



wwPDB EM Validation Summary Report ⓘ

Oct 22, 2024 – 03:00 PM JST

PDB ID : 8XLF
EMDB ID : EMD-38447
Title : Structure of chimeric RyR
Authors : Lin, L.; Wang, C.; Wang, W.; Jiang, H.; Yuchi, Z.
Deposited on : 2023-12-25
Resolution : 3.62 Å(reported)

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:

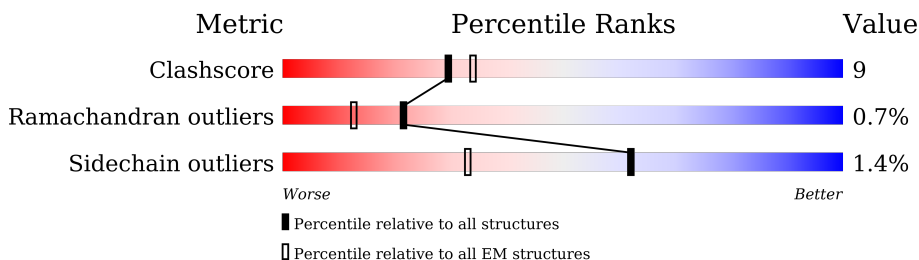
EMDB validation analysis : 0.0.1.dev113
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

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 3.62 Å.

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







Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	5037	
1	B	5037	
1	C	5037	
1	D	5037	
2	I	148	
2	J	148	
2	K	148	
2	L	148	

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Mol	Chain	Length	Quality of chain	
3	E	107	 84%	16%
3	F	107	 86%	14%
3	G	107	 88%	12%
3	H	107	 88%	12%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 118944 atoms, of which 88 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 Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	3916	27821	17738	4950	4957	176	0	0
1	B	3916	27821	17738	4950	4957	176	0	0
1	C	3916	27821	17738	4950	4957	176	0	0
1	D	3916	27821	17738	4950	4957	176	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	4563	LYS	ARG	engineered mutation	UNP P11716
A	4564	TYR	PHE	engineered mutation	UNP P11716
A	4657	ILE	CYS	engineered mutation	UNP P11716
A	4792	SER	LEU	engineered mutation	UNP P11716
B	4563	LYS	ARG	engineered mutation	UNP P11716
B	4564	TYR	PHE	engineered mutation	UNP P11716
B	4657	ILE	CYS	engineered mutation	UNP P11716
B	4792	SER	LEU	engineered mutation	UNP P11716
C	4563	LYS	ARG	engineered mutation	UNP P11716
C	4564	TYR	PHE	engineered mutation	UNP P11716
C	4657	ILE	CYS	engineered mutation	UNP P11716
C	4792	SER	LEU	engineered mutation	UNP P11716
D	4563	LYS	ARG	engineered mutation	UNP P11716
D	4564	TYR	PHE	engineered mutation	UNP P11716
D	4657	ILE	CYS	engineered mutation	UNP P11716
D	4792	SER	LEU	engineered mutation	UNP P11716

- Molecule 2 is a protein called Calmodulin-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	L	139	1042	646	174	212	10	0	0
2	I	139	1042	646	174	212	10	0	0
2	J	139	1042	646	174	212	10	0	0
2	K	139	1042	646	174	212	10	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	32	ALA	GLU	engineered mutation	UNP P0DP23
L	68	ALA	GLU	engineered mutation	UNP P0DP23
L	105	ALA	GLU	engineered mutation	UNP P0DP23
L	141	ALA	GLU	engineered mutation	UNP P0DP23
I	32	ALA	GLU	engineered mutation	UNP P0DP23
I	68	ALA	GLU	engineered mutation	UNP P0DP23
I	105	ALA	GLU	engineered mutation	UNP P0DP23
I	141	ALA	GLU	engineered mutation	UNP P0DP23
J	32	ALA	GLU	engineered mutation	UNP P0DP23
J	68	ALA	GLU	engineered mutation	UNP P0DP23
J	105	ALA	GLU	engineered mutation	UNP P0DP23
J	141	ALA	GLU	engineered mutation	UNP P0DP23
K	32	ALA	GLU	engineered mutation	UNP P0DP23
K	68	ALA	GLU	engineered mutation	UNP P0DP23
K	105	ALA	GLU	engineered mutation	UNP P0DP23
K	141	ALA	GLU	engineered mutation	UNP P0DP23

- Molecule 3 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	H	107	804	510	144	146	4	0	0
3	E	107	804	510	144	146	4	0	0
3	F	107	804	510	144	146	4	0	0
3	G	107	804	510	144	146	4	0	0

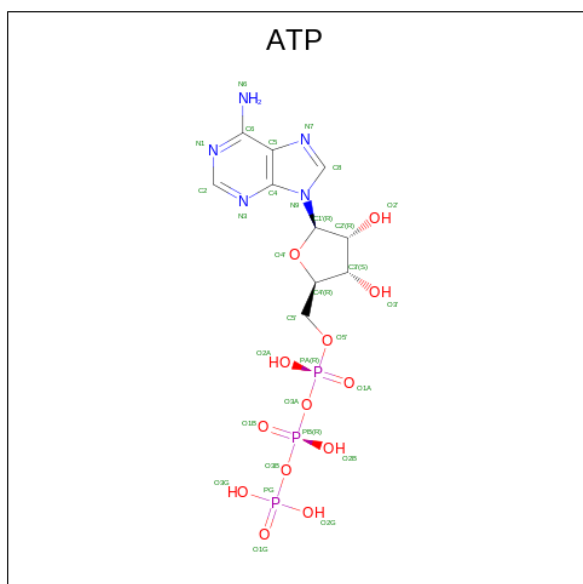
- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	AltConf
4	A	1	Total Ca 1 1	0
4	B	1	Total Ca 1 1	0
4	C	1	Total Ca 1 1	0
4	D	1	Total Ca 1 1	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
5	A	1	Total Zn 1 1	0
5	B	1	Total Zn 1 1	0
5	C	1	Total Zn 1 1	0
5	D	1	Total Zn 1 1	0

- Molecule 6 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃).



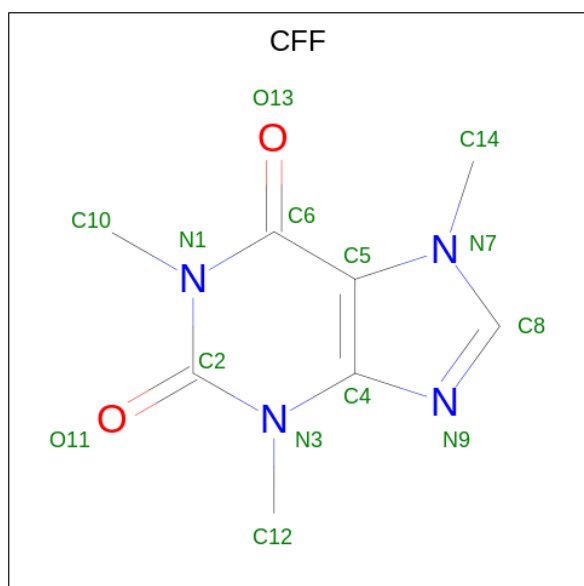
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
6	A	1	43	10	12	5	13	3	0

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

- Molecule 7 is CAFFEINE (three-letter code: CFF) (formula: $C_8H_{10}N_4O_2$) (labeled as "Ligand of Interest" by depositor).

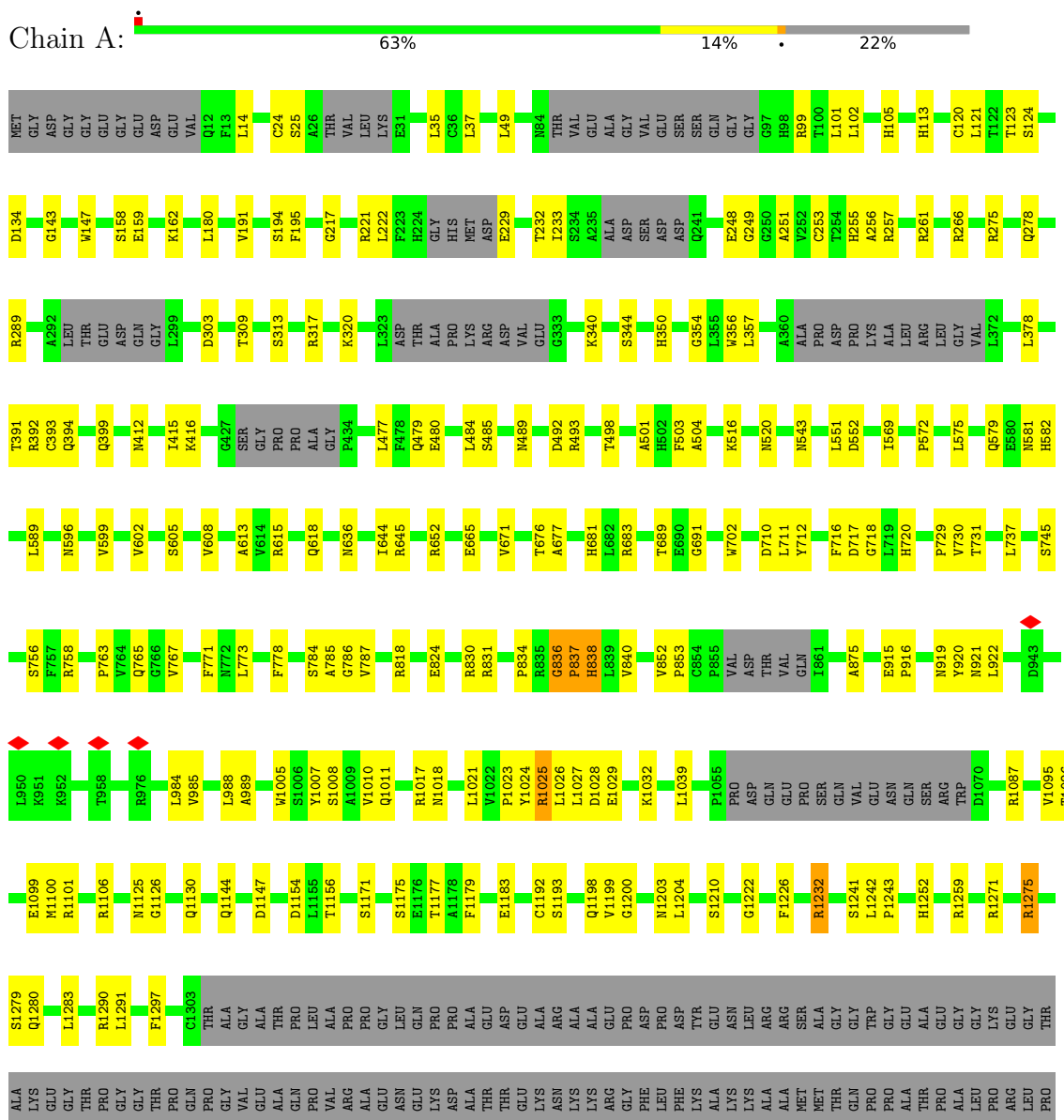


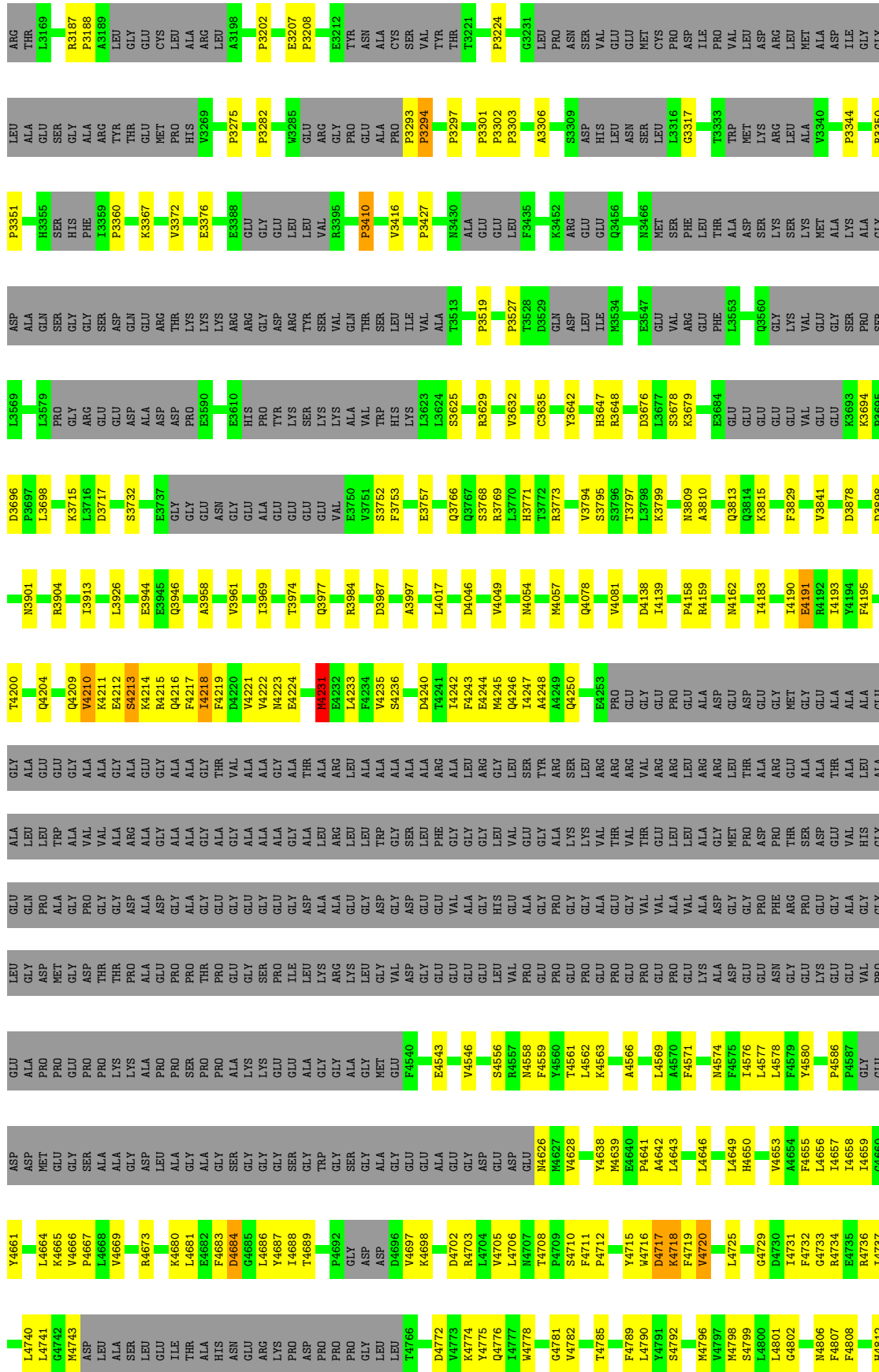
Mol	Chain	Residues	Atoms					AltConf
			Total	C	H	N	O	
7	A	1	Total 24	C 8	H 10	N 4	O 2	0
7	B	1	Total 24	C 8	H 10	N 4	O 2	0
7	C	1	Total 24	C 8	H 10	N 4	O 2	0
7	D	1	Total 24	C 8	H 10	N 4	O 2	0

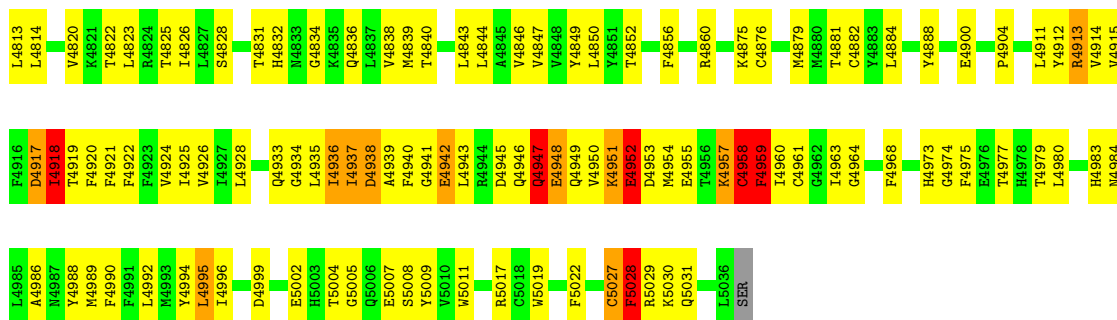
3 Residue-property plots

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

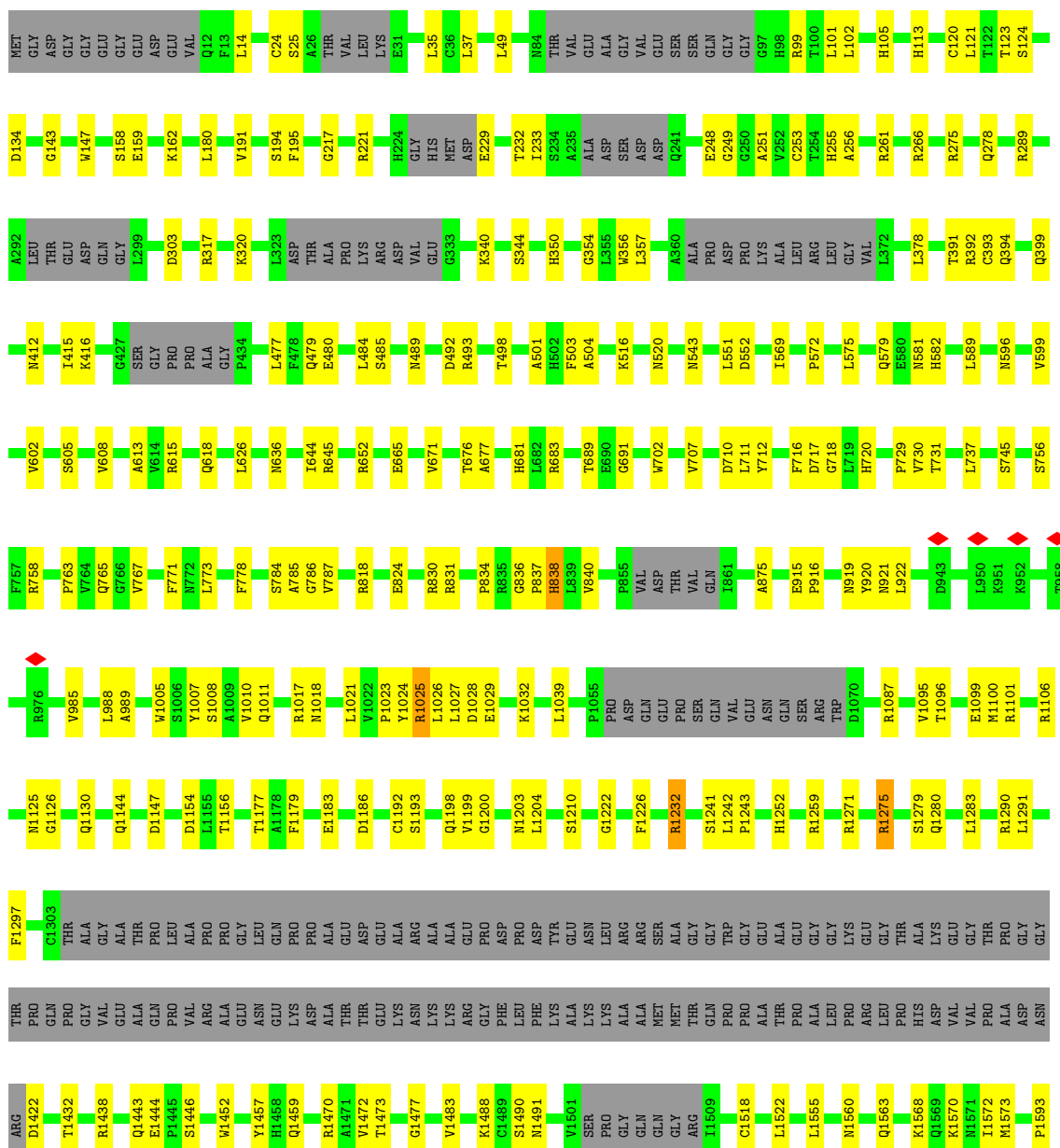
- Molecule 1: Ryanodine receptor 1

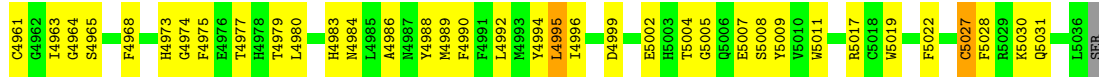




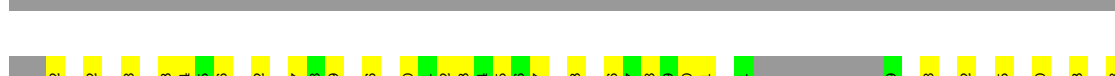
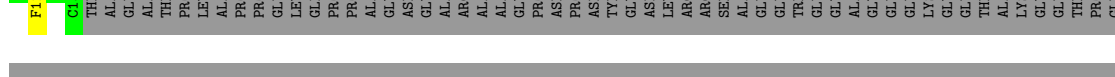
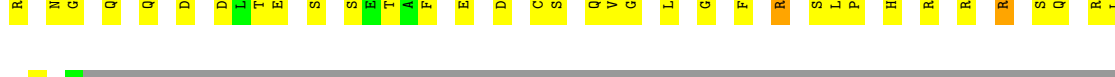
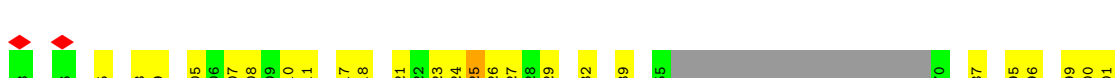
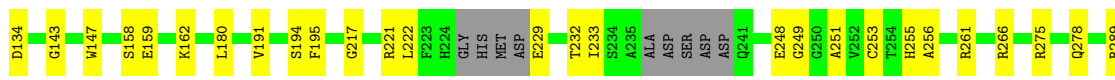
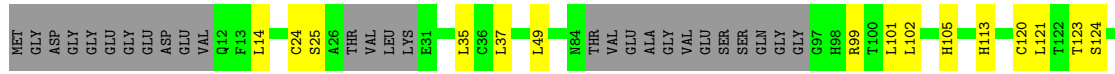


• Molecule 1: Ryanodine receptor 1

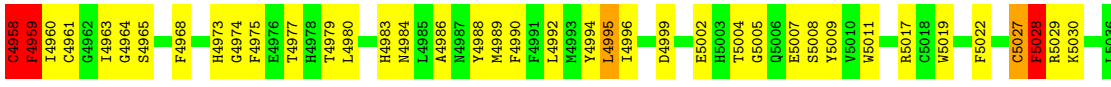




● Molecule 1: Ryanodine receptor 1

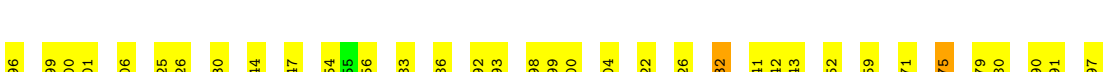
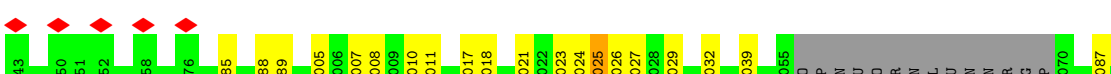
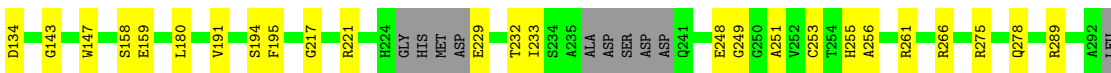
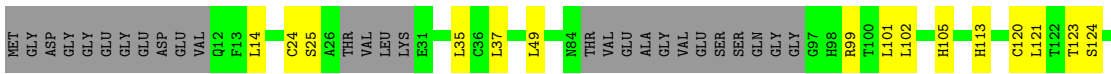


ALA	R1786	ASP	L2023	V2117	L2457	R2600	TYR	W2819	A3896	L3003	SER	A4189	ARG
ALA	R1769	ALA	P2024	S2270	R2458	R2615	SER	E2820	LYS	P3004	PHE	LEU	THR
LYS	M120	GLU	L2027	D2282	L2474	R2616	LYS	W2821	GLY	L3015	PHE	GLY	THR
GLU	F2121	GLU	R2028	N2283	L2479	S2617	ALA	T2822	THR	T3016	SER	CYS	GLY
GLU	Q2029	GLU	Q2029	M2301	GLY	M2618	GLU	E2824	THR	T3017	ALA	LEU	PRO
GLU	D2030	GLU	D2030	L2302	LYS	M2619	LYS	E2825	PRO	T3018	GLU	ARG	ALA
ALA	C2042	ALA	C2042	L2305	ASP	L2623	ALA	A2826	LEU	T3019	ASP	LEU	ARG
F1782	C2043	PRO	C2043	C2305	GLY	R2624	THR	K2827	L2905	T3020	ILE	LEU	THR
A1788	G2043	GLU	G2043	Y2142	ALA	R2625	VAL	E2827	L2906	P3021	LYS	GLY	PRO
ALA	E2047	GLY	E2047	P2146	LEU	R2626	ALA	E2830	Y2908	P3022	LYS	ASP	GLU
GLY	GLU	LYS	GLU	D2151	V2486	M2634	ALA	GLU	D2909	P3023	VAL	GLU	GLU
VAL	ALA	LYS	GLU	T2152	F2494	GLU	ASN	ARG	T2910	P3024	ASN	VAL	VAL
E1793	ASP	ASP	GLU	M2153	V2503	PHE	PHE	THR	K2911	S3041	ARG	LEU	ASN
D1828	E1923	LEU	GLU	S2154	Y2510	ALA	ASP	GLU	E2915	L3042	LEU	ARG	LEU
D1856	L1927	GLU	GLU	D2171	Q2515	K2638	PRO	LYS	K2916	PHE	LEU	LEU	GLY
K1860	C1947	THR	GLU	E2174	D2516	H2639	PRO	LYS	D2919	CYS	GLY	LYS	VAL
L1863	E1956	SER	SER	K2189	F2517	P2640	VAL	THR	M2932	ALA	VAL	SER	ALA
I1866	F1961	SER	SER	W2190	L2518	Y2655	E2741	ILE	N2933	L3049	ALA	ALA	PRO
E1873	A1962	ARG	ARG	F2191	L2519	CYS	THR	LEU	G2934	V3050	ARG	ALA	ARG
GLU	E1963	GLU	GLU	Y2192	L2522	LEU	THR	PRO	R2939	A3061	GLM	THR	THR
GLU	R1964	GLY	LEU	Q2193	M2530	PRO	GLY	THR	GLY	P3062	VAL	GLN	GLM
GLU	Y1965	GLU	SER	H2194	R2531	TRP	I2746	ALA	LEU	ALA	VAL	VAL	VAL
GLU	V1966	GLU	SER	H2195	R2531	A2662	T2747	GLN	THR	VAL	GLY	VAL	GLY
GLU	L1969	GLU	LEU	M2196	L2536	L2678	T2748	THR	T2749	VAL	VAL	VAL	GLY
GLU	Q1970	GLU	LEU	L2197	D2537	PHE	E2750	ASP	K2750	ASN	VAL	VAL	VAL
GLU	A1971	GLU	THR	M2198	L2539	TRP	L2751	GLU	L2751	CYS	GLN	GLM	GLM
GLU	M1972	GLU	VAL	R2199	ALA	ILE	D2752	ARG	D2752	GLY	THR	TYR	THR
GLU	Q1973	GLU	ARG	G2216	THR	ILE	I2755	GLY	I2755	Y2855	THR	THR	THR
GLU	R1974	GLU	VAL	GLY	VAL	ASP	E2760	Y2855	E2760	N2856	SER	THR	THR
GLU	S1975	GLU	VAL	GLY	ARG	ASP	Y2761	N2856	Y2761	P2857	THR	THR	THR
GLU	R1982	GLU	LYS	E2222	ASP	SER	H2763	Q2858	T2762	Q2858	GLU	THR	THR
GLU	A1992	GLU	LYS	C2232	ARG	PRO	E2764	L2862	F2768	L2862	ALA	THR	THR
GLU	R1996	GLU	PRO	C2233	ARG	LEU	E2764	S2863	D2768	S2863	ARG	THR	THR
ASP	S2000	GLU	GLU	R2244	HIS	CYS	F2768	G2864	D2769	G2864	THR	VAL	VAL
GLU	Q2005	GLU	GLU	Q2245	PHE	ALA	T2770	V2865	T2770	V2865	VAL	VAL	VAL
GLU	D2014	GLU	PRO	M2246	GLY	ALA	K2770	T2866	K2770	T2866	VAL	VAL	VAL
GLU	ALA	GLU	ALA	L2254	GLY	ALA	I2771	L2867	I2771	L2867	ARG	VAL	VAL
GLU	ASP	GLU	LYS	L2257	PRO	LEU	Q2772	S2868	Q2772	S2868	VAL	VAL	VAL
GLU	ALA	GLU	LYS	L2257	PRO	PRO	N2773	Q2872	N2773	Q2872	VAL	VAL	VAL
GLU	ASP	GLU	LYS	L2257	PRO	PRO	M2774	A2873	M2774	A2873	VAL	VAL	VAL
GLU	ASP	GLU	LYS	L2257	PRO	PRO	E2783	Q2877	E2783	Q2877	VAL	VAL	VAL
GLU	GLU	GLU	LYS	L2257	PRO	PRO	E2784	H2883	E2784	H2883	VAL	VAL	VAL
GLU	GLU	GLU	LYS	L2257	PRO	PRO	F2797	W2886	F2797	W2886	VAL	VAL	VAL
GLU	GLU	GLU	LYS	L2257	PRO	PRO	K2810	G2887	K2810	G2887	GLN	GLN	GLN
GLU	GLU	GLU	LYS	L2257	PRO	PRO	A2815	K2890	A2815	K2890	ILE	ILE	ILE



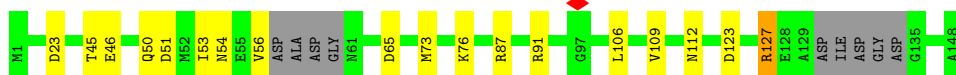
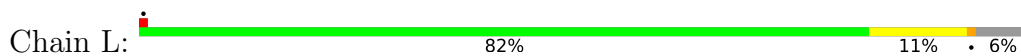
SER

● Molecule 1: Ryanodine receptor 1

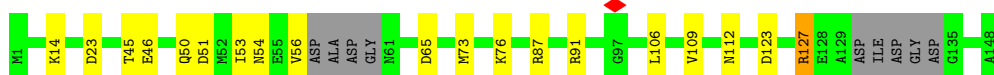
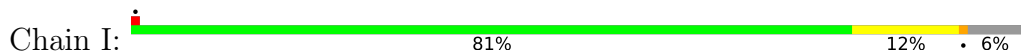




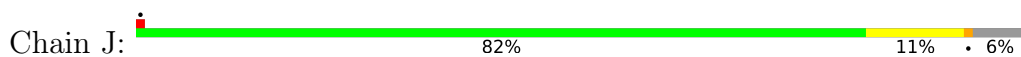
• Molecule 2: Calmodulin-1



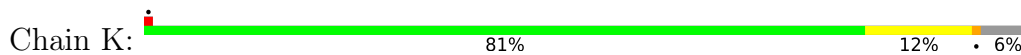
• Molecule 2: Calmodulin-1



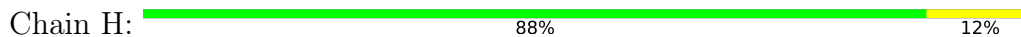
• Molecule 2: Calmodulin-1



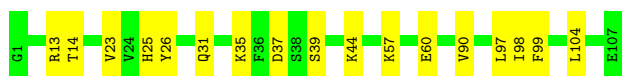
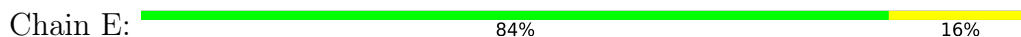
• Molecule 2: Calmodulin-1



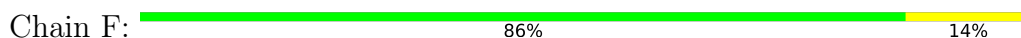
• Molecule 3: Peptidyl-prolyl cis-trans isomerase FKBP1B



• Molecule 3: Peptidyl-prolyl cis-trans isomerase FKBP1B




• Molecule 3: Peptidyl-prolyl cis-trans isomerase FKBP1B





- Molecule 3: Peptidyl-prolyl cis-trans isomerase FKBP1B

Chain G:  88% 12%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	19505	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.484	Depositor
Minimum map value	-0.814	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.053	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	613.2, 613.2, 613.2	wwPDB
Map dimensions	480, 480, 480	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.2775, 1.2775, 1.2775	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: CFF, ZN, CA, 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	0.40	1/28349 (0.0%)	0.58	33/38619 (0.1%)
1	B	0.40	1/28349 (0.0%)	0.58	32/38619 (0.1%)
1	C	0.40	1/28349 (0.0%)	0.58	33/38619 (0.1%)
1	D	0.40	1/28349 (0.0%)	0.58	33/38619 (0.1%)
2	I	0.28	0/1052	0.50	0/1416
2	J	0.28	0/1052	0.50	0/1416
2	K	0.28	0/1052	0.50	0/1416
2	L	0.28	0/1052	0.50	0/1416
3	E	0.31	0/820	0.55	0/1105
3	F	0.31	0/820	0.55	0/1105
3	G	0.31	0/820	0.55	0/1105
3	H	0.31	0/820	0.55	0/1105
All	All	0.39	4/120884 (0.0%)	0.58	131/164560 (0.1%)

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	3
1	C	0	3
1	D	0	3
All	All	0	12

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	4200	THR	C-N	5.19	1.46	1.34
1	B	4200	THR	C-N	5.19	1.46	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	4200	THR	C-N	5.19	1.46	1.34
1	D	4200	THR	C-N	5.19	1.46	1.34

The worst 5 of 131 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	836	GLY	C-N-CD	-13.39	91.14	120.60
1	A	836	GLY	C-N-CD	-13.37	91.18	120.60
1	C	836	GLY	C-N-CD	-13.37	91.18	120.60
1	B	836	GLY	C-N-CD	-13.36	91.21	120.60
1	A	4200	THR	O-C-N	-10.40	106.05	122.70

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	4231	MET	Peptide
1	A	4957	LYS	Peptide
1	A	4959	PHE	Peptide
1	B	4231	MET	Peptide
1	B	4957	LYS	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	27821	0	24966	494	0
1	B	27821	0	24966	499	0
1	C	27821	0	24966	506	0
1	D	27821	0	24966	495	0
2	I	1042	0	972	12	0
2	J	1042	0	972	11	0
2	K	1042	0	972	12	0
2	L	1042	0	972	12	0
3	E	804	0	812	9	0
3	F	804	0	812	8	0
3	G	804	0	812	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	804	0	812	7	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	31	12	12	1	0
6	B	31	12	12	1	0
6	C	31	12	12	1	0
6	D	31	12	12	1	0
7	A	14	10	10	1	0
7	B	14	10	10	1	0
7	C	14	10	10	1	0
7	D	14	10	10	1	0
All	All	118856	88	107088	2037	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 9.

The worst 5 of 2037 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:B:4586:PRO:HG3	1:B:4628:VAL:HG11	1.39	1.04
1:A:4586:PRO:HG3	1:A:4628:VAL:HG11	1.39	1.03
1:C:4586:PRO:HG3	1:C:4628:VAL:HG11	1.39	1.00
1:D:4586:PRO:HG3	1:D:4628:VAL:HG11	1.39	1.00
1:B:4569:LEU:HD21	1:B:4649:LEU:HD23	1.47	0.97

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	3800/5037 (75%)	3436 (90%)	337 (9%)	27 (1%)	19	53
1	B	3800/5037 (75%)	3439 (90%)	335 (9%)	26 (1%)	19	53
1	C	3800/5037 (75%)	3437 (90%)	336 (9%)	27 (1%)	19	53
1	D	3800/5037 (75%)	3436 (90%)	337 (9%)	27 (1%)	19	53
2	I	133/148 (90%)	124 (93%)	9 (7%)	0	100	100
2	J	133/148 (90%)	124 (93%)	9 (7%)	0	100	100
2	K	133/148 (90%)	124 (93%)	9 (7%)	0	100	100
2	L	133/148 (90%)	124 (93%)	9 (7%)	0	100	100
3	E	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
3	F	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
3	G	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
3	H	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
All	All	16152/21168 (76%)	14636 (91%)	1409 (9%)	107 (1%)	21	53

5 of 107 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	837	PRO
1	A	3003	LEU
1	A	3004	PRO
1	A	3061	ALA
1	A	3350	ARG

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	2448/4276 (57%)	2413 (99%)	35 (1%)	62	79
1	B	2448/4276 (57%)	2414 (99%)	34 (1%)	62	79

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	2448/4276 (57%)	2414 (99%)	34 (1%)	62	79
1	D	2448/4276 (57%)	2413 (99%)	35 (1%)	62	79
2	I	104/122 (85%)	103 (99%)	1 (1%)	73	84
2	J	104/122 (85%)	103 (99%)	1 (1%)	73	84
2	K	104/122 (85%)	103 (99%)	1 (1%)	73	84
2	L	104/122 (85%)	103 (99%)	1 (1%)	73	84
3	E	84/88 (96%)	83 (99%)	1 (1%)	67	82
3	F	84/88 (96%)	83 (99%)	1 (1%)	67	82
3	G	84/88 (96%)	83 (99%)	1 (1%)	67	82
3	H	84/88 (96%)	83 (99%)	1 (1%)	67	82
All	All	10544/17944 (59%)	10398 (99%)	146 (1%)	62	79

5 of 146 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	1232	ARG
1	D	5028	PHE
1	D	1996	ARG
1	D	4580	TYR
1	B	2615	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 147 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	720	HIS
1	D	4933	GLN
1	D	1203	ASN
1	D	2260	ASN
1	B	1299	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 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
6	ATP	B	5103	-	26,33,33	3.47	15 (57%)	31,52,52	2.22	11 (35%)
7	CFF	A	5104	-	8,15,15	3.59	5 (62%)	8,23,23	3.29	6 (75%)
6	ATP	C	5103	-	26,33,33	3.47	15 (57%)	31,52,52	2.21	11 (35%)
7	CFF	C	5104	-	8,15,15	3.59	5 (62%)	8,23,23	3.32	6 (75%)
7	CFF	B	5104	-	8,15,15	3.58	5 (62%)	8,23,23	3.31	6 (75%)
7	CFF	D	5104	-	8,15,15	3.58	5 (62%)	8,23,23	3.29	6 (75%)
6	ATP	A	5103	-	26,33,33	3.47	15 (57%)	31,52,52	2.21	11 (35%)
6	ATP	D	5103	-	26,33,33	3.46	15 (57%)	31,52,52	2.22	11 (35%)

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
6	ATP	B	5103	-	-	4/18/38/38	0/3/3/3
7	CFF	A	5104	-	-	-	0/2/2/2
6	ATP	C	5103	-	-	4/18/38/38	0/3/3/3
7	CFF	C	5104	-	-	-	0/2/2/2
7	CFF	B	5104	-	-	-	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	CFF	D	5104	-	-	-	0/2/2/2
6	ATP	A	5103	-	-	4/18/38/38	0/3/3/3
6	ATP	D	5103	-	-	4/18/38/38	0/3/3/3

The worst 5 of 80 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	C	5103	ATP	O4'-C1'	12.33	1.58	1.41
6	A	5103	ATP	O4'-C1'	12.28	1.58	1.41
6	B	5103	ATP	O4'-C1'	12.28	1.58	1.41
6	D	5103	ATP	O4'-C1'	12.25	1.58	1.41
7	C	5104	CFF	O13-C6	6.52	1.40	1.24

The worst 5 of 68 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	5104	CFF	C4-C5-C6	-7.42	115.20	119.96
7	C	5104	CFF	C4-C5-C6	-7.42	115.20	119.96
7	A	5104	CFF	C4-C5-C6	-7.35	115.24	119.96
7	D	5104	CFF	C4-C5-C6	-7.32	115.26	119.96
6	B	5103	ATP	C4-C5-N7	-4.88	104.32	109.40

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	5103	ATP	C4'-C5'-O5'-PA
6	B	5103	ATP	C4'-C5'-O5'-PA
6	C	5103	ATP	C4'-C5'-O5'-PA
6	D	5103	ATP	C4'-C5'-O5'-PA
6	A	5103	ATP	PB-O3A-PA-O5'

There are no ring outliers.

8 monomers are involved in 8 short contacts:

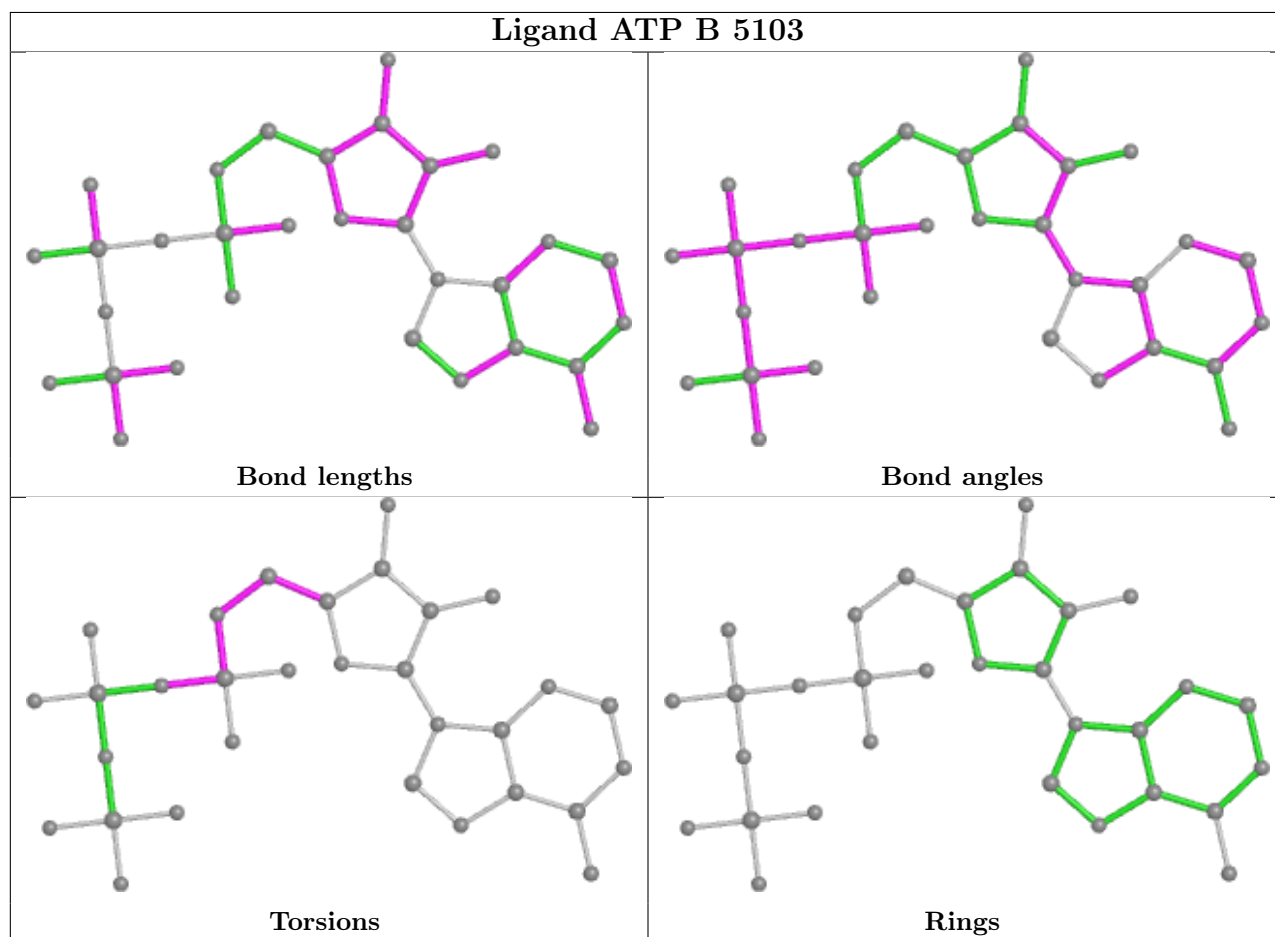
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	5103	ATP	1	0
7	A	5104	CFF	1	0
6	C	5103	ATP	1	0
7	C	5104	CFF	1	0

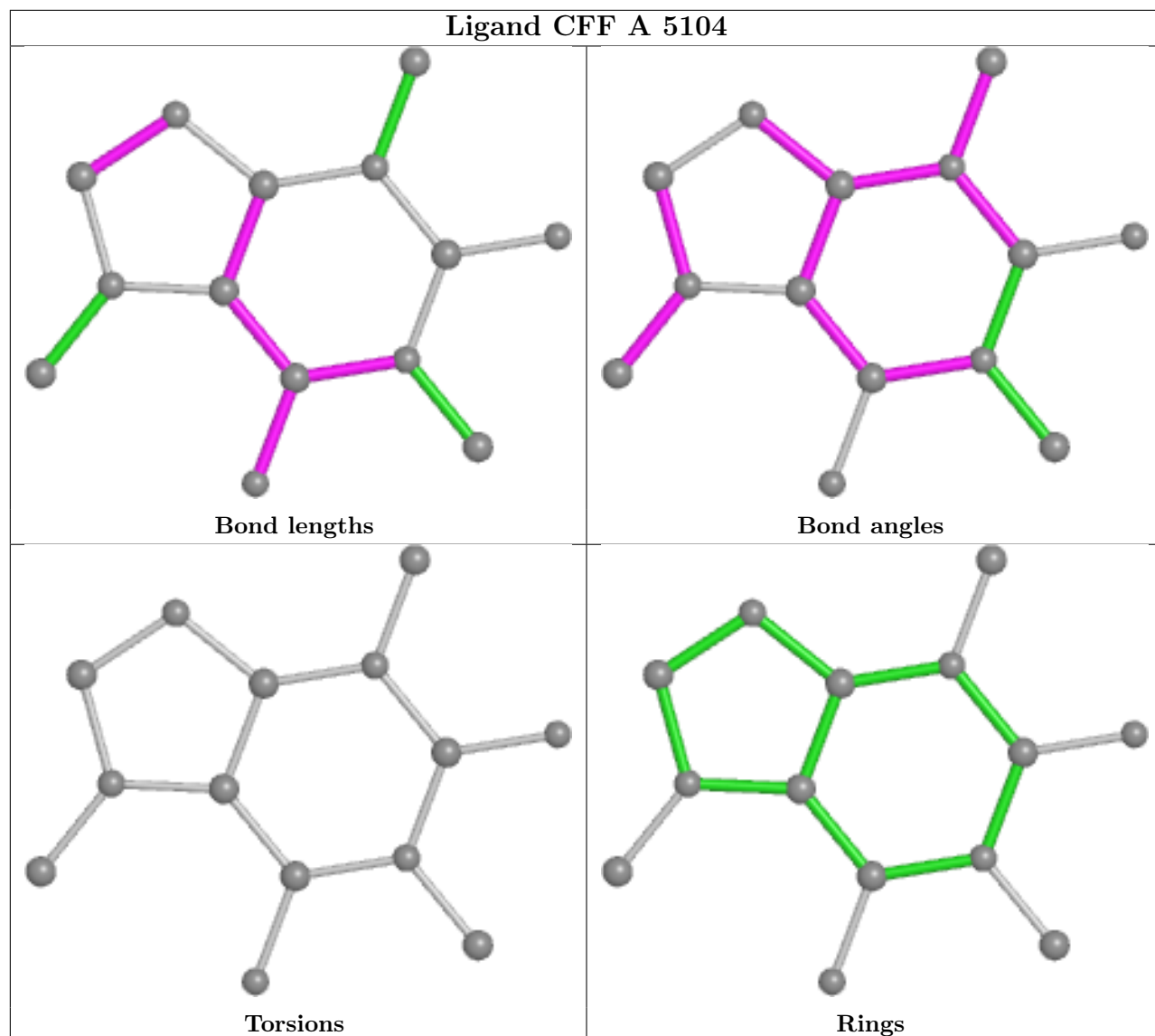
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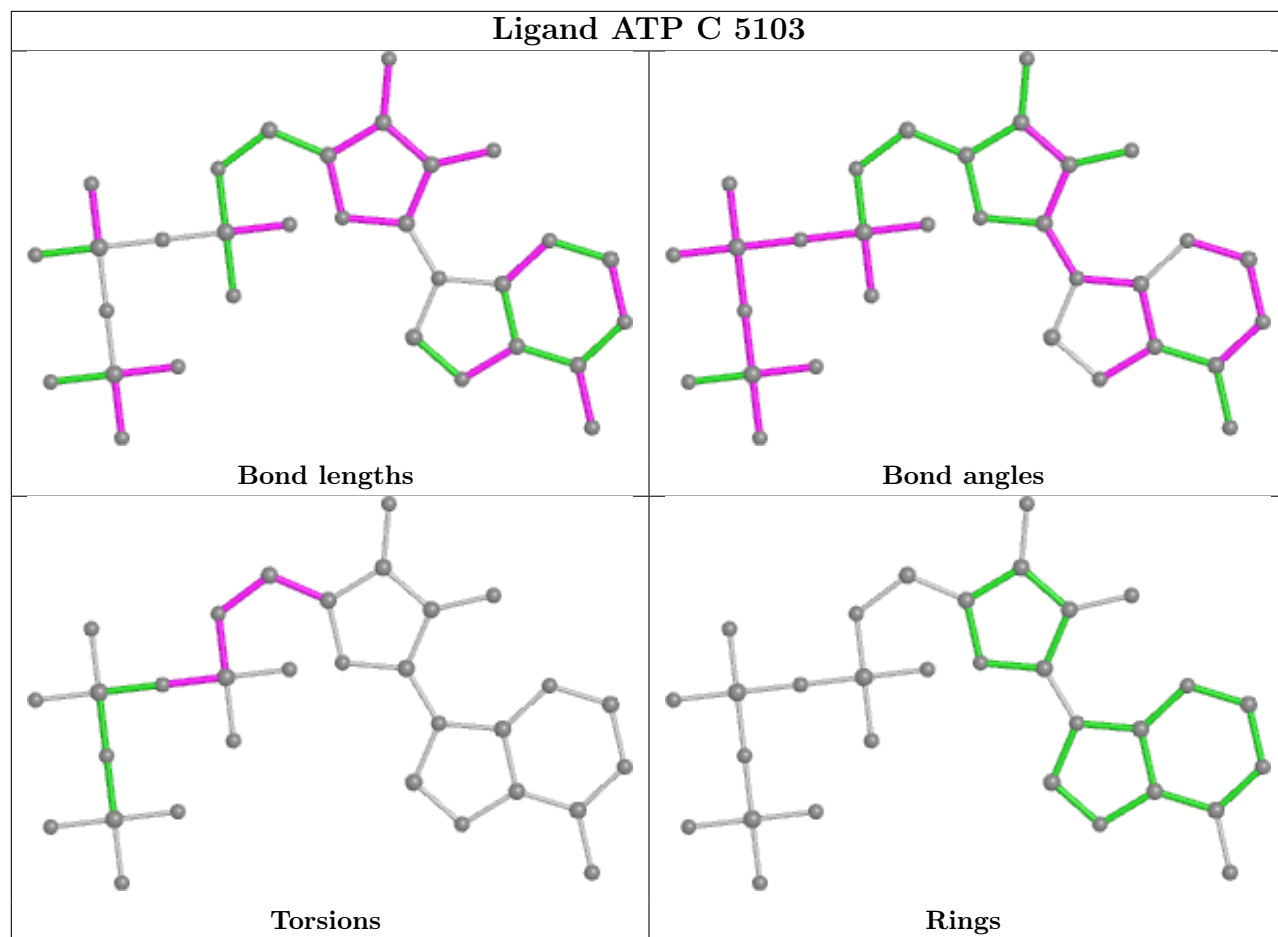
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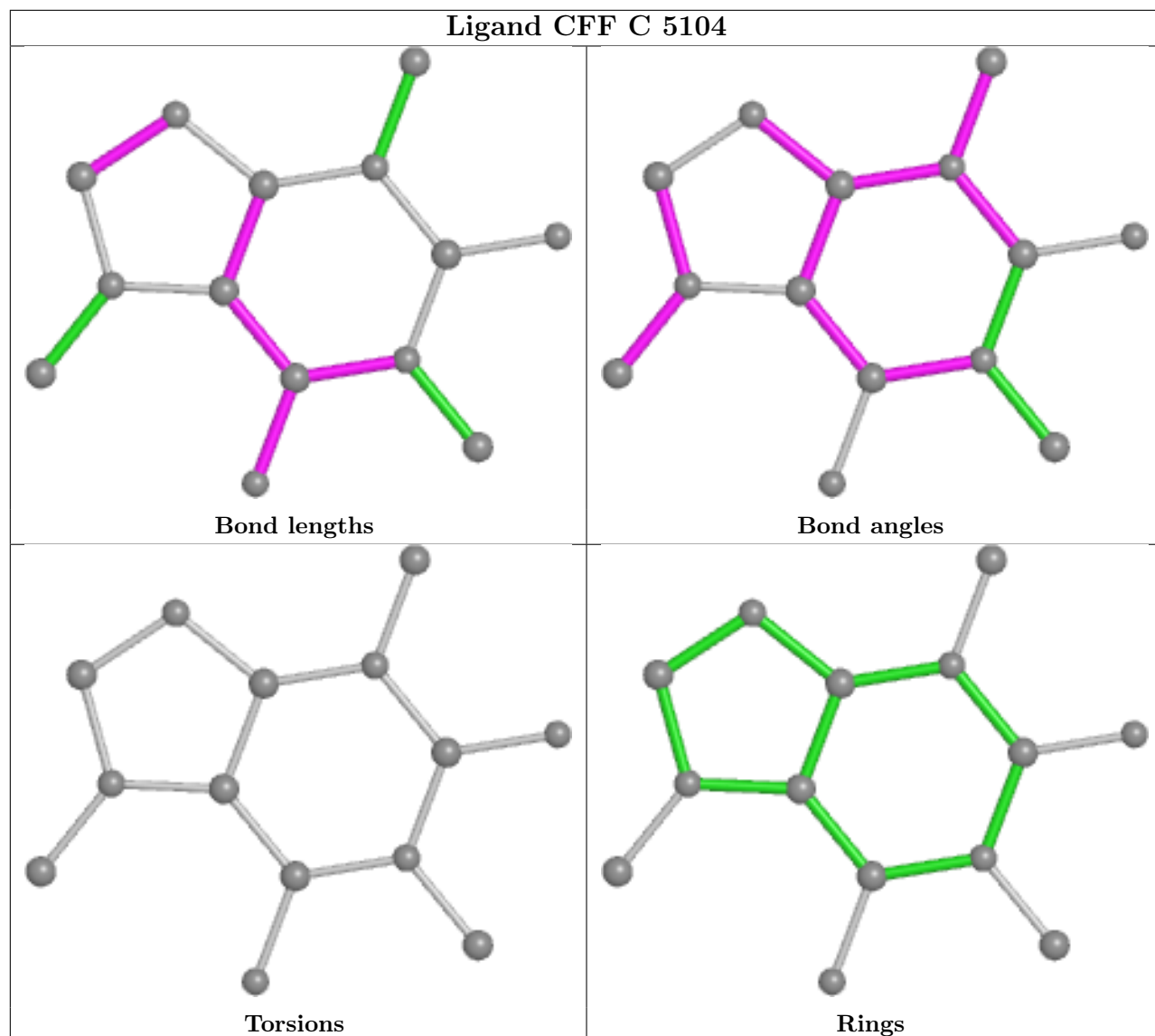
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	5104	CFF	1	0
7	D	5104	CFF	1	0
6	A	5103	ATP	1	0
6	D	5103	ATP	1	0

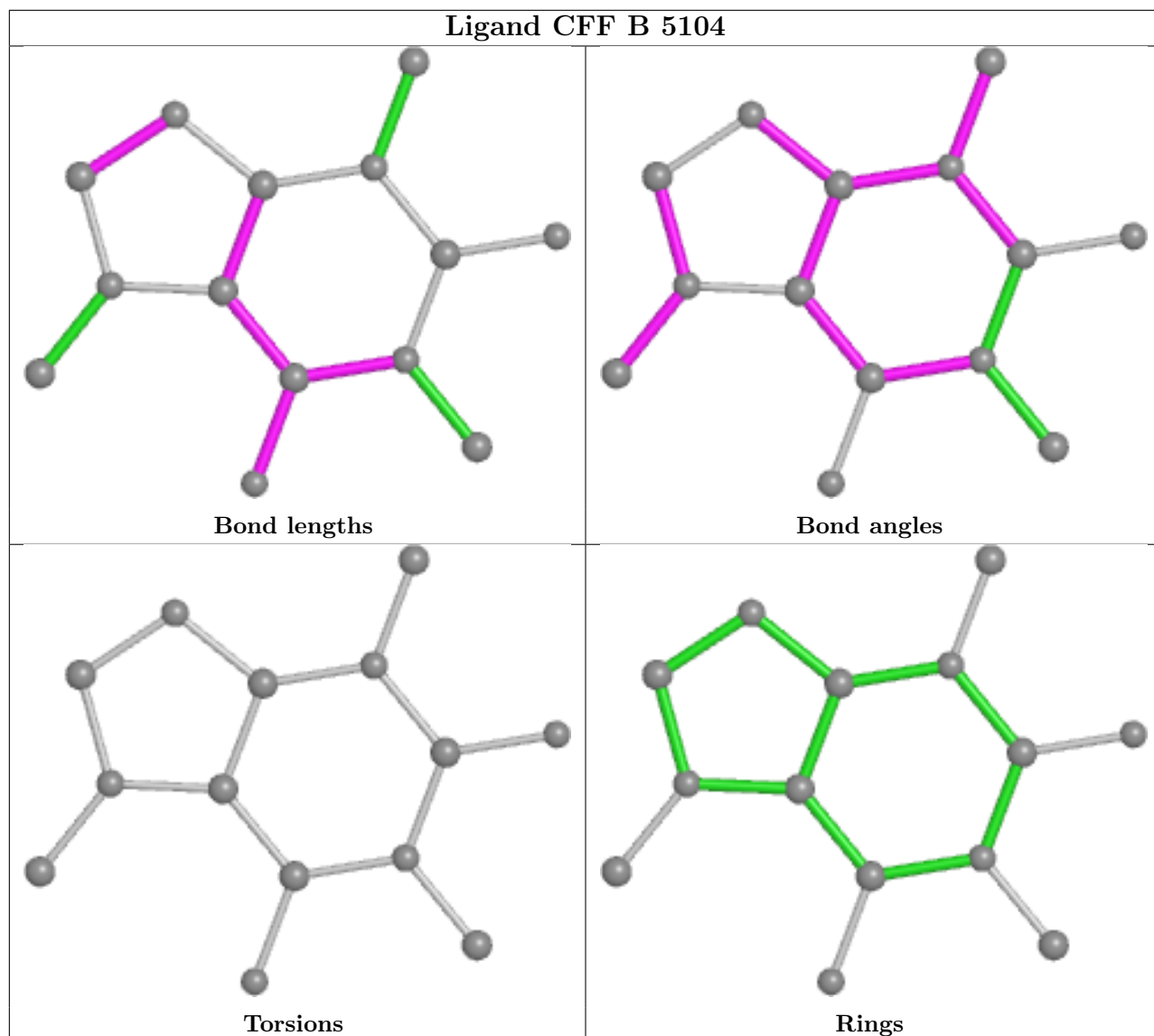
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

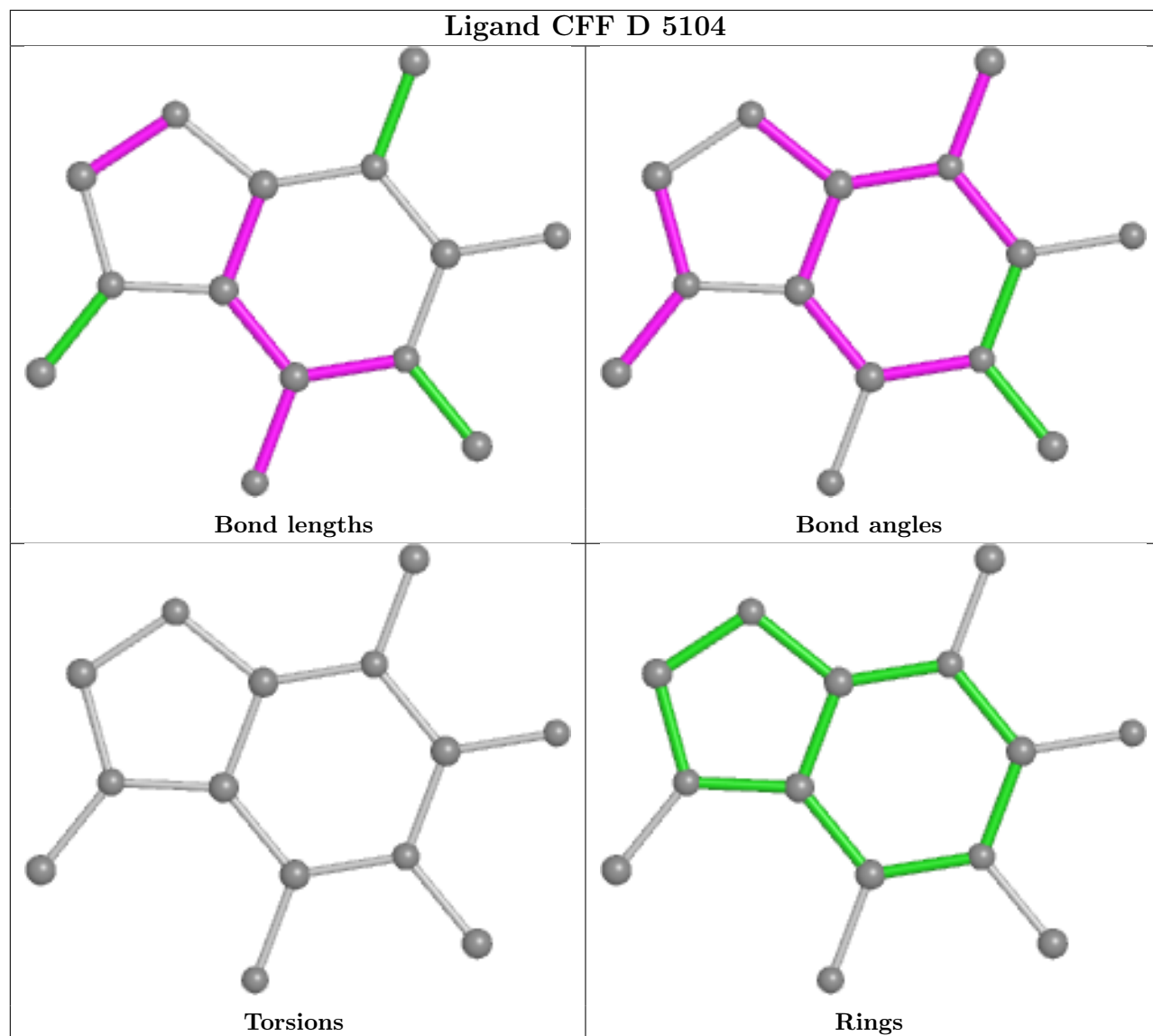


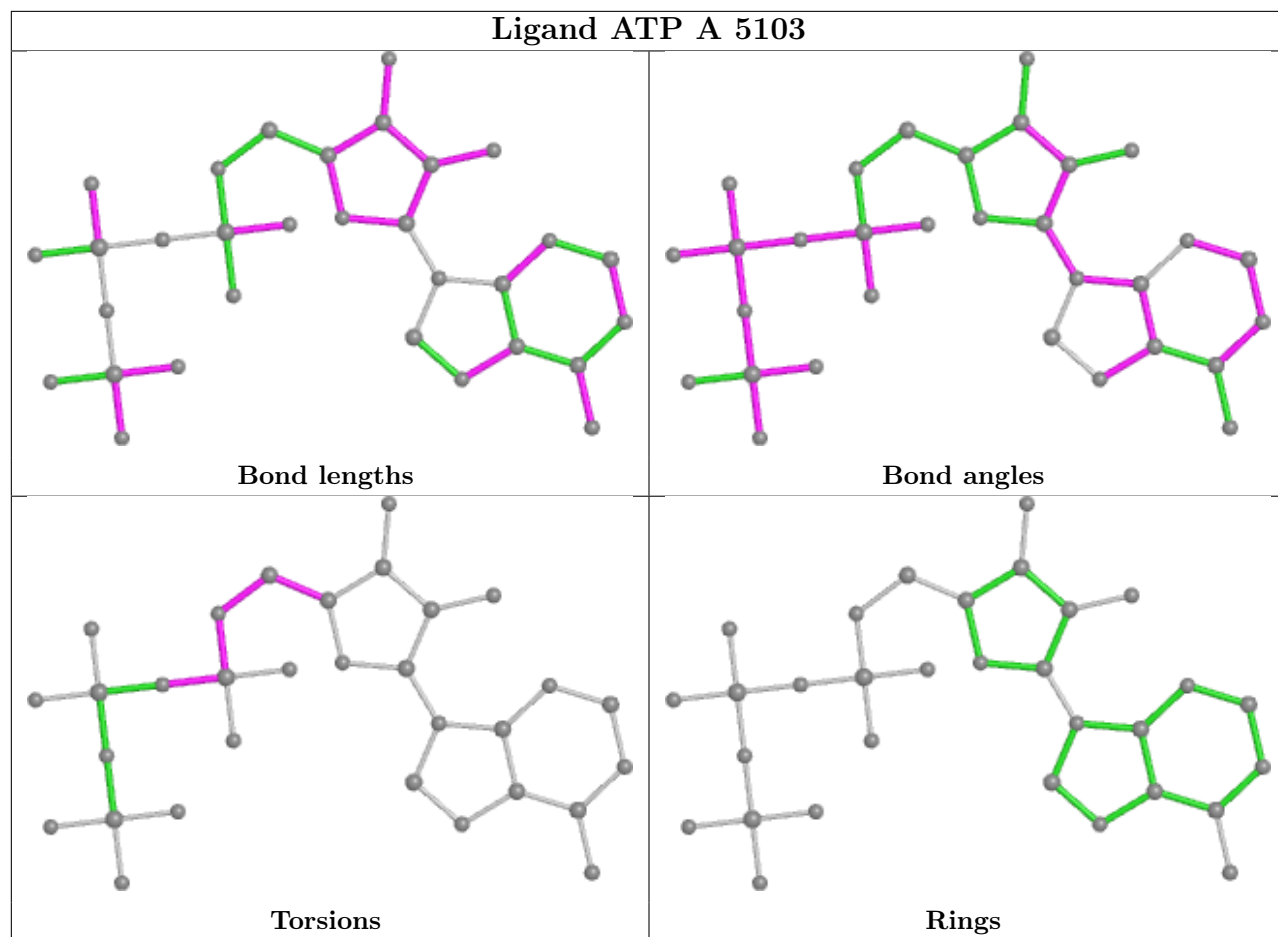


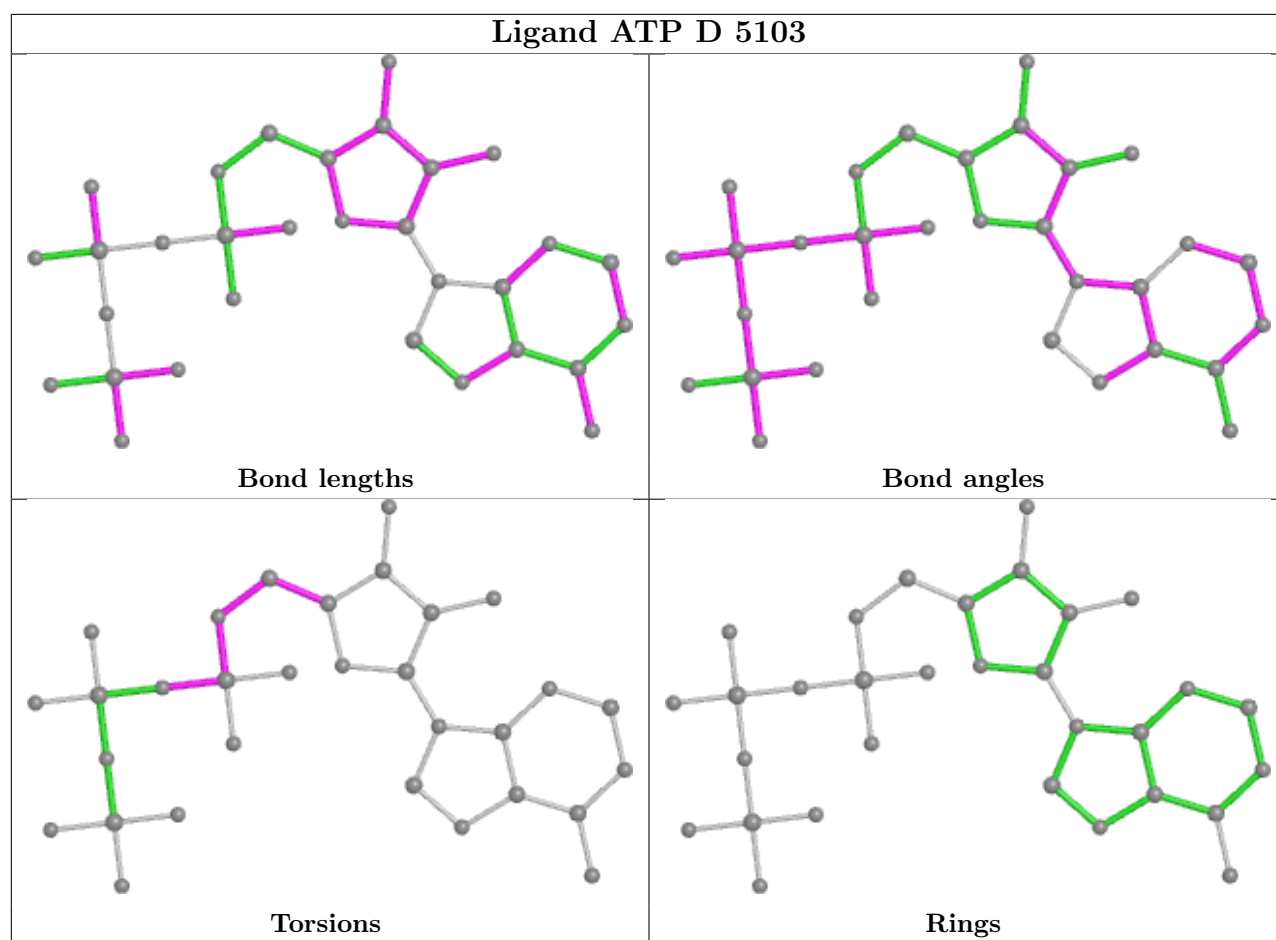












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

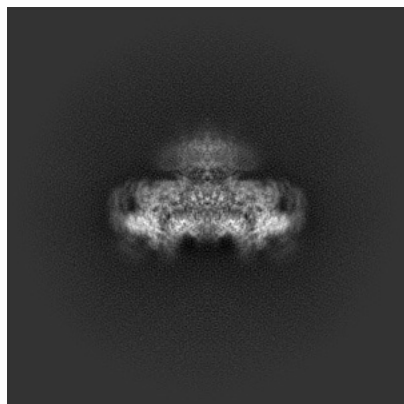
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-38447. These allow visual inspection of the internal detail of the map and identification of artifacts.

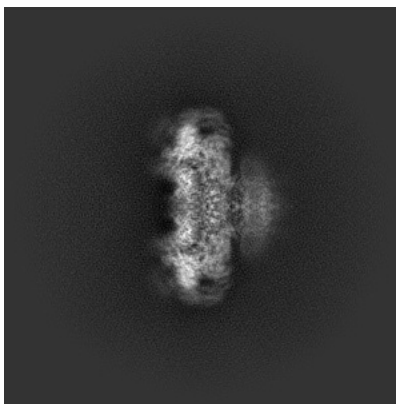
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

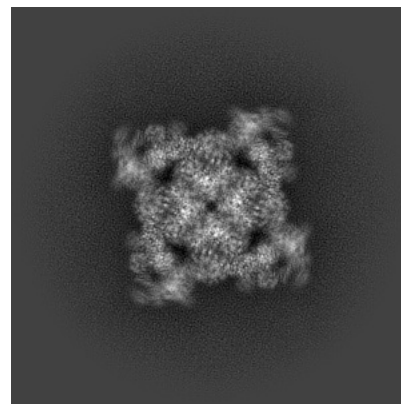
6.1.1 Primary map



X

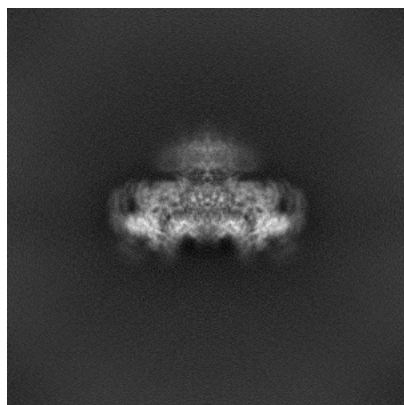


Y

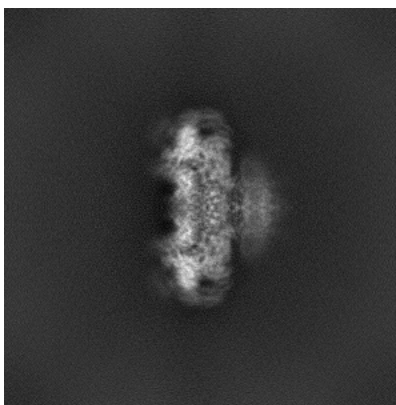


Z

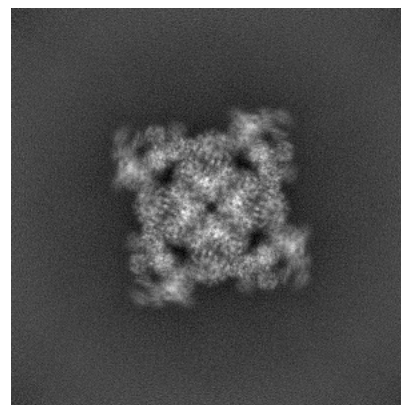
6.1.2 Raw map



X



Y

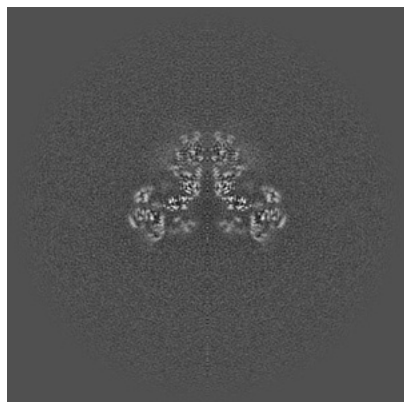


Z

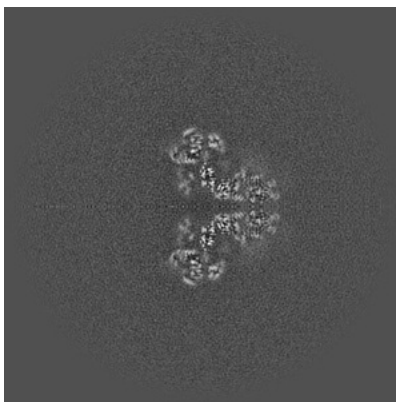
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

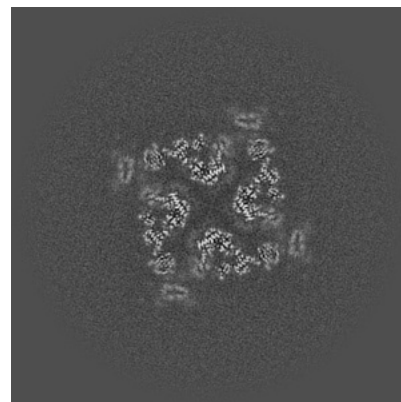
6.2.1 Primary map



X Index: 240

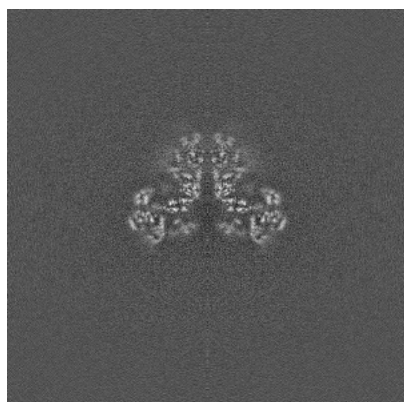


Y Index: 240

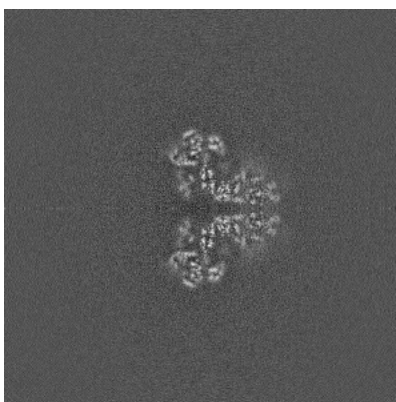


Z Index: 240

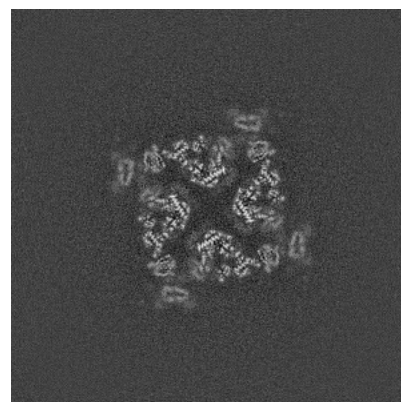
6.2.2 Raw map



X Index: 240



Y Index: 240

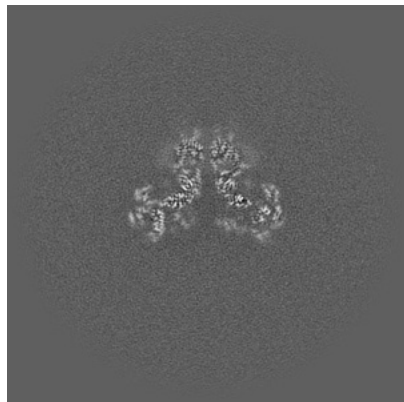


Z Index: 240

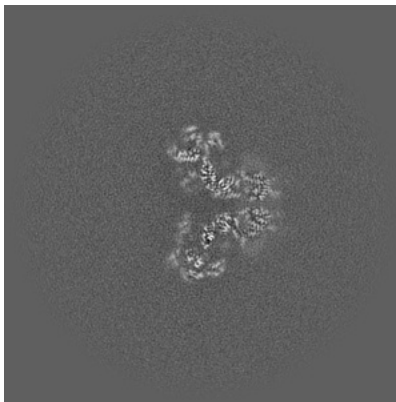
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

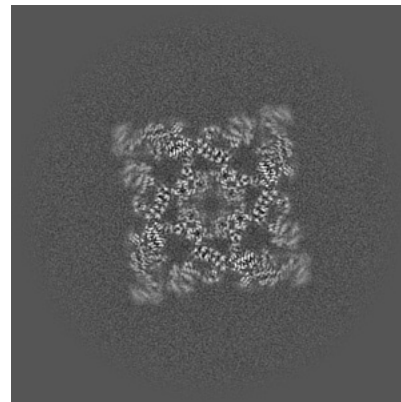
6.3.1 Primary map



X Index: 238

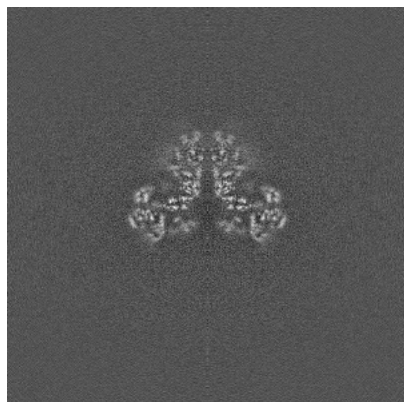


Y Index: 238

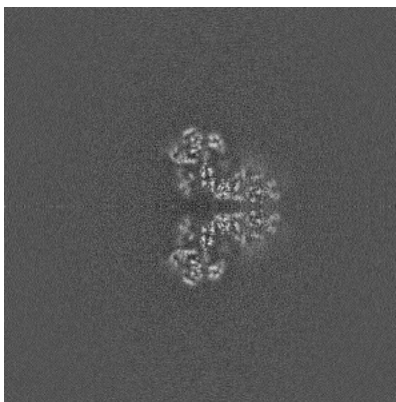


Z Index: 223

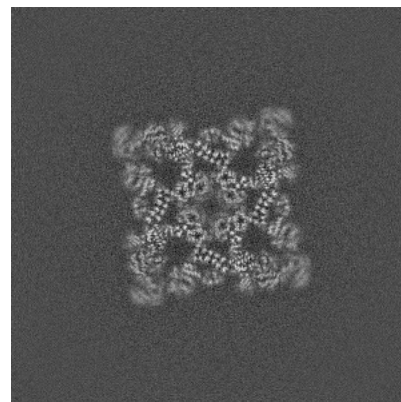
6.3.2 Raw map



X Index: 240



Y Index: 240

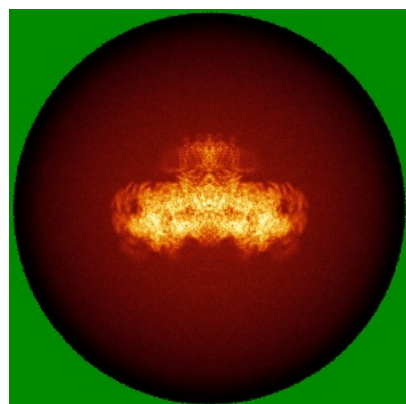


Z Index: 222

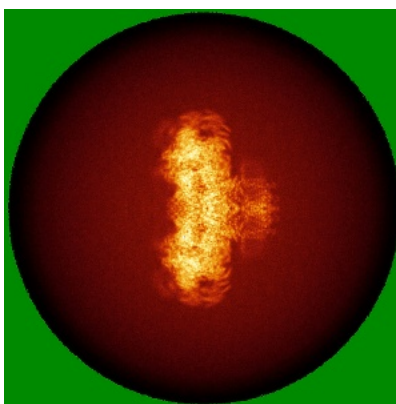
The images above show the largest variance slices of the map in three orthogonal directions.

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

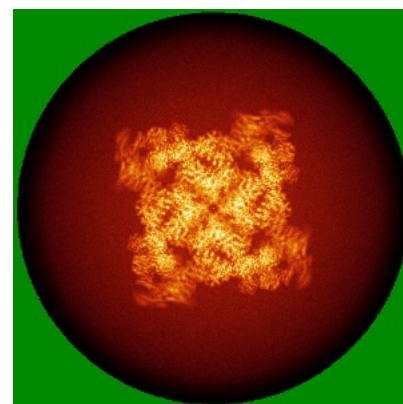
6.4.1 Primary map



X

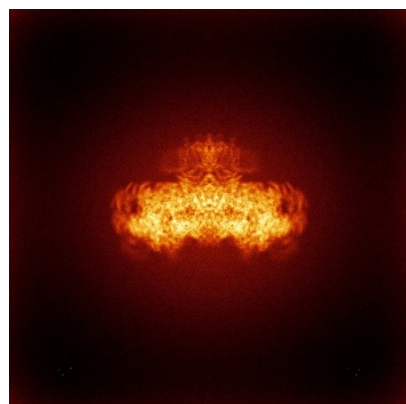


Y

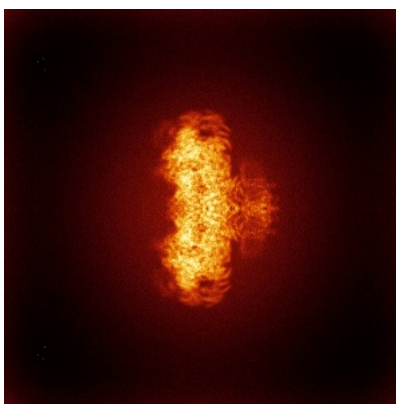


Z

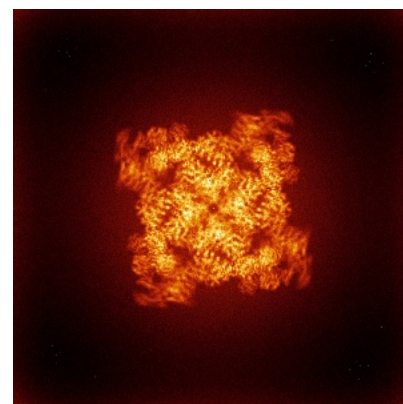
6.4.2 Raw map



X



Y

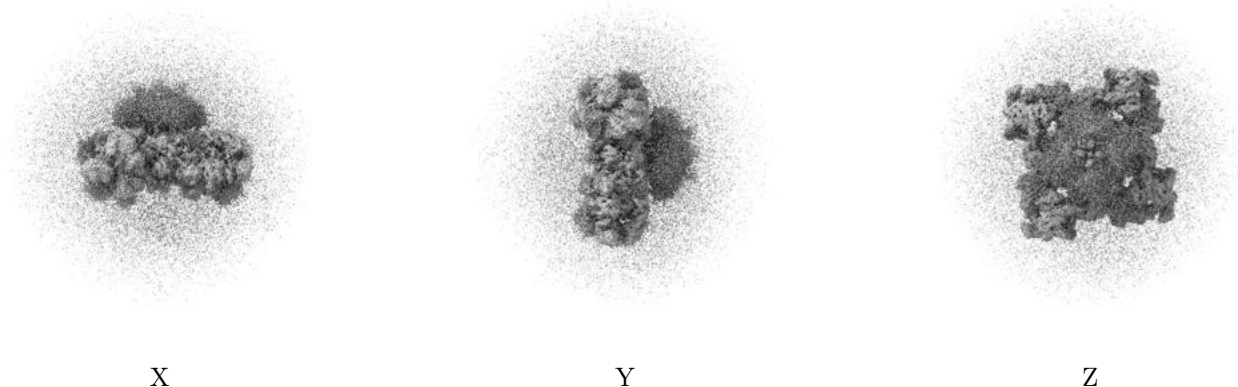


Z

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.

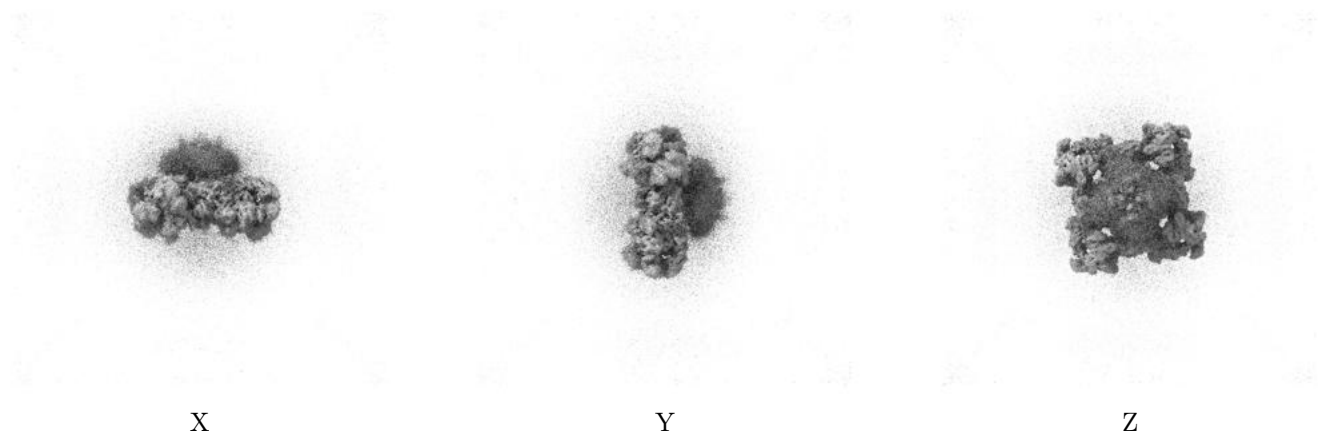
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.15. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

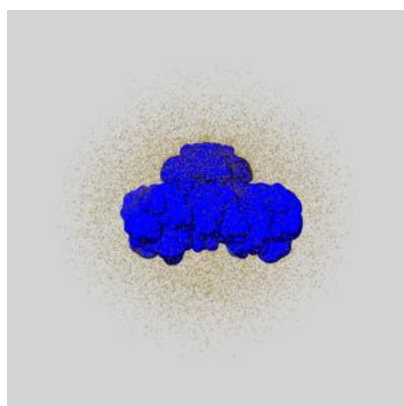
6.6 Mask visualisation [i](#)

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

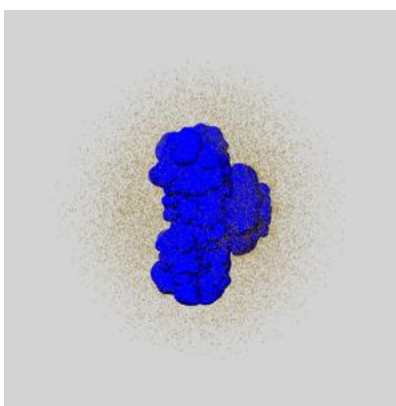
A mask typically either:

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

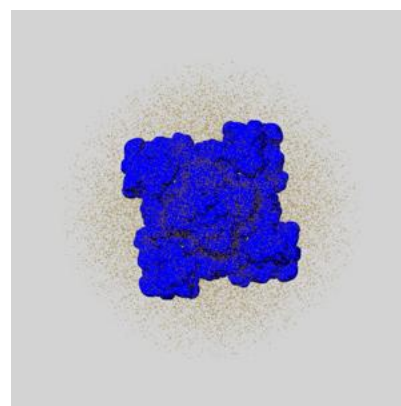
6.6.1 emd_38447_msk_1.map [i](#)



X



Y

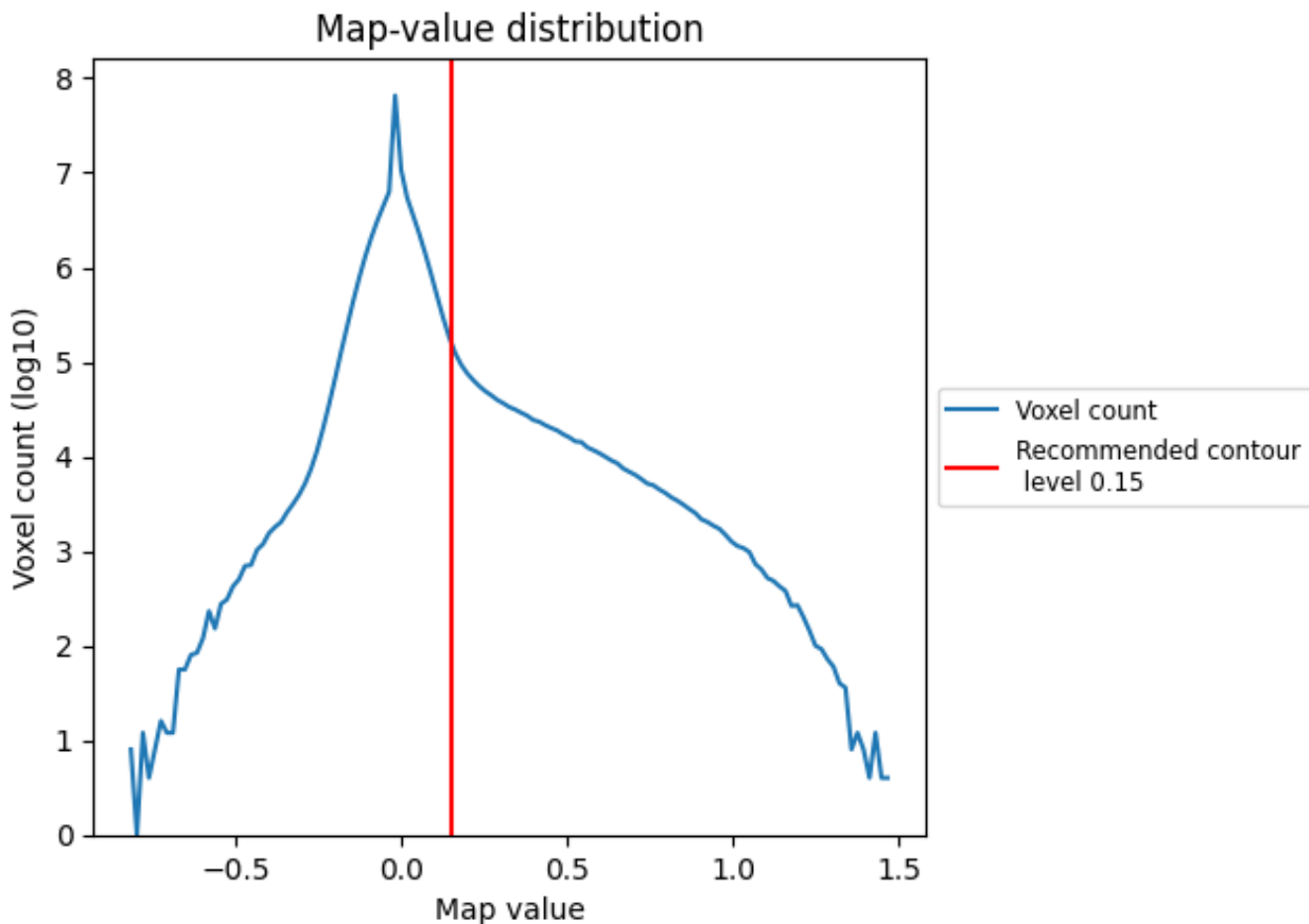


Z

7 Map analysis [i](#)

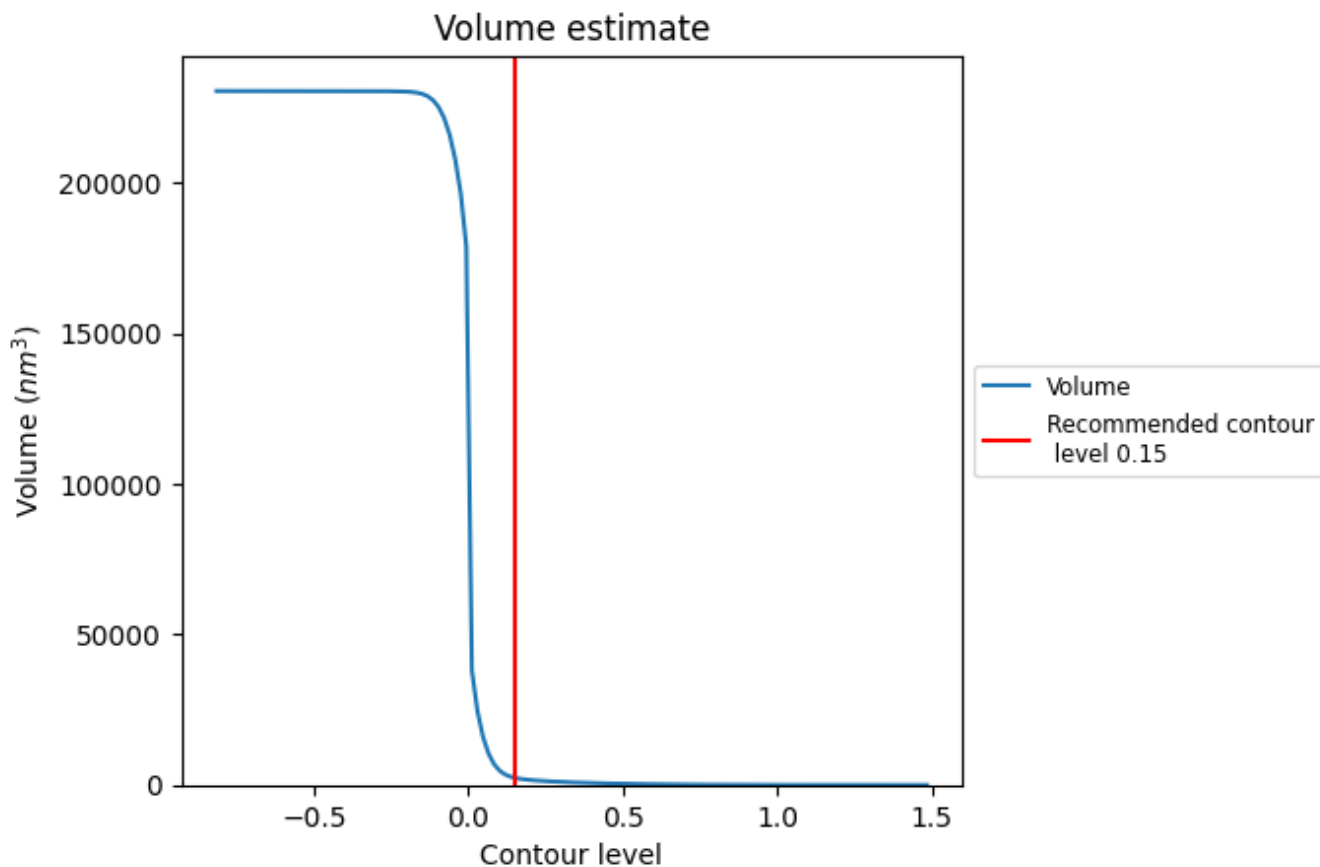
This section contains the results of statistical analysis of the map.

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.

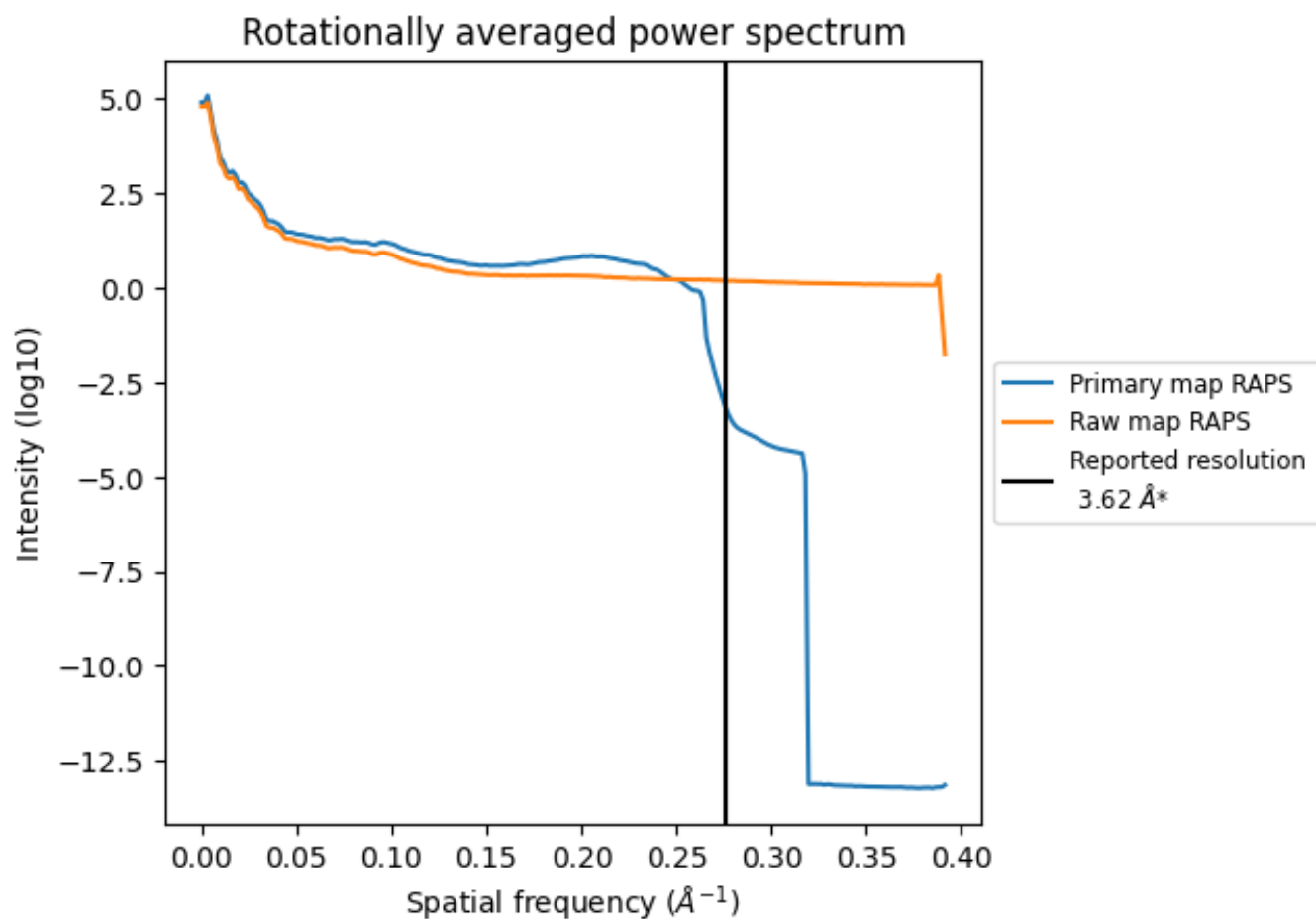
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 2397 nm^3 ; this corresponds to an approximate mass of 2166 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](#)

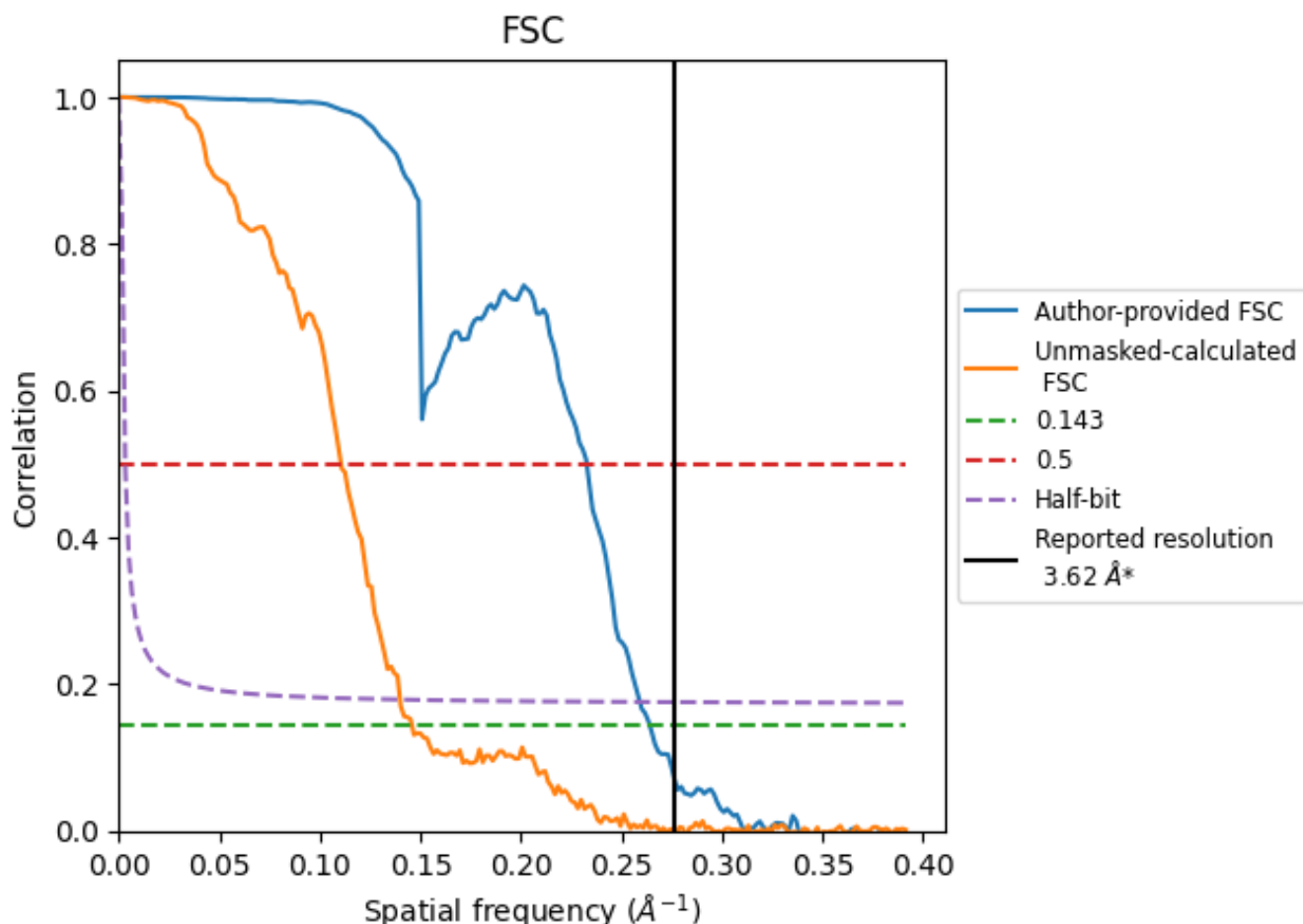


*Reported resolution corresponds to spatial frequency of 0.276 Å⁻¹

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 0.276 Å⁻¹

8.2 Resolution estimates [i](#)

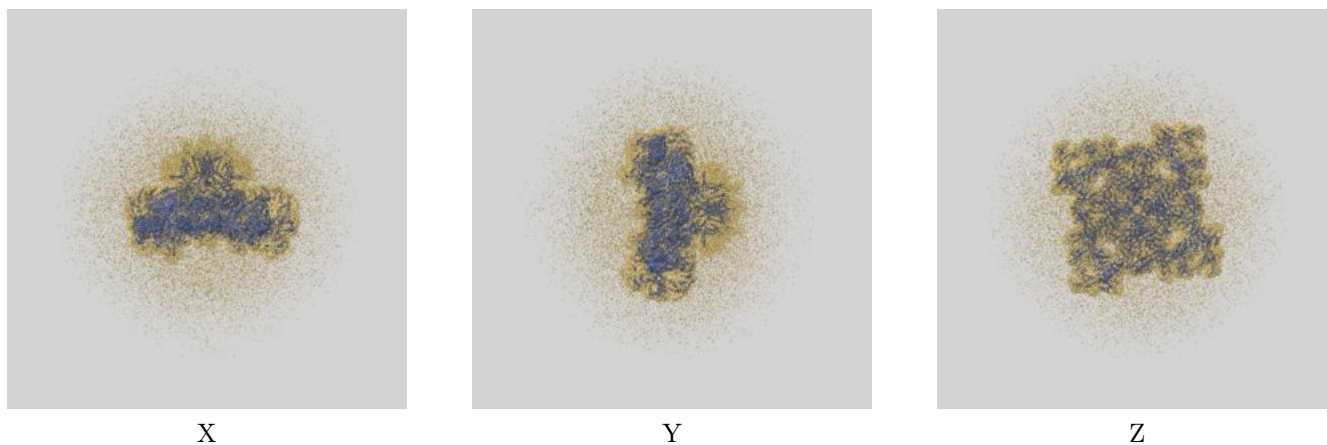
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.62	-	-
Author-provided FSC curve	3.79	4.30	3.86
Unmasked-calculated*	6.86	9.05	7.15

*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 6.86 differs from the reported value 3.62 by more than 10 %

9 Map-model fit [i](#)

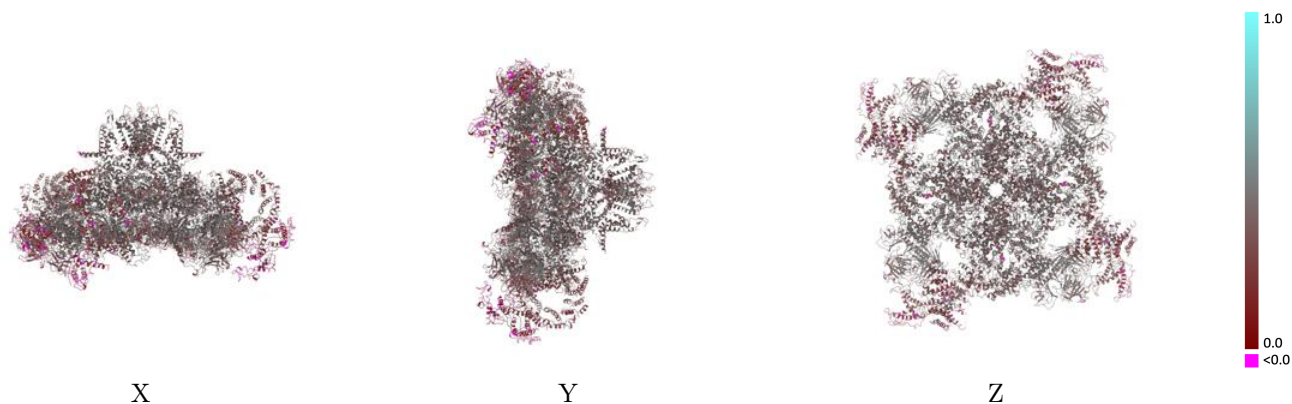
This section contains information regarding the fit between EMDB map EMD-38447 and PDB model 8XLF. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



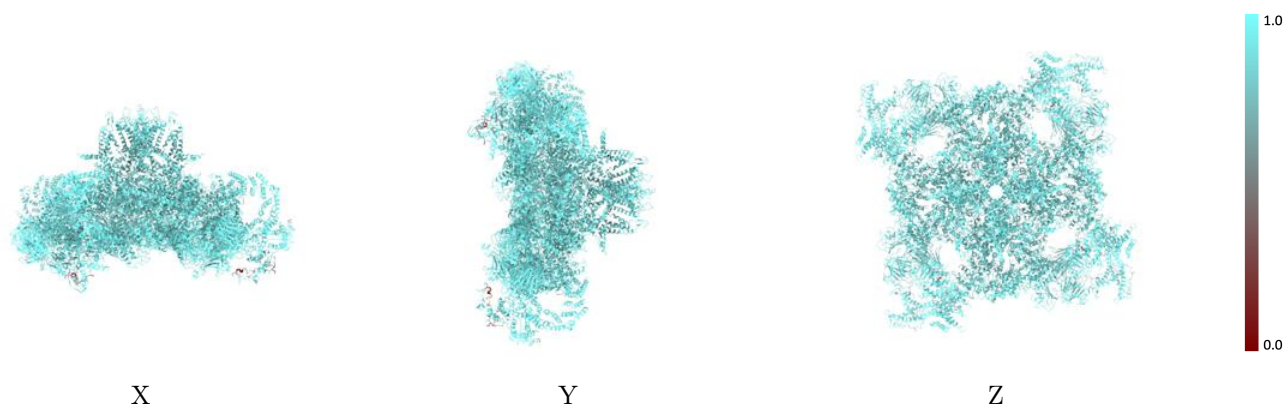
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



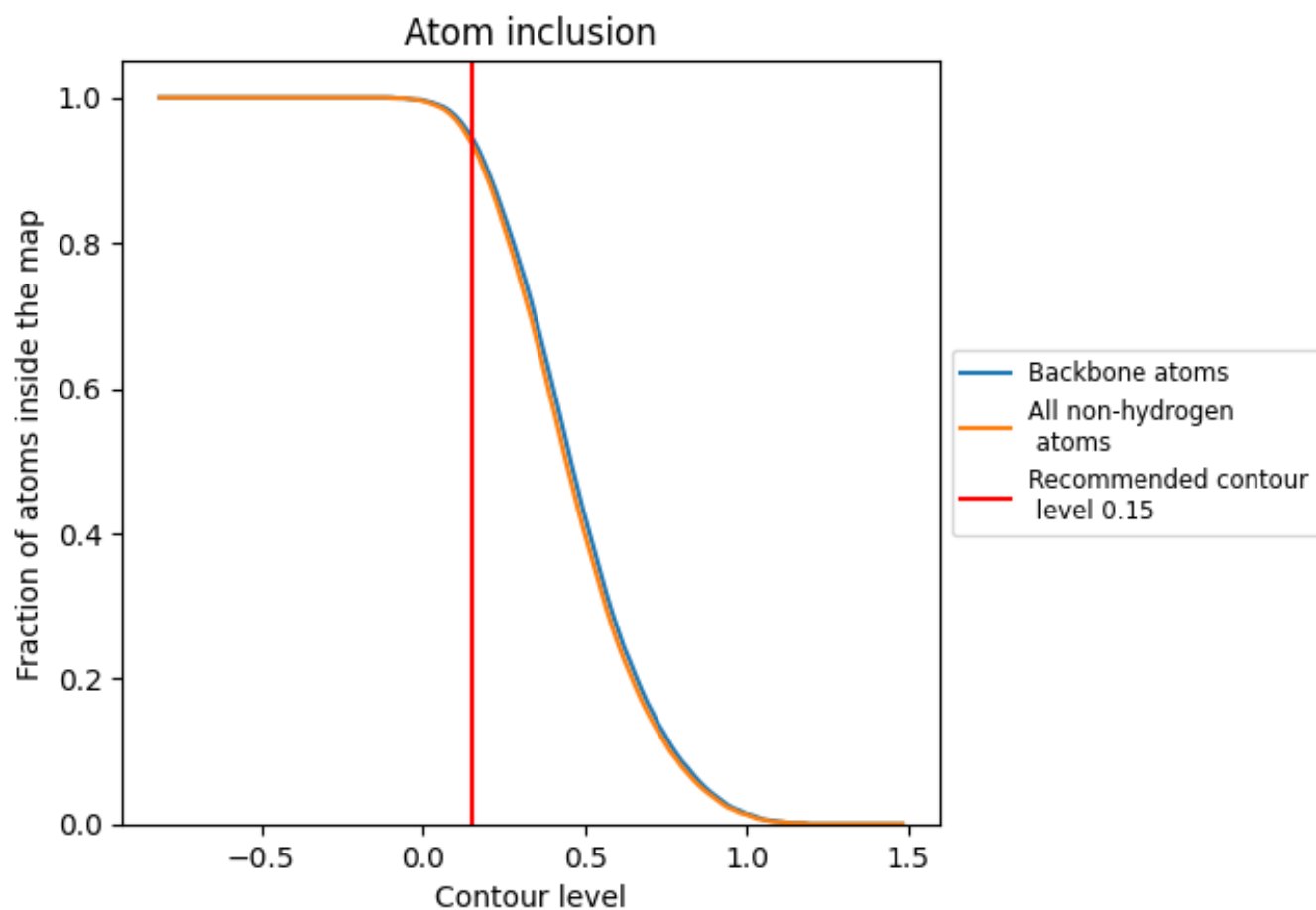
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.15).



























9.4 Atom inclusion [i](#)



At the recommended contour level, 95% of all backbone atoms, 94% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9380	 0.3750
A	 0.9410	 0.3780
B	 0.9410	 0.3780
C	 0.9410	 0.3780
D	 0.9410	 0.3790
E	 0.9510	 0.3920
F	 0.9510	 0.3890
G	 0.9530	 0.3890
H	 0.9510	 0.3910
I	 0.8990	 0.2850
J	 0.9000	 0.2880
K	 0.8990	 0.2870
L	 0.9010	 0.2840

