



wwPDB EM Validation Summary Report ⓘ

Mar 5, 2026 – 08:15 PM UTC

PDB ID : 8UY6 / pdb_00008uy6
EMDB ID : EMD-42793
Title : Aquaporin Z with ALFA tag and bound to nanobody
Authors : Stover, L.; Bahramimoghaddam, H.; Wang, L.; Zhou, M.; Laganowsky, A.
Deposited on : 2023-11-13
Resolution : 1.90 Å(reported)
Based on initial model : 1RC2

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

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

A user guide is available at

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

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

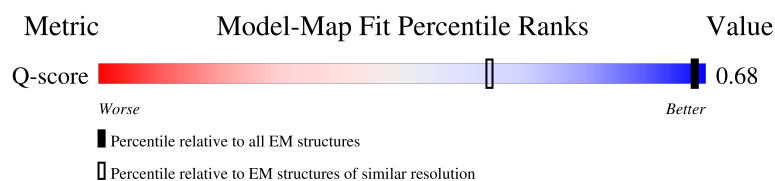
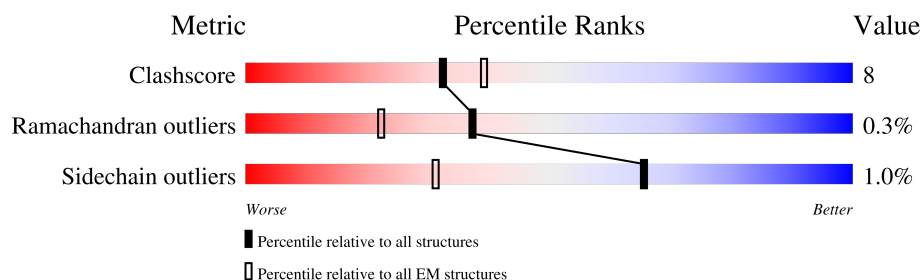
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 1.90 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	1185 (1.40 - 2.40)

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	258	82% 13% 5%
1	C	258	82% 13% 5%
1	E	258	82% 13% 5%
1	G	258	82% 12% 5%

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Mol	Chain	Length	Quality of chain
1	I	258	 82%13%5%
1	K	258	 83%12%5%
1	M	258	 82%13%5%
1	O	258	 82%12%5%
2	B	124	 79%19%. .
2	D	124	 81%17%. .
2	F	124	 82%16%. .
2	H	124	 81%17%. .
2	J	124	 81%18%. .
2	L	124	 81%17%. .
2	N	124	 81%18%. .
2	P	124	 81%17%. .

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 23864 atoms, of which 1248 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 Aquaporin Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	C	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	E	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	G	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	I	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	K	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	M	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		
1	O	244	Total	C	N	O	S	0	0
			1787	1180	297	305	5		

There are 248 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	228	ARG	-	expression tag	UNP P60844
A	229	ALA	-	expression tag	UNP P60844
A	230	SER	-	expression tag	UNP P60844
A	231	ARG	-	expression tag	UNP P60844
A	232	LEU	-	expression tag	UNP P60844
A	233	GLU	-	expression tag	UNP P60844
A	234	GLU	-	expression tag	UNP P60844
A	235	GLU	-	expression tag	UNP P60844
A	236	LEU	-	expression tag	UNP P60844
A	237	ARG	-	expression tag	UNP P60844
A	238	ARG	-	expression tag	UNP P60844
A	239	ARG	-	expression tag	UNP P60844
A	240	LEU	-	expression tag	UNP P60844
A	241	THR	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
A	242	GLU	-	expression tag	UNP P60844
A	243	PRO	-	expression tag	UNP P60844
A	244	GLY	-	expression tag	UNP P60844
A	245	GLY	-	expression tag	UNP P60844
A	246	GLY	-	expression tag	UNP P60844
A	247	PRO	-	expression tag	UNP P60844
A	248	GLY	-	expression tag	UNP P60844
A	249	ALA	-	expression tag	UNP P60844
A	250	SER	-	expression tag	UNP P60844
A	251	TRP	-	expression tag	UNP P60844
A	252	SER	-	expression tag	UNP P60844
A	253	HIS	-	expression tag	UNP P60844
A	254	PRO	-	expression tag	UNP P60844
A	255	GLN	-	expression tag	UNP P60844
A	256	PHE	-	expression tag	UNP P60844
A	257	GLU	-	expression tag	UNP P60844
A	258	LYS	-	expression tag	UNP P60844
C	228	ARG	-	expression tag	UNP P60844
C	229	ALA	-	expression tag	UNP P60844
C	230	SER	-	expression tag	UNP P60844
C	231	ARG	-	expression tag	UNP P60844
C	232	LEU	-	expression tag	UNP P60844
C	233	GLU	-	expression tag	UNP P60844
C	234	GLU	-	expression tag	UNP P60844
C	235	GLU	-	expression tag	UNP P60844
C	236	LEU	-	expression tag	UNP P60844
C	237	ARG	-	expression tag	UNP P60844
C	238	ARG	-	expression tag	UNP P60844
C	239	ARG	-	expression tag	UNP P60844
C	240	LEU	-	expression tag	UNP P60844
C	241	THR	-	expression tag	UNP P60844
C	242	GLU	-	expression tag	UNP P60844
C	243	PRO	-	expression tag	UNP P60844
C	244	GLY	-	expression tag	UNP P60844
C	245	GLY	-	expression tag	UNP P60844
C	246	GLY	-	expression tag	UNP P60844
C	247	PRO	-	expression tag	UNP P60844
C	248	GLY	-	expression tag	UNP P60844
C	249	ALA	-	expression tag	UNP P60844
C	250	SER	-	expression tag	UNP P60844
C	251	TRP	-	expression tag	UNP P60844
C	252	SER	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
C	253	HIS	-	expression tag	UNP P60844
C	254	PRO	-	expression tag	UNP P60844
C	255	GLN	-	expression tag	UNP P60844
C	256	PHE	-	expression tag	UNP P60844
C	257	GLU	-	expression tag	UNP P60844
C	258	LYS	-	expression tag	UNP P60844
E	228	ARG	-	expression tag	UNP P60844
E	229	ALA	-	expression tag	UNP P60844
E	230	SER	-	expression tag	UNP P60844
E	231	ARG	-	expression tag	UNP P60844
E	232	LEU	-	expression tag	UNP P60844
E	233	GLU	-	expression tag	UNP P60844
E	234	GLU	-	expression tag	UNP P60844
E	235	GLU	-	expression tag	UNP P60844
E	236	LEU	-	expression tag	UNP P60844
E	237	ARG	-	expression tag	UNP P60844
E	238	ARG	-	expression tag	UNP P60844
E	239	ARG	-	expression tag	UNP P60844
E	240	LEU	-	expression tag	UNP P60844
E	241	THR	-	expression tag	UNP P60844
E	242	GLU	-	expression tag	UNP P60844
E	243	PRO	-	expression tag	UNP P60844
E	244	GLY	-	expression tag	UNP P60844
E	245	GLY	-	expression tag	UNP P60844
E	246	GLY	-	expression tag	UNP P60844
E	247	PRO	-	expression tag	UNP P60844
E	248	GLY	-	expression tag	UNP P60844
E	249	ALA	-	expression tag	UNP P60844
E	250	SER	-	expression tag	UNP P60844
E	251	TRP	-	expression tag	UNP P60844
E	252	SER	-	expression tag	UNP P60844
E	253	HIS	-	expression tag	UNP P60844
E	254	PRO	-	expression tag	UNP P60844
E	255	GLN	-	expression tag	UNP P60844
E	256	PHE	-	expression tag	UNP P60844
E	257	GLU	-	expression tag	UNP P60844
E	258	LYS	-	expression tag	UNP P60844
G	228	ARG	-	expression tag	UNP P60844
G	229	ALA	-	expression tag	UNP P60844
G	230	SER	-	expression tag	UNP P60844
G	231	ARG	-	expression tag	UNP P60844
G	232	LEU	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
G	233	GLU	-	expression tag	UNP P60844
G	234	GLU	-	expression tag	UNP P60844
G	235	GLU	-	expression tag	UNP P60844
G	236	LEU	-	expression tag	UNP P60844
G	237	ARG	-	expression tag	UNP P60844
G	238	ARG	-	expression tag	UNP P60844
G	239	ARG	-	expression tag	UNP P60844
G	240	LEU	-	expression tag	UNP P60844
G	241	THR	-	expression tag	UNP P60844
G	242	GLU	-	expression tag	UNP P60844
G	243	PRO	-	expression tag	UNP P60844
G	244	GLY	-	expression tag	UNP P60844
G	245	GLY	-	expression tag	UNP P60844
G	246	GLY	-	expression tag	UNP P60844
G	247	PRO	-	expression tag	UNP P60844
G	248	GLY	-	expression tag	UNP P60844
G	249	ALA	-	expression tag	UNP P60844
G	250	SER	-	expression tag	UNP P60844
G	251	TRP	-	expression tag	UNP P60844
G	252	SER	-	expression tag	UNP P60844
G	253	HIS	-	expression tag	UNP P60844
G	254	PRO	-	expression tag	UNP P60844
G	255	GLN	-	expression tag	UNP P60844
G	256	PHE	-	expression tag	UNP P60844
G	257	GLU	-	expression tag	UNP P60844
G	258	LYS	-	expression tag	UNP P60844
I	228	ARG	-	expression tag	UNP P60844
I	229	ALA	-	expression tag	UNP P60844
I	230	SER	-	expression tag	UNP P60844
I	231	ARG	-	expression tag	UNP P60844
I	232	LEU	-	expression tag	UNP P60844
I	233	GLU	-	expression tag	UNP P60844
I	234	GLU	-	expression tag	UNP P60844
I	235	GLU	-	expression tag	UNP P60844
I	236	LEU	-	expression tag	UNP P60844
I	237	ARG	-	expression tag	UNP P60844
I	238	ARG	-	expression tag	UNP P60844
I	239	ARG	-	expression tag	UNP P60844
I	240	LEU	-	expression tag	UNP P60844
I	241	THR	-	expression tag	UNP P60844
I	242	GLU	-	expression tag	UNP P60844
I	243	PRO	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
I	244	GLY	-	expression tag	UNP P60844
I	245	GLY	-	expression tag	UNP P60844
I	246	GLY	-	expression tag	UNP P60844
I	247	PRO	-	expression tag	UNP P60844
I	248	GLY	-	expression tag	UNP P60844
I	249	ALA	-	expression tag	UNP P60844
I	250	SER	-	expression tag	UNP P60844
I	251	TRP	-	expression tag	UNP P60844
I	252	SER	-	expression tag	UNP P60844
I	253	HIS	-	expression tag	UNP P60844
I	254	PRO	-	expression tag	UNP P60844
I	255	GLN	-	expression tag	UNP P60844
I	256	PHE	-	expression tag	UNP P60844
I	257	GLU	-	expression tag	UNP P60844
I	258	LYS	-	expression tag	UNP P60844
K	228	ARG	-	expression tag	UNP P60844
K	229	ALA	-	expression tag	UNP P60844
K	230	SER	-	expression tag	UNP P60844
K	231	ARG	-	expression tag	UNP P60844
K	232	LEU	-	expression tag	UNP P60844
K	233	GLU	-	expression tag	UNP P60844
K	234	GLU	-	expression tag	UNP P60844
K	235	GLU	-	expression tag	UNP P60844
K	236	LEU	-	expression tag	UNP P60844
K	237	ARG	-	expression tag	UNP P60844
K	238	ARG	-	expression tag	UNP P60844
K	239	ARG	-	expression tag	UNP P60844
K	240	LEU	-	expression tag	UNP P60844
K	241	THR	-	expression tag	UNP P60844
K	242	GLU	-	expression tag	UNP P60844
K	243	PRO	-	expression tag	UNP P60844
K	244	GLY	-	expression tag	UNP P60844
K	245	GLY	-	expression tag	UNP P60844
K	246	GLY	-	expression tag	UNP P60844
K	247	PRO	-	expression tag	UNP P60844
K	248	GLY	-	expression tag	UNP P60844
K	249	ALA	-	expression tag	UNP P60844
K	250	SER	-	expression tag	UNP P60844
K	251	TRP	-	expression tag	UNP P60844
K	252	SER	-	expression tag	UNP P60844
K	253	HIS	-	expression tag	UNP P60844
K	254	PRO	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
K	255	GLN	-	expression tag	UNP P60844
K	256	PHE	-	expression tag	UNP P60844
K	257	GLU	-	expression tag	UNP P60844
K	258	LYS	-	expression tag	UNP P60844
M	228	ARG	-	expression tag	UNP P60844
M	229	ALA	-	expression tag	UNP P60844
M	230	SER	-	expression tag	UNP P60844
M	231	ARG	-	expression tag	UNP P60844
M	232	LEU	-	expression tag	UNP P60844
M	233	GLU	-	expression tag	UNP P60844
M	234	GLU	-	expression tag	UNP P60844
M	235	GLU	-	expression tag	UNP P60844
M	236	LEU	-	expression tag	UNP P60844
M	237	ARG	-	expression tag	UNP P60844
M	238	ARG	-	expression tag	UNP P60844
M	239	ARG	-	expression tag	UNP P60844
M	240	LEU	-	expression tag	UNP P60844
M	241	THR	-	expression tag	UNP P60844
M	242	GLU	-	expression tag	UNP P60844
M	243	PRO	-	expression tag	UNP P60844
M	244	GLY	-	expression tag	UNP P60844
M	245	GLY	-	expression tag	UNP P60844
M	246	GLY	-	expression tag	UNP P60844
M	247	PRO	-	expression tag	UNP P60844
M	248	GLY	-	expression tag	UNP P60844
M	249	ALA	-	expression tag	UNP P60844
M	250	SER	-	expression tag	UNP P60844
M	251	TRP	-	expression tag	UNP P60844
M	252	SER	-	expression tag	UNP P60844
M	253	HIS	-	expression tag	UNP P60844
M	254	PRO	-	expression tag	UNP P60844
M	255	GLN	-	expression tag	UNP P60844
M	256	PHE	-	expression tag	UNP P60844
M	257	GLU	-	expression tag	UNP P60844
M	258	LYS	-	expression tag	UNP P60844
O	228	ARG	-	expression tag	UNP P60844
O	229	ALA	-	expression tag	UNP P60844
O	230	SER	-	expression tag	UNP P60844
O	231	ARG	-	expression tag	UNP P60844
O	232	LEU	-	expression tag	UNP P60844
O	233	GLU	-	expression tag	UNP P60844
O	234	GLU	-	expression tag	UNP P60844

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Chain	Residue	Modelled	Actual	Comment	Reference
O	235	GLU	-	expression tag	UNP P60844
O	236	LEU	-	expression tag	UNP P60844
O	237	ARG	-	expression tag	UNP P60844
O	238	ARG	-	expression tag	UNP P60844
O	239	ARG	-	expression tag	UNP P60844
O	240	LEU	-	expression tag	UNP P60844
O	241	THR	-	expression tag	UNP P60844
O	242	GLU	-	expression tag	UNP P60844
O	243	PRO	-	expression tag	UNP P60844
O	244	GLY	-	expression tag	UNP P60844
O	245	GLY	-	expression tag	UNP P60844
O	246	GLY	-	expression tag	UNP P60844
O	247	PRO	-	expression tag	UNP P60844
O	248	GLY	-	expression tag	UNP P60844
O	249	ALA	-	expression tag	UNP P60844
O	250	SER	-	expression tag	UNP P60844
O	251	TRP	-	expression tag	UNP P60844
O	252	SER	-	expression tag	UNP P60844
O	253	HIS	-	expression tag	UNP P60844
O	254	PRO	-	expression tag	UNP P60844
O	255	GLN	-	expression tag	UNP P60844
O	256	PHE	-	expression tag	UNP P60844
O	257	GLU	-	expression tag	UNP P60844
O	258	LYS	-	expression tag	UNP P60844

- Molecule 2 is a protein called anti-ALFA nanobody.

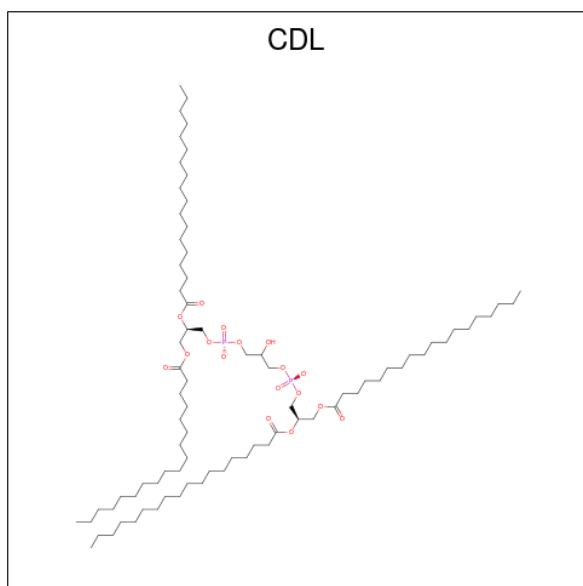
Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	D	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	F	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	H	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	J	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	L	122	Total	C	N	O	S	0	0
			940	578	169	185	8		
2	N	122	Total	C	N	O	S	0	0
			940	578	169	185	8		

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Mol	Chain	Residues	Atoms					AltConf	Trace
2	P	122	Total	C	N	O	S	0	0
			940	578	169	185	8		

- Molecule 3 is CARDIOLIPIN (CCD ID: CDL) (formula: $C_{81}H_{156}O_{17}P_2$).



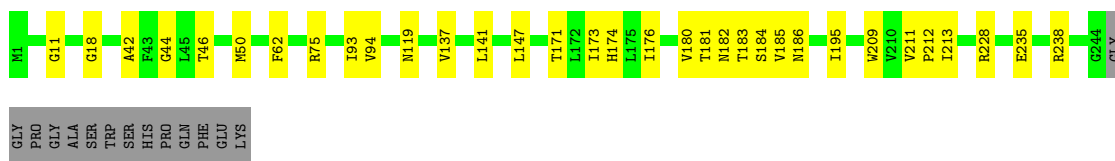
Mol	Chain	Residues	Atoms					AltConf
3	A	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	C	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	E	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	G	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	I	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	K	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	M	1	Total	C	H	O	P	0
			256	81	156	17	2	
3	O	1	Total	C	H	O	P	0
			256	81	156	17	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.

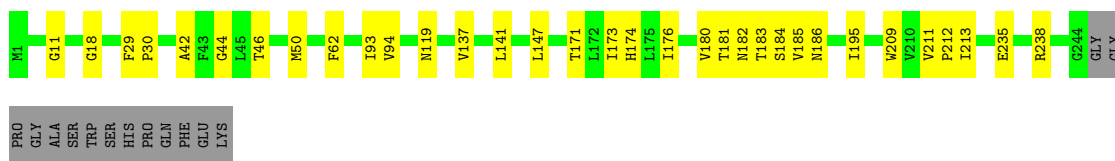
• Molecule 1: Aquaporin Z

Chain A: 



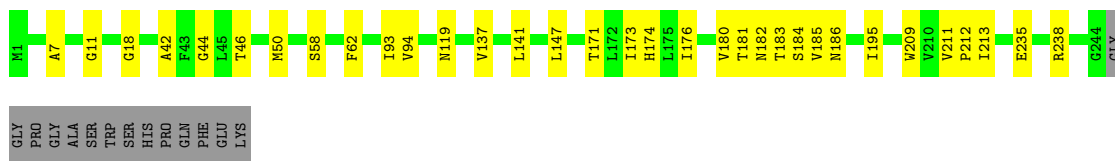
• Molecule 1: Aquaporin Z

Chain C: 



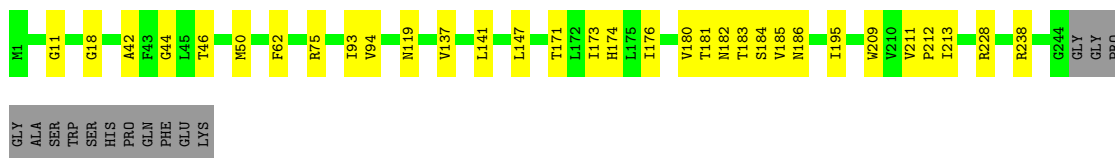
• Molecule 1: Aquaporin Z

Chain E: 



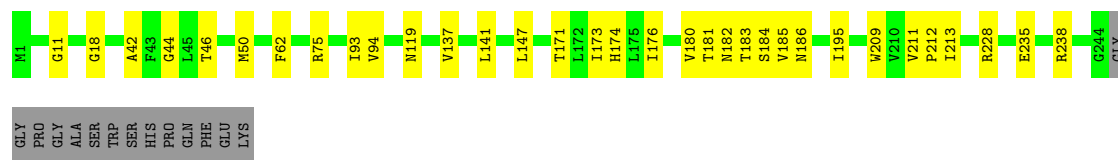
• Molecule 1: Aquaporin Z

Chain G: 



- Molecule 1: Aquaporin Z

Chain I:  82% 13% 5%



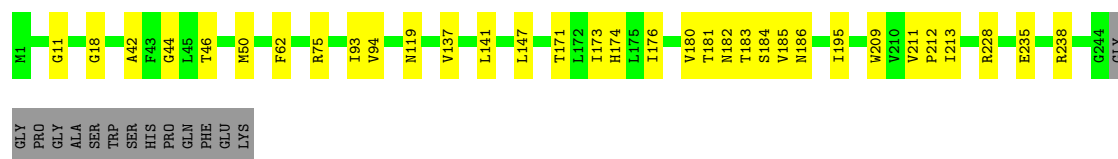
- Molecule 1: Aquaporin Z

Chain K:  83% 12% 5%



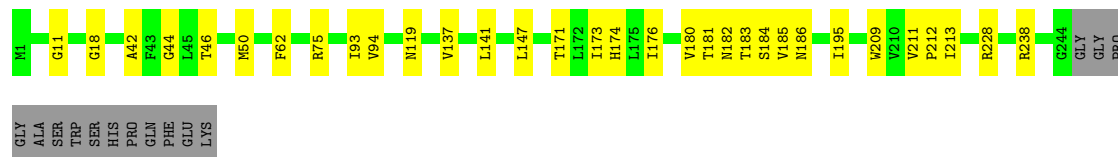
- Molecule 1: Aquaporin Z

Chain M:  82% 13% 5%



- Molecule 1: Aquaporin Z

Chain O:  82% 12% 5%



- Molecule 2: anti-ALFA nanobody

Chain B:  79% 19% 2%

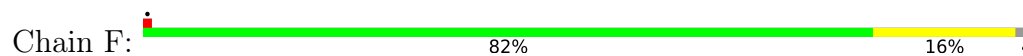


- Molecule 2: anti-ALFA nanobody

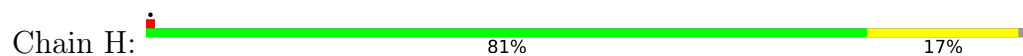
Chain D:  81% 17% 2%



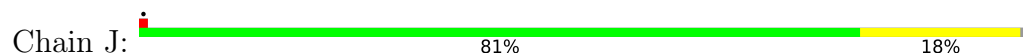
- Molecule 2: anti-ALFA nanobody



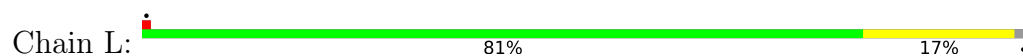
- Molecule 2: anti-ALFA nanobody



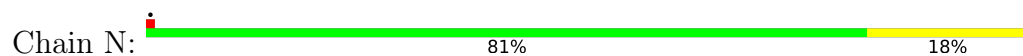
- Molecule 2: anti-ALFA nanobody



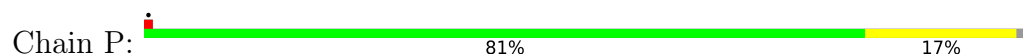
- Molecule 2: anti-ALFA nanobody



- Molecule 2: anti-ALFA nanobody



- Molecule 2: anti-ALFA nanobody



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, D4	Depositor
Number of particles used	918328	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.871	Depositor
Minimum map value	-0.279	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.028	Depositor
Recommended contour level	0.145	Depositor
Map size ($\text{\AA}$)	291.2, 291.2, 291.2	wwPDB
Map dimensions	350, 350, 350	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.832, 0.832, 0.832	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: CDL

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	0.14	0/1834	0.30	0/2498
1	C	0.14	0/1834	0.29	0/2498
1	E	0.14	0/1834	0.30	0/2498
1	G	0.14	0/1834	0.29	0/2498
1	I	0.14	0/1834	0.29	0/2498
1	K	0.14	0/1834	0.30	0/2498
1	M	0.14	0/1834	0.30	0/2498
1	O	0.14	0/1834	0.29	0/2498
2	B	0.12	0/956	0.26	0/1291
2	D	0.12	0/956	0.27	0/1291
2	F	0.12	0/956	0.27	0/1291
2	H	0.12	0/956	0.27	0/1291
2	J	0.12	0/956	0.27	0/1291
2	L	0.12	0/956	0.27	0/1291
2	N	0.12	0/956	0.26	0/1291
2	P	0.12	0/956	0.27	0/1291
All	All	0.14	0/22320	0.29	0/30312

There are no bond length outliers.

There are no bond angle outliers.

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	1787	0	1822	26	0
1	C	1787	0	1822	26	0
1	E	1787	0	1822	26	0
1	G	1787	0	1822	25	0
1	I	1787	0	1822	25	0
1	K	1787	0	1822	25	0
1	M	1787	0	1822	26	0
1	O	1787	0	1822	25	0
2	B	940	0	902	27	0
2	D	940	0	902	26	0
2	F	940	0	902	25	0
2	H	940	0	902	26	0
2	J	940	0	902	26	0
2	L	940	0	902	26	0
2	N	940	0	902	26	0
2	P	940	0	902	26	0
3	A	100	156	156	3	0
3	C	100	156	156	3	0
3	E	100	156	156	3	0
3	G	100	156	156	3	0
3	I	100	156	156	3	0
3	K	100	156	156	3	0
3	M	100	156	156	3	0
3	O	100	156	156	3	0
All	All	22616	1248	23040	388	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 8.

The worst 5 of 388 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)
2:P:15:GLN:N	2:P:15:GLN:OE1	2.03	0.92
2:H:15:GLN:OE1	2:H:15:GLN:N	2.03	0.92
2:B:15:GLN:N	2:B:15:GLN:OE1	2.03	0.91
2:D:15:GLN:N	2:D:15:GLN:OE1	2.03	0.91
2:J:15:GLN:OE1	2:J:15:GLN:N	2.03	0.91

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	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	C	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	E	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	G	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	I	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	K	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	M	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
1	O	242/258 (94%)	233 (96%)	8 (3%)	1 (0%)	30	22
2	B	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	D	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	F	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	H	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	J	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	L	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	N	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
2	P	120/124 (97%)	115 (96%)	5 (4%)	0	100	100
All	All	2896/3056 (95%)	2784 (96%)	104 (4%)	8 (0%)	37	29

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	185	VAL
1	C	185	VAL
1	E	185	VAL
1	G	185	VAL
1	I	185	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	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	C	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	E	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	G	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	I	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	K	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	M	173/183 (94%)	172 (99%)	1 (1%)	78	81
1	O	173/183 (94%)	172 (99%)	1 (1%)	78	81
2	B	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	D	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	F	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	H	101/102 (99%)	100 (99%)	1 (1%)	68	70
2	J	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	L	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	N	101/102 (99%)	99 (98%)	2 (2%)	48	46
2	P	101/102 (99%)	100 (99%)	1 (1%)	68	70
All	All	2192/2280 (96%)	2170 (99%)	22 (1%)	65	70

5 of 22 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	137	VAL
1	M	137	VAL
2	L	84	SER
2	N	32	SER
1	E	137	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
2	P	7	GLN
2	N	7	GLN
2	J	7	GLN
2	H	7	GLN
2	L	7	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	CDL	I	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	G	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	M	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	E	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	O	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	K	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	C	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (0%)
3	CDL	A	301	-	99,99,99	0.30	0	105,111,111	0.54	1 (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
3	CDL	I	301	-	-	55/110/110/110	-
3	CDL	G	301	-	-	55/110/110/110	-
3	CDL	M	301	-	-	55/110/110/110	-
3	CDL	E	301	-	-	55/110/110/110	-
3	CDL	O	301	-	-	55/110/110/110	-
3	CDL	K	301	-	-	55/110/110/110	-
3	CDL	C	301	-	-	55/110/110/110	-
3	CDL	A	301	-	-	55/110/110/110	-

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	O	301	CDL	CB2-C1-CA2	-2.73	104.80	112.65
3	G	301	CDL	CB2-C1-CA2	-2.72	104.83	112.65
3	A	301	CDL	CB2-C1-CA2	-2.71	104.84	112.65
3	E	301	CDL	CB2-C1-CA2	-2.71	104.84	112.65
3	I	301	CDL	CB2-C1-CA2	-2.71	104.84	112.65

There are no chirality outliers.

5 of 440 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	CDL	O1-C1-CB2-OB2
3	A	301	CDL	CA2-OA2-PA1-OA5
3	A	301	CDL	CA3-OA5-PA1-OA2
3	A	301	CDL	CA3-OA5-PA1-OA3
3	A	301	CDL	CA3-OA5-PA1-OA4

There are no ring outliers.

8 monomers are involved in 24 short contacts:

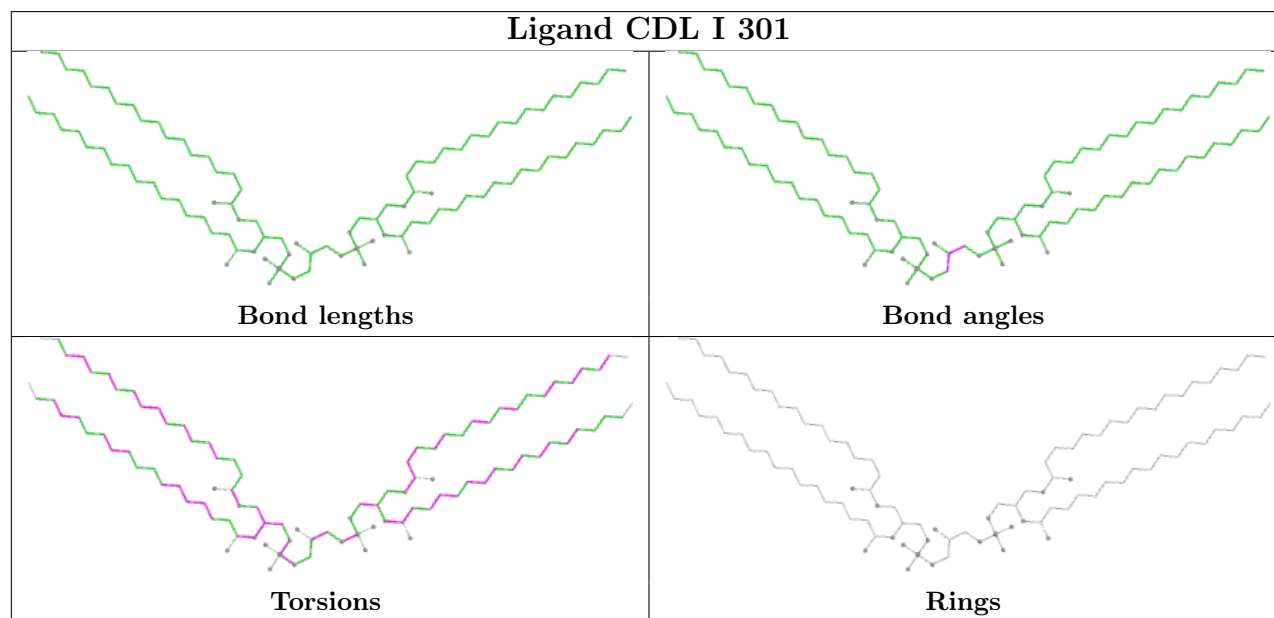
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	I	301	CDL	3	0
3	G	301	CDL	3	0

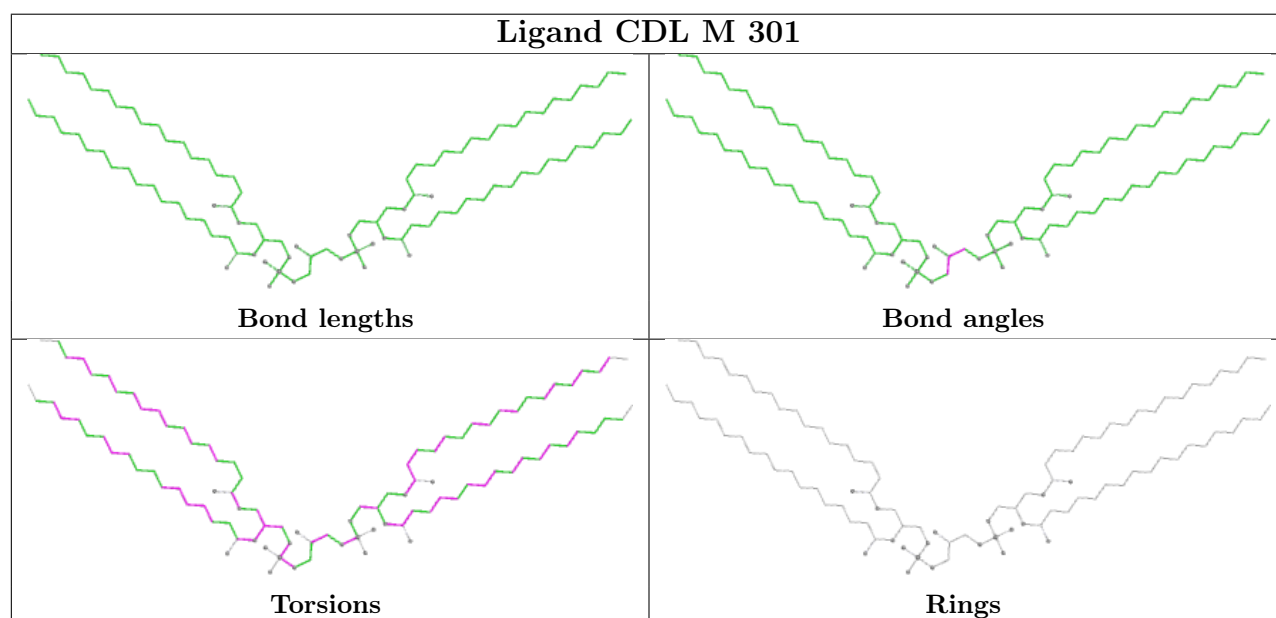
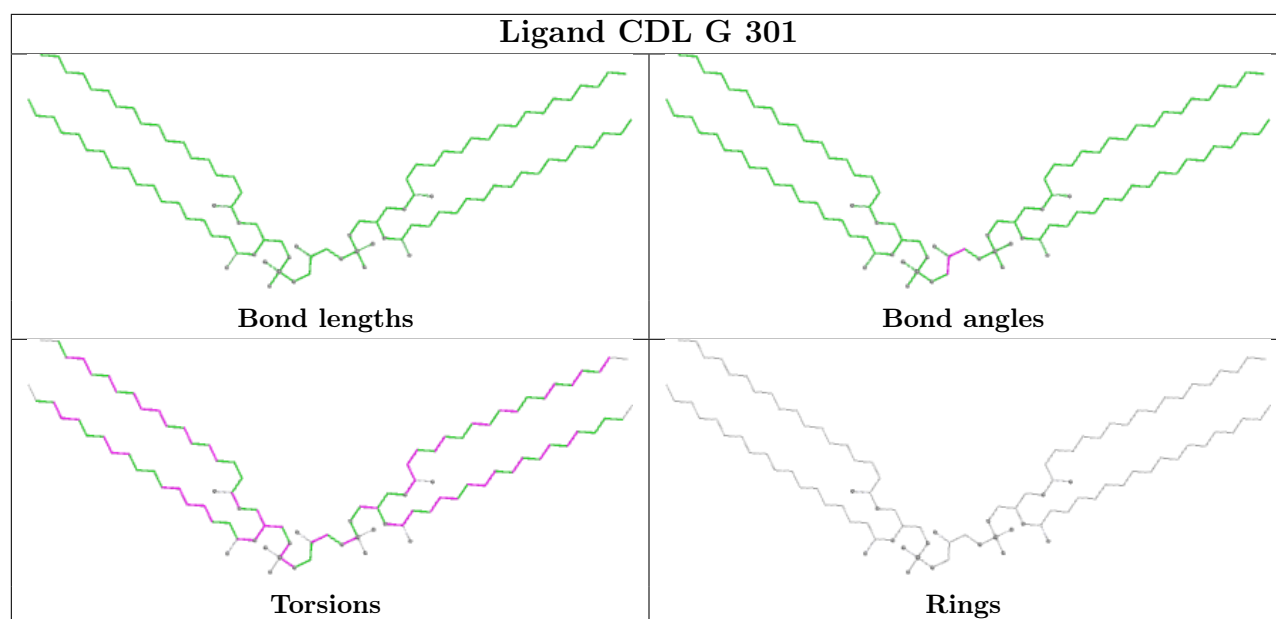
Continued on next page...

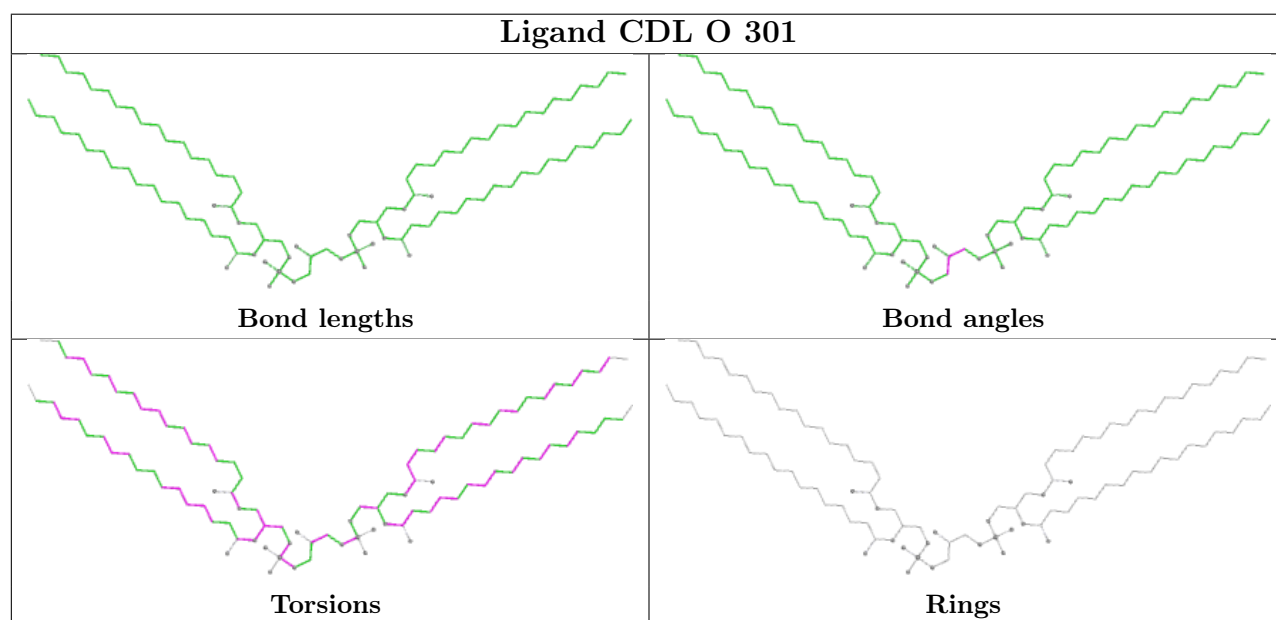
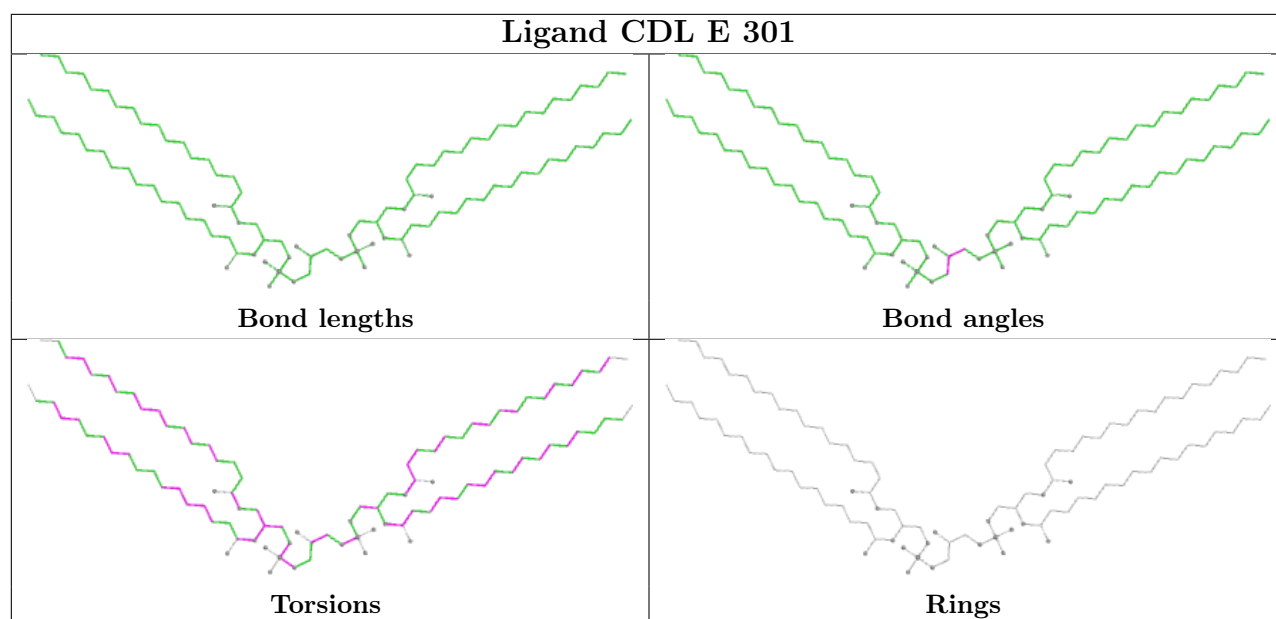
Continued from previous page...

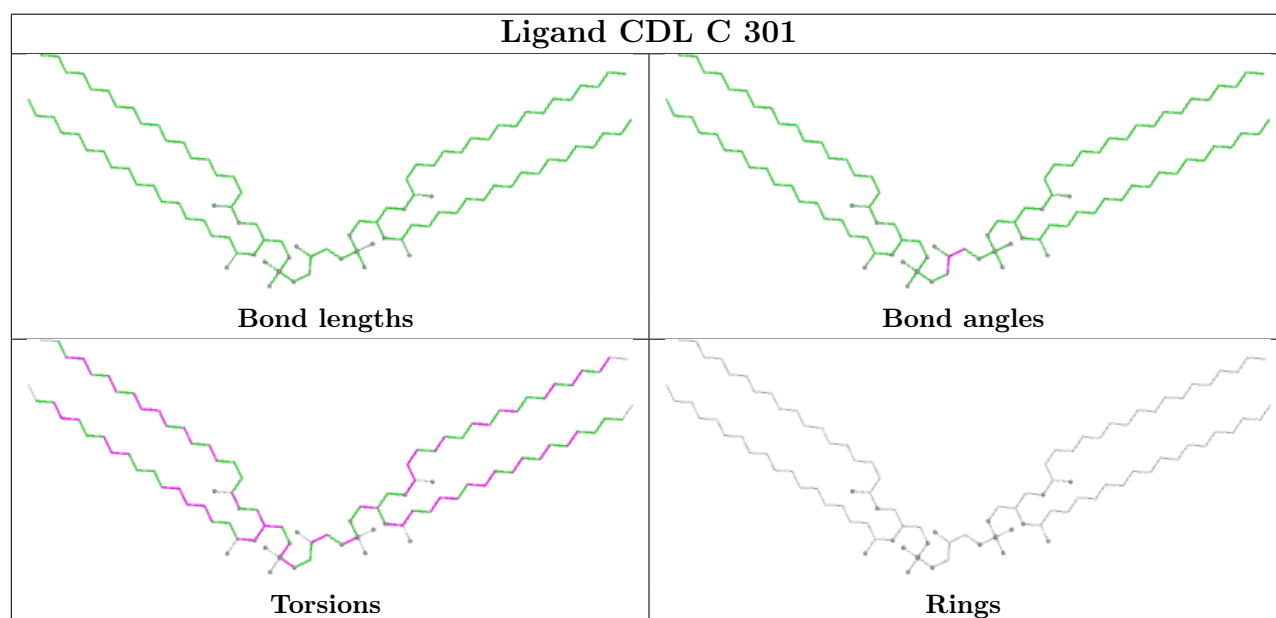
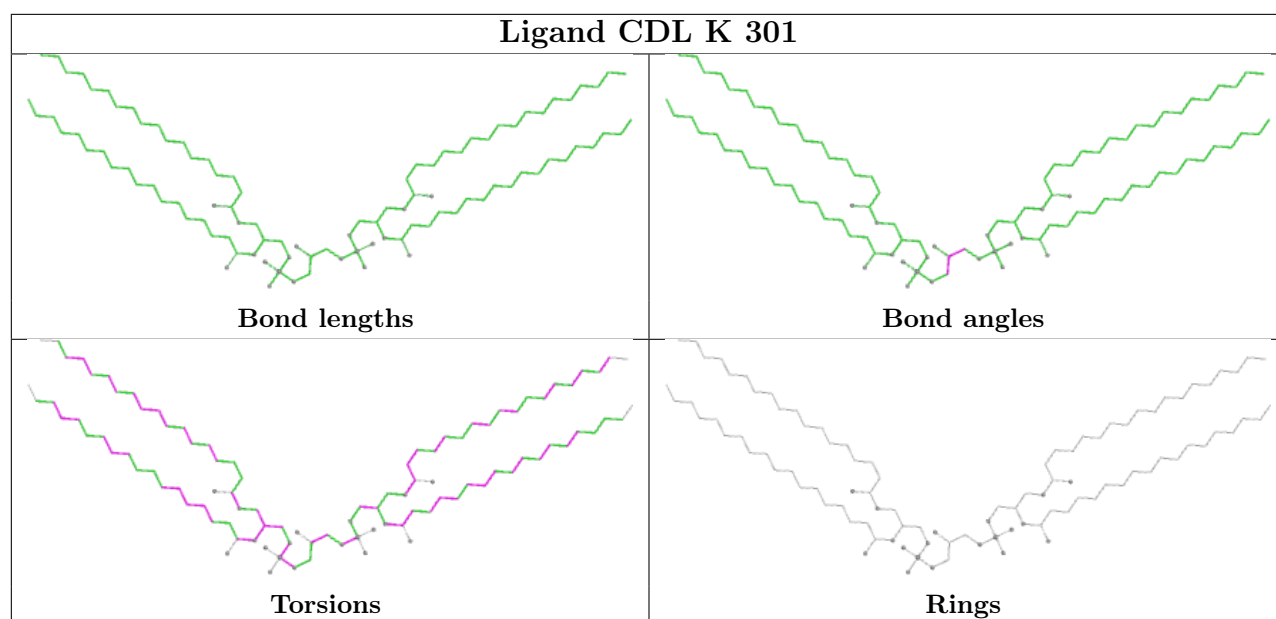
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	M	301	CDL	3	0
3	E	301	CDL	3	0
3	O	301	CDL	3	0
3	K	301	CDL	3	0
3	C	301	CDL	3	0
3	A	301	CDL	3	0

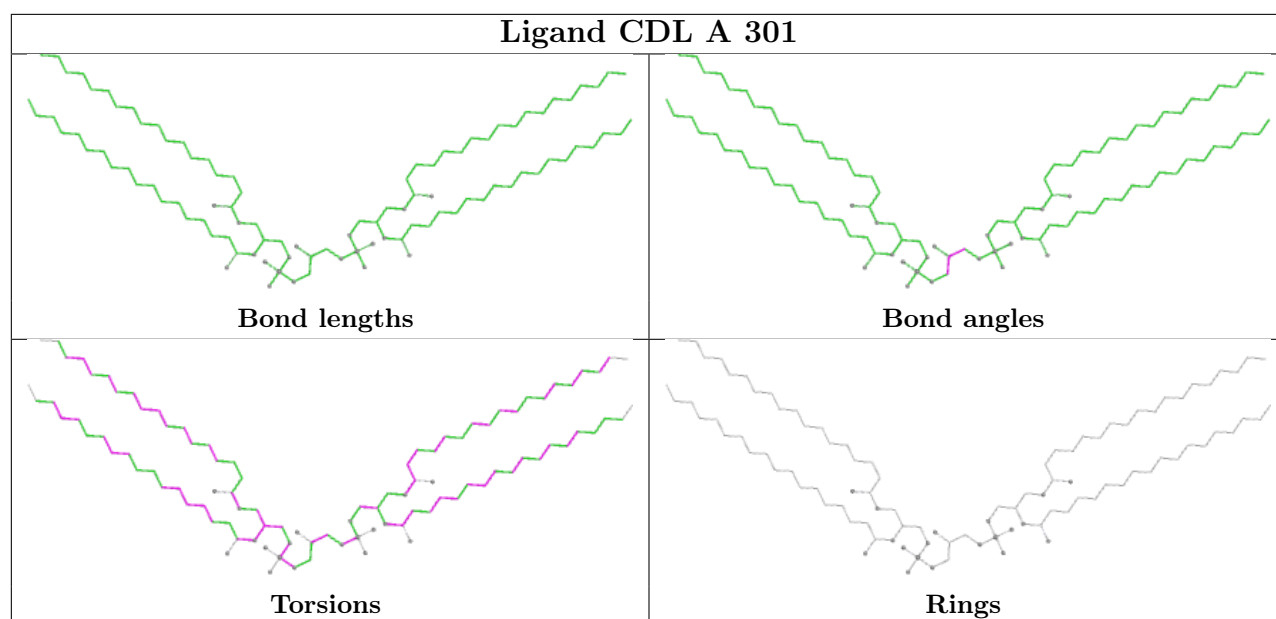
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

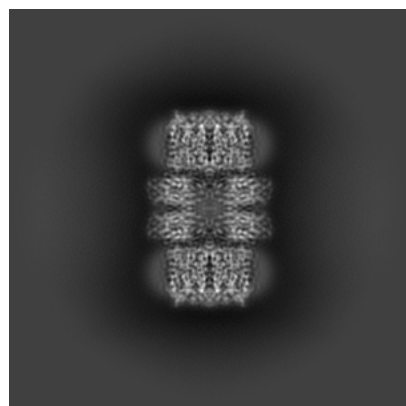
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42793. These allow visual inspection of the internal detail of the map and identification of artifacts.

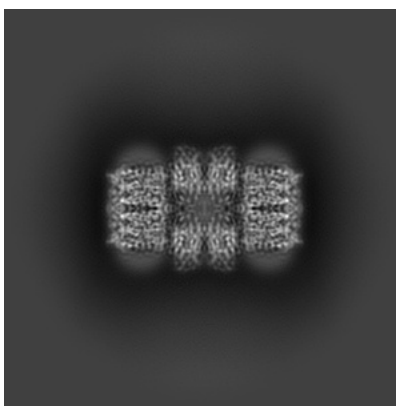
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

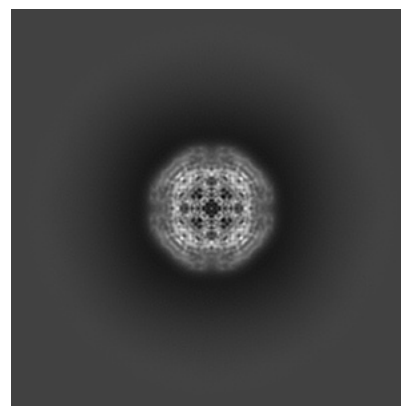
6.1.1 Primary map



X

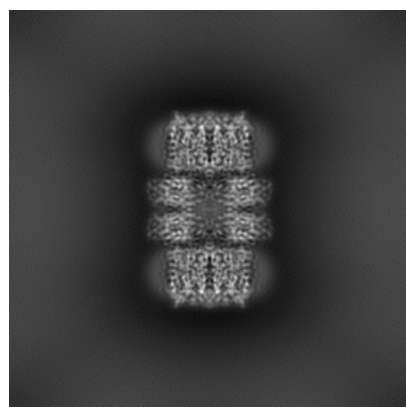


Y

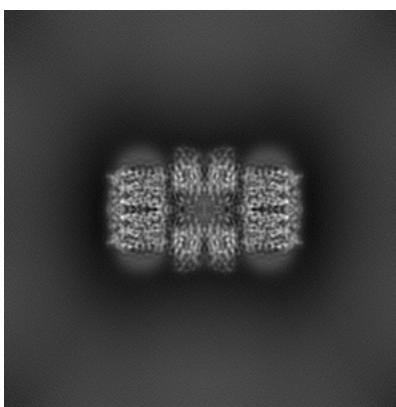


Z

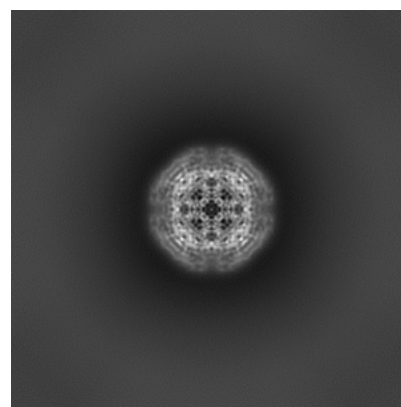
6.1.2 Raw map



X



Y

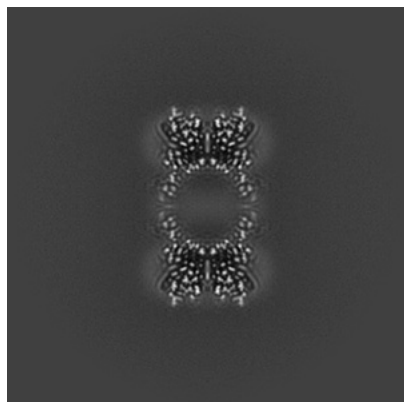


Z

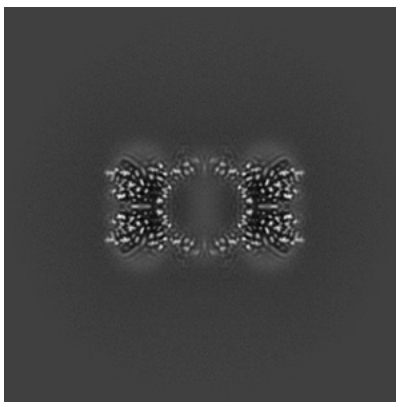
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

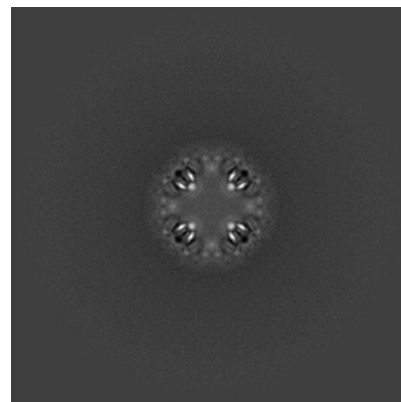
6.2.1 Primary map



X Index: 175

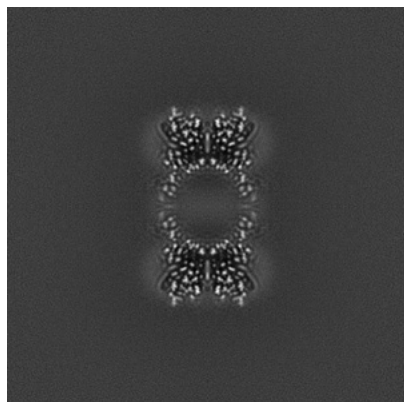


Y Index: 175

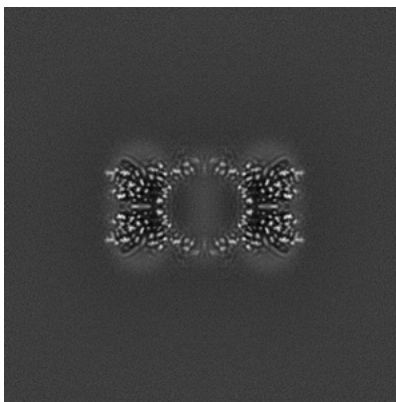


Z Index: 175

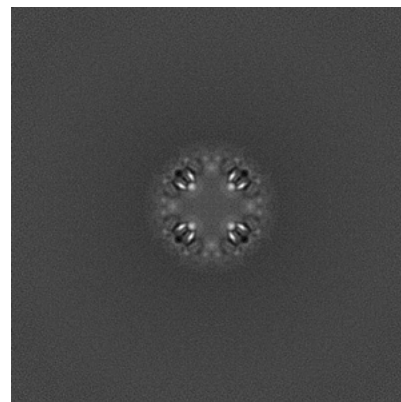
6.2.2 Raw map



X Index: 175



Y Index: 175

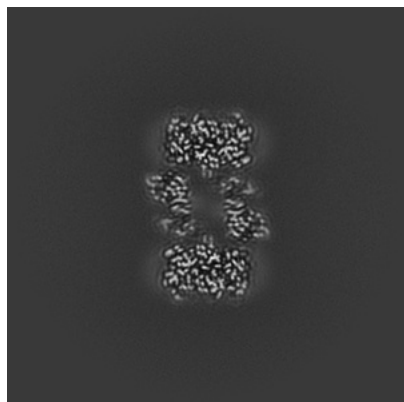


Z Index: 175

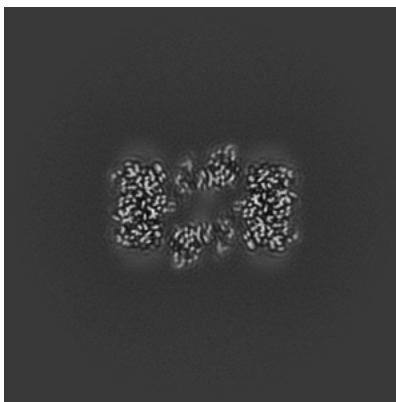
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

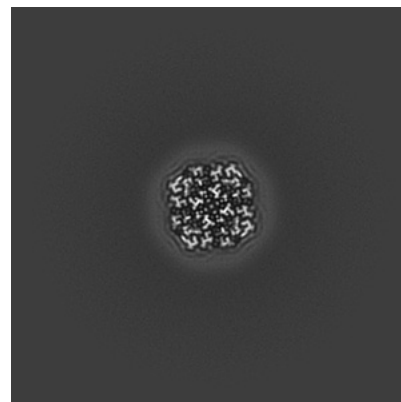
6.3.1 Primary map



X Index: 156

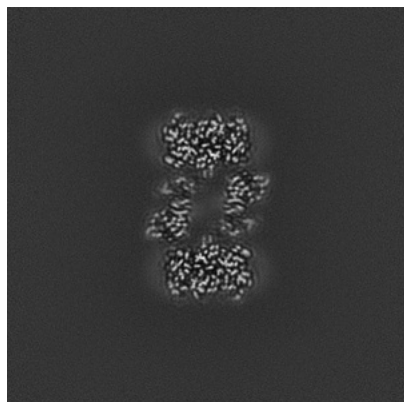


Y Index: 156

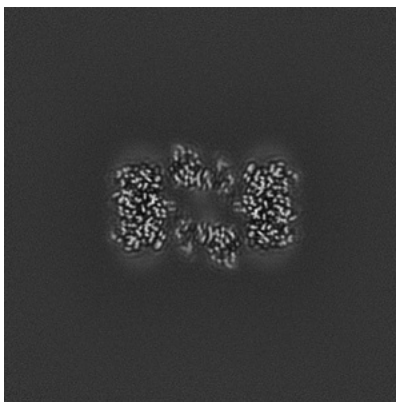


Z Index: 116

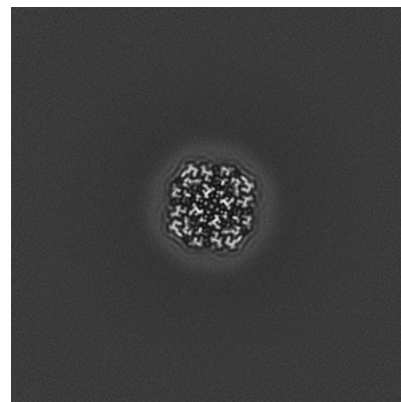
6.3.2 Raw map



X Index: 194



Y Index: 194

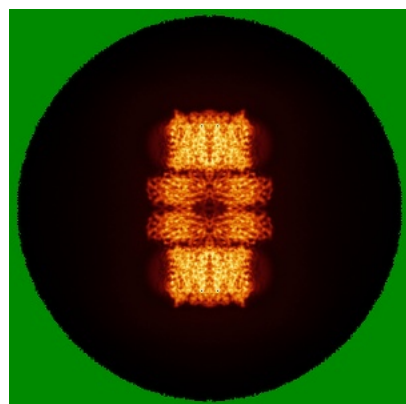


Z Index: 234

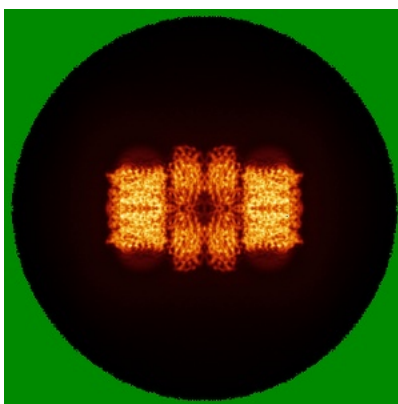
The images above show the largest variance slices of the map in three orthogonal directions.

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

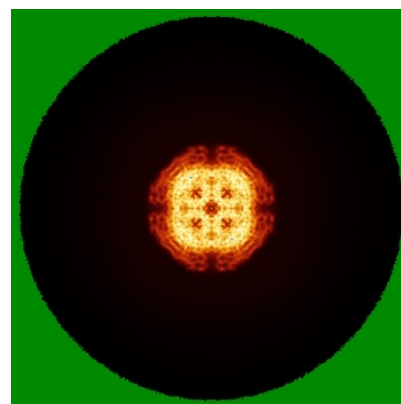
6.4.1 Primary map



X

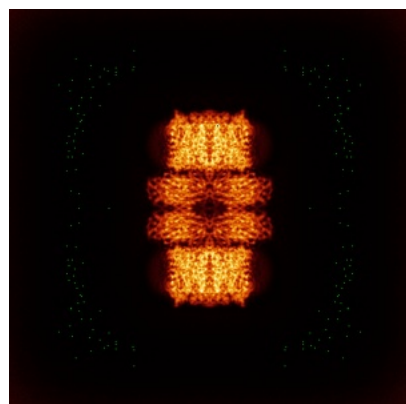


Y

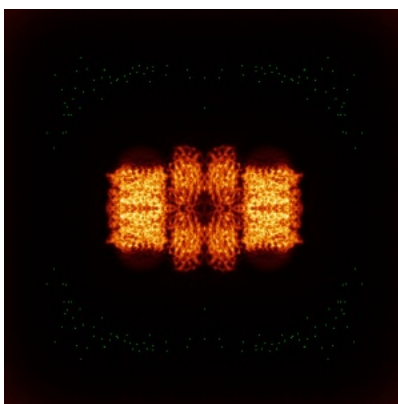


Z

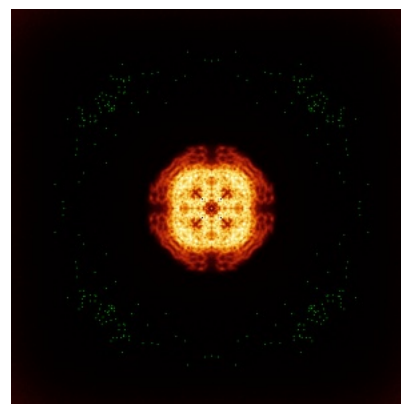
6.4.2 Raw map



X



Y



Z

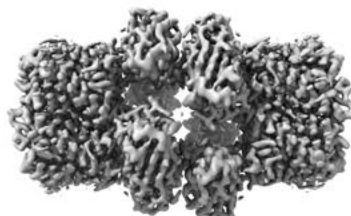
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

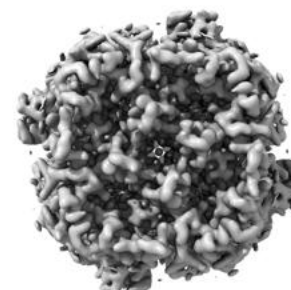
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.145. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

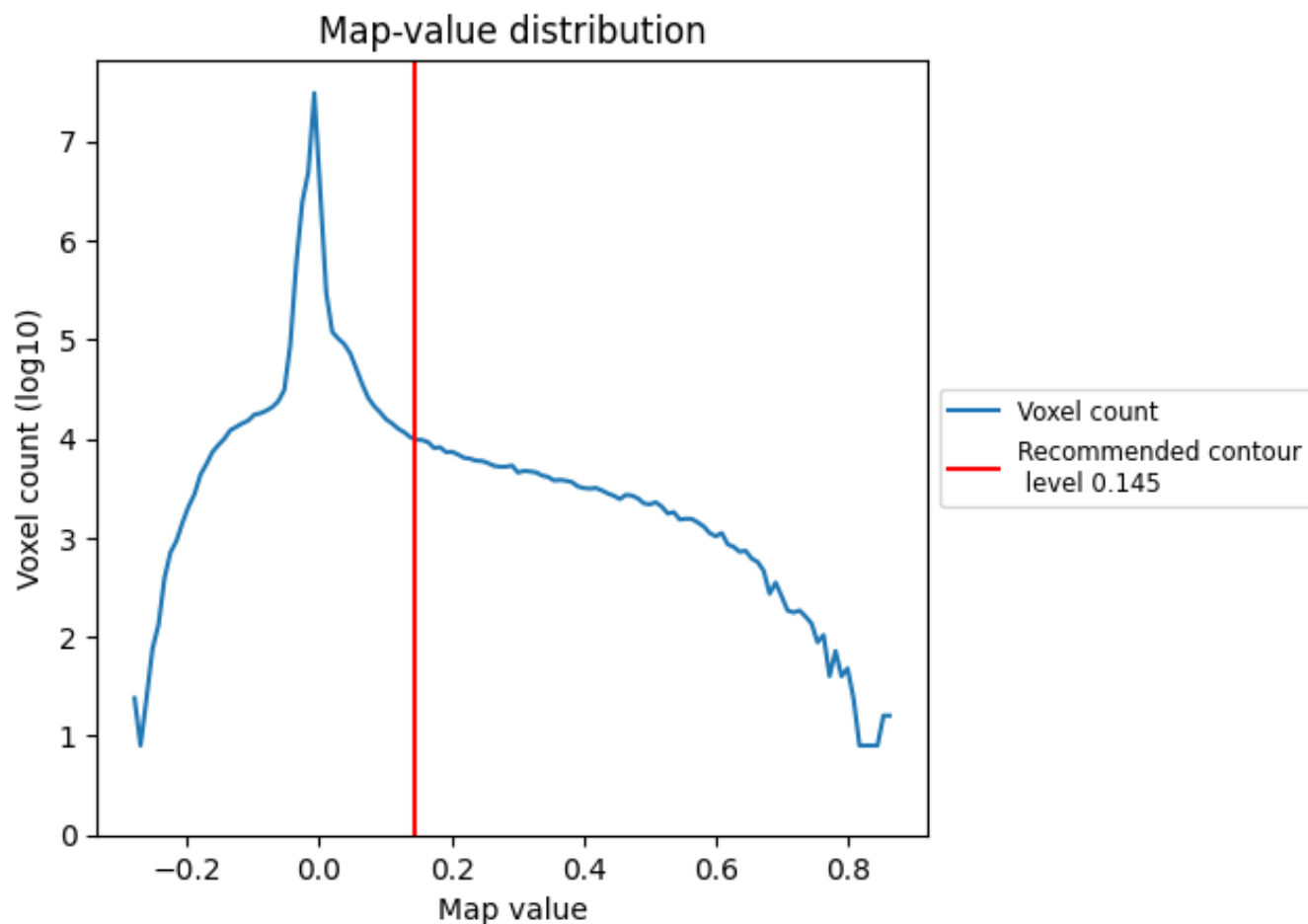
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

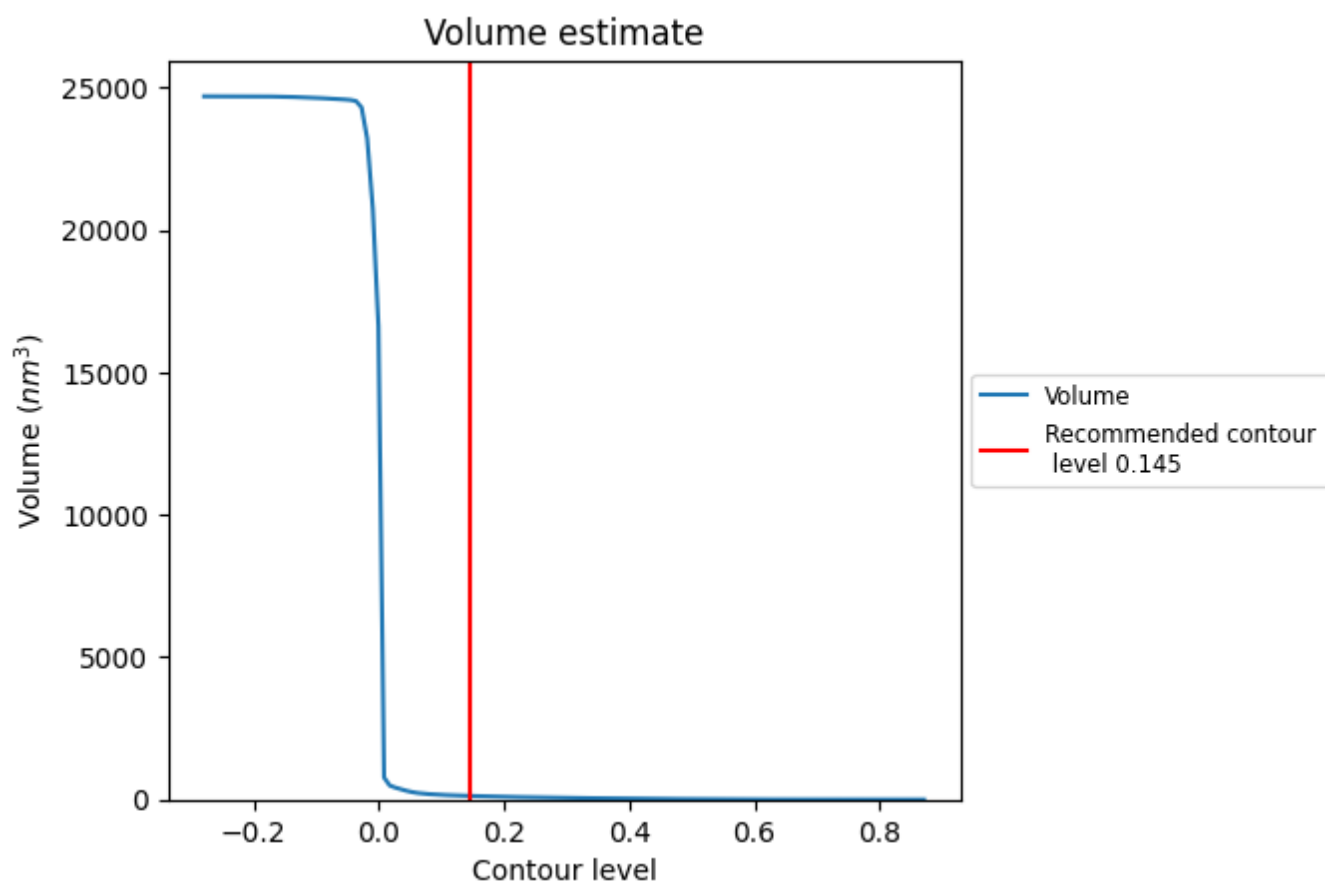
This section contains the results of statistical analysis of the map.

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.

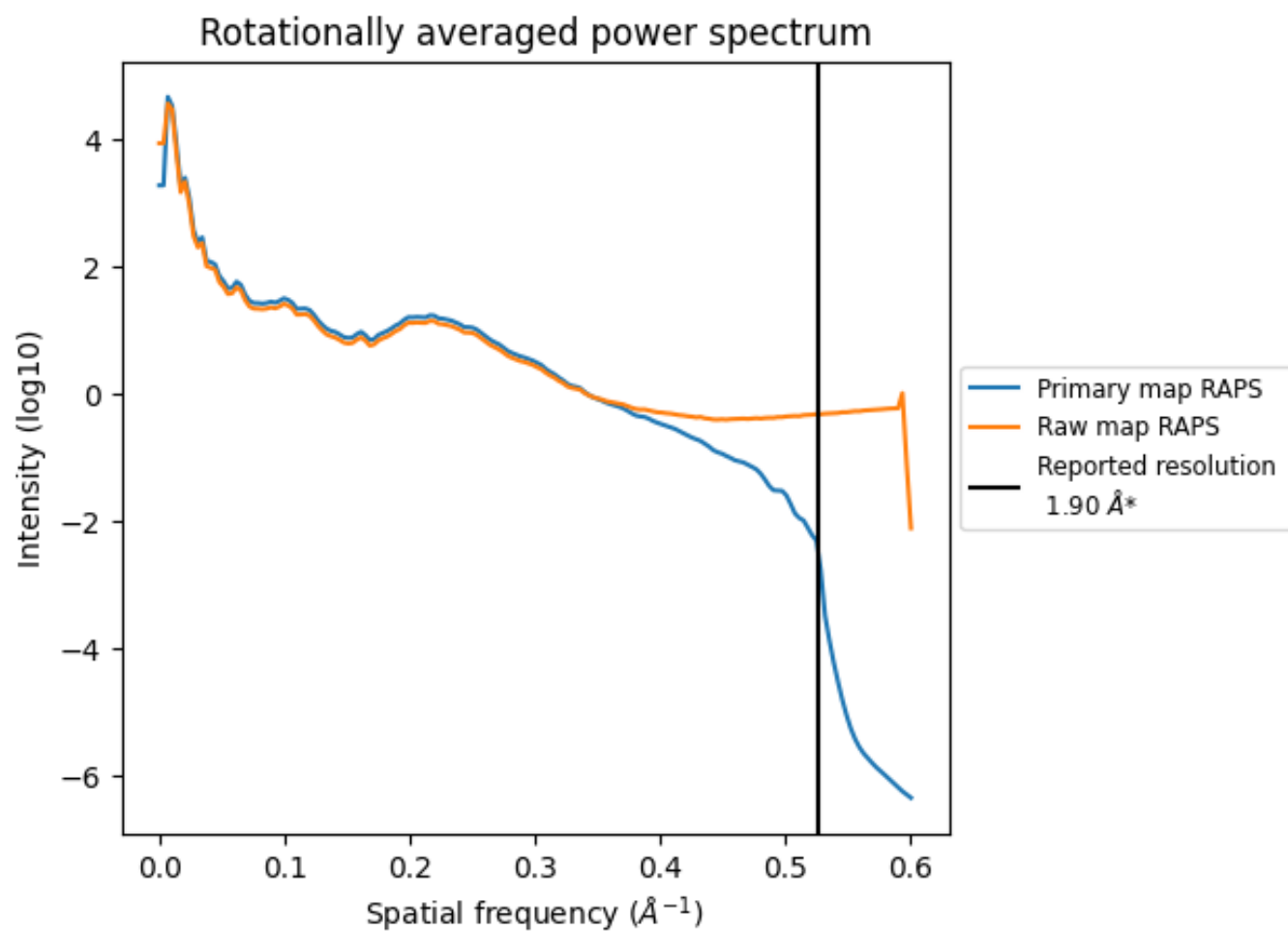
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 128 nm^3 ; this corresponds to an approximate mass of 116 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 ⓘ

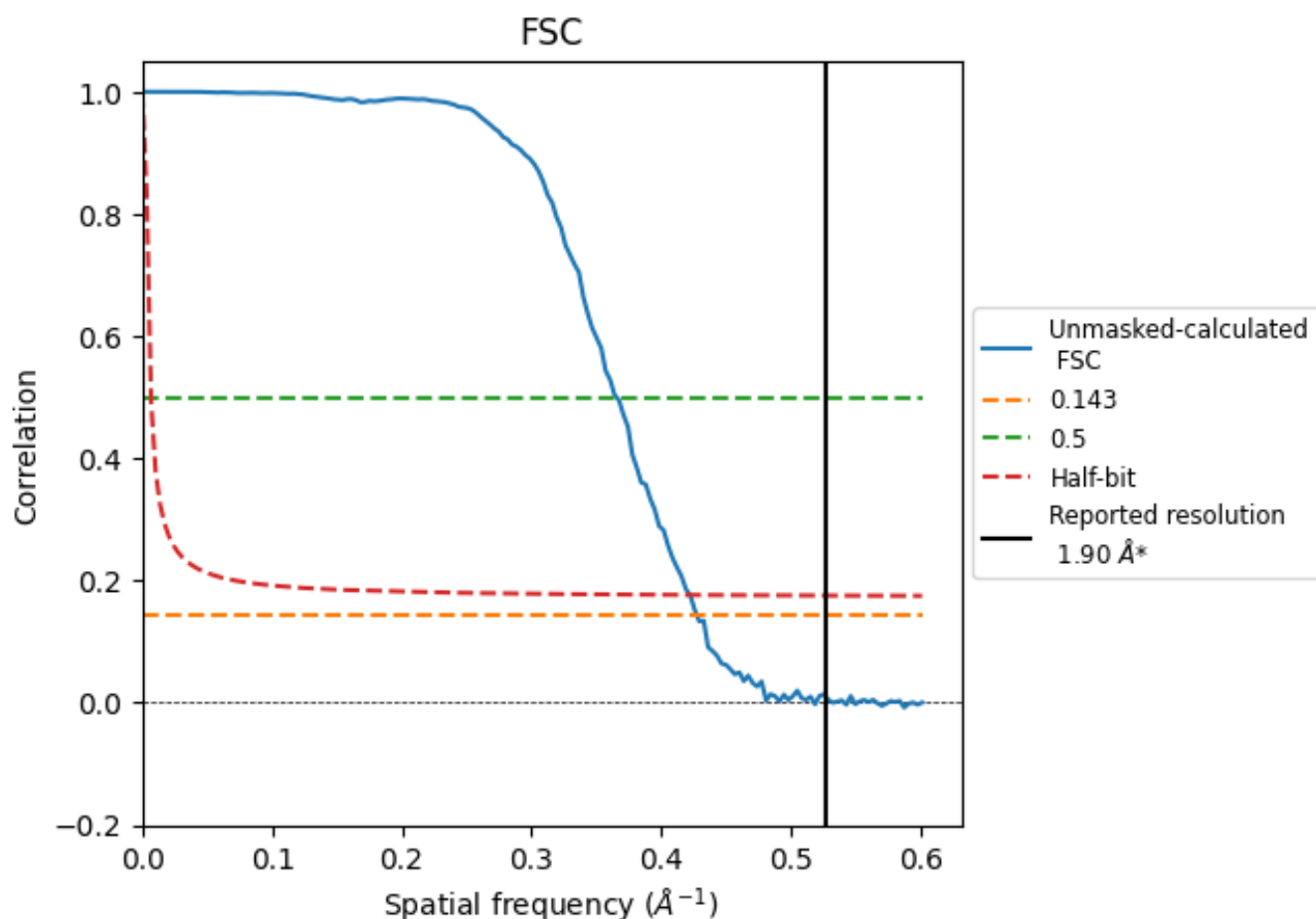


*Reported resolution corresponds to spatial frequency of 0.526 Å⁻¹

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 0.526 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	1.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.34	2.74	2.37

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.34 differs from the reported value 1.9 by more than 10 %

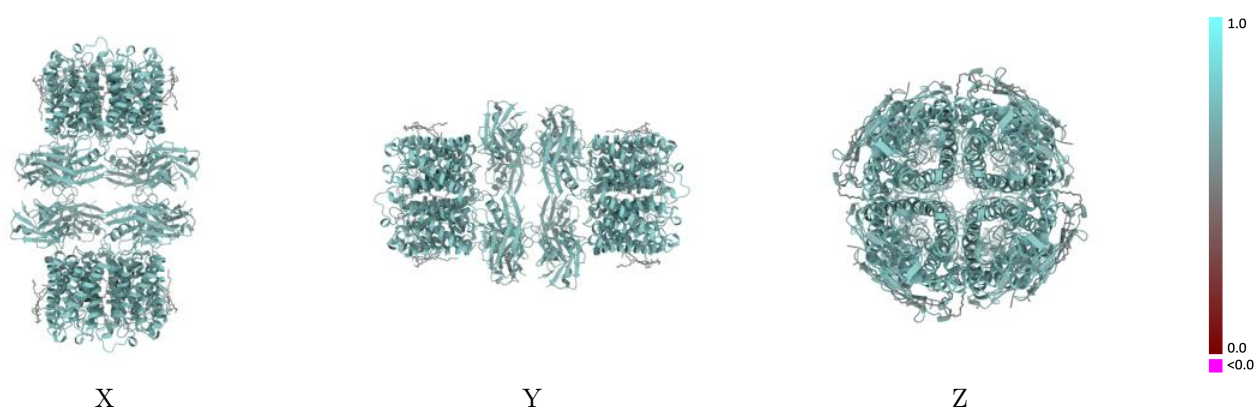
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-42793 and PDB model 8UY6. Per-residue inclusion information can be found in section 3 on page 12.

9.1 Map-model overlay [i](#)

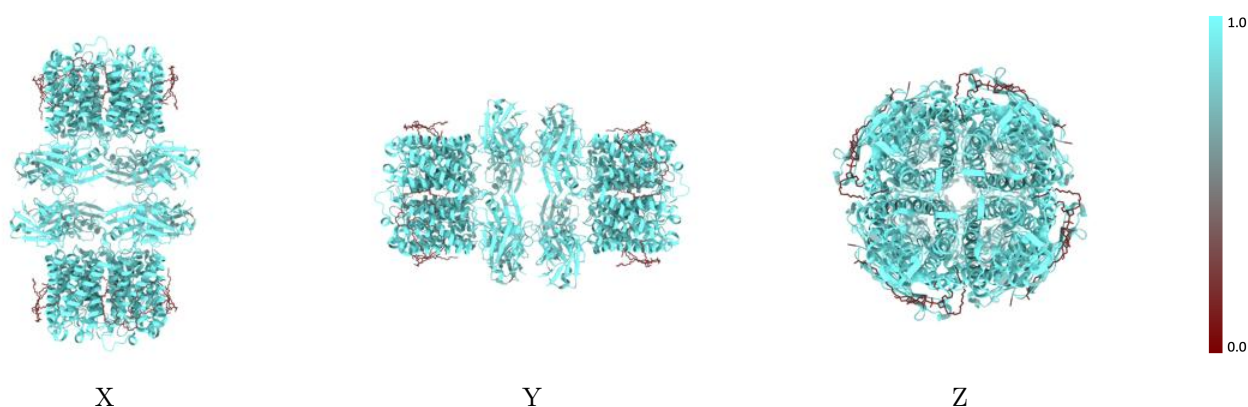
This section was not generated.

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



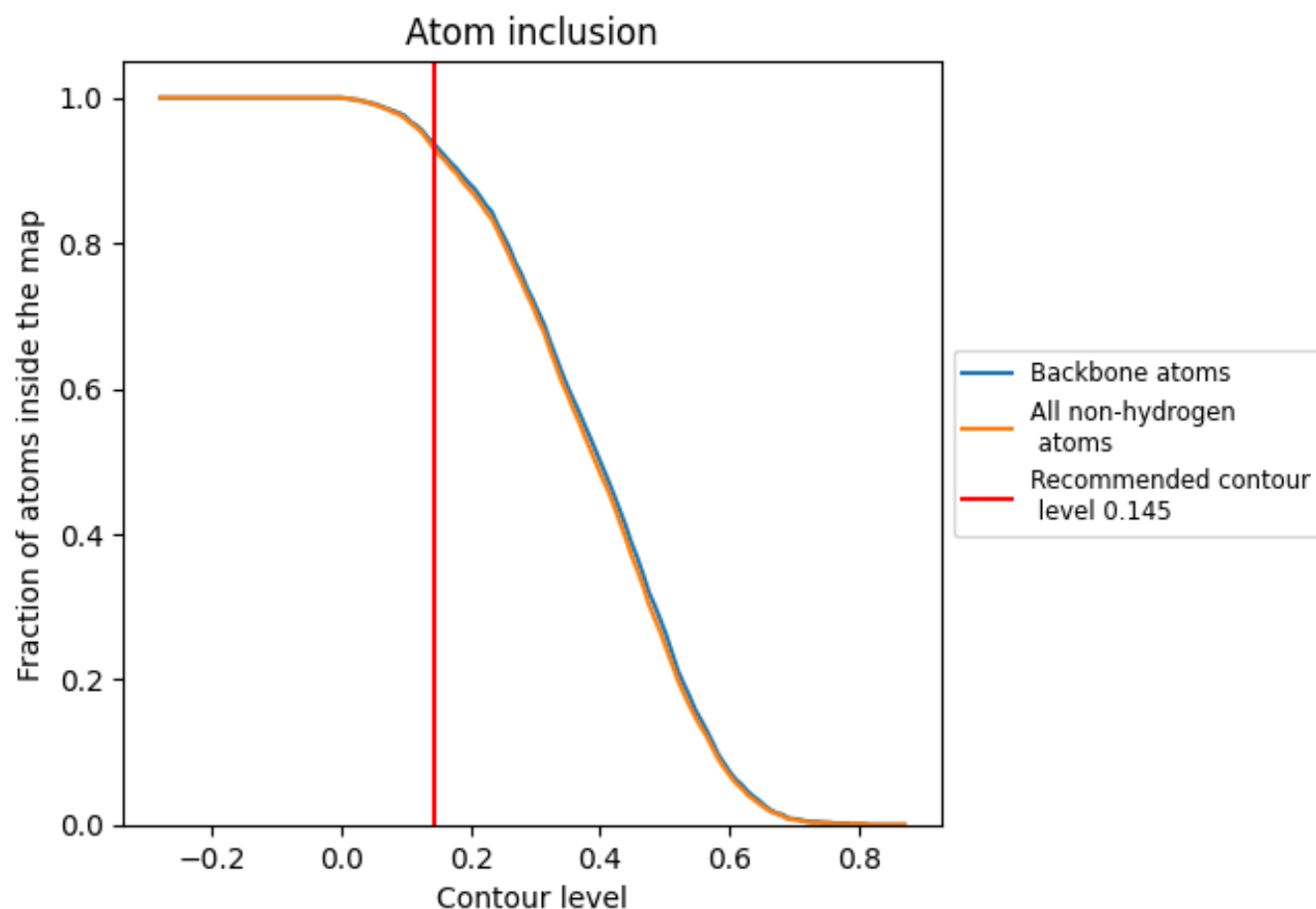
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.145).

9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 93% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.145) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9290	 0.6800
A	 0.9390	 0.6940
B	 0.9110	 0.6520
C	 0.9390	 0.6940
D	 0.9100	 0.6520
E	 0.9390	 0.6940
F	 0.9100	 0.6520
G	 0.9390	 0.6940
H	 0.9090	 0.6510
I	 0.9390	 0.6950
J	 0.9100	 0.6510
K	 0.9390	 0.6940
L	 0.9100	 0.6510
M	 0.9390	 0.6930
N	 0.9110	 0.6540
O	 0.9390	 0.6950
P	 0.9100	 0.6530

