Full wwPDB EM Validation Report (i)

Jul 14, 2025 – 02:15 PM JST

PDB ID	:	9KNQ / pdb_00009knq
EMDB ID	:	EMD-62459
Title	:	Measles virus L-P complex in apo state
Authors	:	Wang, Y.R.; Zhang, H.Q.
Deposited on	:	2024-11-19
Resolution	:	3.00 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 (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

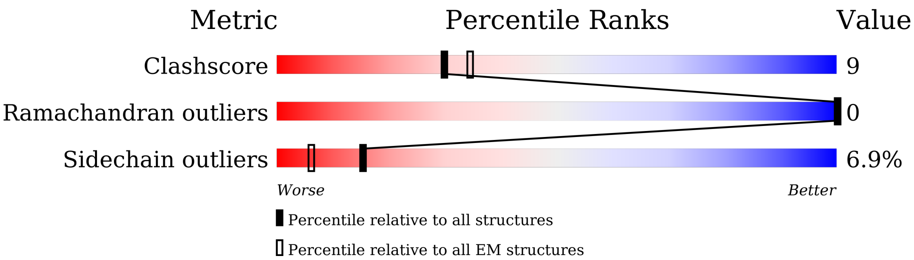
EMDB validation analysis	:	0.0.1.dev118
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 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 <=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	2183	• 46% 11% • 41%
2	B	507	• 6% • 90%
2	C	507	• 19% 9% • 72%
2	D	507	• 7% • • 88%
2	E	507	• • • • 92%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 12606 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 RNA-directed RNA polymerase L.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1284	10307	6574	1784	1890	59	0	0

- Molecule 2 is a protein called Phosphoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	52	398	252	69	76	1	0	0
2	D	61	461	289	77	94	1	0	0
2	E	42	328	209	56	62	1	0	0
2	C	142	1110	708	196	201	5	0	0

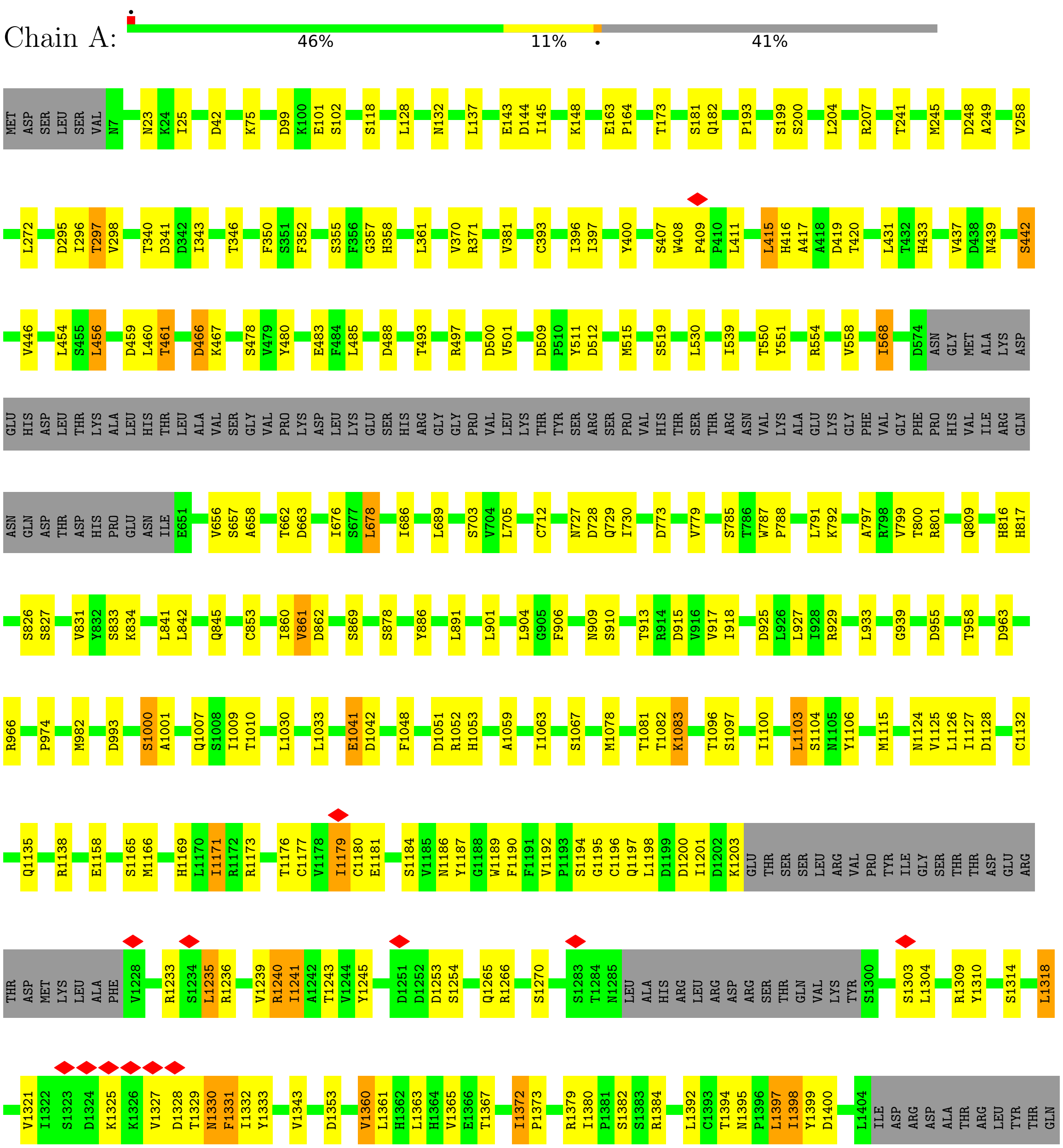
- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
3	A	2	2	2	0

3 Residue-property plots

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

- Molecule 1: RNA-directed RNA polymerase L



SER HIS ARG HIS LEU VAL GLU PHE VAL THR TRP SER THR PRO GLN LEU TYR HIS ILE LEU ALA LYS SER THR ALA LEU SER MET ILE ASP LEU VAL THR LYS PHE GLU LYS ASP HIS MET ASN GLU ILE SER ALA LEU ILE GLY ASP ASP ILE ASN SER PHE ILE THR GLU PHE

LEU LEU ILE GLU PRO ARG LEU PHE THR ILE TYR LEU GLY GLN CYS ALA ALA ILE ASN TRP ALA PHE ASP VAL HIS TYR HIS ARG PRO SER GLY LYS TYR GLN MET GLY GLU LEU LEU SER SER PHE LEU SER ARG MET SER LYS GLY VAL PHE LYS VAL LEU VAL ASN ALA LEU SER HIS

PRO LYS ILE TYR LYS LYS PHE TRP HIS CYS GLY ILE ILE GLU PRO ILE HIS GLY PRO SER LEU ASP ALA GLN ASN LEU HIS THR THR VAL CYS ASN MET VAL TYR THR CYS TYR MET THR TYR LEU ASP LEU LEU LEU ASN GLU GLU LEU GLU GLU PHE THR PHE LEU LEU CYS GLU SER

ASP GLU ASP VAL VAL PRO ASP ARG PHE ASP ASN ILE GLN ALA LYS HIS LEU CYS VAL LEU ALA ASP LEU TYR CYS GLN PRO GLY THR CYS PRO PRO ILE ARG GLY LEU ARG PRO VAL GLU LYS CYS ALA VAL LEU THR ASP HIS ILE LYS ALA GLU ALA ARG LEU SER PRO ALA GLY SER

SER TRP ASN ILE ASN PRO ILE ILE VAL ASP HIS TYR SER CYS SER LEU THR TYR LEU ARG ARG GLY SER ILE LYS GLN ILE ARG LEU ARG VAL ASP PRO GLY PHE ILE PHE ASP ALA LEU ALA GLU VAL ASN VAL SER GLN PRO LYS VAL GLY SER ASN ASN ILE SER ASN MET SER ILE

LYS ASP PHE ARG PRO PRO HIS ASP ASP VAL ALA LYS LEU LEU LYS ASP ILE ASN THR SER LYS HIS ASN LEU PRO ILE SER GLY GLY SER LEU ALA ASN TYR GLU ILE HIS ALA PHE ARG ARG ILE GLY LEU ASN SER SER ALA CYS TYR LYS ALA VAL GLU ILE SER THR LEU ILE ARG

ARG CYS LEU GLU PRO GLY GLU ASP GLY LEU PHE LEU GLY GLU GLY SER GLY SER MET LEU ILE THR TYR LYS GLU ILE LEU LYS LEU ASN LYS CYS PHE TYR ASN SER GLY VAL SER ALA ASN SER ARG SER GLY GLN ARG GLU LEU ALA PRO TYR PRO SER GLU VAL GLY LEU VAL GLU

HIS ARG MET GLY VAL GLY ASN ILE VAL LYS VAL LEU PHE ASN GLY ARG PRO GLU VAL THR TRP VAL GLY SER ILE ASP CYS PHE ASN PHE ILE VAL SER ASN ILE PRO THR SER SER VAL GLY PHE ILE HIS SER ASP ILE GLU THR LEU PRO ASN LYS ASP THR ILE GLU LYS LEU GLU

GLU LEU ALA ALA ILE LEU SER MET ALA LEU LEU LEU GLY LYS ILE GLY SER ILE LEU VAL ILE LYS LEU MET PRO PHE SER GLY ASP PHE VAL GLN GLY PHE ILE SER TYR VAL GLY SER HIS TYR ARG GLU VAL ASN LEU VAL TYR PRO ARG TYR SER ASN PHE ILE SER THR GLU SER

TYR LEU VAL MET THR ASP LEU LYS ALA ASN ARG LEU MET ASN PRO GLU LYS ILE LYS GLN GLN ILE ILE GLU SER SER VAL ARG THR SER PRO GLY LEU ILE GLY HIS ILE LEU SER ILE LYS GLN LEU SER CYS ILE GLN ALA ILE VAL GLY GLY ALA VAL SER ARG GLY ASP ILE ASN

PRO ILE LEU LYS LYS LEU THR PRO ILE GLU GLN VAL LEU ILE SER CYS GLY LEU ALA ILE ASN GLY PRO LYS LEU CYS LYS GLU LEU ILE HIS HIS ASP VAL ALA SER GLY GLN ASP GLY LEU LEU ASN SER ILE LEU ILE LEU TYR ARG GLU LEU ALA ARG PHE LYS ASP ASN GLN ARG

SER GLN GLN GLY MET PHE HIS ALA TYR PRO VAL LEU VAL SER SER ARG GLN ARG GLU LEU VAL SER ARG ILE THR ARG LYS PHE TRP GLY HIS ILE LEU LEU TYR SER GLY ASN ARG LYS LEU ILE ASN ARG PHE ILE GLN ASN LEU LYS SER GLY TYR LEU VAL LEU ASP LEU HIS GLN

ASN ILE PHE VAL LYS ASN LEU SER LYS SER GLU LYS GLN ILE ILE MET THR GLY GLY LEU LYS ARG GLU TRP VAL PHE LYS VAL THR VAL LYS GLU THR LYS GLU TRP TYR LYS LEU VAL GLY TYR SER ALA LEU ILE LYS ASP

- Molecule 2: Phosphoprotein

Chain B:

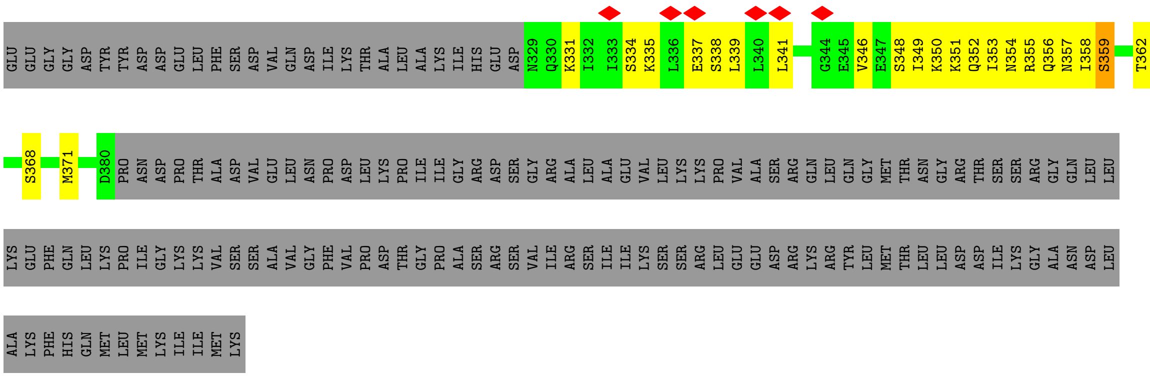
MET ALA GLU GLU GLN ALA ARG HIS VAL LYS ASN GLY LEU GLU CYS ILE ARG ALA LEU LYS ALA GLU PRO ILE GLY SER LEU ALA VAL GLU GLU ALA MET ALA ALA TRP SER GLU ILE SER ASP ASN PRO GLY GLN ASP ARG ALA THR CYS LYS GLU GLU ALA GLY SER SER GLY LEU

SER LYS PRO CYS LEU SER ALA ILE GLY SER THR GLU GLY GLY ALA PRO ARG ILE ARG GLY GLN GLY SER GLY GLU SER ASP ASP ALA GLU THR LEU GLY ILE PRO SER ARG ASN LEU GLN ALA SER SER THR GLY LEU GLN CYS TYR HIS VAL TYR ASP HIS SER GLY GLU ALA VAL

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

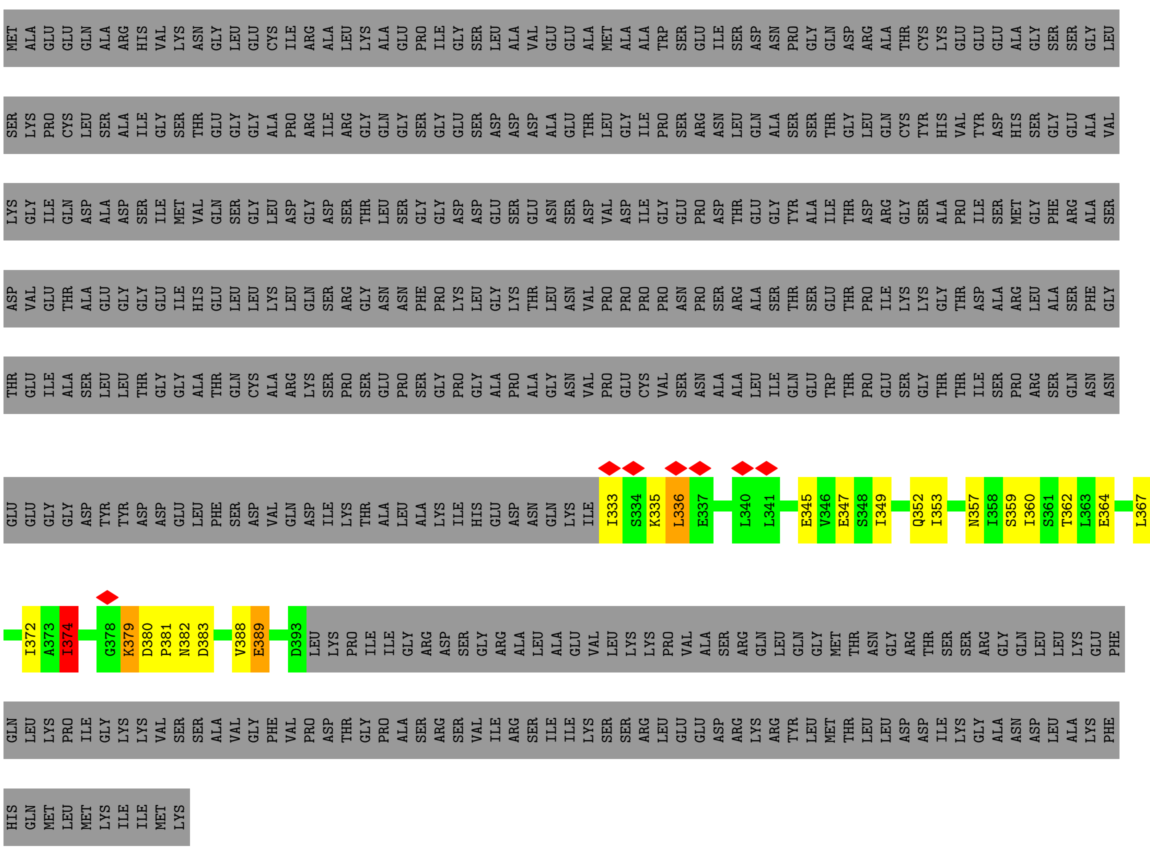
ASP VAL GLU THR ALA GLU GLY GLY GLU ILE HIS GLU LEU LEU LYS LEU GLN SER ARG GLY ASN ASN PHE PRO LYS LEU GLY LYS THR LEU ASN VAL PRO PRO PRO ASN PRO SER ARG ALA SER THR SER GLU THR PRO ILE LYS LYS GLY THR ASP ALA ARG LEU ALA SER PHE GLY

THR GLU ILE ALA SER LEU LEU THR GLY GLY ALA THR GLN CYS ALA ARG LYS SER PRO SER GLU PRO SER GLY PRO GLY ALA PRO ALA GLY ASN VAL PRO GLU CYS VAL SER ASN ALA ALA LEU ILE GLN GLU TRP THR PRO GLU SER GLY THR THR ILE SER PRO ARG SER GLN ASN ASN



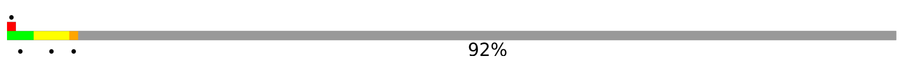
• Molecule 2: Phosphoprotein

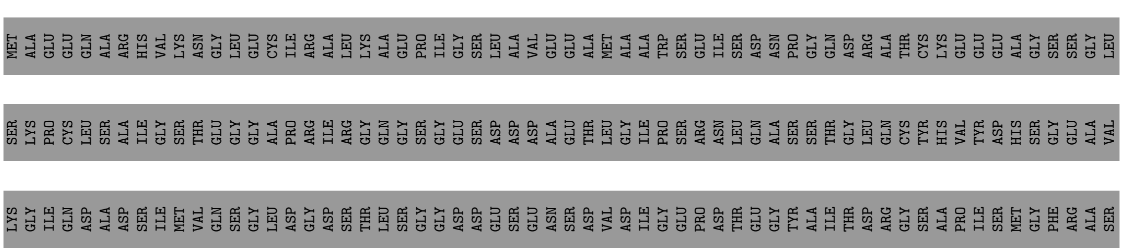
Chain D:

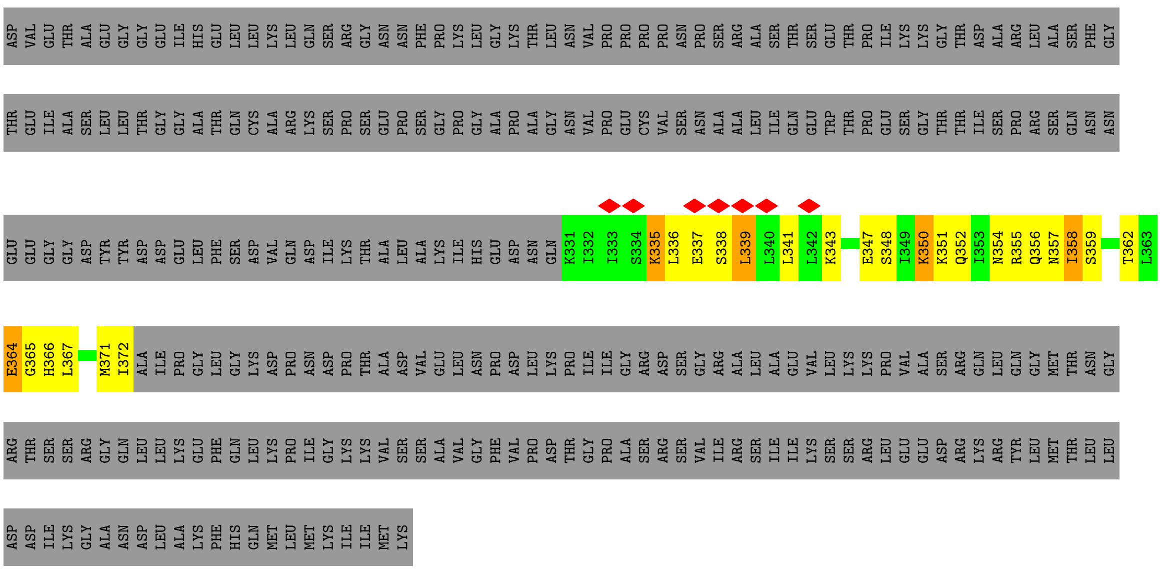


• Molecule 2: Phosphoprotein

Chain E:

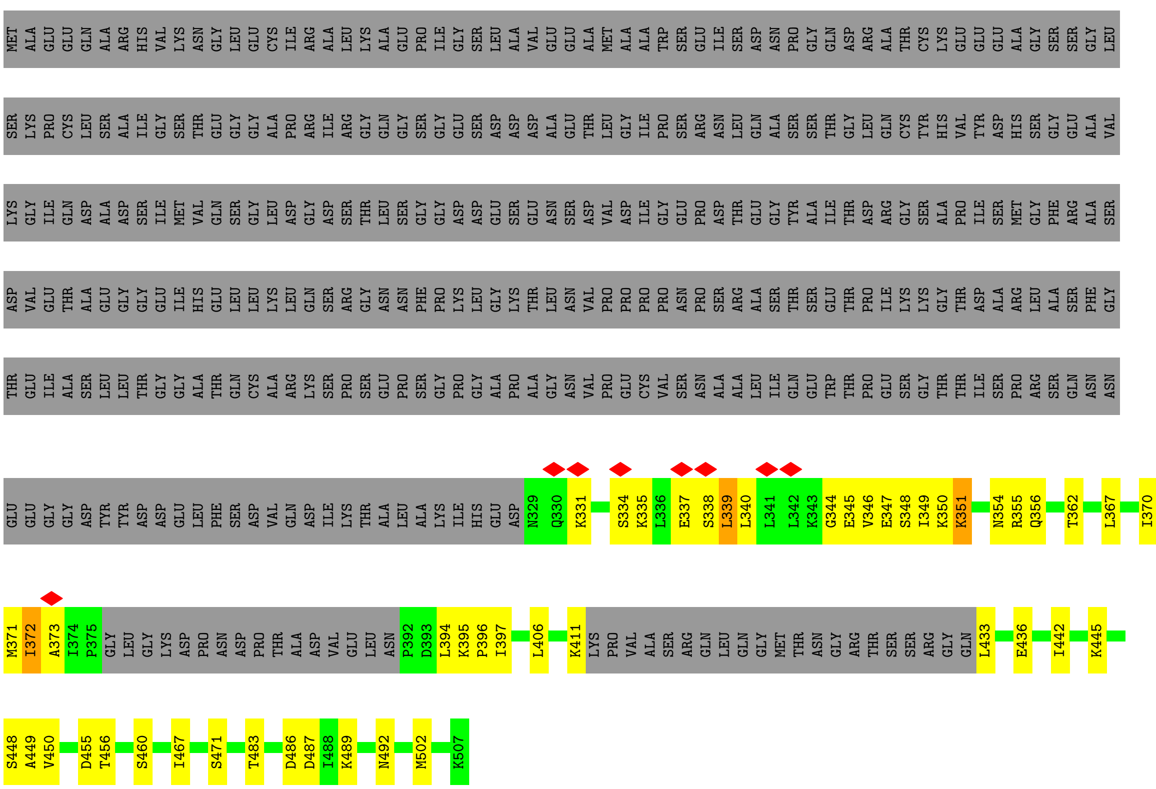






• Molecule 2: Phosphoprotein

Chain C:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	185565	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 $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.573	Depositor
Minimum map value	-0.274	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.0592	Depositor
Map size (Å)	270.004, 270.004, 270.004	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.9643, 0.9643, 0.9643	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: ZN

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	0/10537	0.36	0/14283
2	B	0.17	0/399	0.41	0/532
2	C	0.15	0/1119	0.41	0/1490
2	D	0.18	0/465	0.60	3/628 (0.5%)
2	E	0.18	0/328	0.48	0/436
All	All	0.17	0/12848	0.38	3/17369 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	374	ILE	CA-C-N	5.68	140.62	127.00
2	D	374	ILE	C-N-CA	5.68	140.62	127.00
2	D	374	ILE	C-N-CD	-5.12	109.34	120.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	10307	0	10315	149	0
2	B	398	0	438	16	0
2	C	1110	0	1216	36	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	461	0	483	21	0
2	E	328	0	367	22	0
3	A	2	0	0	0	0
All	All	12606	0	12819	226	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.

All (226) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1177:CYS:O	1:A:1181:GLU:HB2	1.78	0.83
2:D:379:LYS:HD2	2:D:380:ASP:H	1.41	0.83
1:A:1186:ASN:HB2	1:A:1318:LEU:HD23	1.64	0.80
1:A:1266:ARG:HD3	1:A:1399:TYR:HB2	1.65	0.78
1:A:729:GLN:HG2	1:A:730:ILE:HG23	1.66	0.78
2:B:338:SER:HB2	2:C:340:LEU:HD13	1.72	0.70
1:A:132:ASN:OD1	1:A:886:TYR:OH	2.05	0.68
2:B:356:GLN:OE1	2:C:356:GLN:NE2	2.28	0.66
1:A:1173:ARG:H	1:A:1173:ARG:HD3	1.61	0.66
1:A:23:ASN:ND2	1:A:712:CYS:SG	2.70	0.65
1:A:1166:MET:HG2	1:A:1365:VAL:HG22	1.78	0.63
1:A:371:ARG:NH2	1:A:728:ASP:O	2.32	0.62
1:A:1233:ARG:H	1:A:1235:LEU:HD23	1.65	0.62
2:C:331:LYS:HZ2	2:C:335:LYS:HG2	1.65	0.62
2:D:357:ASN:OD1	2:E:356:GLN:NE2	2.32	0.60
1:A:1171:ILE:HG23	1:A:1360:VAL:HG13	1.84	0.60
1:A:1201:ILE:HD11	1:A:1203:LYS:HG3	1.83	0.60
1:A:1325:LYS:HE3	1:A:1327:VAL:HG12	1.82	0.59
1:A:466:ASP:OD1	1:A:497:ARG:NH1	2.36	0.59
1:A:144:ASP:O	1:A:148:LYS:HG2	2.03	0.59
1:A:144:ASP:N	1:A:144:ASP:OD1	2.33	0.58
1:A:467:LYS:O	1:A:497:ARG:NH1	2.37	0.58
1:A:400:TYR:HE2	1:A:409:PRO:HD2	1.68	0.58
2:E:350:LYS:NZ	2:C:345:GLU:O	2.37	0.58
1:A:408:TRP:HB3	1:A:411:LEU:HB2	1.85	0.58
1:A:1330:ASN:N	1:A:1330:ASN:OD1	2.35	0.57
1:A:1318:LEU:O	1:A:1333:TYR:OH	2.21	0.57
2:E:371:MET:HB3	2:E:372:ILE:HD12	1.87	0.57
1:A:773:ASP:OD1	1:A:773:ASP:N	2.38	0.56
1:A:1007:GLN:OE1	1:A:1106:TYR:OH	2.23	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1372:ILE:HD12	1:A:1373:PRO:HD2	1.87	0.56
1:A:509:ASP:HB3	1:A:512:ASP:HB2	1.87	0.56
1:A:1138:ARG:HH22	1:A:1372:ILE:HB	1.69	0.56
1:A:101:GLU:HG2	1:A:199:SER:HB3	1.87	0.56
2:B:337:GLU:O	2:B:341:LEU:HG	2.07	0.55
1:A:245:MET:HE1	1:A:258:VAL:HG11	1.87	0.55
1:A:809:GLN:O	1:A:809:GLN:NE2	2.39	0.55
2:D:383:ASP:OD1	2:D:383:ASP:N	2.37	0.55
1:A:915:ASP:N	1:A:915:ASP:OD1	2.35	0.55
2:B:358:ILE:O	2:B:362:THR:HG23	2.07	0.55
2:D:379:LYS:HD2	2:D:380:ASP:N	2.18	0.54
1:A:417:ALA:HA	1:A:442:SER:HB2	1.89	0.54
1:A:343:ILE:O	1:A:346:THR:HG22	2.08	0.54
1:A:550:THR:HG22	1:A:551:TYR:H	1.71	0.54
2:B:335:LYS:O	2:B:339:LEU:HB2	2.08	0.54
1:A:568:ILE:HD11	1:A:686:ILE:HG21	1.89	0.54
1:A:860:ILE:HG12	1:A:1010:THR:HG22	1.90	0.54
2:E:337:GLU:O	2:E:341:LEU:HG	2.07	0.54
1:A:1239:VAL:O	1:A:1243:THR:HG22	2.08	0.53
1:A:1124:ASN:HB3	1:A:1127:ILE:HD12	1.89	0.53
1:A:1165:SER:HB2	1:A:1367:THR:HG22	1.88	0.53
2:E:350:LYS:NZ	2:C:349:ILE:HG23	2.22	0.53
2:D:345:GLU:O	2:D:349:ILE:HG12	2.09	0.53
1:A:1253:ASP:OD1	1:A:1253:ASP:N	2.38	0.53
1:A:963:ASP:OD1	1:A:966:ARG:NH2	2.42	0.52
1:A:1236:ARG:HD3	1:A:1240:ARG:HG2	1.91	0.52
2:E:348:SER:C	2:E:352:GLN:HE21	2.17	0.52
1:A:182:GLN:HG2	1:A:207:ARG:HH11	1.73	0.52
1:A:955:ASP:HB3	1:A:958:THR:HG22	1.90	0.52
1:A:1240:ARG:HD2	1:A:1241:ILE:H	1.75	0.52
2:E:355:ARG:HA	2:E:358:ILE:HG12	1.91	0.52
1:A:909:ASN:OD1	1:A:910:SER:N	2.43	0.52
1:A:407:SER:HB2	1:A:409:PRO:HD3	1.93	0.51
1:A:1189:TRP:HE3	1:A:1314:SER:HB3	1.76	0.51
1:A:1309:ARG:HG3	1:A:1310:TYR:HD1	1.75	0.51
2:D:333:ILE:N	2:D:336:LEU:HD23	2.26	0.51
2:C:351:LYS:HZ3	2:C:355:ARG:HG3	1.76	0.51
2:B:334:SER:OG	2:C:340:LEU:HD12	2.10	0.51
2:C:373:ALA:O	2:C:433:LEU:N	2.43	0.51
1:A:1395:ASN:HB3	1:A:1398:ILE:HG22	1.93	0.51
2:C:351:LYS:NZ	2:C:355:ARG:HG3	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:788:PRO:HG2	1:A:791:LEU:HD13	1.93	0.51
1:A:1303:SER:OG	1:A:1304:LEU:N	2.43	0.51
1:A:352:PHE:O	1:A:355:SER:OG	2.29	0.50
1:A:1082:THR:OG1	1:A:1083:LYS:N	2.43	0.50
1:A:1304:LEU:HD22	1:A:1304:LEU:H	1.77	0.50
2:B:357:ASN:OD1	2:B:358:ILE:N	2.45	0.50
2:C:351:LYS:HA	2:C:354:ASN:ND2	2.25	0.50
1:A:861:VAL:HG12	1:A:862:ASP:H	1.74	0.50
1:A:1327:VAL:HG23	1:A:1328:ASP:O	2.12	0.50
1:A:407:SER:C	1:A:408:TRP:HD1	2.20	0.49
1:A:797:ALA:O	1:A:801:ARG:HG3	2.12	0.49
2:B:349:ILE:HD12	2:B:350:LYS:N	2.27	0.49
2:E:337:GLU:HG2	2:E:338:SER:H	1.77	0.49
1:A:1009:ILE:HG23	1:A:1103:LEU:HG	1.94	0.49
1:A:500:ASP:OD1	1:A:501:VAL:N	2.45	0.49
2:C:345:GLU:OE1	2:C:346:VAL:HG13	2.12	0.49
2:C:467:ILE:O	2:C:471:SER:OG	2.29	0.49
1:A:1190:PHE:HB2	1:A:1361:LEU:HB3	1.94	0.49
2:E:343:LYS:HE3	2:C:339:LEU:HD12	1.94	0.49
2:C:346:VAL:O	2:C:350:LYS:HG3	2.13	0.48
1:A:1194:SER:OG	1:A:1195:GLY:N	2.45	0.48
1:A:1051:ASP:OD2	1:A:1384:ARG:NH2	2.41	0.48
1:A:456:LEU:HG	1:A:511:TYR:CD2	2.48	0.48
2:C:346:VAL:O	2:C:349:ILE:HG13	2.14	0.48
2:B:331:LYS:O	2:B:335:LYS:HB3	2.14	0.48
2:C:372:ILE:HG13	2:C:373:ALA:H	1.79	0.48
1:A:497:ARG:HD3	1:A:497:ARG:HA	1.70	0.48
1:A:173:THR:HG21	1:A:906:PHE:CE2	2.49	0.47
1:A:295:ASP:OD1	1:A:296:ILE:N	2.42	0.47
1:A:842:LEU:HD23	1:A:1304:LEU:HD12	1.96	0.47
2:C:371:MET:HB2	2:C:396:PRO:HA	1.97	0.47
2:D:380:ASP:N	2:D:381:PRO:HD3	2.30	0.47
2:C:367:LEU:O	2:C:370:ILE:HG22	2.15	0.47
1:A:419:ASP:OD1	1:A:419:ASP:N	2.48	0.47
1:A:371:ARG:HD3	1:A:727:ASN:HD21	1.79	0.47
1:A:248:ASP:OD1	1:A:249:ALA:N	2.48	0.47
1:A:480:TYR:HB2	1:A:485:LEU:HD11	1.97	0.47
1:A:929:ARG:HH11	1:A:974:PRO:HG2	1.78	0.47
2:C:455:ASP:OD1	2:C:460:SER:OG	2.32	0.47
2:C:411:LYS:HE2	2:C:436:GLU:HA	1.96	0.47
2:B:349:ILE:O	2:B:353:ILE:HG12	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1063:ILE:HD12	1:A:1245:TYR:HD1	1.80	0.46
2:C:351:LYS:HA	2:C:354:ASN:HD21	1.81	0.46
1:A:99:ASP:OD2	1:A:102:SER:OG	2.26	0.46
2:D:360:ILE:O	2:D:364:GLU:HG3	2.14	0.46
2:E:343:LYS:O	2:E:347:GLU:HG2	2.16	0.46
1:A:1000:SER:OG	1:A:1001:ALA:O	2.33	0.46
1:A:128:LEU:HD13	1:A:886:TYR:HB3	1.98	0.46
1:A:460:LEU:HG	1:A:1397:LEU:HD11	1.97	0.46
1:A:42:ASP:OD1	1:A:42:ASP:N	2.45	0.46
2:B:354:ASN:HB2	2:D:352:GLN:HE22	1.80	0.46
1:A:1177:CYS:O	1:A:1181:GLU:CB	2.58	0.45
2:E:357:ASN:HD21	2:C:355:ARG:HB2	1.82	0.45
1:A:1400:ASP:OD1	1:A:1400:ASP:N	2.49	0.45
1:A:904:LEU:HD23	1:A:904:LEU:HA	1.85	0.45
2:E:358:ILE:HG13	2:E:359:SER:N	2.31	0.45
1:A:530:LEU:HD22	1:A:705:LEU:HD22	1.97	0.45
1:A:918:ILE:HD13	1:A:918:ILE:HA	1.87	0.45
1:A:1063:ILE:HD12	1:A:1245:TYR:CD1	2.52	0.45
1:A:1115:MET:HE2	1:A:1115:MET:HB3	1.82	0.45
1:A:416:HIS:CE1	2:D:362:THR:HA	2.52	0.45
2:C:344:GLY:O	2:C:347:GLU:HG3	2.17	0.45
1:A:1169:HIS:CG	1:A:1179:ILE:HD11	2.52	0.45
2:B:352:GLN:O	2:B:355:ARG:HG3	2.17	0.44
1:A:833:SER:OG	1:A:834:LYS:N	2.48	0.44
1:A:1236:ARG:HA	1:A:1240:ARG:HG2	1.98	0.44
2:C:483:THR:HA	2:C:486:ASP:OD2	2.18	0.44
2:B:358:ILE:HD12	2:B:359:SER:N	2.32	0.44
2:D:367:LEU:HD23	2:D:367:LEU:HA	1.78	0.44
2:C:371:MET:HG2	2:C:395:LYS:O	2.18	0.44
1:A:459:ASP:OD1	1:A:460:LEU:N	2.42	0.44
2:D:359:SER:O	2:D:362:THR:OG1	2.34	0.44
2:E:350:LYS:HZ1	2:C:348:SER:HB3	1.83	0.44
1:A:371:ARG:HD3	1:A:727:ASN:ND2	2.33	0.44
1:A:1379:ARG:HD2	1:A:1379:ARG:HA	1.81	0.44
1:A:433:HIS:O	1:A:437:VAL:HG12	2.17	0.44
1:A:1233:ARG:C	1:A:1235:LEU:H	2.25	0.44
2:E:354:ASN:O	2:E:358:ILE:HG23	2.18	0.44
1:A:454:LEU:HD13	2:D:389:GLU:OE1	2.18	0.44
1:A:1392:LEU:H	1:A:1392:LEU:HD12	1.83	0.43
1:A:662:THR:OG1	1:A:663:ASP:N	2.51	0.43
1:A:1053:HIS:CE1	1:A:1380:ILE:HG23	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1363:LEU:HD12	1:A:1363:LEU:HA	1.89	0.43
2:B:346:VAL:HB	2:D:345:GLU:HG2	2.00	0.43
2:E:350:LYS:HG2	2:E:351:LYS:NZ	2.34	0.43
1:A:1169:HIS:CD2	1:A:1179:ILE:HD11	2.53	0.43
1:A:1200:ASP:OD1	1:A:1201:ILE:N	2.52	0.43
2:D:388:VAL:O	2:D:389:GLU:HB2	2.19	0.43
1:A:1059:ALA:O	1:A:1063:ILE:HG12	2.19	0.43
1:A:1097:SER:HA	1:A:1100:ILE:HG12	2.00	0.43
1:A:1265:GLN:HB3	1:A:1266:ARG:CZ	2.49	0.43
1:A:656:VAL:HG11	1:A:792:LYS:HB3	2.01	0.43
1:A:678:LEU:HD13	1:A:678:LEU:HA	1.78	0.43
1:A:241:THR:HG21	1:A:352:PHE:CE2	2.54	0.42
1:A:381:VAL:HG12	2:B:371:MET:HE2	2.01	0.42
2:B:348:SER:O	2:B:351:LYS:HG3	2.19	0.42
2:D:335:LYS:H	2:D:335:LYS:HD3	1.84	0.42
1:A:1007:GLN:OE1	1:A:1007:GLN:N	2.44	0.42
1:A:1125:VAL:HG23	1:A:1126:LEU:HD23	2.01	0.42
1:A:1329:THR:HB	1:A:1333:TYR:HB2	2.00	0.42
2:C:334:SER:O	2:C:337:GLU:HG3	2.19	0.42
2:D:349:ILE:O	2:D:353:ILE:HG12	2.19	0.42
1:A:1196:CYS:HA	1:A:1353:ASP:HB3	2.00	0.42
1:A:801:ARG:HB3	2:C:450:VAL:HG13	2.01	0.42
1:A:729:GLN:HE21	1:A:729:GLN:HB3	1.63	0.42
1:A:925:ASP:N	1:A:925:ASP:OD1	2.50	0.42
1:A:193:PRO:HB2	1:A:204:LEU:HD11	2.02	0.42
1:A:350:PHE:HB3	1:A:845:GLN:HE21	1.84	0.42
1:A:393:CYS:O	1:A:397:ILE:HG12	2.19	0.42
1:A:657:SER:HA	1:A:779:VAL:O	2.19	0.42
1:A:1197:GLN:CD	1:A:1198:LEU:H	2.28	0.42
2:E:336:LEU:HA	2:E:339:LEU:HB3	2.02	0.42
2:C:492:ASN:N	2:C:492:ASN:OD1	2.53	0.42
2:C:487:ASP:OD1	2:C:487:ASP:N	2.52	0.42
1:A:340:THR:OG1	1:A:341:ASP:N	2.52	0.42
1:A:1132:CYS:HB3	1:A:1135:GLN:HG2	2.02	0.42
1:A:1236:ARG:O	1:A:1240:ARG:NE	2.53	0.42
2:E:350:LYS:HZ2	2:C:349:ILE:HG23	1.84	0.42
2:C:442:ILE:O	2:C:442:ILE:HG13	2.19	0.42
1:A:901:LEU:HD23	1:A:901:LEU:HA	1.90	0.41
1:A:913:THR:O	1:A:917:VAL:HG12	2.20	0.41
1:A:1236:ARG:HH11	1:A:1240:ARG:HG2	1.85	0.41
1:A:143:GLU:H	1:A:143:GLU:CD	2.22	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:347:GLU:O	2:E:351:LYS:HE2	2.20	0.41
1:A:676:ILE:HD12	1:A:676:ILE:HA	1.89	0.41
2:D:379:LYS:H	2:D:379:LYS:HG3	1.64	0.41
2:C:448:SER:OG	2:C:449:ALA:N	2.52	0.41
1:A:298:VAL:HG22	2:C:502:MET:HG2	2.02	0.41
1:A:658:ALA:HB3	1:A:800:THR:OG1	2.20	0.41
2:E:364:GLU:HG3	2:E:365:GLY:N	2.35	0.41
1:A:297:THR:O	1:A:297:THR:OG1	2.37	0.41
1:A:415:LEU:HD13	1:A:416:HIS:CE1	2.56	0.41
1:A:461:THR:HG22	1:A:1078:MET:SD	2.61	0.41
1:A:163:GLU:HB2	1:A:164:PRO:HD3	2.03	0.41
1:A:554:ARG:HA	1:A:554:ARG:HD2	1.78	0.41
1:A:816:HIS:O	1:A:817:HIS:ND1	2.54	0.41
1:A:826:SER:OG	1:A:827:SER:N	2.54	0.41
1:A:1158:GLU:OE1	1:A:1158:GLU:N	2.53	0.41
1:A:1179:ILE:HD12	1:A:1180:CYS:N	2.36	0.41
1:A:515:MET:O	1:A:519:SER:OG	2.33	0.41
1:A:933:LEU:HB3	1:A:939:GLY:HA3	2.03	0.41
1:A:1187:TYR:N	1:A:1318:LEU:HB2	2.36	0.41
2:E:359:SER:O	2:E:362:THR:HG22	2.21	0.41
1:A:1041:GLU:HG3	1:A:1042:ASP:N	2.36	0.41
1:A:1048:PHE:HA	1:A:1384:ARG:HD2	2.03	0.41
1:A:357:GLY:O	1:A:358:HIS:ND1	2.55	0.40
2:E:335:LYS:C	2:E:336:LEU:HD23	2.46	0.40
1:A:1331:PHE:CE1	1:A:1333:TYR:HA	2.57	0.40
2:D:374:ILE:HA	2:D:374:ILE:HD12	1.77	0.40
2:C:445:LYS:HB2	2:C:445:LYS:HE2	1.74	0.40
1:A:1052:ARG:CZ	1:A:1382:SER:HB2	2.52	0.40
2:D:335:LYS:HE2	2:D:335:LYS:HB2	1.84	0.40
2:D:367:LEU:HD21	2:E:367:LEU:HD12	2.03	0.40
1:A:137:LEU:HD21	1:A:1343:VAL:HG13	2.02	0.40
2:C:489:LYS:HA	2:C:489:LYS:HD2	1.90	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	A	1276/2183 (58%)	1189 (93%)	87 (7%)	0	100	100
2	B	50/507 (10%)	48 (96%)	2 (4%)	0	100	100
2	C	136/507 (27%)	123 (90%)	13 (10%)	0	100	100
2	D	59/507 (12%)	47 (80%)	12 (20%)	0	100	100
2	E	40/507 (8%)	35 (88%)	5 (12%)	0	100	100
All	All	1561/4211 (37%)	1442 (92%)	119 (8%)	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	1144/1945 (59%)	1070 (94%)	74 (6%)	14	43
2	B	47/416 (11%)	45 (96%)	2 (4%)	25	58
2	C	127/416 (30%)	118 (93%)	9 (7%)	12	40
2	D	55/416 (13%)	48 (87%)	7 (13%)	3	17
2	E	40/416 (10%)	34 (85%)	6 (15%)	2	12
All	All	1413/3609 (39%)	1315 (93%)	98 (7%)	15	42

All (98) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ILE
1	A	75	LYS
1	A	118	SER
1	A	145	ILE
1	A	181	SER
1	A	200	SER

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Mol	Chain	Res	Type
1	A	272	LEU
1	A	297	THR
1	A	361	LEU
1	A	370	VAL
1	A	396	ILE
1	A	415	LEU
1	A	420	THR
1	A	431	LEU
1	A	439	ASN
1	A	442	SER
1	A	446	VAL
1	A	456	LEU
1	A	461	THR
1	A	466	ASP
1	A	478	SER
1	A	483	GLU
1	A	488	ASP
1	A	493	THR
1	A	539	ILE
1	A	558	VAL
1	A	568	ILE
1	A	678	LEU
1	A	689	LEU
1	A	703	SER
1	A	785	SER
1	A	787	TRP
1	A	799	VAL
1	A	831	VAL
1	A	841	LEU
1	A	853	CYS
1	A	861	VAL
1	A	869	SER
1	A	878	SER
1	A	891	LEU
1	A	927	LEU
1	A	982	MET
1	A	993	ASP
1	A	1000	SER
1	A	1030	LEU
1	A	1033	LEU
1	A	1041	GLU
1	A	1067	SER

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Mol	Chain	Res	Type
1	A	1081	THR
1	A	1083	LYS
1	A	1096	THR
1	A	1103	LEU
1	A	1104	SER
1	A	1128	ASP
1	A	1171	ILE
1	A	1176	THR
1	A	1179	ILE
1	A	1184	SER
1	A	1192	VAL
1	A	1235	LEU
1	A	1240	ARG
1	A	1241	ILE
1	A	1254	SER
1	A	1270	SER
1	A	1318	LEU
1	A	1321	VAL
1	A	1330	ASN
1	A	1331	PHE
1	A	1332	ILE
1	A	1360	VAL
1	A	1372	ILE
1	A	1394	THR
1	A	1397	LEU
1	A	1398	ILE
2	B	359	SER
2	B	368	SER
2	D	336	LEU
2	D	347	GLU
2	D	372	ILE
2	D	374	ILE
2	D	379	LYS
2	D	382	ASN
2	D	389	GLU
2	E	335	LYS
2	E	339	LEU
2	E	350	LYS
2	E	358	ILE
2	E	364	GLU
2	E	366	HIS
2	C	338	SER

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Mol	Chain	Res	Type
2	C	339	LEU
2	C	351	LYS
2	C	362	THR
2	C	372	ILE
2	C	394	LEU
2	C	397	ILE
2	C	406	LEU
2	C	456	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	23	ASN
1	A	51	HIS
1	A	91	ASN
1	A	114	ASN
1	A	126	GLN
1	A	157	HIS
1	A	292	GLN
1	A	307	HIS
1	A	344	HIS
1	A	369	ASN
1	A	425	GLN
1	A	557	GLN
1	A	729	GLN
1	A	771	GLN
1	A	809	GLN
1	A	845	GLN
1	A	1061	HIS
1	A	1186	ASN
1	A	1317	ASN
1	A	1335	GLN
1	A	1401	ASN
2	B	356	GLN
2	B	366	HIS
2	D	352	GLN
2	D	356	GLN
2	E	352	GLN
2	E	354	ASN
2	C	356	GLN
2	C	498	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)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.

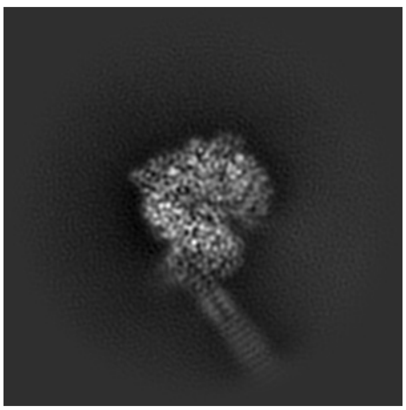
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-62459. These allow visual inspection of the internal detail of the map and identification of artifacts.

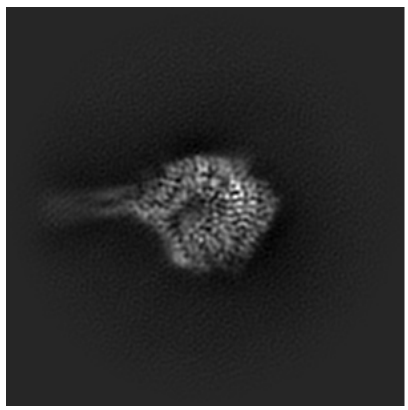
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

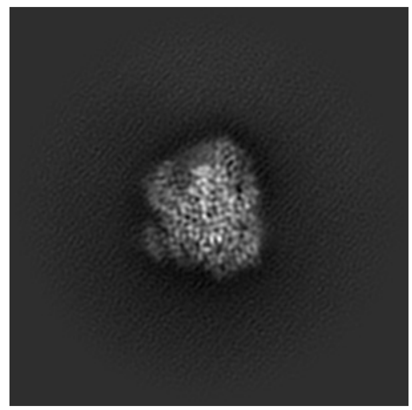
6.1.1 Primary map



X

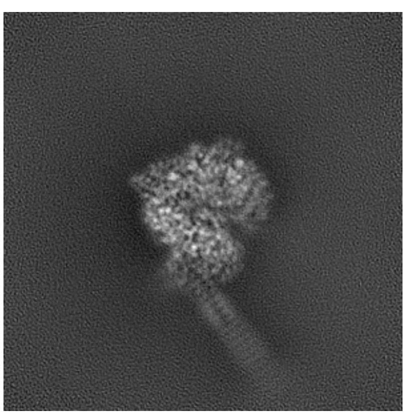


Y

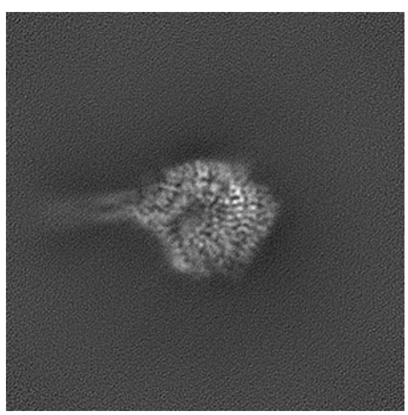


Z

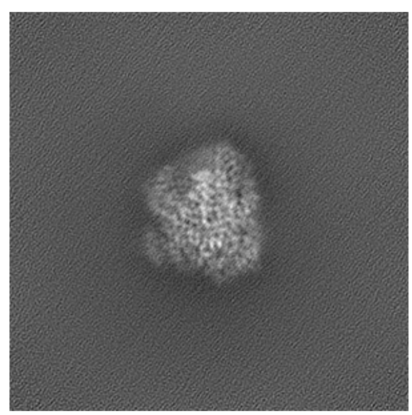
6.1.2 Raw map



X



Y

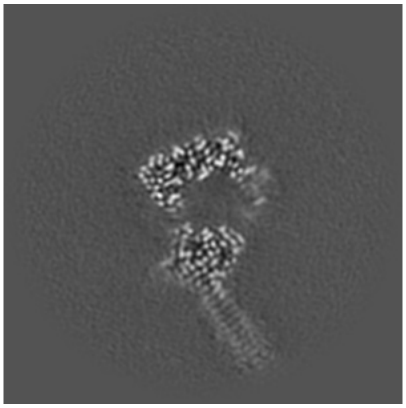


Z

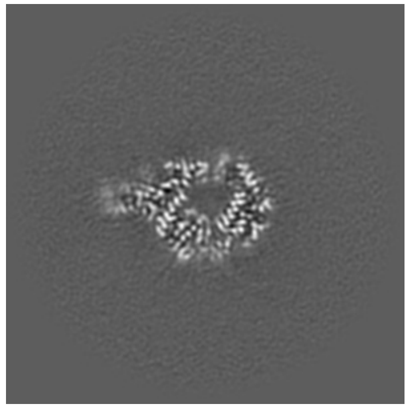
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

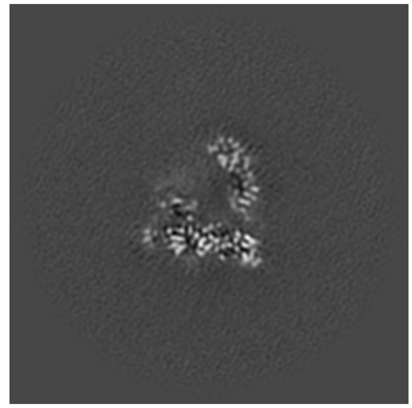
6.2.1 Primary map



X Index: 140

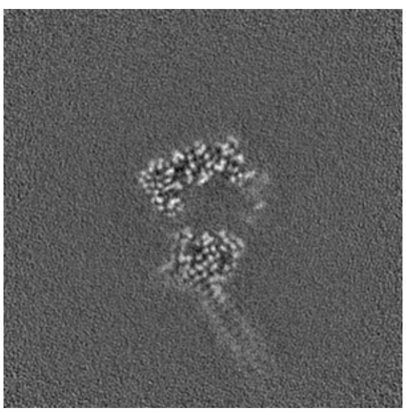


Y Index: 140

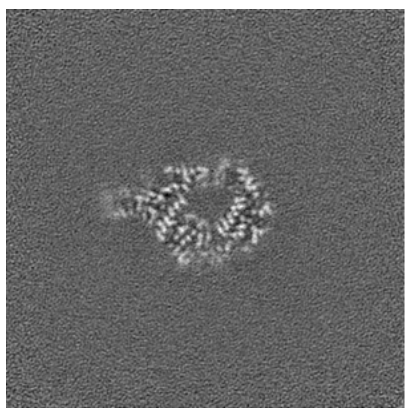


Z Index: 140

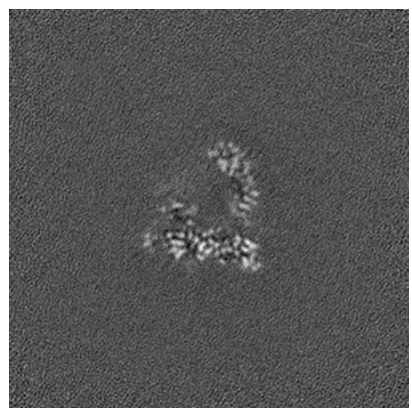
6.2.2 Raw map



X Index: 140



Y Index: 140

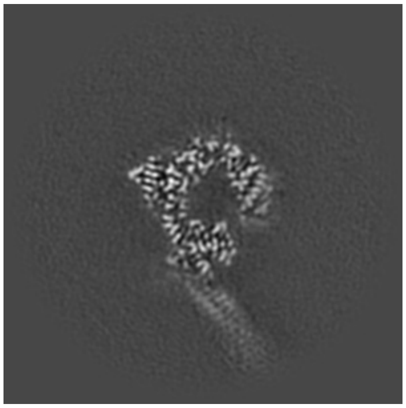


Z Index: 140

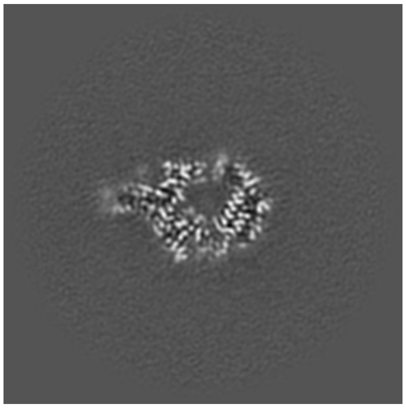
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices

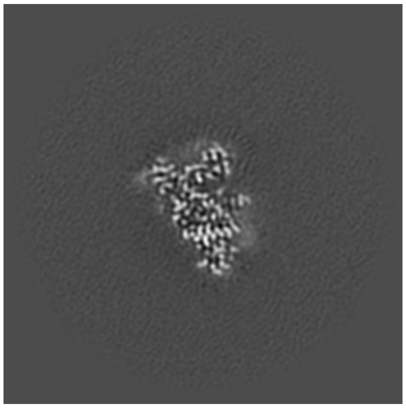
6.3.1 Primary map



X Index: 147

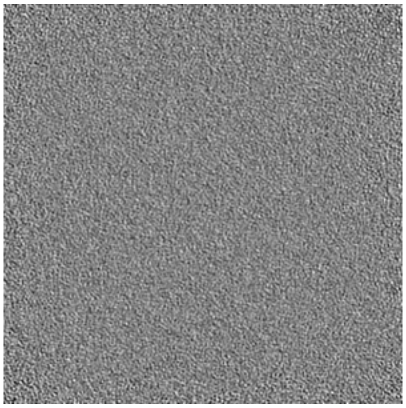


Y Index: 139

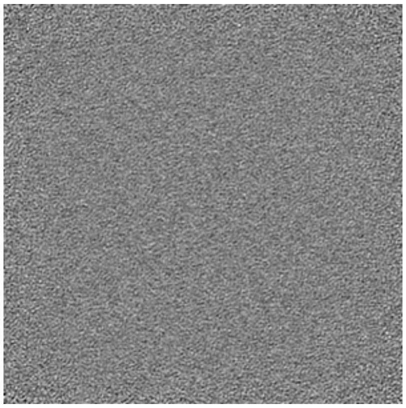


Z Index: 164

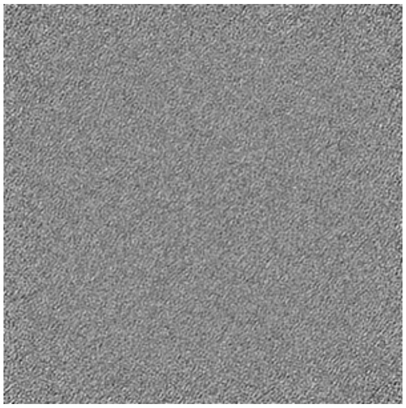
6.3.2 Raw map



X Index: 0



Y Index: 0

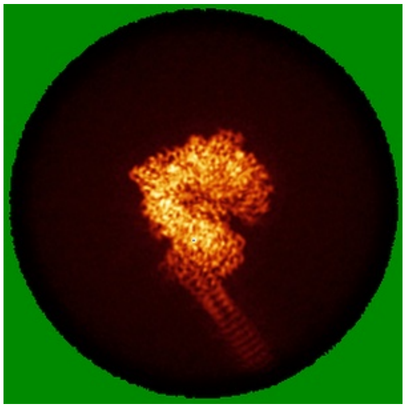


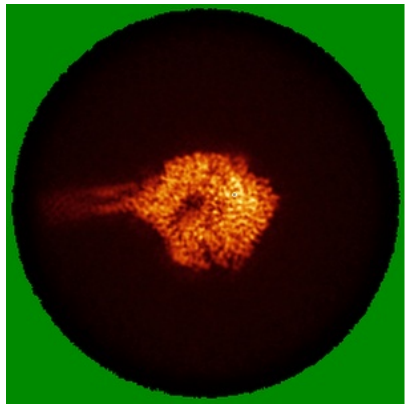
Z Index: 0

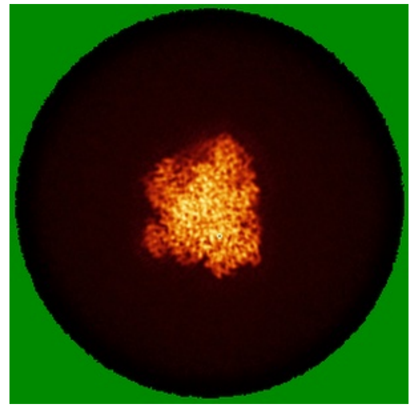
The images above show the largest variance slices of the map in three orthogonal directions.

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

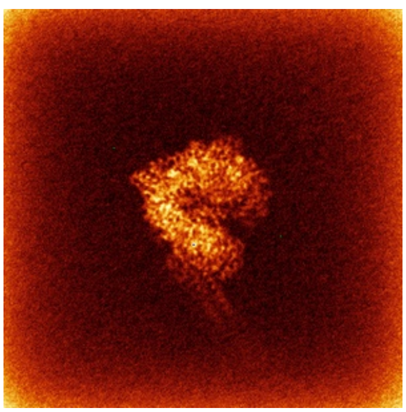
6.4.1 Primary map

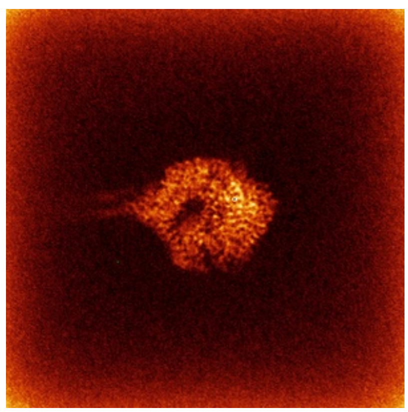

X

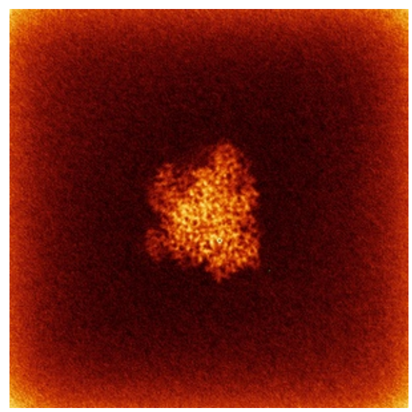

Y


Z

6.4.2 Raw map


X


Y

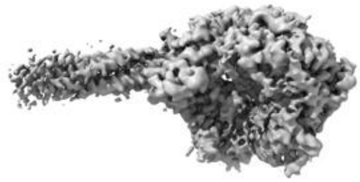

Z

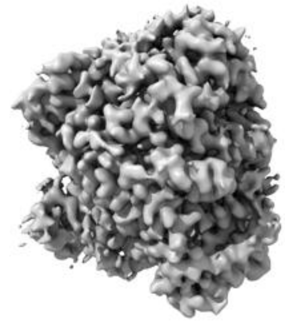
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map


X


Y

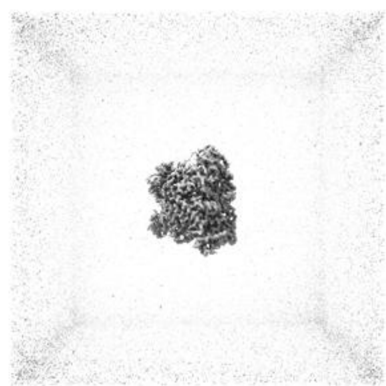

Z

The images above show the 3D surface view of the map at the recommended contour level 0.0592. 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.

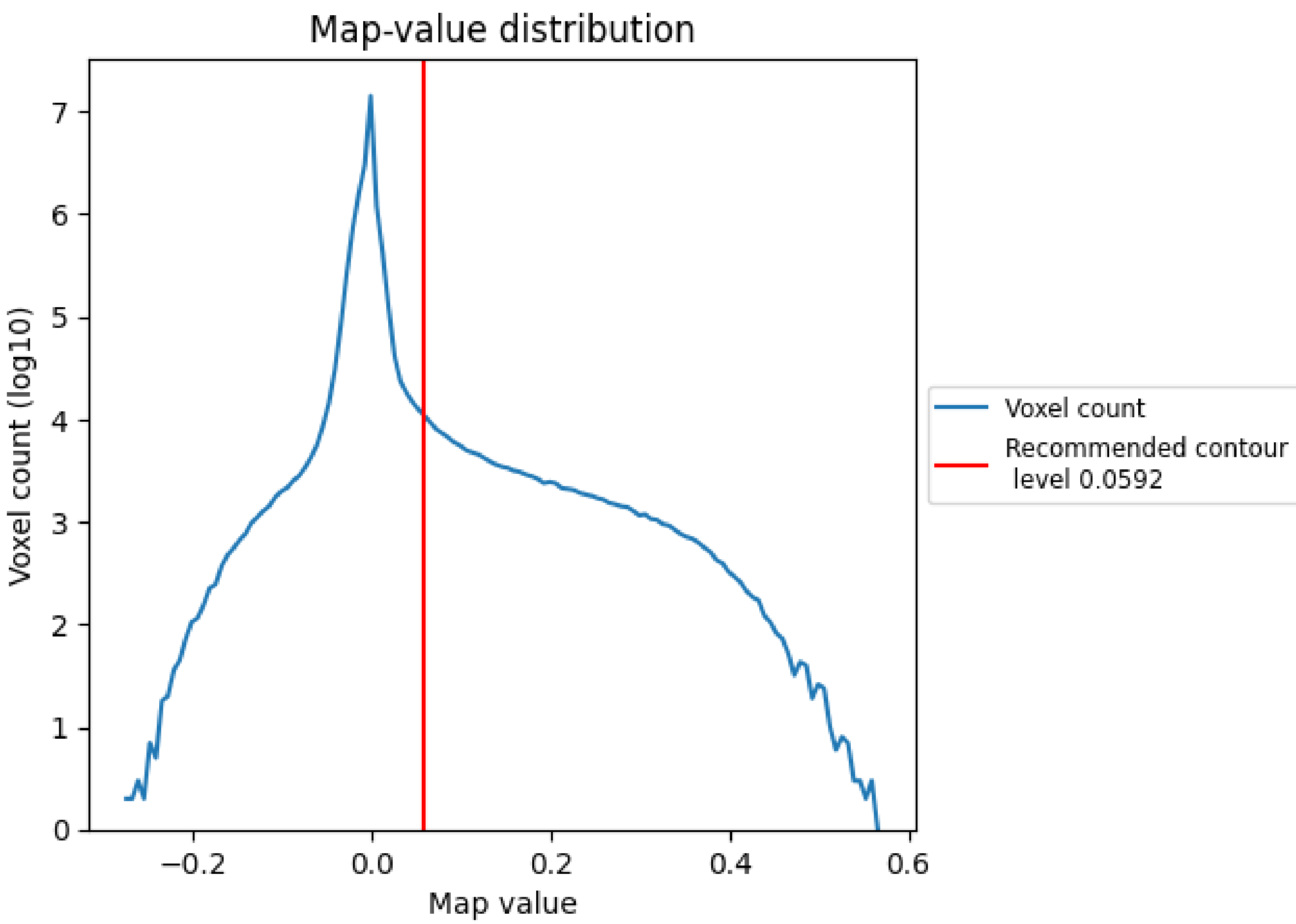
6.6 Mask visualisation (i)

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

7 Map analysis (i)

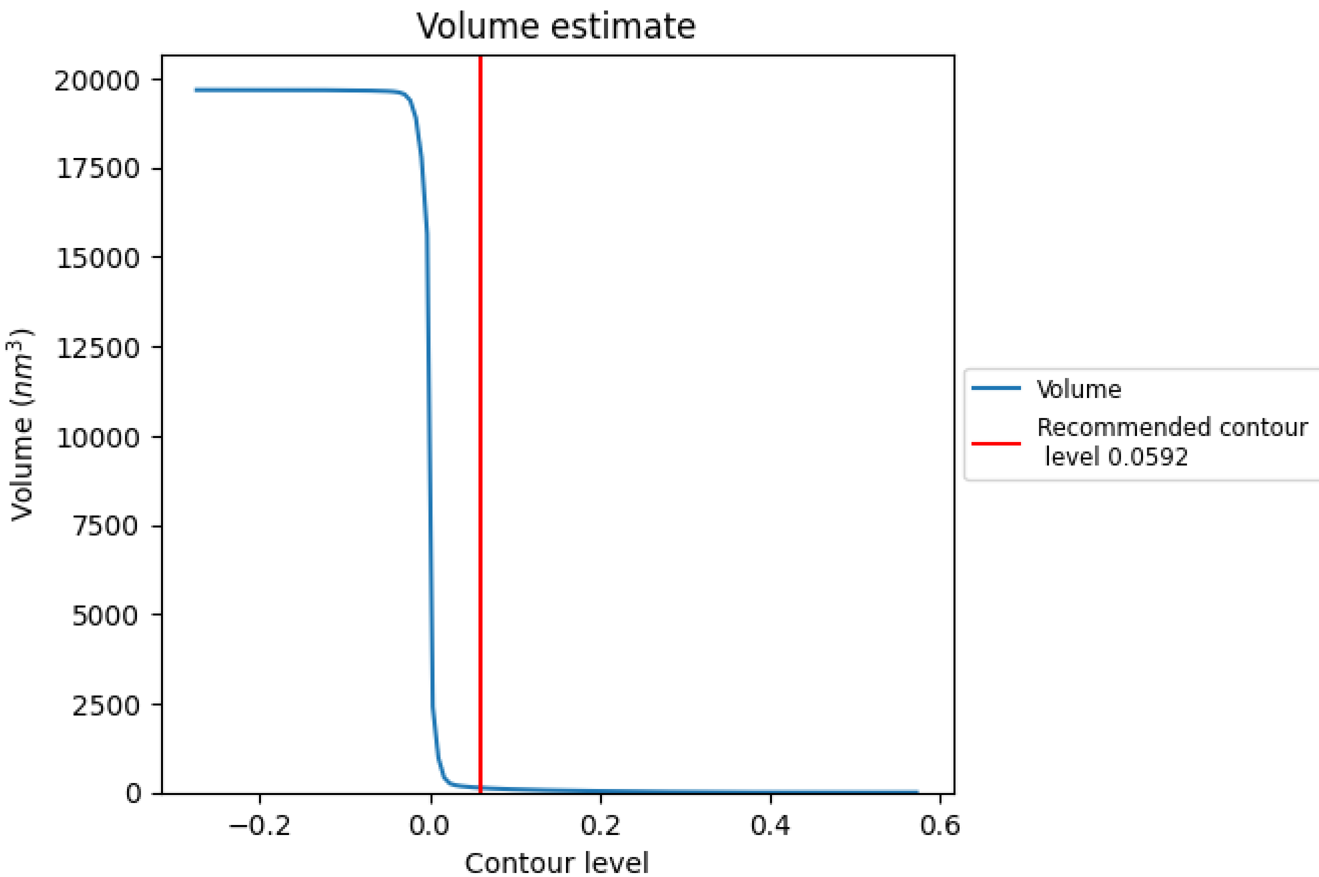
This section contains the results of statistical analysis of the map.

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.

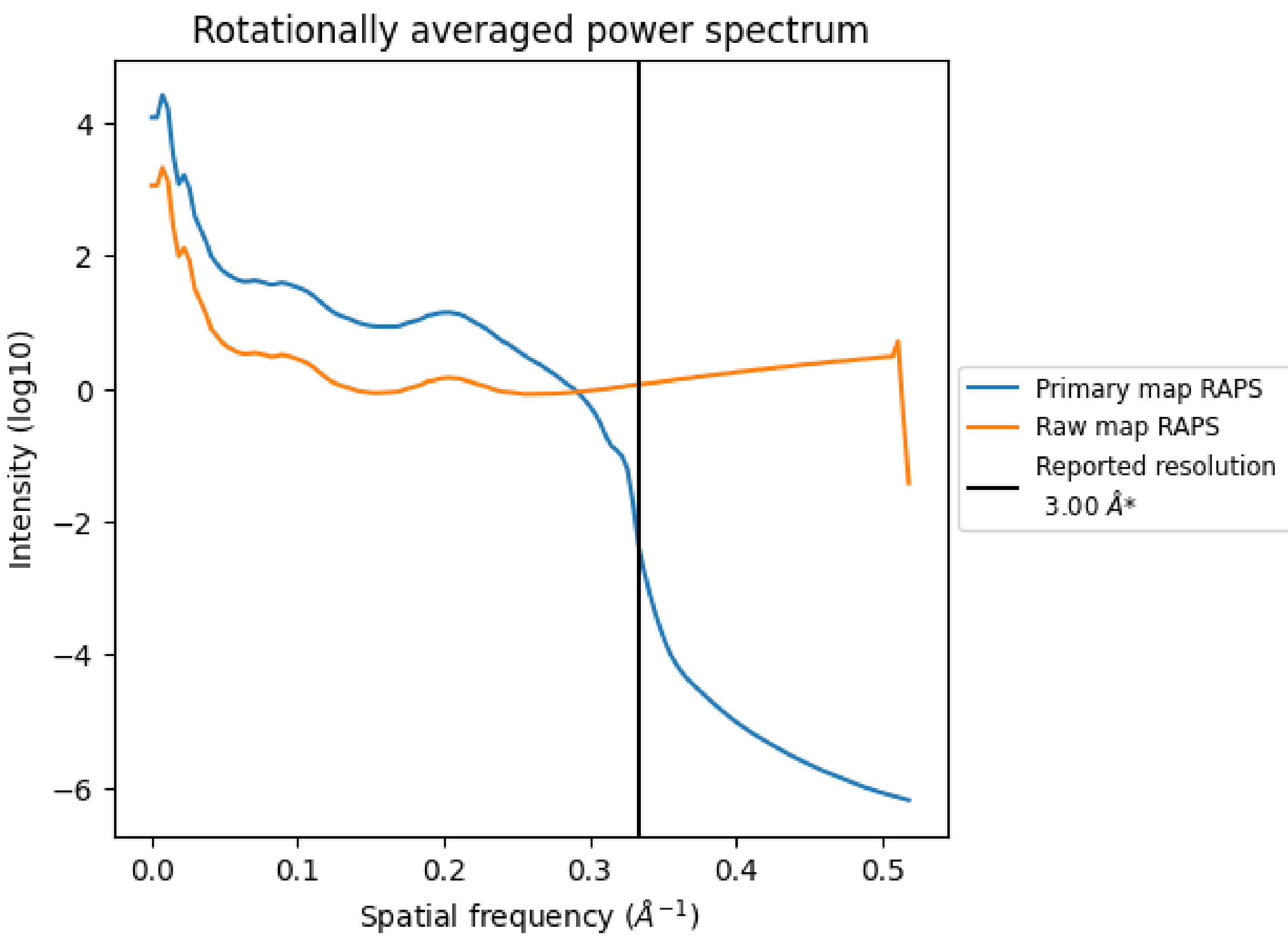
7.2 Volume estimate (i)



The volume at the recommended contour level is 130 nm^3; this corresponds to an approximate mass of 117 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)

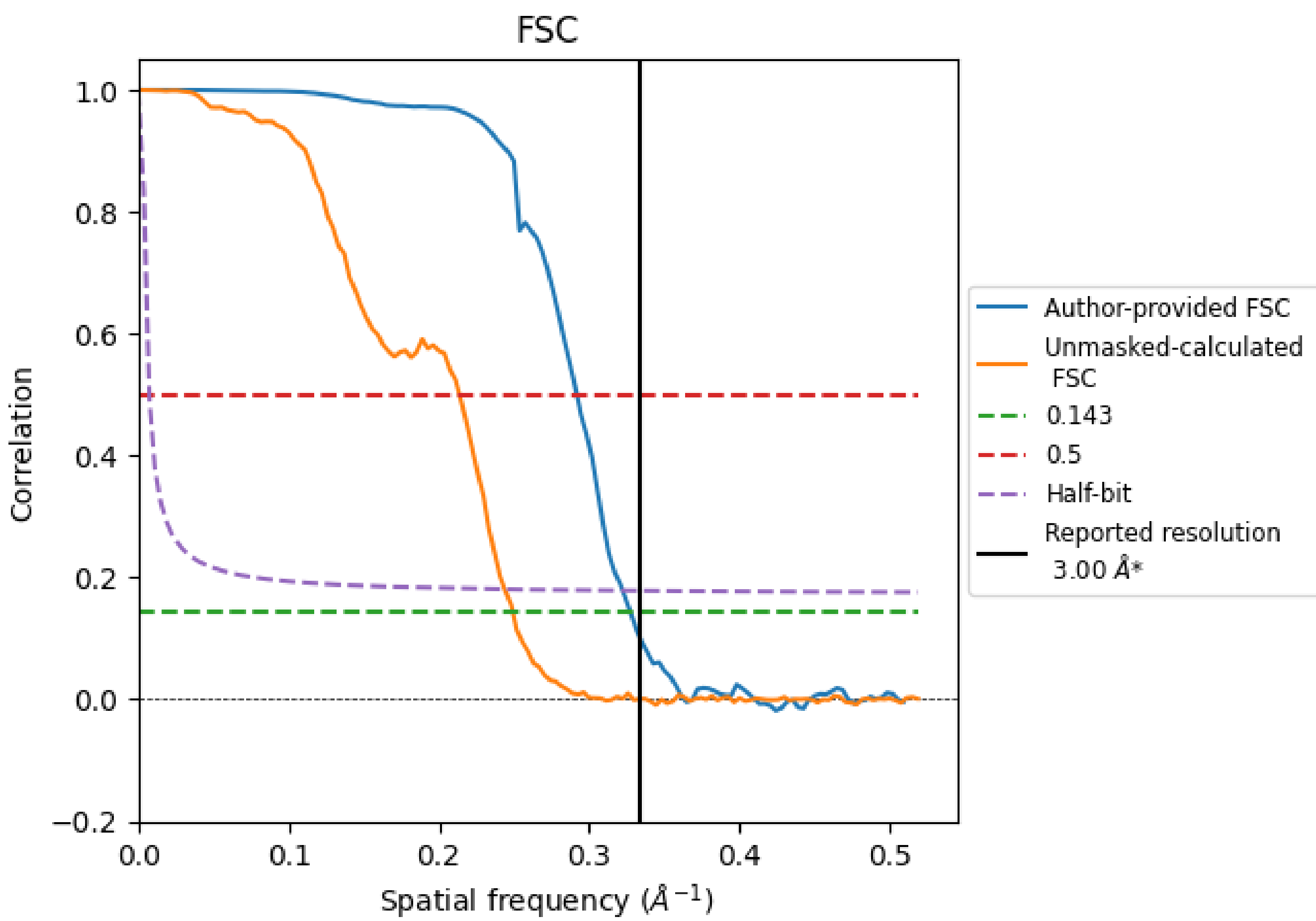


*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

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 0.333 $Å^{-1}$

8.2 Resolution estimates (i)

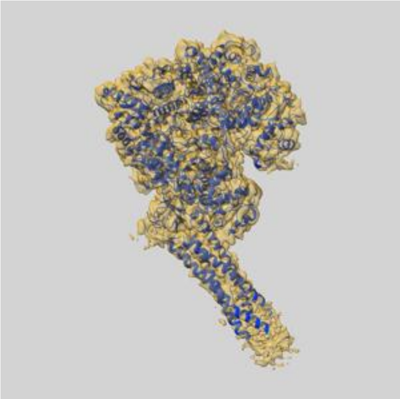
Resolution estimate (Å)	**Estimation criterion (FSC cut-off)**		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	3.05	3.43	3.10
Unmasked-calculated*	4.01	4.68	4.10

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.01 differs from the reported value 3.0 by more than 10 %

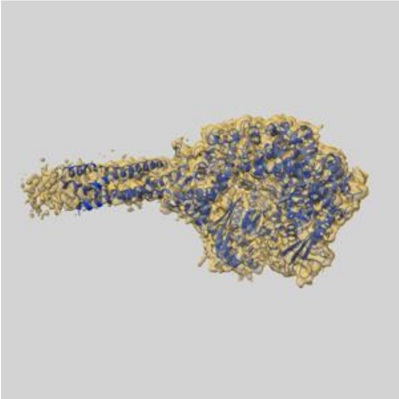
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-62459 and PDB model 9KNQ. Per-residue inclusion information can be found in section 3 on page 4.

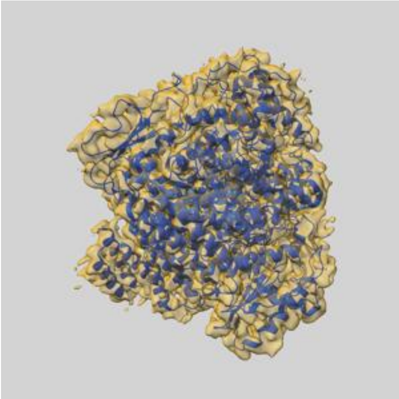
9.1 Map-model overlay (i)



X



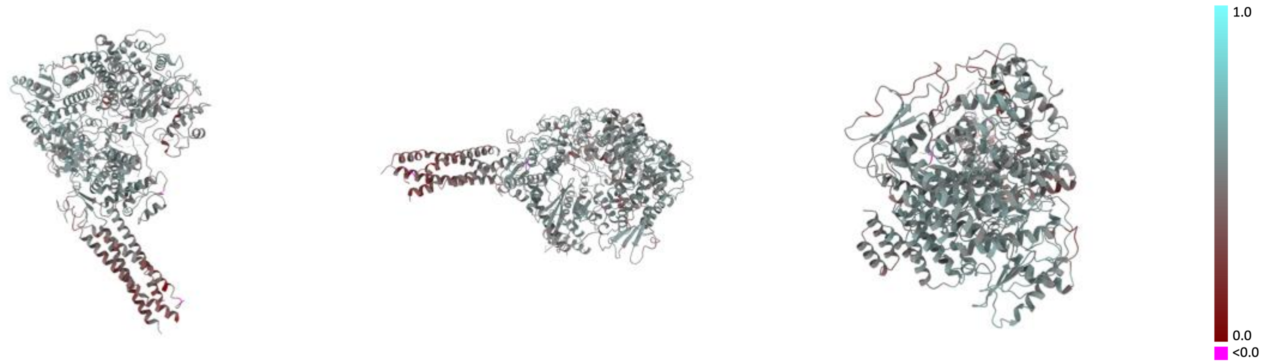
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0592 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.

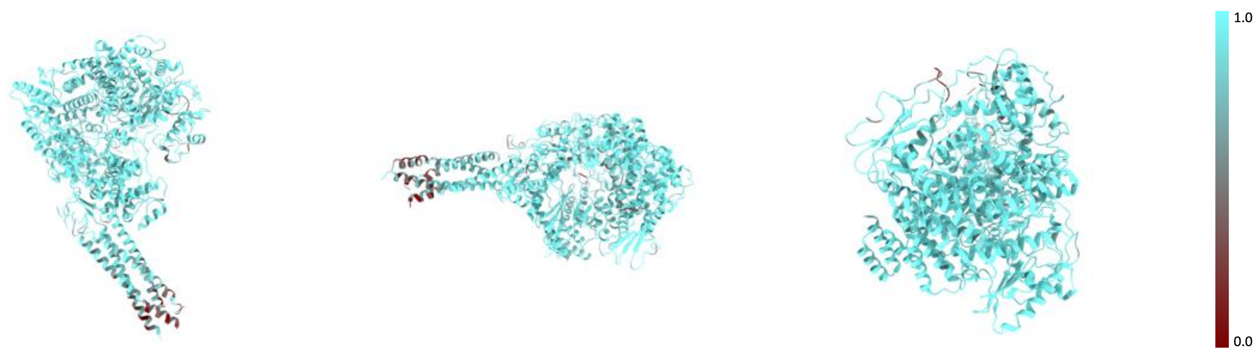
9.2 Q-score mapped to coordinate model (i)



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.

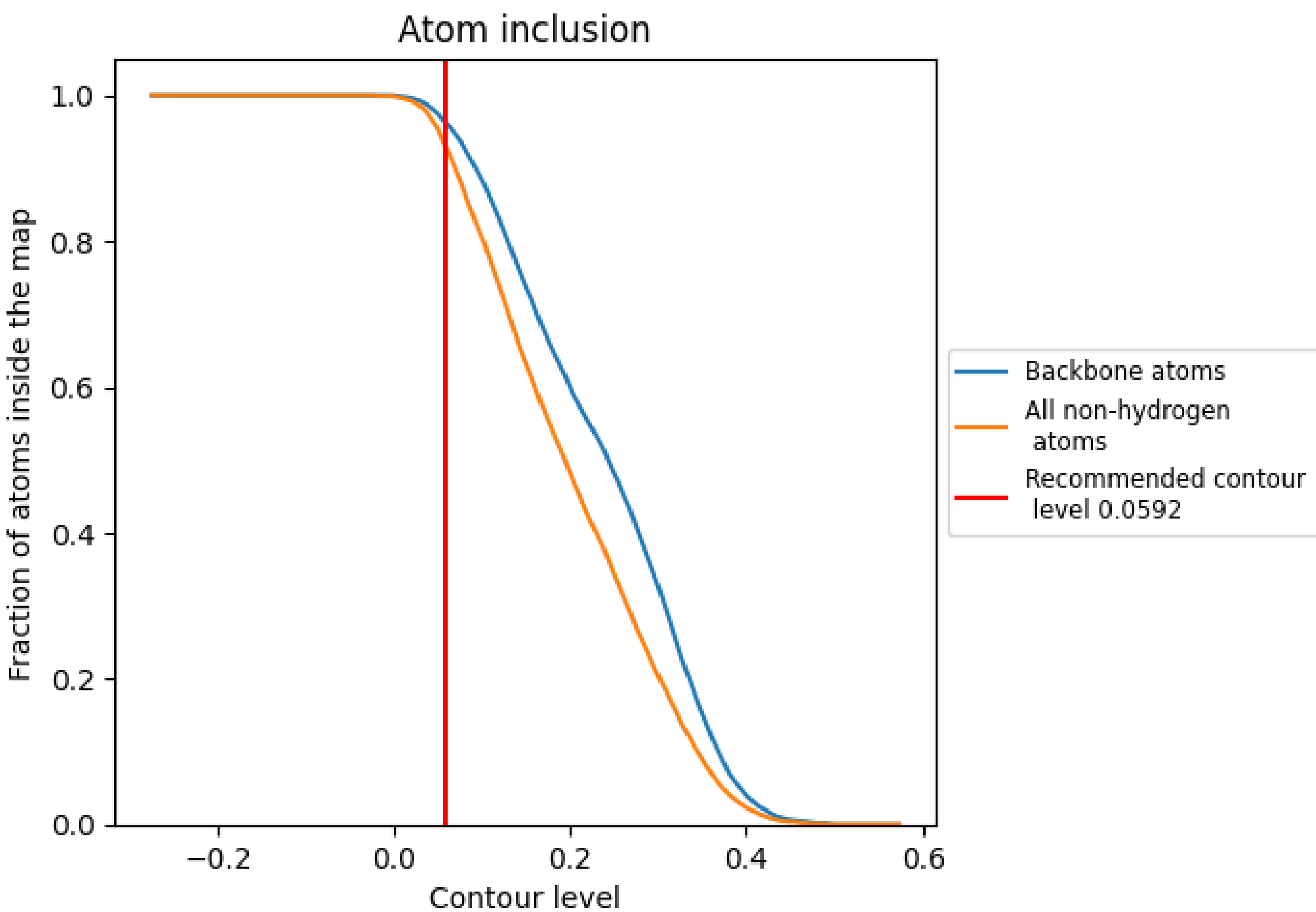
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.0592).

9.4 Atom inclusion ⓘ



At the recommended contour level, 96% of all backbone atoms, 93% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.0592) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9290	0.4980
A	0.9590	0.5180
B	0.7830	0.4070
C	0.8420	0.4290
D	0.7820	0.4040
E	0.6990	0.3590