



Full wwPDB EM Validation Report ⓘ

Sep 22, 2021 – 10:15 AM JST

PDB ID : 7V73
EMDB ID : EMD-31757
Title : Thermostabilized human prestin in complex with chloride
Deposited on : 2021-08-21
Resolution : 3.00 Å(reported)
Based on initial model : 5DA0

This is a Full wwPDB EM Validation Report.

This report is produced by the wwPDB biocuration pipeline after annotation of the structure.

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

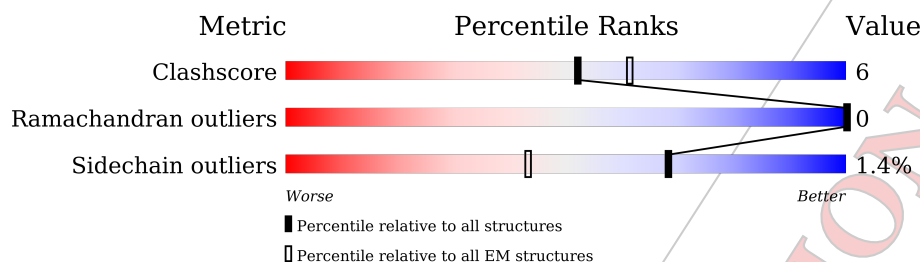
EMDB validation analysis : 0.0.0.dev97
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

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 3.00 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	753	8% 69% 10% 21%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4872 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.

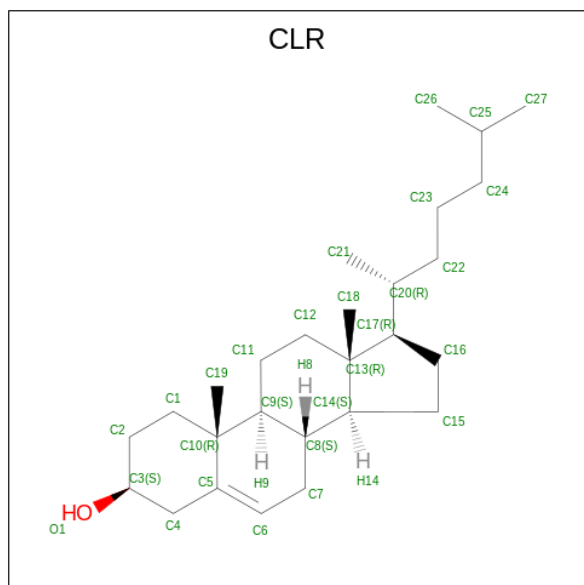
- Molecule 1 is a protein called Prestin.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	597	Total	C	N	O	S	0	0
			4620	3078	745	793	4		

- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl) (labeled as "Ligand of Interest" by depositor).

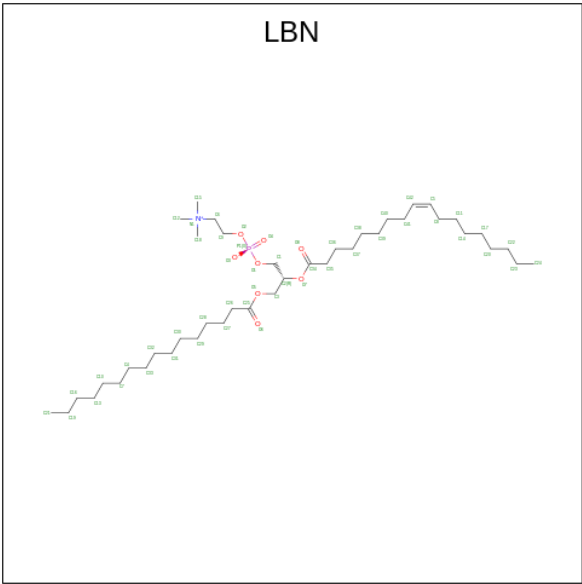
Mol	Chain	Residues	Atoms		AltConf
2	A	1	Total	Cl	0
			1	1	

- Molecule 3 is CHOLESTEROL (three-letter code: CLR) (formula: C₂₇H₄₆O).



Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	C	O	0
			56	54	2	
3	A	1	Total	C	O	0
			56	54	2	

- Molecule 4 is 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (three-letter code: LBN) (formula: C₄₂H₈₂NO₈P).

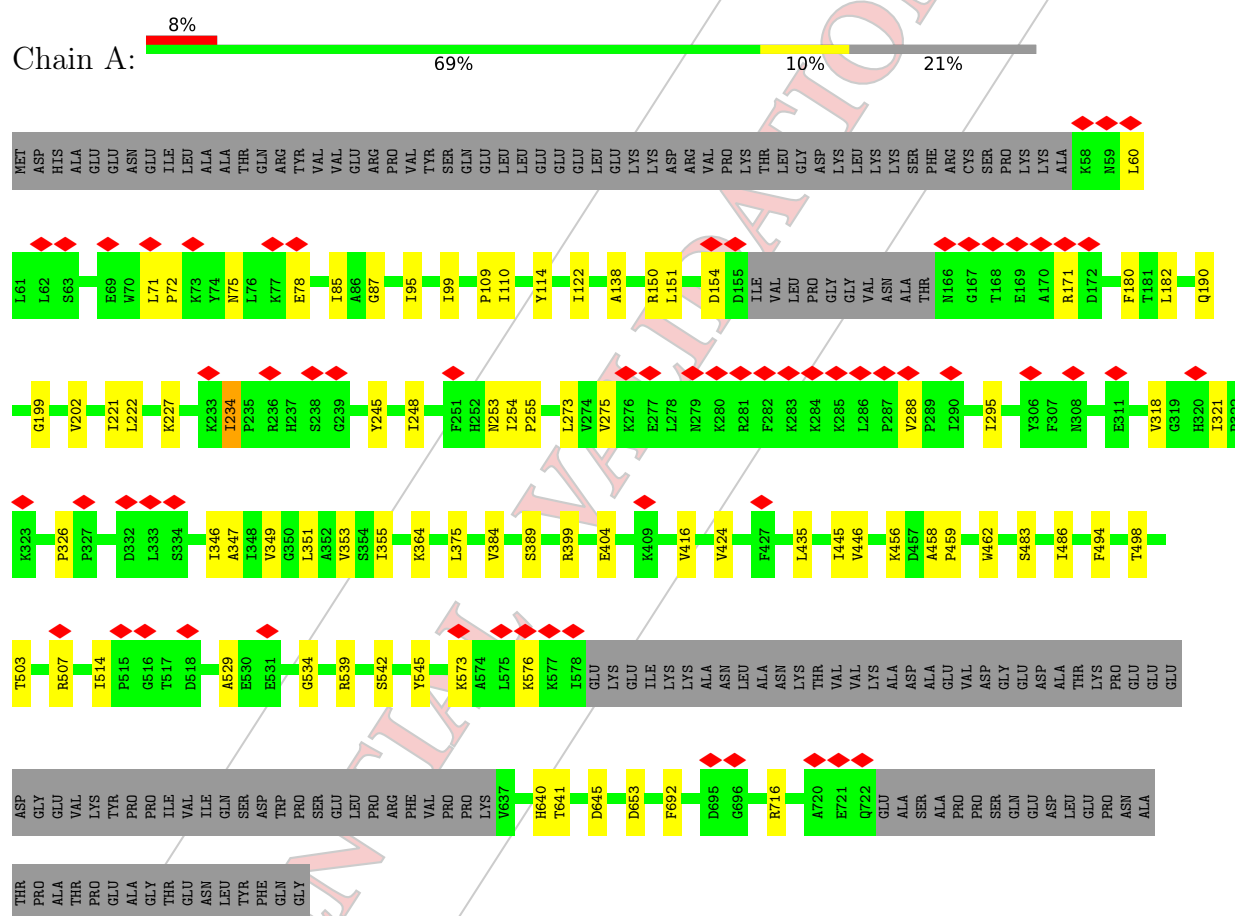


Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	
4	A	1	Total	C	N	O	P	0
			195	175	2	16	2	

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: Prestin



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	341744	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 ($e^-/\text{\AA}^2$)	54	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.247	Depositor
Minimum map value	-0.156	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.008	Depositor
Recommended contour level	0.0326	Depositor
Map size (Å)	199.2006, 199.2006, 199.2006	wwPDB
Map dimensions	180, 180, 180	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.10667, 1.10667, 1.10667	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: CLR, CL, LBN

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	0.76	0/4725	0.94	2/6423 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	399	ARG	NE-CZ-NH1	5.99	123.29	120.30
1	A	692	PHE	CB-CG-CD2	-5.35	117.06	120.80

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	4620	0	4896	49	0
2	A	1	0	0	0	0
3	A	56	0	92	14	0
4	A	195	0	0	5	0
All	All	4872	0	4988	56	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (56) 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)
3:A:803:CLR:H232	3:A:803:CLR:H162	1.40	1.01
4:A:807:LBN:C12	4:A:808:LBN:C10	2.53	0.86
1:A:446:VAL:HG12	3:A:803:CLR:C18	2.11	0.79
1:A:351:LEU:HD22	1:A:375:LEU:HD22	1.68	0.75
4:A:807:LBN:O4	4:A:808:LBN:C13	2.35	0.74
1:A:445:ILE:CG2	3:A:803:CLR:H191	2.23	0.69
1:A:273:LEU:HB3	3:A:803:CLR:H212	1.77	0.67
3:A:803:CLR:H162	3:A:803:CLR:C23	2.15	0.67
1:A:349:VAL:O	1:A:353:VAL:HG23	1.98	0.63
1:A:114:TYR:CD1	1:A:326:PRO:HG3	2.33	0.63
1:A:273:LEU:CB	3:A:803:CLR:H212	2.30	0.62
3:A:803:CLR:H152	3:A:803:CLR:H221	1.82	0.62
1:A:110:ILE:HD13	1:A:321:ILE:HG23	1.81	0.61
1:A:456:LYS:HE3	4:A:804:LBN:C25	2.31	0.60
1:A:234:ILE:HG22	1:A:253:ASN:HD22	1.67	0.59
1:A:245:TYR:HA	1:A:248:ILE:HG12	1.86	0.57
1:A:273:LEU:CB	3:A:803:CLR:C21	2.83	0.57
1:A:462:TRP:CD1	3:A:802:CLR:H193	2.40	0.57
1:A:458:ALA:N	1:A:459:PRO:HD2	2.21	0.56
1:A:75:ASN:ND2	1:A:78:GLU:OE2	2.40	0.55
1:A:503:THR:OG1	1:A:545:TYR:OH	2.18	0.54
1:A:446:VAL:HG12	3:A:803:CLR:H181	1.91	0.53
1:A:445:ILE:HG21	3:A:803:CLR:H191	1.89	0.53
1:A:446:VAL:HG12	3:A:803:CLR:H183	1.89	0.52
1:A:150:ARG:HE	1:A:151:LEU:HD12	1.74	0.52
1:A:85:ILE:HG23	1:A:288:VAL:HG12	1.94	0.49
1:A:273:LEU:HB2	3:A:803:CLR:C21	2.43	0.48
1:A:545:TYR:HA	1:A:653:ASP:OD1	2.14	0.48
1:A:254:ILE:N	1:A:255:PRO:HD2	2.30	0.47
1:A:641:THR:OG1	1:A:716:ARG:NH2	2.48	0.47
1:A:275:VAL:HG21	1:A:295:ILE:HD11	1.98	0.46
1:A:364:LYS:NZ	1:A:404:GLU:OE2	2.44	0.45
1:A:71:LEU:N	1:A:72:PRO:HD2	2.32	0.44
1:A:514:ILE:HD13	1:A:529:ALA:HB2	1.99	0.44
4:A:807:LBN:C12	4:A:808:LBN:C4	2.95	0.44
1:A:222:LEU:HD12	1:A:445:ILE:HD12	2.00	0.43
1:A:138:ALA:HB1	1:A:221:ILE:HD13	2.01	0.43
4:A:807:LBN:C12	4:A:808:LBN:C13	2.96	0.43
1:A:109:PRO:HG2	1:A:318:VAL:HG13	2.01	0.43
1:A:182:LEU:HD22	1:A:346:ILE:HD12	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:347:ALA:O	1:A:351:LEU:HG	2.19	0.42
1:A:534:GLY:O	1:A:640:HIS:ND1	2.52	0.42
1:A:273:LEU:HB3	3:A:803:CLR:C21	2.45	0.42
1:A:494:PHE:O	1:A:498:THR:HG23	2.20	0.42
1:A:87:GLY:HA3	1:A:416:VAL:CG1	2.49	0.42
1:A:318:VAL:HG21	1:A:435:LEU:HD23	2.01	0.42
1:A:95:ILE:HD13	1:A:424:VAL:HG21	2.02	0.41
1:A:190:GLN:HG2	1:A:351:LEU:HD21	2.02	0.41
1:A:483:SER:HB3	1:A:486:ILE:HD13	2.02	0.41
1:A:355:ILE:HD11	1:A:375:LEU:CD2	2.51	0.41
1:A:539:ARG:HB2	1:A:645:ASP:HB3	2.03	0.41
1:A:99:ILE:HG23	1:A:109:PRO:HB3	2.03	0.40
1:A:122:ILE:HD13	1:A:384:VAL:HB	2.03	0.40
1:A:199:GLY:O	1:A:202:VAL:HG22	2.22	0.40
1:A:154:ASP:OD2	1:A:171:ARG:NH1	2.55	0.40
1:A:180:PHE:CZ	1:A:389:SER:HA	2.57	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	591/753 (78%)	563 (95%)	28 (5%)	0	100	100

There are no Ramachandran outliers to report.

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	A	503/637 (79%)	496 (99%)	7 (1%)	67 / 88

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	60	LEU
1	A	227	LYS
1	A	234	ILE
1	A	507	ARG
1	A	542	SER
1	A	573	LYS
1	A	576	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	177	GLN
1	A	253	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 11 ligands modelled in this entry, 1 is monoatomic - leaving 10 for Mogul analysis.

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

the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	LBN	A	808	-	13,13,51	0.29	0	12,12,59	0.46	0
4	LBN	A	806	-	51,51,51	0.40	0	57,59,59	0.46	0
4	LBN	A	811	-	13,13,51	0.47	0	12,12,59	0.43	0
4	LBN	A	809	-	14,14,51	0.27	0	13,13,59	0.25	0
4	LBN	A	807	-	51,51,51	0.55	1 (1%)	57,59,59	0.43	0
4	LBN	A	805	-	15,15,51	0.30	0	14,14,59	0.28	0
3	CLR	A	802	-	31,31,31	0.52	0	48,48,48	0.97	1 (2%)
4	LBN	A	810	-	15,15,51	0.30	0	14,14,59	0.18	0
4	LBN	A	804	-	15,15,51	0.30	0	14,14,59	0.33	0
3	CLR	A	803	-	31,31,31	0.60	0	48,48,48	1.50	8 (16%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LBN	A	808	-	-	7/11/11/55	-
4	LBN	A	806	-	-	27/55/55/55	-
4	LBN	A	811	-	-	11/11/11/55	-
4	LBN	A	809	-	-	10/12/12/55	-
4	LBN	A	807	-	-	30/55/55/55	-
4	LBN	A	805	-	-	8/13/13/55	-
3	CLR	A	802	-	-	5/10/68/68	0/4/4/4
4	LBN	A	810	-	-	7/13/13/55	-
4	LBN	A	804	-	-	8/13/13/55	-
3	CLR	A	803	-	-	4/10/68/68	0/4/4/4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	807	LBN	C12-N1	-3.08	1.41	1.50

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	803	CLR	C16-C15-C14	-5.00	95.23	105.13
3	A	803	CLR	C14-C8-C9	-4.09	103.61	109.09
3	A	803	CLR	C7-C8-C9	3.13	113.51	109.71
3	A	803	CLR	C15-C14-C13	2.63	107.01	103.84
3	A	803	CLR	C15-C14-C8	2.53	123.24	119.08
3	A	803	CLR	C10-C9-C8	2.36	116.28	112.73
3	A	803	CLR	C4-C5-C10	2.15	119.28	116.42
3	A	802	CLR	C13-C17-C20	2.10	122.77	119.49
3	A	803	CLR	C4-C5-C6	-2.01	117.72	120.61

There are no chirality outliers.

All (117) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	806	LBN	C1-O1-P1-O2
4	A	806	LBN	N1-C6-C9-O2
4	A	806	LBN	C6-C9-O2-P1
3	A	802	CLR	C13-C17-C20-C22
4	A	806	LBN	C28-C29-C30-C31
4	A	807	LBN	C26-C25-O5-C3
4	A	811	LBN	C29-C30-C31-C32
3	A	803	CLR	C16-C17-C20-C21
4	A	808	LBN	C28-C29-C30-C31
3	A	802	CLR	C13-C17-C20-C21
4	A	807	LBN	C26-C27-C28-C29
4	A	807	LBN	O6-C25-O5-C3
4	A	806	LBN	C7-C10-C13-C16
4	A	805	LBN	C30-C31-C32-C33
4	A	807	LBN	O7-C2-C3-O5
3	A	803	CLR	C13-C17-C20-C21
3	A	803	CLR	C13-C17-C20-C22
3	A	802	CLR	C22-C23-C24-C25
4	A	806	LBN	C34-C35-C36-C37
3	A	802	CLR	C16-C17-C20-C22
4	A	808	LBN	C33-C4-C7-C10
4	A	807	LBN	C9-C6-N1-C15
4	A	806	LBN	C39-C40-C41-C42
4	A	806	LBN	C35-C34-O7-C2
4	A	809	LBN	C7-C10-C13-C16
4	A	811	LBN	C31-C32-C33-C4
4	A	807	LBN	C27-C28-C29-C30
4	A	806	LBN	C11-C14-C17-C20
4	A	808	LBN	C32-C33-C4-C7

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Mol	Chain	Res	Type	Atoms
4	A	806	LBN	C10-C13-C16-C19
4	A	809	LBN	C29-C30-C31-C32
4	A	806	LBN	C33-C4-C7-C10
4	A	809	LBN	C28-C29-C30-C31
4	A	810	LBN	C10-C13-C16-C19
4	A	806	LBN	C35-C36-C37-C38
3	A	802	CLR	C16-C17-C20-C21
4	A	806	LBN	O8-C34-O7-C2
4	A	807	LBN	C9-C6-N1-C12
4	A	807	LBN	C9-C6-N1-C18
4	A	805	LBN	C33-C4-C7-C10
4	A	811	LBN	C30-C31-C32-C33
4	A	811	LBN	C7-C10-C13-C16
4	A	806	LBN	C32-C33-C4-C7
4	A	810	LBN	C33-C4-C7-C10
4	A	811	LBN	C28-C29-C30-C31
4	A	804	LBN	C32-C33-C4-C7
4	A	805	LBN	C13-C10-C7-C4
4	A	808	LBN	C13-C10-C7-C4
4	A	807	LBN	C14-C11-C8-C5
4	A	805	LBN	C10-C13-C16-C19
4	A	806	LBN	C13-C10-C7-C4
4	A	807	LBN	C37-C38-C39-C40
4	A	809	LBN	C30-C31-C32-C33
4	A	811	LBN	C32-C33-C4-C7
4	A	807	LBN	C32-C33-C4-C7
4	A	807	LBN	C11-C14-C17-C20
3	A	803	CLR	C16-C17-C20-C22
4	A	807	LBN	O8-C34-O7-C2
4	A	806	LBN	C26-C25-O5-C3
4	A	808	LBN	C7-C10-C13-C16
4	A	807	LBN	C13-C16-C19-C21
4	A	804	LBN	C30-C31-C32-C33
4	A	804	LBN	C7-C10-C13-C16
4	A	809	LBN	C32-C33-C4-C7
4	A	807	LBN	C35-C34-O7-C2
4	A	807	LBN	O1-C1-C2-O7
4	A	807	LBN	C39-C40-C41-C42
4	A	810	LBN	C27-C28-C29-C30
4	A	805	LBN	C32-C33-C4-C7
4	A	811	LBN	C10-C13-C16-C19
4	A	807	LBN	C10-C13-C16-C19

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Mol	Chain	Res	Type	Atoms
4	A	806	LBN	C1-C2-C3-O5
4	A	807	LBN	C1-C2-C3-O5
4	A	808	LBN	C27-C28-C29-C30
4	A	806	LBN	O6-C25-O5-C3
4	A	806	LBN	C13-C16-C19-C21
4	A	809	LBN	C31-C32-C33-C4
4	A	809	LBN	C13-C10-C7-C4
4	A	811	LBN	C13-C16-C19-C21
4	A	811	LBN	C27-C28-C29-C30
4	A	807	LBN	C31-C32-C33-C4
4	A	807	LBN	C38-C39-C40-C41
4	A	804	LBN	C13-C10-C7-C4
4	A	811	LBN	C13-C10-C7-C4
4	A	807	LBN	C34-C35-C36-C37
4	A	807	LBN	O1-C1-C2-C3
4	A	806	LBN	C3-C2-O7-C34
4	A	806	LBN	O7-C2-C3-O5
4	A	805	LBN	C7-C10-C13-C16
4	A	806	LBN	C27-C28-C29-C30
4	A	809	LBN	C13-C16-C19-C21
4	A	807	LBN	C6-C9-O2-P1
4	A	806	LBN	C20-C22-C23-C24
4	A	807	LBN	N1-C6-C9-O2
4	A	811	LBN	C33-C4-C7-C10
4	A	804	LBN	C26-C27-C28-C29
4	A	807	LBN	C33-C4-C7-C10
4	A	810	LBN	C31-C32-C33-C4
4	A	809	LBN	C33-C4-C7-C10
4	A	806	LBN	C9-O2-P1-O1
4	A	807	LBN	C9-O2-P1-O1
4	A	807	LBN	C35-C36-C37-C38
4	A	805	LBN	C28-C29-C30-C31
4	A	809	LBN	C10-C13-C16-C19
4	A	808	LBN	C13-C16-C19-C21
4	A	804	LBN	C25-C26-C27-C28
4	A	810	LBN	C28-C29-C30-C31
4	A	810	LBN	C25-C26-C27-C28
4	A	805	LBN	C13-C16-C19-C21
4	A	804	LBN	C29-C30-C31-C32
4	A	810	LBN	C30-C31-C32-C33
4	A	806	LBN	C9-C6-N1-C18
4	A	806	LBN	C9-C6-N1-C12

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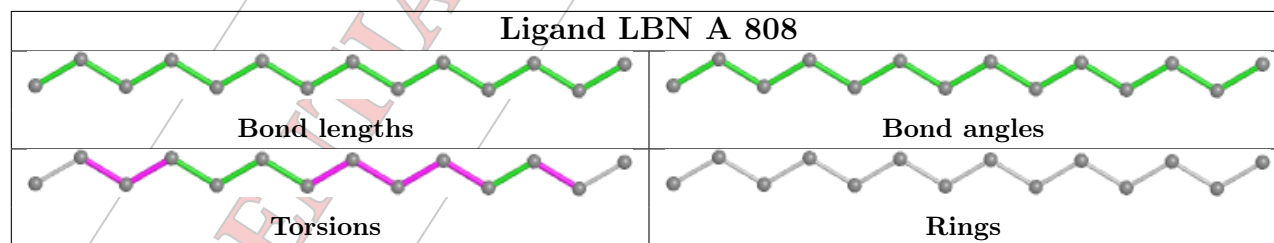
Mol	Chain	Res	Type	Atoms
4	A	806	LBN	C1-O1-P1-O3
4	A	807	LBN	C9-O2-P1-O4
4	A	804	LBN	C13-C16-C19-C21
4	A	807	LBN	C42-C5-C8-C11

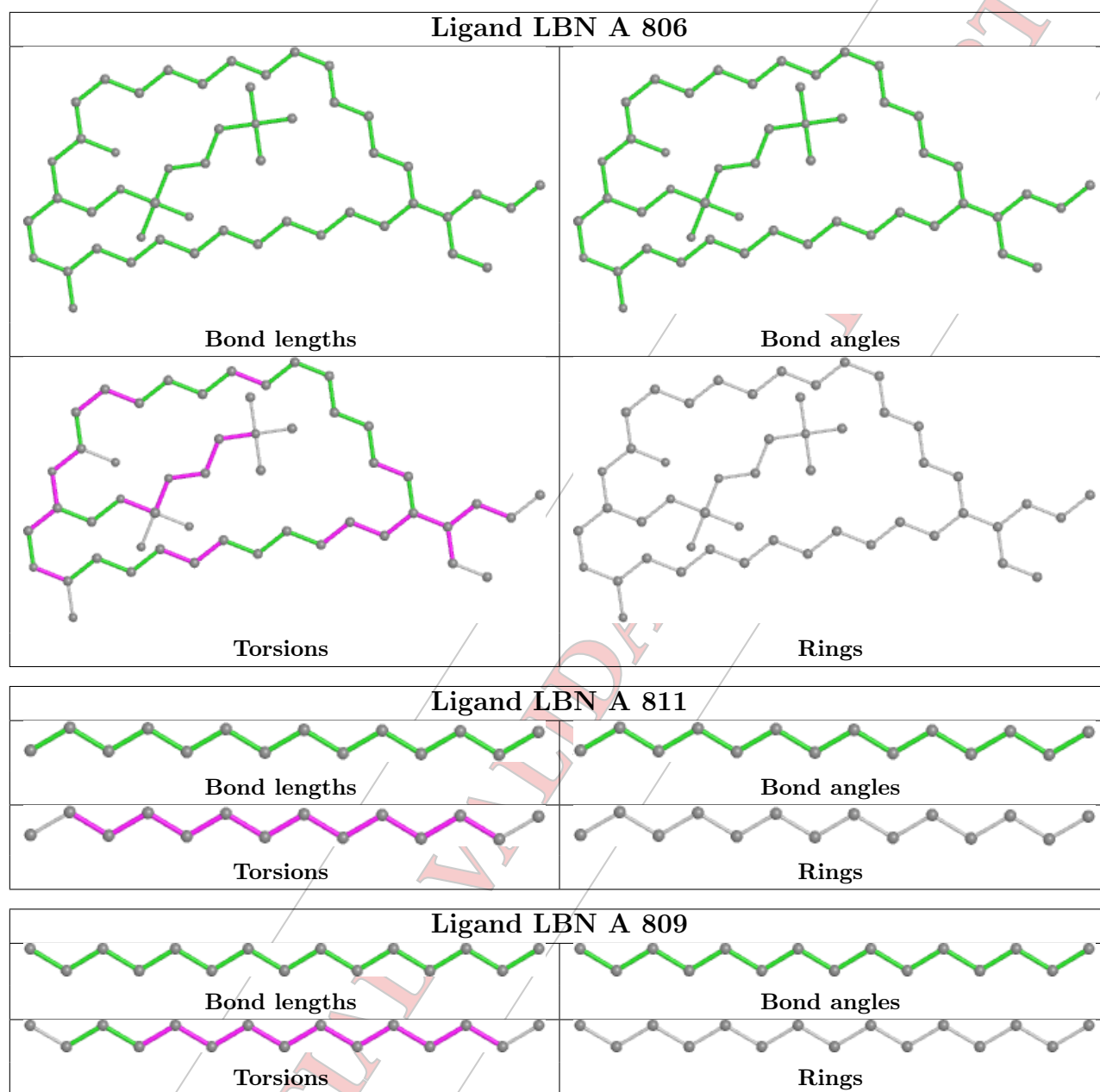
There are no ring outliers.

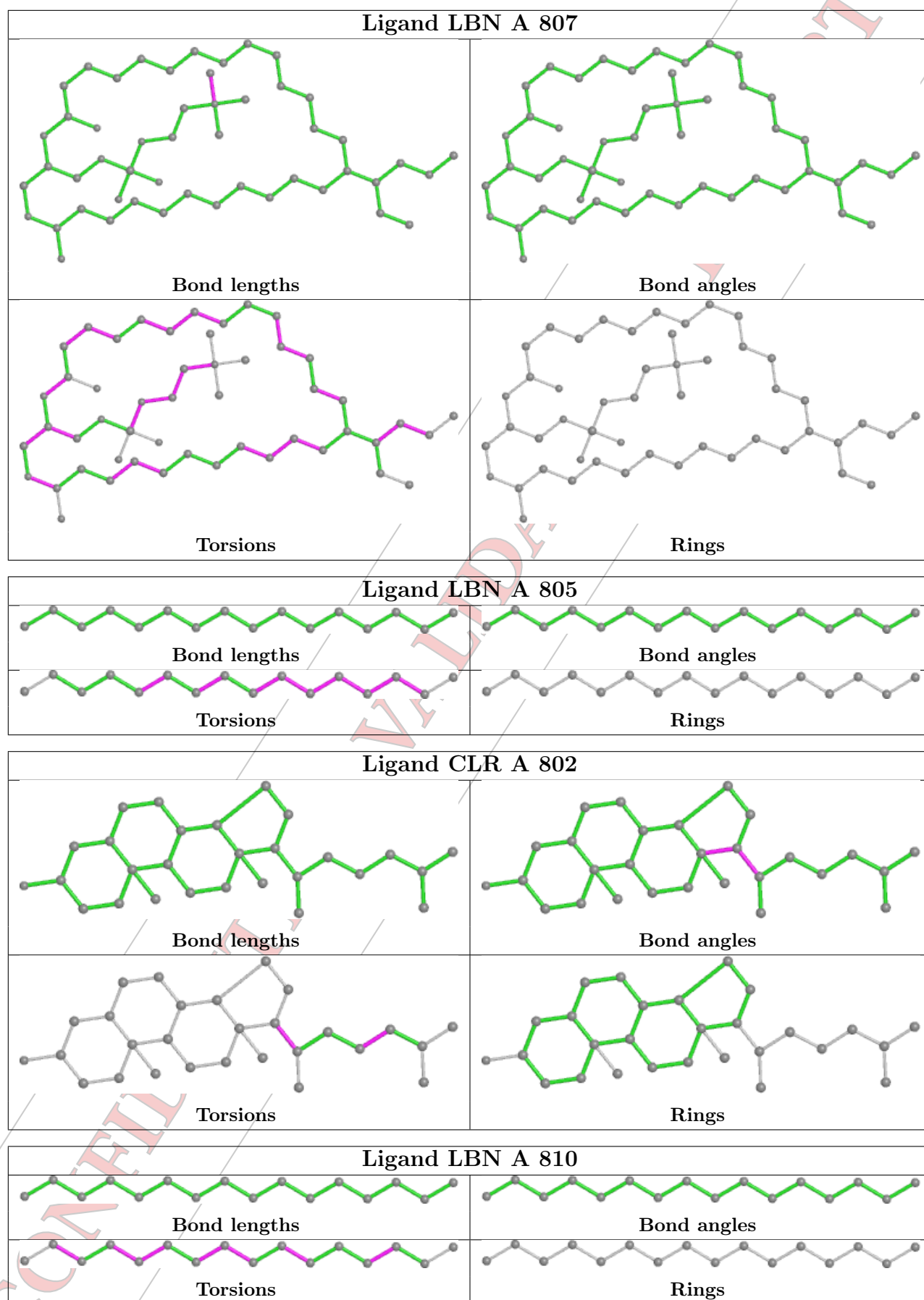
5 monomers are involved in 19 short contacts:

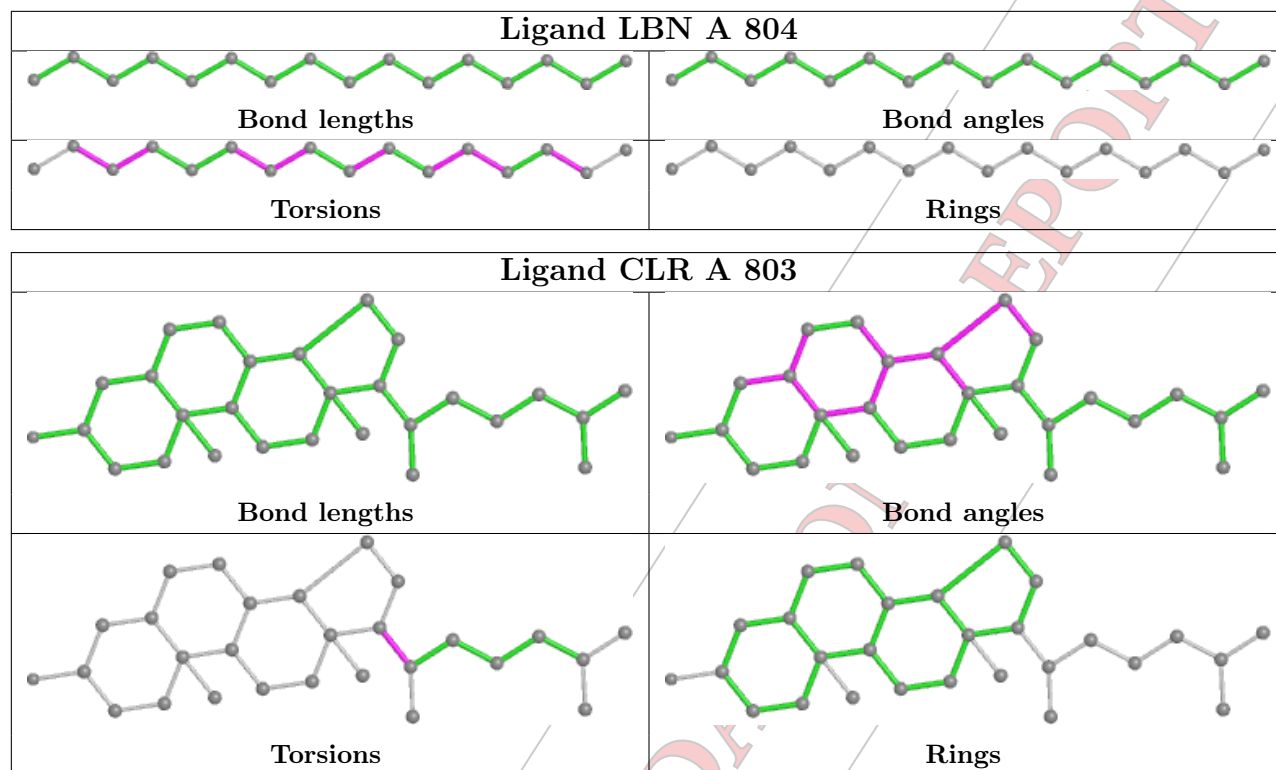
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	808	LBN	4	0
4	A	807	LBN	4	0
3	A	802	CLR	1	0
4	A	804	LBN	1	0
3	A	803	CLR	13	0

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

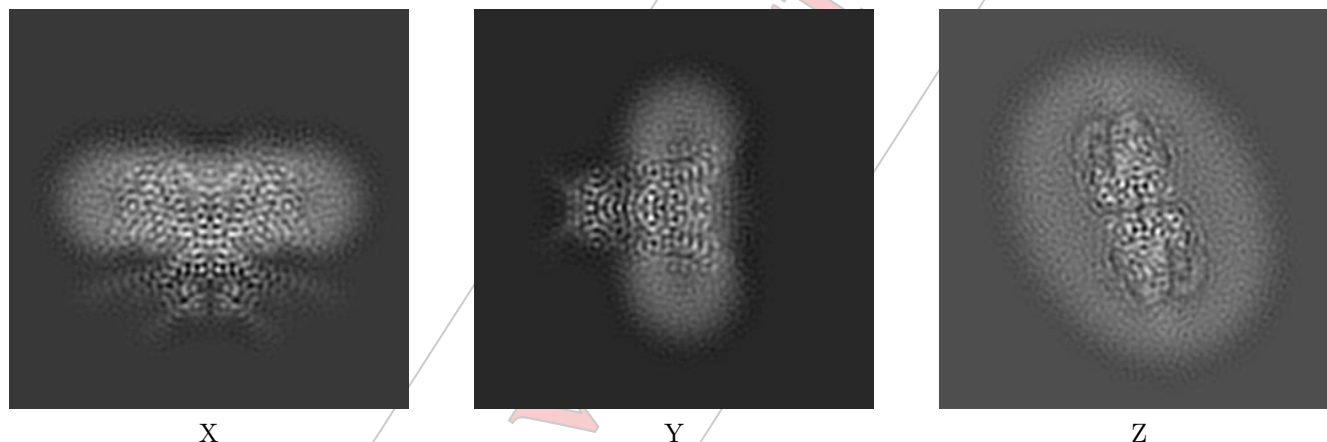
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31757. These allow visual inspection of the internal detail of the map and identification of artifacts.

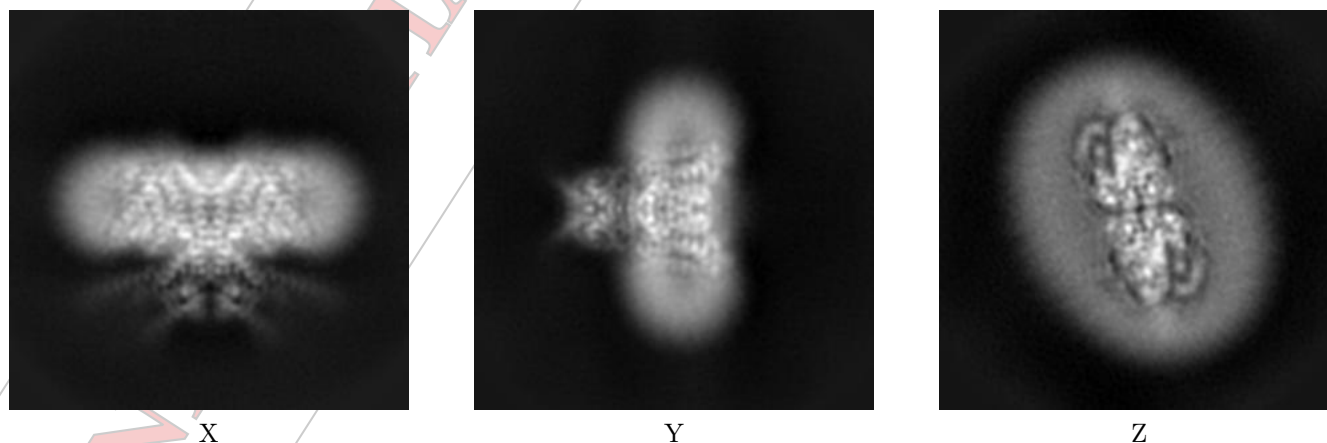
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

6.1.1 Primary map



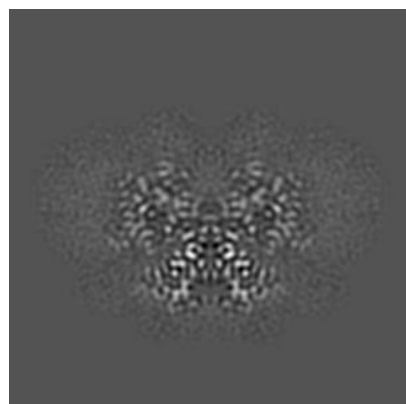
6.1.2 Raw map



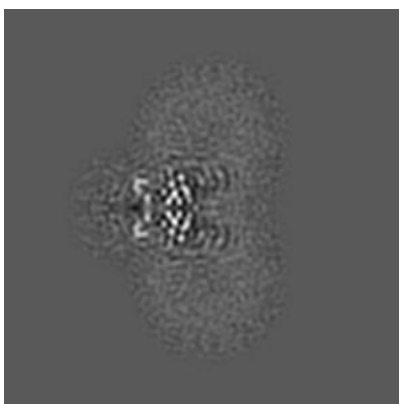
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

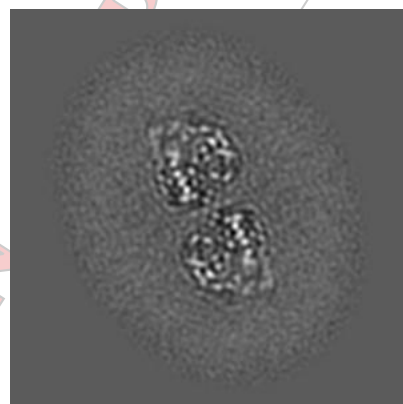
6.2.1 Primary map



X Index: 90

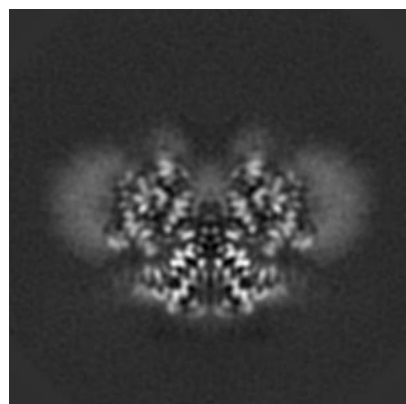


Y Index: 90

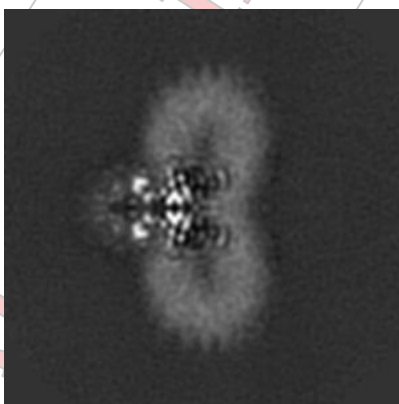


Z Index: 90

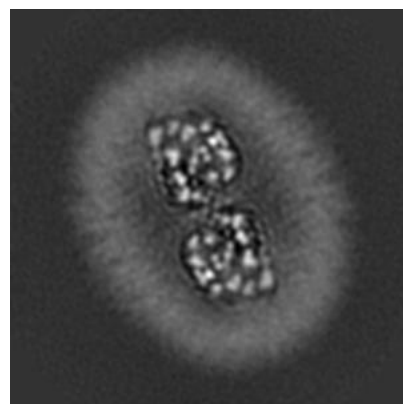
6.2.2 Raw map



X Index: 90



Y Index: 90

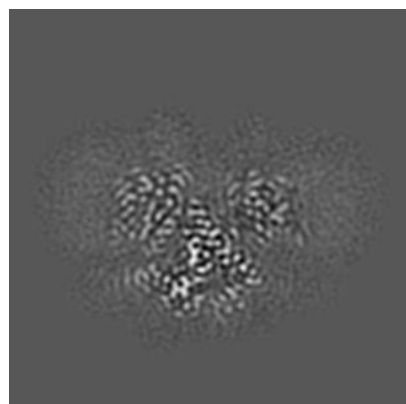


Z Index: 90

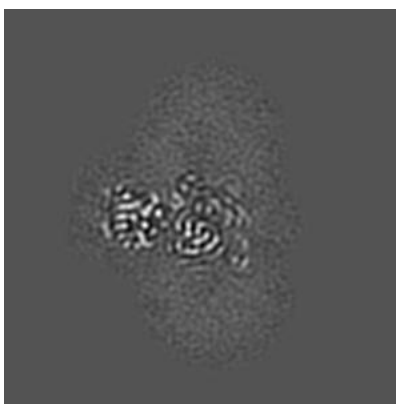
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

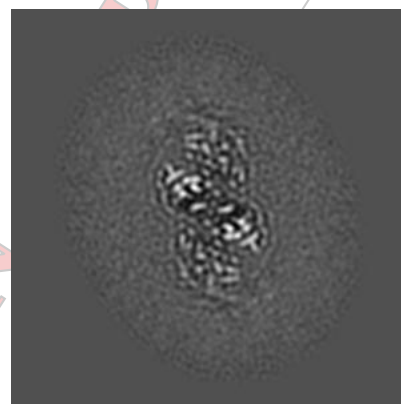
6.3.1 Primary map



X Index: 94

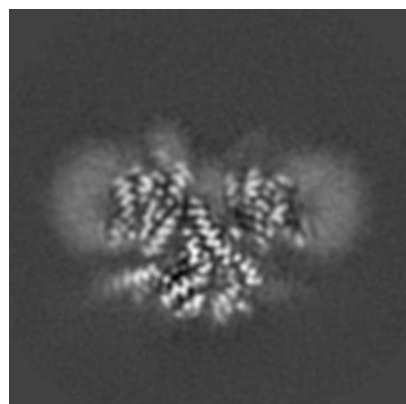


Y Index: 102

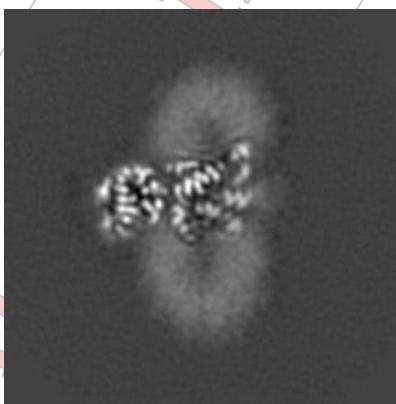


Z Index: 82

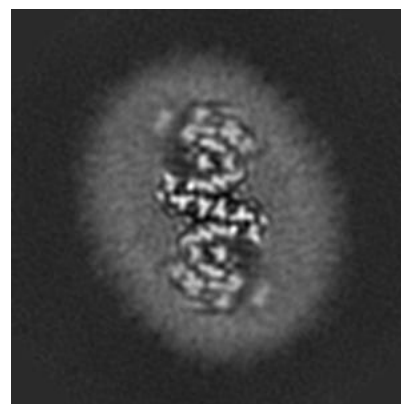
6.3.2 Raw map



X Index: 94



Y Index: 78



Z Index: 79

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

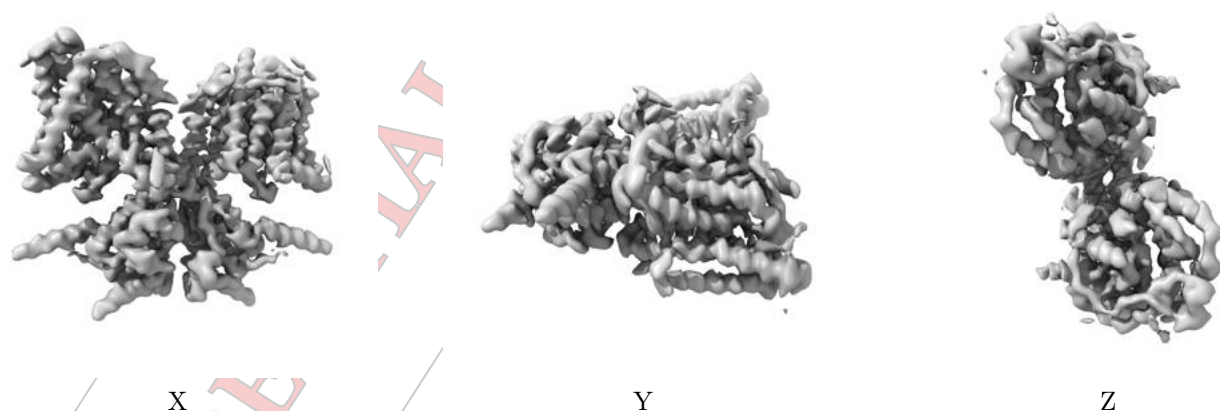
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0326. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

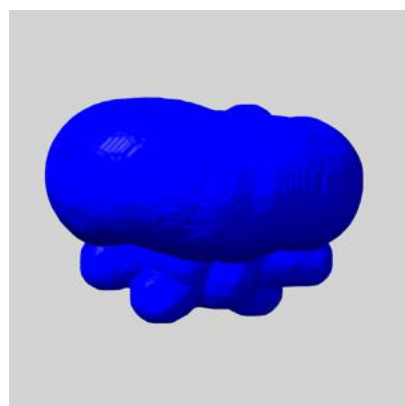
6.5 Mask visualisation [i](#)

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

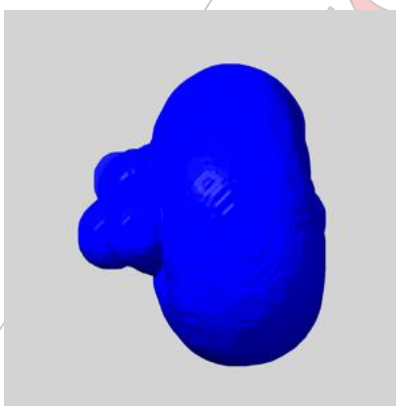
A mask typically either:

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

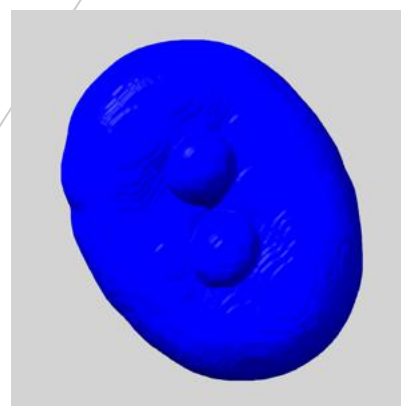
6.5.1 D_1300024130_em-mask-volume_P1.map.V2 [i](#)



X



Y

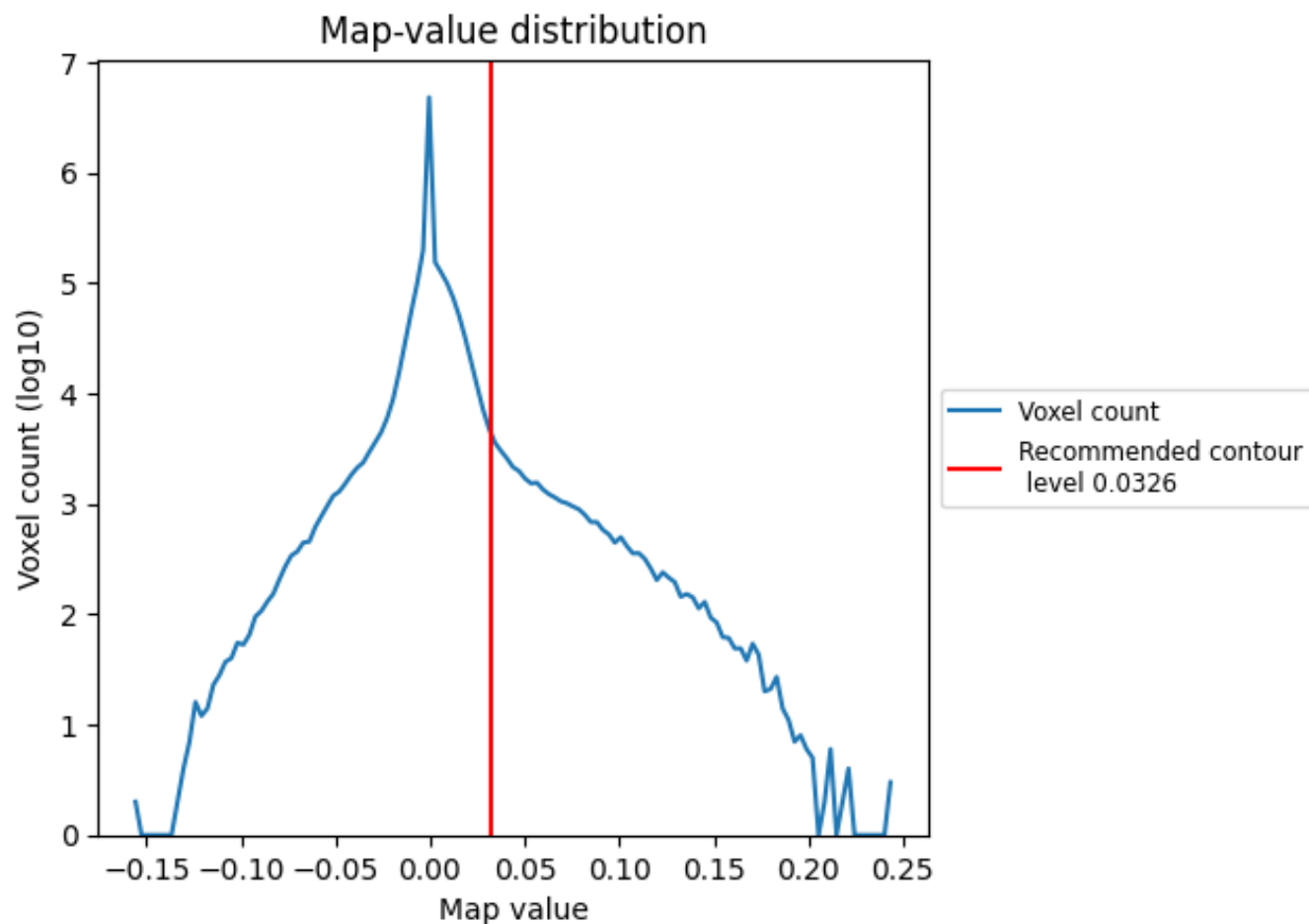


Z

7 Map analysis [i](#)

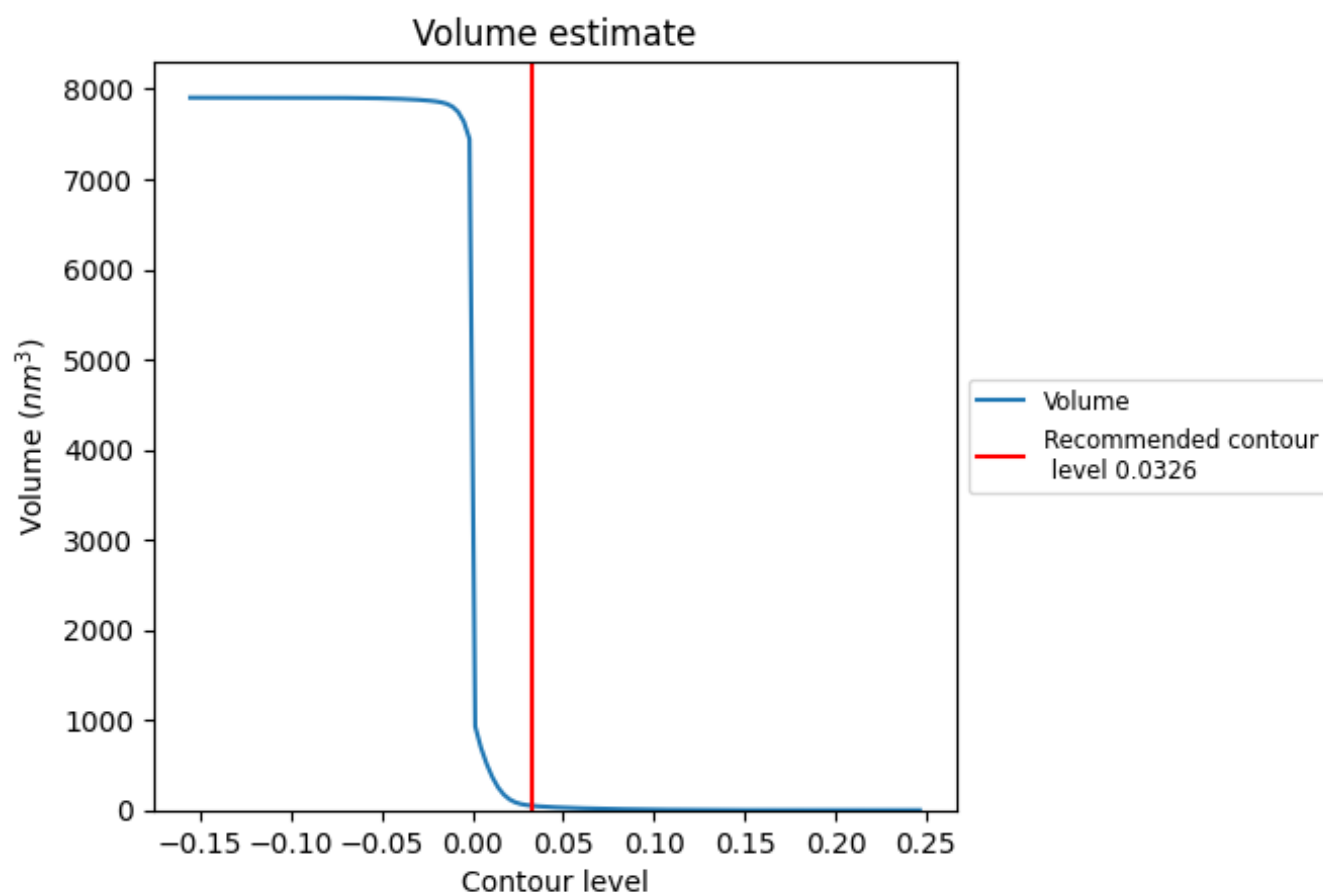
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

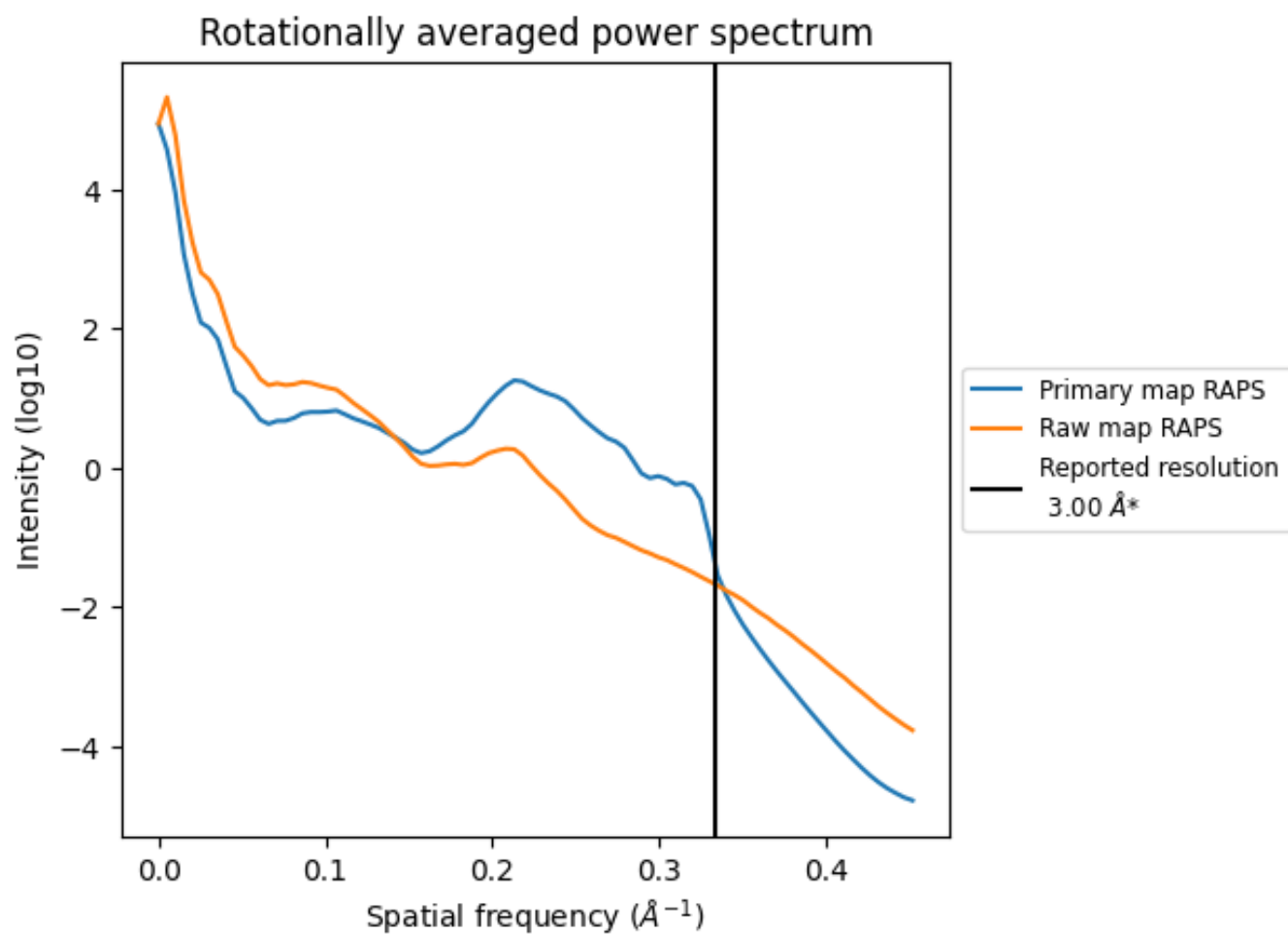
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 49 nm^3 ; this corresponds to an approximate mass of 44 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](#)

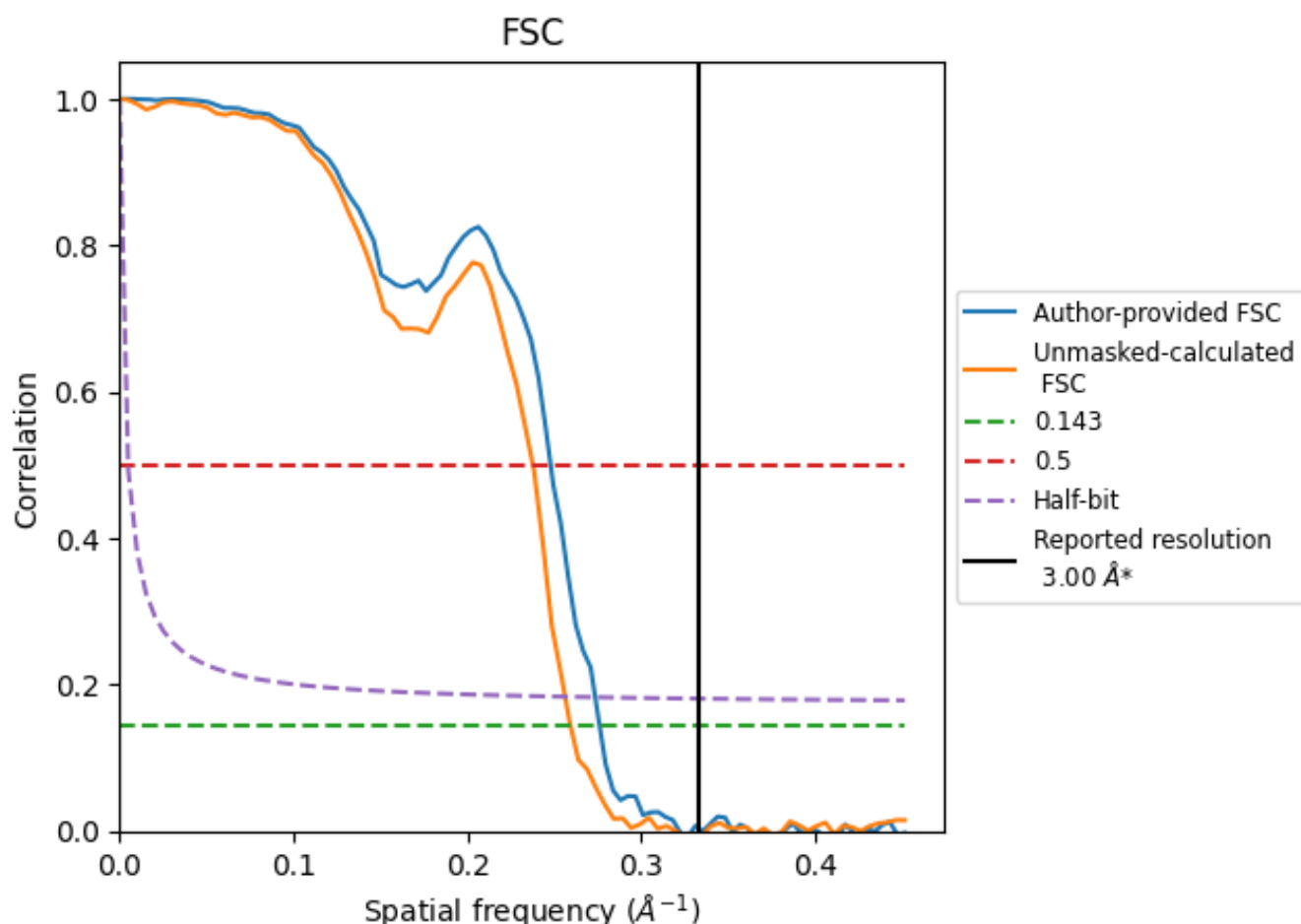


*Reported resolution corresponds to spatial frequency of 0.333 Å⁻¹

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	3.62	4.03	3.65
Unmasked-calculated*	3.85	4.21	3.90

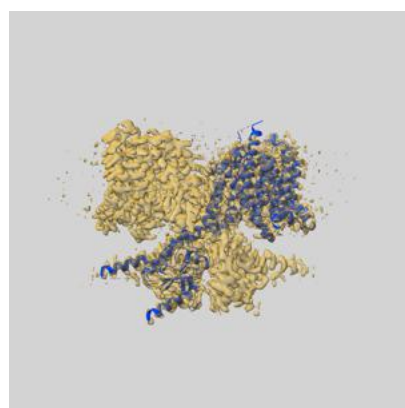
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 3.62 differs from the reported value 3.0 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.85 differs from the reported value 3.0 by more than 10 %

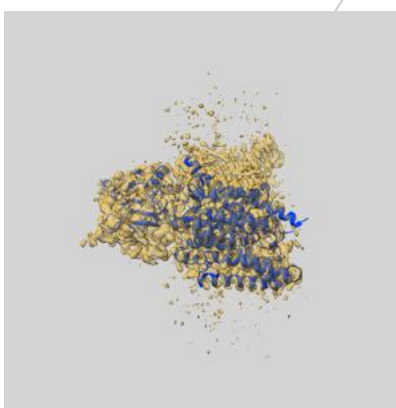
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-31757 and PDB model 7V73. Per-residue inclusion information can be found in section 3 on page 5.

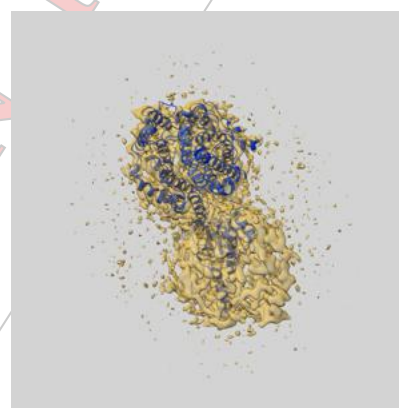
9.0.1 Map-model overlay [i](#)



X

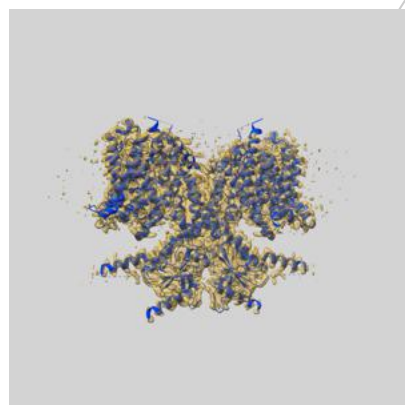


Y

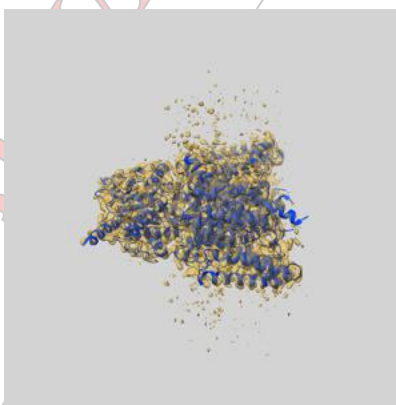


Z

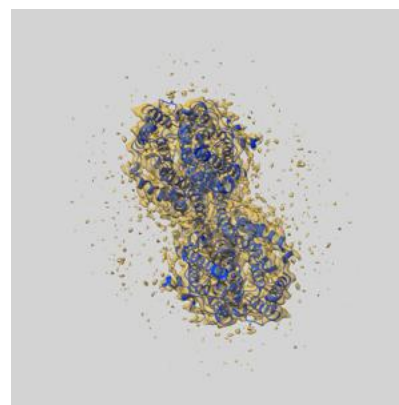
9.0.2 Map-model assembly overlay [i](#)



X



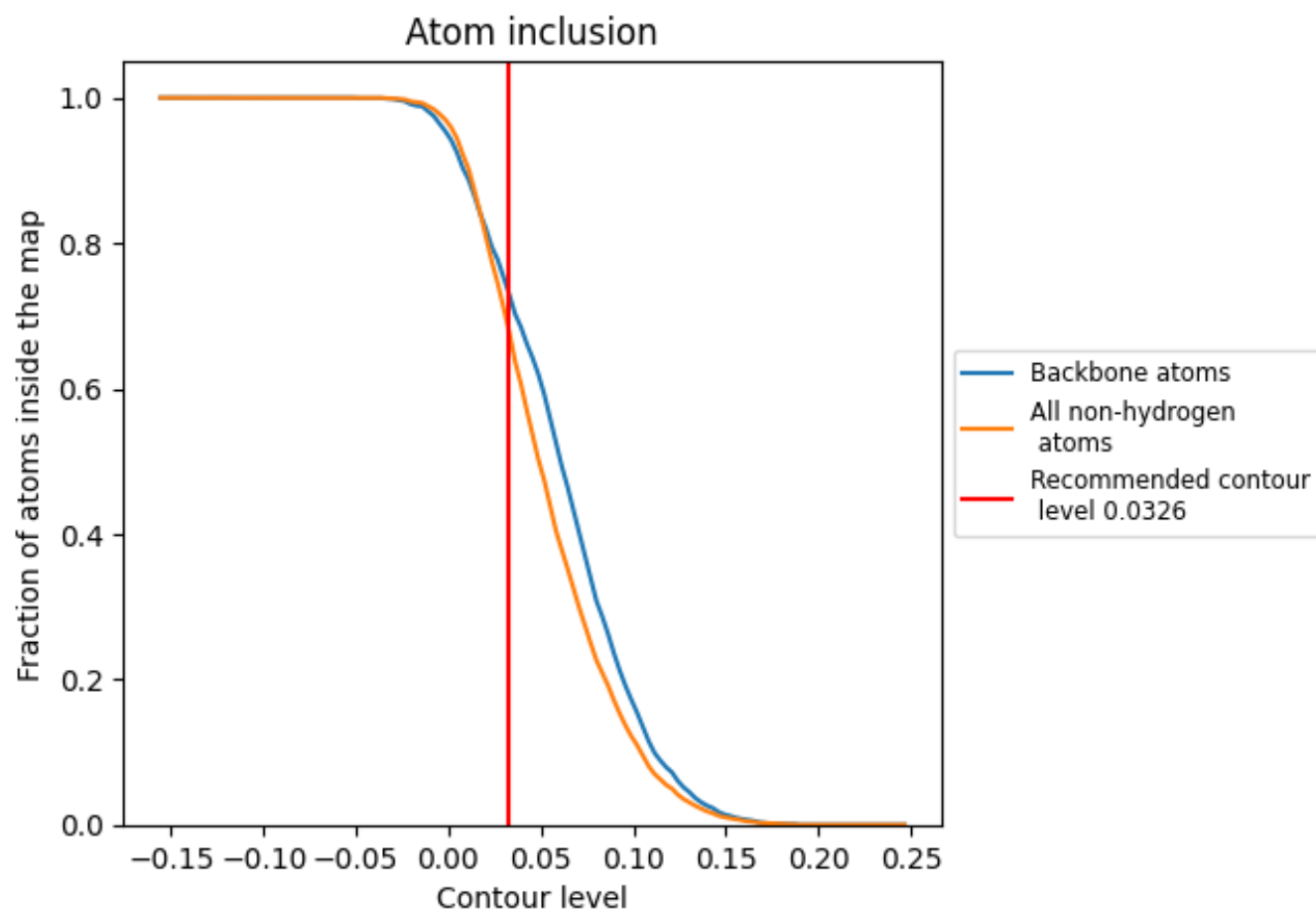
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0326 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.

9.1 Atom inclusion [i](#)



At the recommended contour level, 73% of all backbone atoms, 68% of all non-hydrogen atoms, are inside the map.



Full wwPDB EM Validation Report ⓘ

Sep 22, 2021 – 02:58 PM JST

PDB ID : 7V74
EMDB ID : EMD-31758
Title : Thermostabilized human prestin in complex with sulfate
Deposited on : 2021-08-21
Resolution : 3.00 Å(reported)
Based on initial model : 5DA0

This is a Full wwPDB EM Validation Report.

This report is produced by the wwPDB biocuration pipeline after annotation of the structure.

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

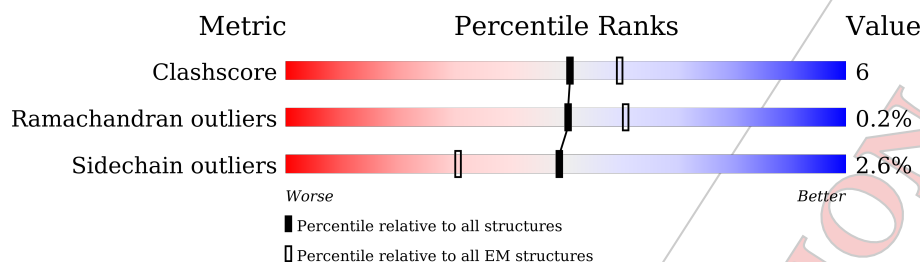
EMDB validation analysis : 0.0.0.dev97
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

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 3.00 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	753	10% 67% 12% 21%

2 Entry composition [i](#)

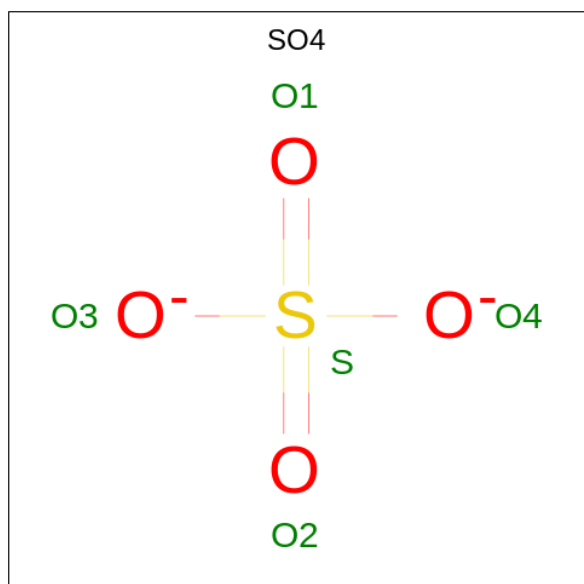
There are 4 unique types of molecules in this entry. The entry contains 4874 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 prestin.

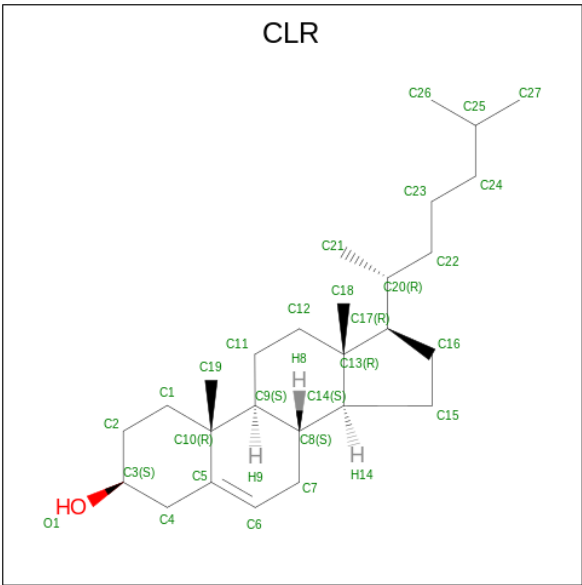
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	597	4620	3078	745	793	4	0	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S) (labeled as "Ligand of Interest" by depositor).



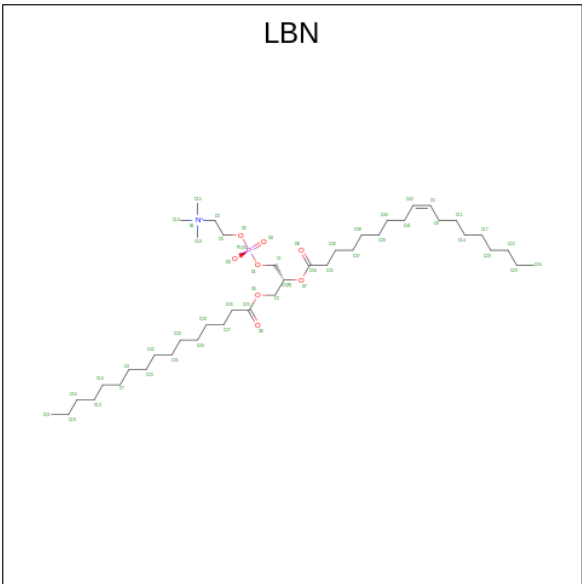
Mol	Chain	Residues	Atoms			AltConf
			Total	O	S	
2	A	1	5	4	1	0

- Molecule 3 is CHOLESTEROL (three-letter code: CLR) (formula: C₂₇H₄₆O).



Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	C	O	0
			56	54	2	
3	A	1	Total	C	O	0
			56	54	2	

- Molecule 4 is 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (three-letter code: LBN) (formula: C₄₂H₈₂NO₈P).



Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	
4	A	1	Total	C	N	O	P	0
			193	173	2	16	2	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	249144	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 ($e^-/\text{\AA}^2$)	54	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.296	Depositor
Minimum map value	-0.225	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.0359	Depositor
Map size (Å)	192.56058, 192.56058, 192.56058	wwPDB
Map dimensions	174, 174, 174	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.10667, 1.10667, 1.10667	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: CLR, LBN, SO4

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	0.82	0/4725	1.01	2/6423 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	502	ARG	NE-CZ-NH2	-5.38	117.61	120.30
1	A	545	TYR	CB-CG-CD1	-5.14	117.92	121.00

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	4620	0	4896	50	0
2	A	5	0	0	0	0
3	A	56	0	92	8	0
4	A	193	0	0	4	0
All	All	4874	0	4988	58	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (58) 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)
3:A:803:CLR:H232	3:A:803:CLR:H162	1.42	0.98
1:A:462:TRP:CD1	3:A:802:CLR:H193	2.17	0.80
3:A:803:CLR:H162	3:A:803:CLR:C23	2.17	0.73
1:A:351:LEU:HD22	1:A:375:LEU:HD22	1.70	0.72
1:A:114:TYR:CD1	1:A:326:PRO:HG3	2.28	0.68
1:A:110:ILE:HD13	1:A:321:ILE:HG23	1.75	0.67
1:A:446:VAL:HG12	3:A:803:CLR:C18	2.30	0.61
4:A:807:LBN:O4	4:A:808:LBN:C40	2.49	0.59
1:A:234:ILE:HG22	1:A:253:ASN:HD22	1.68	0.57
1:A:445:ILE:CG2	3:A:803:CLR:H191	2.37	0.54
1:A:275:VAL:HG21	1:A:295:ILE:HD11	1.90	0.53
1:A:481:PHE:O	1:A:482:LEU:HD23	2.09	0.52
1:A:119:PRO:HB2	1:A:120:PRO:CD	2.40	0.51
1:A:122:ILE:HD11	1:A:384:VAL:HG11	1.94	0.49
1:A:214:THR:HB	1:A:451:LEU:HD22	1.95	0.49
1:A:122:ILE:CD1	1:A:384:VAL:HG11	2.43	0.49
1:A:150:ARG:HE	1:A:151:LEU:HD12	1.78	0.48
1:A:458:ALA:N	1:A:459:PRO:HD2	2.28	0.48
4:A:807:LBN:C12	4:A:808:LBN:C41	2.91	0.48
1:A:138:ALA:HB1	1:A:221:ILE:HD13	1.96	0.48
1:A:137:PHE:CE2	1:A:139:VAL:HB	2.49	0.47
4:A:807:LBN:C12	4:A:808:LBN:C42	2.92	0.47
1:A:467:LEU:HD22	1:A:498:THR:HG22	1.97	0.47
1:A:244:ILE:O	1:A:247:VAL:HG12	2.16	0.46
1:A:182:LEU:HD22	1:A:346:ILE:HD12	1.97	0.46
3:A:803:CLR:H152	3:A:803:CLR:H221	1.98	0.46
1:A:245:TYR:HA	1:A:248:ILE:HG12	1.97	0.46
1:A:435:LEU:HD21	1:A:440:LEU:HD21	1.98	0.46
1:A:637:VAL:HG11	1:A:670:ILE:HD12	1.98	0.46
1:A:222:LEU:HD12	1:A:445:ILE:HD12	1.98	0.46
1:A:87:GLY:HA3	1:A:416:VAL:CG1	2.46	0.45
3:A:802:CLR:H273	3:A:802:CLR:H232	1.85	0.45
1:A:545:TYR:CZ	1:A:547:ALA:HB3	2.52	0.45
1:A:545:TYR:HA	1:A:653:ASP:OD1	2.17	0.45
1:A:273:LEU:HB2	3:A:803:CLR:C21	2.47	0.44
1:A:254:ILE:N	1:A:255:PRO:HD2	2.32	0.44
1:A:676:LEU:HD23	1:A:679:CYS:SG	2.58	0.44
1:A:223:LEU:CD2	1:A:243:VAL:HG13	2.48	0.44
1:A:508:THR:HB	1:A:538:PHE:CZ	2.53	0.44
1:A:225:GLN:O	1:A:229:LEU:HB2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:347:ALA:O	1:A:351:LEU:HG	2.18	0.43
1:A:110:ILE:HD11	1:A:425:LEU:HD23	2.01	0.43
1:A:227:LYS:HE2	1:A:228:TYR:CE2	2.54	0.43
1:A:75:ASN:ND2	1:A:78:GLU:OE2	2.52	0.42
1:A:534:GLY:O	1:A:640:HIS:ND1	2.52	0.42
1:A:355:ILE:HD11	1:A:375:LEU:HD23	2.01	0.42
1:A:448:LEU:HD12	1:A:448:LEU:HA	1.92	0.41
1:A:641:THR:OG1	1:A:716:ARG:NH2	2.53	0.41
1:A:119:PRO:HA	1:A:381:MET:HG3	2.03	0.41
1:A:507:ARG:NH2	1:A:522:ASP:OD2	2.53	0.41
4:A:807:LBN:C12	4:A:808:LBN:C5	2.99	0.41
1:A:119:PRO:HB2	1:A:120:PRO:HD3	2.01	0.41
1:A:227:LYS:HG3	1:A:228:TYR:N	2.36	0.41
1:A:514:ILE:HD13	1:A:529:ALA:HB2	2.02	0.41
1:A:95:ILE:HD13	1:A:424:VAL:HG21	2.03	0.40
1:A:435:LEU:HD12	1:A:436:PRO:HD2	2.04	0.40
1:A:687:LEU:HD23	1:A:687:LEU:HA	1.92	0.40
1:A:71:LEU:N	1:A:72:PRO:HD2	2.36	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	591 / 753 (78%)	551 (93%)	39 (7%)	1 (0%)	47 82

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	285	LYS

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	503/637 (79%)	490 (97%)	13 (3%)	46 78

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	60	LEU
1	A	119	PRO
1	A	137	PHE
1	A	227	LYS
1	A	245	TYR
1	A	369	ILE
1	A	398	SER
1	A	542	SER
1	A	557	LYS
1	A	573	LYS
1	A	576	LYS
1	A	686	LYS
1	A	722	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	190	GLN
1	A	253	ASN
1	A	454	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

11 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	LBN	A	807	-	51,51,51	0.47	1 (1%)	57,59,59	0.56	0
4	LBN	A	808	-	13,13,51	1.19	1 (7%)	12,12,59	0.37	0
3	CLR	A	802	-	31,31,31	0.48	0	48,48,48	0.87	1 (2%)
4	LBN	A	804	-	13,13,51	0.19	0	12,12,59	0.10	0
4	LBN	A	810	-	15,15,51	0.18	0	14,14,59	0.30	0
4	LBN	A	809	-	14,14,51	0.21	0	13,13,59	0.18	0
4	LBN	A	811	-	13,13,51	0.31	0	12,12,59	0.40	0
3	CLR	A	803	-	31,31,31	0.50	0	48,48,48	1.14	3 (6%)
4	LBN	A	806	-	51,51,51	0.34	0	57,59,59	0.44	0
4	LBN	A	805	-	15,15,51	0.25	0	14,14,59	0.30	0
2	SO4	A	801	-	4,4,4	0.37	0	6,6,6	0.25	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LBN	A	807	-	-	31/55/55/55	-
4	LBN	A	808	-	-	5/11/11/55	-
3	CLR	A	802	-	-	7/10/68/68	0/4/4/4
4	LBN	A	804	-	-	6/11/11/55	-
4	LBN	A	810	-	-	7/13/13/55	-
4	LBN	A	809	-	-	7/12/12/55	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LBN	A	811	-	-	10/11/11/55	-
3	CLR	A	803	-	-	6/10/68/68	0/4/4/4
4	LBN	A	806	-	-	27/55/55/55	-
4	LBN	A	805	-	-	6/13/13/55	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	808	LBN	C42-C5	4.08	1.55	1.31
4	A	807	LBN	C12-N1	-2.27	1.43	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	803	CLR	C16-C15-C14	-5.21	94.82	105.13
3	A	803	CLR	C15-C14-C8	2.77	123.64	119.08
3	A	803	CLR	C14-C8-C9	-2.44	105.82	109.09
3	A	802	CLR	C15-C14-C13	2.22	106.52	103.84

There are no chirality outliers.

All (112) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	806	LBN	C9-O2-P1-O1
4	A	806	LBN	C9-O2-P1-O3
4	A	806	LBN	C9-O2-P1-O4
4	A	807	LBN	C9-O2-P1-O4
4	A	807	LBN	O7-C2-C3-O5
3	A	802	CLR	C13-C17-C20-C22
4	A	807	LBN	C26-C25-O5-C3
4	A	807	LBN	C26-C27-C28-C29
4	A	808	LBN	C14-C17-C20-C22
4	A	807	LBN	O6-C25-O5-C3
4	A	811	LBN	C7-C10-C13-C16
4	A	806	LBN	C26-C25-O5-C3
4	A	810	LBN	C27-C28-C29-C30
4	A	805	LBN	C33-C4-C7-C10
3	A	803	CLR	C13-C17-C20-C22
4	A	806	LBN	C32-C33-C4-C7
3	A	802	CLR	C22-C23-C24-C25

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Mol	Chain	Res	Type	Atoms
4	A	810	LBN	C29-C30-C31-C32
3	A	803	CLR	C16-C17-C20-C21
4	A	805	LBN	C7-C10-C13-C16
3	A	803	CLR	C13-C17-C20-C21
4	A	806	LBN	O6-C25-O5-C3
4	A	811	LBN	C29-C30-C31-C32
4	A	806	LBN	C1-O1-P1-O2
4	A	811	LBN	C31-C32-C33-C4
3	A	802	CLR	C13-C17-C20-C21
4	A	807	LBN	C9-C6-N1-C12
4	A	807	LBN	C9-C6-N1-C15
3	A	802	CLR	C16-C17-C20-C22
4	A	810	LBN	C26-C27-C28-C29
4	A	804	LBN	C32-C33-C4-C7
4	A	806	LBN	C17-C20-C22-C23
4	A	806	LBN	C26-C27-C28-C29
4	A	809	LBN	C28-C29-C30-C31
4	A	811	LBN	C30-C31-C32-C33
4	A	806	LBN	C34-C35-C36-C37
4	A	806	LBN	C30-C31-C32-C33
4	A	807	LBN	C27-C28-C29-C30
4	A	806	LBN	C37-C38-C39-C40
4	A	810	LBN	C30-C31-C32-C33
4	A	806	LBN	C38-C39-C40-C41
4	A	810	LBN	C28-C29-C30-C31
4	A	811	LBN	C32-C33-C4-C7
4	A	806	LBN	C27-C28-C29-C30
4	A	806	LBN	C35-C36-C37-C38
4	A	809	LBN	C29-C30-C31-C32
4	A	807	LBN	C37-C38-C39-C40
4	A	809	LBN	C32-C33-C4-C7
4	A	807	LBN	C41-C42-C5-C8
4	A	809	LBN	C7-C10-C13-C16
4	A	805	LBN	C10-C13-C16-C19
3	A	802	CLR	C16-C17-C20-C21
4	A	811	LBN	C10-C13-C16-C19
4	A	811	LBN	C33-C4-C7-C10
4	A	807	LBN	C9-C6-N1-C18
4	A	809	LBN	C30-C31-C32-C33
4	A	804	LBN	C26-C27-C28-C29
4	A	807	LBN	C14-C11-C8-C5
4	A	807	LBN	C35-C34-O7-C2

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Mol	Chain	Res	Type	Atoms
4	A	807	LBN	O1-C1-C2-O7
4	A	807	LBN	O8-C34-O7-C2
4	A	806	LBN	C14-C17-C20-C22
4	A	806	LBN	C8-C11-C14-C17
4	A	810	LBN	C13-C10-C7-C4
4	A	811	LBN	C28-C29-C30-C31
4	A	807	LBN	C1-C2-C3-O5
4	A	804	LBN	C7-C10-C13-C16
4	A	809	LBN	C13-C10-C7-C4
4	A	807	LBN	C32-C33-C4-C7
4	A	810	LBN	C25-C26-C27-C28
4	A	807	LBN	C31-C32-C33-C4
4	A	808	LBN	C17-C20-C22-C23
3	A	803	CLR	C16-C17-C20-C22
4	A	806	LBN	O1-C1-C2-C3
4	A	811	LBN	C13-C16-C19-C21
4	A	806	LBN	C29-C30-C31-C32
4	A	807	LBN	C14-C17-C20-C22
3	A	803	CLR	C17-C20-C22-C23
4	A	806	LBN	O1-C1-C2-O7
4	A	804	LBN	C29-C30-C31-C32
4	A	806	LBN	C28-C29-C30-C31
4	A	806	LBN	C35-C34-O7-C2
4	A	807	LBN	C34-C35-C36-C37
4	A	807	LBN	C8-C11-C14-C17
4	A	807	LBN	O1-C1-C2-C3
4	A	808	LBN	C37-C38-C39-C40
4	A	808	LBN	C39-C40-C41-C42
4	A	806	LBN	O8-C34-O7-C2
4	A	805	LBN	C13-C10-C7-C4
4	A	806	LBN	C1-O1-P1-O4
4	A	807	LBN	C6-C9-O2-P1
4	A	807	LBN	C13-C16-C19-C21
4	A	807	LBN	N1-C6-C9-O2
4	A	805	LBN	C26-C27-C28-C29
3	A	802	CLR	C23-C24-C25-C27
4	A	806	LBN	C1-C2-O7-C34
4	A	807	LBN	C9-O2-P1-O1
4	A	804	LBN	C30-C31-C32-C33
4	A	807	LBN	C10-C13-C16-C19
4	A	811	LBN	C13-C10-C7-C4
4	A	806	LBN	C3-C2-O7-C34

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Mol	Chain	Res	Type	Atoms
3	A	802	CLR	C23-C24-C25-C26
4	A	807	LBN	C38-C39-C40-C41
4	A	804	LBN	C28-C29-C30-C31
3	A	803	CLR	C22-C23-C24-C25
4	A	807	LBN	C35-C36-C37-C38
4	A	805	LBN	C13-C16-C19-C21
4	A	808	LBN	C8-C11-C14-C17
4	A	807	LBN	C11-C14-C17-C20
4	A	809	LBN	C10-C13-C16-C19
4	A	807	LBN	C17-C20-C22-C23
4	A	806	LBN	C20-C22-C23-C24

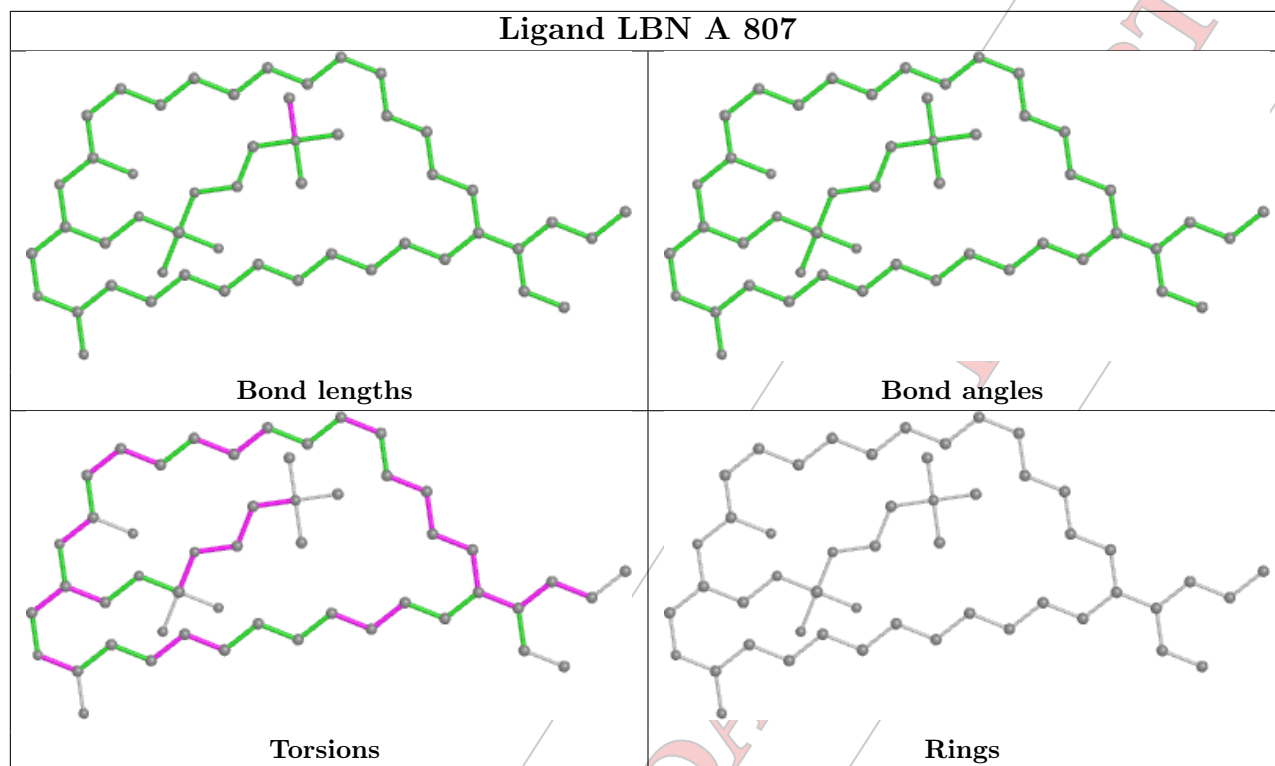
There are no ring outliers.

4 monomers are involved in 12 short contacts:

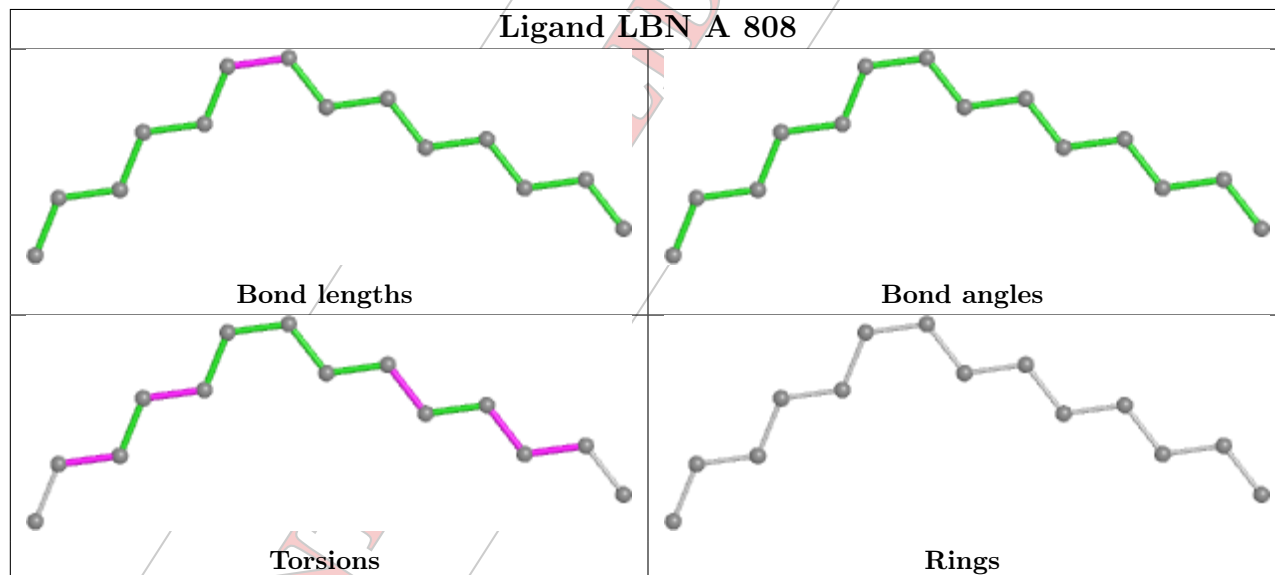
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	807	LBN	4	0
4	A	808	LBN	4	0
3	A	802	CLR	2	0
3	A	803	CLR	6	0

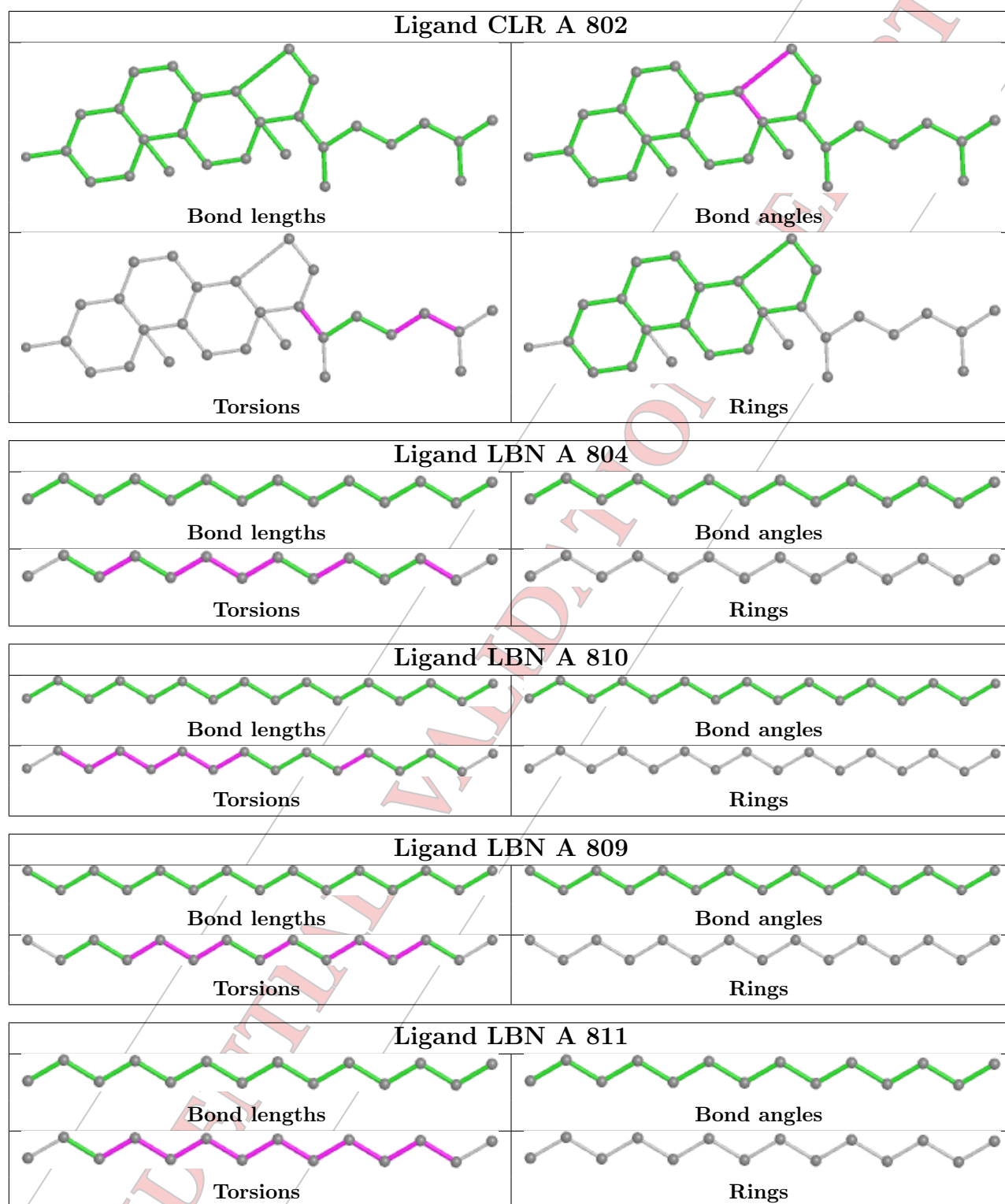
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

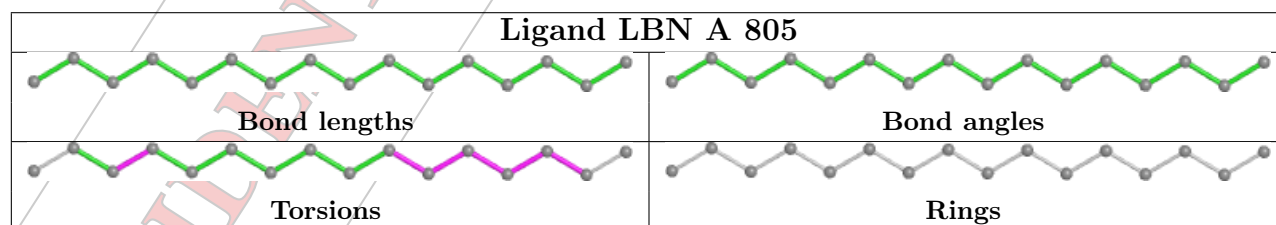
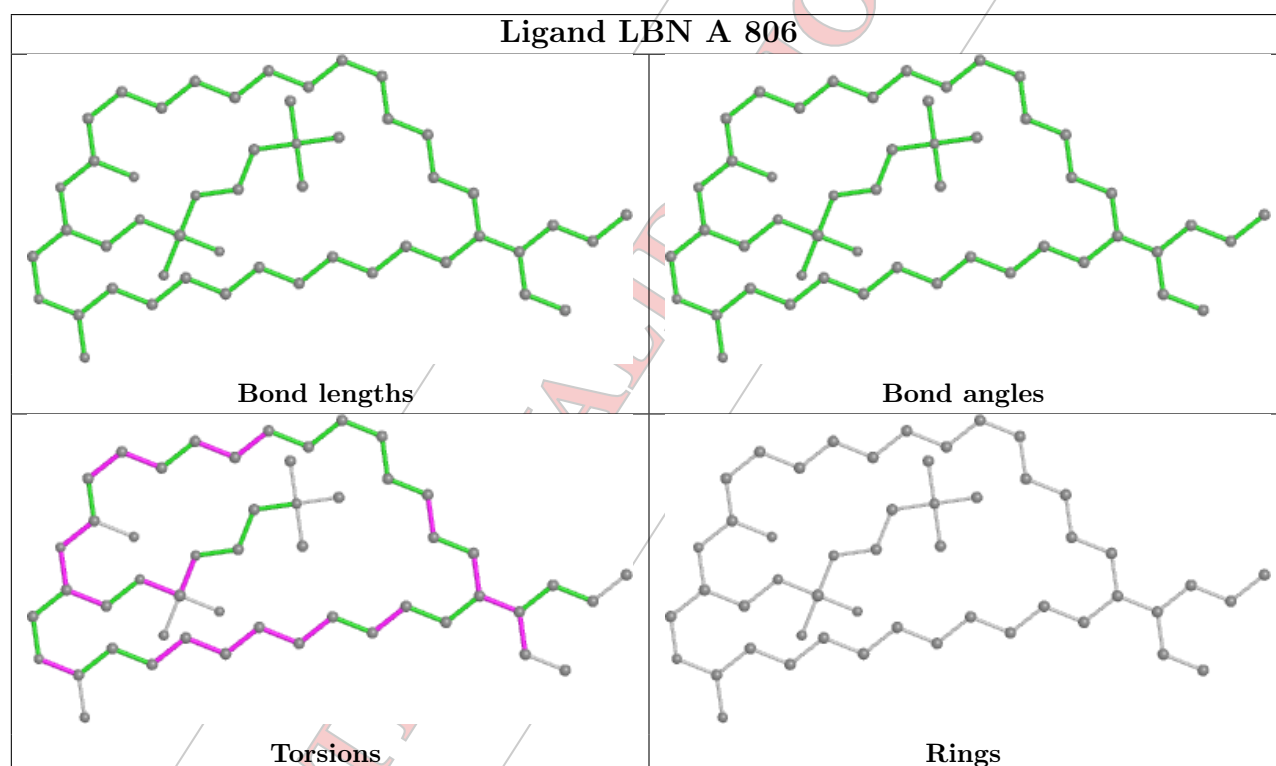
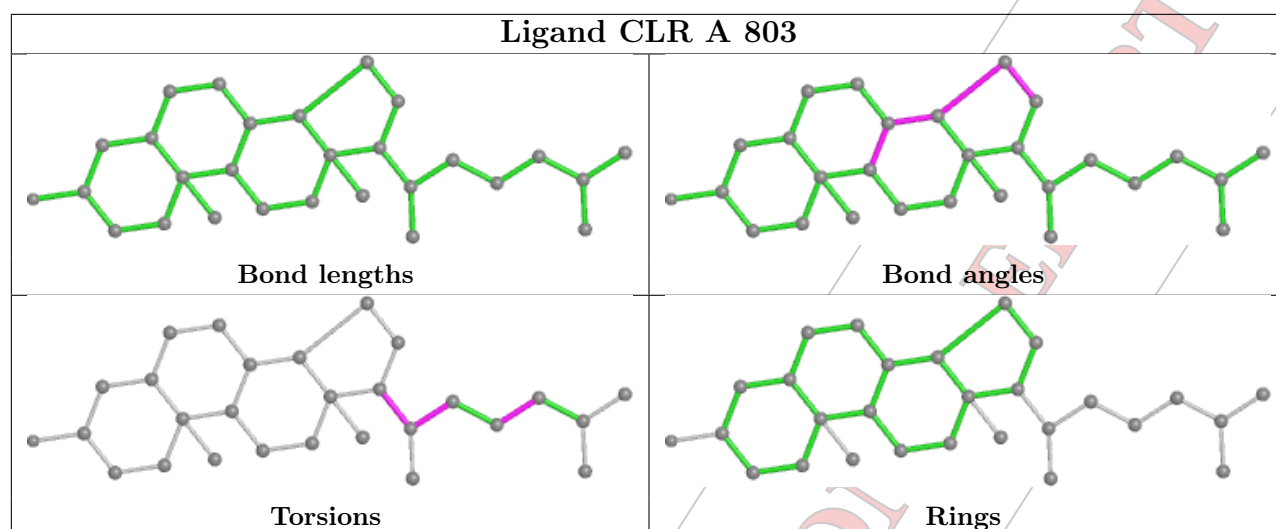
Ligand LBN A 807

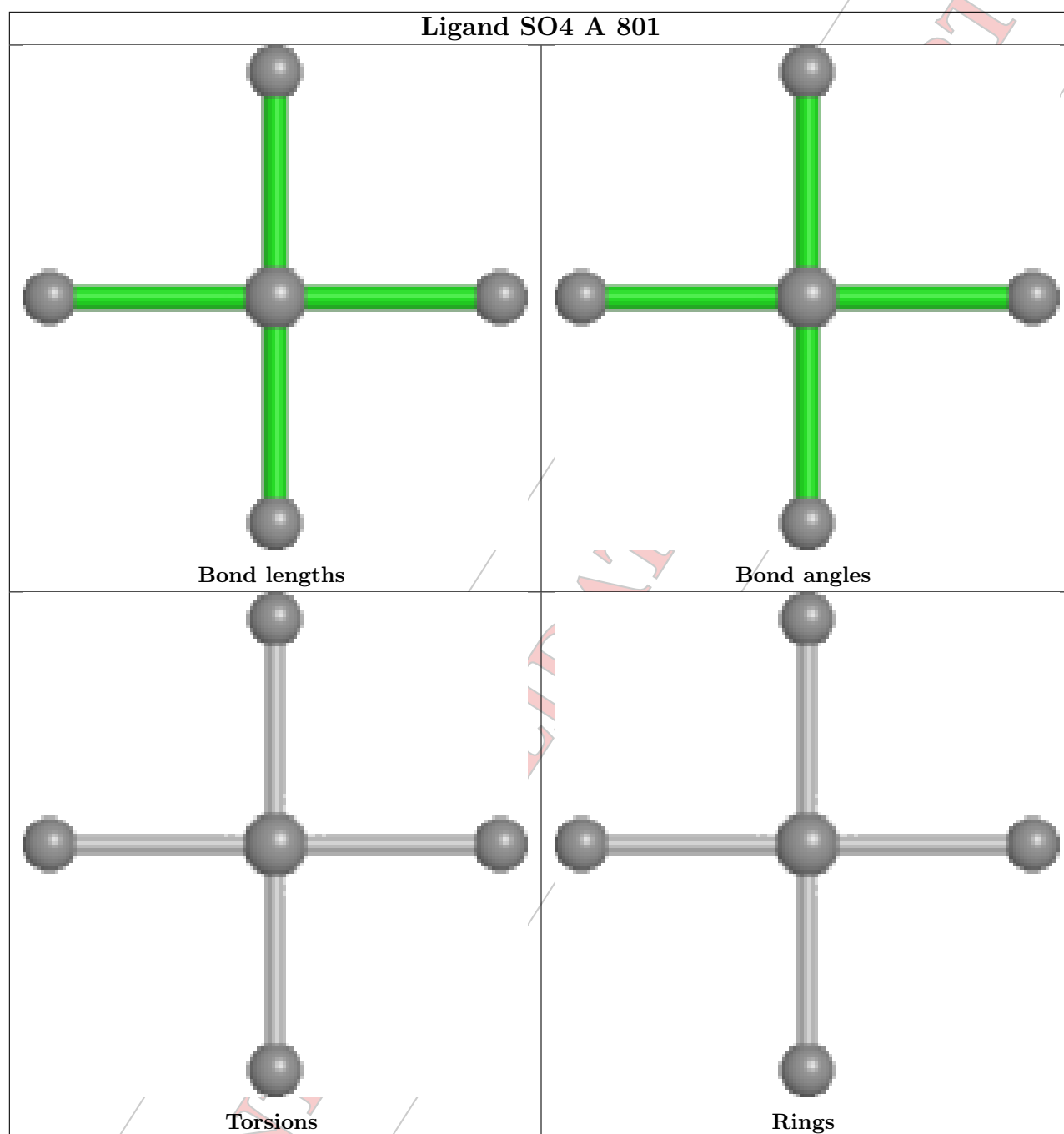


Ligand LBN A 808









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.

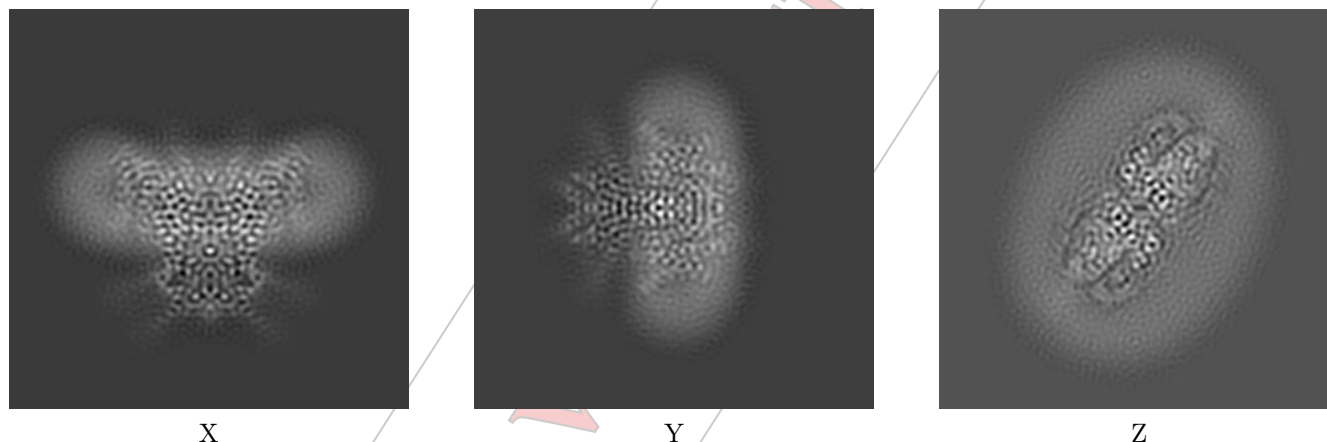
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31758. These allow visual inspection of the internal detail of the map and identification of artifacts.

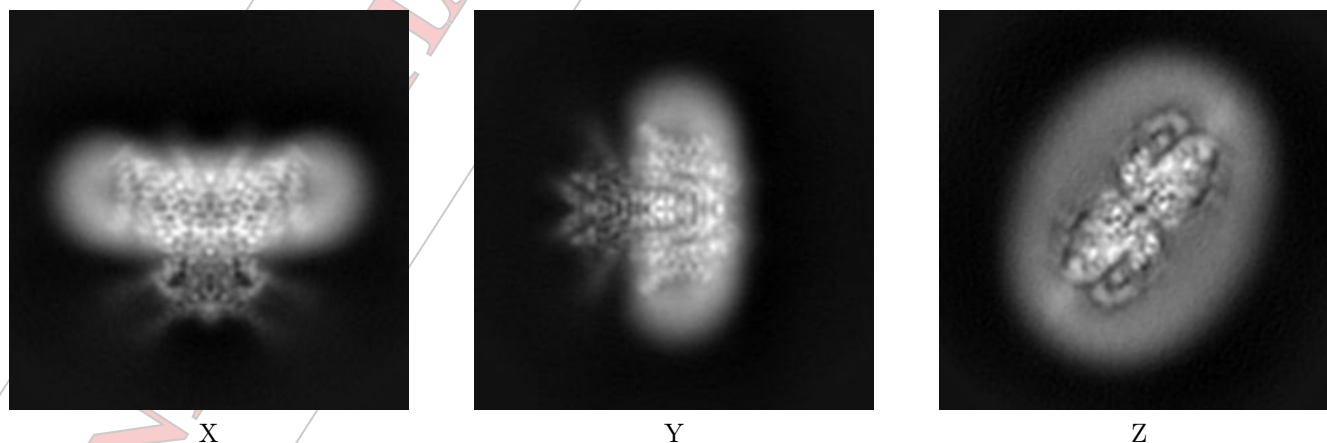
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

6.1.1 Primary map



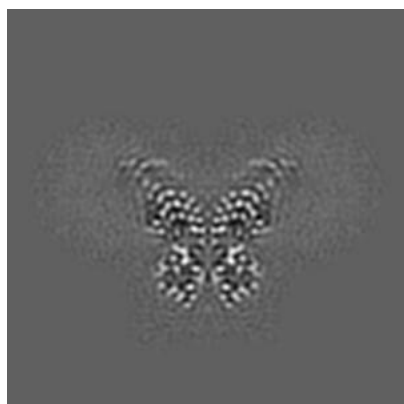
6.1.2 Raw map



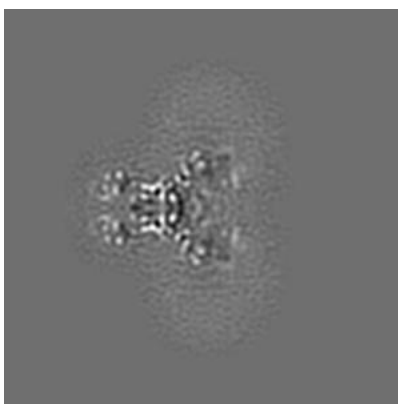
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

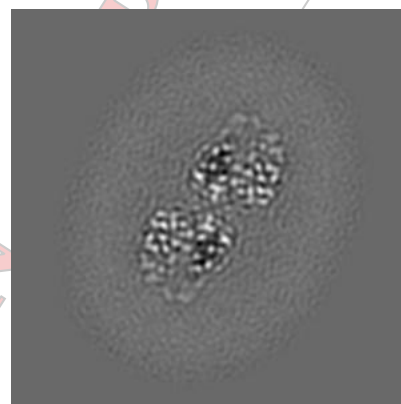
6.2.1 Primary map



X Index: 87

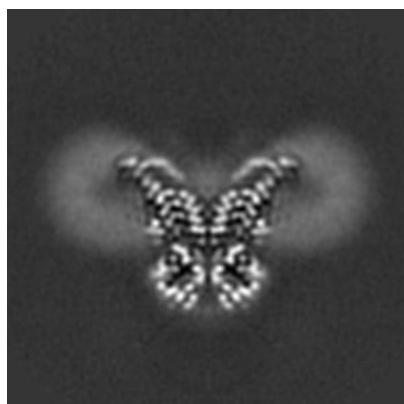


Y Index: 87

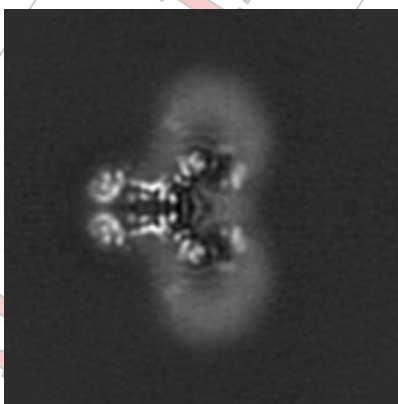


Z Index: 87

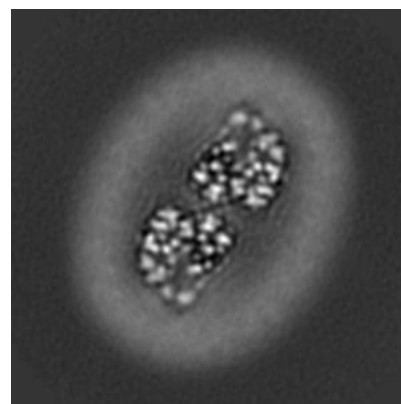
6.2.2 Raw map



X Index: 87



Y Index: 87

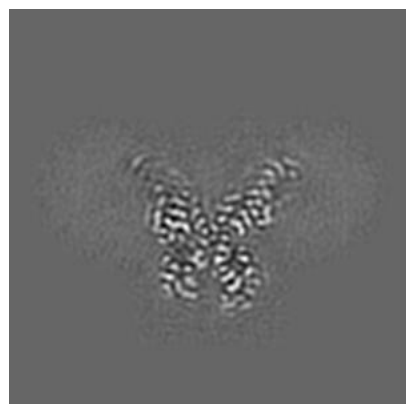


Z Index: 87

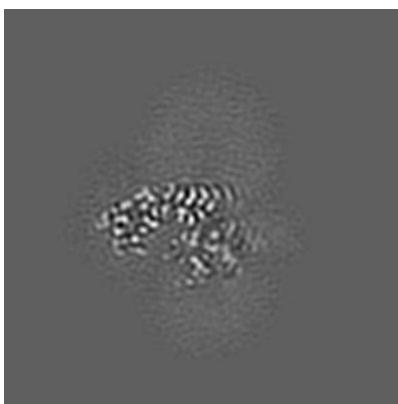
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

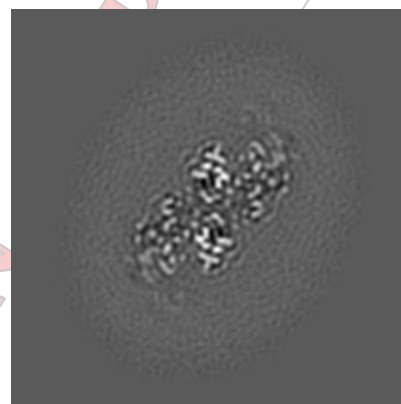
6.3.1 Primary map



X Index: 89

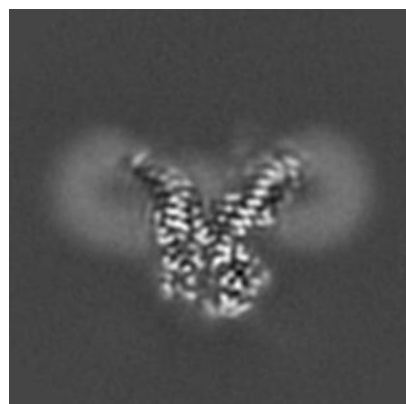


Y Index: 73

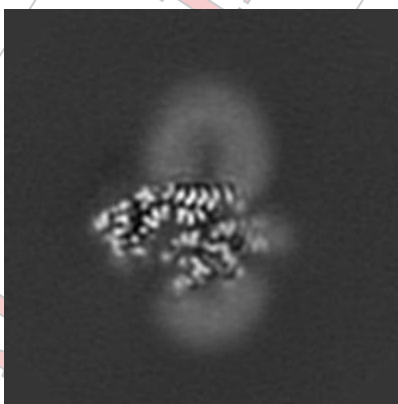


Z Index: 81

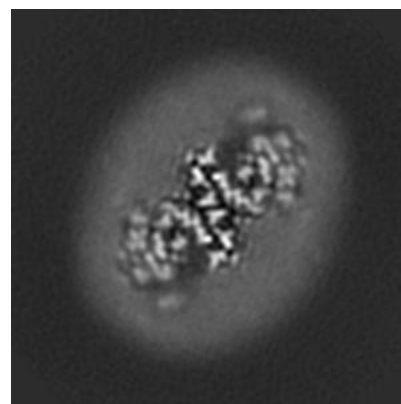
6.3.2 Raw map



X Index: 90



Y Index: 73

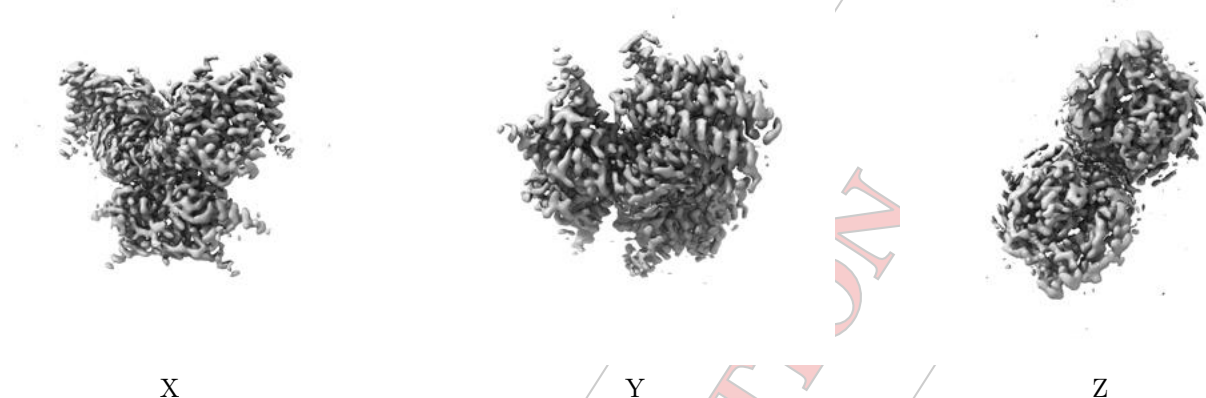


Z Index: 77

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

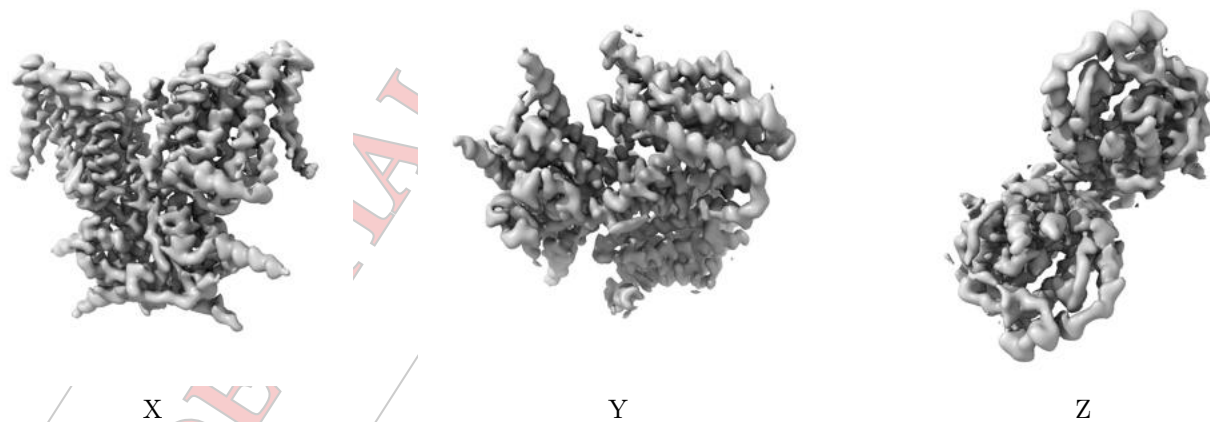
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0359. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

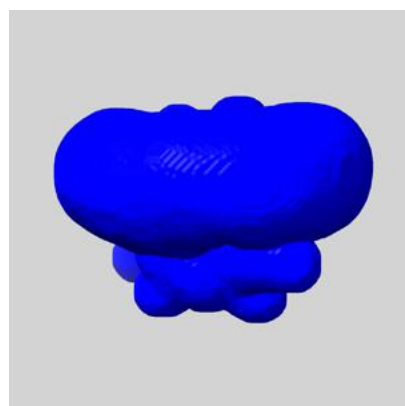
6.5 Mask visualisation [i](#)

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

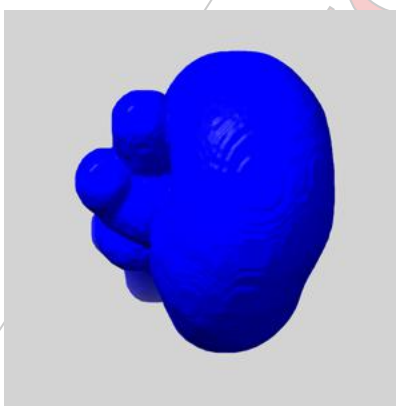
A mask typically either:

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

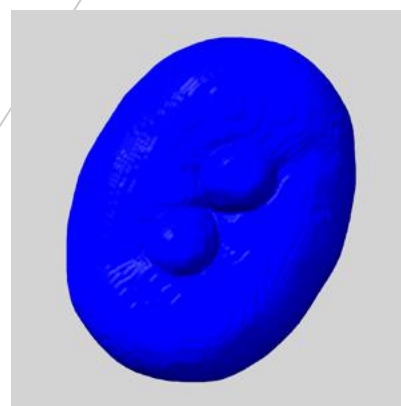
6.5.1 D_1300024141_em-mask-volume_P1.map.V2 [i](#)



X



Y

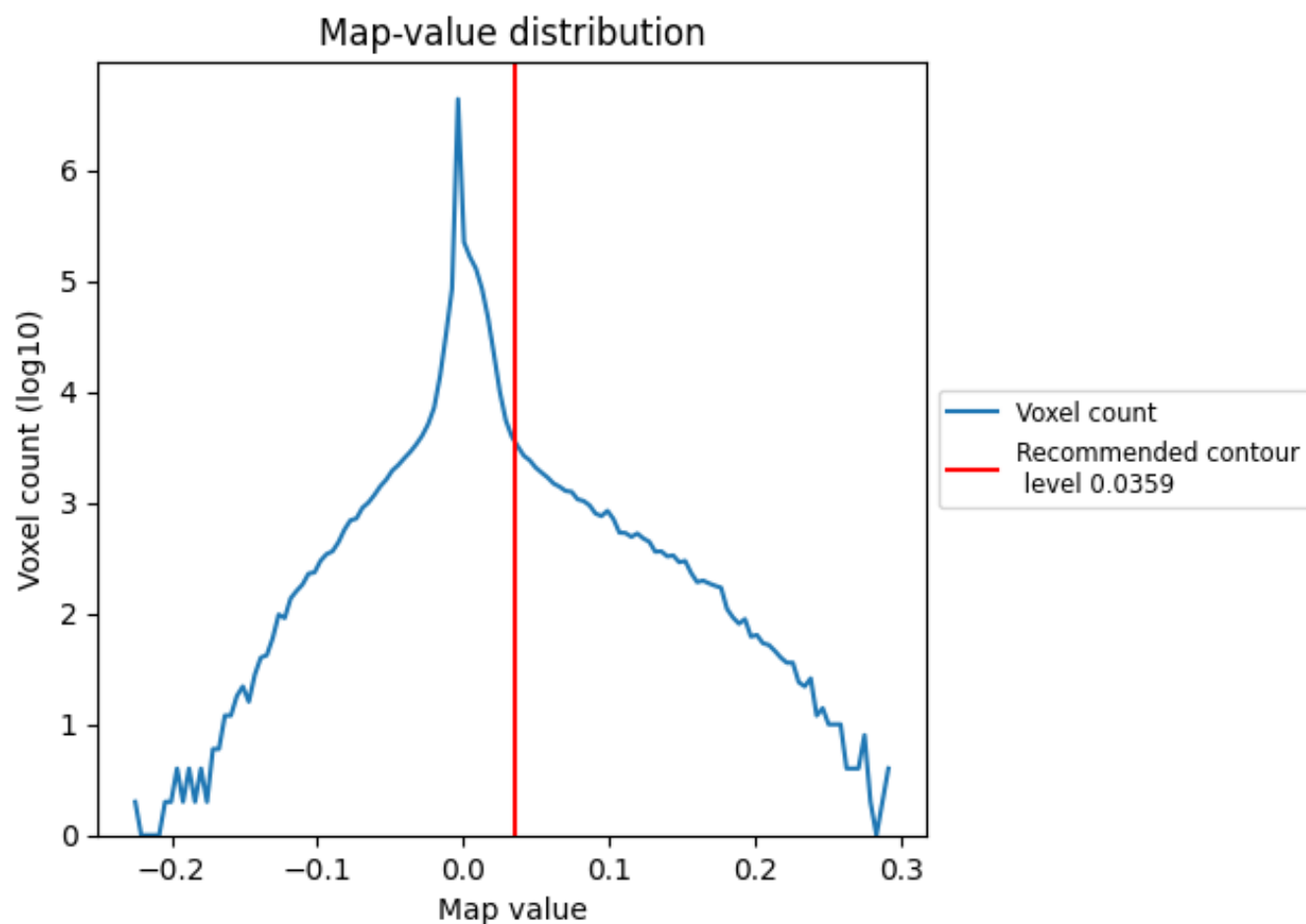


Z

7 Map analysis [i](#)

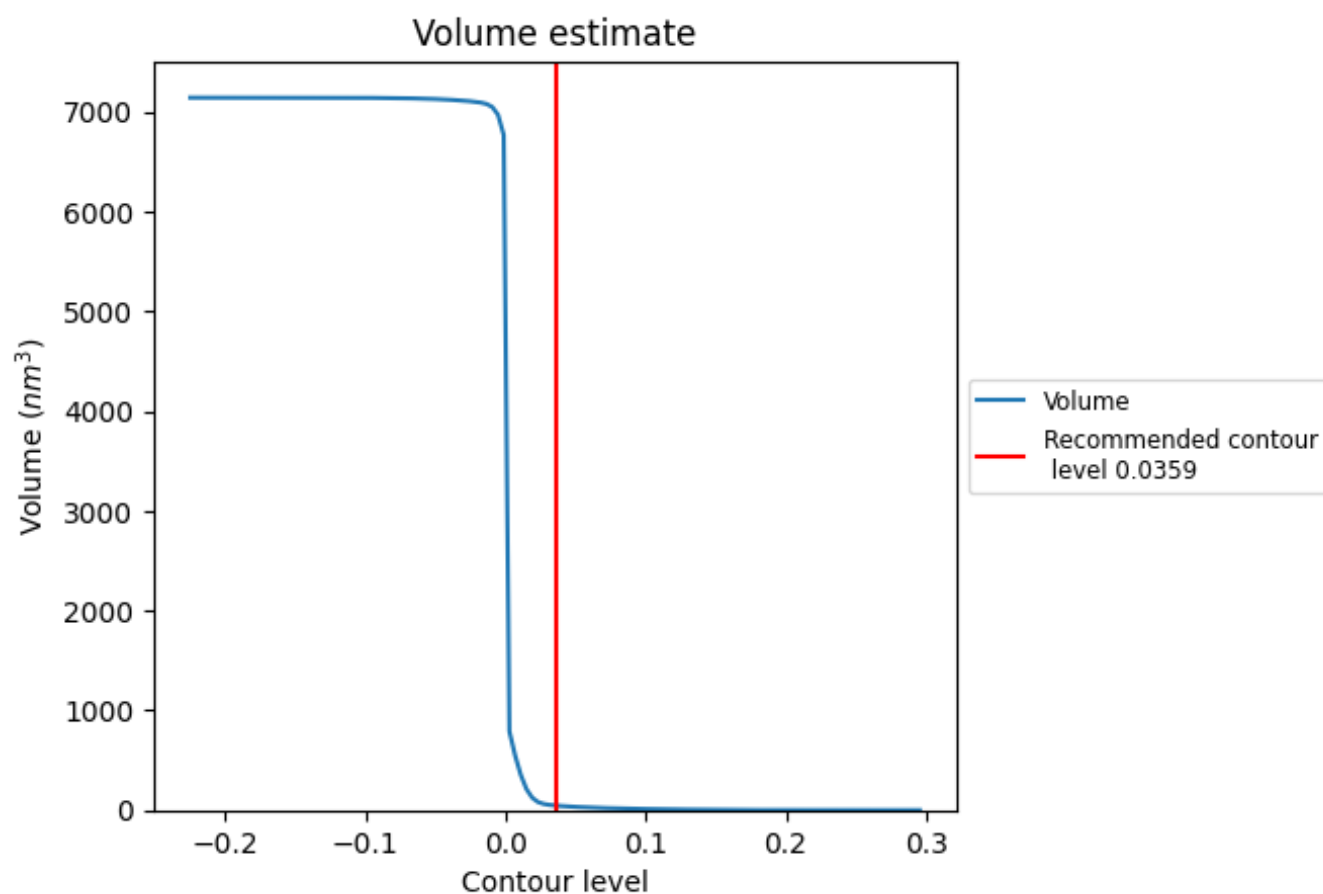
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

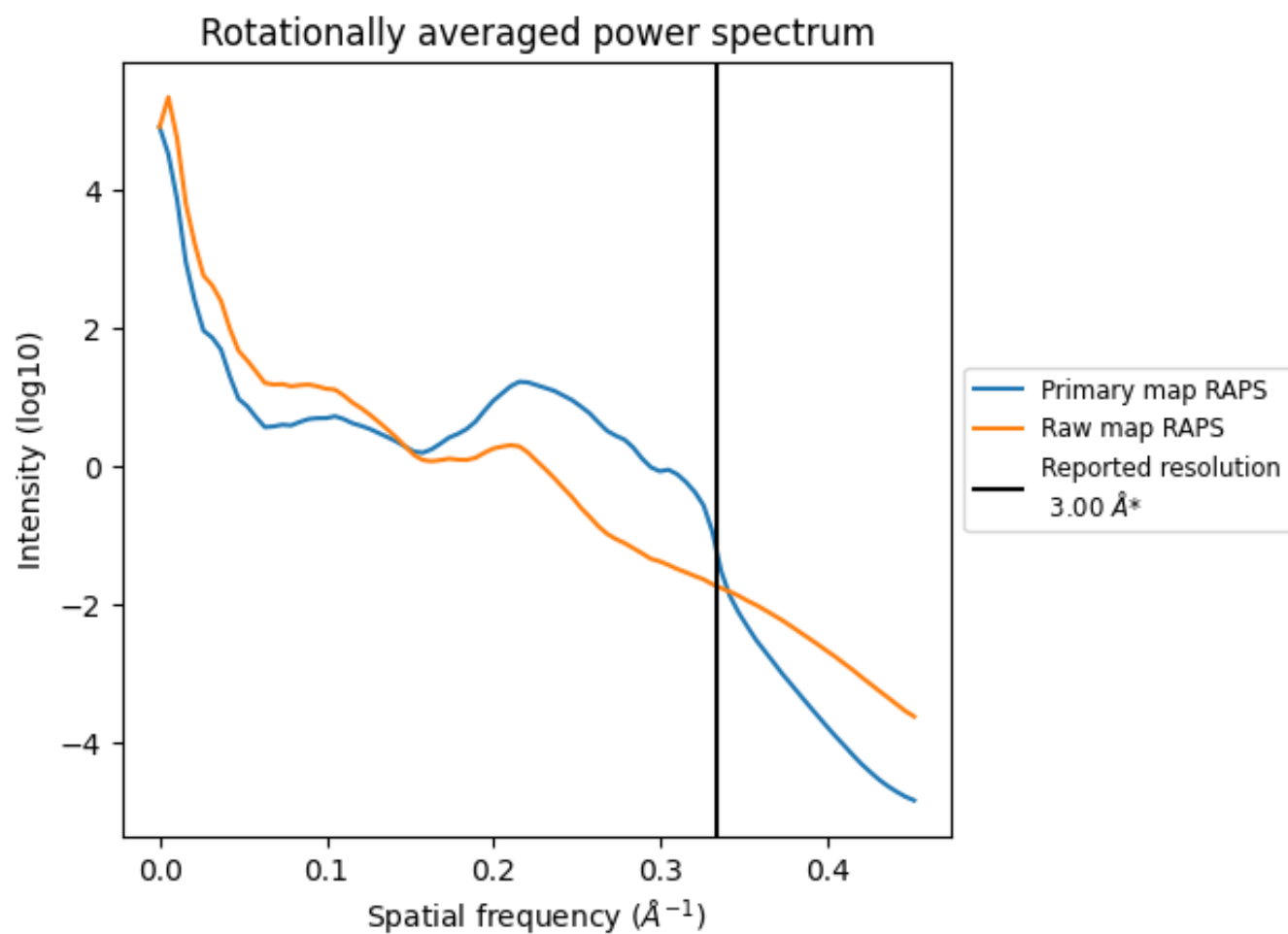
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 46 nm^3 ; this corresponds to an approximate mass of 41 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 ⓘ

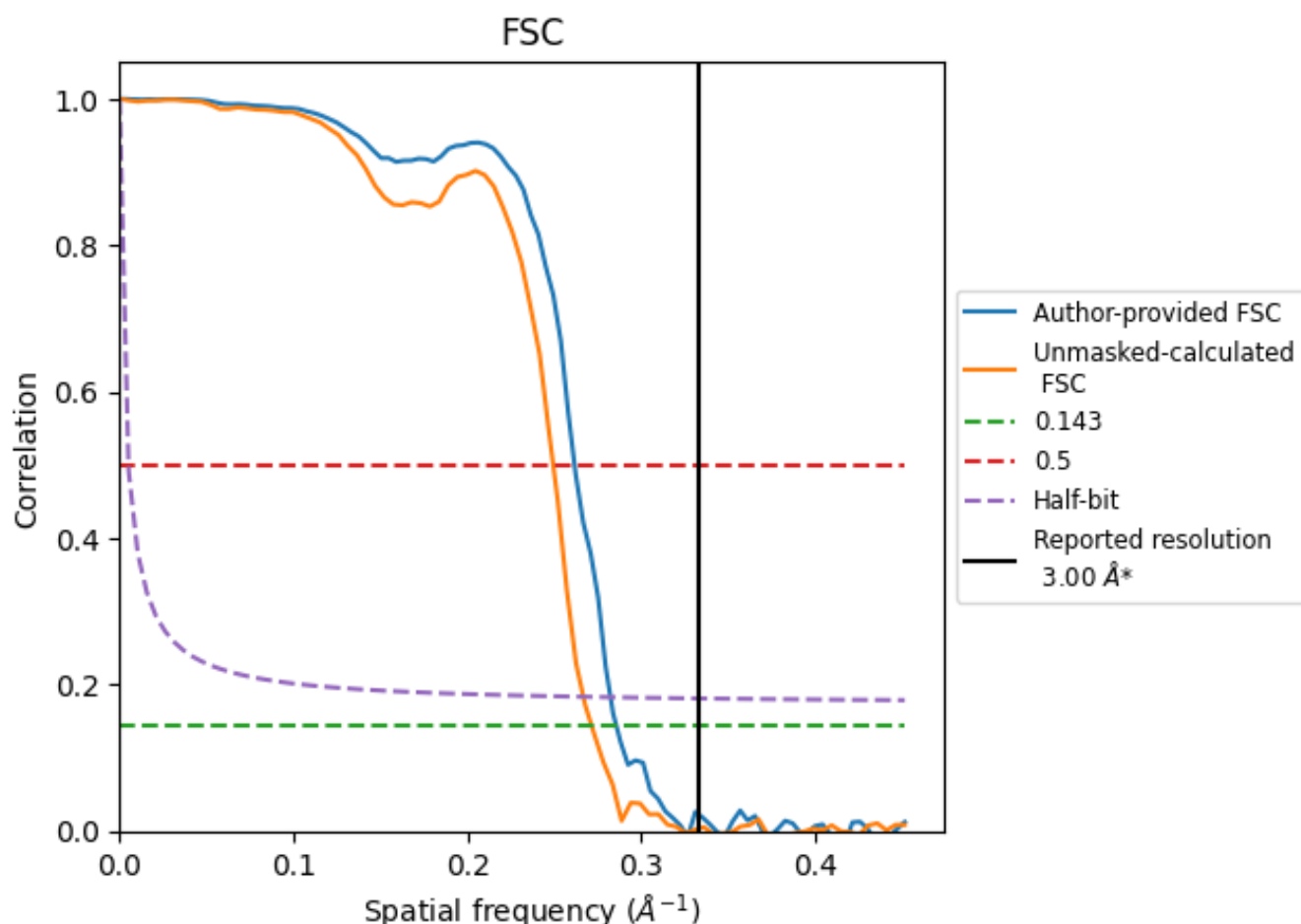


*Reported resolution corresponds to spatial frequency of $0.333 \text{ \AA}^{-1}$

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	3.50	3.82	3.54
Unmasked-calculated*	3.68	4.01	3.75

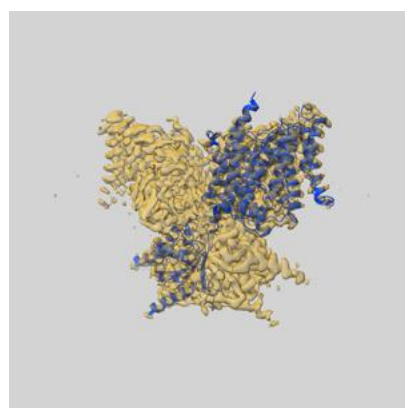
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 3.50 differs from the reported value 3.0 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.68 differs from the reported value 3.0 by more than 10 %

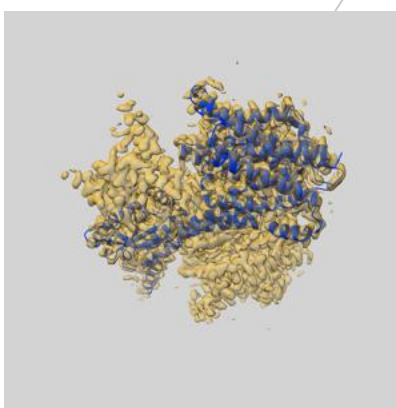
9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-31758 and PDB model 7V74. Per-residue inclusion information can be found in section 3 on page 6.

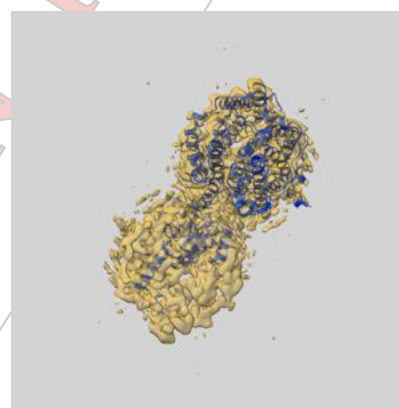
9.0.1 Map-model overlay ⓘ



X

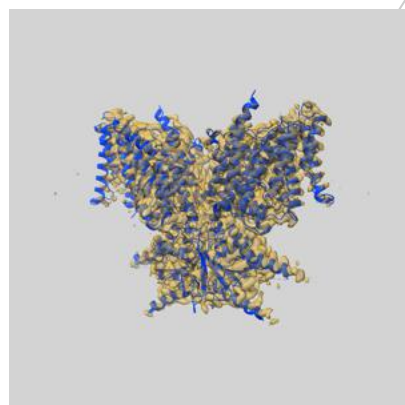


Y

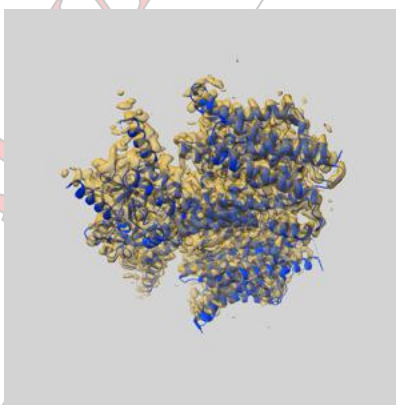


Z

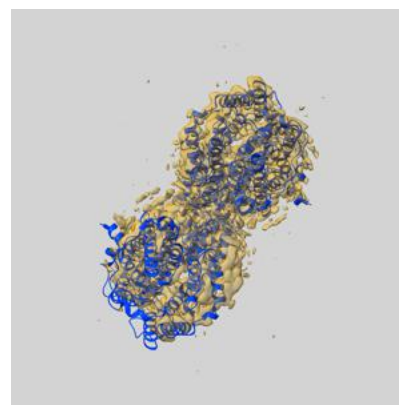
9.0.2 Map-model assembly overlay ⓘ



X



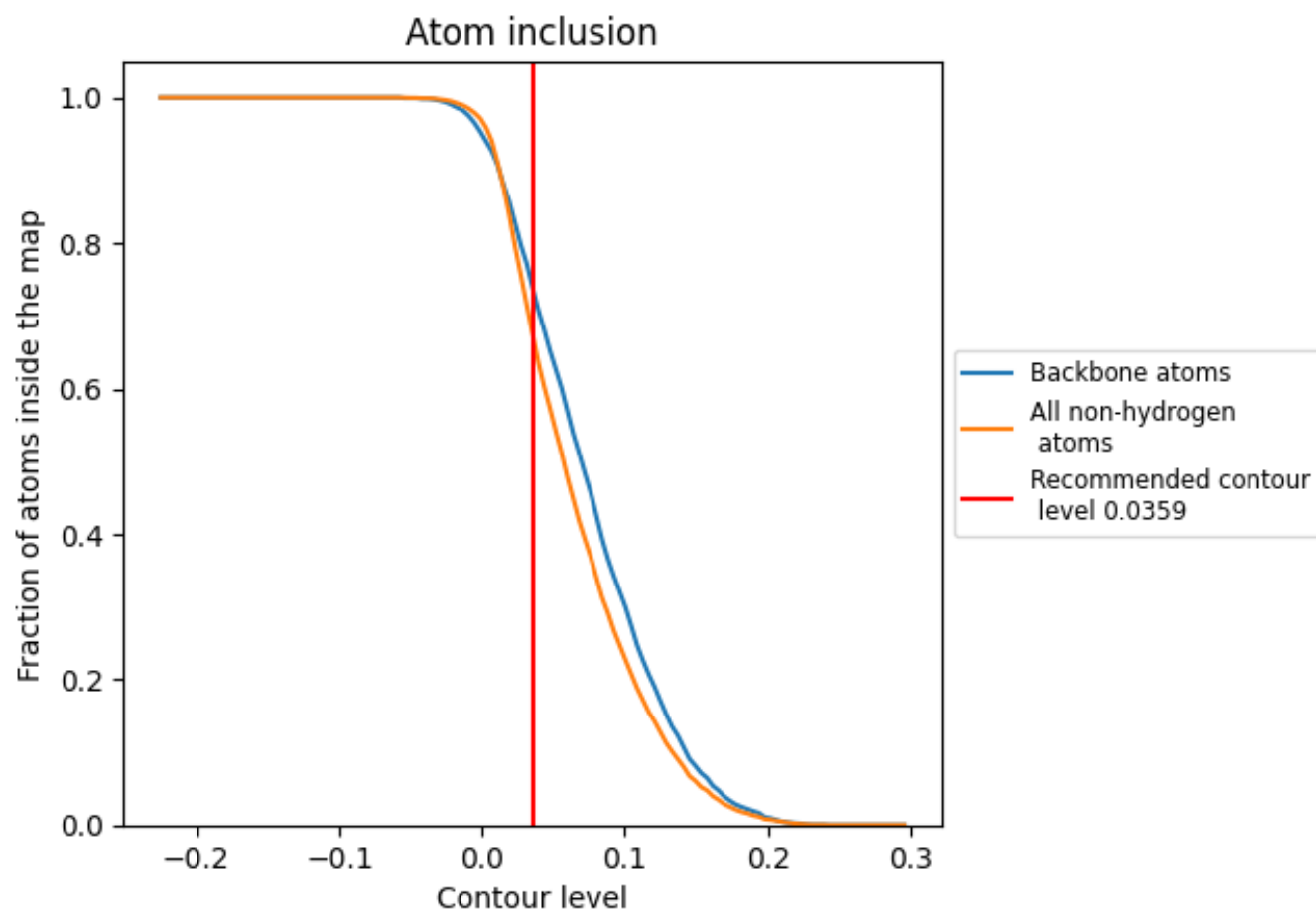
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0359 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.

9.1 Atom inclusion [i](#)



At the recommended contour level, 73% of all backbone atoms, 67% of all non-hydrogen atoms, are inside the map.



Full wwPDB EM Validation Report ⓘ

Sep 22, 2021 – 02:00 PM JST

PDB ID : 7V75
EMDB ID : EMD-31759
Title : Thermostabilized human prestin in complex with salicylate
Deposited on : 2021-08-21
Resolution : 3.00 Å(reported)
Based on initial model : 5DA0

This is a Full wwPDB EM Validation Report.

This report is produced by the wwPDB biocuration pipeline after annotation of the structure.

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

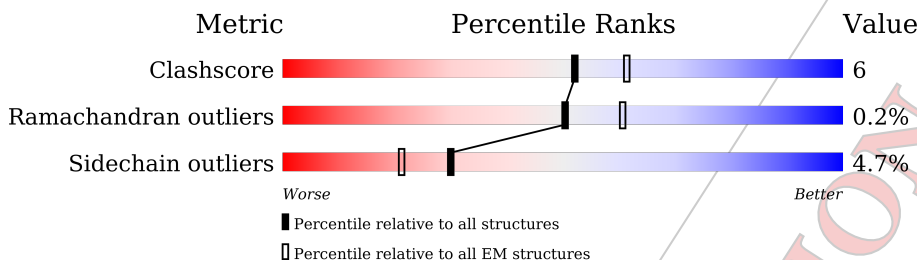
EMDB validation analysis : 0.0.0.dev97
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

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 3.00 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	753	12% 68% 11% 20%

2 Entry composition [i](#)

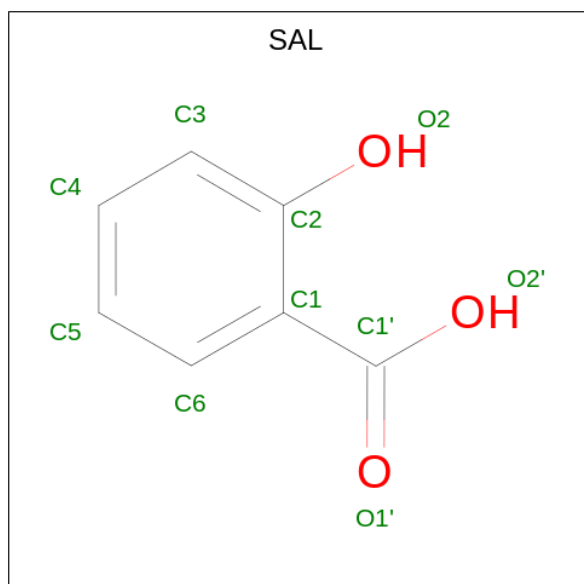
There are 4 unique types of molecules in this entry. The entry contains 4986 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 prestin.

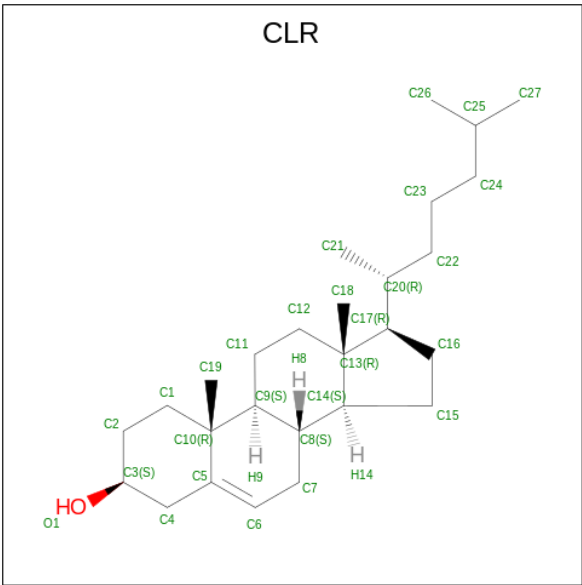
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	605	4687	3122	756	805	4	0	0

- Molecule 2 is 2-HYDROXYBENZOIC ACID (three-letter code: SAL) (formula: $C_7H_6O_3$) (labeled as "Ligand of Interest" by depositor).



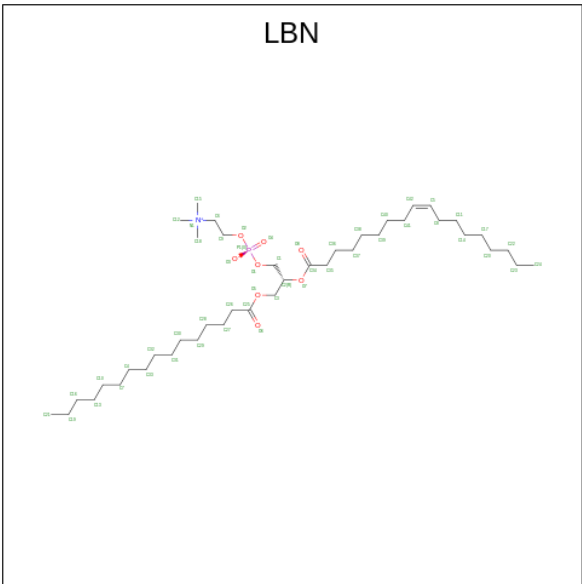
Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
2	A	1	10	7	3	0

- Molecule 3 is CHOLESTEROL (three-letter code: CLR) (formula: $C_{27}H_{46}O$).



Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	C	O	0
			56	54	2	
3	A	1	Total	C	O	0
			56	54	2	

- Molecule 4 is 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (three-letter code: LBN) (formula: C₄₂H₈₂NO₈P).



Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	

Continued on next page...

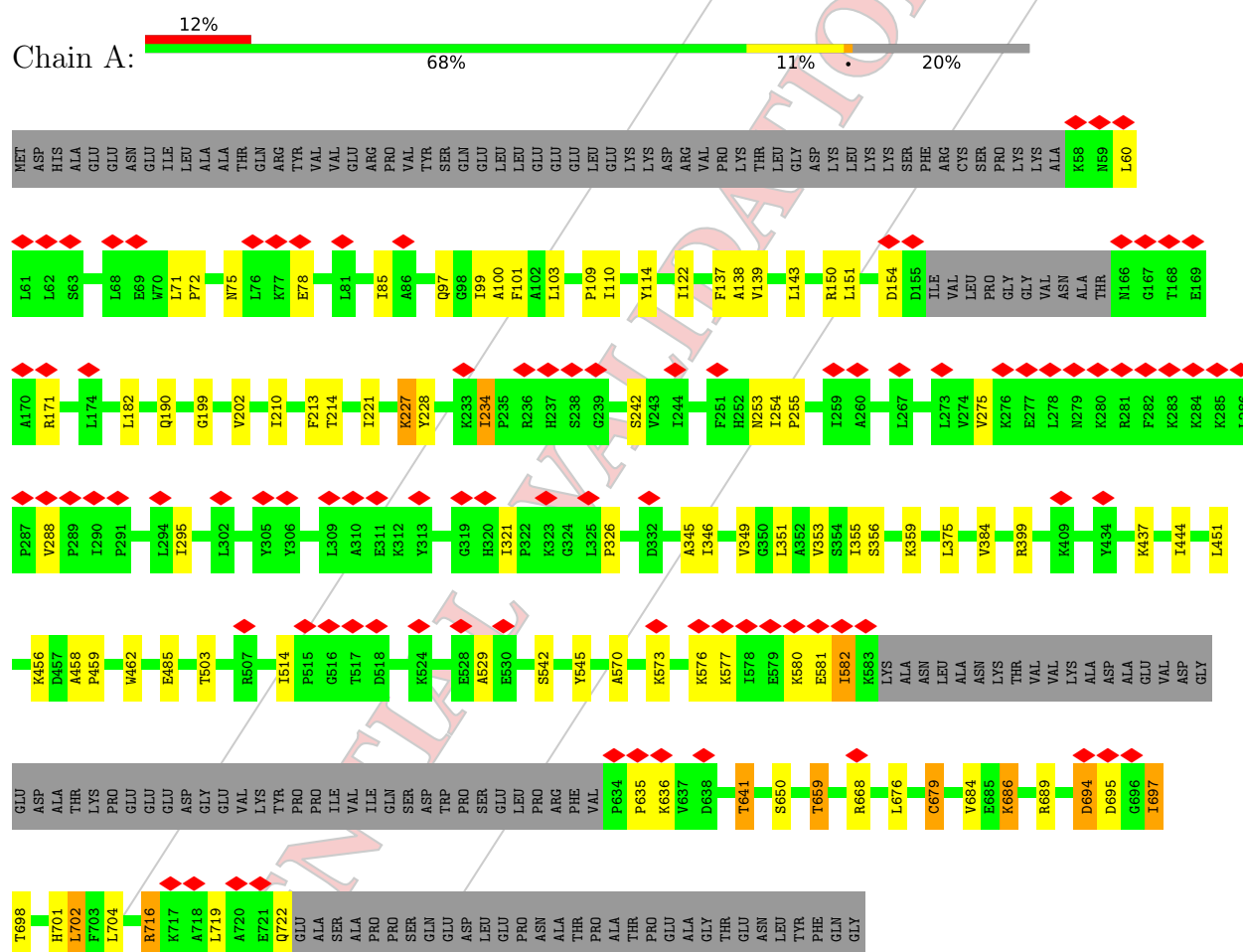
Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	
4	A	1	Total	C	N	O	P	0
			233	203	3	24	3	

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: prestin



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	113410	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 ($e^-/\text{\AA}^2$)	54	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.288	Depositor
Minimum map value	-0.189	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.04	Depositor
Map size (Å)	188.13391, 188.13391, 188.13391	wwPDB
Map dimensions	170, 170, 170	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.10667, 1.10667, 1.10667	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: CLR, SAL, LBN

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	0.81	1/4794 (0.0%)	0.96	8/6514 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	242	SER	CA-CB	-5.32	1.45	1.52

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	689	ARG	NE-CZ-NH1	6.03	123.31	120.30
1	A	399	ARG	NE-CZ-NH1	5.79	123.19	120.30
1	A	668	ARG	NE-CZ-NH2	-5.74	117.43	120.30
1	A	716	ARG	NE-CZ-NH1	5.72	123.16	120.30
1	A	659	THR	OG1-CB-CG2	-5.66	96.97	110.00
1	A	716	ARG	NE-CZ-NH2	-5.61	117.50	120.30
1	A	641	THR	OG1-CB-CG2	-5.25	97.94	110.00
1	A	213	PHE	CB-CG-CD1	-5.14	117.20	120.80

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	4687	0	4973	50	0
2	A	10	0	5	1	0
3	A	56	0	92	4	0
4	A	233	0	0	5	0
All	All	4986	0	5070	57	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (57) 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)
4:A:807:LBN:C24	4:A:811:LBN:C11	2.39	1.00
1:A:345:ALA:HB1	1:A:485:GLU:HG2	1.66	0.77
1:A:676:LEU:HB2	1:A:702:LEU:HD22	1.71	0.72
1:A:138:ALA:HB1	1:A:221:ILE:HG12	1.72	0.72
4:A:807:LBN:C12	4:A:808:LBN:C10	2.71	0.69
1:A:85:ILE:HD12	1:A:288:VAL:HG12	1.74	0.69
4:A:806:LBN:C29	4:A:807:LBN:C9	2.70	0.69
1:A:234:ILE:HG22	1:A:253:ASN:HD22	1.58	0.67
1:A:462:TRP:CD1	3:A:802:CLR:H193	2.30	0.66
1:A:114:TYR:CD1	1:A:326:PRO:HG3	2.34	0.63
1:A:351:LEU:HD22	1:A:375:LEU:HD22	1.80	0.63
4:A:807:LBN:O4	4:A:808:LBN:C13	2.48	0.61
1:A:85:ILE:HD12	1:A:288:VAL:CG1	2.31	0.61
1:A:345:ALA:CB	1:A:485:GLU:HG2	2.32	0.59
1:A:355:ILE:HD11	1:A:375:LEU:CD2	2.35	0.56
1:A:110:ILE:HD13	1:A:321:ILE:HG23	1.90	0.54
1:A:137:PHE:HE1	2:A:801:SAL:C1	2.20	0.53
1:A:150:ARG:HE	1:A:151:LEU:HD12	1.74	0.53
1:A:100:ALA:HB1	1:A:444:ILE:HD11	1.90	0.53
1:A:349:VAL:O	1:A:353:VAL:HG23	2.09	0.52
1:A:210:ILE:HD13	1:A:356:SER:OG	2.08	0.52
1:A:570:ALA:HB3	1:A:635:PRO:HG2	1.91	0.52
1:A:75:ASN:ND2	1:A:78:GLU:OE2	2.43	0.52
1:A:214:THR:HB	1:A:451:LEU:HD13	1.93	0.51
1:A:139:VAL:O	1:A:143:LEU:HG	2.10	0.51
1:A:143:LEU:HD22	1:A:485:GLU:OE1	2.11	0.49
1:A:190:GLN:HG2	1:A:351:LEU:HD21	1.94	0.49
1:A:355:ILE:HD11	1:A:375:LEU:HD23	1.95	0.49
1:A:182:LEU:HD22	1:A:346:ILE:HD12	1.95	0.48
1:A:103:LEU:HD13	1:A:437:LYS:HE3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:803:CLR:H211	3:A:803:CLR:H241	1.95	0.47
1:A:582:ILE:HD13	1:A:582:ILE:HA	1.82	0.46
1:A:503:THR:OG1	1:A:545:TYR:OH	2.16	0.45
1:A:676:LEU:HB3	1:A:679:CYS:SG	2.57	0.45
3:A:803:CLR:H222	3:A:803:CLR:H162	1.58	0.45
1:A:199:GLY:O	1:A:202:VAL:HG22	2.17	0.45
1:A:355:ILE:HD11	1:A:375:LEU:HD21	1.99	0.44
1:A:122:ILE:HD13	1:A:384:VAL:HB	2.00	0.43
1:A:99:ILE:HG23	1:A:109:PRO:HB3	2.00	0.43
1:A:275:VAL:HG21	1:A:295:ILE:HD11	2.00	0.43
1:A:514:ILE:HD13	1:A:529:ALA:HB2	2.00	0.43
1:A:679:CYS:HB2	1:A:684:VAL:HG23	2.00	0.43
1:A:97:GLN:O	1:A:101:PHE:CD2	2.72	0.43
1:A:254:ILE:N	1:A:255:PRO:HD2	2.33	0.42
1:A:686:LYS:HB2	1:A:686:LYS:HE3	1.47	0.42
1:A:71:LEU:N	1:A:72:PRO:HD2	2.34	0.42
1:A:202:VAL:HG23	1:A:359:LYS:HZ1	1.85	0.42
1:A:704:LEU:HD23	1:A:704:LEU:HA	1.78	0.41
1:A:458:ALA:N	1:A:459:PRO:HD2	2.34	0.41
1:A:697:ILE:HD13	1:A:701:HIS:HB2	2.00	0.41
1:A:100:ALA:HB1	1:A:444:ILE:CD1	2.51	0.41
1:A:227:LYS:HG3	1:A:228:TYR:N	2.36	0.41
3:A:802:CLR:H183	3:A:802:CLR:H20	1.99	0.41
1:A:456:LYS:HE3	4:A:804:LBN:C25	2.51	0.40
1:A:154:ASP:OD2	1:A:171:ARG:NH1	2.54	0.40
1:A:85:ILE:HG23	1:A:288:VAL:HG12	2.04	0.40
1:A:345:ALA:HB1	1:A:485:GLU:CG	2.42	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	599/753 (80%)	567 (95%)	31 (5%)	1 (0%)	47 82

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	694	ASP

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	511/637 (80%)	487 (95%)	24 (5%)	26 63

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	60	LEU
1	A	227	LYS
1	A	234	ILE
1	A	542	SER
1	A	573	LYS
1	A	576	LYS
1	A	577	LYS
1	A	580	LYS
1	A	581	GLU
1	A	582	ILE
1	A	636	LYS
1	A	641	THR
1	A	650	SER
1	A	659	THR
1	A	679	CYS
1	A	686	LYS
1	A	694	ASP
1	A	695	ASP
1	A	697	ILE
1	A	698	THR

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Mol	Chain	Res	Type
1	A	702	LEU
1	A	716	ARG
1	A	719	LEU
1	A	722	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	177	GLN
1	A	253	ASN
1	A	640	HIS
1	A	722	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

11 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	LBN	A	808	-	13,13,51	0.31	0	12,12,59	0.49	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	LBN	A	807	-	51,51,51	0.52	1 (1%)	57,59,59	0.47	0
2	SAL	A	801	-	8,10,10	1.99	1 (12%)	9,13,13	0.56	0
4	LBN	A	811	-	51,51,51	0.40	0	57,59,59	0.70	0
4	LBN	A	805	-	15,15,51	0.28	0	14,14,59	0.22	0
4	LBN	A	804	-	15,15,51	0.23	0	14,14,59	0.26	0
3	CLR	A	802	-	31,31,31	0.43	0	48,48,48	0.83	0
4	LBN	A	806	-	51,51,51	0.43	0	57,59,59	0.52	0
4	LBN	A	810	-	15,15,51	0.30	0	14,14,59	0.18	0
3	CLR	A	803	-	31,31,31	0.37	0	48,48,48	0.81	2 (4%)
4	LBN	A	809	-	14,14,51	0.23	0	13,13,59	0.20	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LBN	A	808	-	-	8/11/11/55	-
4	LBN	A	807	-	-	31/55/55/55	-
2	SAL	A	801	-	-	0/0/4/4	0/1/1/1
4	LBN	A	811	-	-	33/55/55/55	-
4	LBN	A	805	-	-	6/13/13/55	-
4	LBN	A	804	-	-	9/13/13/55	-
3	CLR	A	802	-	-	6/10/68/68	0/4/4/4
4	LBN	A	806	-	-	26/55/55/55	-
4	LBN	A	810	-	-	8/13/13/55	-
3	CLR	A	803	-	-	5/10/68/68	0/4/4/4
4	LBN	A	809	-	-	8/12/12/55	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	SAL	C1-C1'	5.41	1.52	1.47
4	A	807	LBN	C12-N1	-2.93	1.41	1.50

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	803	CLR	C17-C13-C14	-2.73	96.84	100.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	803	CLR	C13-C14-C8	2.09	117.48	114.38

There are no chirality outliers.

All (140) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	802	CLR	C13-C17-C20-C21
3	A	802	CLR	C13-C17-C20-C22
3	A	802	CLR	C16-C17-C20-C21
3	A	803	CLR	C13-C17-C20-C21
3	A	803	CLR	C13-C17-C20-C22
3	A	803	CLR	C16-C17-C20-C22
4	A	806	LBN	C1-O1-P1-O3
4	A	806	LBN	C1-O1-P1-O4
4	A	806	LBN	C9-O2-P1-O4
4	A	806	LBN	C2-C3-O5-C25
4	A	807	LBN	O7-C2-C3-O5
4	A	811	LBN	C9-O2-P1-O3
4	A	811	LBN	N1-C6-C9-O2
3	A	803	CLR	C16-C17-C20-C21
4	A	811	LBN	O8-C34-O7-C2
4	A	811	LBN	C35-C34-O7-C2
3	A	802	CLR	C21-C20-C22-C23
3	A	802	CLR	C16-C17-C20-C22
4	A	807	LBN	C26-C25-O5-C3
4	A	811	LBN	C41-C42-C5-C8
4	A	806	LBN	C28-C29-C30-C31
4	A	807	LBN	O6-C25-O5-C3
4	A	808	LBN	C28-C29-C30-C31
4	A	811	LBN	C35-C36-C37-C38
4	A	807	LBN	C26-C27-C28-C29
3	A	802	CLR	C17-C20-C22-C23
4	A	808	LBN	C33-C4-C7-C10
4	A	811	LBN	C9-C6-N1-C18
4	A	806	LBN	C26-C25-O5-C3
4	A	806	LBN	O6-C25-O5-C3
4	A	806	LBN	C7-C10-C13-C16
4	A	806	LBN	C35-C34-O7-C2
4	A	811	LBN	C14-C17-C20-C22
4	A	811	LBN	C25-C26-C27-C28
4	A	806	LBN	C1-O1-P1-O2
4	A	806	LBN	O8-C34-O7-C2

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Mol	Chain	Res	Type	Atoms
4	A	807	LBN	C9-C6-N1-C15
4	A	807	LBN	C27-C28-C29-C30
4	A	810	LBN	C10-C13-C16-C19
4	A	811	LBN	C1-C2-O7-C34
4	A	809	LBN	C29-C30-C31-C32
4	A	811	LBN	C13-C10-C7-C4
4	A	809	LBN	C28-C29-C30-C31
4	A	808	LBN	C32-C33-C4-C7
4	A	811	LBN	C10-C13-C16-C19
4	A	806	LBN	C8-C11-C14-C17
4	A	811	LBN	C29-C30-C31-C32
4	A	805	LBN	C10-C13-C16-C19
4	A	809	LBN	C7-C10-C13-C16
4	A	805	LBN	C13-C10-C7-C4
4	A	807	LBN	C9-C6-N1-C12
4	A	811	LBN	C9-C6-N1-C12
4	A	811	LBN	C9-C6-N1-C15
4	A	804	LBN	C30-C31-C32-C33
4	A	807	LBN	C37-C38-C39-C40
4	A	809	LBN	C30-C31-C32-C33
4	A	806	LBN	C39-C40-C41-C42
4	A	810	LBN	C33-C4-C7-C10
4	A	809	LBN	C32-C33-C4-C7
4	A	807	LBN	C9-C6-N1-C18
4	A	804	LBN	C7-C10-C13-C16
4	A	804	LBN	C32-C33-C4-C7
4	A	811	LBN	C13-C16-C19-C21
4	A	811	LBN	C14-C11-C8-C5
4	A	807	LBN	O8-C34-O7-C2
4	A	811	LBN	C28-C29-C30-C31
4	A	805	LBN	C33-C4-C7-C10
4	A	808	LBN	C13-C10-C7-C4
4	A	807	LBN	C35-C34-O7-C2
4	A	811	LBN	O7-C2-C3-O5
4	A	807	LBN	C14-C11-C8-C5
4	A	808	LBN	C7-C10-C13-C16
4	A	807	LBN	C11-C14-C17-C20
4	A	806	LBN	C9-O2-P1-O1
4	A	807	LBN	C1-C2-C3-O5
4	A	808	LBN	C27-C28-C29-C30
4	A	811	LBN	C1-C2-C3-O5
4	A	811	LBN	C20-C22-C23-C24

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Mol	Chain	Res	Type	Atoms
4	A	807	LBN	C31-C32-C33-C4
4	A	811	LBN	C26-C25-O5-C3
4	A	806	LBN	C3-C2-O7-C34
4	A	806	LBN	C13-C16-C19-C21
4	A	807	LBN	O1-C1-C2-O7
4	A	806	LBN	C31-C32-C33-C4
4	A	804	LBN	C26-C27-C28-C29
4	A	810	LBN	C27-C28-C29-C30
4	A	806	LBN	C33-C4-C7-C10
4	A	806	LBN	C37-C38-C39-C40
4	A	807	LBN	C33-C4-C7-C10
4	A	806	LBN	C20-C22-C23-C24
4	A	807	LBN	C32-C33-C4-C7
4	A	807	LBN	C34-C35-C36-C37
4	A	809	LBN	C13-C10-C7-C4
4	A	811	LBN	C26-C27-C28-C29
4	A	807	LBN	O1-C1-C2-C3
4	A	811	LBN	C27-C28-C29-C30
4	A	811	LBN	O6-C25-O5-C3
4	A	805	LBN	C7-C10-C13-C16
3	A	803	CLR	C20-C22-C23-C24
4	A	804	LBN	C13-C10-C7-C4
4	A	807	LBN	C39-C40-C41-C42
4	A	810	LBN	C30-C31-C32-C33
4	A	810	LBN	C25-C26-C27-C28
4	A	811	LBN	C9-O2-P1-O1
4	A	811	LBN	C38-C39-C40-C41
4	A	807	LBN	C6-C9-O2-P1
4	A	808	LBN	C13-C16-C19-C21
4	A	804	LBN	C25-C26-C27-C28
4	A	807	LBN	N1-C6-C9-O2
4	A	804	LBN	C33-C4-C7-C10
4	A	807	LBN	C38-C39-C40-C41
4	A	806	LBN	C11-C14-C17-C20
4	A	805	LBN	C30-C31-C32-C33
4	A	810	LBN	C31-C32-C33-C4
4	A	806	LBN	C27-C28-C29-C30
4	A	811	LBN	C32-C33-C4-C7
4	A	807	LBN	C9-O2-P1-O1
4	A	806	LBN	C13-C10-C7-C4
4	A	807	LBN	C13-C10-C7-C4
4	A	808	LBN	C30-C31-C32-C33

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Mol	Chain	Res	Type	Atoms
4	A	811	LBN	C39-C40-C41-C42
4	A	805	LBN	C27-C28-C29-C30
4	A	810	LBN	C13-C16-C19-C21
4	A	807	LBN	C35-C36-C37-C38
4	A	807	LBN	C41-C42-C5-C8
4	A	804	LBN	C27-C28-C29-C30
4	A	811	LBN	C2-C1-O1-P1
4	A	809	LBN	C13-C16-C19-C21
4	A	806	LBN	C10-C13-C16-C19
4	A	806	LBN	C34-C35-C36-C37
4	A	810	LBN	C26-C27-C28-C29
4	A	807	LBN	C42-C5-C8-C11
4	A	811	LBN	C11-C14-C17-C20
4	A	806	LBN	C32-C33-C4-C7
4	A	804	LBN	C29-C30-C31-C32
4	A	807	LBN	C9-O2-P1-O4
4	A	811	LBN	C9-O2-P1-O4
4	A	807	LBN	C8-C11-C14-C17
4	A	811	LBN	C6-C9-O2-P1
4	A	809	LBN	C31-C32-C33-C4

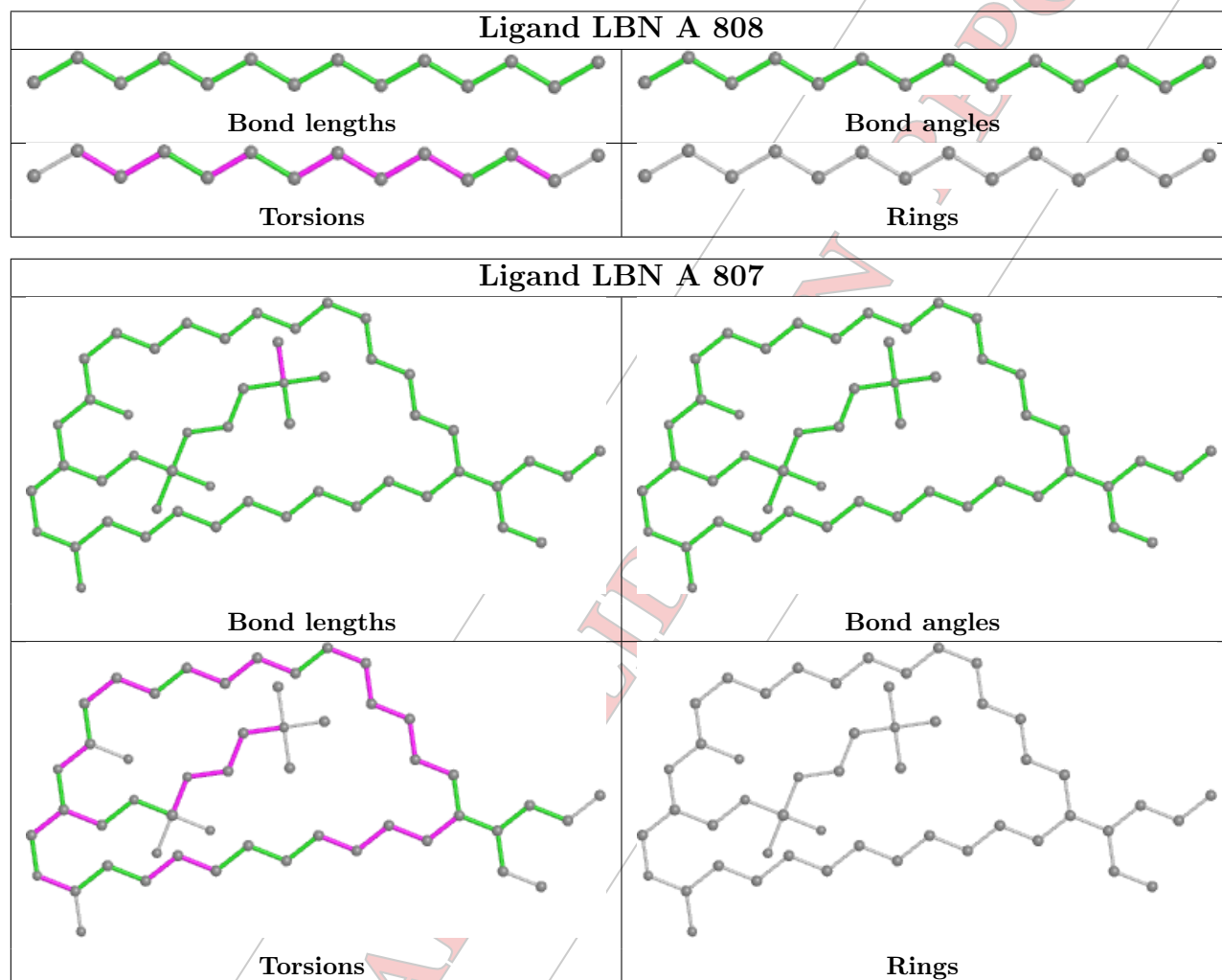
There are no ring outliers.

8 monomers are involved in 10 short contacts:

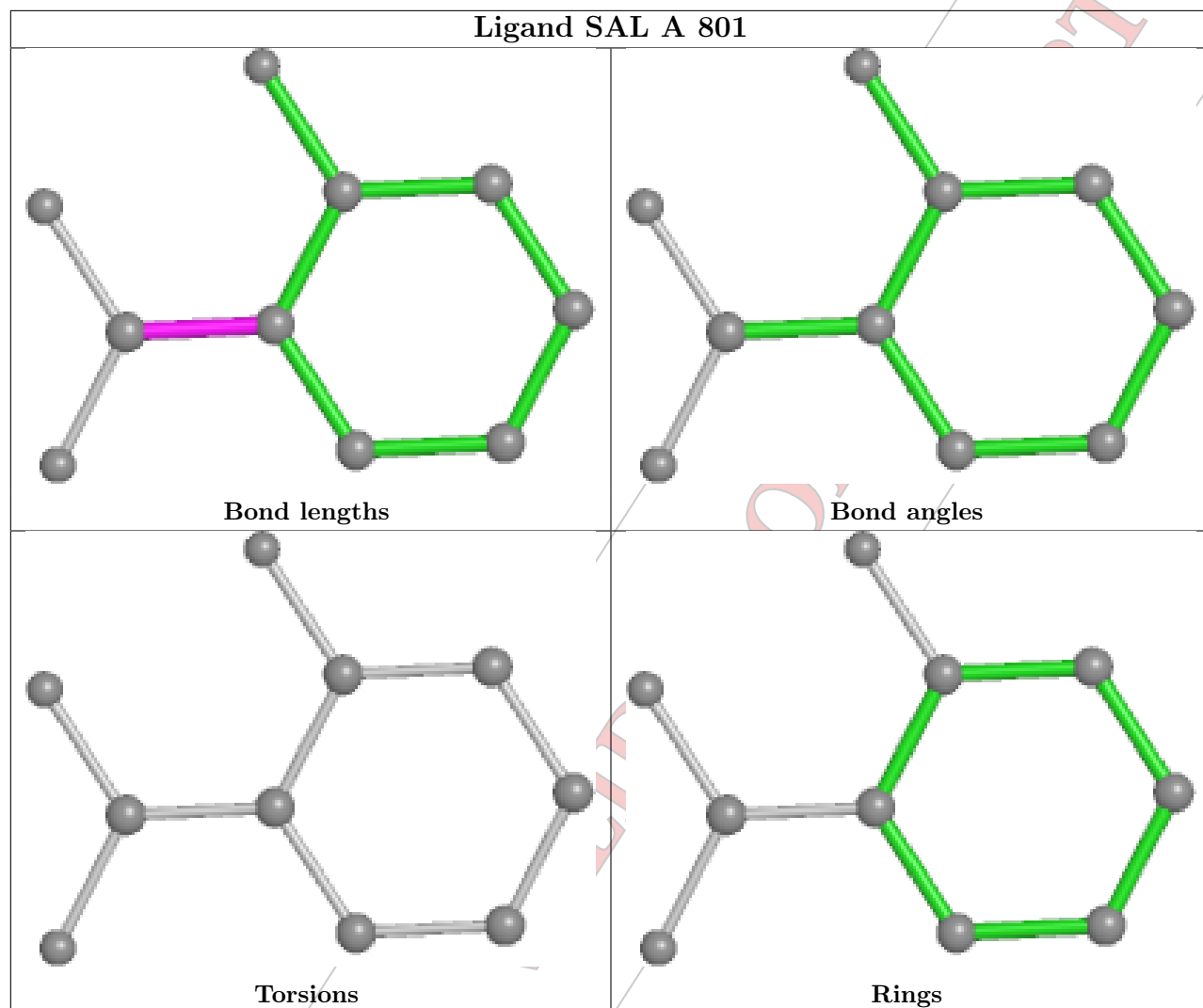
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	808	LBN	2	0
4	A	807	LBN	4	0
2	A	801	SAL	1	0
4	A	811	LBN	1	0
4	A	804	LBN	1	0
3	A	802	CLR	2	0
4	A	806	LBN	1	0
3	A	803	CLR	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the

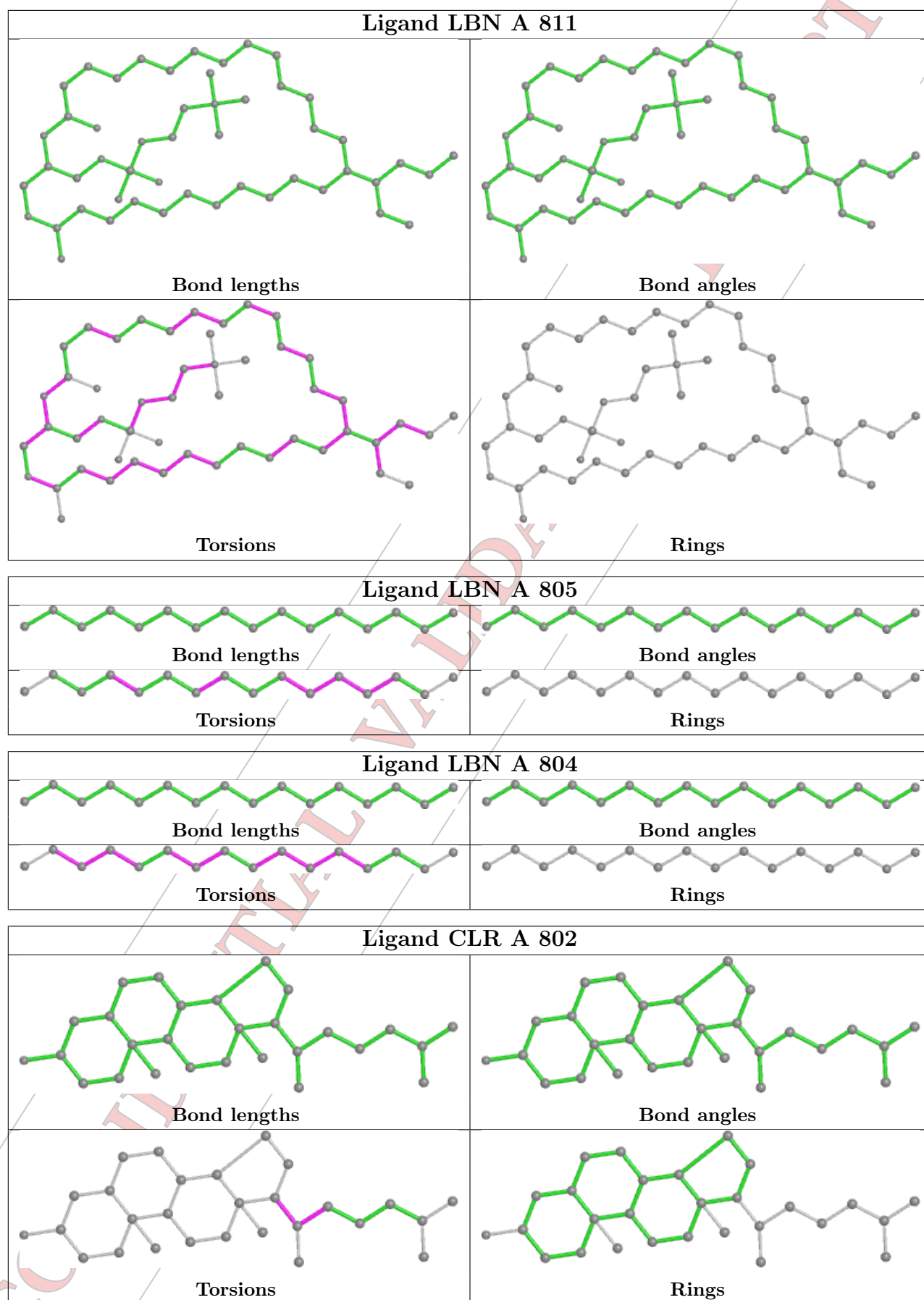
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

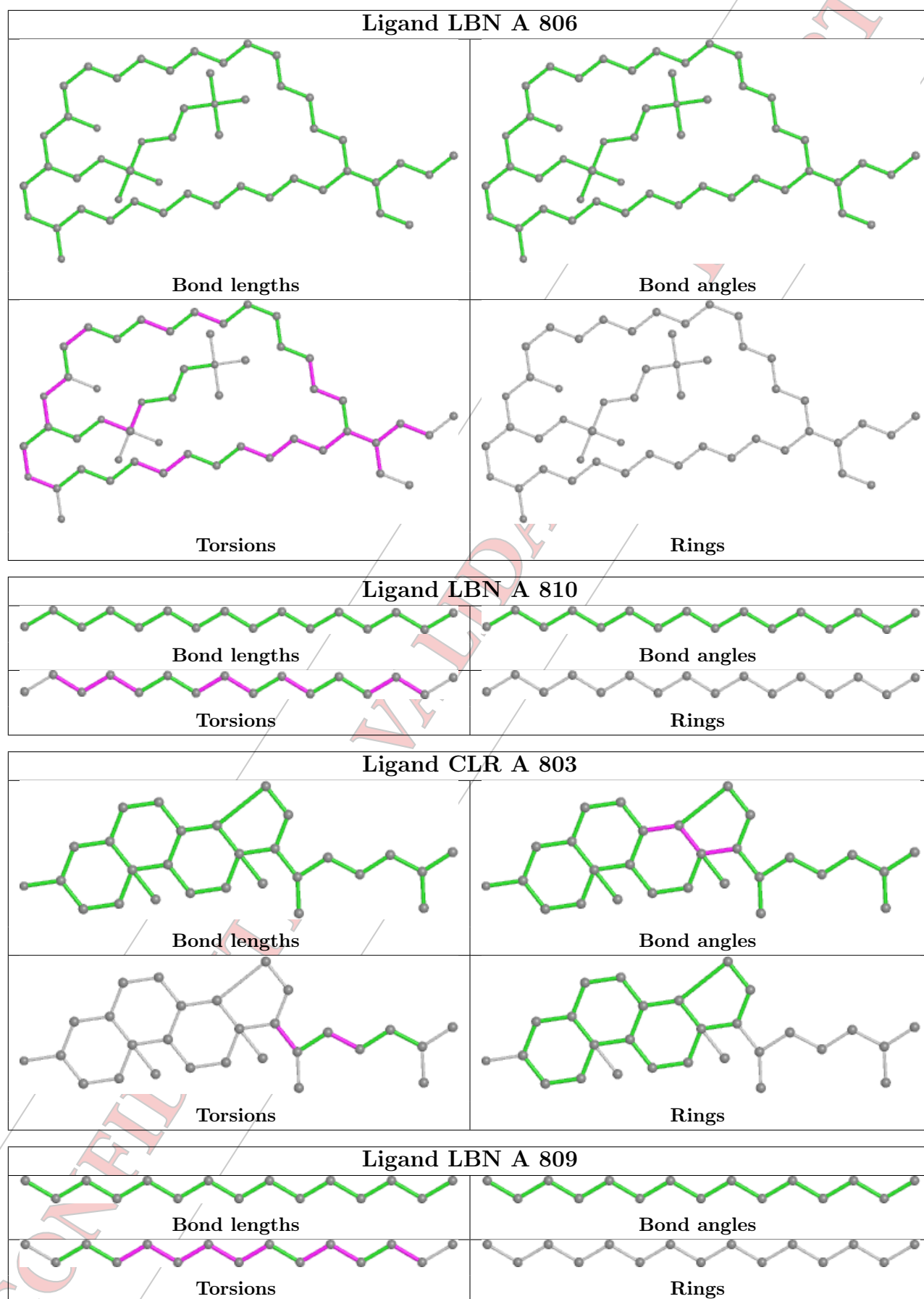


Ligand SAL A 801



CONFIDENTIAL





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.

CONFIDENTIAL VALIDATION REPORT

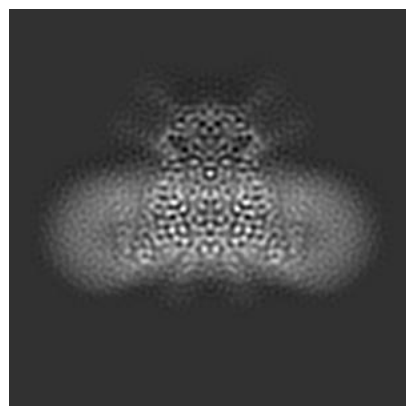
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31759. These allow visual inspection of the internal detail of the map and identification of artifacts.

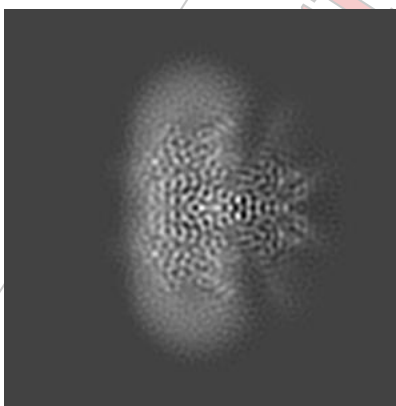
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

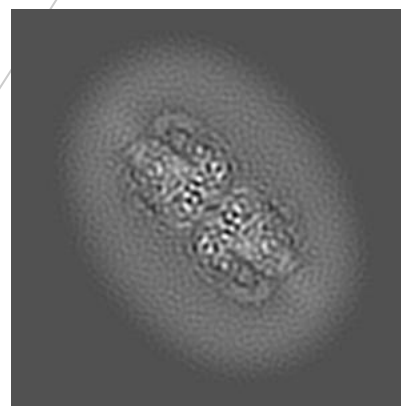
6.1.1 Primary map



X

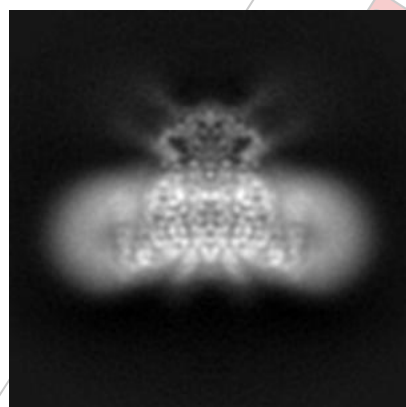


Y

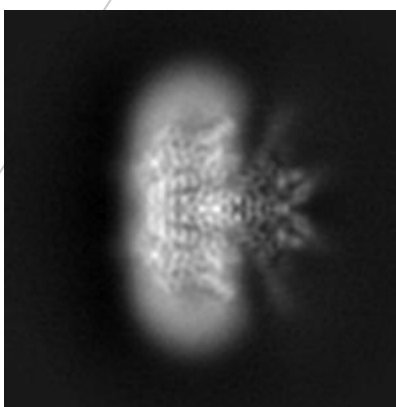


Z

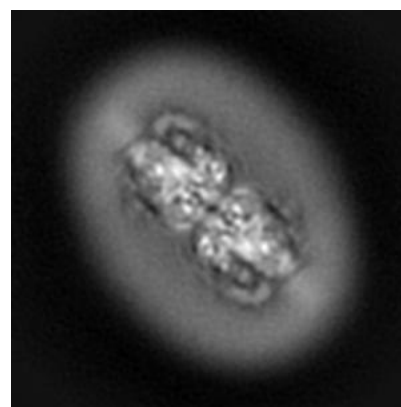
6.1.2 Raw map



X



Y



Z

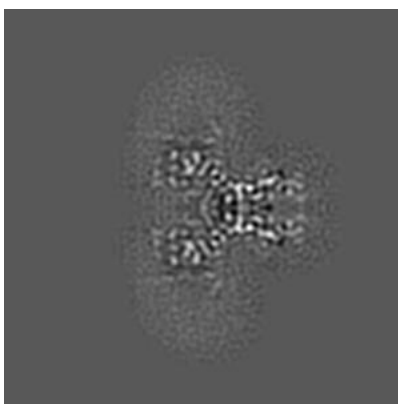
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

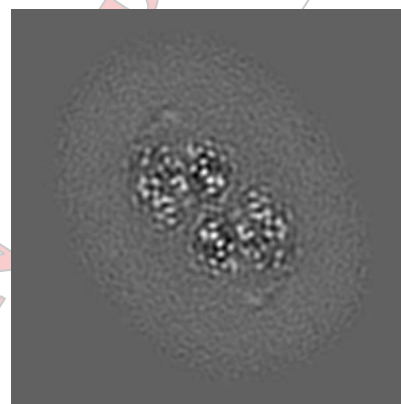
6.2.1 Primary map



X Index: 85

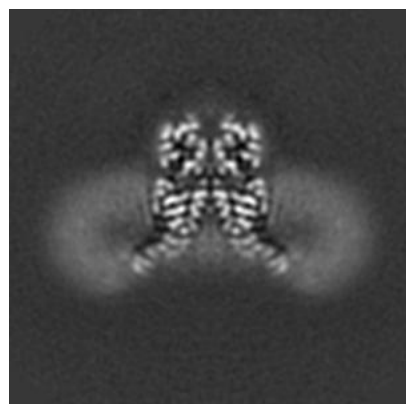


Y Index: 85

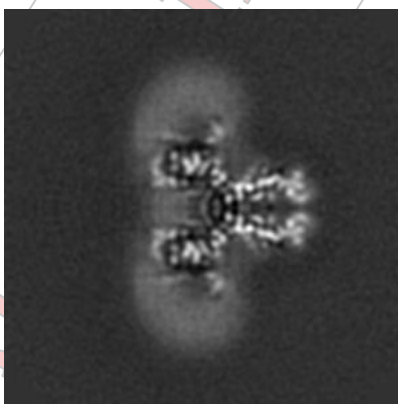


Z Index: 85

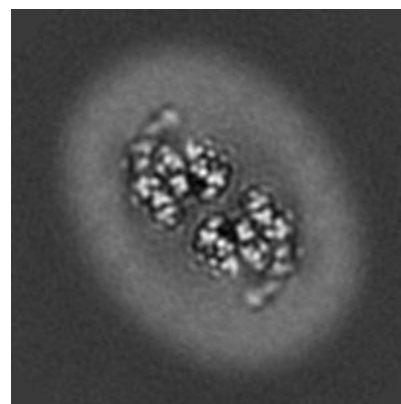
6.2.2 Raw map



X Index: 85



Y Index: 85



Z Index: 85

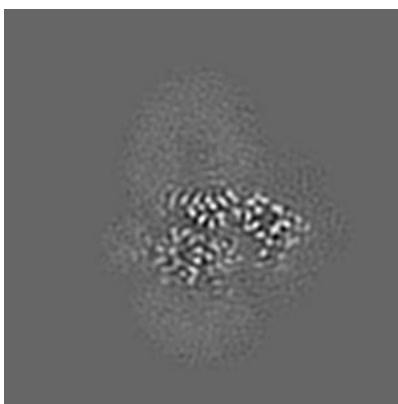
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

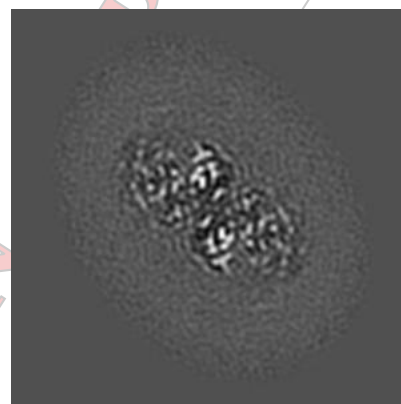
6.3.1 Primary map



X Index: 85

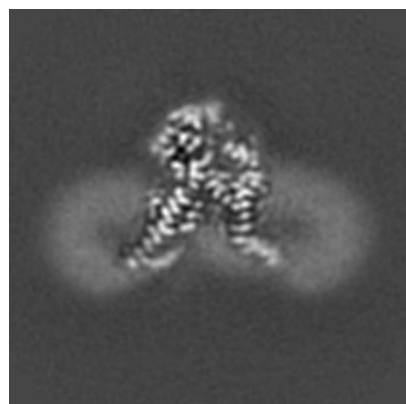


Y Index: 99

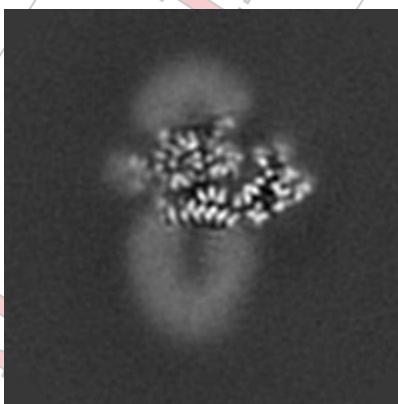


Z Index: 88

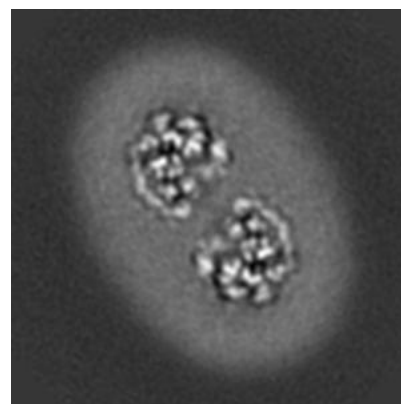
6.3.2 Raw map



X Index: 89



Y Index: 71

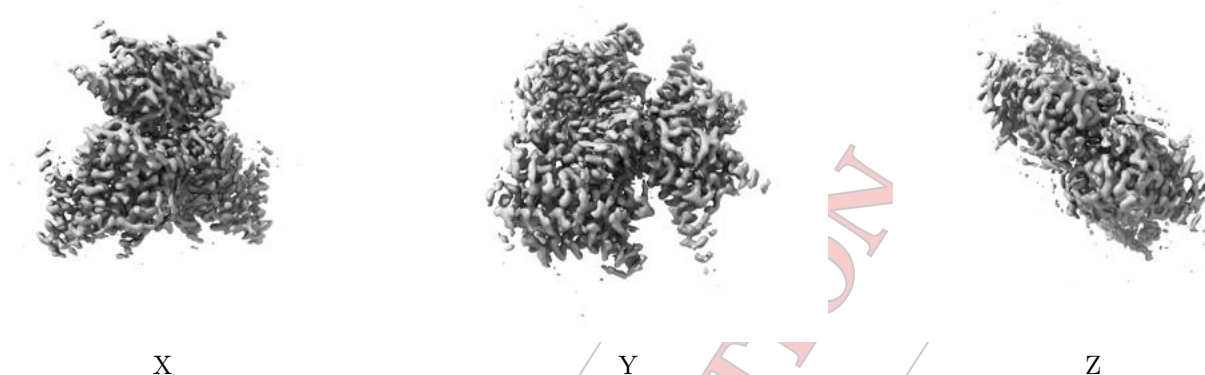


Z Index: 66

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

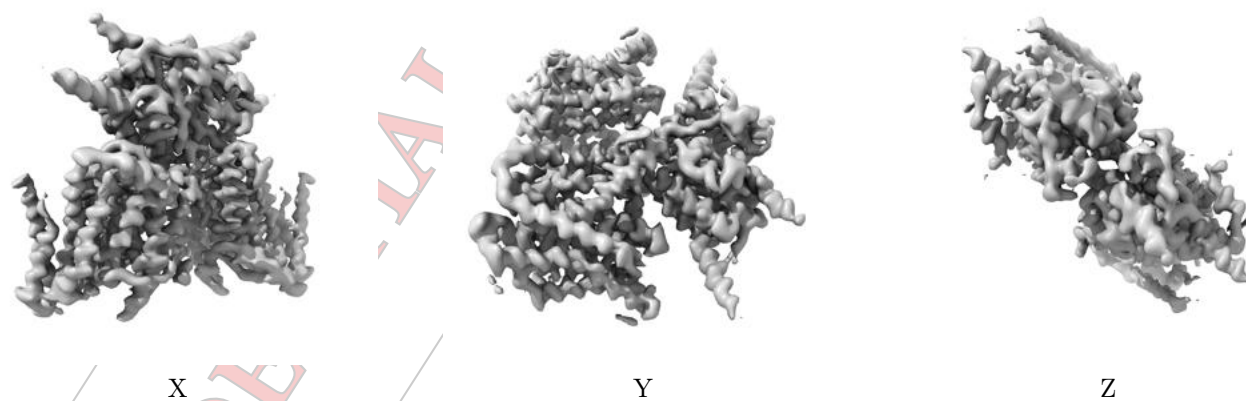
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.04. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

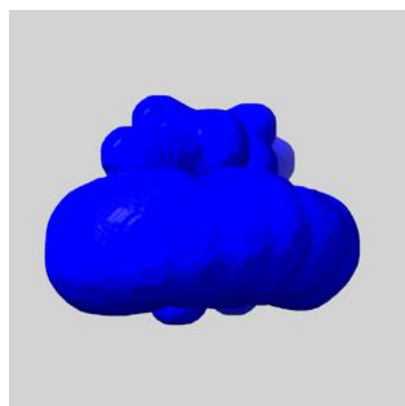
6.5 Mask visualisation [i](#)

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

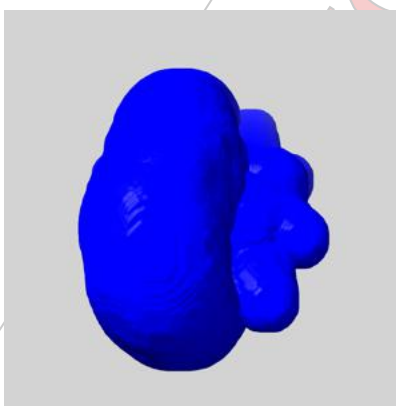
A mask typically either:

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

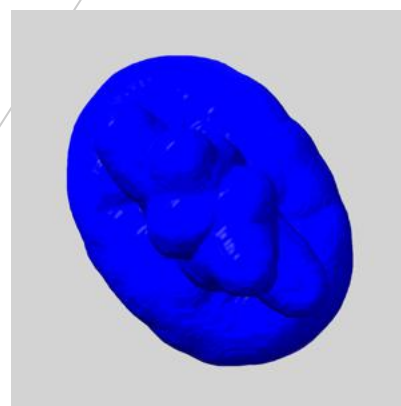
6.5.1 D_1300024140_em-mask-volume_P1.map.V2 [i](#)



X



Y

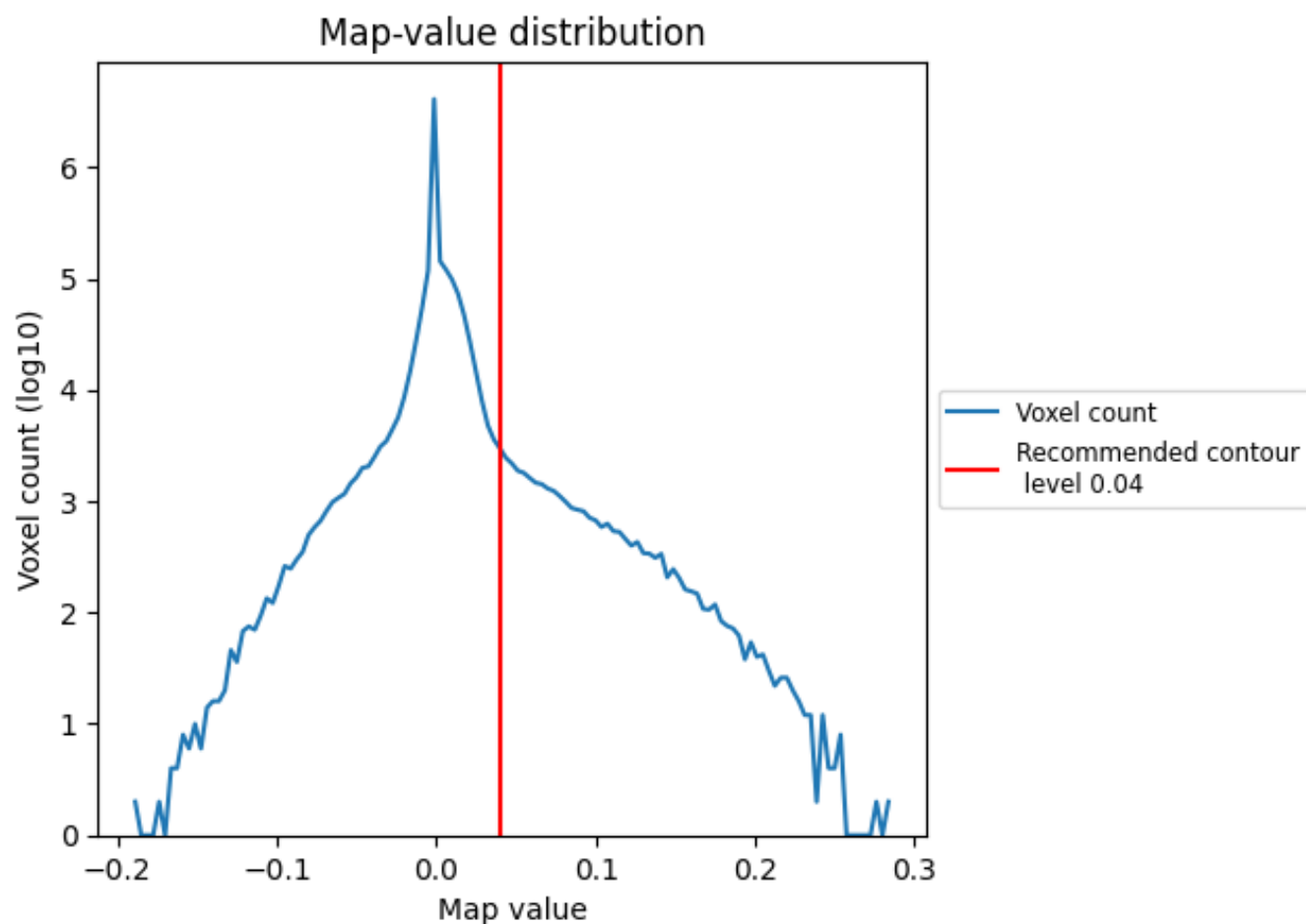


Z

7 Map analysis [i](#)

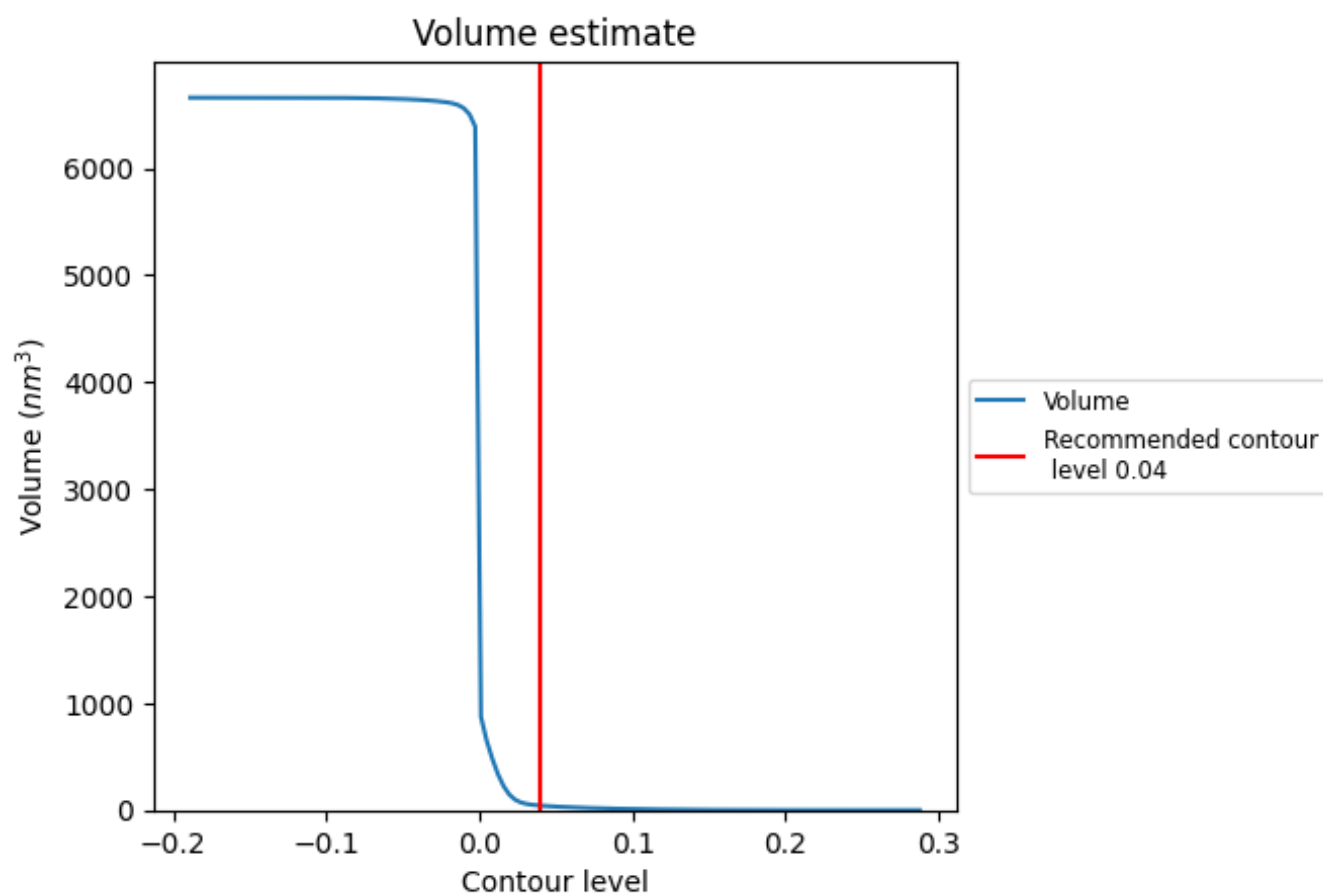
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

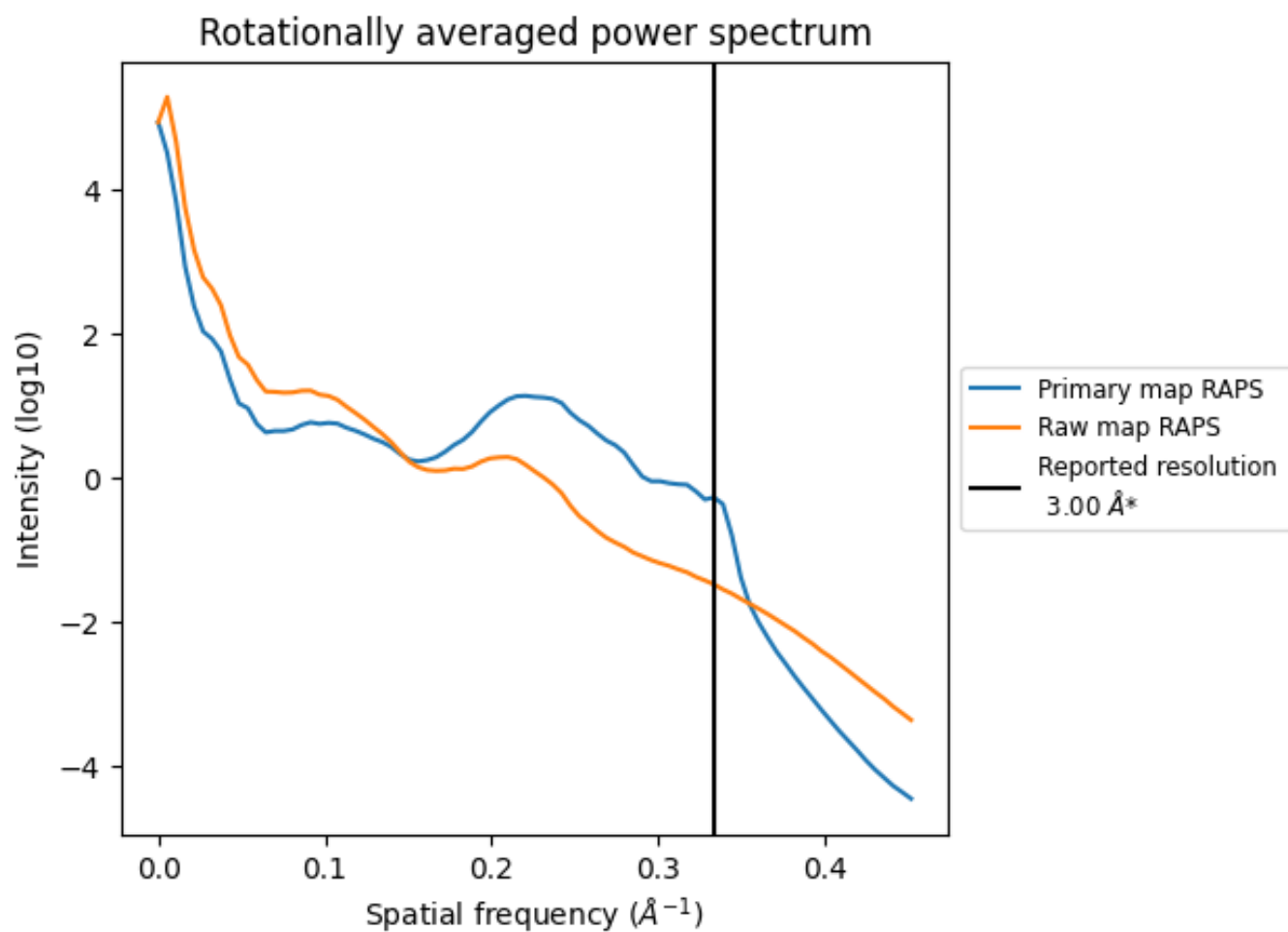
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 43 nm^3 ; this corresponds to an approximate mass of 38 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](#)

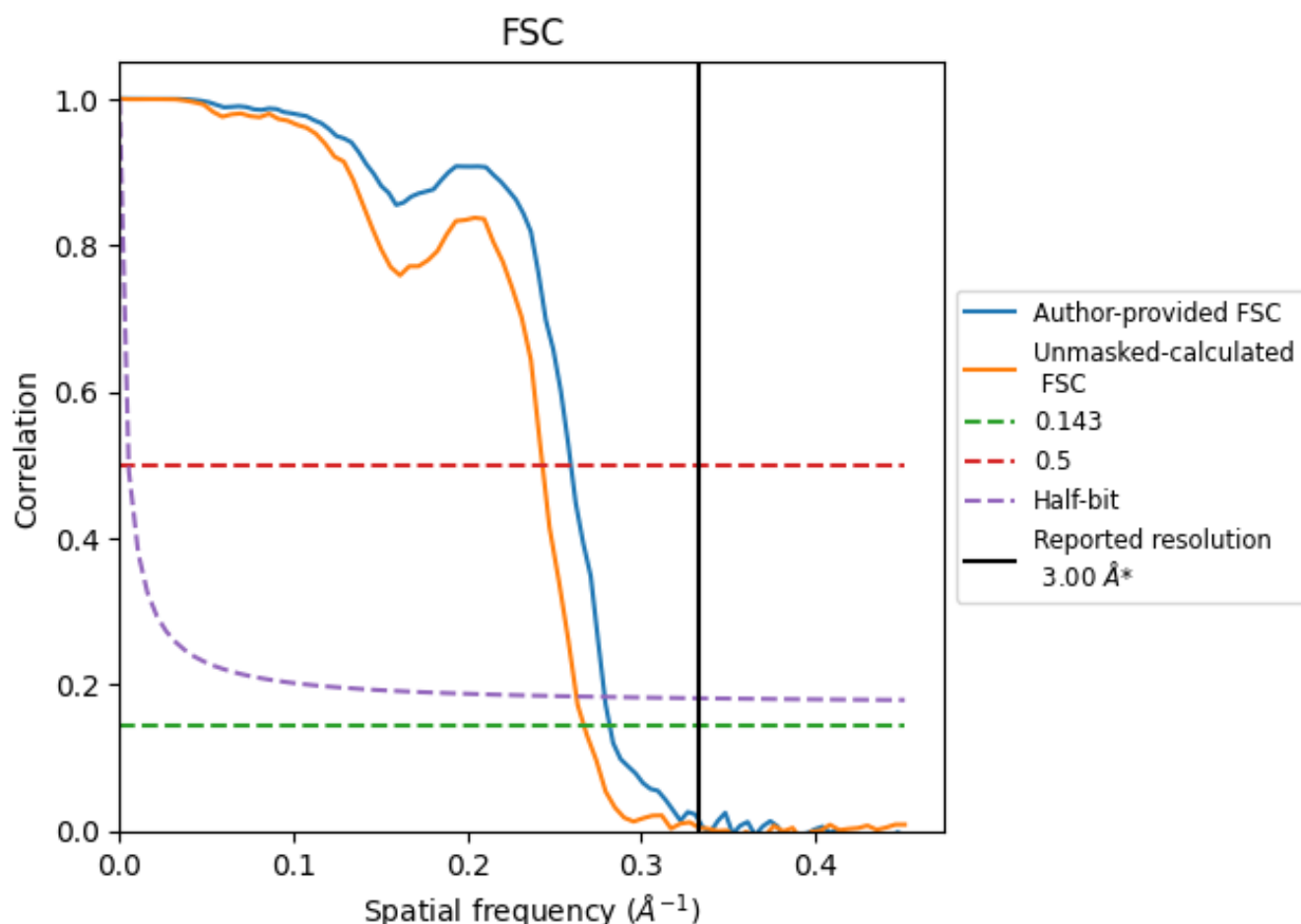


*Reported resolution corresponds to spatial frequency of 0.333 Å⁻¹

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	3.54	3.85	3.58
Unmasked-calculated*	3.74	4.11	3.80

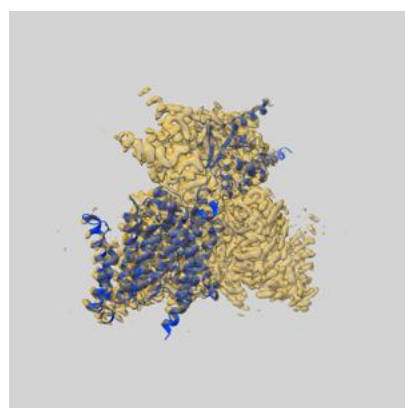
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 3.54 differs from the reported value 3.0 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.74 differs from the reported value 3.0 by more than 10 %

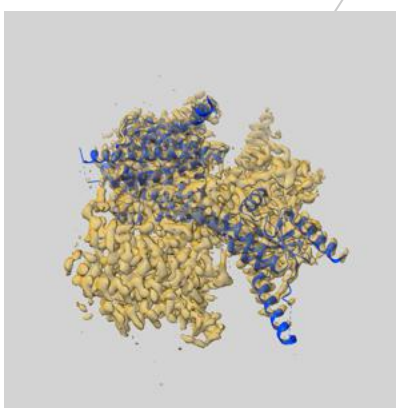
9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-31759 and PDB model 7V75. Per-residue inclusion information can be found in section 3 on page 6.

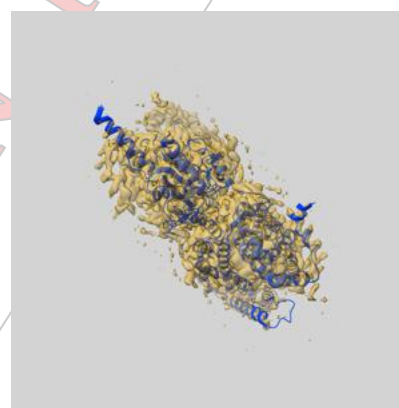
9.0.1 Map-model overlay ⓘ



X

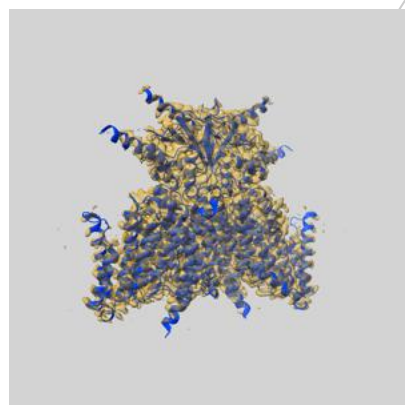


Y

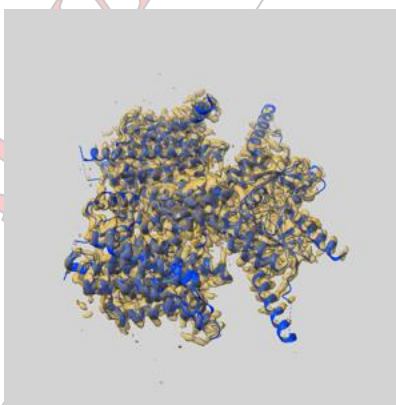


Z

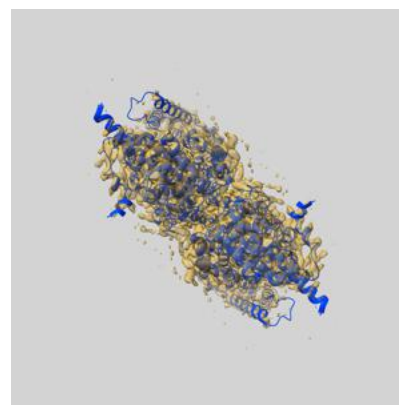
9.0.2 Map-model assembly overlay ⓘ



X



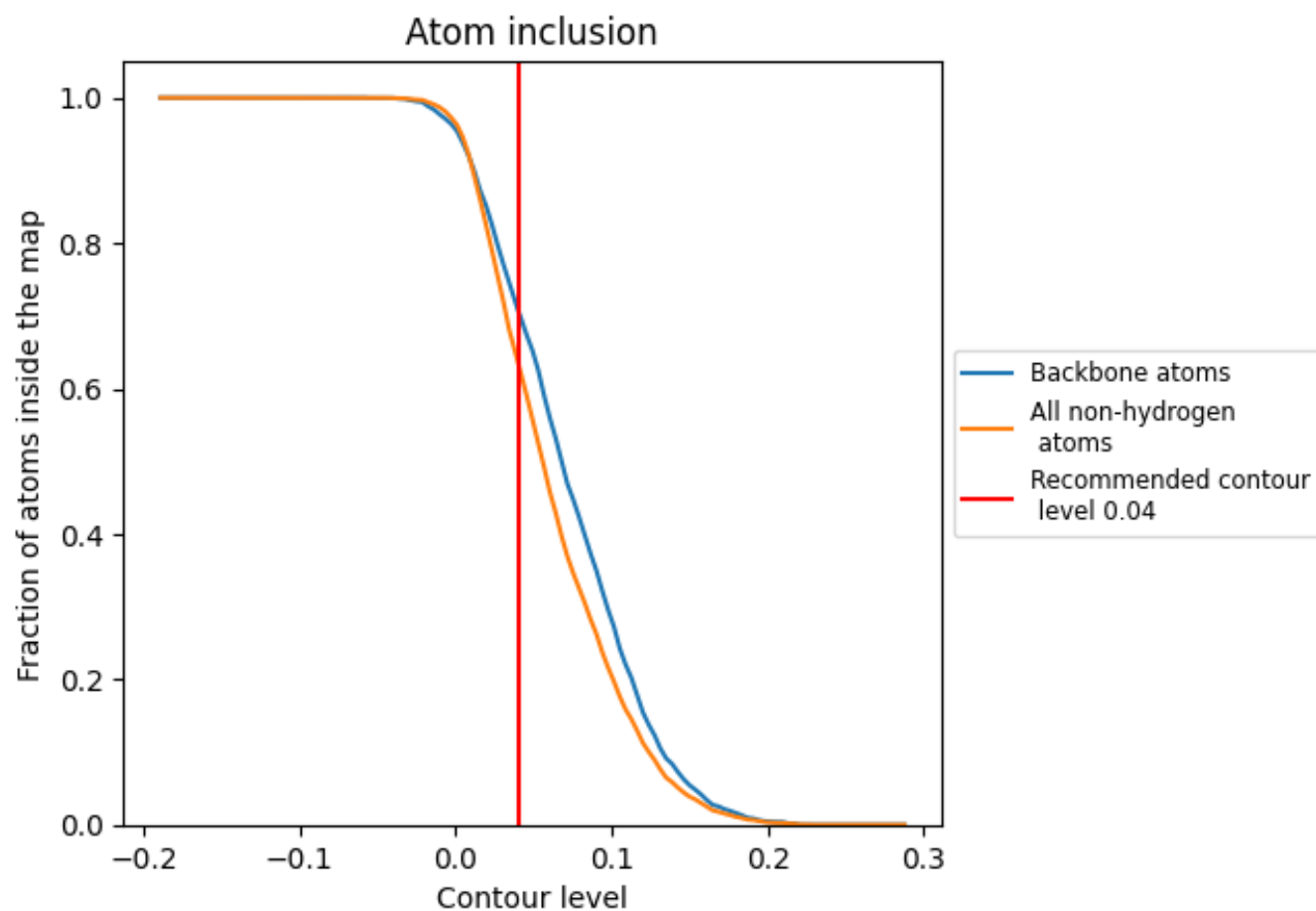
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.04 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.

9.1 Atom inclusion [i](#)



At the recommended contour level, 71% of all backbone atoms, 64% of all non-hydrogen atoms, are inside the map.