



wwPDB EM Validation Summary Report ⓘ

Mar 4, 2024 – 09:46 AM EST

PDB ID : 6MDO
EMDB ID : EMD-9102
Title : The D1 and D2 domain rings of NSF engaging the SNAP-25 N-terminus within the 20S supercomplex (focused refinement on D1/D2 rings, class 1)
Authors : White, K.I.; Zhao, M.; Brunger, A.T.
Deposited on : 2018-09-04
Resolution : 3.90 Å (reported)
Based on initial model : 3J96

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.dev70
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)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

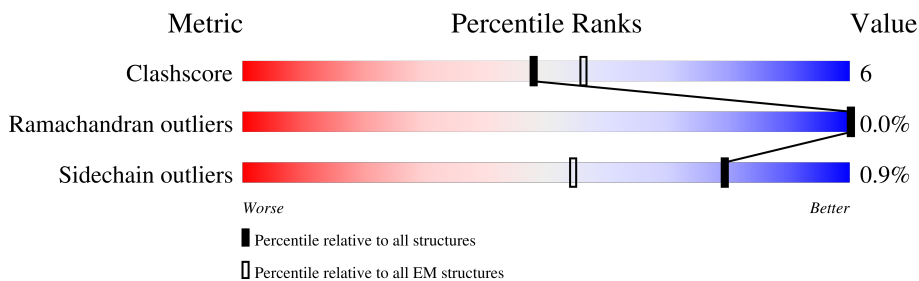
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.90 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)
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	768	 57% 9% 33%
1	B	768	 55% 11% 32%
1	C	768	 55% 12% 32%
1	D	768	 58% 10% 32%
1	E	768	 56% 10% 34%
1	F	768	 25% 6% 69%
2	H	207	 7% 92%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 45505 atoms, of which 22990 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 Vesicle-fusing ATPase.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	511	8082	2525	4099	696	740	22	0	0
1	B	519	8203	2561	4161	706	753	22	0	0
1	C	521	8244	2574	4181	709	758	22	0	0
1	D	525	8308	2594	4214	713	764	23	0	0
1	E	509	8059	2511	4094	693	739	22	0	0
1	F	241	3874	1214	1983	317	349	11	0	0

There are 276 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-23	MET	-	initiating methionine	UNP P18708
A	-22	GLY	-	expression tag	UNP P18708
A	-21	HIS	-	expression tag	UNP P18708
A	-20	HIS	-	expression tag	UNP P18708
A	-19	HIS	-	expression tag	UNP P18708
A	-18	HIS	-	expression tag	UNP P18708
A	-17	HIS	-	expression tag	UNP P18708
A	-16	HIS	-	expression tag	UNP P18708
A	-15	ASP	-	expression tag	UNP P18708
A	-14	TYR	-	expression tag	UNP P18708
A	-13	ASP	-	expression tag	UNP P18708
A	-12	ILE	-	expression tag	UNP P18708
A	-11	PRO	-	expression tag	UNP P18708
A	-10	THR	-	expression tag	UNP P18708
A	-9	THR	-	expression tag	UNP P18708
A	-8	GLU	-	expression tag	UNP P18708
A	-7	ASN	-	expression tag	UNP P18708
A	-6	LEU	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	TYR	-	expression tag	UNP P18708
A	-4	PHE	-	expression tag	UNP P18708
A	-3	GLN	-	expression tag	UNP P18708
A	-2	GLY	-	expression tag	UNP P18708
A	-1	ALA	-	expression tag	UNP P18708
A	0	HIS	-	expression tag	UNP P18708
A	458	ILE	LYS	conflict	UNP P18708
A	724	TYR	-	expression tag	UNP P18708
A	725	ARG	-	expression tag	UNP P18708
A	726	VAL	-	expression tag	UNP P18708
A	727	ARG	-	expression tag	UNP P18708
A	728	LYS	-	expression tag	UNP P18708
A	729	PHE	-	expression tag	UNP P18708
A	730	LEU	-	expression tag	UNP P18708
A	731	ALA	-	expression tag	UNP P18708
A	732	LEU	-	expression tag	UNP P18708
A	733	LEU	-	expression tag	UNP P18708
A	734	ARG	-	expression tag	UNP P18708
A	735	GLU	-	expression tag	UNP P18708
A	736	GLU	-	expression tag	UNP P18708
A	737	GLY	-	expression tag	UNP P18708
A	738	ALA	-	expression tag	UNP P18708
A	739	SER	-	expression tag	UNP P18708
A	740	PRO	-	expression tag	UNP P18708
A	741	LEU	-	expression tag	UNP P18708
A	742	ASP	-	expression tag	UNP P18708
A	743	PHE	-	expression tag	UNP P18708
A	744	ASP	-	expression tag	UNP P18708
B	-23	MET	-	initiating methionine	UNP P18708
B	-22	GLY	-	expression tag	UNP P18708
B	-21	HIS	-	expression tag	UNP P18708
B	-20	HIS	-	expression tag	UNP P18708
B	-19	HIS	-	expression tag	UNP P18708
B	-18	HIS	-	expression tag	UNP P18708
B	-17	HIS	-	expression tag	UNP P18708
B	-16	HIS	-	expression tag	UNP P18708
B	-15	ASP	-	expression tag	UNP P18708
B	-14	TYR	-	expression tag	UNP P18708
B	-13	ASP	-	expression tag	UNP P18708
B	-12	ILE	-	expression tag	UNP P18708
B	-11	PRO	-	expression tag	UNP P18708
B	-10	THR	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-9	THR	-	expression tag	UNP P18708
B	-8	GLU	-	expression tag	UNP P18708
B	-7	ASN	-	expression tag	UNP P18708
B	-6	LEU	-	expression tag	UNP P18708
B	-5	TYR	-	expression tag	UNP P18708
B	-4	PHE	-	expression tag	UNP P18708
B	-3	GLN	-	expression tag	UNP P18708
B	-2	GLY	-	expression tag	UNP P18708
B	-1	ALA	-	expression tag	UNP P18708
B	0	HIS	-	expression tag	UNP P18708
B	458	ILE	LYS	conflict	UNP P18708
B	724	TYR	-	expression tag	UNP P18708
B	725	ARG	-	expression tag	UNP P18708
B	726	VAL	-	expression tag	UNP P18708
B	727	ARG	-	expression tag	UNP P18708
B	728	LYS	-	expression tag	UNP P18708
B	729	PHE	-	expression tag	UNP P18708
B	730	LEU	-	expression tag	UNP P18708
B	731	ALA	-	expression tag	UNP P18708
B	732	LEU	-	expression tag	UNP P18708
B	733	LEU	-	expression tag	UNP P18708
B	734	ARG	-	expression tag	UNP P18708
B	735	GLU	-	expression tag	UNP P18708
B	736	GLU	-	expression tag	UNP P18708
B	737	GLY	-	expression tag	UNP P18708
B	738	ALA	-	expression tag	UNP P18708
B	739	SER	-	expression tag	UNP P18708
B	740	PRO	-	expression tag	UNP P18708
B	741	LEU	-	expression tag	UNP P18708
B	742	ASP	-	expression tag	UNP P18708
B	743	PHE	-	expression tag	UNP P18708
B	744	ASP	-	expression tag	UNP P18708
C	-23	MET	-	initiating methionine	UNP P18708
C	-22	GLY	-	expression tag	UNP P18708
C	-21	HIS	-	expression tag	UNP P18708
C	-20	HIS	-	expression tag	UNP P18708
C	-19	HIS	-	expression tag	UNP P18708
C	-18	HIS	-	expression tag	UNP P18708
C	-17	HIS	-	expression tag	UNP P18708
C	-16	HIS	-	expression tag	UNP P18708
C	-15	ASP	-	expression tag	UNP P18708
C	-14	TYR	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-13	ASP	-	expression tag	UNP P18708
C	-12	ILE	-	expression tag	UNP P18708
C	-11	PRO	-	expression tag	UNP P18708
C	-10	THR	-	expression tag	UNP P18708
C	-9	THR	-	expression tag	UNP P18708
C	-8	GLU	-	expression tag	UNP P18708
C	-7	ASN	-	expression tag	UNP P18708
C	-6	LEU	-	expression tag	UNP P18708
C	-5	TYR	-	expression tag	UNP P18708
C	-4	PHE	-	expression tag	UNP P18708
C	-3	GLN	-	expression tag	UNP P18708
C	-2	GLY	-	expression tag	UNP P18708
C	-1	ALA	-	expression tag	UNP P18708
C	0	HIS	-	expression tag	UNP P18708
C	458	ILE	LYS	conflict	UNP P18708
C	724	TYR	-	expression tag	UNP P18708
C	725	ARG	-	expression tag	UNP P18708
C	726	VAL	-	expression tag	UNP P18708
C	727	ARG	-	expression tag	UNP P18708
C	728	LYS	-	expression tag	UNP P18708
C	729	PHE	-	expression tag	UNP P18708
C	730	LEU	-	expression tag	UNP P18708
C	731	ALA	-	expression tag	UNP P18708
C	732	LEU	-	expression tag	UNP P18708
C	733	LEU	-	expression tag	UNP P18708
C	734	ARG	-	expression tag	UNP P18708
C	735	GLU	-	expression tag	UNP P18708
C	736	GLU	-	expression tag	UNP P18708
C	737	GLY	-	expression tag	UNP P18708
C	738	ALA	-	expression tag	UNP P18708
C	739	SER	-	expression tag	UNP P18708
C	740	PRO	-	expression tag	UNP P18708
C	741	LEU	-	expression tag	UNP P18708
C	742	ASP	-	expression tag	UNP P18708
C	743	PHE	-	expression tag	UNP P18708
C	744	ASP	-	expression tag	UNP P18708
D	-23	MET	-	initiating methionine	UNP P18708
D	-22	GLY	-	expression tag	UNP P18708
D	-21	HIS	-	expression tag	UNP P18708
D	-20	HIS	-	expression tag	UNP P18708
D	-19	HIS	-	expression tag	UNP P18708
D	-18	HIS	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-17	HIS	-	expression tag	UNP P18708
D	-16	HIS	-	expression tag	UNP P18708
D	-15	ASP	-	expression tag	UNP P18708
D	-14	TYR	-	expression tag	UNP P18708
D	-13	ASP	-	expression tag	UNP P18708
D	-12	ILE	-	expression tag	UNP P18708
D	-11	PRO	-	expression tag	UNP P18708
D	-10	THR	-	expression tag	UNP P18708
D	-9	THR	-	expression tag	UNP P18708
D	-8	GLU	-	expression tag	UNP P18708
D	-7	ASN	-	expression tag	UNP P18708
D	-6	LEU	-	expression tag	UNP P18708
D	-5	TYR	-	expression tag	UNP P18708
D	-4	PHE	-	expression tag	UNP P18708
D	-3	GLN	-	expression tag	UNP P18708
D	-2	GLY	-	expression tag	UNP P18708
D	-1	ALA	-	expression tag	UNP P18708
D	0	HIS	-	expression tag	UNP P18708
D	458	ILE	LYS	conflict	UNP P18708
D	724	TYR	-	expression tag	UNP P18708
D	725	ARG	-	expression tag	UNP P18708
D	726	VAL	-	expression tag	UNP P18708
D	727	ARG	-	expression tag	UNP P18708
D	728	LYS	-	expression tag	UNP P18708
D	729	PHE	-	expression tag	UNP P18708
D	730	LEU	-	expression tag	UNP P18708
D	731	ALA	-	expression tag	UNP P18708
D	732	LEU	-	expression tag	UNP P18708
D	733	LEU	-	expression tag	UNP P18708
D	734	ARG	-	expression tag	UNP P18708
D	735	GLU	-	expression tag	UNP P18708
D	736	GLU	-	expression tag	UNP P18708
D	737	GLY	-	expression tag	UNP P18708
D	738	ALA	-	expression tag	UNP P18708
D	739	SER	-	expression tag	UNP P18708
D	740	PRO	-	expression tag	UNP P18708
D	741	LEU	-	expression tag	UNP P18708
D	742	ASP	-	expression tag	UNP P18708
D	743	PHE	-	expression tag	UNP P18708
D	744	ASP	-	expression tag	UNP P18708
E	-23	MET	-	initiating methionine	UNP P18708
E	-22	GLY	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-21	HIS	-	expression tag	UNP P18708
E	-20	HIS	-	expression tag	UNP P18708
E	-19	HIS	-	expression tag	UNP P18708
E	-18	HIS	-	expression tag	UNP P18708
E	-17	HIS	-	expression tag	UNP P18708
E	-16	HIS	-	expression tag	UNP P18708
E	-15	ASP	-	expression tag	UNP P18708
E	-14	TYR	-	expression tag	UNP P18708
E	-13	ASP	-	expression tag	UNP P18708
E	-12	ILE	-	expression tag	UNP P18708
E	-11	PRO	-	expression tag	UNP P18708
E	-10	THR	-	expression tag	UNP P18708
E	-9	THR	-	expression tag	UNP P18708
E	-8	GLU	-	expression tag	UNP P18708
E	-7	ASN	-	expression tag	UNP P18708
E	-6	LEU	-	expression tag	UNP P18708
E	-5	TYR	-	expression tag	UNP P18708
E	-4	PHE	-	expression tag	UNP P18708
E	-3	GLN	-	expression tag	UNP P18708
E	-2	GLY	-	expression tag	UNP P18708
E	-1	ALA	-	expression tag	UNP P18708
E	0	HIS	-	expression tag	UNP P18708
E	458	ILE	LYS	conflict	UNP P18708
E	724	TYR	-	expression tag	UNP P18708
E	725	ARG	-	expression tag	UNP P18708
E	726	VAL	-	expression tag	UNP P18708
E	727	ARG	-	expression tag	UNP P18708
E	728	LYS	-	expression tag	UNP P18708
E	729	PHE	-	expression tag	UNP P18708
E	730	LEU	-	expression tag	UNP P18708
E	731	ALA	-	expression tag	UNP P18708
E	732	LEU	-	expression tag	UNP P18708
E	733	LEU	-	expression tag	UNP P18708
E	734	ARG	-	expression tag	UNP P18708
E	735	GLU	-	expression tag	UNP P18708
E	736	GLU	-	expression tag	UNP P18708
E	737	GLY	-	expression tag	UNP P18708
E	738	ALA	-	expression tag	UNP P18708
E	739	SER	-	expression tag	UNP P18708
E	740	PRO	-	expression tag	UNP P18708
E	741	LEU	-	expression tag	UNP P18708
E	742	ASP	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
E	743	PHE	-	expression tag	UNP P18708
E	744	ASP	-	expression tag	UNP P18708
F	-23	MET	-	initiating methionine	UNP P18708
F	-22	GLY	-	expression tag	UNP P18708
F	-21	HIS	-	expression tag	UNP P18708
F	-20	HIS	-	expression tag	UNP P18708
F	-19	HIS	-	expression tag	UNP P18708
F	-18	HIS	-	expression tag	UNP P18708
F	-17	HIS	-	expression tag	UNP P18708
F	-16	HIS	-	expression tag	UNP P18708
F	-15	ASP	-	expression tag	UNP P18708
F	-14	TYR	-	expression tag	UNP P18708
F	-13	ASP	-	expression tag	UNP P18708
F	-12	ILE	-	expression tag	UNP P18708
F	-11	PRO	-	expression tag	UNP P18708
F	-10	THR	-	expression tag	UNP P18708
F	-9	THR	-	expression tag	UNP P18708
F	-8	GLU	-	expression tag	UNP P18708
F	-7	ASN	-	expression tag	UNP P18708
F	-6	LEU	-	expression tag	UNP P18708
F	-5	TYR	-	expression tag	UNP P18708
F	-4	PHE	-	expression tag	UNP P18708
F	-3	GLN	-	expression tag	UNP P18708
F	-2	GLY	-	expression tag	UNP P18708
F	-1	ALA	-	expression tag	UNP P18708
F	0	HIS	-	expression tag	UNP P18708
F	458	ILE	LYS	conflict	UNP P18708
F	724	TYR	-	expression tag	UNP P18708
F	725	ARG	-	expression tag	UNP P18708
F	726	VAL	-	expression tag	UNP P18708
F	727	ARG	-	expression tag	UNP P18708
F	728	LYS	-	expression tag	UNP P18708
F	729	PHE	-	expression tag	UNP P18708
F	730	LEU	-	expression tag	UNP P18708
F	731	ALA	-	expression tag	UNP P18708
F	732	LEU	-	expression tag	UNP P18708
F	733	LEU	-	expression tag	UNP P18708
F	734	ARG	-	expression tag	UNP P18708
F	735	GLU	-	expression tag	UNP P18708
F	736	GLU	-	expression tag	UNP P18708
F	737	GLY	-	expression tag	UNP P18708
F	738	ALA	-	expression tag	UNP P18708

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Chain	Residue	Modelled	Actual	Comment	Reference
F	739	SER	-	expression tag	UNP P18708
F	740	PRO	-	expression tag	UNP P18708
F	741	LEU	-	expression tag	UNP P18708
F	742	ASP	-	expression tag	UNP P18708
F	743	PHE	-	expression tag	UNP P18708
F	744	ASP	-	expression tag	UNP P18708

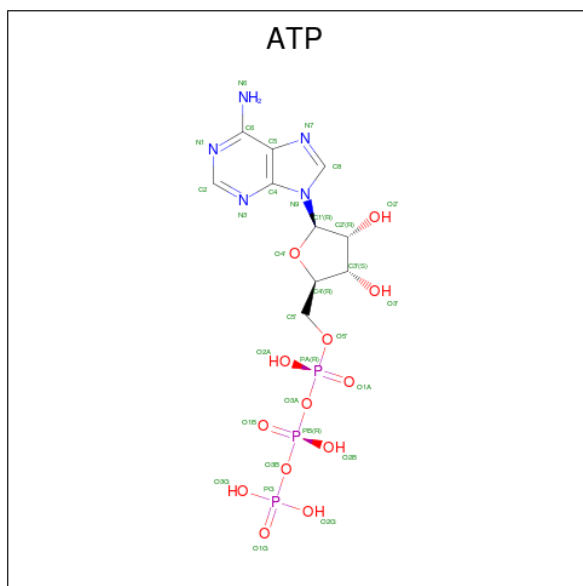
- Molecule 2 is a protein called Synaptosomal-associated protein 25.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
2	H	17	270	82	126	28	31	3	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	-2	MET	-	initiating methionine	UNP P60881
H	-1	ALA	-	expression tag	UNP P60881
H	0	SER	-	expression tag	UNP P60881

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



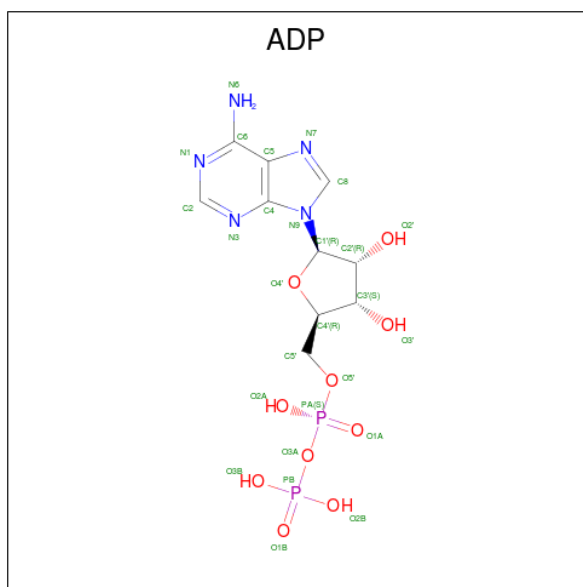
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
3	A	1	43	10	12	5	13	3	0

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Mol	Chain	Residues	Atoms					AltConf	
3	B	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	B	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	C	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	C	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	D	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	D	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	E	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
3	F	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



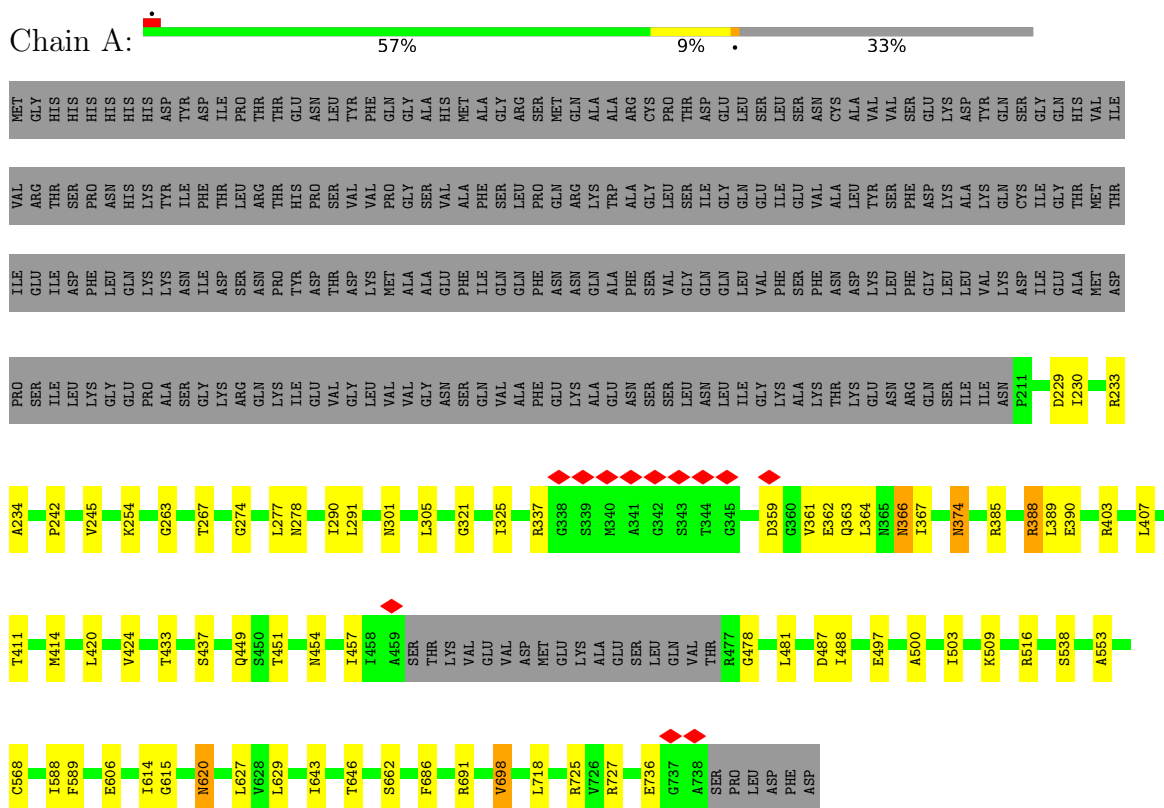
Mol	Chain	Residues	Atoms					AltConf	
4	A	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	
4	E	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	

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.

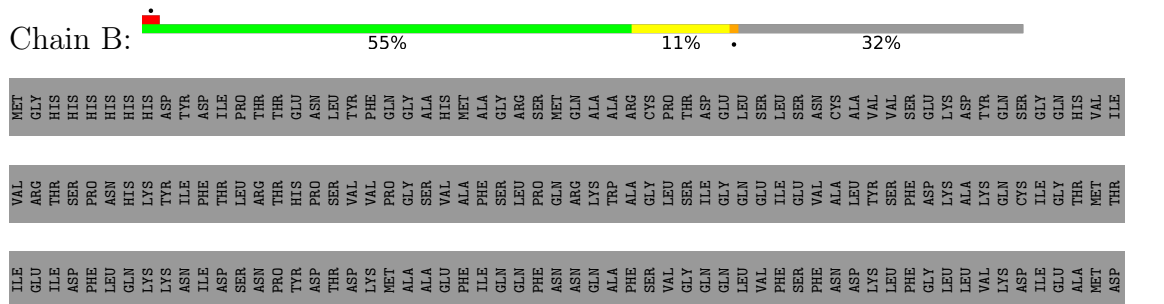
• Molecule 1: Vesicle-fusing ATPase

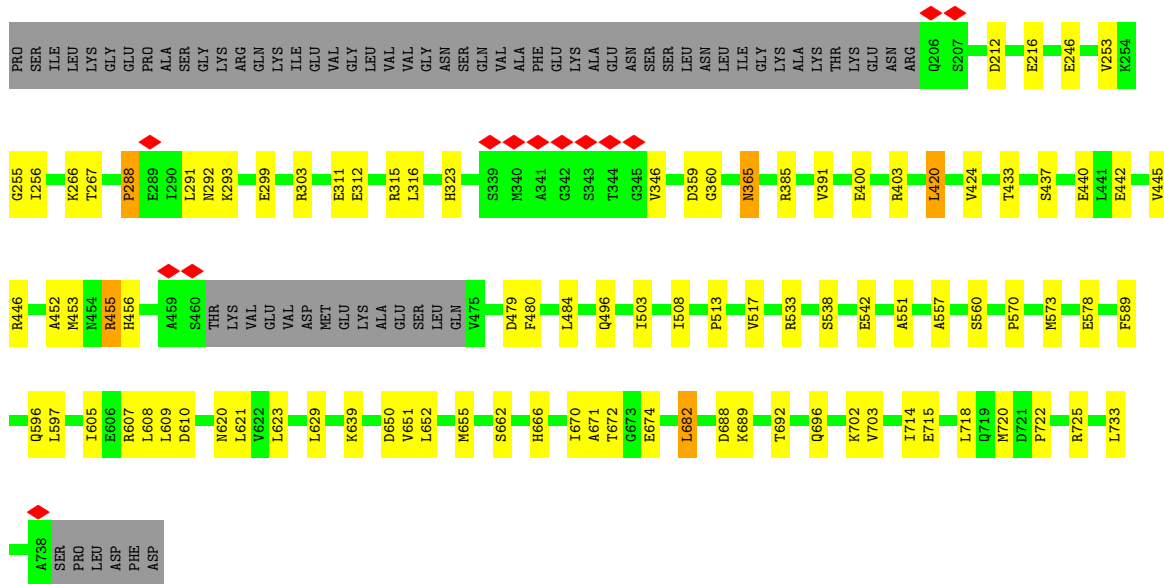
Chain A:



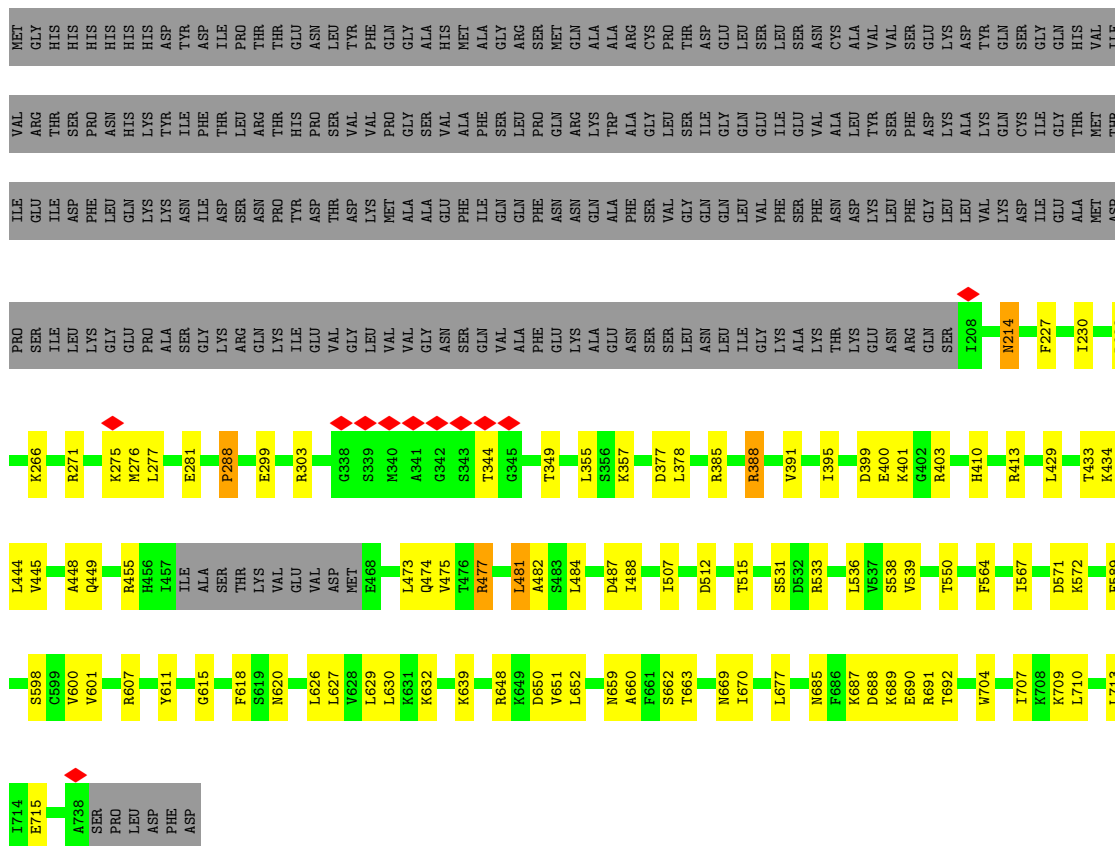
• Molecule 1: Vesicle-fusing ATPase

Chain B:



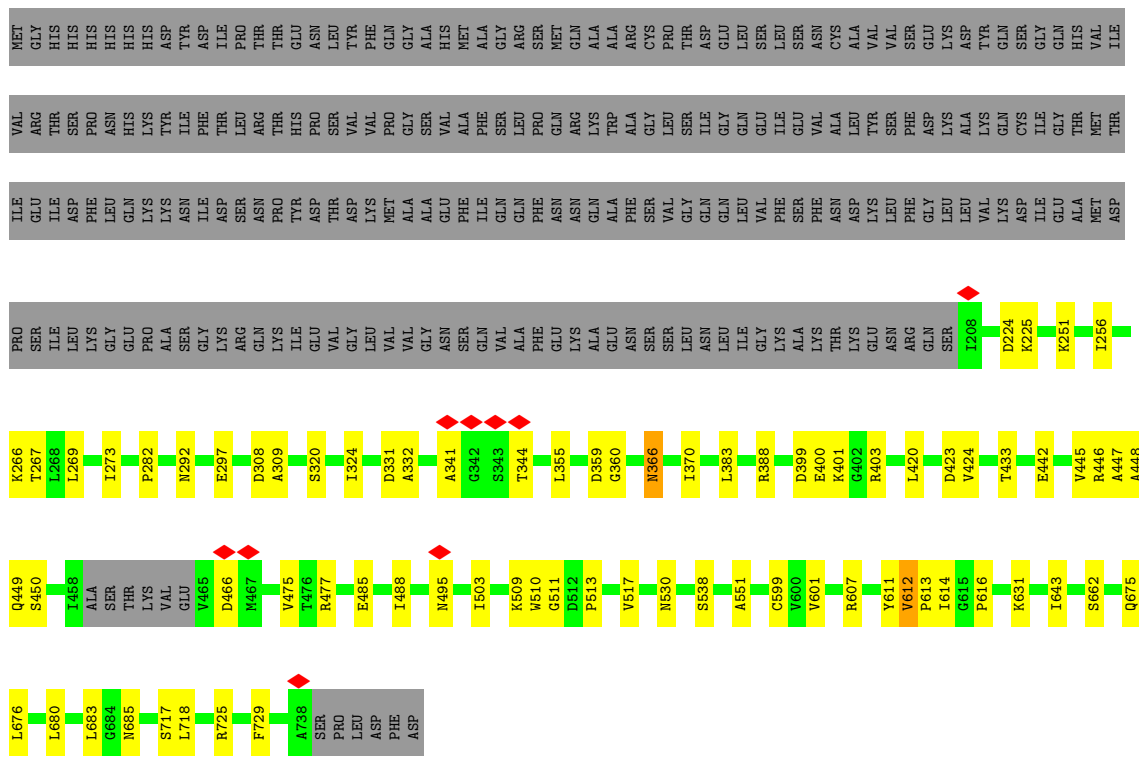


• Molecule 1: Vesicle-fusing ATPase

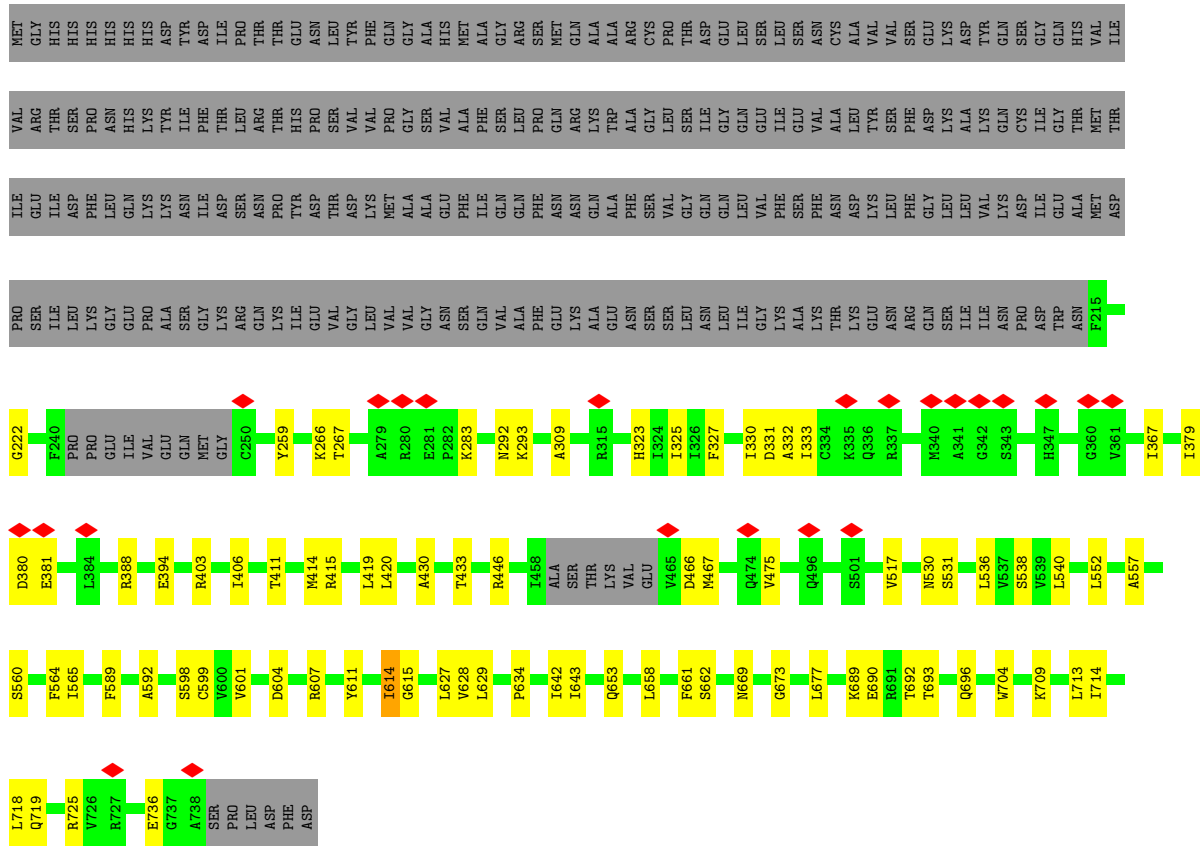


• Molecule 1: Vesicle-fusing ATPase





● Molecule 1: Vesicle-fusing ATPase



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	166620	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION; CTF correction was carried out in Relion with reconstruction step.	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.046	Depositor
Minimum map value	-0.010	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.0135	Depositor
Map size (\AA)	301.3, 301.3, 301.3	wwPDB
Map dimensions	230, 230, 230	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.31, 1.31, 1.31	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: ADP, ATP

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	0.61	0/4044	0.74	0/5447
1	B	0.67	0/4103	0.78	4/5529 (0.1%)
1	C	0.65	0/4124	0.76	6/5556 (0.1%)
1	D	0.58	0/4155	0.69	0/5598
1	E	0.50	0/4020	0.72	2/5409 (0.0%)
1	F	0.57	0/1921	0.73	2/2592 (0.1%)
2	H	0.41	0/143	0.77	0/187
All	All	0.60	0/22510	0.74	14/30318 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	2
1	C	0	4
1	D	0	5
1	E	0	5
All	All	0	19

There are no bond length outliers.

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	420	LEU	CB-CG-CD1	7.74	124.15	111.00
1	F	698	VAL	CG1-CB-CG2	7.25	122.50	110.90
1	E	713	LEU	CB-CG-CD2	6.83	122.61	111.00
1	B	346	VAL	CG1-CB-CG2	6.74	121.69	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	C	484	LEU	CB-CG-CD2	6.43	121.93	111.00

There are no chirality outliers.

5 of 19 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	388	ARG	Peptide
1	A	615	GLY	Peptide
1	A	698	VAL	Peptide
1	B	288	PRO	Peptide
1	B	496	GLN	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3983	4099	4109	43	0
1	B	4042	4161	4170	68	0
1	C	4063	4181	4190	63	0
1	D	4094	4214	4223	51	0
1	E	3965	4094	4101	52	0
1	F	1891	1983	1984	32	0
2	H	144	126	135	1	0
3	A	31	12	12	0	0
3	B	62	24	24	5	0
3	C	62	24	24	4	0
3	D	62	24	24	3	0
3	E	31	12	12	0	0
3	F	31	12	12	0	0
4	A	27	12	12	1	0
4	E	27	12	12	3	0
All	All	22515	22990	23044	288	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.

The worst 5 of 288 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:718:LEU:O	1:D:725:ARG:NH1	2.12	0.82
1:E:403:ARG:NH1	1:E:433:THR:O	2.16	0.78
1:D:538:SER:O	1:D:662:SER:OG	2.01	0.77
1:D:403:ARG:NH1	1:D:433:THR:O	2.18	0.77
1:C:355:LEU:O	1:C:388:ARG:NH2	2.18	0.76

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	507/768 (66%)	506 (100%)	1 (0%)	0	100	100
1	B	515/768 (67%)	514 (100%)	1 (0%)	0	100	100
1	C	517/768 (67%)	515 (100%)	2 (0%)	0	100	100
1	D	521/768 (68%)	517 (99%)	4 (1%)	0	100	100
1	E	503/768 (66%)	502 (100%)	1 (0%)	0	100	100
1	F	239/768 (31%)	238 (100%)	0	1 (0%)	34	71
2	H	15/207 (7%)	15 (100%)	0	0	100	100
All	All	2817/4815 (58%)	2807 (100%)	9 (0%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	635	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	434/658 (66%)	426 (98%)	8 (2%)	59	77
1	B	442/658 (67%)	438 (99%)	4 (1%)	78	87
1	C	444/658 (68%)	441 (99%)	3 (1%)	84	90
1	D	448/658 (68%)	444 (99%)	4 (1%)	78	87
1	E	433/658 (66%)	432 (100%)	1 (0%)	93	96
1	F	211/658 (32%)	210 (100%)	1 (0%)	88	93
2	H	15/177 (8%)	14 (93%)	1 (7%)	16	46
All	All	2427/4125 (59%)	2405 (99%)	22 (1%)	79	87

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

Mol	Chain	Res	Type
1	C	620	ASN
1	D	477	ARG
1	D	401	LYS
1	D	599	CYS
1	A	620	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	486	ASN
1	E	719	GLN
1	B	719	GLN
1	C	272	GLN
1	C	374	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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
3	ATP	D	802	-	26,33,33	0.92	0	31,52,52	1.90	6 (19%)
3	ATP	D	801	-	26,33,33	0.97	1 (3%)	31,52,52	1.71	6 (19%)
4	ADP	E	802	-	24,29,29	0.93	1 (4%)	29,45,45	1.64	5 (17%)
3	ATP	A	801	-	26,33,33	0.93	1 (3%)	31,52,52	1.94	6 (19%)
3	ATP	C	802	-	26,33,33	0.92	0	31,52,52	1.77	5 (16%)
3	ATP	C	801	-	26,33,33	0.95	1 (3%)	31,52,52	1.92	4 (12%)
3	ATP	E	801	-	26,33,33	0.97	2 (7%)	31,52,52	1.84	7 (22%)
4	ADP	A	802	-	24,29,29	0.87	0	29,45,45	1.63	5 (17%)
3	ATP	B	802	-	26,33,33	0.95	1 (3%)	31,52,52	1.94	4 (12%)
3	ATP	B	801	-	26,33,33	0.87	0	31,52,52	1.81	5 (16%)
3	ATP	F	801	-	26,33,33	0.91	1 (3%)	31,52,52	1.81	7 (22%)

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	ATP	D	802	-	-	3/18/38/38	0/3/3/3
3	ATP	D	801	-	-	2/18/38/38	0/3/3/3
4	ADP	E	802	-	-	3/12/32/32	0/3/3/3
3	ATP	A	801	-	-	4/18/38/38	0/3/3/3
3	ATP	C	802	-	-	1/18/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ATP	C	801	-	-	5/18/38/38	0/3/3/3
3	ATP	E	801	-	-	2/18/38/38	0/3/3/3
4	ADP	A	802	-	-	6/12/32/32	0/3/3/3
3	ATP	B	802	-	-	1/18/38/38	0/3/3/3
3	ATP	B	801	-	-	0/18/38/38	0/3/3/3
3	ATP	F	801	-	-	4/18/38/38	0/3/3/3

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	801	ATP	C2'-C1'	-2.56	1.49	1.53
3	D	801	ATP	C2'-C1'	-2.50	1.50	1.53
3	B	802	ATP	C2'-C1'	-2.22	1.50	1.53
4	E	802	ADP	C5-C4	2.10	1.46	1.40
3	E	801	ATP	C2'-C1'	-2.09	1.50	1.53

The worst 5 of 60 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	801	ATP	PA-O3A-PB	-6.28	111.28	132.83
3	B	802	ATP	PA-O3A-PB	-5.95	112.41	132.83
3	C	801	ATP	PA-O3A-PB	-5.67	113.37	132.83
3	A	801	ATP	PB-O3B-PG	-5.62	113.53	132.83
3	C	801	ATP	PB-O3B-PG	-5.48	114.01	132.83

There are no chirality outliers.

5 of 31 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	801	ATP	C5'-O5'-PA-O3A
3	A	801	ATP	C3'-C4'-C5'-O5'
3	C	801	ATP	C5'-O5'-PA-O3A
3	C	802	ATP	PB-O3A-PA-O5'
3	D	801	ATP	C5'-O5'-PA-O2A

There are no ring outliers.

6 monomers are involved in 16 short contacts:

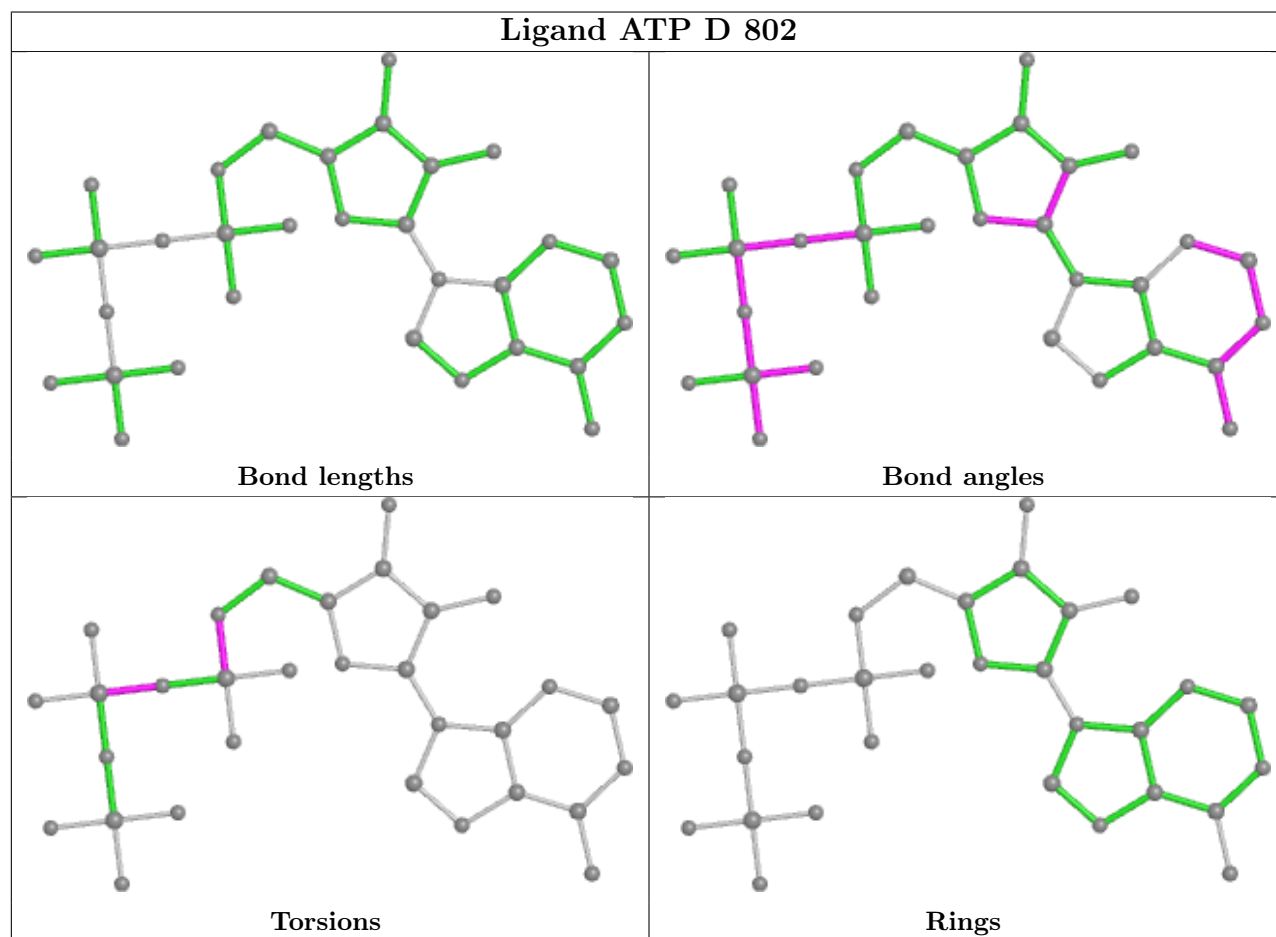
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	802	ATP	3	0

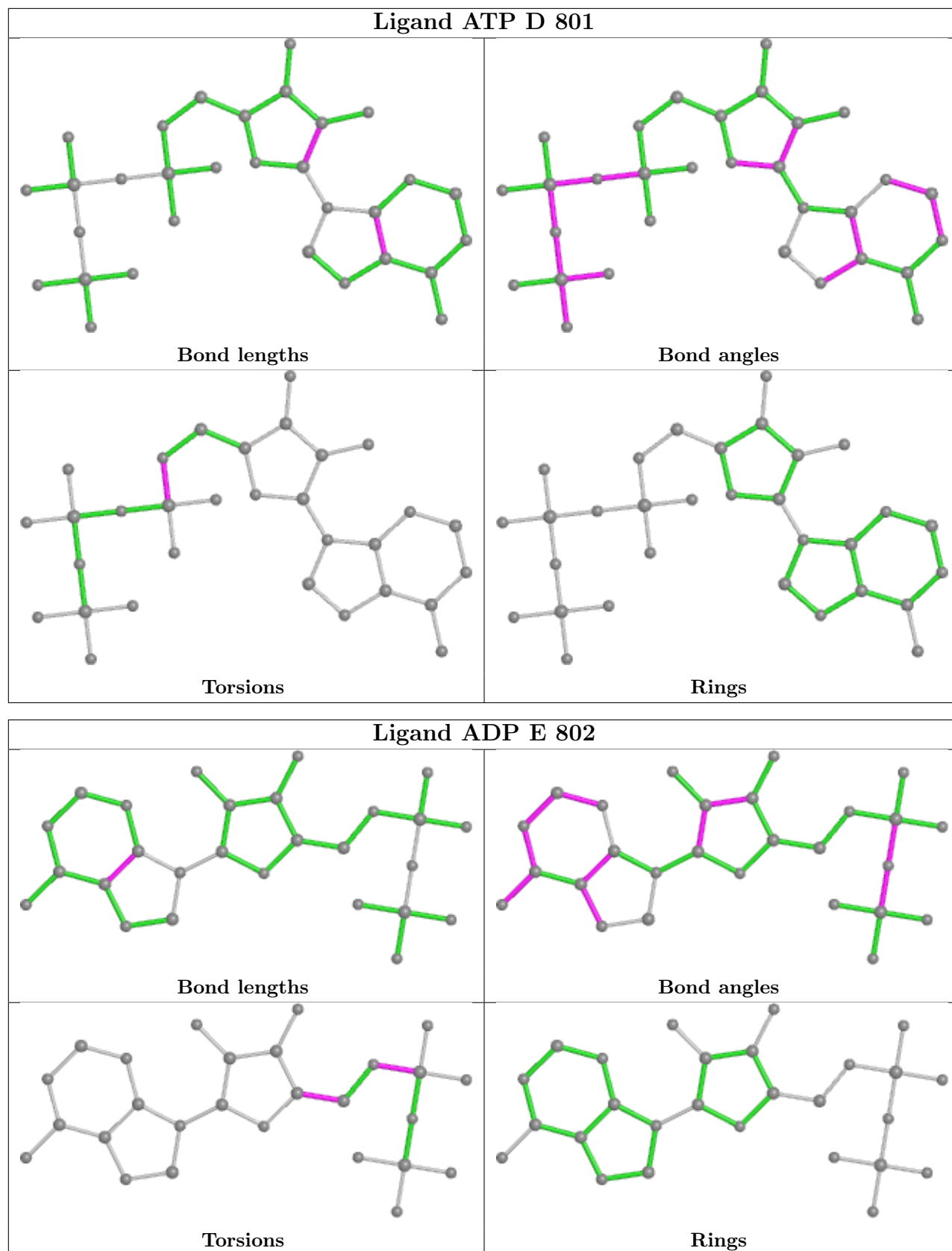
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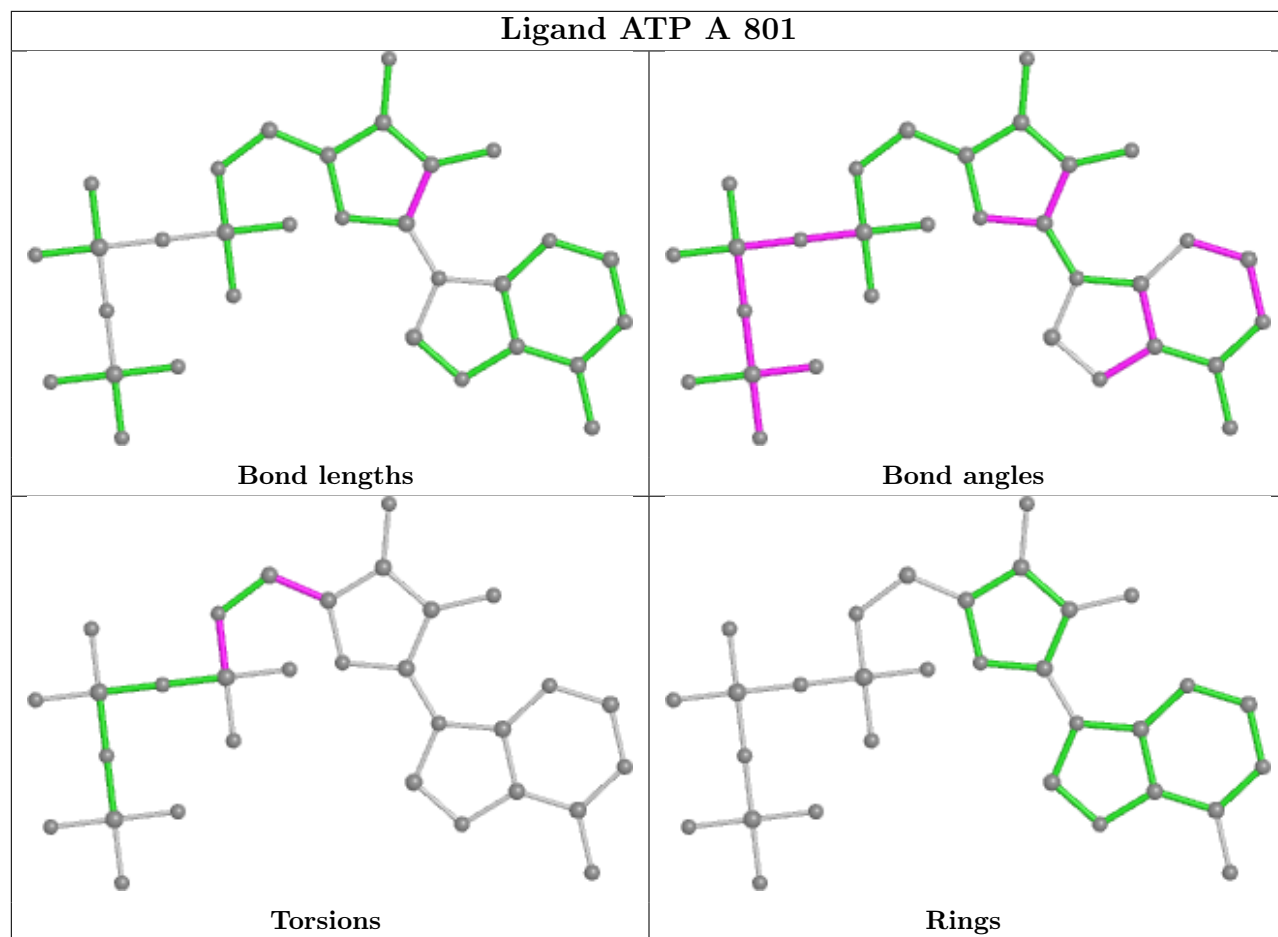
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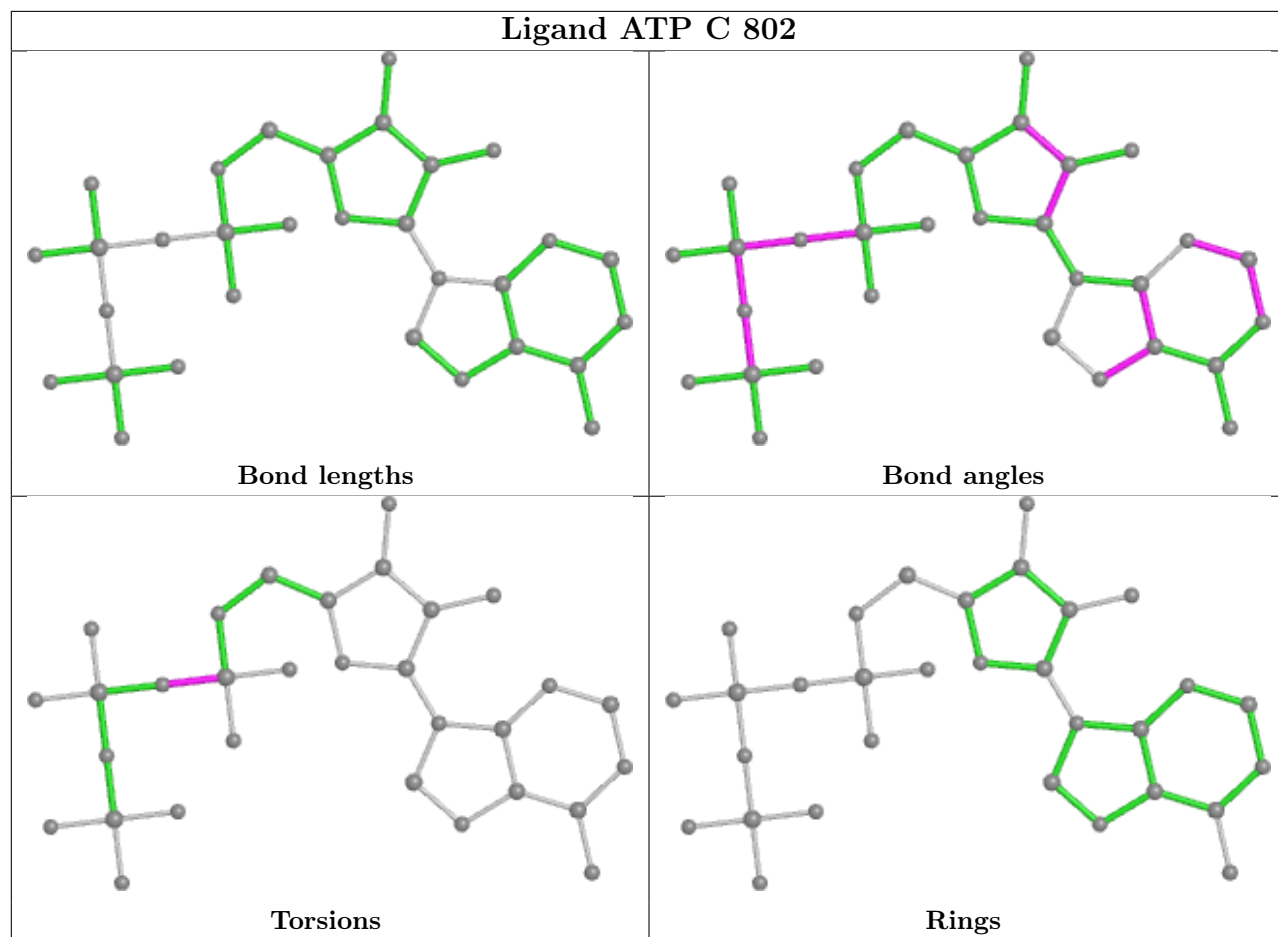
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	802	ADP	3	0
3	C	802	ATP	2	0
3	C	801	ATP	2	0
4	A	802	ADP	1	0
3	B	801	ATP	5	0

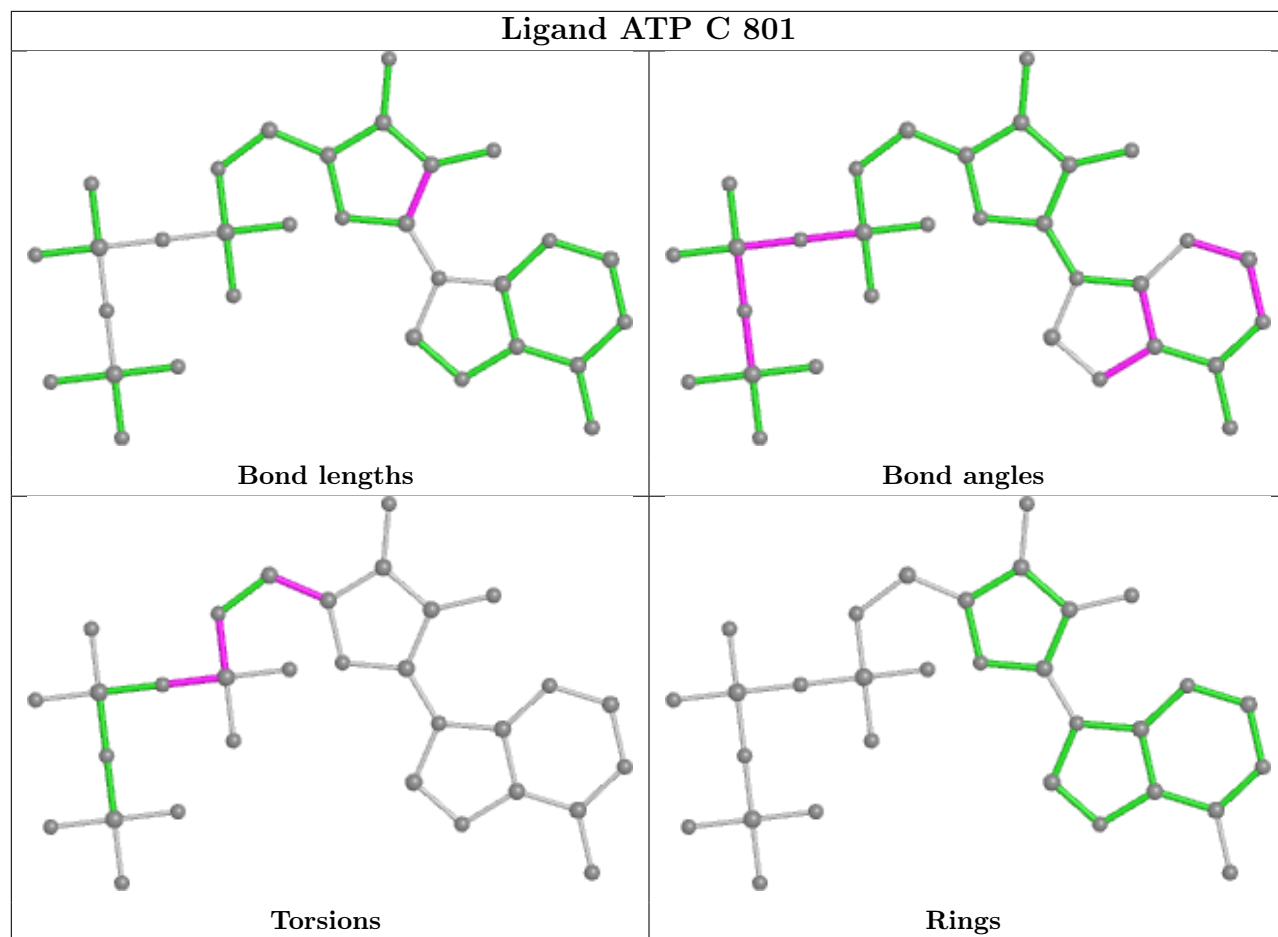
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

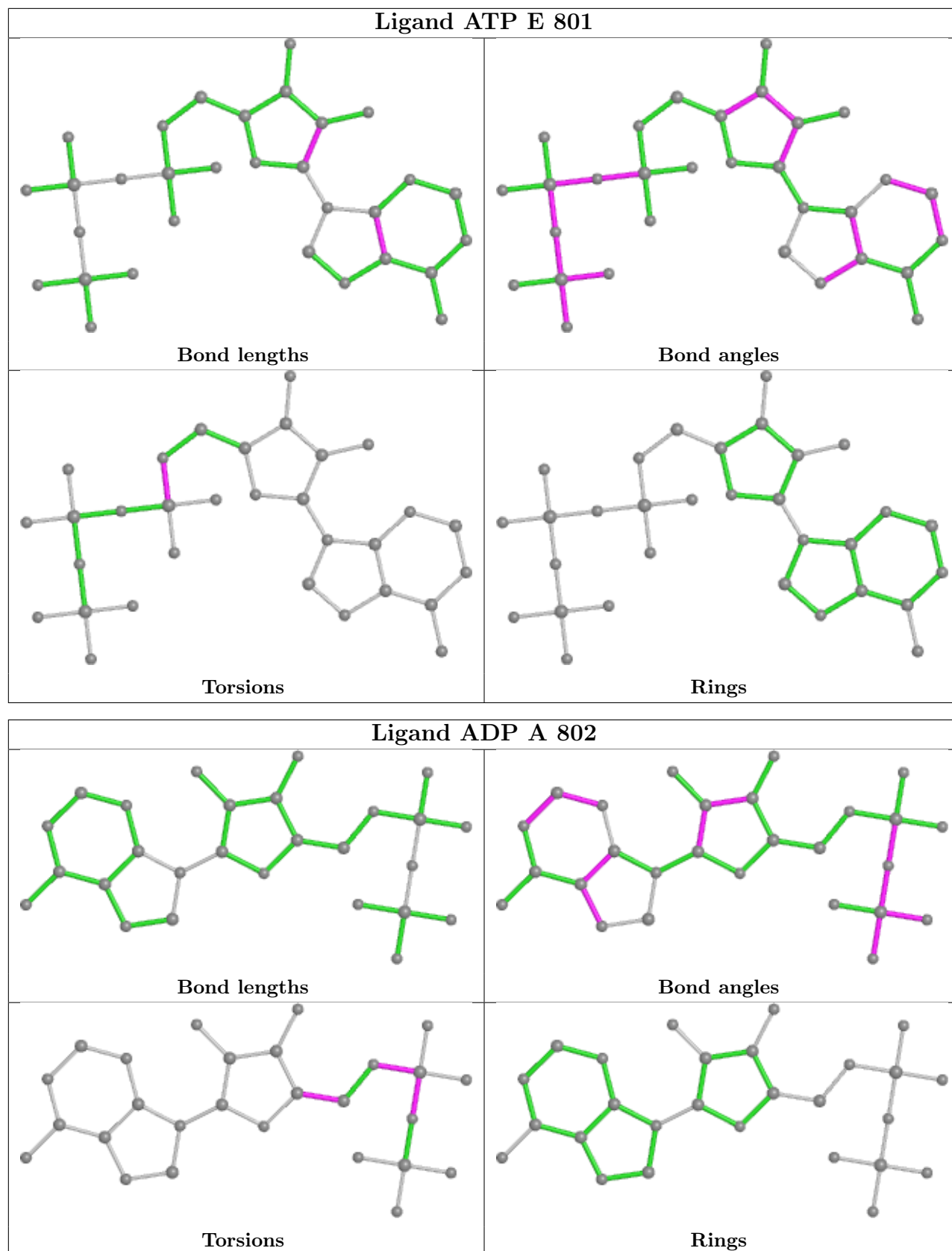


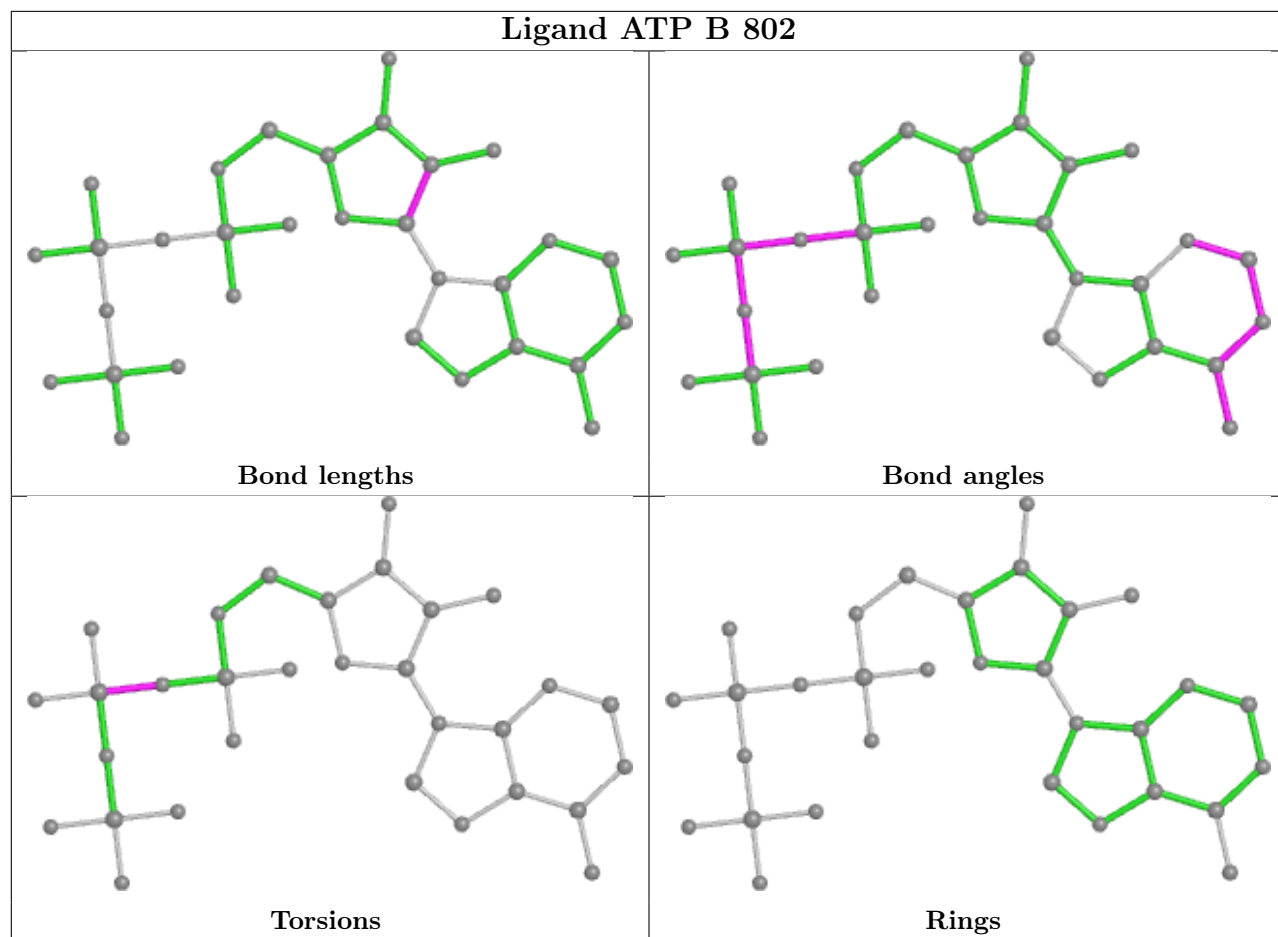


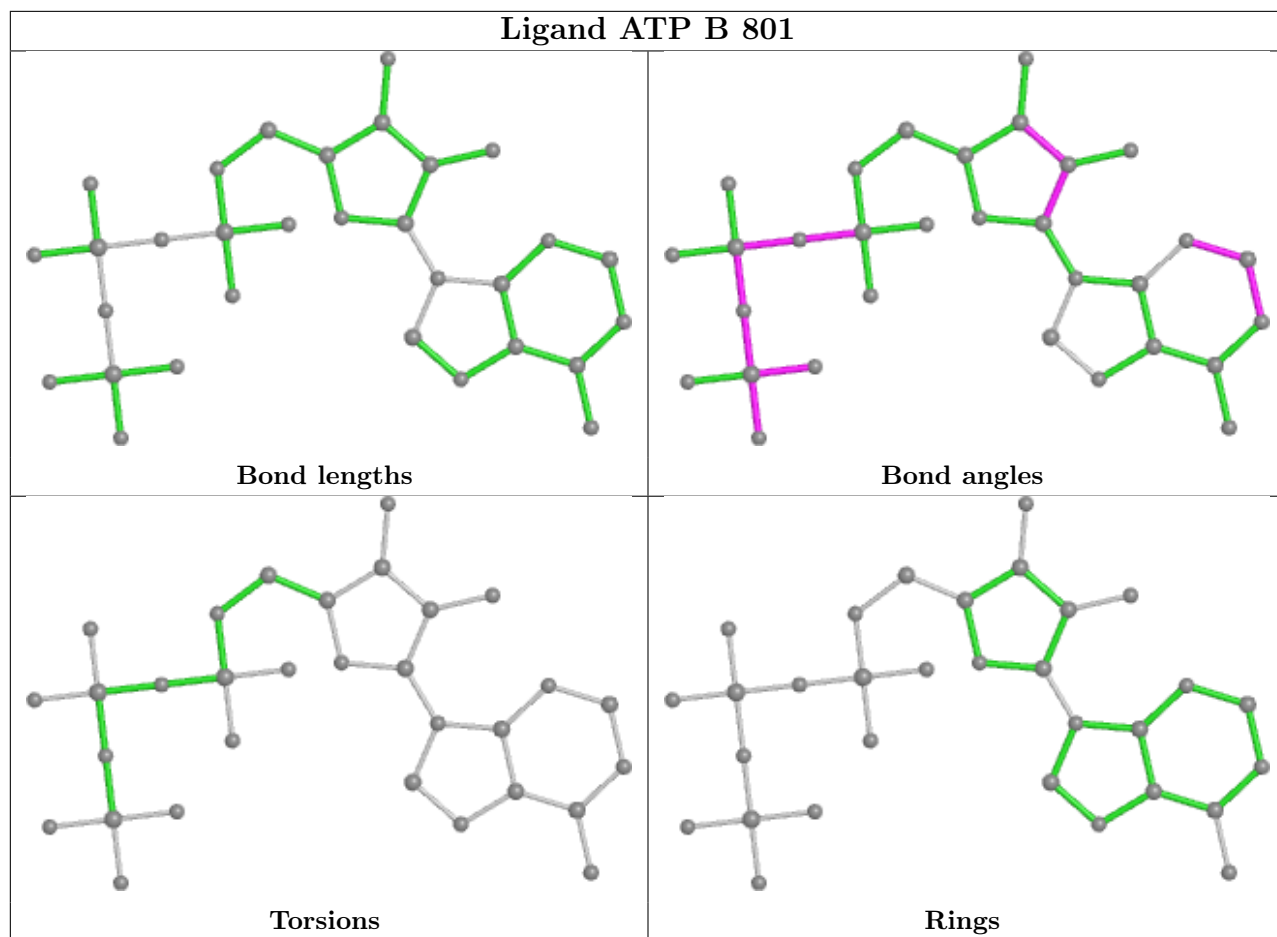


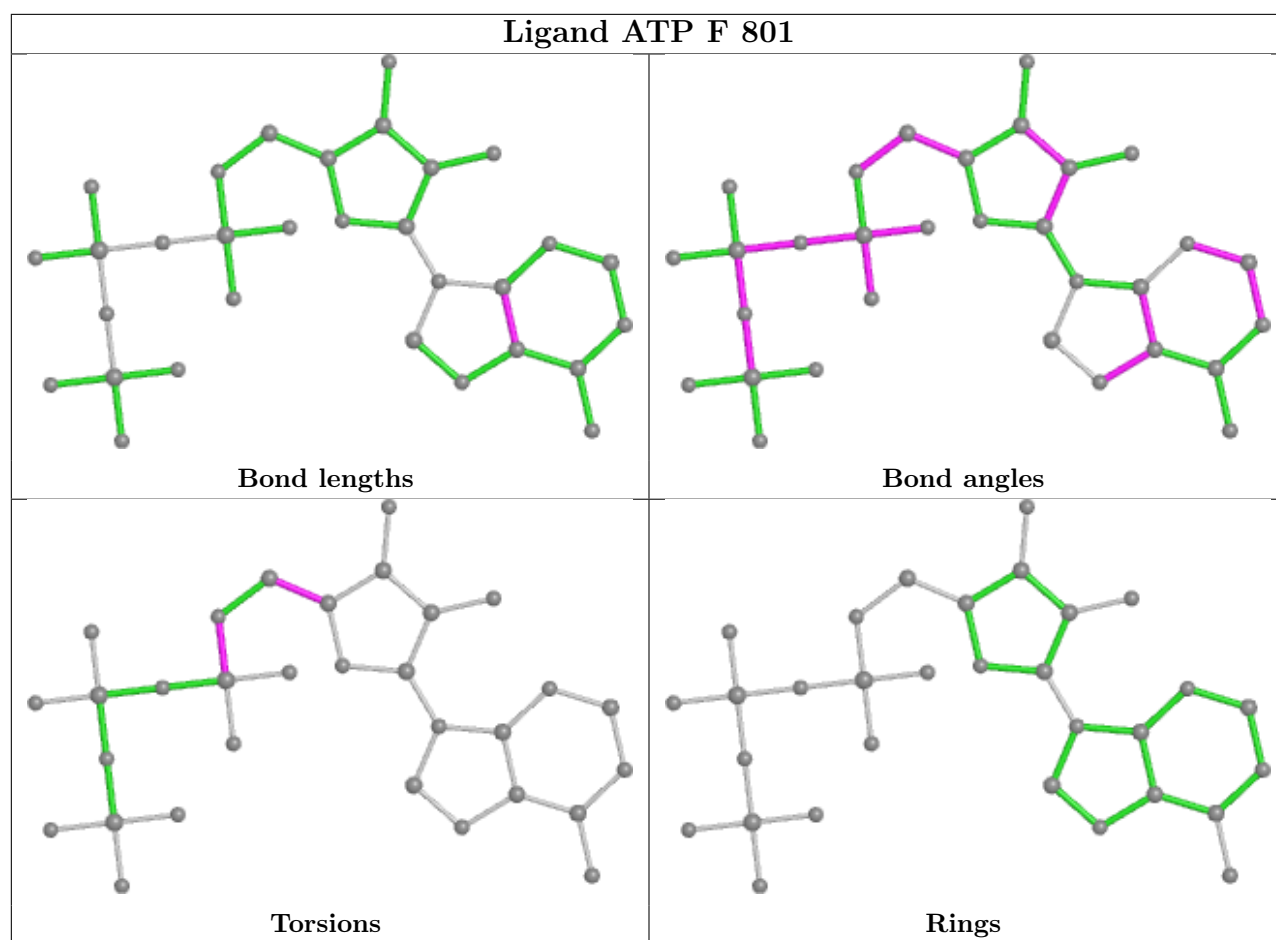












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

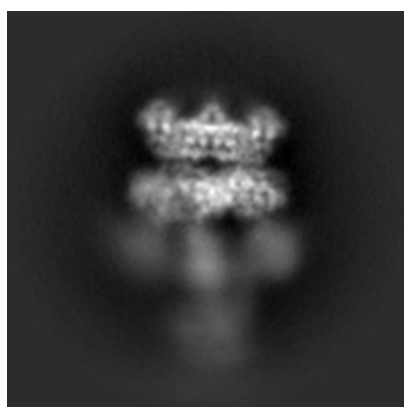
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-9102. These allow visual inspection of the internal detail of the map and identification of artifacts.

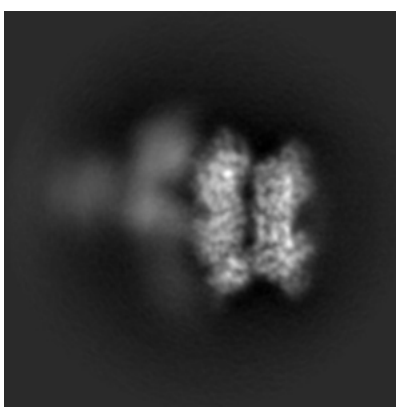
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

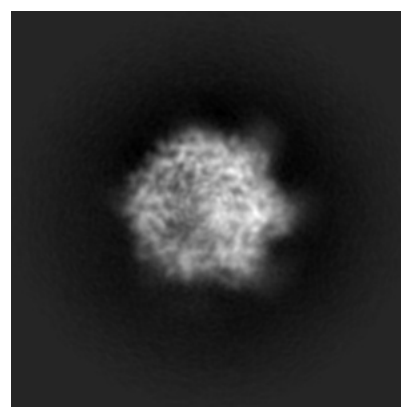
6.1.1 Primary map



X



Y

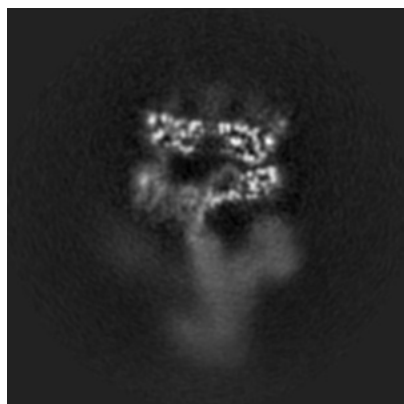


Z

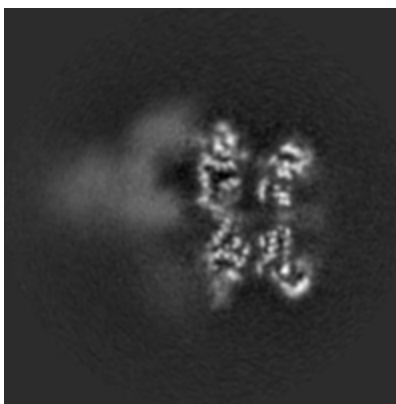
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

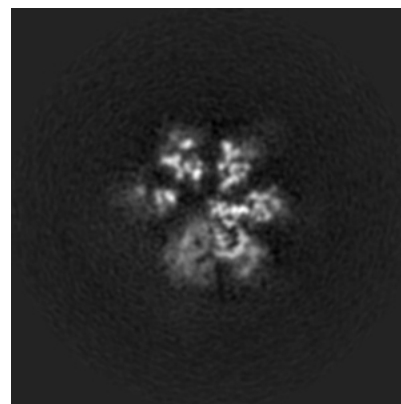
6.2.1 Primary map



X Index: 115



Y Index: 115

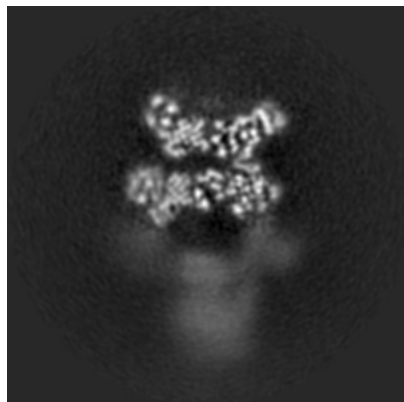


Z Index: 115

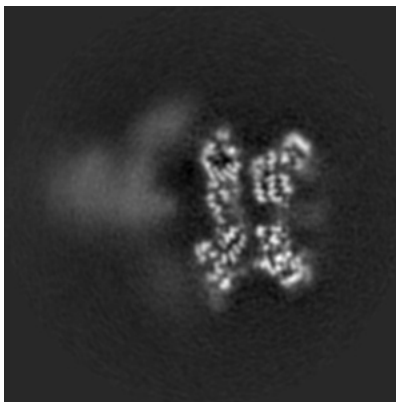
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

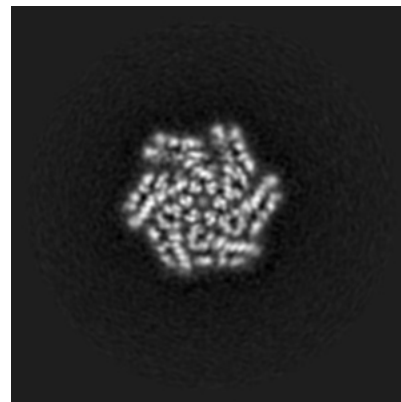
6.3.1 Primary map



X Index: 130



Y Index: 121

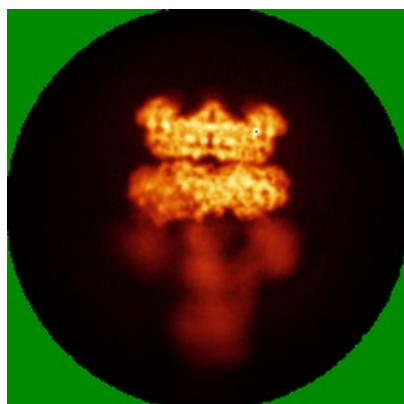


Z Index: 162

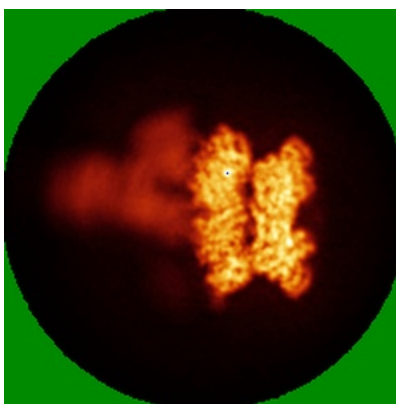
The images above show the largest variance slices of the map in three orthogonal directions.

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

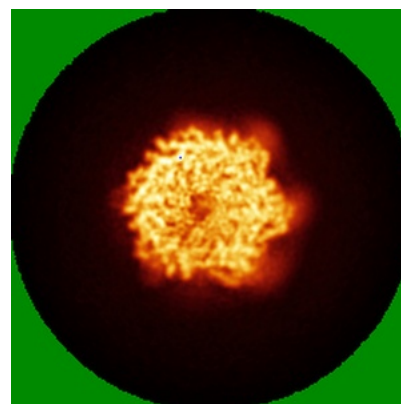
6.4.1 Primary map



X



Y

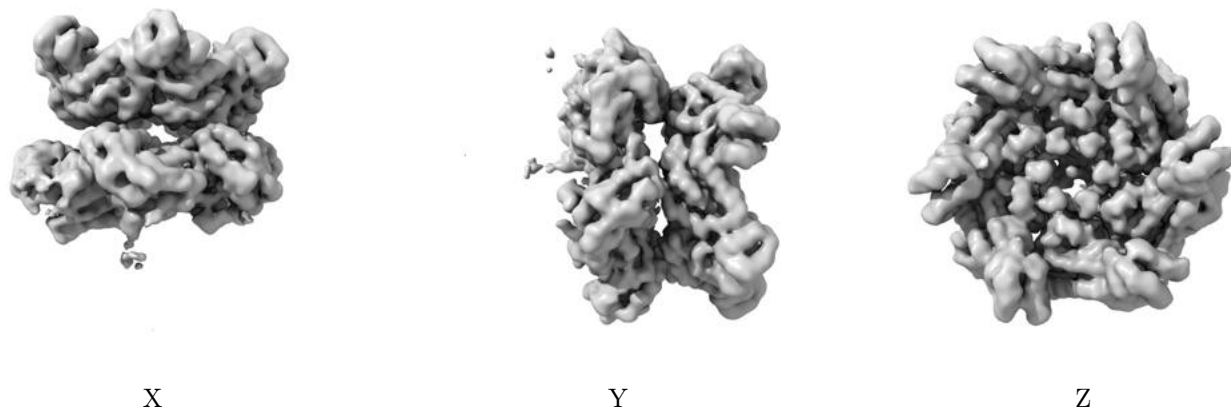


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0135. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

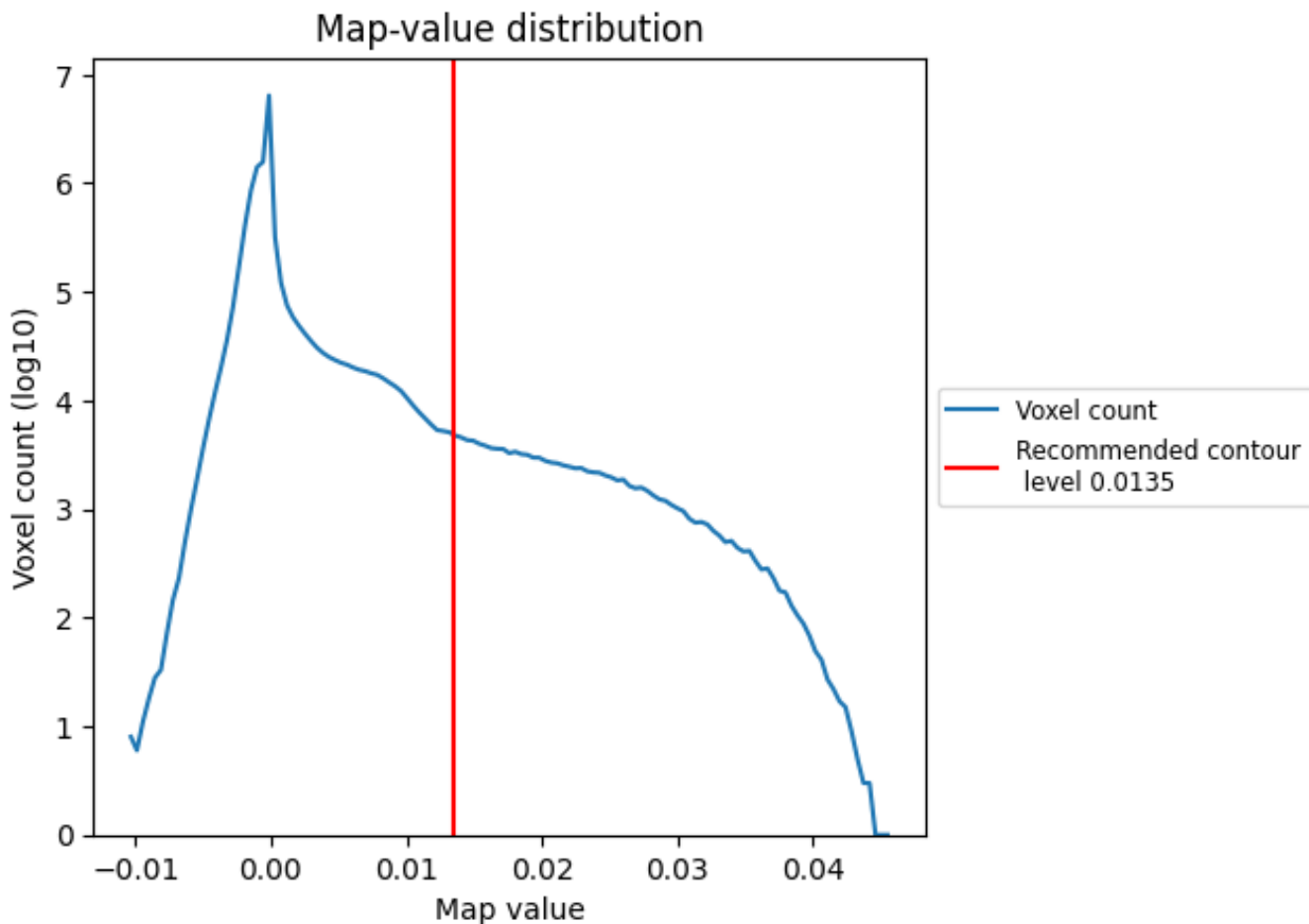
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

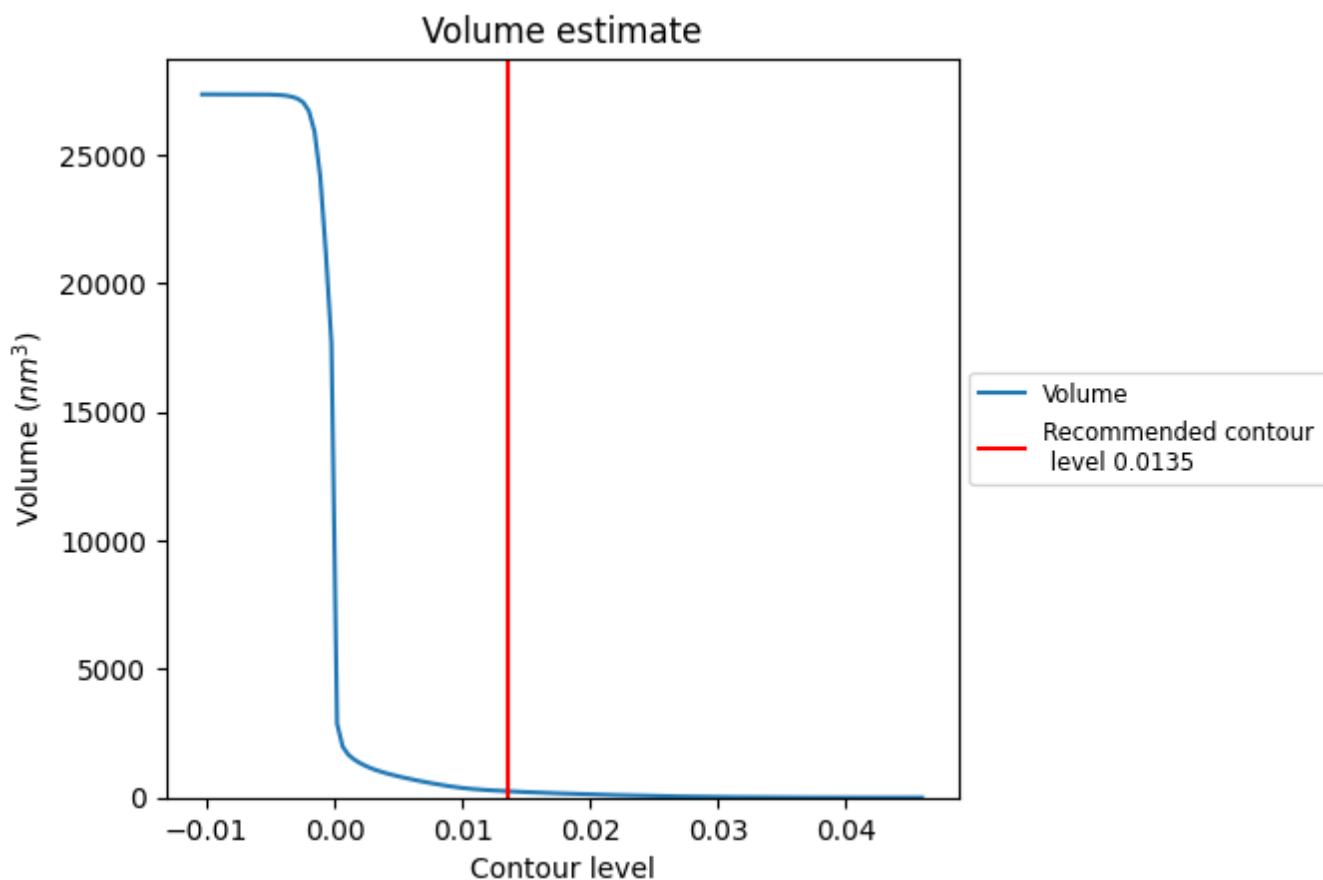
This section contains the results of statistical analysis of the map.

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.

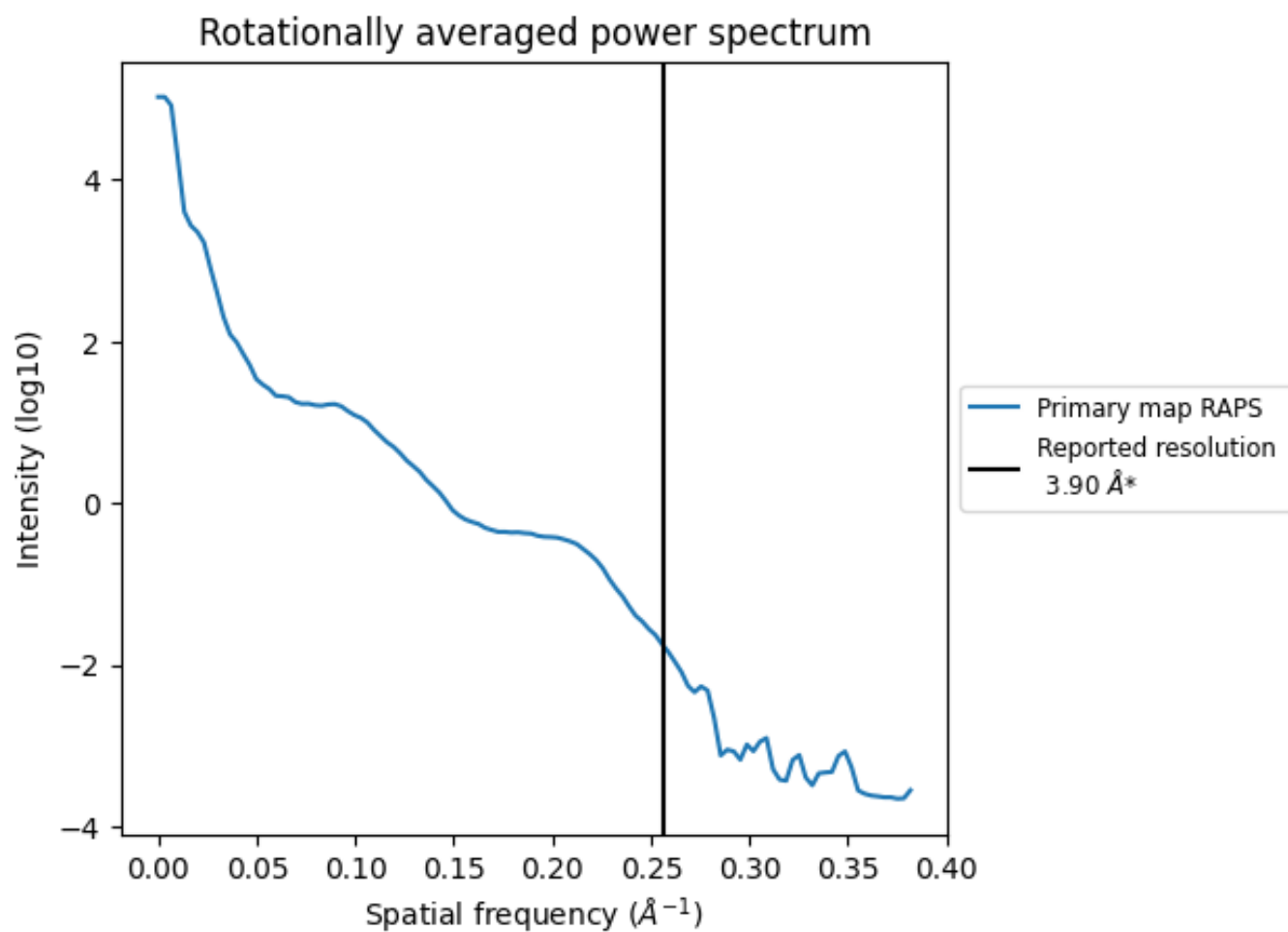
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 248 nm^3 ; this corresponds to an approximate mass of 224 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](#)

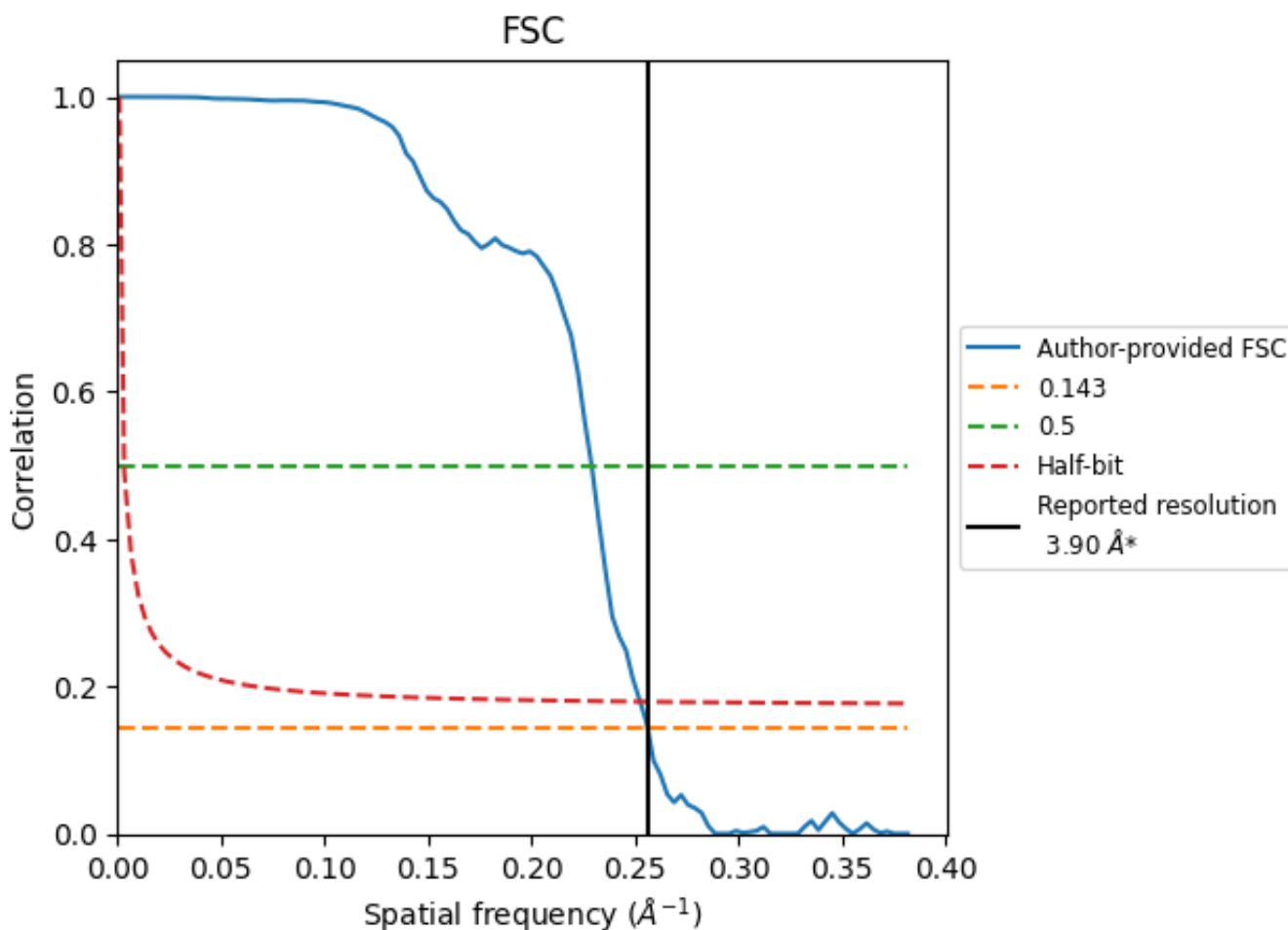


*Reported resolution corresponds to spatial frequency of 0.256 Å⁻¹

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 0.256 Å⁻¹

8.2 Resolution estimates [i](#)

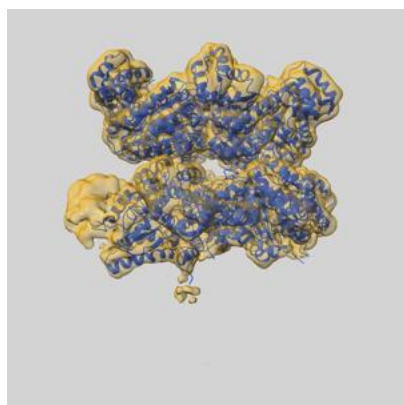
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.91	4.37	3.96
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

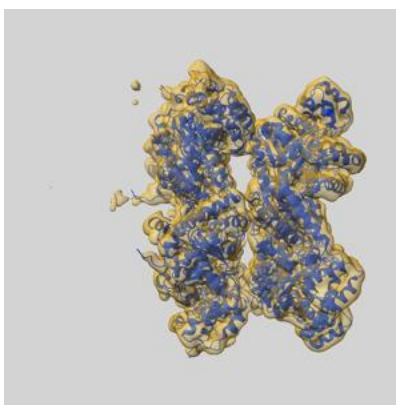
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-9102 and PDB model 6MDO. Per-residue inclusion information can be found in section 3 on page 12.

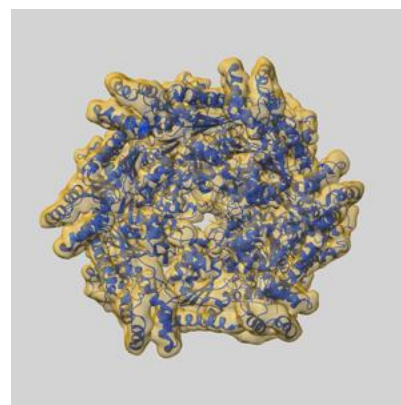
9.1 Map-model overlay [i](#)



X



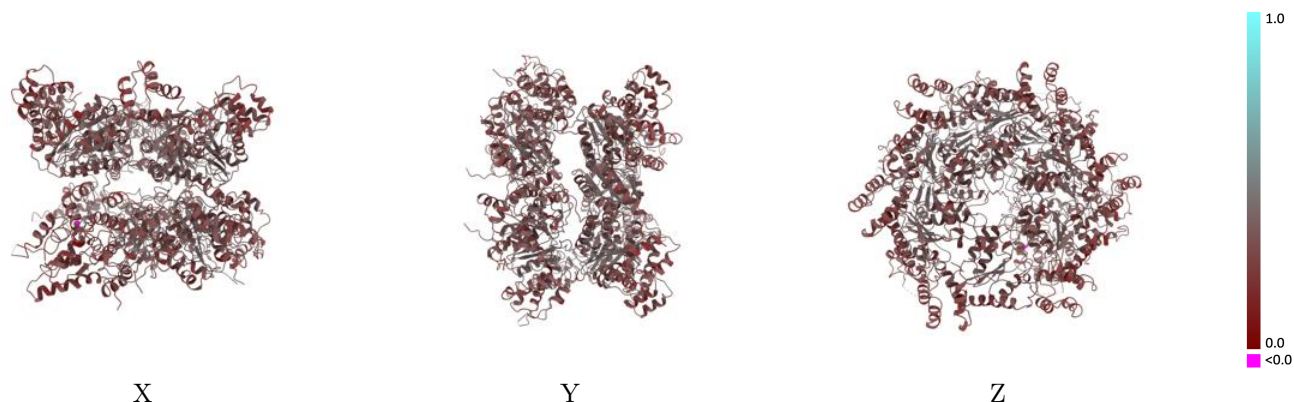
Y



Z

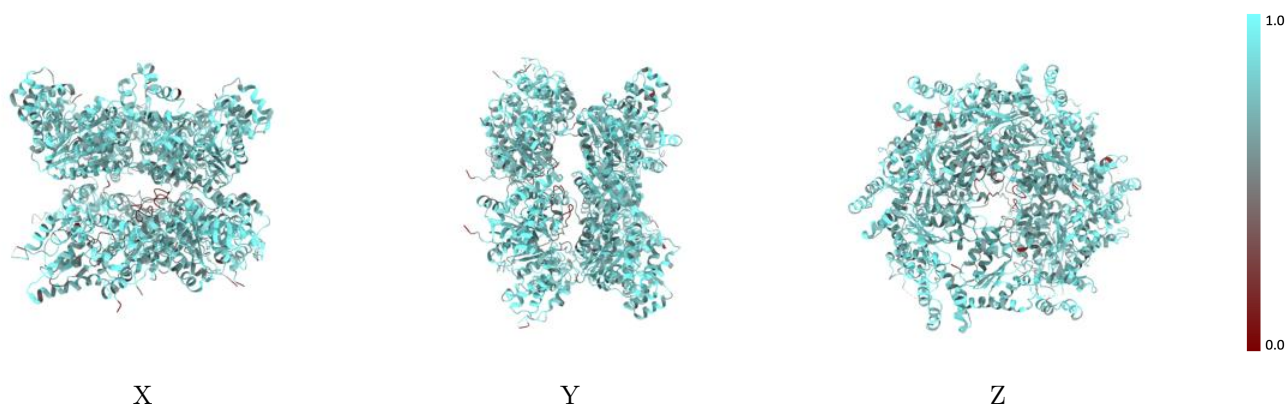
The images above show the 3D surface view of the map at the recommended contour level 0.0135 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



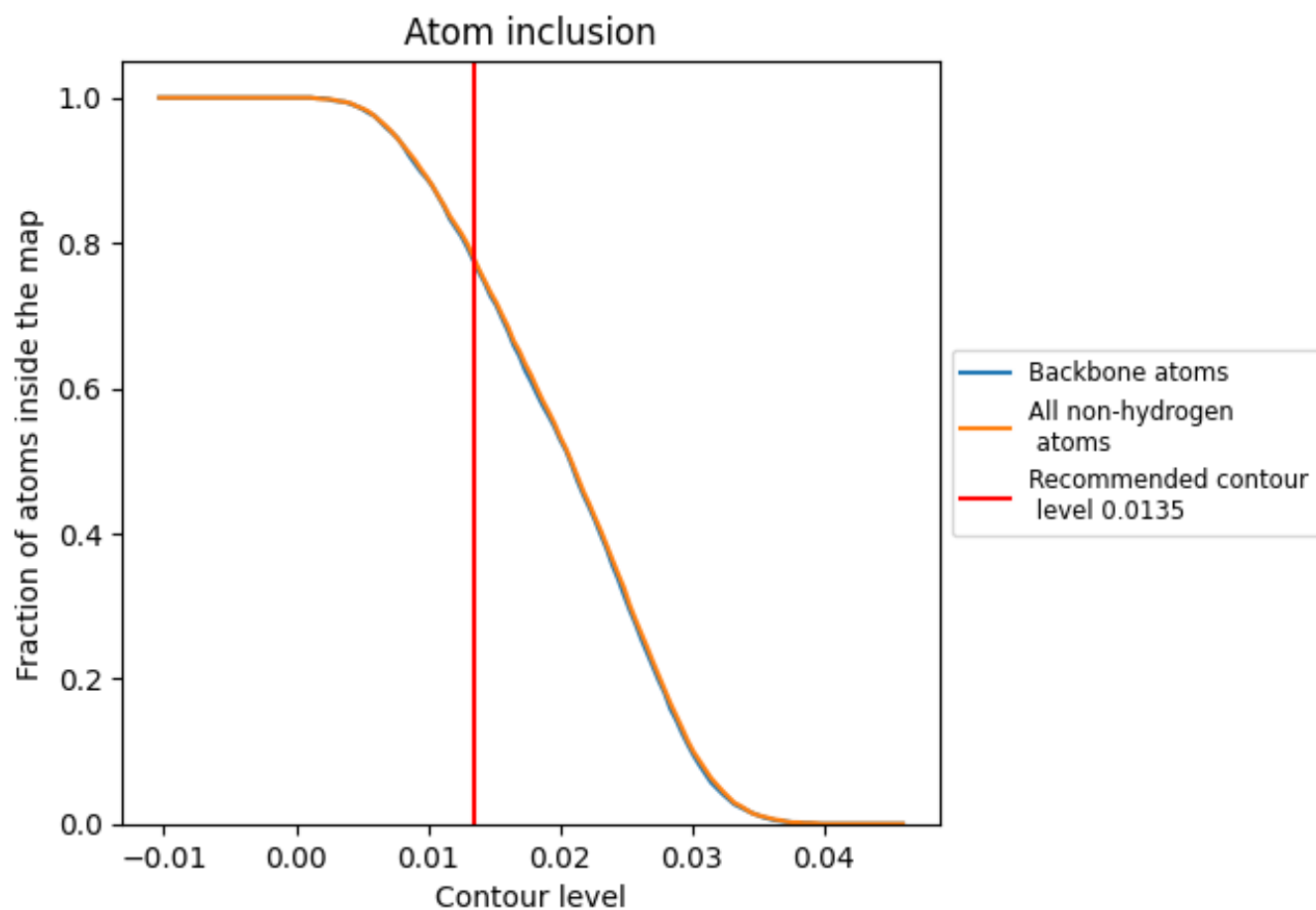
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0135).

















9.4 Atom inclusion [i](#)



At the recommended contour level, 77% of all backbone atoms, 78% 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 (0.0135) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7780	 0.3200
A	 0.7870	 0.3190
B	 0.7960	 0.3360
C	 0.7990	 0.3360
D	 0.7920	 0.3190
E	 0.7750	 0.2980
F	 0.8020	 0.3090
H	 0.5360	 0.2930

