



Full wwPDB EM Validation Report ⓘ

Mar 26, 2026 – 02:31 AM UTC

PDB ID : 7KZF / pdb_00007kzf
EMDB ID : EMD-23081
Title : High resolution cryo EM analysis of HPV16 identifies minor structural protein L2 and describes capsid flexibility
Authors : Hartmann, S.R.; Goetschius, D.J.; Hafenstein, S.
Deposited on : 2020-12-10
Resolution : 3.10 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

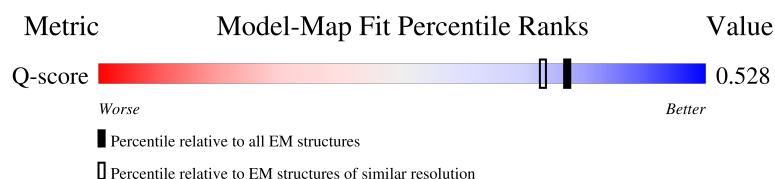
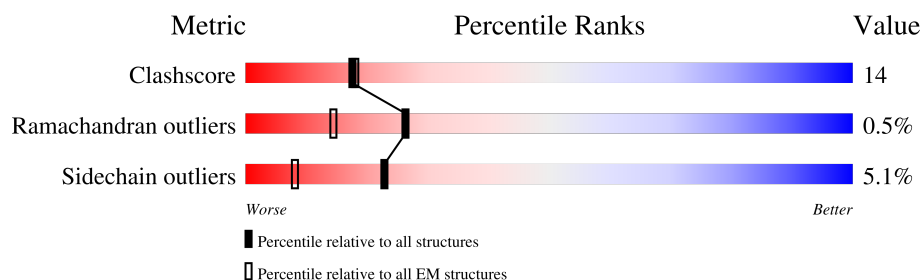
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

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

The reported resolution of this entry is 3.10 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14724 (2.60 - 3.60)

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	503	13% 71% 22% • 6%
1	B	503	14% 68% 24% • 7%
1	C	503	16% 69% 25% • 5%
1	D	503	15% 71% 24% • 5%

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Mol	Chain	Length	Quality of chain
1	E	503	15% 69% 24% • •
1	F	503	14% 68% 25% • •

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 22491 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.

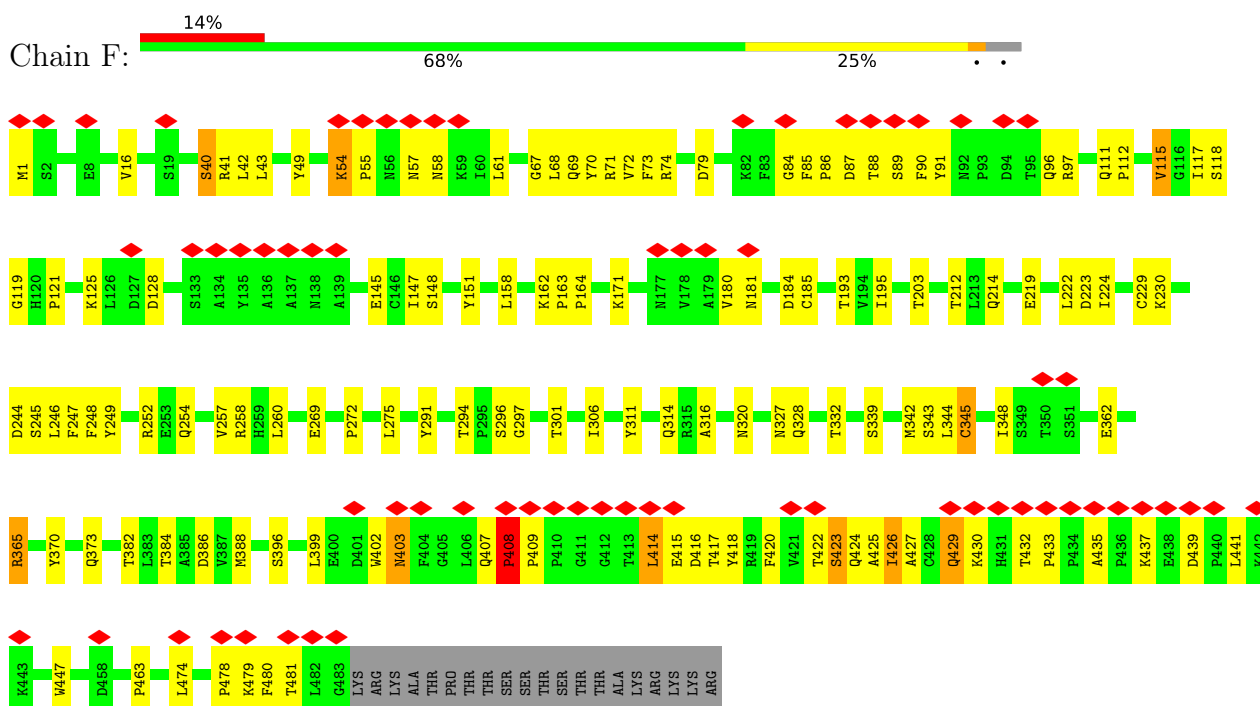
- Molecule 1 is a protein called Major capsid protein L1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	F	483	Total	C	N	O	S	0	0
			3790	2424	633	711	22		
1	B	466	Total	C	N	O	S	0	0
			3659	2335	615	688	21		
1	C	480	Total	C	N	O	S	0	0
			3771	2412	630	707	22		
1	D	480	Total	C	N	O	S	0	0
			3771	2412	630	707	22		
1	E	481	Total	C	N	O	S	0	0
			3776	2416	631	708	21		
1	A	474	Total	C	N	O	S	0	0
			3724	2380	626	697	21		

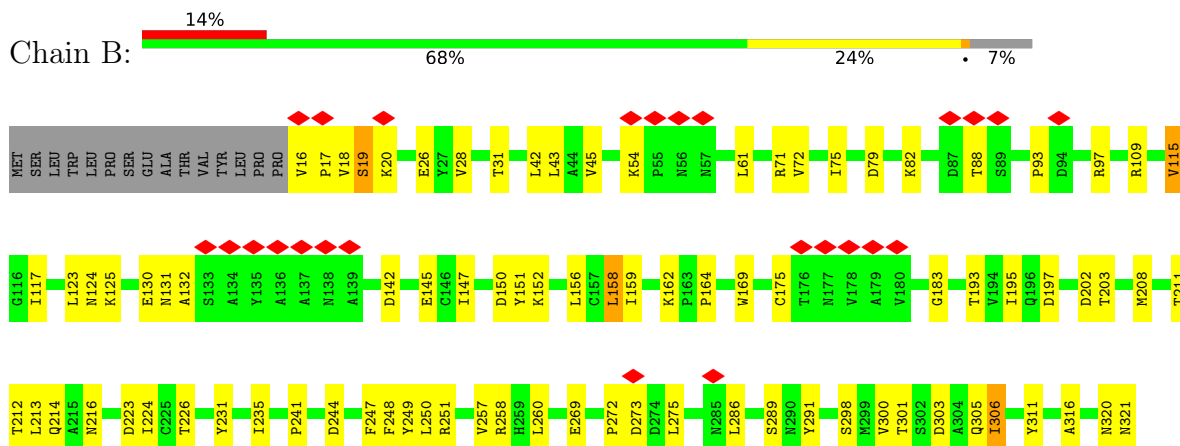
3 Residue-property plots

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.

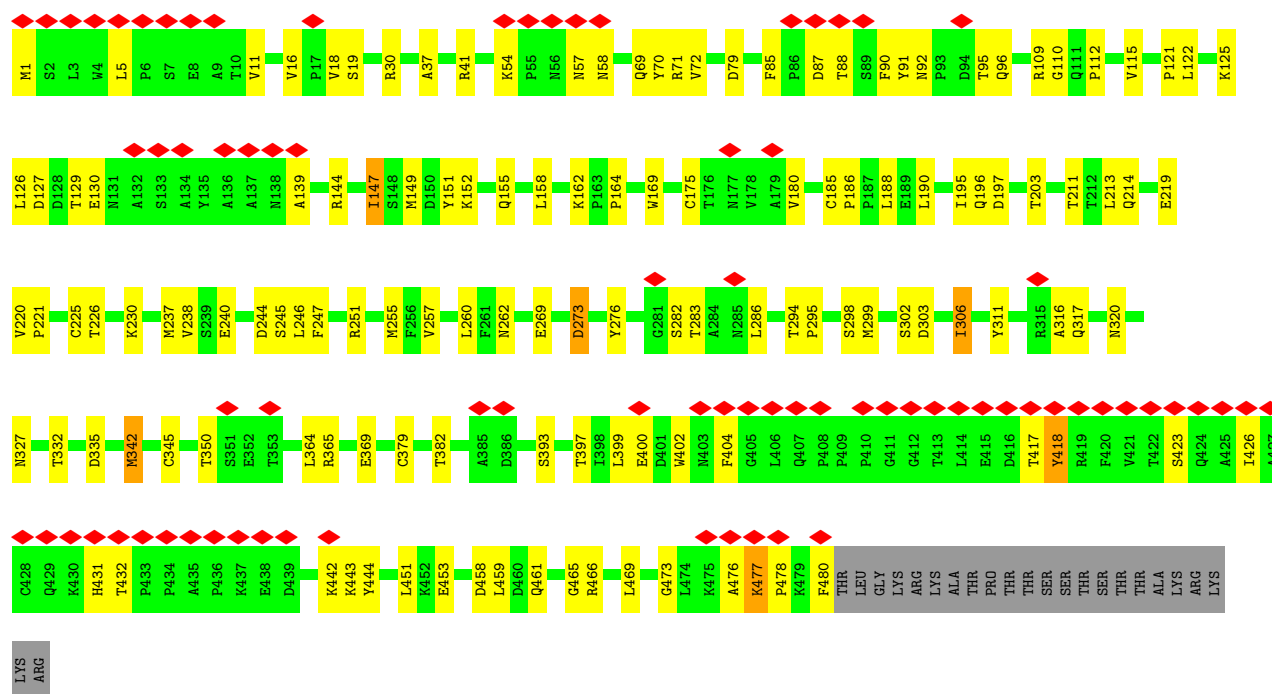
• Molecule 1: Major capsid protein L1



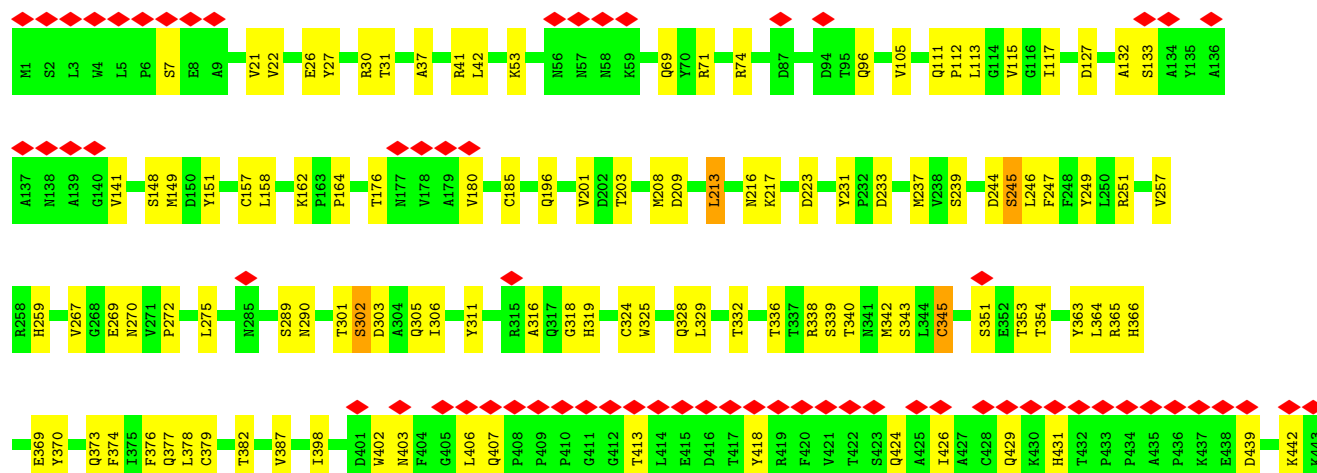
• Molecule 1: Major capsid protein L1



- Molecule 1: Major capsid protein L1



- Molecule 1: Major capsid protein L1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	181299	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	17.655	Depositor
Minimum map value	-10.471	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	2.5	Depositor
Map size ($\text{\AA}$)	660.0, 660.0, 660.0	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.1, 1.1, 1.1	Depositor

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.26	0/3826	0.42	0/5207
1	B	0.24	0/3758	0.41	0/5115
1	C	0.24	0/3876	0.42	0/5280
1	D	0.23	0/3876	0.39	0/5280
1	E	0.23	0/3881	0.40	0/5288
1	F	0.23	0/3895	0.44	0/5306
All	All	0.24	0/23112	0.41	0/31476

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	1
1	C	0	4
1	E	0	1
1	F	0	2
All	All	0	10

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	425	ALA	Peptide
1	A	426	ILE	Peptide
1	B	430	LYS	Peptide
1	C	417	THR	Peptide

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Mol	Chain	Res	Type	Group
1	C	418	TYR	Peptide
1	C	426	ILE	Peptide
1	C	477	LYS	Peptide
1	E	433	PRO	Peptide
1	F	407	GLN	Peptide
1	F	408	PRO	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	A	3724	0	3644	166	0
1	B	3659	0	3574	108	0
1	C	3771	0	3689	107	0
1	D	3771	0	3687	133	0
1	E	3776	0	3693	93	0
1	F	3790	0	3704	180	0
All	All	22491	0	21991	601	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 14.

All (601) 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:425:ALA:CB	1:A:62:VAL:HG13	1.30	1.59
1:F:447:TRP:CZ3	1:A:419:ARG:HB3	1.39	1.54
1:F:447:TRP:CZ2	1:A:419:ARG:CA	1.97	1.44
1:D:477:LYS:CE	1:D:479:LYS:HD3	1.51	1.37
1:D:477:LYS:HE2	1:D:479:LYS:CB	1.52	1.36
1:F:425:ALA:HB2	1:A:62:VAL:CG1	1.58	1.32
1:F:447:TRP:CH2	1:A:419:ARG:CA	2.14	1.29
1:D:249:TYR:HE1	1:D:251:ARG:NH1	1.40	1.18
1:F:87:ASP:HB2	1:A:88:THR:OG1	1.44	1.17
1:C:480:PHE:CE2	1:D:387:VAL:HG22	1.80	1.16
1:F:88:THR:HG21	1:A:84:GLY:C	1.70	1.15

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:480:PHE:HE2	1:D:387:VAL:HG22	1.00	1.13
1:D:477:LYS:CE	1:D:479:LYS:HB2	1.79	1.13
1:D:96:GLN:HE21	1:D:382:THR:CG2	1.62	1.11
1:A:152:LYS:HG3	1:A:255:MET:HB2	1.27	1.09
1:D:477:LYS:HE3	1:D:479:LYS:HD3	1.16	1.08
1:C:478:PRO:HB2	1:D:26:GLU:CD	1.79	1.07
1:F:86:PRO:HB2	1:A:89:SER:HB2	1.07	1.05
1:D:460:ASP:O	1:D:466:ARG:NH1	1.89	1.05
1:C:480:PHE:CE1	1:D:27:TYR:CD1	2.44	1.05
1:F:416:ASP:HA	1:A:41:ARG:O	1.58	1.03
1:D:249:TYR:CE1	1:D:251:ARG:NH1	2.27	1.02
1:F:88:THR:HG21	1:A:85:PHE:N	1.42	1.02
1:F:86:PRO:CB	1:A:89:SER:HB2	1.86	1.01
1:F:89:SER:OG	1:A:87:ASP:CG	2.02	1.01
1:F:40:SER:O	1:A:414:LEU:CD1	2.09	1.00
1:B:241:PRO:HG3	1:A:409:PRO:O	1.61	1.00
1:B:345:CYS:SG	1:C:214:GLN:HA	2.01	0.99
1:A:152:LYS:CG	1:A:255:MET:HB2	1.93	0.99
1:D:477:LYS:CE	1:D:479:LYS:CD	2.42	0.97
1:F:425:ALA:CB	1:A:62:VAL:CG1	2.24	0.96
1:D:96:GLN:HG2	1:D:382:THR:HG22	1.46	0.96
1:A:87:ASP:HB2	1:A:90:PHE:CD2	2.01	0.95
1:B:18:VAL:CG1	1:A:407:GLN:OE1	2.15	0.94
1:F:432:THR:OG1	1:F:433:PRO:HD3	1.66	0.94
1:E:69:GLN:HB2	1:E:71:ARG:HH12	1.32	0.94
1:F:40:SER:O	1:A:414:LEU:HD11	1.64	0.94
1:F:447:TRP:CZ3	1:A:419:ARG:CB	2.17	0.94
1:D:96:GLN:HE21	1:D:382:THR:HG22	1.32	0.93
1:F:415:GLU:O	1:A:40:SER:HB2	1.69	0.92
1:F:447:TRP:CH2	1:A:419:ARG:CB	0.89	0.92
1:F:414:LEU:CD1	1:A:40:SER:O	2.17	0.92
1:D:477:LYS:HE2	1:D:479:LYS:HB2	0.92	0.92
1:F:447:TRP:CH2	1:A:419:ARG:HB3	0.69	0.91
1:F:425:ALA:HB1	1:A:62:VAL:HG13	1.50	0.90
1:F:88:THR:CG2	1:A:85:PHE:N	2.33	0.90
1:F:447:TRP:CZ2	1:A:419:ARG:HG2	1.53	0.90
1:C:478:PRO:CB	1:D:26:GLU:OE2	2.19	0.90
1:B:406:LEU:HD23	1:B:406:LEU:O	1.72	0.90
1:A:87:ASP:HB2	1:A:90:PHE:HD2	1.36	0.90
1:D:249:TYR:HE1	1:D:251:ARG:HH11	1.08	0.89
1:F:87:ASP:CB	1:A:88:THR:OG1	2.21	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:54:LYS:CD	1:B:61:LEU:HD11	2.04	0.88
1:B:54:LYS:HE2	1:B:61:LEU:CD2	2.04	0.88
1:F:447:TRP:CZ2	1:A:419:ARG:HG3	1.45	0.88
1:B:18:VAL:HG13	1:A:407:GLN:OE1	1.73	0.88
1:F:414:LEU:HD11	1:A:40:SER:O	1.74	0.87
1:F:415:GLU:O	1:A:40:SER:CB	2.22	0.87
1:F:41:ARG:HD2	1:A:416:ASP:OD1	1.73	0.87
1:B:54:LYS:HE2	1:B:61:LEU:HD21	1.54	0.87
1:D:477:LYS:HE3	1:D:479:LYS:CD	2.04	0.87
1:F:414:LEU:HD21	1:A:41:ARG:HB2	1.57	0.86
1:B:54:LYS:CE	1:B:61:LEU:HD11	2.06	0.86
1:B:54:LYS:HD3	1:B:61:LEU:HD11	1.59	0.85
1:D:398:ILE:HG23	1:D:402:TRP:CZ2	2.12	0.85
1:E:418:TYR:CD2	1:E:426:ILE:HD12	2.12	0.84
1:F:88:THR:CG2	1:A:84:GLY:C	2.49	0.83
1:F:416:ASP:CA	1:A:41:ARG:O	2.26	0.83
1:A:85:PHE:CD2	1:A:90:PHE:HZ	1.95	0.83
1:A:85:PHE:CD2	1:A:90:PHE:CZ	2.66	0.83
1:C:478:PRO:HB3	1:D:26:GLU:OE2	1.79	0.82
1:F:447:TRP:CH2	1:A:419:ARG:C	2.57	0.82
1:F:118:SER:CB	1:F:223:ASP:OD2	2.27	0.82
1:C:18:VAL:HG23	1:C:19:SER:H	1.46	0.81
1:F:424:GLN:OE1	1:A:61:LEU:HD22	1.81	0.80
1:D:246:LEU:HD11	1:D:249:TYR:HB3	1.63	0.80
1:A:85:PHE:O	1:A:87:ASP:N	2.14	0.80
1:C:478:PRO:CB	1:D:26:GLU:CD	2.55	0.80
1:D:461:GLN:HE22	1:E:21:VAL:H	1.28	0.80
1:F:43:LEU:CD1	1:A:416:ASP:HB3	2.11	0.79
1:D:325:TRP:CZ3	1:D:402:TRP:HH2	2.01	0.79
1:E:418:TYR:CD1	1:E:429:GLN:OE1	2.36	0.79
1:F:118:SER:OG	1:F:223:ASP:OD2	1.99	0.79
1:D:306:ILE:O	1:D:311:TYR:OH	1.99	0.79
1:A:152:LYS:HG3	1:A:255:MET:CB	2.09	0.79
1:F:479:LYS:HZ1	1:B:20:LYS:HZ1	1.29	0.79
1:F:416:ASP:HB3	1:A:43:LEU:HD12	1.65	0.78
1:E:418:TYR:CE2	1:E:426:ILE:HD12	2.18	0.78
1:C:480:PHE:HD1	1:D:22:VAL:HG21	1.49	0.78
1:D:460:ASP:HA	1:D:466:ARG:CG	2.13	0.78
1:F:447:TRP:CH2	1:A:419:ARG:HB2	0.98	0.78
1:F:373:GLN:HE22	1:F:463:PRO:HG2	1.48	0.77
1:D:96:GLN:CG	1:D:382:THR:HG22	2.13	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:373:GLN:HE22	1:A:463:PRO:HG2	1.49	0.77
1:D:96:GLN:NE2	1:D:382:THR:CG2	2.46	0.77
1:D:96:GLN:NE2	1:D:382:THR:HG22	2.00	0.76
1:B:306:ILE:O	1:B:311:TYR:OH	2.02	0.76
1:D:460:ASP:HA	1:D:466:ARG:HG2	1.68	0.76
1:F:85:PHE:C	1:A:88:THR:O	2.29	0.76
1:B:54:LYS:HE2	1:B:61:LEU:CD1	2.15	0.76
1:D:477:LYS:NZ	1:D:479:LYS:HD3	2.01	0.76
1:E:69:GLN:HB2	1:E:71:ARG:NH1	2.01	0.75
1:C:466:ARG:NH1	1:D:319:HIS:CE1	2.54	0.75
1:C:480:PHE:HE1	1:D:27:TYR:CD1	2.04	0.75
1:F:479:LYS:HZ1	1:B:20:LYS:NZ	1.83	0.74
1:B:54:LYS:HE2	1:B:61:LEU:HD11	1.69	0.74
1:D:477:LYS:CE	1:D:479:LYS:CB	2.49	0.74
1:F:43:LEU:HD12	1:A:416:ASP:HB3	1.68	0.74
1:F:415:GLU:O	1:A:40:SER:OG	2.06	0.74
1:D:365:ARG:NH2	1:E:269:GLU:OE2	2.21	0.73
1:F:416:ASP:HB3	1:A:43:LEU:CD1	2.18	0.73
1:F:429:GLN:O	1:F:430:LYS:HG2	1.87	0.73
1:F:414:LEU:CG	1:A:40:SER:O	2.37	0.72
1:F:43:LEU:O	1:A:418:TYR:HA	1.90	0.72
1:B:244:ASP:OD1	1:B:320:ASN:ND2	2.22	0.72
1:E:420:PHE:HB3	1:E:423:SER:HB3	1.72	0.72
1:F:158:LEU:HB3	1:F:246:LEU:HD13	1.71	0.71
1:A:85:PHE:HB3	1:A:86:PRO:HD2	1.72	0.71
1:C:95:THR:HG23	1:C:96:GLN:HG3	1.71	0.71
1:C:306:ILE:O	1:C:311:TYR:OH	2.08	0.71
1:D:301:THR:HG22	1:D:303:ASP:H	1.56	0.71
1:F:40:SER:O	1:A:414:LEU:HD12	1.91	0.70
1:B:345:CYS:SG	1:C:214:GLN:CA	2.78	0.70
1:F:447:TRP:HH2	1:A:419:ARG:CB	1.36	0.70
1:B:241:PRO:HG2	1:A:410:PRO:HA	1.73	0.70
1:C:480:PHE:CD1	1:D:22:VAL:HG21	2.26	0.70
1:C:480:PHE:HE2	1:D:387:VAL:CG2	1.92	0.70
1:F:423:SER:HB2	1:A:61:LEU:O	1.92	0.70
1:F:402:TRP:O	1:F:403:ASN:ND2	2.24	0.69
1:C:85:PHE:CD2	1:C:90:PHE:HE1	2.09	0.69
1:A:434:PRO:HB2	1:A:438:GLU:HG3	1.74	0.69
1:F:96:GLN:NE2	1:F:382:THR:HG22	2.08	0.69
1:F:414:LEU:HG	1:A:40:SER:O	1.91	0.69
1:D:477:LYS:HE2	1:D:479:LYS:HB3	1.69	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:40:SER:HB3	1:A:415:GLU:HB2	1.75	0.69
1:F:479:LYS:NZ	1:B:20:LYS:NZ	2.41	0.69
1:F:246:LEU:HD11	1:F:248:PHE:O	1.92	0.69
1:C:152:LYS:HG3	1:C:255:MET:HB2	1.74	0.69
1:F:89:SER:OG	1:A:87:ASP:OD1	2.09	0.69
1:F:447:TRP:HZ2	1:A:419:ARG:CA	1.67	0.69
1:F:343:SER:O	1:B:214:GLN:NE2	2.24	0.68
1:C:480:PHE:CE1	1:D:27:TYR:CG	2.80	0.68
1:F:61:LEU:HB3	1:A:424:GLN:HG2	1.75	0.68
1:C:18:VAL:HG23	1:C:19:SER:N	2.08	0.68
1:D:477:LYS:HE2	1:D:479:LYS:CG	2.22	0.68
1:E:74:ARG:HE	1:E:328:GLN:HE21	1.40	0.68
1:F:128:ASP:OD2	1:B:131:ASN:ND2	2.26	0.68
1:B:382:THR:HG23	1:B:382:THR:O	1.95	0.68
1:D:325:TRP:HZ3	1:D:402:TRP:HH2	1.40	0.67
1:F:447:TRP:HZ2	1:A:419:ARG:N	1.91	0.67
1:D:69:GLN:OE1	1:D:71:ARG:NH2	2.28	0.66
1:F:84:GLY:HA2	1:A:84:GLY:HA2	1.77	0.66
1:F:425:ALA:HB2	1:A:62:VAL:HG13	0.67	0.66
1:E:437:LYS:HD2	1:E:440:PRO:HB3	1.77	0.66
1:B:433:PRO:HD2	1:B:434:PRO:HD3	1.78	0.66
1:C:480:PHE:HB2	1:D:26:GLU:HB3	1.78	0.66
1:A:109:ARG:NH1	1:A:335:ASP:OD1	2.29	0.65
1:B:365:ARG:NH1	1:C:185:CYS:SG	2.69	0.65
1:F:269:GLU:OE2	1:E:365:ARG:NH2	2.29	0.65
1:A:85:PHE:CE2	1:A:90:PHE:HZ	2.14	0.65
1:C:461:GLN:HE22	1:D:21:VAL:H	1.44	0.64
1:E:208:MET:HE3	1:E:213:LEU:HD23	1.78	0.64
1:F:306:ILE:O	1:F:311:TYR:OH	2.14	0.64
1:A:71:ARG:NH1	1:A:368:GLU:OE1	2.30	0.64
1:F:429:GLN:C	1:F:430:LYS:HG2	2.23	0.64
1:F:408:PRO:HB2	1:F:409:PRO:HD3	1.79	0.64
1:B:152:LYS:NZ	1:B:202:ASP:OD2	2.31	0.64
1:D:196:GLN:HG2	1:D:444:TYR:HB3	1.80	0.64
1:F:41:ARG:HB3	1:A:415:GLU:O	1.98	0.63
1:C:69:GLN:OE1	1:C:71:ARG:NH2	2.31	0.63
1:E:400:GLU:HG2	1:E:406:LEU:HD11	1.80	0.63
1:F:185:CYS:SG	1:E:365:ARG:NH1	2.71	0.63
1:B:373:GLN:HE22	1:B:463:PRO:HG2	1.62	0.63
1:B:409:PRO:HD2	1:B:410:PRO:HD3	1.81	0.63
1:B:439:ASP:HB3	1:B:442:LYS:HB2	1.80	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:460:ASP:HA	1:D:466:ARG:HG3	1.80	0.63
1:F:247:PHE:HB2	1:F:316:ALA:HB1	1.80	0.62
1:E:152:LYS:HB2	1:E:255:MET:HB2	1.80	0.62
1:D:398:ILE:CG2	1:D:402:TRP:CH2	2.82	0.62
1:F:61:LEU:O	1:A:424:GLN:N	2.30	0.62
1:F:418:TYR:HA	1:A:43:LEU:O	1.99	0.62
1:D:398:ILE:HG23	1:D:402:TRP:CH2	2.34	0.62
1:A:87:ASP:CB	1:A:90:PHE:HD2	2.11	0.62
1:F:69:GLN:OE1	1:F:71:ARG:NH2	2.33	0.61
1:F:417:THR:N	1:A:41:ARG:O	2.33	0.61
1:E:91:TYR:OH	1:E:93:PRO:HB3	2.01	0.61
1:E:420:PHE:C	1:E:422:THR:H	2.09	0.61
1:B:117:ILE:HG22	1:B:150:ASP:HB3	1.81	0.61
1:F:447:TRP:HH2	1:A:419:ARG:C	2.01	0.61
1:B:19:SER:HA	1:A:407:GLN:HG2	1.80	0.61
1:C:85:PHE:CD2	1:C:90:PHE:CE1	2.88	0.61
1:C:273:ASP:OD1	1:C:273:ASP:N	2.30	0.61
1:E:88:THR:HA	1:E:90:PHE:CE1	2.35	0.61
1:C:365:ARG:NH1	1:D:185:CYS:SG	2.74	0.61
1:F:447:TRP:CE3	1:A:419:ARG:HB3	2.20	0.60
1:C:247:PHE:HB2	1:C:316:ALA:HB1	1.83	0.60
1:E:240:GLU:HG2	1:E:241:PRO:HD2	1.83	0.60
1:F:447:TRP:CZ2	1:A:419:ARG:CG	0.84	0.60
1:D:477:LYS:HE2	1:D:479:LYS:CD	2.21	0.60
1:C:480:PHE:CZ	1:D:27:TYR:HB3	2.36	0.60
1:F:61:LEU:O	1:A:423:SER:OG	2.09	0.60
1:F:61:LEU:HD13	1:A:424:GLN:OE1	2.02	0.60
1:F:96:GLN:HG2	1:F:382:THR:HG22	1.84	0.60
1:C:72:VAL:HG22	1:C:332:THR:HG23	1.84	0.60
1:E:247:PHE:HB2	1:E:316:ALA:HB1	1.83	0.60
1:F:40:SER:CB	1:A:415:GLU:HB2	2.31	0.60
1:A:388:MET:HG2	1:A:399:LEU:HD21	1.84	0.60
1:A:386:ASP:OD1	1:A:386:ASP:N	2.31	0.60
1:F:61:LEU:HB3	1:A:424:GLN:CG	2.32	0.59
1:D:247:PHE:HB2	1:D:316:ALA:HB1	1.84	0.59
1:C:246:LEU:O	1:C:317:GLN:NE2	2.34	0.59
1:B:16:VAL:N	1:A:388:MET:HE1	2.17	0.59
1:B:79:ASP:HB3	1:B:82:LYS:HG2	1.85	0.59
1:D:466:ARG:NH1	1:E:319:HIS:CE1	2.71	0.59
1:F:79:ASP:OD1	1:F:327:ASN:ND2	2.36	0.59
1:A:31:THR:OG1	1:A:378:LEU:O	2.20	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:425:ALA:HB2	1:A:62:VAL:CB	2.31	0.58
1:F:97:ARG:HH21	1:F:403:ASN:HB2	1.68	0.58
1:C:466:ARG:HH11	1:D:319:HIS:CE1	2.20	0.58
1:B:258:ARG:NH1	1:C:130:GLU:OE2	2.37	0.58
1:E:306:ILE:O	1:E:311:TYR:OH	2.22	0.58
1:F:420:PHE:CE1	1:A:447:TRP:HZ3	2.22	0.58
1:B:211:THR:OG1	1:B:226:THR:O	2.22	0.58
1:C:92:ASN:HB3	1:C:95:THR:HG22	1.86	0.58
1:D:208:MET:HE3	1:D:213:LEU:HD23	1.86	0.58
1:E:469:LEU:O	1:E:473:GLY:N	2.36	0.58
1:B:125:LYS:HD3	1:B:145:GLU:HG3	1.86	0.57
1:B:235:ILE:HG22	1:A:414:LEU:HD21	1.86	0.57
1:F:479:LYS:NZ	1:B:20:LYS:HE2	2.18	0.57
1:F:246:LEU:HD21	1:F:249:TYR:HB3	1.87	0.57
1:F:423:SER:CB	1:A:61:LEU:O	2.52	0.57
1:F:118:SER:HB3	1:F:223:ASP:OD2	2.05	0.57
1:F:57:ASN:OD1	1:F:58:ASN:N	2.32	0.57
1:B:130:GLU:HG3	1:B:260:LEU:HD13	1.86	0.57
1:F:414:LEU:HG	1:A:40:SER:C	2.29	0.57
1:A:428:CYS:O	1:A:430:LYS:NZ	2.37	0.56
1:D:402:TRP:CD1	1:D:402:TRP:N	2.73	0.56
1:A:298:SER:OG	1:A:299:MET:N	2.39	0.56
1:F:244:ASP:OD1	1:F:320:ASN:ND2	2.36	0.56
1:E:42:LEU:HB2	1:E:370:TYR:HB2	1.87	0.56
1:D:458:ASP:OD2	1:E:20:LYS:NZ	2.37	0.56
1:B:247:PHE:HB2	1:B:316:ALA:HB1	1.88	0.56
1:F:86:PRO:N	1:A:88:THR:O	2.33	0.56
1:B:54:LYS:CE	1:B:61:LEU:CD1	2.76	0.55
1:A:364:LEU:O	1:A:365:ARG:NE	2.39	0.55
1:E:127:ASP:OD1	1:E:127:ASP:N	2.38	0.55
1:F:72:VAL:HG22	1:F:332:THR:HG23	1.88	0.55
1:A:57:ASN:OD1	1:A:58:ASN:N	2.38	0.55
1:C:244:ASP:OD1	1:C:320:ASN:ND2	2.34	0.55
1:F:96:GLN:HE21	1:F:382:THR:HG22	1.70	0.55
1:F:365:ARG:NH2	1:B:269:GLU:OE2	2.40	0.55
1:A:152:LYS:HG3	1:A:254:GLN:O	2.07	0.55
1:E:72:VAL:HG22	1:E:332:THR:HG23	1.88	0.54
1:E:335:ASP:OD1	1:E:337:THR:OG1	2.23	0.54
1:F:479:LYS:NZ	1:B:20:LYS:CE	2.70	0.54
1:D:127:ASP:N	1:D:127:ASP:OD1	2.39	0.54
1:F:435:ALA:HB3	1:F:437:LYS:HG3	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:121:PRO:HG3	1:D:289:SER:HB2	1.87	0.54
1:D:31:THR:OG1	1:D:378:LEU:O	2.18	0.54
1:E:135:TYR:OH	1:E:287:ALA:N	2.39	0.54
1:E:220:VAL:HG23	1:E:225:CYS:HA	1.88	0.54
1:E:418:TYR:CE2	1:E:426:ILE:HG23	2.42	0.54
1:A:130:GLU:HG3	1:A:260:LEU:HD23	1.88	0.54
1:C:127:ASP:OD1	1:C:127:ASP:N	2.40	0.54
1:F:87:ASP:HA	1:A:90:PHE:H	1.73	0.54
1:D:111:GLN:NE2	1:E:169:TRP:HE1	2.06	0.54
1:F:222:LEU:HD22	1:B:275:LEU:HD13	1.90	0.54
1:B:71:ARG:NH1	1:B:197:ASP:OD1	2.41	0.54
1:B:164:PRO:HG2	1:B:195:ILE:HB	1.90	0.53
1:D:477:LYS:HG3	1:E:26:GLU:OE2	2.07	0.53
1:C:41:ARG:NH2	1:D:233:ASP:OD1	2.41	0.53
1:D:96:GLN:HG2	1:D:382:THR:CG2	2.31	0.53
1:F:49:TYR:CD1	1:F:223:ASP:OD1	2.62	0.53
1:B:18:VAL:HG11	1:A:407:GLN:OE1	2.07	0.53
1:B:406:LEU:O	1:B:406:LEU:CD2	2.52	0.53
1:F:121:PRO:HG3	1:B:289:SER:HB2	1.90	0.53
1:D:105:VAL:HG22	1:D:374:PHE:HD2	1.73	0.53
1:E:421:VAL:HG12	1:E:421:VAL:O	2.08	0.53
1:C:54:LYS:HE3	1:C:57:ASN:HB3	1.90	0.53
1:A:85:PHE:HD2	1:A:90:PHE:CZ	2.22	0.53
1:E:298:SER:OG	1:E:299:MET:N	2.42	0.53
1:B:344:LEU:HD23	1:C:186:PRO:HG2	1.91	0.53
1:E:125:LYS:NZ	1:E:145:GLU:OE1	2.36	0.53
1:C:88:THR:C	1:C:90:PHE:H	2.17	0.52
1:F:125:LYS:NZ	1:F:145:GLU:OE2	2.38	0.52
1:F:291:TYR:HB3	1:E:117:ILE:HD13	1.91	0.52
1:F:424:GLN:N	1:A:61:LEU:O	2.33	0.52
1:B:158:LEU:HD23	1:B:249:TYR:HB2	1.90	0.52
1:C:79:ASP:OD1	1:C:327:ASN:ND2	2.40	0.52
1:D:460:ASP:CA	1:D:466:ARG:CG	2.87	0.52
1:F:162:LYS:HB2	1:F:245:SER:HA	1.92	0.52
1:F:73:PHE:CZ	1:A:419:ARG:NH2	2.78	0.52
1:C:478:PRO:HB2	1:D:26:GLU:OE2	1.89	0.52
1:A:344:LEU:HD21	1:A:365:ARG:HG3	1.92	0.52
1:D:339:SER:HA	1:D:366:HIS:HE2	1.75	0.51
1:A:263:ARG:NH1	1:A:290:ASN:HB3	2.25	0.51
1:B:433:PRO:CD	1:B:434:PRO:HD3	2.39	0.51
1:F:43:LEU:HD11	1:A:416:ASP:HB3	1.91	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:478:PRO:HB3	1:B:26:GLU:HG2	1.92	0.51
1:D:325:TRP:CE3	1:D:402:TRP:HH2	2.28	0.51
1:F:416:ASP:HA	1:A:41:ARG:C	2.31	0.51
1:E:88:THR:HA	1:E:90:PHE:HE1	1.74	0.51
1:F:96:GLN:CG	1:F:382:THR:HG22	2.39	0.51
1:A:114:GLY:HA3	1:A:340:THR:CG2	2.40	0.51
1:B:142:ASP:OD2	1:C:283:THR:OG1	2.22	0.51
1:C:37:ALA:HB1	1:C:451:LEU:HD13	1.93	0.51
1:A:85:PHE:C	1:A:87:ASP:N	2.68	0.51
1:F:345:CYS:SG	1:B:216:ASN:HB2	2.51	0.51
1:B:305:GLN:NE2	1:B:338:ARG:HH12	2.09	0.51
1:B:365:ARG:NH2	1:C:269:GLU:OE2	2.44	0.51
1:A:152:LYS:CD	1:A:255:MET:HB2	2.39	0.51
1:F:260:LEU:HD23	1:E:117:ILE:HG13	1.93	0.50
1:C:164:PRO:HG2	1:C:195:ILE:HB	1.94	0.50
1:B:115:VAL:HB	1:C:257:VAL:HG23	1.93	0.50
1:F:479:LYS:HZ1	1:B:20:LYS:CE	2.25	0.50
1:C:70:TYR:OH	1:C:230:LYS:O	2.22	0.50
1:C:240:GLU:OE2	1:C:245:SER:OG	2.27	0.50
1:D:345:CYS:SG	1:E:216:ASN:N	2.85	0.50
1:D:460:ASP:CA	1:D:466:ARG:HG2	2.40	0.50
1:B:300:VAL:HB	1:B:337:THR:HG23	1.94	0.50
1:D:373:GLN:HE22	1:D:463:PRO:HG2	1.77	0.49
1:D:164:PRO:HG3	1:D:332:THR:OG1	2.11	0.49
1:E:29:ALA:HB3	1:E:380:LYS:HG3	1.94	0.49
1:E:126:LEU:HB3	1:E:262:ASN:HB3	1.92	0.49
1:A:176:THR:O	1:A:177:ASN:ND2	2.44	0.49
1:D:151:TYR:CD1	1:D:203:THR:HB	2.48	0.49
1:B:344:LEU:HD21	1:C:188:LEU:HD21	1.95	0.49
1:E:85:PHE:CD2	1:E:90:PHE:HZ	2.31	0.49
1:A:87:ASP:CB	1:A:90:PHE:CD2	2.84	0.49
1:F:164:PRO:HG2	1:F:195:ILE:HB	1.95	0.49
1:C:151:TYR:CG	1:C:203:THR:HB	2.48	0.49
1:D:302:SER:HB2	1:E:253:GLU:H	1.78	0.49
1:B:289:SER:O	1:B:289:SER:OG	2.25	0.49
1:C:365:ARG:NH2	1:D:269:GLU:OE2	2.45	0.49
1:C:130:GLU:HG3	1:C:260:LEU:HD13	1.94	0.49
1:A:85:PHE:CE1	1:A:378:LEU:HD22	2.48	0.49
1:A:307:PHE:CE2	1:A:335:ASP:HB3	2.48	0.49
1:F:96:GLN:NE2	1:F:382:THR:CG2	2.76	0.49
1:B:409:PRO:CD	1:B:410:PRO:HD3	2.41	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:480:PHE:CZ	1:D:27:TYR:CB	2.96	0.49
1:C:480:PHE:CZ	1:D:27:TYR:CG	3.00	0.49
1:D:439:ASP:HB3	1:D:442:LYS:HG2	1.95	0.49
1:A:96:GLN:HG2	1:A:382:THR:HG22	1.94	0.49
1:B:223:ASP:OD1	1:B:224:ILE:HG23	2.12	0.48
1:D:42:LEU:HB2	1:D:370:TYR:HB2	1.94	0.48
1:F:384:THR:O	1:F:388:MET:HB2	2.13	0.48
1:F:432:THR:OG1	1:F:433:PRO:CD	2.51	0.48
1:E:418:TYR:HD2	1:E:426:ILE:HD12	1.73	0.48
1:E:468:PHE:O	1:E:471:GLN:HG3	2.14	0.48
1:E:78:PRO:HD3	1:E:452:LYS:HA	1.95	0.48
1:E:157:CYS:O	1:E:249:TYR:HA	2.14	0.48
1:A:85:PHE:HD2	1:A:90:PHE:CE2	2.31	0.48
1:B:43:LEU:HD21	1:C:190:LEU:HD22	1.96	0.48
1:A:28:VAL:HG22	1:A:381:ILE:HG12	1.96	0.48
1:F:125:LYS:HD3	1:F:147:ILE:HD11	1.95	0.48
1:A:37:ALA:HB1	1:A:451:LEU:HD13	1.96	0.48
1:C:158:LEU:HD13	1:C:237:MET:HE1	1.95	0.48
1:F:68:LEU:HD22	1:F:203:THR:HG22	1.95	0.48
1:F:117:ILE:HD11	1:B:291:TYR:HB3	1.96	0.48
1:E:151:TYR:CD1	1:E:203:THR:HB	2.48	0.48
1:C:162:LYS:HG2	1:C:244:ASP:HB3	1.95	0.47
1:D:162:LYS:HB2	1:D:245:SER:HA	1.97	0.47
1:A:385:ALA:O	1:A:389:THR:HG23	2.14	0.47
1:C:298:SER:OG	1:C:299:MET:N	2.47	0.47
1:C:96:GLN:HG2	1:C:382:THR:HA	1.97	0.47
1:C:196:GLN:HE21	1:C:444:TYR:HA	1.79	0.47
1:E:420:PHE:C	1:E:422:THR:N	2.73	0.47
1:C:480:PHE:CE2	1:D:27:TYR:HB3	2.50	0.47
1:C:480:PHE:CE1	1:D:27:TYR:HB3	2.50	0.47
1:A:307:PHE:HE2	1:A:335:ASP:HB3	1.79	0.47
1:F:61:LEU:C	1:A:424:GLN:HG2	2.40	0.47
1:F:151:TYR:O	1:F:297:GLY:N	2.46	0.47
1:B:417:THR:O	1:B:417:THR:OG1	2.31	0.47
1:F:97:ARG:NH2	1:F:403:ASN:HB2	2.30	0.47
1:F:119:GLY:HA3	1:F:148:SER:HA	1.95	0.47
1:F:425:ALA:HB1	1:A:62:VAL:CG1	2.19	0.47
1:B:250:LEU:HD13	1:B:306:ILE:HD12	1.96	0.47
1:D:111:GLN:HE22	1:E:169:TRP:HE1	1.62	0.47
1:F:125:LYS:NZ	1:B:132:ALA:O	2.48	0.47
1:F:416:ASP:C	1:A:41:ARG:O	2.57	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:220:VAL:HG23	1:C:225:CYS:HA	1.97	0.47
1:F:85:PHE:CD2	1:F:90:PHE:CE2	3.03	0.47
1:C:397:THR:HA	1:C:400:GLU:HB2	1.97	0.46
1:C:466:ARG:HH21	1:D:318:GLY:HA2	1.80	0.46
1:B:382:THR:O	1:B:382:THR:CG2	2.63	0.46
1:D:325:TRP:HZ3	1:D:402:TRP:CH2	2.28	0.46
1:A:122:LEU:HD13	1:A:144:ARG:NH2	2.30	0.46
1:F:121:PRO:HD3	1:F:222:LEU:HD11	1.96	0.46
1:A:152:LYS:CD	1:A:255:MET:CB	2.93	0.46
1:E:91:TYR:CE2	1:E:93:PRO:HA	2.50	0.46
1:A:82:LYS:HB2	1:A:82:LYS:HE2	1.69	0.46
1:A:164:PRO:HG2	1:A:195:ILE:HB	1.97	0.46
1:B:54:LYS:CE	1:B:61:LEU:HD21	2.36	0.46
1:C:57:ASN:C	1:C:58:ASN:HD22	2.24	0.46
1:A:426:ILE:O	1:A:428:CYS:N	2.41	0.46
1:B:109:ARG:HH21	1:B:335:ASP:HB3	1.81	0.46
1:B:123:LEU:HD22	1:B:147:ILE:HB	1.98	0.46
1:E:37:ALA:HB1	1:E:451:LEU:HD13	1.96	0.46
1:F:42:LEU:HB2	1:F:370:TYR:HB2	1.98	0.46
1:B:93:PRO:O	1:B:97:ARG:NH1	2.40	0.46
1:C:211:THR:OG1	1:C:226:THR:O	2.33	0.46
1:D:398:ILE:HG23	1:D:402:TRP:CE2	2.49	0.46
1:A:158:LEU:HB2	1:A:332:THR:HB	1.97	0.46
1:A:459:LEU:O	1:A:465:GLY:HA3	2.16	0.46
1:E:418:TYR:CG	1:E:429:GLN:OE1	2.69	0.46
1:F:88:THR:C	1:F:90:PHE:H	2.23	0.46
1:C:125:LYS:NZ	1:D:132:ALA:O	2.49	0.45
1:D:365:ARG:NH1	1:E:185:CYS:SG	2.89	0.45
1:E:68:LEU:HD22	1:E:203:THR:HG22	1.98	0.45
1:E:383:LEU:HD13	1:E:404:PHE:CE2	2.51	0.45
1:F:362:GLU:OE2	1:B:124:ASN:ND2	2.50	0.45
1:A:158:LEU:HD21	1:A:237:MET:HE1	1.98	0.45
1:F:87:ASP:O	1:F:90:PHE:CE2	2.70	0.45
1:F:214:GLN:NE2	1:E:343:SER:O	2.49	0.45
1:D:115:VAL:HB	1:E:257:VAL:HG23	1.99	0.45
1:D:289:SER:O	1:D:289:SER:OG	2.22	0.45
1:B:343:SER:O	1:C:214:GLN:NE2	2.41	0.45
1:C:342:MET:HE2	1:C:342:MET:HB3	1.69	0.45
1:A:384:THR:O	1:A:388:MET:HB2	2.16	0.45
1:C:125:LYS:HD2	1:C:147:ILE:CD1	2.47	0.45
1:F:54:LYS:HB2	1:F:54:LYS:HE2	1.62	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:460:ASP:HB3	1:A:469:LEU:HD12	1.98	0.45
1:C:125:LYS:HD2	1:C:147:ILE:HD11	1.98	0.45
1:C:480:PHE:CD1	1:D:27:TYR:CD1	3.02	0.45
1:D:342:MET:HE2	1:D:342:MET:HB3	1.71	0.45
1:E:305:GLN:NE2	1:E:338:ARG:HH12	2.15	0.45
1:C:345:CYS:SG	1:D:216:ASN:HB2	2.57	0.45
1:D:209:ASP:O	1:D:213:LEU:HB2	2.17	0.45
1:E:96:GLN:HG2	1:E:382:THR:HA	1.99	0.45
1:A:123:LEU:HD22	1:A:147:ILE:HB	1.97	0.45
1:C:91:TYR:O	1:C:91:TYR:CG	2.70	0.44
1:D:37:ALA:HB1	1:D:451:LEU:HD13	1.99	0.44
1:D:71:ARG:HA	1:D:71:ARG:HD3	1.71	0.44
1:C:115:VAL:HB	1:D:257:VAL:HG23	1.99	0.44
1:E:249:TYR:O	1:E:250:LEU:HD23	2.17	0.44
1:A:151:TYR:CD1	1:A:203:THR:HB	2.52	0.44
1:D:117:ILE:HD13	1:E:293:PRO:HB3	1.99	0.44
1:F:257:VAL:HG23	1:E:115:VAL:HB	1.99	0.44
1:C:110:GLY:HA3	1:C:369:GLU:CD	2.42	0.44
1:F:54:LYS:HG3	1:F:55:PRO:HD2	2.00	0.44
1:F:125:LYS:HD3	1:F:147:ILE:CD1	2.47	0.44
1:F:151:TYR:OH	1:F:223:ASP:HB2	2.18	0.44
1:C:126:LEU:HD11	1:C:139:ALA:HB2	2.00	0.44
1:D:74:ARG:HE	1:D:328:GLN:HE21	1.65	0.44
1:E:432:THR:HA	1:E:433:PRO:HD3	1.87	0.44
1:A:421:VAL:HG13	1:A:421:VAL:O	2.18	0.44
1:B:72:VAL:HG22	1:B:332:THR:HG23	1.98	0.44
1:D:162:LYS:HG2	1:D:244:ASP:HB3	1.99	0.44
1:A:342:MET:HB3	1:A:342:MET:HE2	1.72	0.44
1:F:447:TRP:HH2	1:A:419:ARG:HB2	1.06	0.44
1:B:28:VAL:HG22	1:B:381:ILE:HG12	1.99	0.44
1:B:325:TRP:HZ3	1:B:402:TRP:HH2	1.66	0.44
1:D:149:MET:HE2	1:D:149:MET:HB3	1.91	0.44
1:D:158:LEU:HD13	1:D:237:MET:HE1	1.99	0.44
1:A:89:SER:O	1:A:89:SER:OG	2.29	0.44
1:F:70:TYR:OH	1:F:230:LYS:O	2.24	0.44
1:D:42:LEU:HB3	1:D:447:TRP:CZ2	2.53	0.44
1:D:363:TYR:OH	1:E:183:GLY:O	2.31	0.44
1:F:96:GLN:CD	1:F:382:THR:HG22	2.42	0.43
1:B:426:ILE:HG13	1:B:427:ALA:O	2.19	0.43
1:C:71:ARG:NH1	1:C:197:ASP:OD1	2.51	0.43
1:D:272:PRO:HD2	1:D:275:LEU:HD12	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:353:THR:O	1:D:353:THR:OG1	2.34	0.43
1:A:342:MET:HG3	1:A:365:ARG:HB2	2.00	0.43
1:B:31:THR:OG1	1:B:378:LEU:O	2.24	0.43
1:A:126:LEU:HB3	1:A:262:ASN:HB3	2.00	0.43
1:B:71:ARG:HA	1:B:71:ARG:HD3	1.74	0.43
1:C:466:ARG:HD3	1:D:319:HIS:NE2	2.34	0.43
1:E:157:CYS:HA	1:E:332:THR:O	2.18	0.43
1:E:272:PRO:HD2	1:E:275:LEU:HD12	2.00	0.43
1:F:163:PRO:HG3	1:F:441:LEU:HD22	1.99	0.43
1:B:151:TYR:CD1	1:B:203:THR:HB	2.54	0.43
1:B:301:THR:HG22	1:B:303:ASP:H	1.83	0.43
1:C:442:LYS:HE3	1:C:442:LYS:HB3	1.58	0.43
1:D:364:LEU:HD23	1:D:364:LEU:HA	1.91	0.43
1:F:91:TYR:O	1:F:91:TYR:CG	2.70	0.43
1:C:30:ARG:HD3	1:C:379:CYS:SG	2.59	0.43
1:F:74:ARG:HH21	1:F:328:GLN:NE2	2.16	0.43
1:B:325:TRP:HZ3	1:B:402:TRP:CH2	2.36	0.43
1:C:112:PRO:HB3	1:D:231:TYR:CD1	2.54	0.43
1:F:89:SER:OG	1:A:87:ASP:OD2	2.32	0.43
1:F:272:PRO:HD2	1:F:275:LEU:HD12	2.00	0.43
1:F:342:MET:HE2	1:F:342:MET:HB3	1.75	0.43
1:D:157:CYS:HA	1:D:332:THR:O	2.19	0.43
1:D:324:CYS:SG	1:D:329:LEU:HD13	2.59	0.43
1:E:87:ASP:O	1:E:90:PHE:CD1	2.70	0.43
1:E:160:GLY:HA2	1:E:247:PHE:CE2	2.54	0.43
1:E:392:HIS:HB2	1:E:399:LEU:HD12	2.00	0.43
1:B:305:GLN:HE22	1:B:338:ARG:HH12	1.67	0.43
1:B:422:THR:O	1:B:422:THR:OG1	2.31	0.43
1:B:273:ASP:N	1:B:273:ASP:OD1	2.52	0.43
1:E:34:TYR:HB2	1:E:459:LEU:HD11	2.01	0.43
1:A:153:GLN:OE1	1:A:254:GLN:NE2	2.50	0.43
1:A:427:ALA:O	1:A:428:CYS:HB2	2.18	0.43
1:F:115:VAL:HB	1:B:257:VAL:HG23	2.01	0.42
1:C:276:TYR:CZ	1:C:286:LEU:HD11	2.53	0.42
1:F:85:PHE:CD2	1:F:90:PHE:HE2	2.37	0.42
1:F:88:THR:HA	1:F:90:PHE:CE2	2.54	0.42
1:F:121:PRO:HB2	1:B:286:LEU:HD22	2.01	0.42
1:F:258:ARG:HB2	1:F:296:SER:HB2	1.99	0.42
1:F:415:GLU:C	1:A:40:SER:HB2	2.41	0.42
1:B:432:THR:N	1:B:433:PRO:HD3	2.33	0.42
1:C:151:TYR:OH	1:C:221:PRO:HB2	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:255:MET:HE3	1:C:295:PRO:HB3	2.01	0.42
1:A:96:GLN:CD	1:A:382:THR:HG22	2.43	0.42
1:F:73:PHE:CE2	1:A:419:ARG:NH2	2.72	0.42
1:D:41:ARG:NH1	1:D:369:GLU:OE2	2.46	0.42
1:D:53:LYS:HE2	1:D:53:LYS:HB3	1.81	0.42
1:D:112:PRO:HB3	1:E:231:TYR:CD1	2.54	0.42
1:A:356:LYS:HE2	1:A:356:LYS:HB2	1.83	0.42
1:B:42:LEU:HB3	1:B:447:TRP:CZ2	2.55	0.42
1:E:87:ASP:O	1:E:90:PHE:HD1	2.01	0.42
1:F:252:ARG:NE	1:F:306:ILE:HD11	2.35	0.42
1:B:316:ALA:HB3	1:B:321:ASN:HA	2.01	0.42
1:B:375:ILE:HD11	1:B:465:GLY:HA2	2.00	0.42
1:B:159:ILE:HD12	1:B:248:PHE:CD2	2.55	0.42
1:B:324:CYS:HB3	1:B:328:GLN:O	2.20	0.42
1:C:402:TRP:C	1:C:404:PHE:H	2.27	0.42
1:A:67:GLY:HA3	1:A:339:SER:HB3	2.01	0.42
1:F:348:ILE:HG22	1:B:183:GLY:HA3	2.01	0.42
1:B:162:LYS:HG2	1:B:244:ASP:HB3	2.01	0.42
1:B:272:PRO:HD2	1:B:275:LEU:HD12	2.02	0.42
1:C:88:THR:C	1:C:90:PHE:N	2.78	0.42
1:D:117:ILE:HD11	1:E:257:VAL:HG11	2.02	0.42
1:B:75:ILE:HD13	1:B:449:VAL:HB	2.01	0.42
1:F:112:PRO:HB3	1:B:231:TYR:CD1	2.55	0.42
1:C:109:ARG:HH21	1:C:335:ASP:HB3	1.84	0.42
1:C:149:MET:HE3	1:C:221:PRO:HG3	2.02	0.42
1:D:148:SER:OG	1:E:129:THR:OG1	2.24	0.42
1:E:152:LYS:NZ	1:E:253:GLU:OE1	2.38	0.42
1:E:384:THR:O	1:E:388:MET:HB2	2.20	0.42
1:E:414:LEU:HD23	1:E:414:LEU:HA	1.83	0.42
1:F:61:LEU:HB3	1:A:424:GLN:CD	2.45	0.41
1:F:415:GLU:N	1:A:40:SER:HB2	2.35	0.41
1:B:241:PRO:CG	1:A:410:PRO:HA	2.47	0.41
1:B:407:GLN:O	1:B:409:PRO:HD3	2.20	0.41
1:C:469:LEU:O	1:C:473:GLY:N	2.53	0.41
1:F:111:GLN:NE2	1:B:169:TRP:HE1	2.19	0.41
1:B:258:ARG:NH2	1:C:257:VAL:O	2.53	0.41
1:C:91:TYR:CD1	1:C:91:TYR:C	2.98	0.41
1:E:342:MET:HE2	1:E:342:MET:HB3	1.66	0.41
1:A:171:LYS:HG3	1:A:186:PRO:HB2	2.02	0.41
1:F:422:THR:HA	1:F:430:LYS:NZ	2.35	0.41
1:F:447:TRP:CZ2	1:A:419:ARG:N	2.69	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:54:LYS:HE2	1:B:61:LEU:CG	2.51	0.41
1:C:41:ARG:HH22	1:D:233:ASP:CG	2.29	0.41
1:C:443:LYS:H	1:C:443:LYS:HG2	1.62	0.41
1:F:224:ILE:HG21	1:F:229:CYS:SG	2.60	0.41
1:F:388:MET:HG2	1:F:399:LEU:HD11	2.02	0.41
1:B:208:MET:HB2	1:B:213:LEU:HD12	2.01	0.41
1:F:67:GLY:HA3	1:F:339:SER:HB3	2.02	0.41
1:C:87:ASP:OD1	1:C:87:ASP:N	2.52	0.41
1:C:364:LEU:HD23	1:C:364:LEU:HA	1.82	0.41
1:C:459:LEU:O	1:C:465:GLY:HA3	2.20	0.41
1:E:164:PRO:HG2	1:E:195:ILE:HB	2.01	0.41
1:E:463:PRO:HA	1:E:466:ARG:NH1	2.36	0.41
1:A:90:PHE:CE1	1:A:91:TYR:HD2	2.38	0.41
1:A:106:GLU:OE2	1:A:467:LYS:NZ	2.53	0.41
1:F:49:TYR:HD1	1:F:223:ASP:OD1	2.02	0.41
1:C:169:TRP:O	1:C:213:LEU:HD11	2.21	0.41
1:E:246:LEU:HD12	1:E:317:GLN:HG2	2.02	0.41
1:A:402:TRP:O	1:A:402:TRP:CD1	2.73	0.41
1:F:91:TYR:HB2	1:F:96:GLN:OE1	2.21	0.41
1:F:408:PRO:HB2	1:F:409:PRO:CD	2.48	0.41
1:F:426:ILE:HB	1:F:427:ALA:H	1.75	0.41
1:E:151:TYR:CG	1:E:203:THR:HB	2.56	0.41
1:B:249:TYR:HE1	1:B:251:ARG:HH11	1.69	0.41
1:C:466:ARG:NH2	1:D:318:GLY:HA2	2.36	0.41
1:D:96:GLN:CD	1:D:382:THR:HG22	2.42	0.41
1:D:305:GLN:NE2	1:D:338:ARG:HH12	2.18	0.41
1:D:418:TYR:CD1	1:D:429:GLN:HG2	2.56	0.41
1:A:56:ASN:OD1	1:A:56:ASN:N	2.44	0.41
1:A:85:PHE:CD2	1:A:90:PHE:CE2	3.07	0.41
1:A:354:THR:OG1	1:A:355:TYR:N	2.54	0.41
1:F:435:ALA:C	1:F:437:LYS:H	2.28	0.41
1:D:365:ARG:HA	1:D:365:ARG:HD3	1.88	0.41
1:D:374:PHE:HB2	1:D:376:PHE:CE2	2.56	0.41
1:C:155:GLN:O	1:C:251:ARG:HA	2.21	0.40
1:D:30:ARG:HB3	1:D:377:GLN:NE2	2.36	0.40
1:D:466:ARG:HD3	1:E:319:HIS:NE2	2.36	0.40
1:E:67:GLY:HA3	1:E:339:SER:HB3	2.02	0.40
1:E:214:GLN:OE1	1:E:219:GLU:HB2	2.21	0.40
1:F:480:PHE:HD1	1:F:480:PHE:HA	1.80	0.40
1:B:399:LEU:HD23	1:B:399:LEU:HA	1.87	0.40
1:C:122:LEU:HD13	1:C:144:ARG:NH2	2.36	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:409:PRO:HA	1:A:410:PRO:HD3	1.97	0.40
1:F:171:LYS:HE2	1:F:212:THR:HB	2.03	0.40
1:D:30:ARG:HD3	1:D:379:CYS:SG	2.61	0.40
1:F:254:GLN:HB3	1:E:301:THR:HG22	2.04	0.40
1:C:342:MET:H	1:C:342:MET:HG2	1.72	0.40
1:D:259:HIS:CE1	1:E:130:GLU:HG2	2.57	0.40
1:E:399:LEU:HD23	1:E:399:LEU:HA	1.97	0.40
1:C:16:VAL:O	1:C:18:VAL:HG13	2.21	0.40
1:D:217:LYS:HE3	1:D:217:LYS:HB2	1.91	0.40
1:D:477:LYS:CD	1:D:479:LYS:HB2	2.46	0.40
1:E:71:ARG:HH21	1:E:368:GLU:HG3	1.86	0.40
1:E:373:GLN:HE22	1:E:463:PRO:HG2	1.86	0.40
1:E:482:LEU:HD22	1:E:482:LEU:H	1.87	0.40
1:A:85:PHE:CB	1:A:86:PRO:HD2	2.45	0.40
1:A:171:LYS:HD3	1:A:212:THR:HG22	2.03	0.40
1:A:395:ASN:HB3	1:A:398:ILE:HD12	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	472/503 (94%)	432 (92%)	38 (8%)	2 (0%)	30	61
1	B	464/503 (92%)	424 (91%)	37 (8%)	3 (1%)	21	52
1	C	478/503 (95%)	439 (92%)	36 (8%)	3 (1%)	21	52
1	D	478/503 (95%)	446 (93%)	31 (6%)	1 (0%)	43	73
1	E	479/503 (95%)	447 (93%)	31 (6%)	1 (0%)	43	73
1	F	481/503 (96%)	441 (92%)	37 (8%)	3 (1%)	21	52
All	All	2852/3018 (94%)	2629 (92%)	210 (7%)	13 (0%)	26	57

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	481	THR
1	C	418	TYR
1	D	403	ASN
1	A	427	ALA
1	F	403	ASN
1	B	431	HIS
1	B	403	ASN
1	C	476	ALA
1	A	86	PRO
1	F	408	PRO
1	B	17	PRO
1	C	477	LYS
1	E	421	VAL

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	412/438 (94%)	397 (96%)	15 (4%)	31	62
1	B	405/438 (92%)	394 (97%)	11 (3%)	39	67
1	C	418/438 (95%)	393 (94%)	25 (6%)	17	47
1	D	418/438 (95%)	390 (93%)	28 (7%)	15	43
1	E	418/438 (95%)	394 (94%)	24 (6%)	18	49
1	F	420/438 (96%)	396 (94%)	24 (6%)	18	49
All	All	2491/2628 (95%)	2364 (95%)	127 (5%)	23	52

All (127) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	1	MET
1	F	16	VAL
1	F	40	SER
1	F	54	LYS

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Mol	Chain	Res	Type
1	F	115	VAL
1	F	180	VAL
1	F	181	ASN
1	F	184	ASP
1	F	193	THR
1	F	219	GLU
1	F	294	THR
1	F	301	THR
1	F	314	GLN
1	F	344	LEU
1	F	345	CYS
1	F	365	ARG
1	F	386	ASP
1	F	396	SER
1	F	414	LEU
1	F	423	SER
1	F	426	ILE
1	F	429	GLN
1	F	439	ASP
1	F	474	LEU
1	B	19	SER
1	B	45	VAL
1	B	88	THR
1	B	115	VAL
1	B	156	LEU
1	B	158	LEU
1	B	175	CYS
1	B	193	THR
1	B	212	THR
1	B	298	SER
1	B	306	ILE
1	C	1	MET
1	C	5	LEU
1	C	11	VAL
1	C	129	THR
1	C	147	ILE
1	C	175	CYS
1	C	180	VAL
1	C	219	GLU
1	C	238	VAL
1	C	262	ASN
1	C	273	ASP

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Mol	Chain	Res	Type
1	C	282	SER
1	C	294	THR
1	C	302	SER
1	C	303	ASP
1	C	306	ILE
1	C	342	MET
1	C	350	THR
1	C	393	SER
1	C	399	LEU
1	C	423	SER
1	C	431	HIS
1	C	432	THR
1	C	453	GLU
1	C	458	ASP
1	D	7	SER
1	D	113	LEU
1	D	133	SER
1	D	141	VAL
1	D	176	THR
1	D	180	VAL
1	D	201	VAL
1	D	213	LEU
1	D	223	ASP
1	D	239	SER
1	D	245	SER
1	D	267	VAL
1	D	270	ASN
1	D	290	ASN
1	D	302	SER
1	D	336	THR
1	D	340	THR
1	D	343	SER
1	D	345	CYS
1	D	351	SER
1	D	354	THR
1	D	406	LEU
1	D	407	GLN
1	D	413	THR
1	D	424	GLN
1	D	426	ILE
1	D	431	HIS
1	D	458	ASP

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Mol	Chain	Res	Type
1	E	5	LEU
1	E	16	VAL
1	E	19	SER
1	E	26	GLU
1	E	45	VAL
1	E	56	ASN
1	E	89	SER
1	E	117	ILE
1	E	122	LEU
1	E	158	LEU
1	E	202	ASP
1	E	213	LEU
1	E	217	LYS
1	E	245	SER
1	E	267	VAL
1	E	339	SER
1	E	342	MET
1	E	351	SER
1	E	406	LEU
1	E	414	LEU
1	E	426	ILE
1	E	442	LYS
1	E	470	LEU
1	E	481	THR
1	A	62	VAL
1	A	83	PHE
1	A	95	THR
1	A	156	LEU
1	A	175	CYS
1	A	181	ASN
1	A	191	ILE
1	A	211	THR
1	A	294	THR
1	A	313	LEU
1	A	342	MET
1	A	344	LEU
1	A	386	ASP
1	A	432	THR
1	A	471	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (78) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	58	ASN
1	F	76	HIS
1	F	111	GLN
1	F	138	ASN
1	F	192	ASN
1	F	254	GLN
1	F	259	HIS
1	F	285	ASN
1	F	305	GLN
1	F	319	HIS
1	F	328	GLN
1	F	357	ASN
1	F	373	GLN
1	F	403	ASN
1	F	450	ASN
1	F	461	GLN
1	B	58	ASN
1	B	111	GLN
1	B	120	HIS
1	B	259	HIS
1	B	285	ASN
1	B	305	GLN
1	B	319	HIS
1	B	373	GLN
1	B	377	GLN
1	B	431	HIS
1	B	461	GLN
1	C	58	ASN
1	C	76	HIS
1	C	96	GLN
1	C	111	GLN
1	C	155	GLN
1	C	168	HIS
1	C	192	ASN
1	C	196	GLN
1	C	254	GLN
1	C	259	HIS
1	C	262	ASN
1	C	270	ASN
1	C	305	GLN
1	C	328	GLN
1	C	341	ASN
1	C	373	GLN

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Mol	Chain	Res	Type
1	C	403	ASN
1	C	429	GLN
1	C	461	GLN
1	D	58	ASN
1	D	76	HIS
1	D	96	GLN
1	D	111	GLN
1	D	181	ASN
1	D	259	HIS
1	D	270	ASN
1	D	305	GLN
1	D	319	HIS
1	D	328	GLN
1	D	373	GLN
1	D	429	GLN
1	D	461	GLN
1	E	36	HIS
1	E	56	ASN
1	E	76	HIS
1	E	111	GLN
1	E	155	GLN
1	E	177	ASN
1	E	259	HIS
1	E	270	ASN
1	E	305	GLN
1	E	327	ASN
1	E	328	GLN
1	E	341	ASN
1	E	373	GLN
1	E	429	GLN
1	E	461	GLN
1	A	111	GLN
1	A	177	ASN
1	A	327	ASN
1	A	373	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

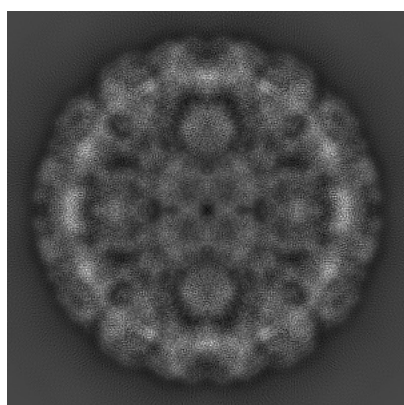
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-23081. These allow visual inspection of the internal detail of the map and identification of artifacts.

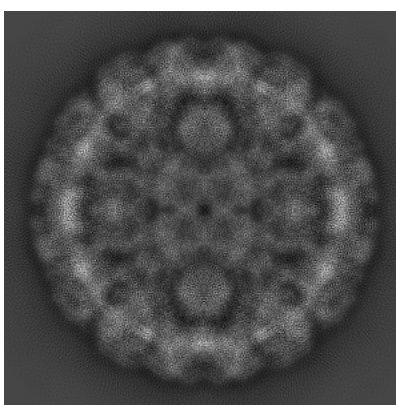
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

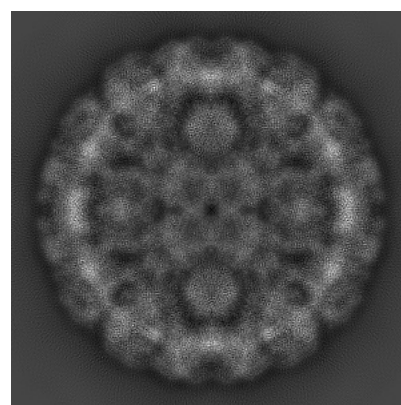
6.1.1 Primary map



X



Y

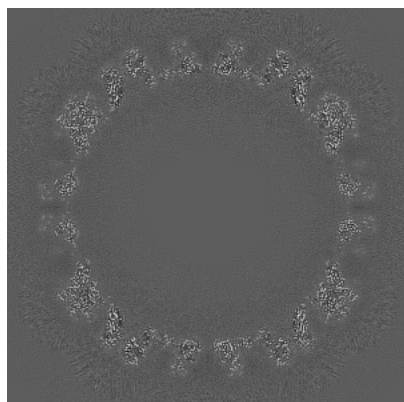


Z

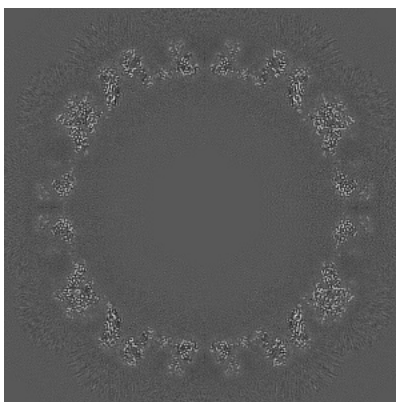
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

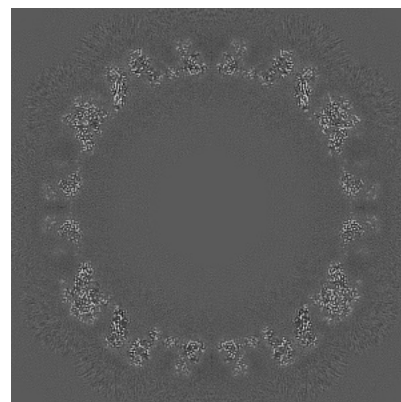
6.2.1 Primary map



X Index: 300



Y Index: 300

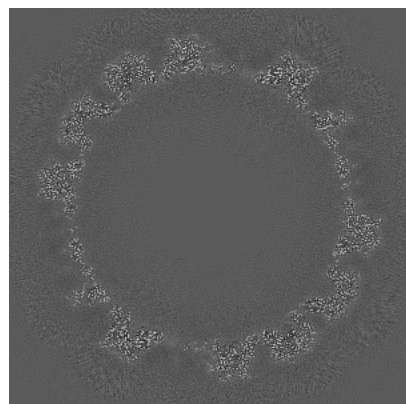


Z Index: 300

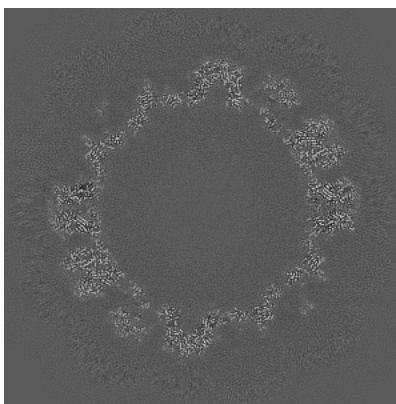
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

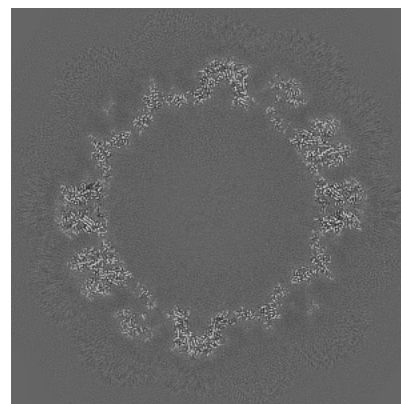
6.3.1 Primary map



X Index: 286



Y Index: 425

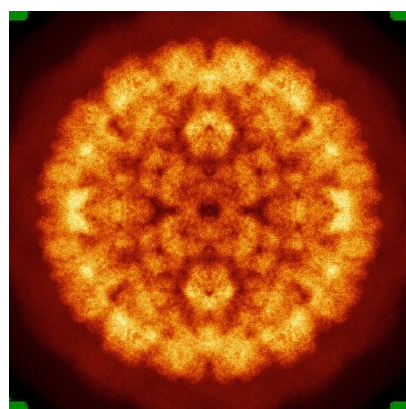


Z Index: 425

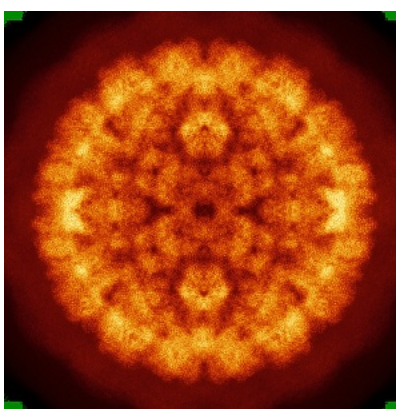
The images above show the largest variance slices of the map in three orthogonal directions.

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

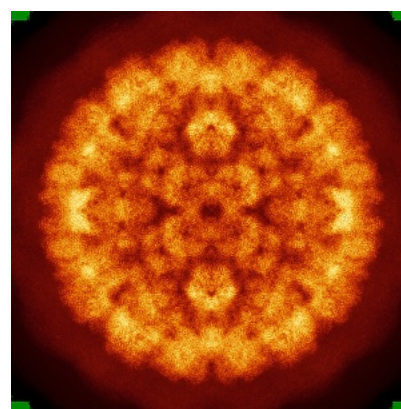
6.4.1 Primary map



X



Y

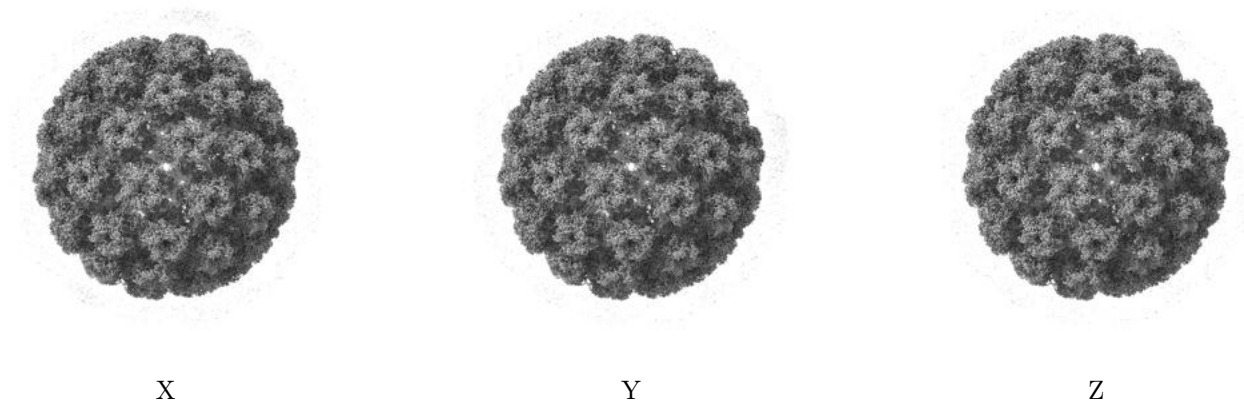


Z

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 2.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

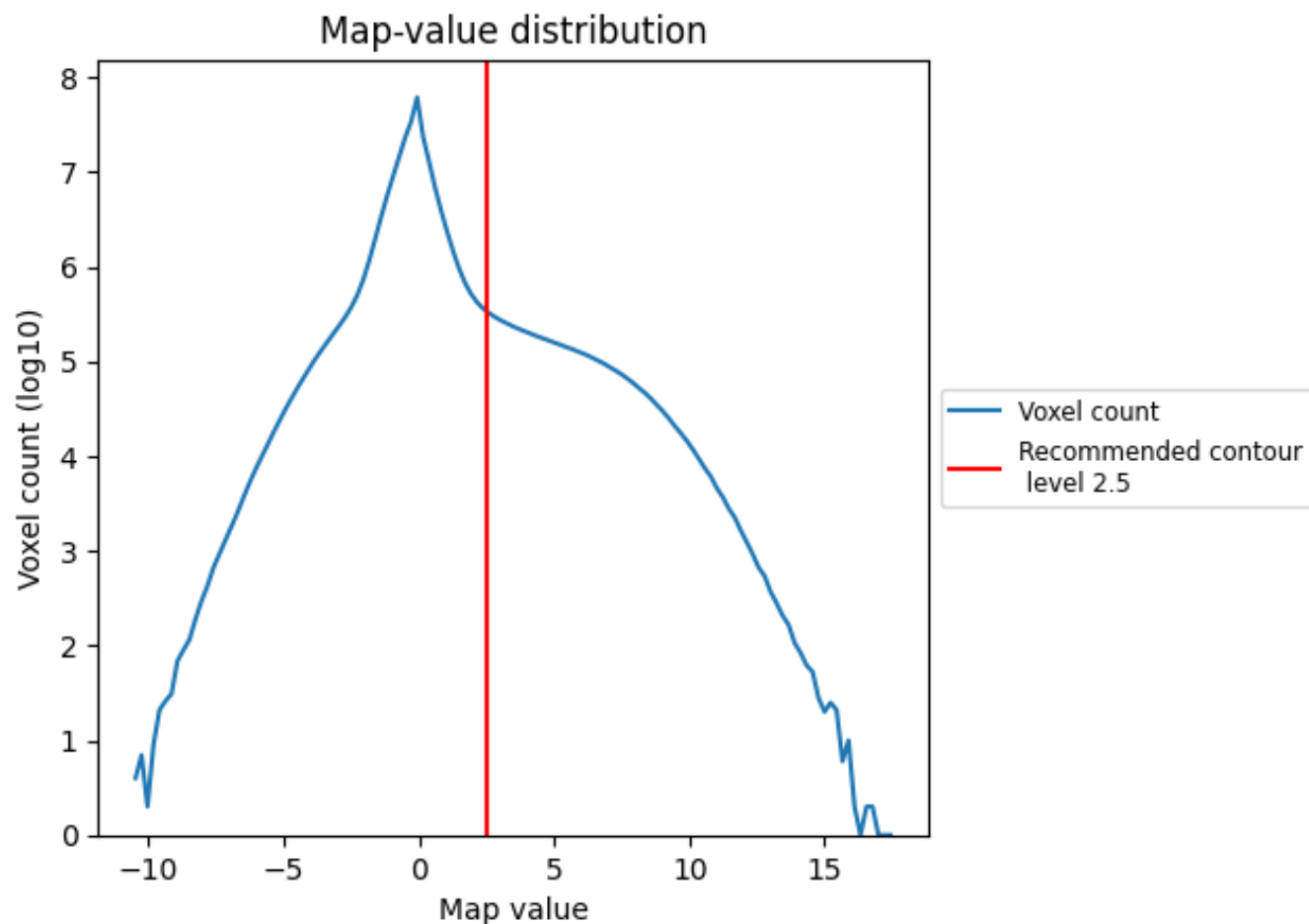
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

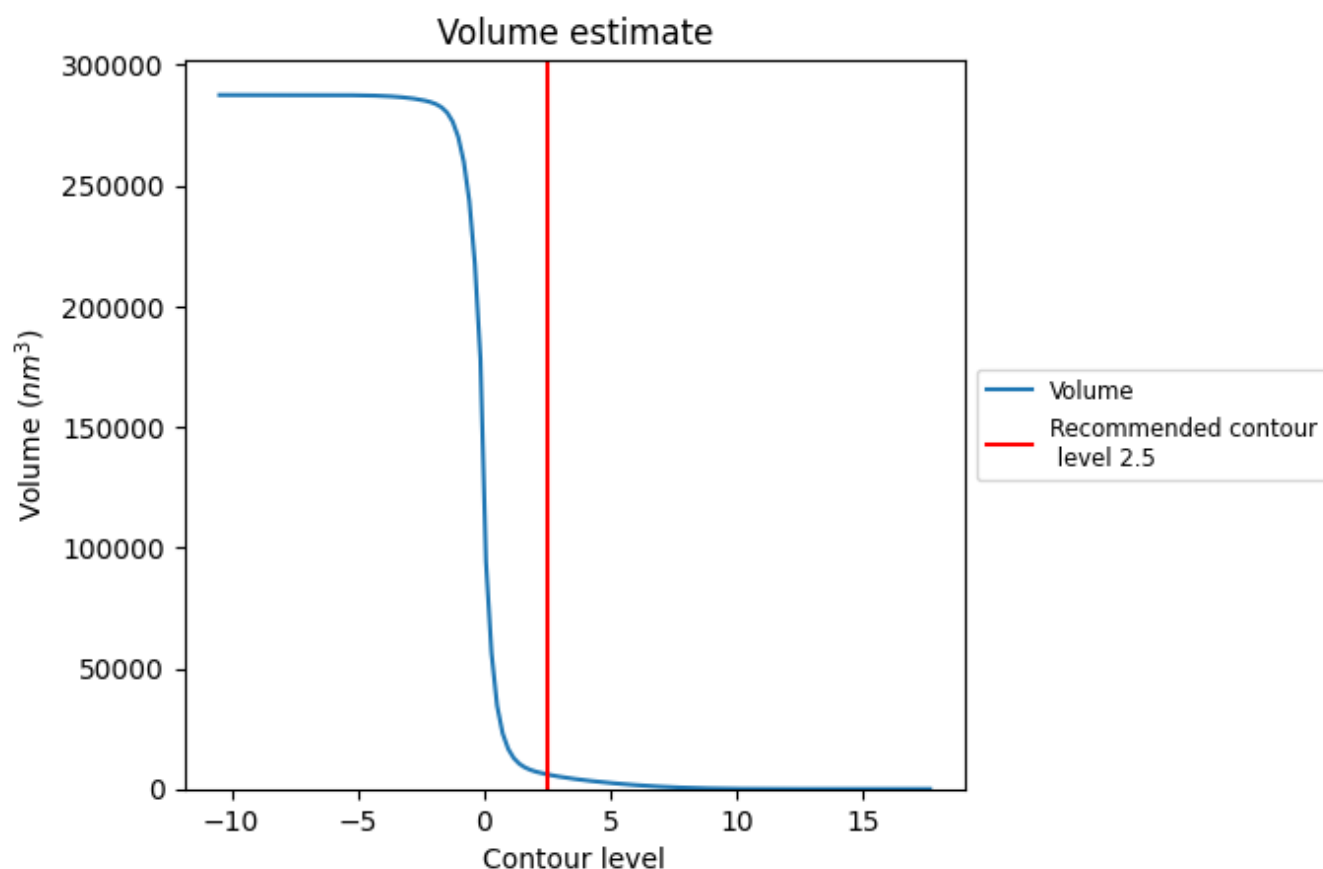
This section contains the results of statistical analysis of the map.

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.

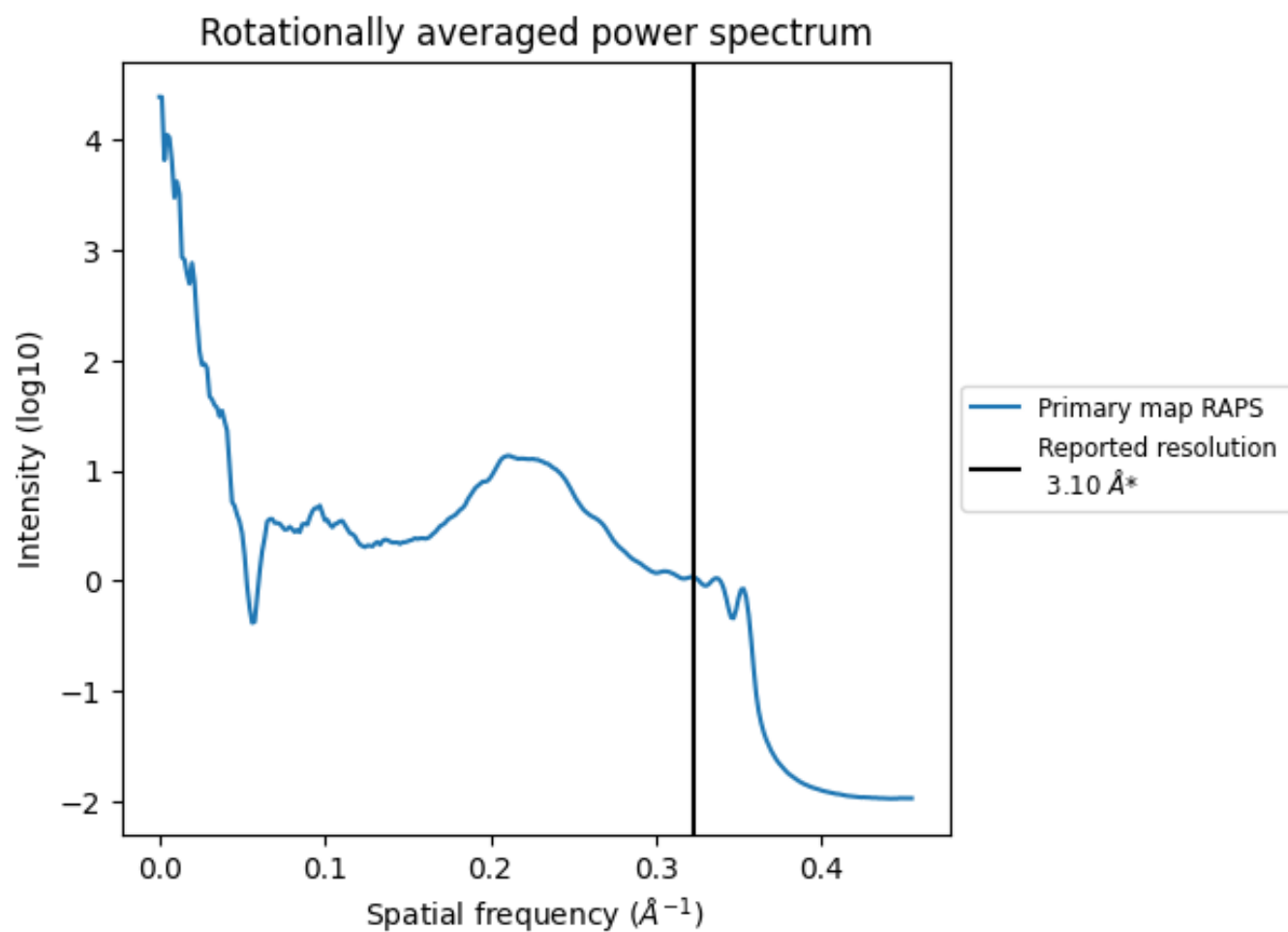
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 6022 nm³; this corresponds to an approximate mass of 5440 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 0.323 Å⁻¹

8 Fourier-Shell correlation

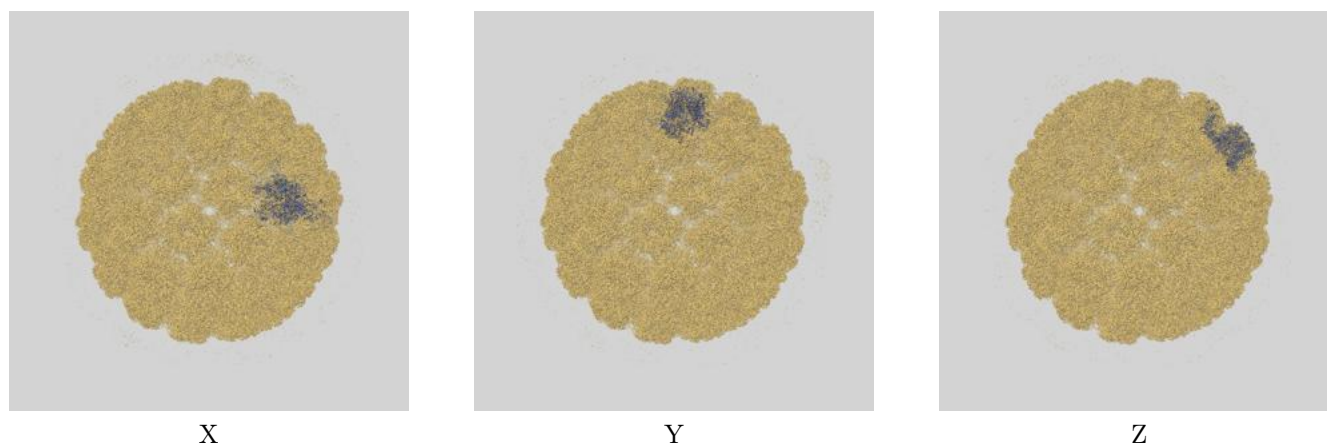
This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

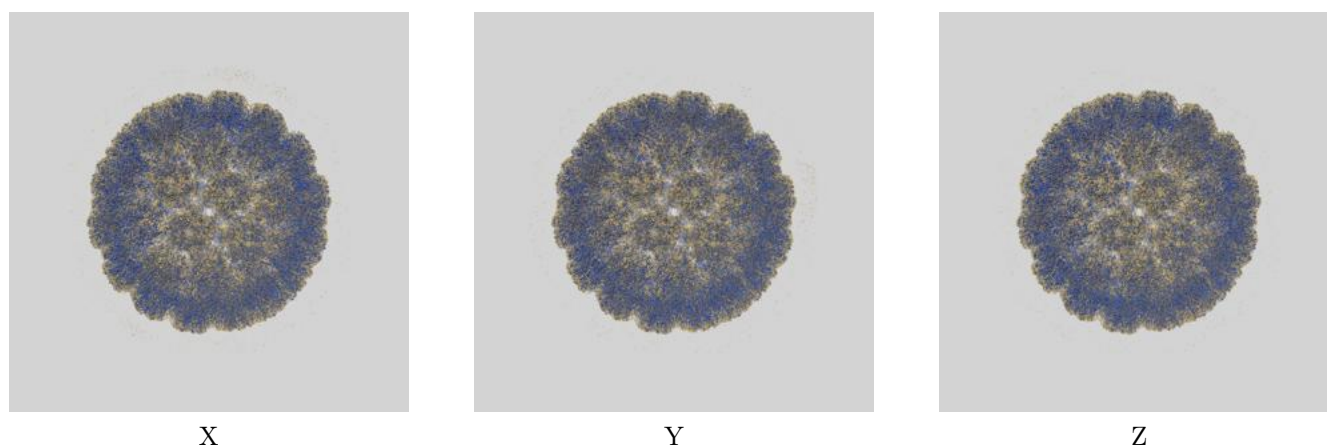
This section contains information regarding the fit between EMDB map EMD-23081 and PDB model 7KZF. Per-residue inclusion information can be found in section 3 on page 5.

9.1 Map-model overlays

9.1.1 Map-model overlay [i](#)

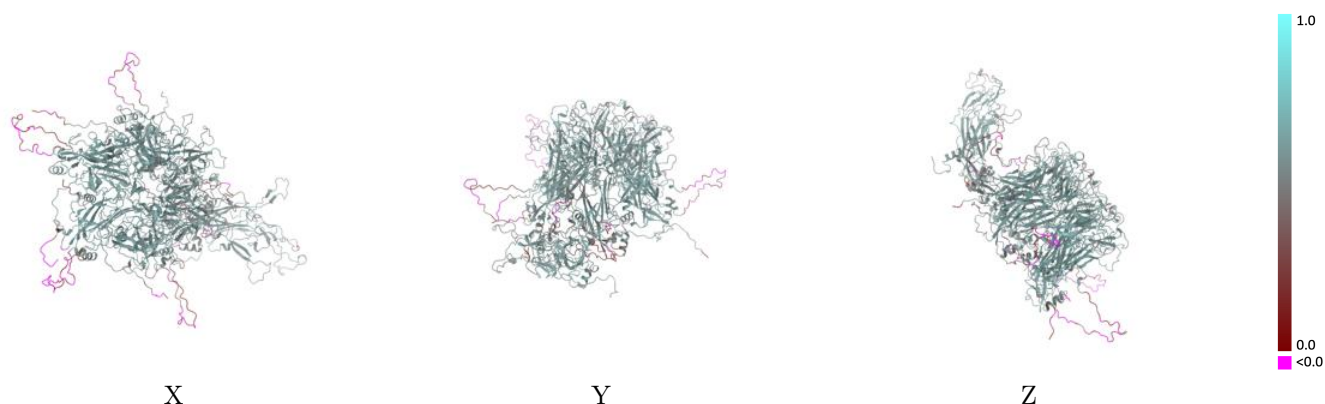


9.1.2 Map-model assembly overlay [i](#)



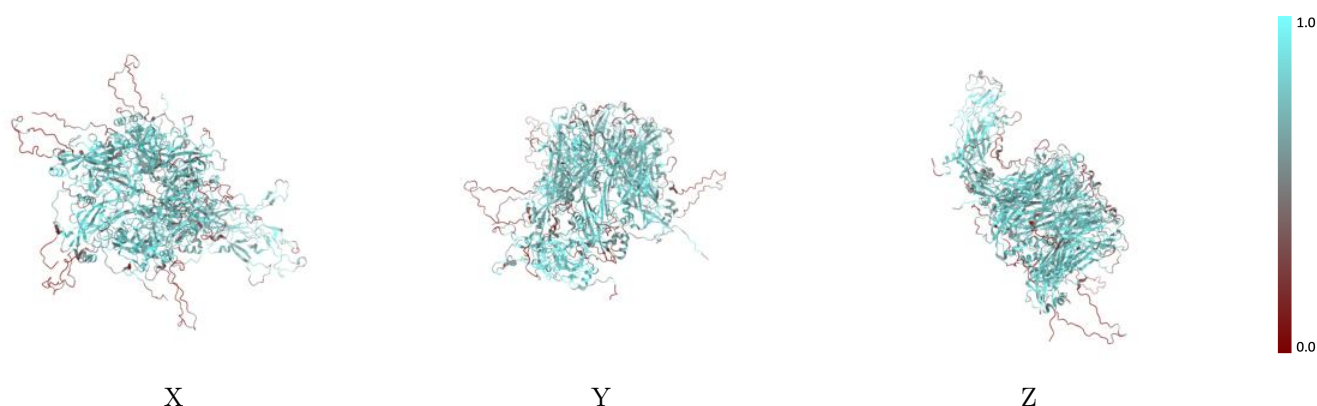
The images above show the 3D surface view of the map at the recommended contour level 2.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



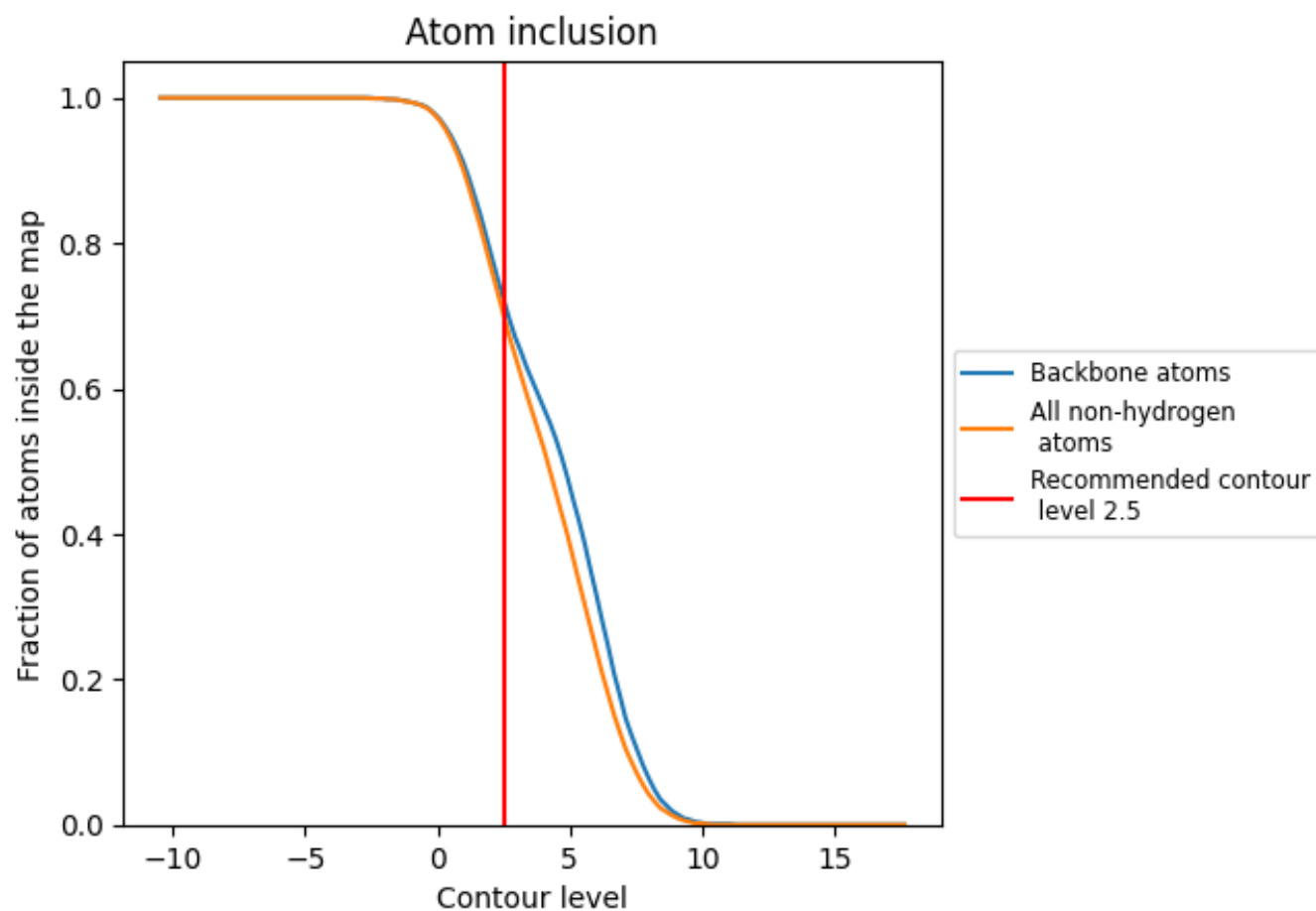
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (2.5).

9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 70% 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 (2.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7010	0.5280
A	0.6930	0.5230
B	0.7090	0.5390
C	0.7040	0.5170
D	0.7030	0.5310
E	0.6870	0.5270
F	0.7080	0.5320

1.0

0.0

<0.0