Full wwPDB EM Validation Report ⓘ

Nov 18, 2025 – 04:04 pm GMT

PDB ID	:	9HVD / pdb_00009hvd
EMDB ID	:	EMD-52432
Title	:	Native human P-eIF2-eIF2B complex
Authors	:	De Miguel, C.; Thorkelsson, S.R.; Wang, C.; Bertolotti, A.
Deposited on	:	2024-12-27
Resolution	:	3.04 Å(reported)
Based on initial model	:	.

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:

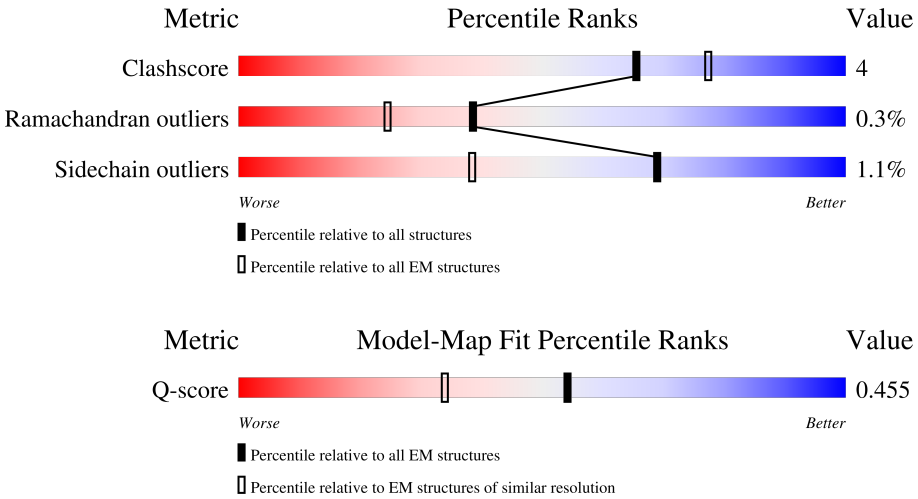
EMDB validation analysis	:	0.0.1.dev129
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 3.04 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	13952 (2.54 - 3.54)

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 <=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	E	452	78% 17%
1	F	452	67% 20% 12%
2	K	315	49% 8% 42%
2	L	315	44% 13% 42%

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Mol	Chain	Length	Quality of chain
3	I	721	
3	J	721	
4	C	351	
4	D	351	
5	A	305	
5	B	305	
6	G	523	
6	H	523	

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 31306 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 Translation initiation factor eIF-2B subunit gamma.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	F	398	Total	C	N	O	S	0	0
			3077	1947	525	581	24		
1	E	433	Total	C	N	O	S	0	0
			3352	2117	576	633	26		

- Molecule 2 is a protein called Eukaryotic translation initiation factor 2 subunit 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	K	183	Total	C	N	O	P	S	0	0
			1507	948	266	286	1	6		
2	L	183	Total	C	N	O	P	S	0	0
			1507	948	266	286	1	6		

- Molecule 3 is a protein called Translation initiation factor eIF2B subunit epsilon.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	J	438	Total	C	N	O	S	0	0
			3428	2170	607	636	15		
3	I	439	Total	C	N	O	S	0	0
			3440	2177	608	639	16		

- Molecule 4 is a protein called Translation initiation factor eIF2B subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	324	Total	C	N	O	S	0	0
			2540	1605	445	475	15		
4	C	326	Total	C	N	O	S	0	0
			2554	1614	448	477	15		

- Molecule 5 is a protein called Translation initiation factor eIF-2B subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	B	292	Total	C	N	O	S	0	0
			2270	1457	376	425	12		
5	A	293	Total	C	N	O	S	0	0
			2279	1463	378	426	12		

- Molecule 6 is a protein called Translation initiation factor eIF-2B subunit delta.

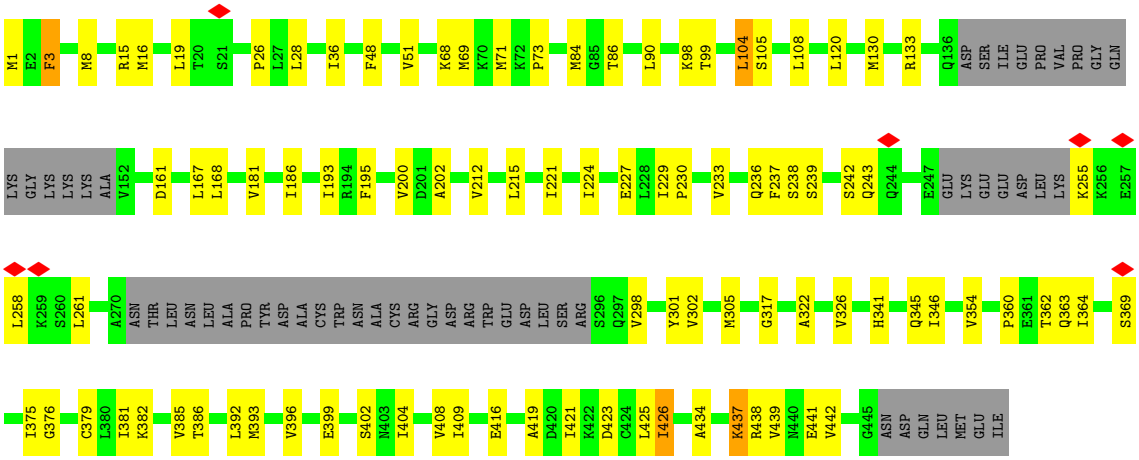
Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	344	Total	C	N	O	S	0	0
			2676	1694	476	492	14		
6	H	344	Total	C	N	O	S	0	0
			2676	1694	476	492	14		

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

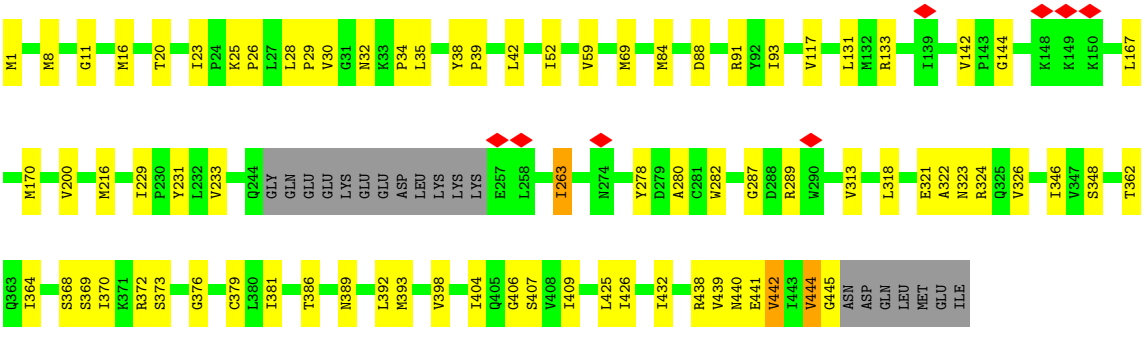
• Molecule 1: Translation initiation factor eIF-2B subunit gamma

Chain F:



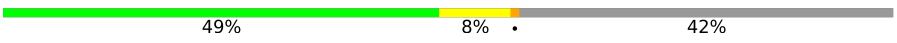
• Molecule 1: Translation initiation factor eIF-2B subunit gamma

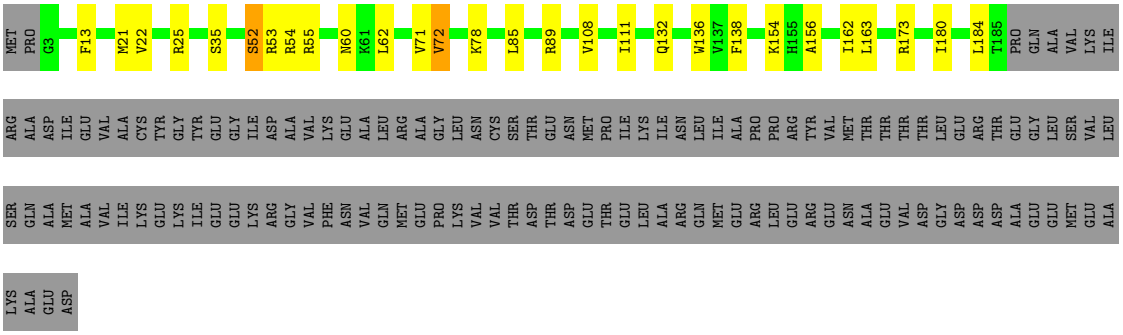
Chain E:



• Molecule 2: Eukaryotic translation initiation factor 2 subunit 1

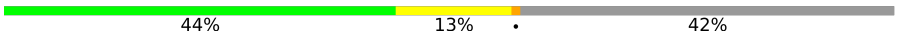
Chain K:

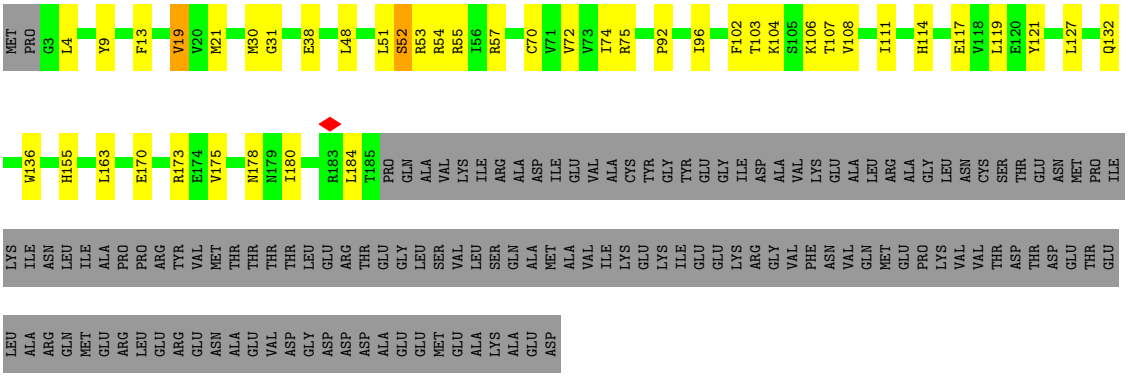




• Molecule 2: Eukaryotic translation initiation factor 2 subunit 1

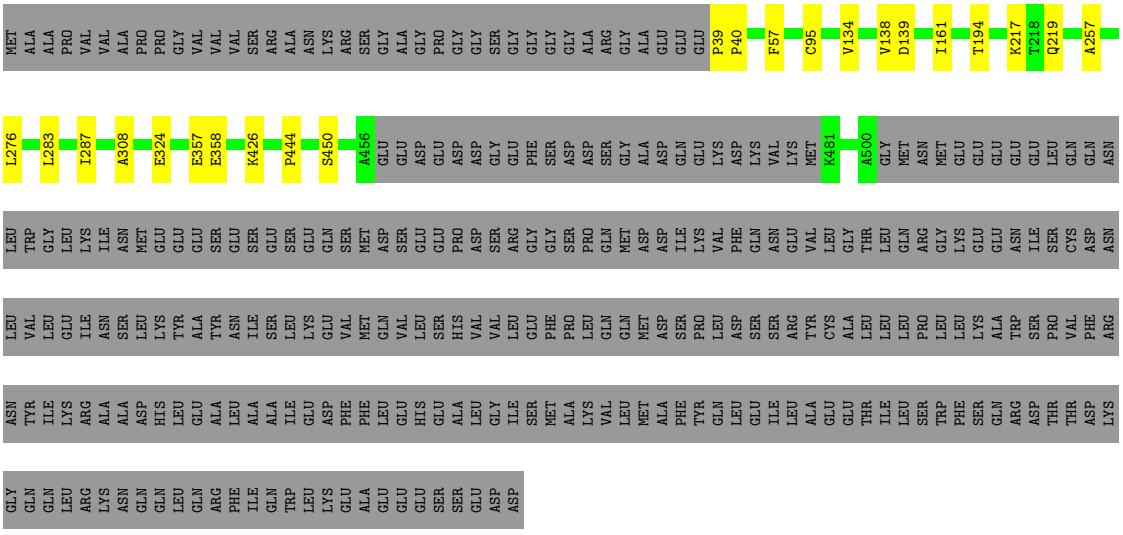
Chain L:





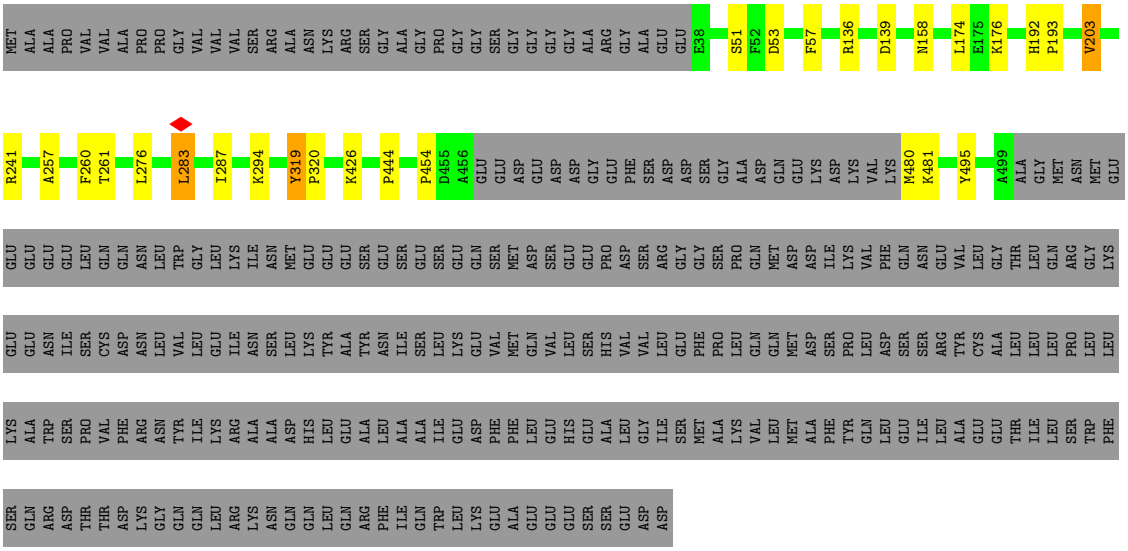
• Molecule 3: Translation initiation factor eIF2B subunit epsilon

Chain J:

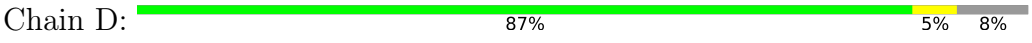


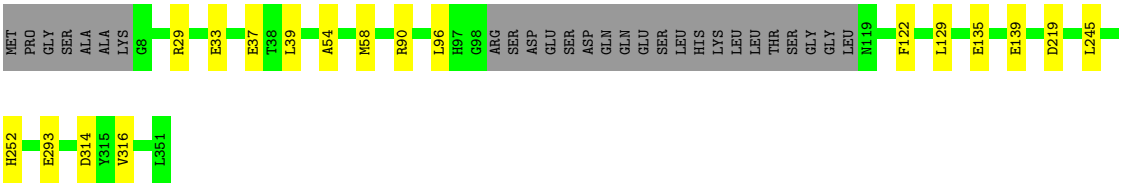
• Molecule 3: Translation initiation factor eIF2B subunit epsilon

Chain I:

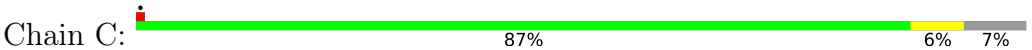


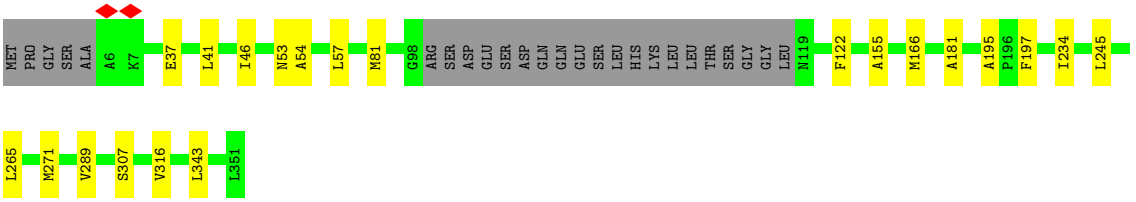
• Molecule 4: Translation initiation factor eIF2B subunit beta



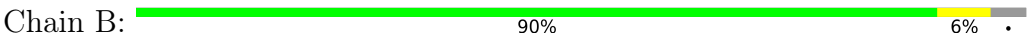


• Molecule 4: Translation initiation factor eIF2B subunit beta

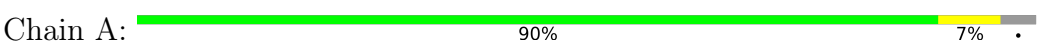




• Molecule 5: Translation initiation factor eIF-2B subunit alpha

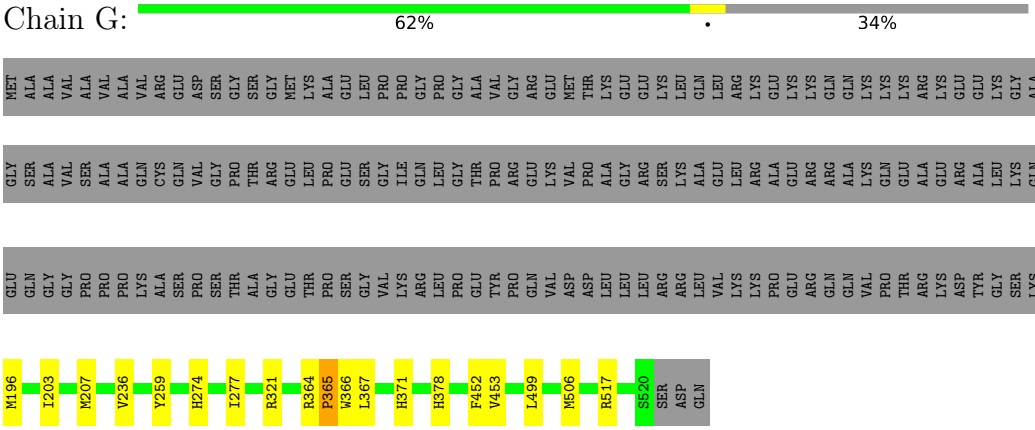


• Molecule 5: Translation initiation factor eIF-2B subunit alpha



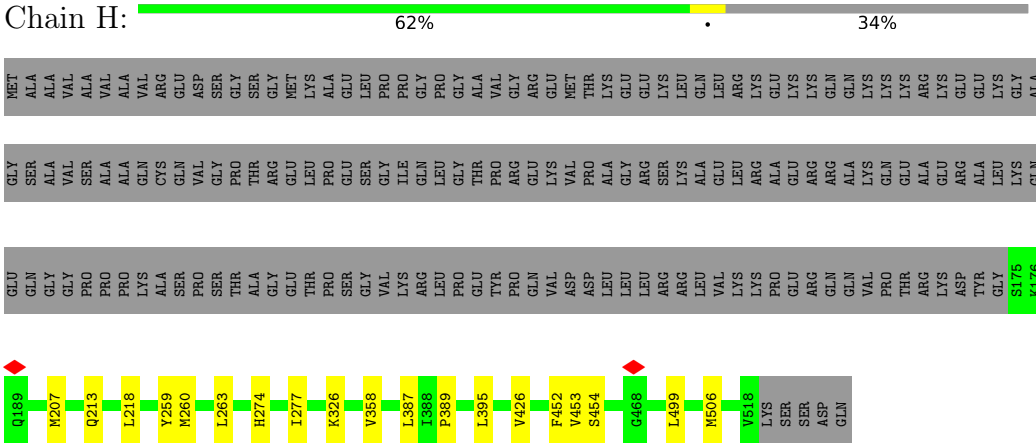
• Molecule 6: Translation initiation factor eIF-2B subunit delta

Chain G:



• Molecule 6: Translation initiation factor eIF-2B subunit delta

Chain H:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	326401	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 ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	75000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	1.755	Depositor
Minimum map value	-0.818	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.039	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	440.0, 440.0, 440.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.1, 1.1, 1.1	Depositor

5 Model quality

5.1 Standard geometry

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

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	E	0.14	0/3402	0.40	0/4593
1	F	0.14	0/3117	0.42	0/4200
2	K	0.11	0/1519	0.32	0/2042
2	L	0.12	0/1519	0.36	0/2042
3	I	0.13	0/3514	0.33	0/4781
3	J	0.11	0/3502	0.29	0/4765
4	C	0.13	0/2603	0.29	0/3518
4	D	0.12	0/2589	0.27	0/3500
5	A	0.13	0/2315	0.28	0/3123
5	B	0.13	0/2306	0.32	0/3112
6	G	0.13	0/2726	0.29	0/3706
6	H	0.13	0/2726	0.30	0/3706
All	All	0.13	0/31838	0.33	0/43088

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
3	I	0	2
3	J	0	1
4	C	0	1
All	All	0	4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	C	195	ALA	Peptide
3	I	319	TYR	Peptide
3	I	57	PHE	Peptide
3	J	57	PHE	Peptide

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	E	3352	0	3450	55	0
1	F	3077	0	3189	51	0
2	K	1507	0	1515	16	0
2	L	1507	0	1515	32	0
3	I	3440	0	3433	15	0
3	J	3428	0	3424	9	0
4	C	2554	0	2557	11	0
4	D	2540	0	2539	12	0
5	A	2279	0	2356	13	0
5	B	2270	0	2343	9	0
6	G	2676	0	2738	11	0
6	H	2676	0	2738	13	0
All	All	31306	0	31797	240	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 4.

All (240) 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:F:8:MET:HE1	1:F:86:THR:HA	1.65	0.79
1:F:229:ILE:HG13	1:F:230:PRO:HD3	1.65	0.78
1:E:142:VAL:HG22	1:E:144:GLY:H	1.52	0.74
1:E:362:THR:HG23	1:E:379:CYS:HB3	1.67	0.74
1:E:346:ILE:HA	1:E:364:ILE:HB	1.70	0.73
2:K:53:ARG:HD3	2:K:54:ARG:H	1.54	0.73
1:E:425:LEU:HG	1:E:441:GLU:HB3	1.70	0.72
1:E:426:ILE:HG21	1:E:432:ILE:HD11	1.71	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:69:MET:HE3	1:E:69:MET:H	1.56	0.69
2:L:21:MET:HE2	2:L:21:MET:HA	1.75	0.68
1:E:404:ILE:HG23	1:E:407:SER:HB3	1.76	0.67
1:F:408:VAL:HB	1:F:425:LEU:HA	1.76	0.67
6:G:364:ARG:HG2	6:G:367:LEU:HD21	1.77	0.66
1:E:84:MET:HE1	1:E:88:ASP:H	1.61	0.65
1:E:444:VAL:HG13	1:E:445:GLY:H	1.61	0.65
4:C:81:MET:HE3	4:C:81:MET:HA	1.79	0.65
4:D:54:ALA:HB3	4:D:122:PHE:HB3	1.78	0.64
6:G:193:THR:HA	6:G:196:MET:HG3	1.79	0.64
1:F:362:THR:HG23	1:F:379:CYS:HB2	1.80	0.64
2:L:30:MET:HA	2:L:30:MET:HE3	1.78	0.63
6:G:207:MET:N	6:G:207:MET:HE2	2.14	0.63
1:F:421:ILE:HG23	1:F:437:LYS:HG3	1.82	0.61
1:E:8:MET:HE3	1:E:8:MET:H	1.66	0.61
1:E:52:ILE:HG21	1:E:93:ILE:HD11	1.83	0.60
2:L:19:VAL:HG12	2:L:70:CYS:SG	2.41	0.60
2:K:180:ILE:HG23	2:K:184:LEU:HD12	1.83	0.60
2:L:103:THR:O	2:L:107:THR:HG22	2.01	0.60
3:I:158:ASN:HD22	3:I:320:PRO:HD3	1.67	0.59
1:F:69:MET:HE1	1:F:73:PRO:HD3	1.85	0.59
2:K:132:GLN:HA	2:K:136:TRP:HB2	1.85	0.59
1:F:385:VAL:HG13	1:F:402:SER:HB3	1.85	0.58
4:C:54:ALA:HB3	4:C:122:PHE:HB3	1.85	0.58
2:L:104:LYS:O	2:L:108:VAL:HG23	2.03	0.58
3:J:276:LEU:HD13	3:J:287:ILE:HD11	1.86	0.58
1:E:29:PRO:HA	1:E:34:PRO:HA	1.86	0.58
1:E:35:LEU:HA	1:E:38:TYR:CE2	2.39	0.58
5:A:46:ARG:HD2	2:L:30:MET:HG2	1.85	0.58
1:F:108:LEU:HD11	1:F:202:ALA:HB1	1.86	0.58
1:E:35:LEU:HA	1:E:38:TYR:HE2	1.69	0.58
3:J:139:ASP:HB2	3:J:257:ALA:HB1	1.85	0.57
3:I:426:LYS:HD2	3:I:444:PRO:HA	1.86	0.57
2:K:71:VAL:HG21	2:K:85:LEU:HD23	1.87	0.57
1:E:313:VAL:HA	1:E:318:LEU:HD22	1.85	0.57
4:C:245:LEU:HB2	4:C:316:VAL:HB	1.86	0.57
1:F:167:LEU:HD12	1:F:302:VAL:HG21	1.87	0.57
1:F:419:ALA:HA	1:F:434:ALA:HA	1.85	0.56
1:E:392:LEU:HB2	1:E:409:ILE:HB	1.87	0.56
1:F:186:ILE:HG23	1:F:237:PHE:HE2	1.71	0.56
2:L:103:THR:HA	2:L:106:LYS:HE3	1.86	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:98:LYS:HG3	1:F:99:THR:HG23	1.88	0.56
1:F:15:ARG:HH21	1:F:317:GLY:H	1.54	0.56
1:F:167:LEU:HD22	1:F:233:VAL:HG21	1.88	0.56
1:E:170:MET:HE1	1:E:229:ILE:HG22	1.88	0.56
2:K:52:SEP:HA	2:K:55:ARG:HH11	1.71	0.56
3:J:194:THR:HG22	3:J:308:ALA:HB1	1.88	0.56
1:E:323:ASN:HA	1:E:326:VAL:HG22	1.87	0.55
1:F:51:VAL:H	1:F:71:MET:HE2	1.72	0.55
1:F:369:SER:HB3	1:F:386:THR:HG22	1.88	0.55
2:K:21:MET:HA	2:K:21:MET:HE2	1.89	0.55
3:I:139:ASP:HB2	3:I:257:ALA:HB1	1.89	0.55
6:G:207:MET:HE2	6:G:207:MET:H	1.73	0.54
2:L:180:ILE:HG23	2:L:184:LEU:HD12	1.88	0.54
1:F:221:ILE:HD12	1:F:227:GLU:HB3	1.89	0.54
5:B:20:MET:HE3	5:B:24:VAL:HB	1.89	0.54
1:E:348:SER:HB2	1:E:368:SER:H	1.73	0.54
1:F:16:MET:HE2	1:F:16:MET:N	2.23	0.54
6:G:274:HIS:HA	6:G:277:ILE:HD12	1.89	0.54
5:A:89:CYS:O	5:A:93:MET:HG3	2.08	0.54
1:F:130:MET:HG2	1:F:302:VAL:HG22	1.91	0.53
1:E:381:ILE:HG22	1:E:398:VAL:HB	1.90	0.53
6:G:499:LEU:HD11	6:G:506:MET:HB3	1.91	0.53
5:A:14:MET:HB3	5:A:15:LYS:HE2	1.91	0.53
1:F:305:MET:N	1:F:305:MET:HE3	2.24	0.53
2:L:102:PHE:O	2:L:106:LYS:HG3	2.08	0.53
2:L:31:GLY:HA2	2:L:48:LEU:HG	1.91	0.53
1:F:19:LEU:HD21	1:F:28:LEU:HD22	1.88	0.53
6:H:499:LEU:HD11	6:H:506:MET:HB3	1.91	0.52
6:H:177:VAL:HG12	6:H:179:LEU:H	1.75	0.52
6:H:207:MET:HE1	6:H:259:TYR:HB3	1.92	0.52
1:E:346:ILE:HG13	1:E:364:ILE:HG13	1.92	0.51
5:A:130:TYR:HD1	5:A:164:MET:HB2	1.75	0.51
6:H:207:MET:HE1	6:H:259:TYR:CG	2.45	0.51
1:E:322:ALA:O	1:E:326:VAL:HG13	2.11	0.51
1:E:280:ALA:HB3	1:E:282:TRP:CH2	2.46	0.51
2:L:52:SEP:HA	2:L:55:ARG:HH11	1.76	0.51
2:L:119:LEU:HB2	2:L:121:TYR:HE2	1.76	0.51
2:K:60:ASN:HB3	2:K:62:LEU:HD23	1.93	0.51
1:F:345:GLN:HB3	1:F:363:GLN:HA	1.93	0.51
1:E:364:ILE:HG23	1:E:381:ILE:HD11	1.93	0.51
2:K:108:VAL:O	2:K:111:ILE:HG13	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:305:LEU:HA	2:L:57:ARG:HH22	1.75	0.50
4:D:245:LEU:HB2	4:D:316:VAL:HB	1.92	0.50
3:I:176:LYS:HA	3:I:176:LYS:HE2	1.92	0.50
2:L:53:ARG:HG2	2:L:54:ARG:HE	1.76	0.50
3:I:203:VAL:HG12	3:I:241:ARG:HB2	1.93	0.50
1:F:26:PRO:HB3	1:F:36:ILE:HD12	1.93	0.50
1:E:231:TYR:HE2	1:E:263:ILE:HD11	1.77	0.50
1:F:168:LEU:HG	1:F:237:PHE:HZ	1.77	0.49
5:B:89:CYS:O	5:B:93:MET:HE2	2.12	0.49
2:L:108:VAL:O	2:L:111:ILE:HG13	2.13	0.49
1:E:441:GLU:O	1:E:442:VAL:HG12	2.13	0.49
2:L:170:GLU:HA	2:L:173:ARG:HB2	1.94	0.49
5:B:292:THR:HG23	5:B:294:SER:H	1.77	0.49
1:F:376:GLY:HA3	1:F:393:MET:HA	1.94	0.49
4:D:96:LEU:HD12	4:D:129:LEU:HD13	1.95	0.49
1:F:193:ILE:HD13	1:F:195:PHE:HE1	1.77	0.49
1:E:11:GLY:HA3	1:E:16:MET:HE3	1.94	0.48
4:D:135:GLU:O	4:D:139:GLU:HG2	2.13	0.48
1:E:364:ILE:HA	1:E:381:ILE:HD11	1.95	0.48
2:L:119:LEU:HB2	2:L:121:TYR:CE2	2.48	0.48
6:G:371:HIS:CD2	1:E:287:GLY:HA3	2.49	0.48
2:L:19:VAL:HG13	2:L:72:VAL:HG12	1.95	0.48
2:L:92:PRO:O	2:L:96:ILE:HG12	2.14	0.48
5:A:76:ILE:HD11	5:A:93:MET:O	2.14	0.47
5:B:128:HIS:HB2	5:B:215:MET:HE1	1.96	0.47
1:F:86:THR:HB	1:F:224:ILE:HG23	1.95	0.47
1:E:1:MET:HE3	1:E:1:MET:N	2.30	0.47
1:E:28:LEU:HD22	1:E:29:PRO:HD2	1.96	0.47
2:K:163:LEU:HB3	2:K:173:ARG:HE	1.80	0.47
2:L:103:THR:O	2:L:106:LYS:HD2	2.15	0.47
1:F:382:LYS:HD2	1:F:399:GLU:HA	1.96	0.47
1:F:133:ARG:HB3	1:F:200:VAL:HG23	1.97	0.46
1:E:28:LEU:HD11	1:E:30:VAL:HB	1.98	0.46
1:E:167:LEU:HD22	1:E:233:VAL:HG21	1.98	0.46
2:K:52:SEP:HA	2:K:55:ARG:NH1	2.30	0.46
1:F:438:ARG:HB2	1:F:441:GLU:HB3	1.97	0.46
3:I:480:MET:C	3:I:480:MET:HE3	2.41	0.46
2:K:154:LYS:HA	2:K:184:LEU:HD13	1.97	0.46
3:I:192:HIS:CG	3:I:193:PRO:HD2	2.51	0.46
2:L:4:LEU:HD13	2:L:127:LEU:HD22	1.97	0.46
2:L:74:ILE:HG22	2:L:75:ARG:HG3	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:91:ARG:HD3	1:E:216:MET:HB2	1.97	0.46
1:F:168:LEU:HG	1:F:237:PHE:CZ	2.51	0.45
4:C:46:ILE:HD13	4:C:57:LEU:HD11	1.98	0.45
1:F:255:LYS:HB3	1:F:258:LEU:HB2	1.99	0.45
5:A:305:LEU:HD21	2:L:53:ARG:HG3	1.98	0.45
6:H:274:HIS:O	6:H:277:ILE:HG13	2.15	0.45
2:L:9:TYR:HE2	2:L:38:GLU:HB3	1.82	0.45
6:H:260:MET:HA	6:H:263:LEU:HB2	1.97	0.45
1:F:409:ILE:HA	1:F:426:ILE:HB	1.99	0.45
1:E:370:ILE:HD11	1:E:373:SER:HB3	1.98	0.45
1:F:261:LEU:HD13	1:F:261:LEU:O	2.16	0.45
1:E:133:ARG:HB3	1:E:200:VAL:HG23	1.99	0.45
2:L:13:PHE:N	2:L:13:PHE:CD1	2.84	0.45
1:F:104:LEU:HD23	1:F:105:SER:H	1.82	0.45
1:F:239:SER:O	1:F:243:GLN:HG2	2.17	0.45
3:I:319:TYR:HE2	4:C:289:VAL:HG12	1.82	0.45
4:C:41:LEU:HD12	4:C:41:LEU:HA	1.81	0.45
1:E:321:GLU:HG2	1:E:324:ARG:HH12	1.82	0.44
1:E:393:MET:HE3	1:E:393:MET:N	2.32	0.44
4:C:234:ILE:HD11	4:C:265:LEU:HD21	1.99	0.44
6:G:321:ARG:HG3	6:G:321:ARG:HH11	1.80	0.44
1:E:25:LYS:HA	1:E:25:LYS:HD3	1.77	0.44
1:E:376:GLY:HA3	1:E:393:MET:HB2	1.98	0.44
1:F:341:HIS:CE1	1:F:360:PRO:HB3	2.53	0.44
1:E:381:ILE:HA	1:E:398:VAL:HB	2.00	0.44
3:I:480:MET:HE3	3:I:481:LYS:N	2.32	0.44
5:A:23:ALA:O	5:A:27:ILE:HG12	2.17	0.44
3:J:134:VAL:O	3:J:138:VAL:HG12	2.18	0.44
3:J:217:LYS:HB3	3:J:219:GLN:HE22	1.82	0.44
5:A:77:SER:OG	2:L:30:MET:HE1	2.18	0.44
4:C:155:ALA:HB1	4:C:181:ALA:HB2	2.00	0.43
4:D:39:LEU:HD23	4:D:39:LEU:HA	1.77	0.43
6:H:326:LYS:HE2	6:H:506:MET:HE1	2.01	0.43
1:F:364:ILE:HA	1:F:381:ILE:HB	2.00	0.43
5:A:78:LEU:HD13	5:A:78:LEU:HA	1.88	0.43
6:H:263:LEU:HD23	6:H:263:LEU:HA	1.85	0.43
5:B:203:ASN:HB3	5:B:239:PHE:CZ	2.53	0.43
2:L:54:ARG:HA	2:L:54:ARG:HD3	1.87	0.43
2:L:175:VAL:HA	2:L:178:ASN:OD1	2.18	0.43
6:G:203:ILE:HA	6:G:259:TYR:HE1	1.83	0.43
1:E:372:ARG:HA	1:E:372:ARG:HD3	1.94	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:293:GLU:H	4:D:293:GLU:HG2	1.64	0.43
1:F:392:LEU:HD23	1:F:396:VAL:HG11	2.00	0.43
2:K:156:ALA:HB2	2:K:162:ILE:HD11	2.00	0.43
4:D:29:ARG:HH22	4:D:37:GLU:HG3	1.83	0.43
6:H:395:LEU:HD12	6:H:426:VAL:HG12	2.00	0.43
3:J:357:GLU:HG3	3:J:358:GLU:HG2	2.01	0.42
6:G:365:PRO:HG2	6:G:366:TRP:CE3	2.54	0.42
3:I:51:SER:HB2	3:I:53:ASP:OD2	2.19	0.42
6:H:213:GLN:HB3	6:H:218:LEU:HD23	2.01	0.42
6:H:453:VAL:HG12	6:H:454:SER:N	2.34	0.42
1:F:236:GLN:HG3	1:F:237:PHE:HD1	1.84	0.42
5:B:56:LEU:HD23	5:B:56:LEU:HA	1.89	0.42
1:E:20:THR:HA	1:E:25:LYS:NZ	2.35	0.42
6:H:207:MET:HE1	6:H:259:TYR:CB	2.48	0.42
3:J:426:LYS:HD2	3:J:444:PRO:HA	2.01	0.42
1:E:278:TYR:CD2	1:E:278:TYR:C	2.97	0.42
1:E:364:ILE:HA	1:E:381:ILE:CD1	2.48	0.42
4:C:53:ASN:HB2	4:C:122:PHE:O	2.19	0.42
3:I:454:PRO:HG3	3:I:495:TYR:CG	2.55	0.42
2:L:163:LEU:HB3	2:L:173:ARG:HE	1.85	0.42
4:D:33:GLU:O	4:D:37:GLU:HG2	2.19	0.42
4:D:96:LEU:HD23	4:D:96:LEU:HA	1.89	0.42
1:F:90:LEU:HD13	1:F:90:LEU:HA	1.90	0.42
5:A:187:MET:HE2	5:A:187:MET:HB2	1.87	0.42
5:B:87:SER:O	5:B:91:LYS:HG2	2.20	0.42
6:G:378:HIS:HB2	1:E:289:ARG:NH2	2.35	0.42
1:E:23:ILE:HD11	1:E:28:LEU:HD23	2.02	0.42
2:L:48:LEU:HB2	2:L:51:LEU:HA	2.01	0.42
1:E:231:TYR:CE2	1:E:263:ILE:HD11	2.55	0.41
6:H:387:LEU:HB3	6:H:389:PRO:HD2	2.01	0.41
1:F:120:LEU:HD21	1:F:301:TYR:CB	2.51	0.41
1:E:369:SER:HB3	1:E:386:THR:HA	2.02	0.41
1:F:404:ILE:HA	1:F:421:ILE:HB	2.02	0.41
5:B:179:LEU:HD23	5:B:179:LEU:HA	1.89	0.41
1:E:39:PRO:O	1:E:42:LEU:HG	2.20	0.41
3:J:217:LYS:HD3	3:J:219:GLN:HE22	1.85	0.41
3:I:276:LEU:HD23	3:I:287:ILE:HD11	2.02	0.41
2:L:132:GLN:HA	2:L:136:TRP:HB2	2.02	0.41
1:F:3:PHE:HB3	1:F:48:PHE:HZ	1.85	0.41
2:K:13:PHE:HB2	2:K:78:LYS:HE2	2.03	0.41
5:A:76:ILE:HD12	5:A:76:ILE:HA	1.79	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:68:LYS:HE2	1:F:68:LYS:HA	2.02	0.41
2:K:25:ARG:NE	2:K:35:SER:HB3	2.35	0.41
4:D:219:ASP:OD1	4:D:219:ASP:C	2.64	0.41
3:I:136:ARG:HG2	3:I:261:THR:HG22	2.01	0.41
3:J:39:PRO:HA	3:J:40:PRO:HD3	1.91	0.41
4:D:58:MET:HE1	4:D:90:ARG:HG3	2.03	0.41
1:F:212:VAL:HA	1:F:215:LEU:HG	2.02	0.41
2:K:53:ARG:HG2	2:K:54:ARG:HH11	1.86	0.41
2:K:72:VAL:HG11	2:K:89:ARG:HB3	2.03	0.41
4:D:252:HIS:HB2	4:D:314:ASP:OD2	2.20	0.41
5:B:15:LYS:HD2	5:B:15:LYS:C	2.46	0.41
1:E:389:ASN:O	1:E:406:GLY:HA2	2.21	0.41
1:E:438:ARG:HG2	1:E:439:VAL:H	1.85	0.41
3:I:319:TYR:O	3:I:319:TYR:CG	2.73	0.40
4:C:343:LEU:HD23	4:C:343:LEU:HA	1.95	0.40
5:A:127:THR:HG23	5:A:152:VAL:HG23	2.02	0.40
1:E:26:PRO:HB2	1:E:59:VAL:HG11	2.04	0.40
1:E:144:GLY:HA3	1:E:440:ASN:CG	2.46	0.40
1:F:84:MET:C	1:F:84:MET:HE2	2.46	0.40
1:F:375:ILE:HA	1:F:392:LEU:HB2	2.04	0.40
1:E:117:VAL:HG21	1:E:131:LEU:HD12	2.03	0.40
4:C:271:MET:HA	4:C:271:MET:HE2	2.04	0.40
1:F:322:ALA:O	1:F:326:VAL:HG13	2.22	0.40
2:L:114:HIS:O	2:L:117:GLU:HG2	2.21	0.40
1:F:1:MET:N	1:F:1:MET:HE3	2.37	0.40
1:F:161:ASP:HB3	1:F:168:LEU:HD13	2.04	0.40
3:I:294:LYS:HE2	3:I:294:LYS:HB3	1.96	0.40

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	E	429/452 (95%)	390 (91%)	36 (8%)	3 (1%)	19 51
1	F	390/452 (86%)	354 (91%)	31 (8%)	5 (1%)	10 36
2	K	180/315 (57%)	174 (97%)	6 (3%)	0	100 100
2	L	180/315 (57%)	174 (97%)	6 (3%)	0	100 100
3	I	435/721 (60%)	409 (94%)	25 (6%)	1 (0%)	44 74
3	J	434/721 (60%)	395 (91%)	38 (9%)	1 (0%)	44 74
4	C	322/351 (92%)	308 (96%)	14 (4%)	0	100 100
4	D	320/351 (91%)	309 (97%)	11 (3%)	0	100 100
5	A	289/305 (95%)	279 (96%)	10 (4%)	0	100 100
5	B	288/305 (94%)	272 (94%)	15 (5%)	1 (0%)	37 68
6	G	342/523 (65%)	324 (95%)	16 (5%)	2 (1%)	22 54
6	H	342/523 (65%)	329 (96%)	13 (4%)	0	100 100
All	All	3951/5334 (74%)	3717 (94%)	221 (6%)	13 (0%)	38 68

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	B	83	TYR
1	E	444	VAL
1	F	426	ILE
6	G	453	VAL
3	I	283	LEU
1	F	354	VAL
1	E	32	ASN
1	F	423	ASP
1	F	437	LYS
1	F	242	SER
3	J	283	LEU
1	E	442	VAL
6	G	365	PRO

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	E	380/398 (96%)	379 (100%)	1 (0%)	91 95
1	F	351/398 (88%)	342 (97%)	9 (3%)	41 69
2	K	167/279 (60%)	164 (98%)	3 (2%)	54 77
2	L	167/279 (60%)	165 (99%)	2 (1%)	67 84
3	I	386/626 (62%)	382 (99%)	4 (1%)	73 87
3	J	384/626 (61%)	380 (99%)	4 (1%)	73 87
4	C	277/298 (93%)	273 (99%)	4 (1%)	62 81
4	D	276/298 (93%)	276 (100%)	0	100 100
5	A	250/260 (96%)	246 (98%)	4 (2%)	58 79
5	B	249/260 (96%)	246 (99%)	3 (1%)	67 84
6	G	301/444 (68%)	298 (99%)	3 (1%)	73 87
6	H	301/444 (68%)	299 (99%)	2 (1%)	81 90
All	All	3489/4610 (76%)	3450 (99%)	39 (1%)	69 85

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	3	PHE
1	F	104	LEU
1	F	181	VAL
1	F	238	SER
1	F	298	VAL
1	F	346	ILE
1	F	416	GLU
1	F	439	VAL
1	F	442	VAL
2	K	22	VAL
2	K	72	VAL
2	K	138	PHE
3	J	95	CYS
3	J	161	ILE
3	J	324	GLU
3	J	450	SER
5	B	104	ILE
5	B	180	ASP
5	B	275	TYR
6	G	236	VAL
6	G	452	PHE
6	G	517	ARG

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Mol	Chain	Res	Type
1	E	263	ILE
3	I	174	LEU
3	I	203	VAL
3	I	260	PHE
3	I	283	LEU
4	C	37	GLU
4	C	166	MET
4	C	197	PHE
4	C	307	SER
5	A	1	MET
5	A	104	ILE
5	A	153	THR
5	A	303	LEU
6	H	358	VAL
6	H	452	PHE
2	L	19	VAL
2	L	155	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	32	ASN
1	F	203	HIS
1	F	244	GLN
2	K	23	ASN
2	K	68	ASN
4	D	158	HIS
4	D	230	ASN
4	D	260	HIS
4	D	331	ASN
5	B	116	HIS
5	B	213	ASN
5	B	223	ASN
6	G	216	GLN
6	G	378	HIS
1	E	154	GLN
1	E	190	HIS
3	I	210	ASN
3	I	214	HIS
3	I	286	GLN
3	I	371	ASN
4	C	331	ASN

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Mol	Chain	Res	Type
6	H	431	ASN
6	H	455	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\#\|Z\| > 2$
2	SEP	K	52	2	8,9,10	1.53	1 (12%)	8,12,14	1.39	2 (25%)
2	SEP	L	52	2	8,9,10	1.53	1 (12%)	8,12,14	1.38	2 (25%)

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
2	SEP	K	52	2	-	0/5/8/10	-
2	SEP	L	52	2	-	2/5/8/10	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	52	SEP	P-O1P	3.35	1.61	1.50
2	L	52	SEP	P-O1P	3.32	1.61	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	L	52	SEP	P-OG-CB	-2.62	111.09	118.30
2	K	52	SEP	P-OG-CB	-2.56	111.24	118.30
2	K	52	SEP	OG-CB-CA	2.24	110.32	108.14
2	L	52	SEP	OG-CB-CA	2.18	110.26	108.14

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	L	52	SEP	CA-CB-OG-P
2	L	52	SEP	CB-OG-P-O1P

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	K	52	SEP	2	0
2	L	52	SEP	1	0

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.

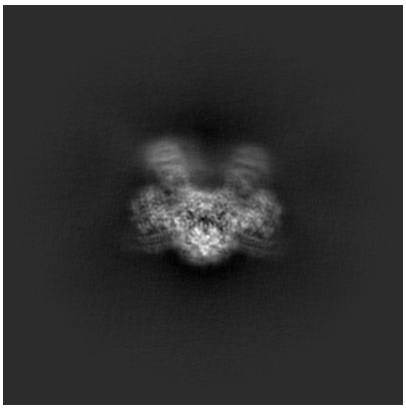
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-52432. These allow visual inspection of the internal detail of the map and identification of artifacts.

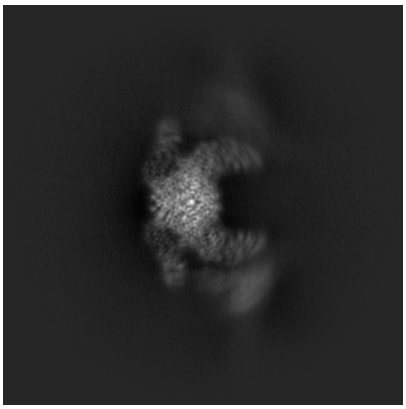
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

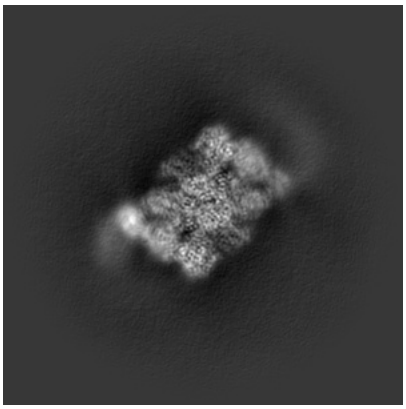
6.1.1 Primary map



X

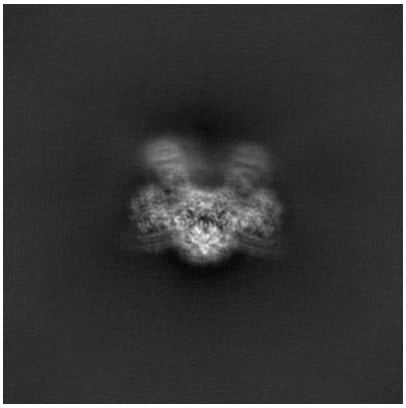


Y

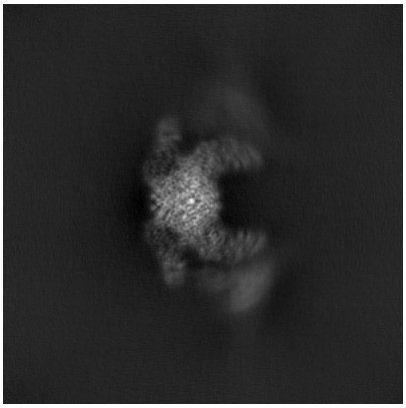


Z

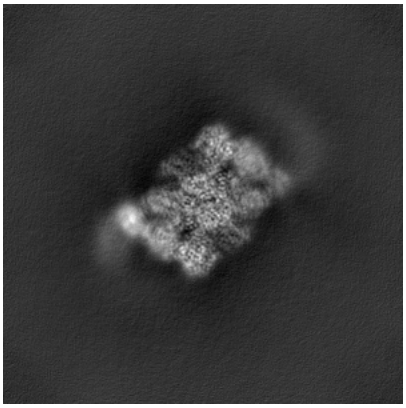
6.1.2 Raw map



X



Y

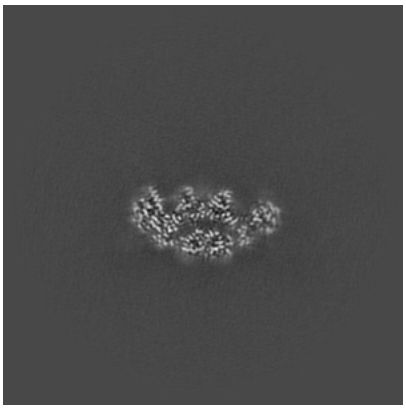


Z

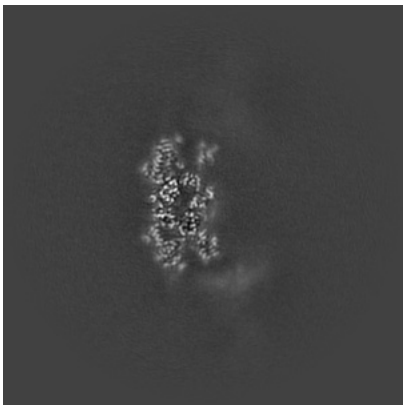
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

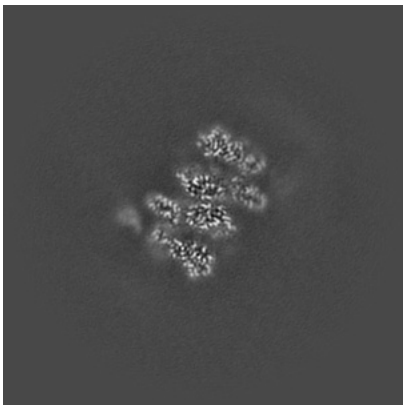
6.2.1 Primary map



X Index: 200

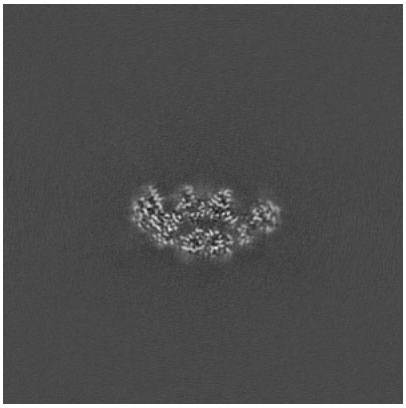


Y Index: 200

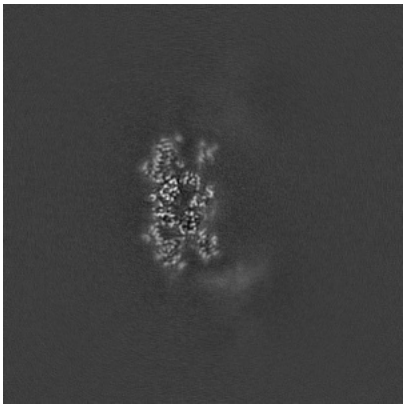


Z Index: 200

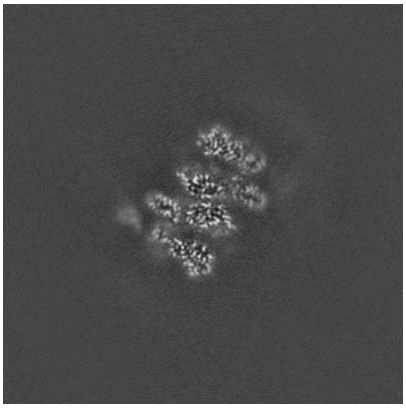
6.2.2 Raw map



X Index: 200



Y Index: 200

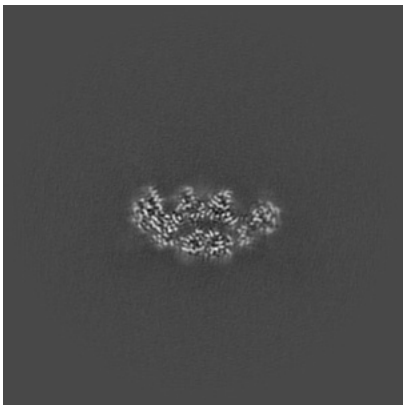


Z Index: 200

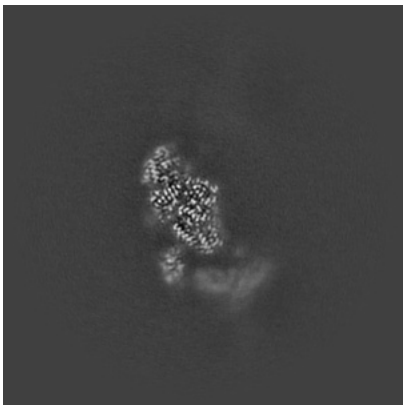
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

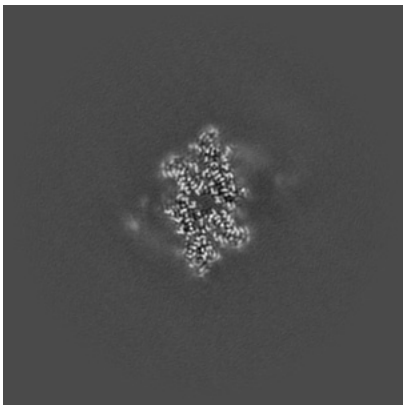
6.3.1 Primary map



X Index: 200

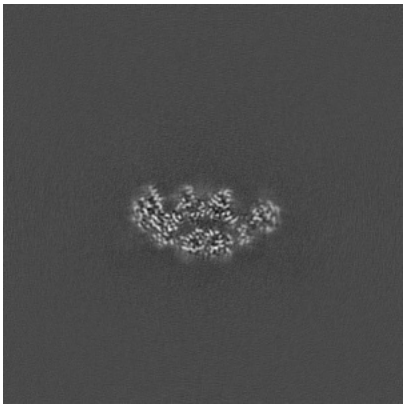


Y Index: 191

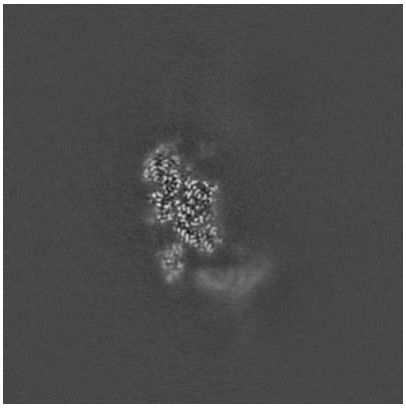


Z Index: 183

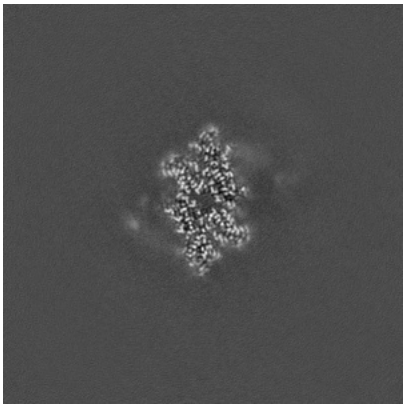
6.3.2 Raw map



X Index: 200



Y Index: 193

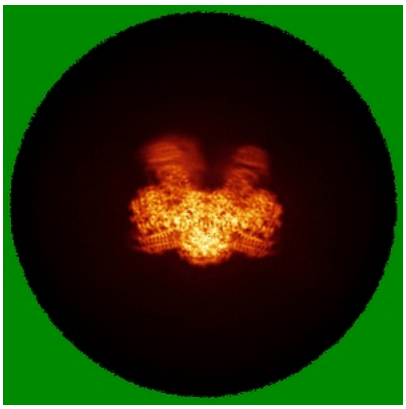


Z Index: 183

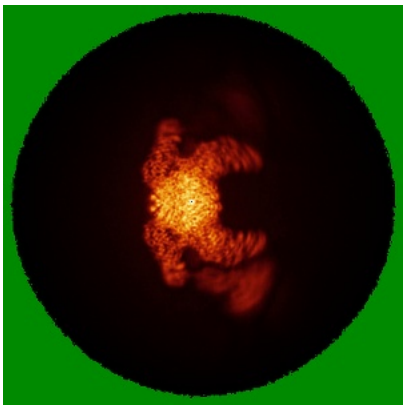
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

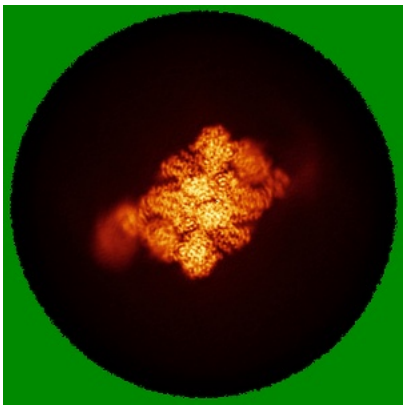
6.4.1 Primary map



X

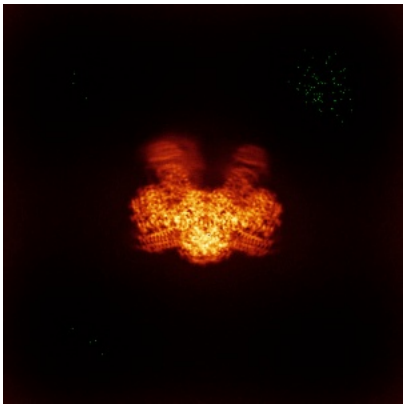


Y

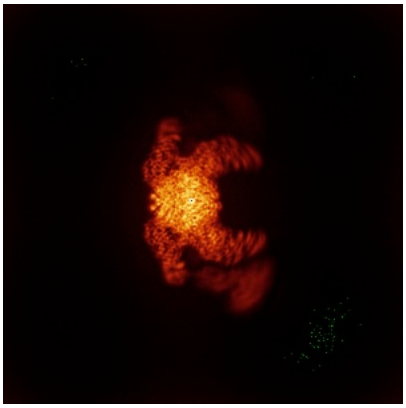


Z

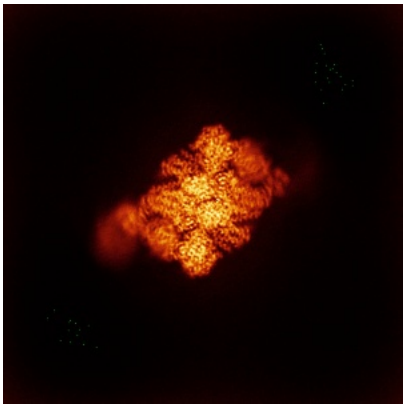
6.4.2 Raw map



X



Y

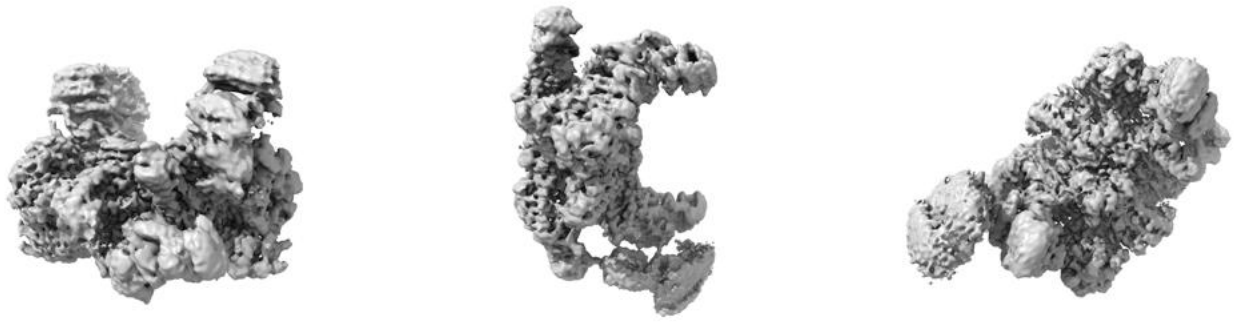


Z

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



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.2. 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.

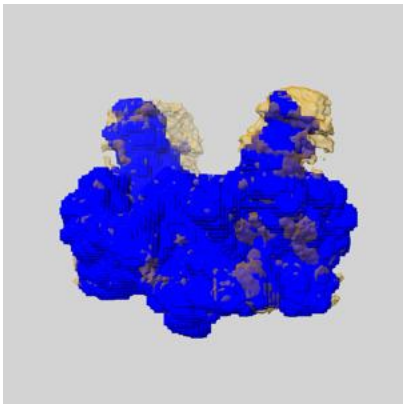
6.6 Mask visualisation (i)

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

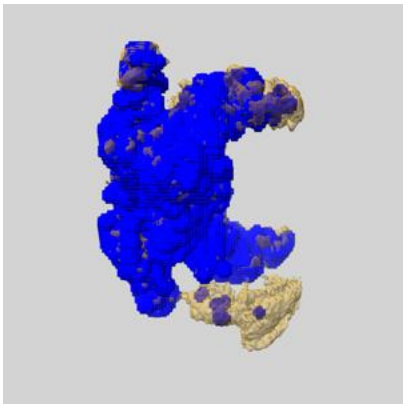
A mask typically either:

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

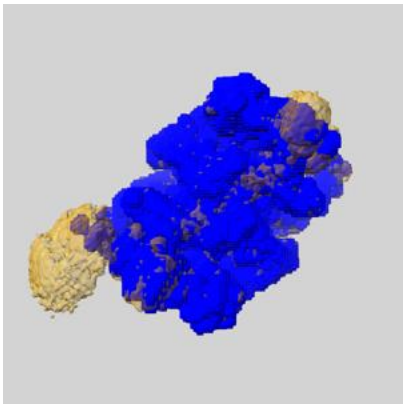
6.6.1 emd_52432_msk_1.map (i)



X



Y

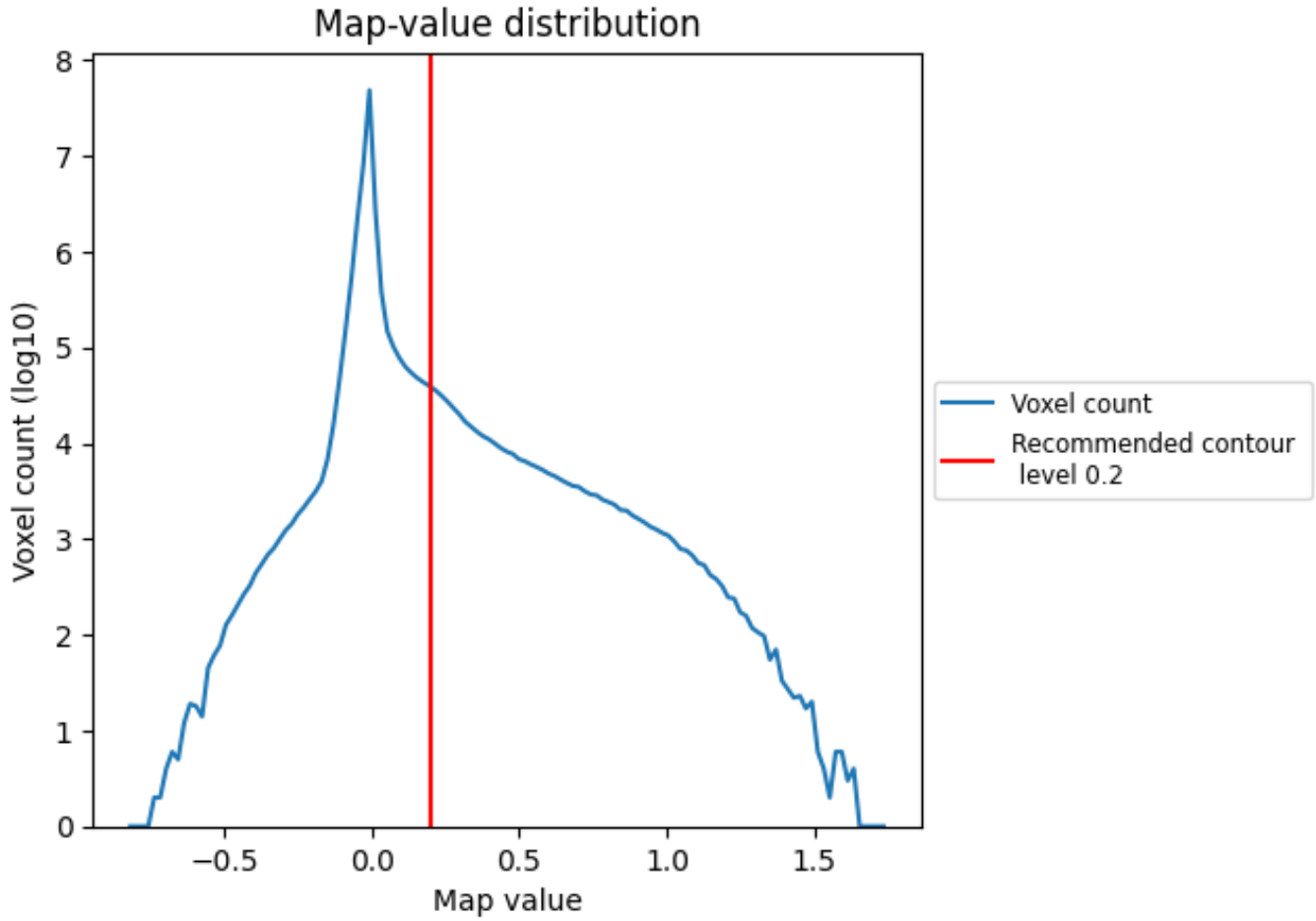


Z

7 Map analysis

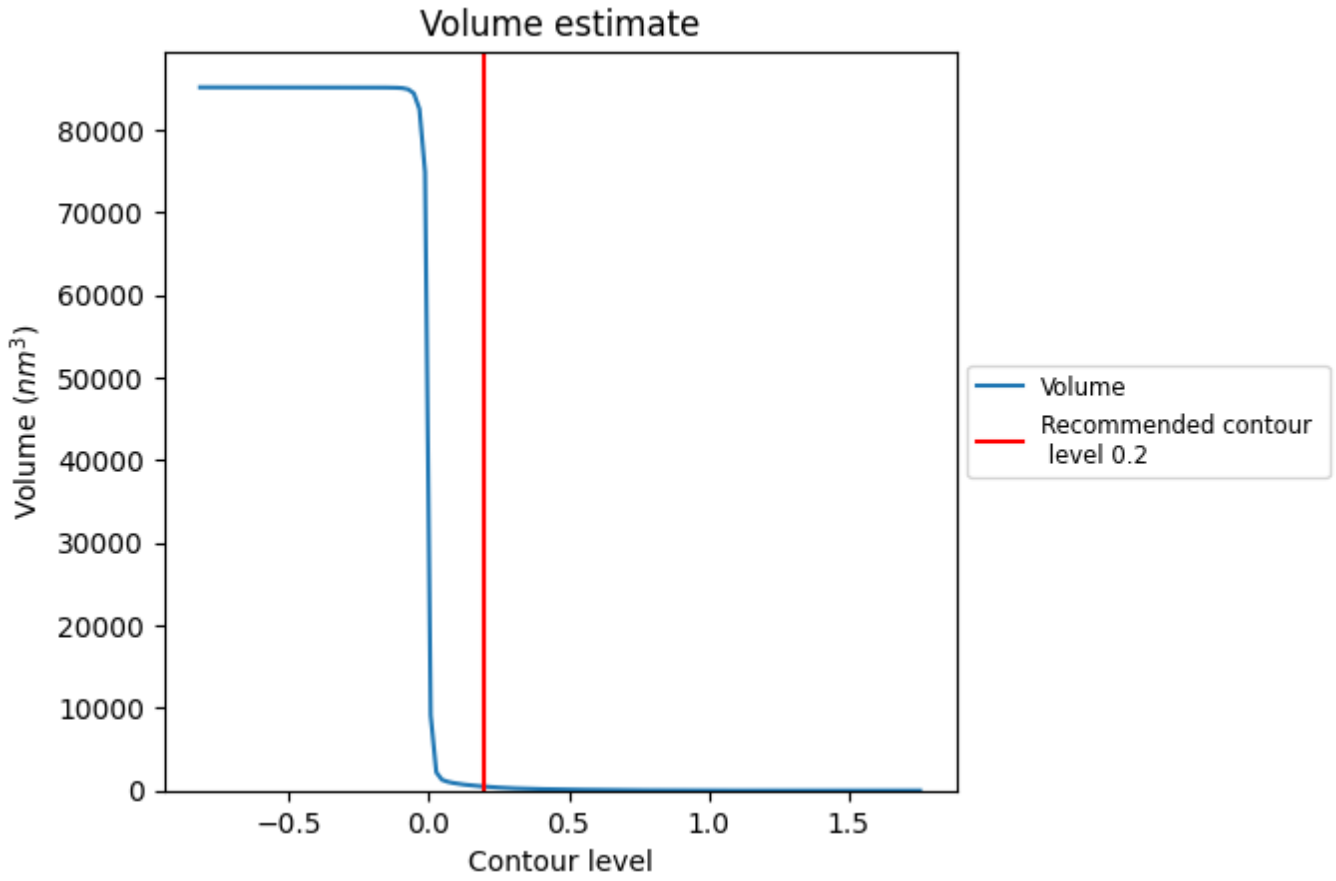
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

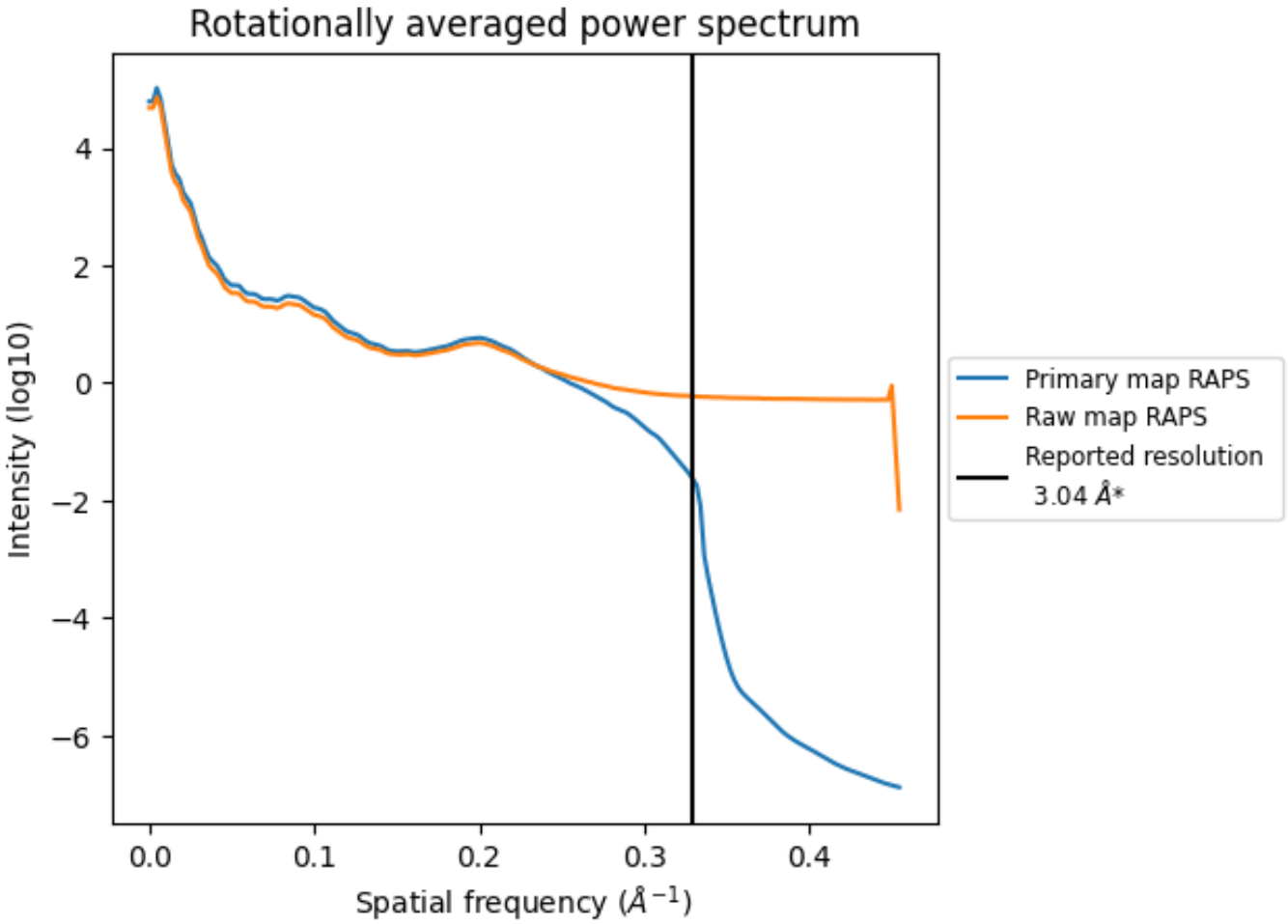
7.2 Volume estimate (i)



The volume at the recommended contour level is 483 nm^3; this corresponds to an approximate mass of 436 kDa.

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

7.3 Rotationally averaged power spectrum (i)

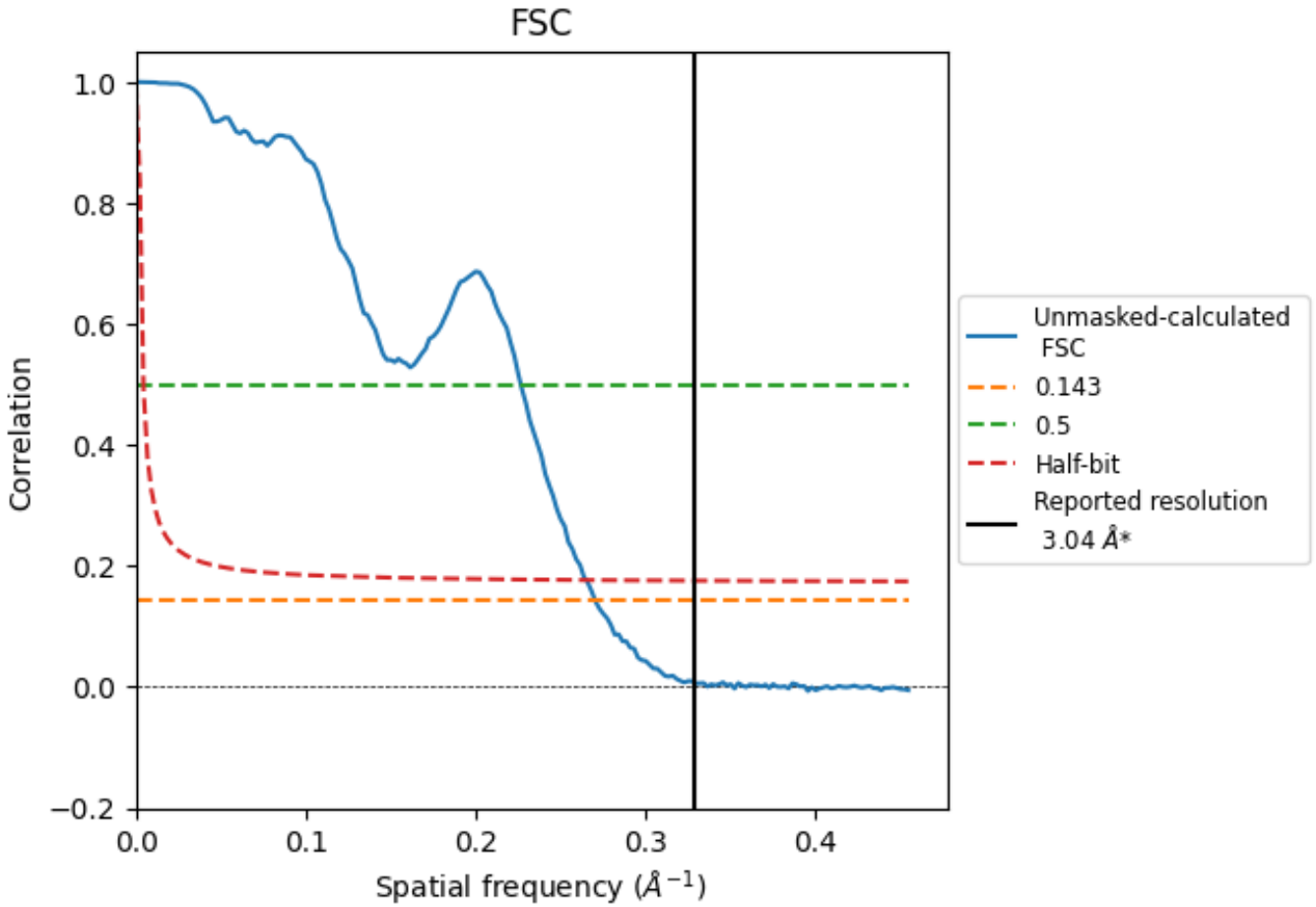


*Reported resolution corresponds to spatial frequency of 0.329 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.329 Å^{-1}

8.2 Resolution estimates (i)

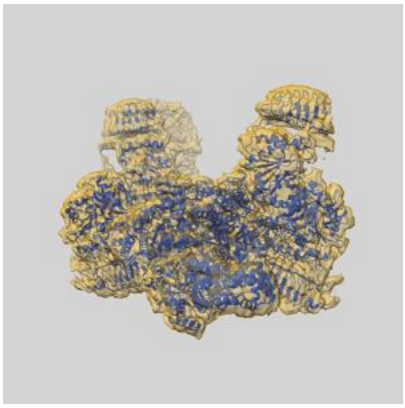
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.04	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.70	4.42	3.77

*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 3.70 differs from the reported value 3.04 by more than 10 %

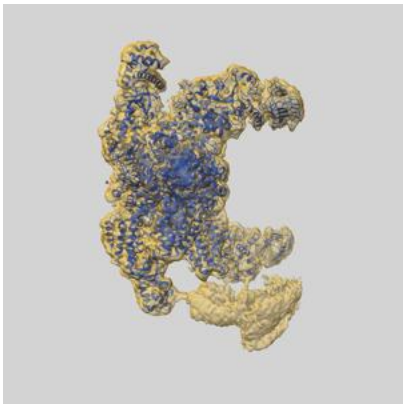
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-52432 and PDB model 9HVD. Per-residue inclusion information can be found in section 3 on page 6.

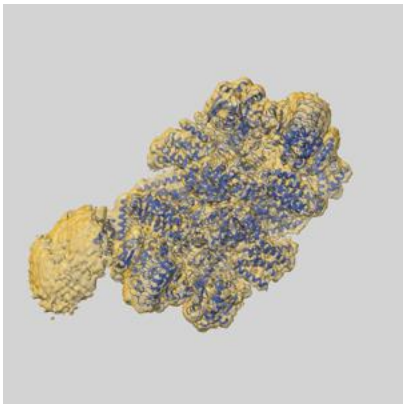
9.1 Map-model overlay



X



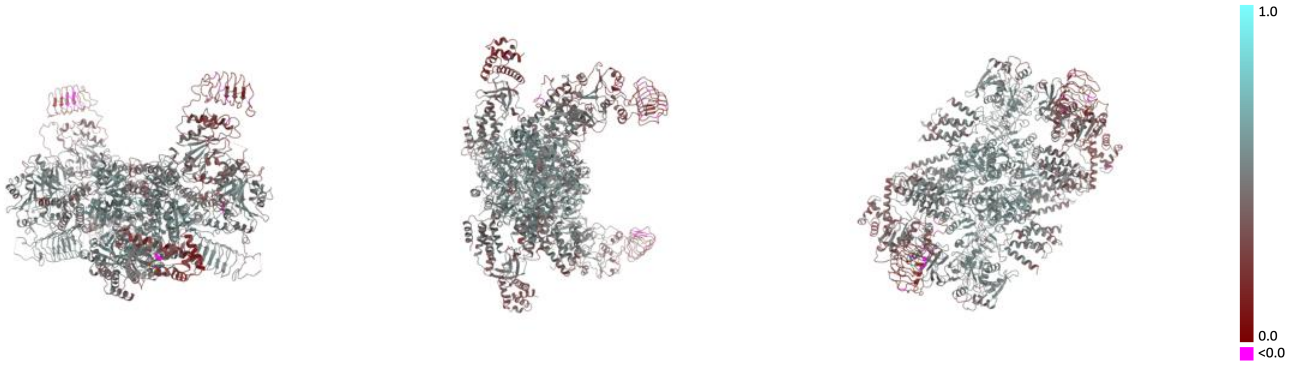
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

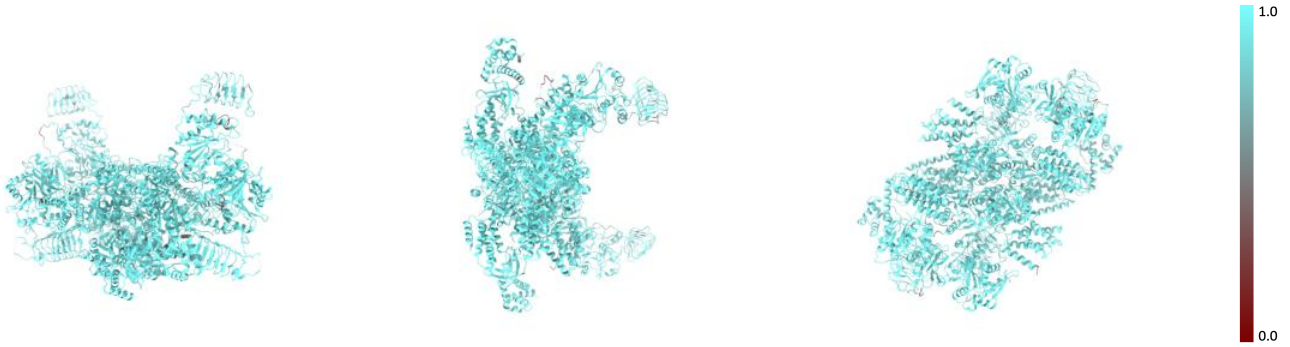
9.2 Q-score mapped to coordinate model (i)



X Y Z

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.

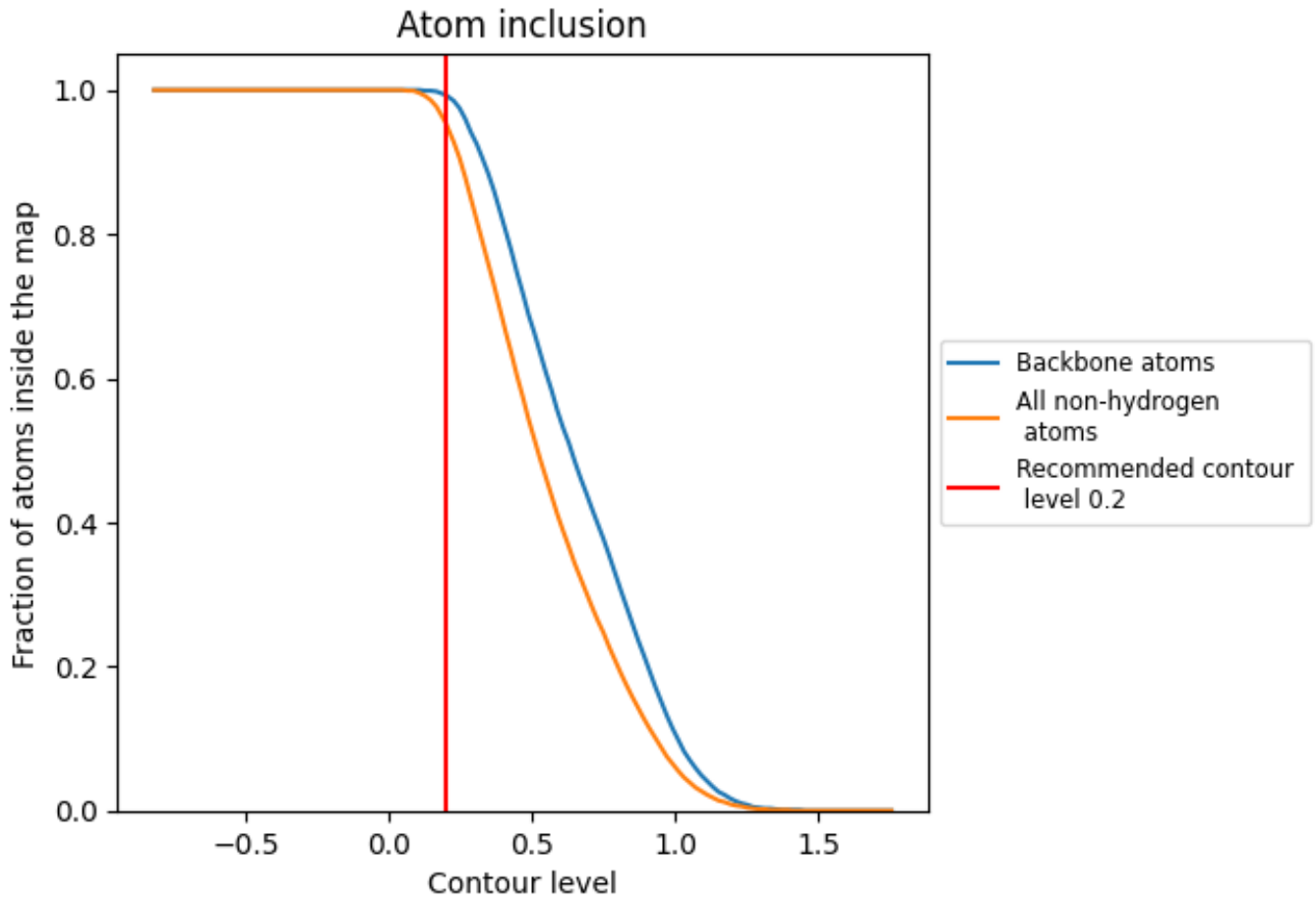
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.2).

9.4 Atom inclusion (i)



At the recommended contour level, 99% of all backbone atoms, 95% 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 (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9540	0.4550
A	0.9790	0.5010
B	0.9830	0.5010
C	0.9720	0.5100
D	0.9730	0.5110
E	0.9090	0.3490
F	0.8850	0.3310
G	0.9660	0.5080
H	0.9550	0.4970
I	0.9820	0.5060
J	0.9810	0.4950
K	0.9590	0.3660
L	0.8940	0.3240