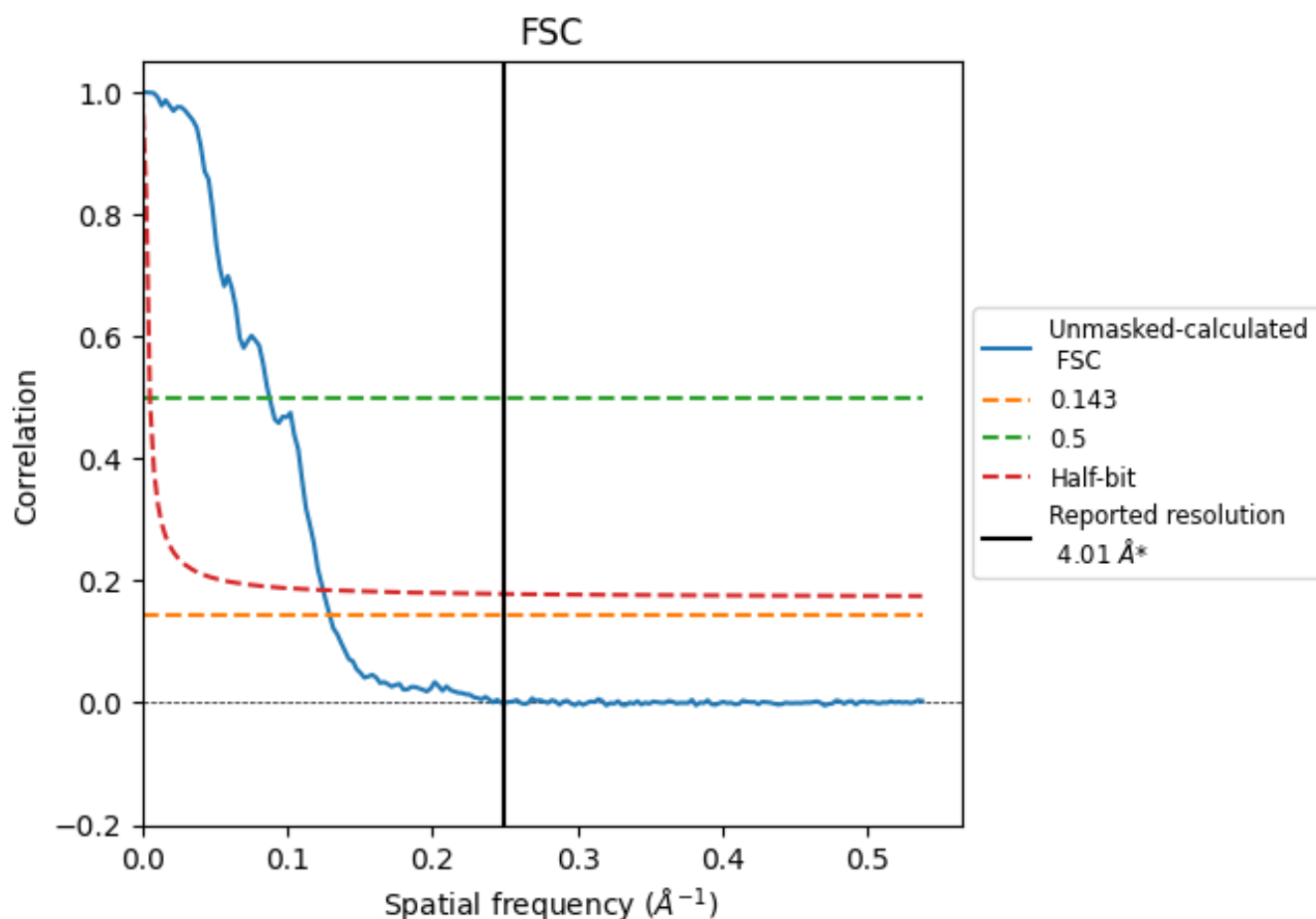


*Reported resolution corresponds to spatial frequency of 0.249 Å⁻¹

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 0.249 Å⁻¹

8.2 Resolution estimates [i](#)

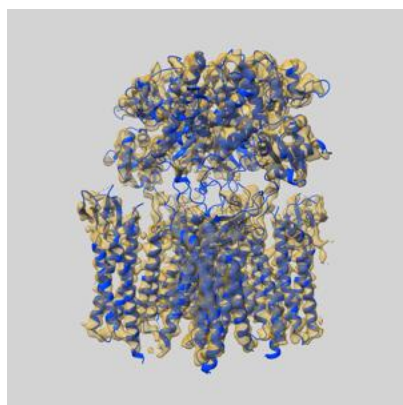
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.01	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.74	11.40	8.03

*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 7.74 differs from the reported value 4.01 by more than 10 %

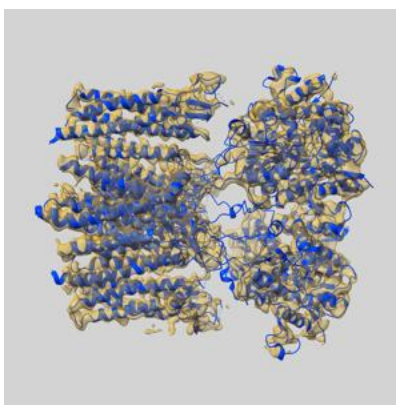
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-71406 and PDB model 9P9C. Per-residue inclusion information can be found in section [3](#) on page [9](#).

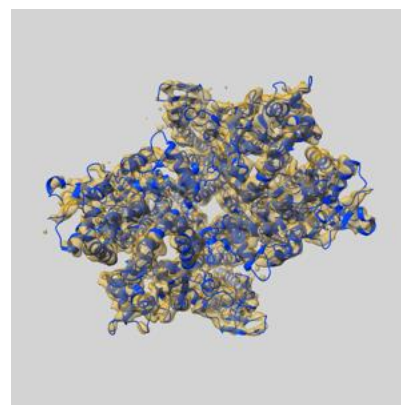
9.1 Map-model overlay [i](#)



X



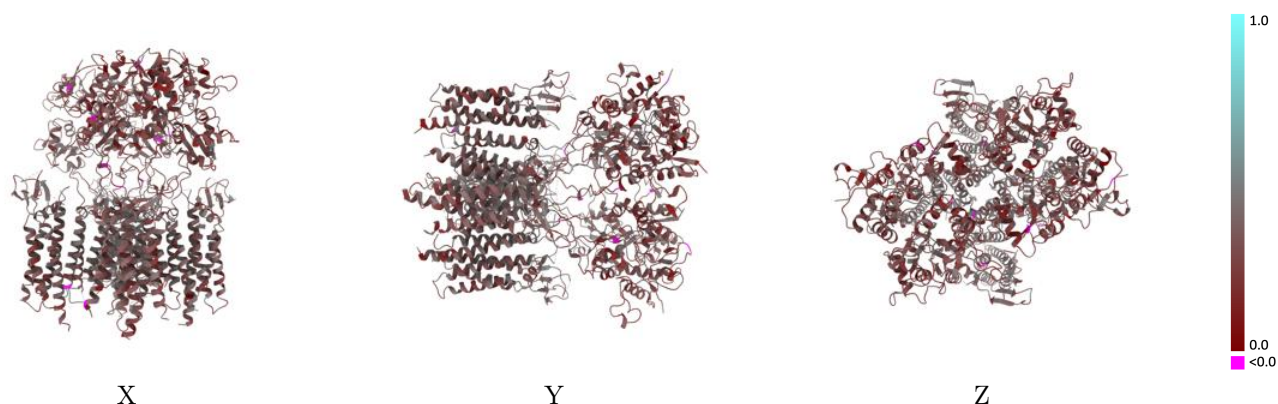
Y



Z

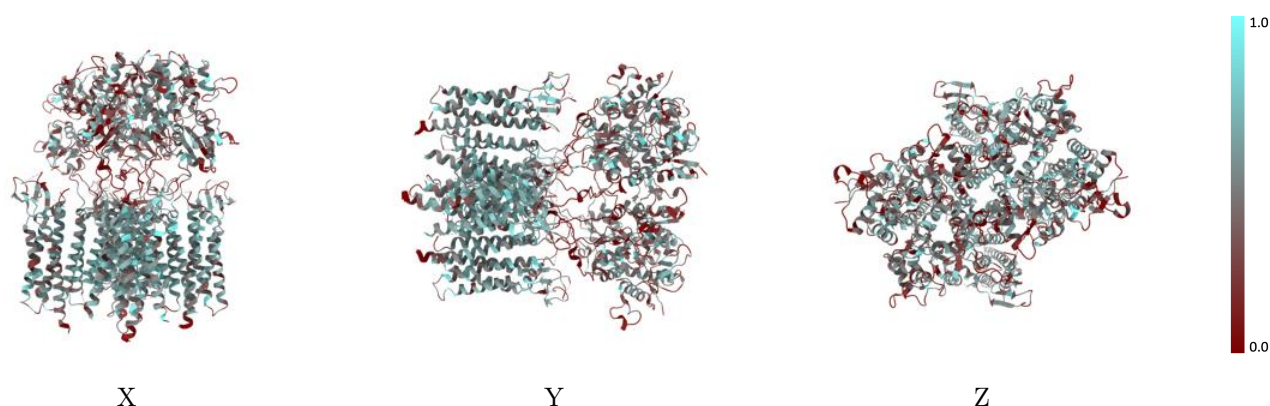
The images above show the 3D surface view of the map at the recommended contour level 0.14 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



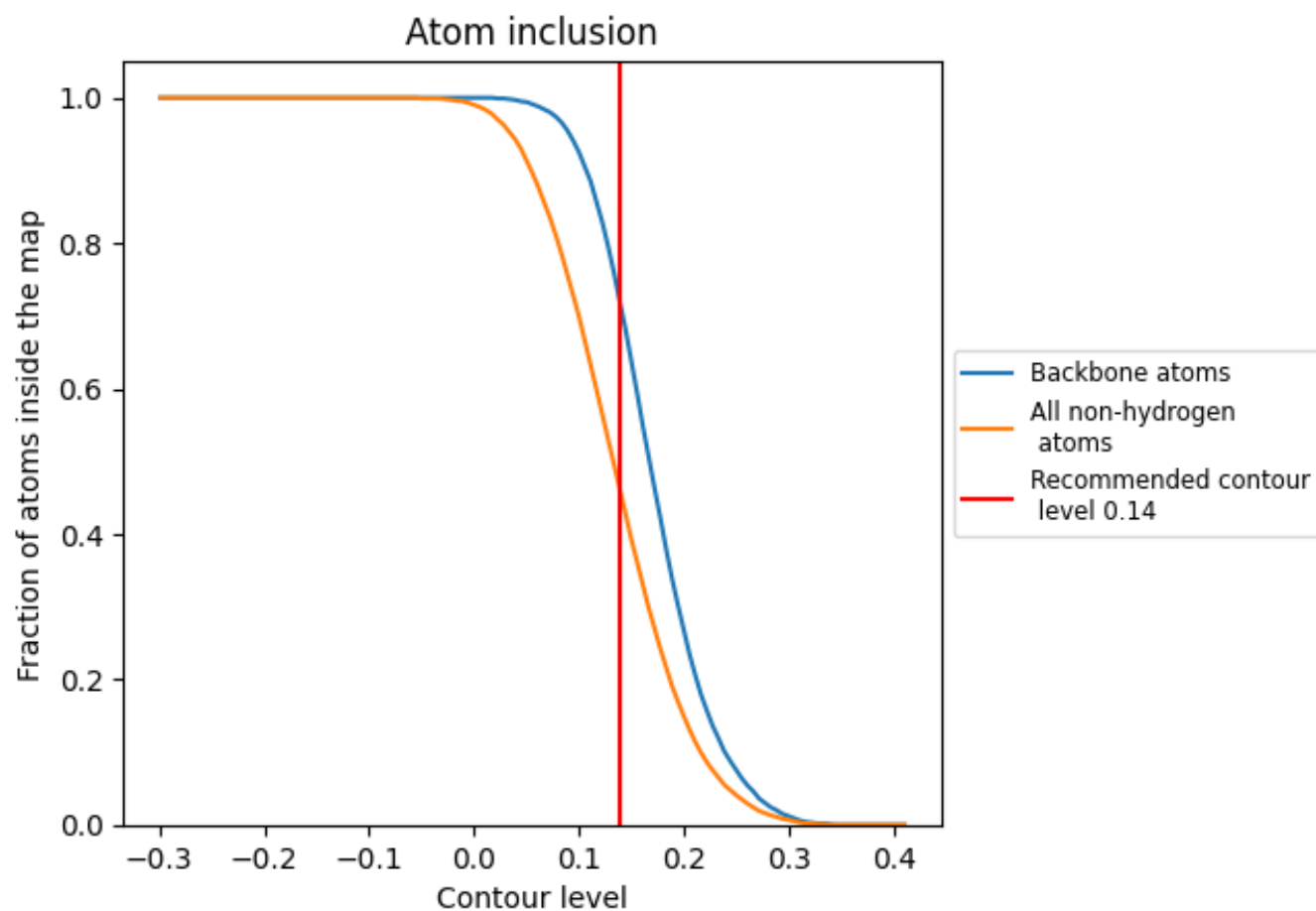
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.14).

9.4 Atom inclusion [i](#)



At the recommended contour level, 71% of all backbone atoms, 46% 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 (0.14) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.4560	<div></div> 0.3240
A	<div></div> 0.4360	<div></div> 0.3100
B	<div></div> 0.4370	<div></div> 0.3230
C	<div></div> 0.4120	<div></div> 0.3060
D	<div></div> 0.4630	<div></div> 0.3180
E	<div></div> 0.5010	<div></div> 0.3410
F	<div></div> 0.4770	<div></div> 0.3480
G	<div></div> 0.5050	<div></div> 0.3520
H	<div></div> 0.5190	<div></div> 0.3520

1.0

0.0

<0.0