



## wwPDB EM Validation Summary Report ⓘ

Mar 19, 2024 – 11:44 PM JST

PDB ID : 6JII  
EMDB ID : EMD-9834  
Title : Structure of RyR2 (F/A/C/L-Ca<sup>2+</sup>/apo-CaM-M dataset)  
Authors : Gong, D.S.; Chi, X.M.; Zhou, G.W.; Huang, G.X.Y.; Lei, J.L.; Yan, N.  
Deposited on : 2019-02-21  
Resolution : 4.20 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](mailto: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>.

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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

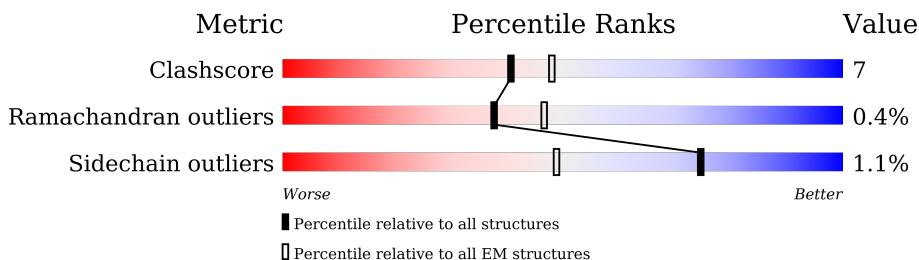
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.20 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.



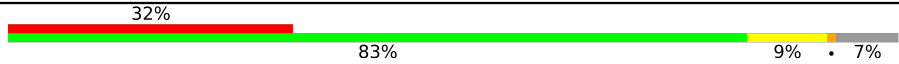
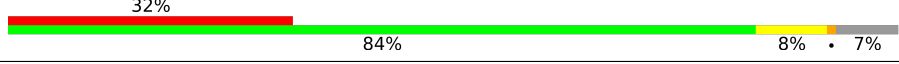
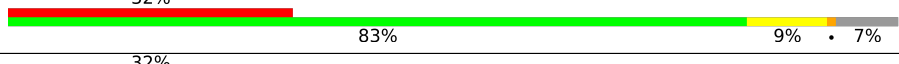

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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  $\geq 3$ , 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	108	
1	D	108	
1	G	108	
1	J	108	
2	B	4968	
2	E	4968	
2	H	4968	
2	K	4968	

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Mol	Chain	Length	Quality of chain
3	C	149	
3	F	149	
3	I	149	
3	L	149	

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 115028 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	107	819	516	144	155	4	0	0
1	D	107	819	516	144	155	4	0	0
1	G	107	819	516	144	155	4	0	0
1	J	107	819	516	144	155	4	0	0

- Molecule 2 is a protein called Ryr2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	3508	26813	17078	4599	4977	159	0	0
2	E	3508	26813	17078	4599	4977	159	0	0
2	H	3508	26813	17078	4599	4977	159	0	0
2	K	3508	26813	17078	4599	4977	159	0	0

- Molecule 3 is a protein called Calmodulin-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	138	1078	668	176	225	9	0	0
3	F	138	1078	668	176	225	9	0	0
3	I	138	1078	668	176	225	9	0	0
3	L	138	1078	668	176	225	9	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	32	ALA	GLU	engineered mutation	UNP P0DP23
C	68	ALA	GLU	engineered mutation	UNP P0DP23
C	105	ALA	GLU	engineered mutation	UNP P0DP23
C	141	ALA	GLU	engineered mutation	UNP P0DP23
F	32	ALA	GLU	engineered mutation	UNP P0DP23
F	68	ALA	GLU	engineered mutation	UNP P0DP23
F	105	ALA	GLU	engineered mutation	UNP P0DP23
F	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
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

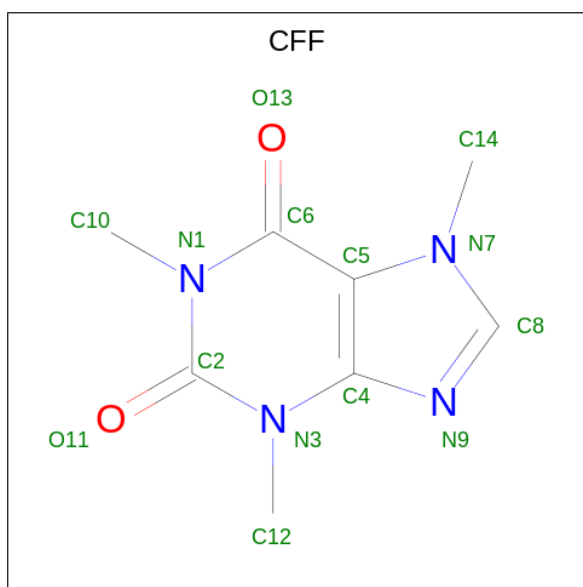
- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
4	B	1	Total Zn 1 1	0
4	E	1	Total Zn 1 1	0
4	H	1	Total Zn 1 1	0
4	K	1	Total Zn 1 1	0

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

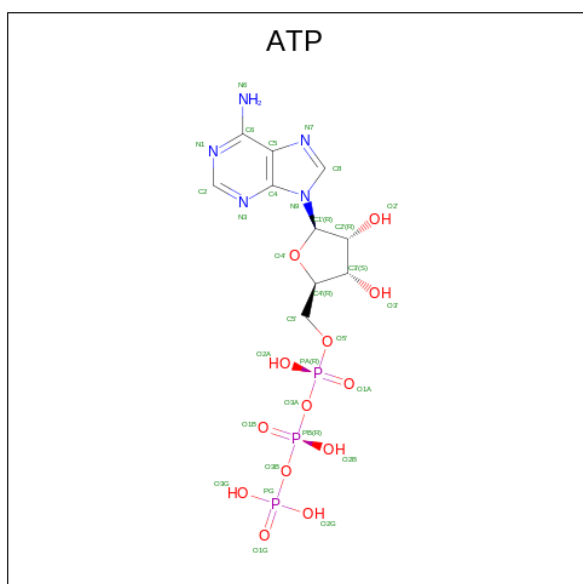
Mol	Chain	Residues	Atoms	AltConf
5	B	1	Total Ca 1 1	0
5	E	1	Total Ca 1 1	0
5	H	1	Total Ca 1 1	0
5	K	1	Total Ca 1 1	0

- Molecule 6 is CAFFEINE (three-letter code: CFF) (formula: C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
6	B	1	Total	C	N	O	0
			14	8	4	2	
6	E	1	Total	C	N	O	0
			14	8	4	2	
6	H	1	Total	C	N	O	0
			14	8	4	2	
6	K	1	Total	C	N	O	0
			14	8	4	2	

- Molecule 7 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ).

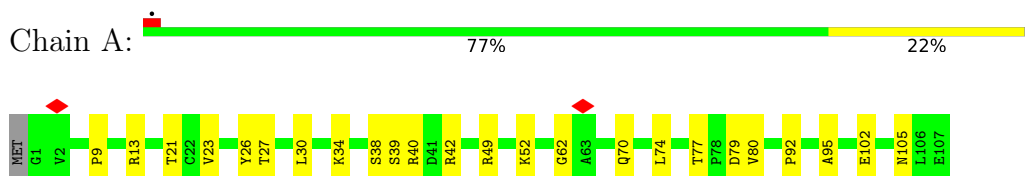


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
7	B	1	31	10	5	13	3	0
7	E	1	31	10	5	13	3	0
7	H	1	31	10	5	13	3	0
7	K	1	31	10	5	13	3	0

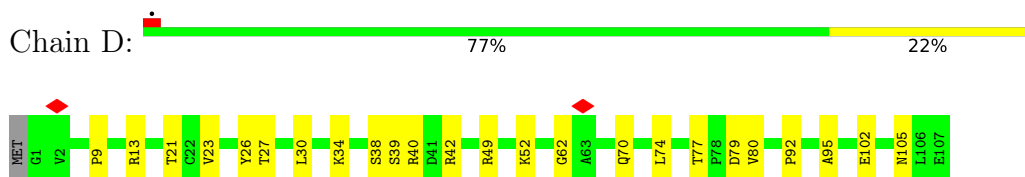
### 3 Residue-property plots

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.

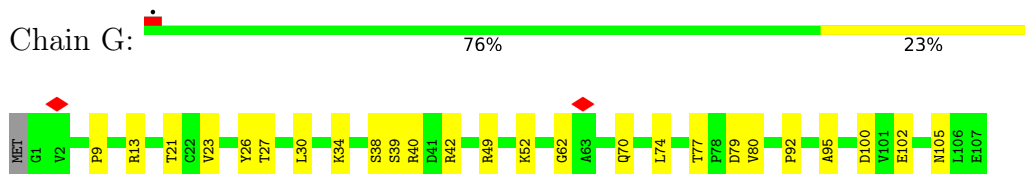
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



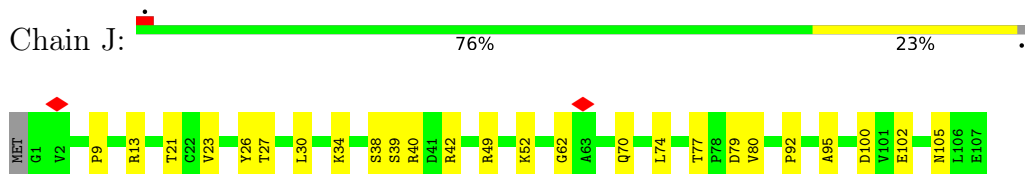
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



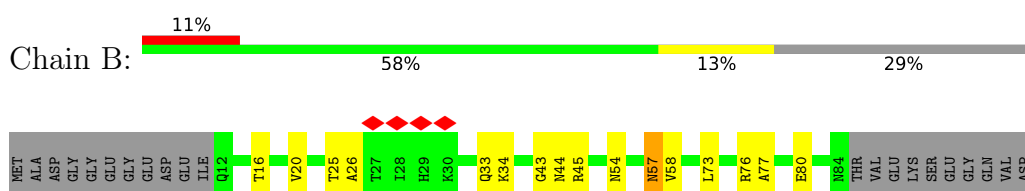
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



- Molecule 2: Ryr2

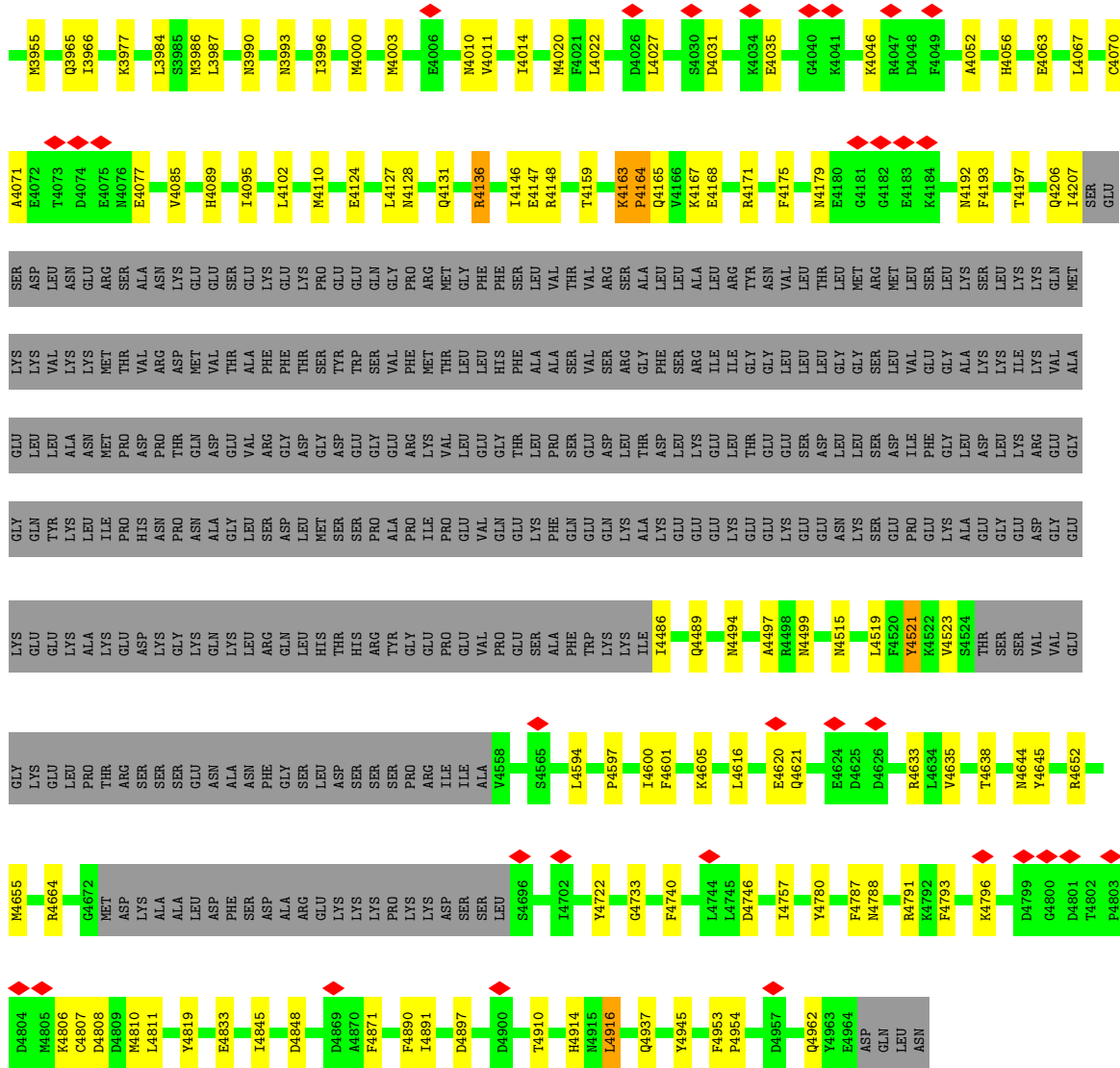




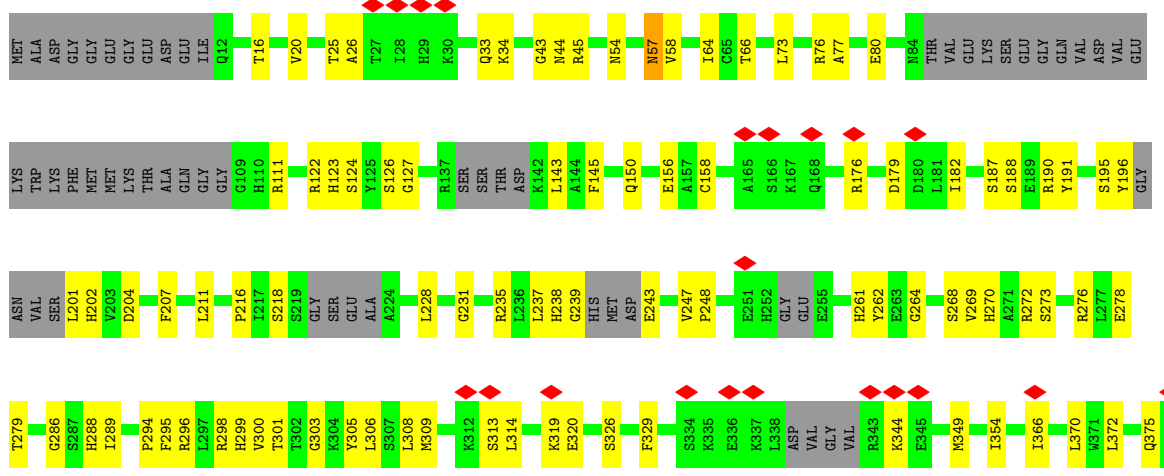


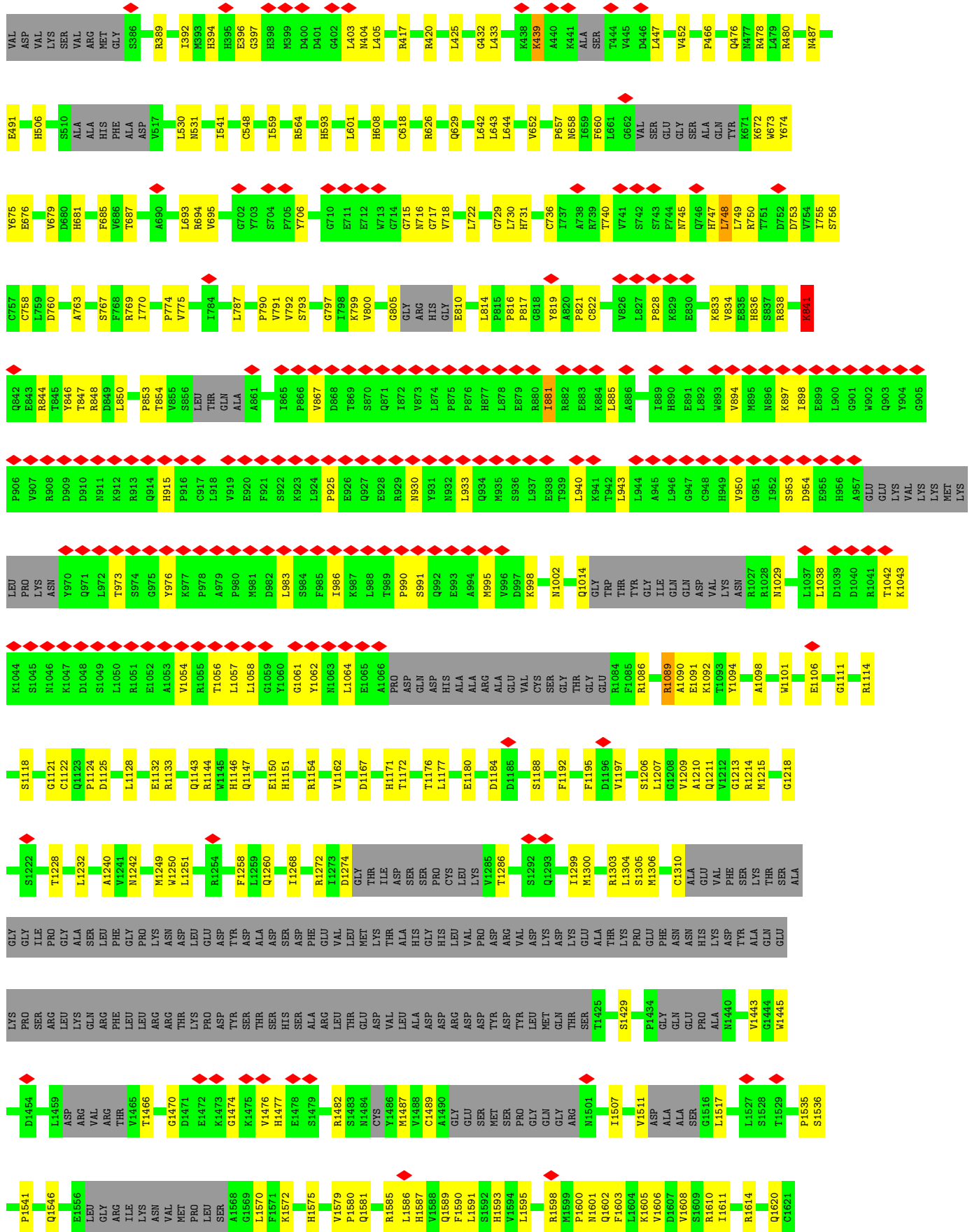






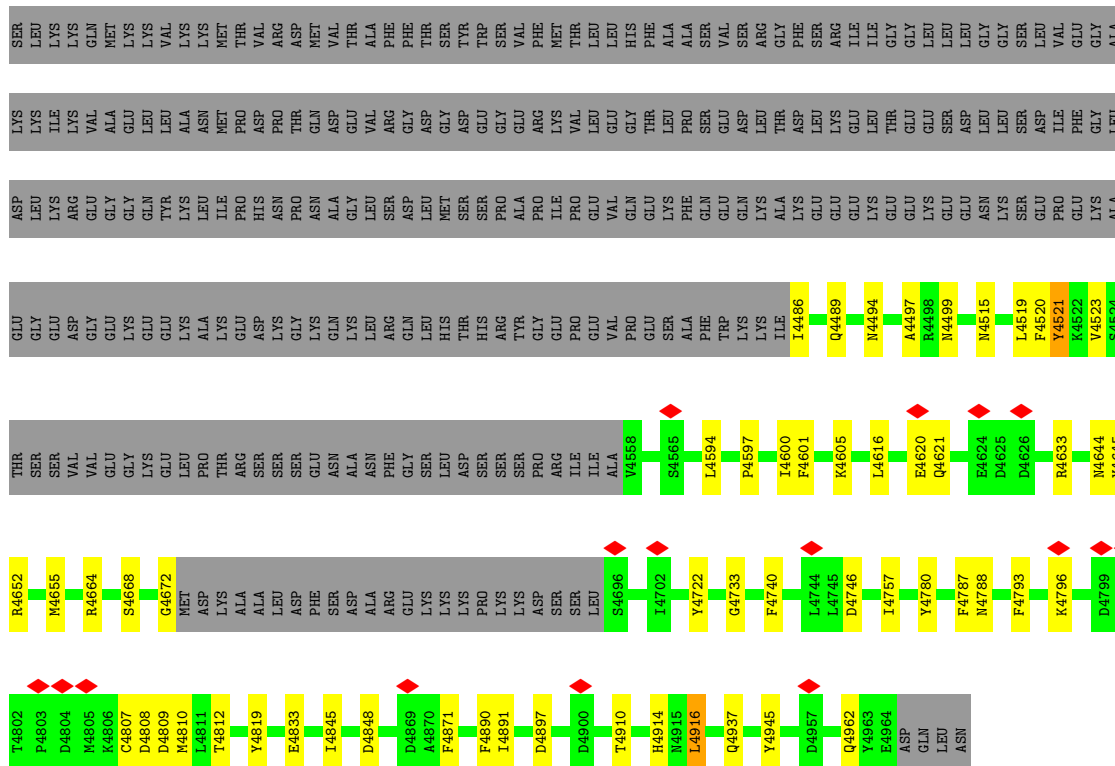
• Molecule 2: Ryr2



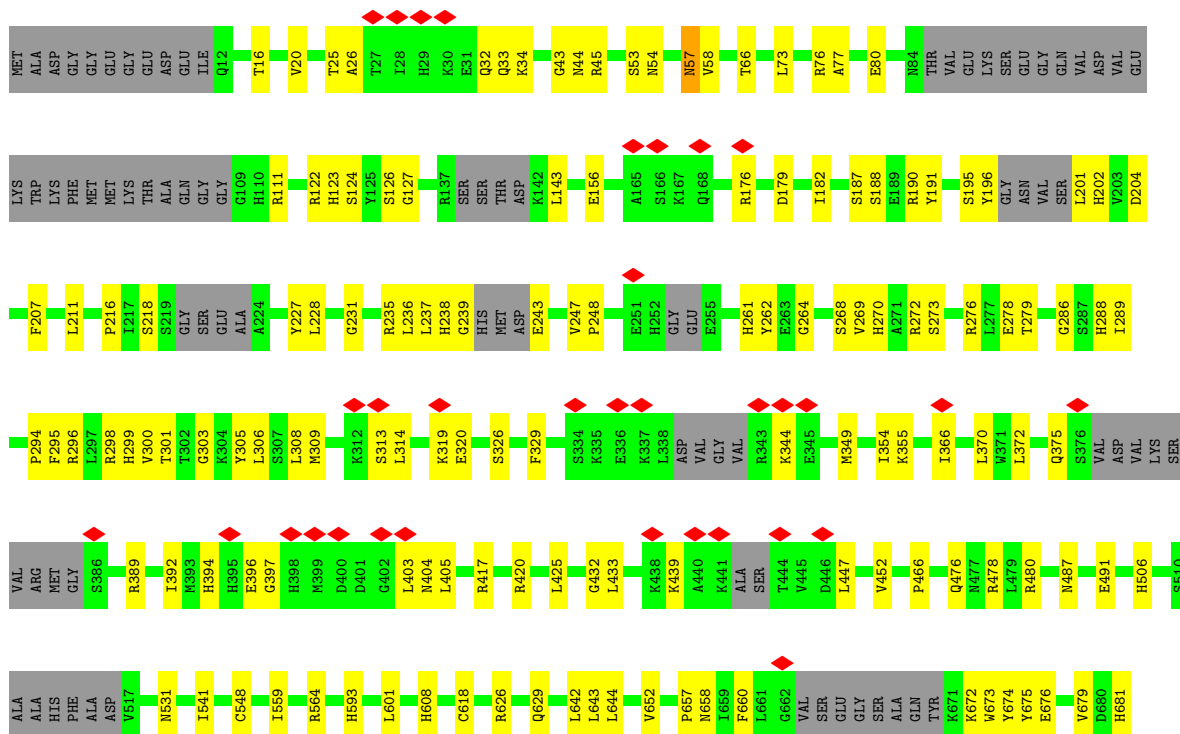


L1622	S1764	PRO	ASP	G2181	P2329	L2410	A2634	L2718	L2838	E2776	L2839	Q2898
E1623	I1755	ALA	GLY	GLY	E2330	A2413	A2635	E2719	H2839	S2779	H2840	I2899
Q1626	L1757	GLU	LEU	GLU	PHE	T2418	L2853	Y2720	A2840	L2780	A2841	N2900
F1627	R1758	GLU	ASP	GLU	CYS	R2419	SER	F2721	H2842	K2781	H2842	G2901
M1628	P1769	SER	GLY	SER	PRO	L2420	GLN	L2722	E2843	T2782	E2843	Y2902
M1629	R1760	GLY	ASN	LYS	ALA	R2425	ALA	L2723	A2844	M2783	A2844	A2903
M1630	M1761	LYS	LYS	GLU	LEU	S2426	LEU	K2724	H2845	L2784	H2845	V2904
H1631	M1762	GLY	ASP	ILE	ARG	L2427	GLY	Y2725	H2846	A2785	H2846	S2905
F1632	F1763	ASP	L2024	THR	GLU	L2433	L2521	L2521	E2847	A2786	E2847	R2906
P1633	P1763	LYS	L2024	PHE	GLU	L2433	L2526	L2526	G2787	G2787	E2847	G2907
E1634	I1771	PRO	R2029	P2191	GLY	V2436	L2529	L2529	W2788	G2788	E2847	PHE
M1772	M1772	LYS	S2032	N2196	ASN	Y2436	T2537	T2537	W2788	G2788	E2847	LYS
D1640	N1773	GLU	S2032	N2199	G2343	V2436	THR	L2539	R2789	R2789	E2847	ASP
I1641	E1781	GLU	Y2039	R2199	E2349	L2439	ARG	L2539	L2790	L2790	E2847	LYS
L1642	E1781	LEU	Y2039	N2211	E2349	A2440	CYS	ARG	L2790	L2790	E2847	LEU
E1643	R1807	LYS	LEU	Q2212	L2352	F2441	ALA	ALA	E2791	E2791	E2847	GLU
L1644	D1808	LYS	LYS	K2213	K2353	Q2442	PRO	PRO	R2792	R2792	E2847	LEU
L1651	P1809	LYS	LYS	K2353	L2354	MET	LEU	LEU	T2793	T2793	E2847	ASP
H1656	M1836	GLN	GLN	L2241	ALA	A2537	PHE	PHE	R2794	R2794	E2847	THR
L1667	L1839	ALA	ALA	N2262	GLU	A2537	ARG	ARG	A2854	A2854	E2847	PRO
G1668	L1839	SER	GLU	F2262	ASP	THR	TYR	TYR	K2855	K2855	E2847	SER
M1669	L1843	SER	LEU	L2254	SER	ALA	LEU	LEU	K2856	K2856	E2847	ILE
L1676	I1846	THR	GLU	L2275	ARG	PRO	ARG	ARG	K2857	K2857	E2847	GLU
Y1680	E1847	ALA	ASP	GLN	GLY	THR	ILE	ILE	K2858	K2858	E2847	LYS
P1683	P1847	ARG	SER	CYS	SER	VAL	VAL	VAL	K2859	K2859	E2847	ARG
L1686	S1849	LYS	LYS	GLN	THR	GLU	A2565	A2565	K2860	K2860	E2847	ALA
Y1687	VAL	LYS	LYS	MET	THR	PRO	ASP	ASP	L2861	L2861	E2847	TYR
H1688	VAL	ALA	LYS	MET	THR	GLU	ASP	ASP	L2862	L2862	E2847	ASN
I1689	ALA	SER	LYS	GLY	LYS	ALA	ALA	ALA	L2863	L2863	E2847	ARG
Y1703	PRO	GLY	PRO	GLY	LYS	GLY	GLY	GLY	L2864	L2864	E2847	THR
D1704	PRO	PRO	PRO	TYR	MET	GLY	GLY	GLY	L2865	L2865	E2847	GLN
L1705	GLU	GLN	GLN	PRO	PRO	F2461	CYS	CYS	L2866	L2866	E2847	ILE
H1710	GLU	GLU	GLU	ASP	ASP	C2462	GLY	GLY	L2867	L2867	E2847	GLY
L1711	GLU	ILE	ILE	THR	THR	D2464	THR	THR	L2868	L2868	E2847	GLN
Y1714	ASP	ASN	ASN	L2088	GLY	H2465	LEU	LEU	L2869	L2869	E2847	VAL
I1726	THR	MET	MET	L2088	GLU	K2466	GLY	GLY	L2870	L2870	E2847	ASP
T1733	CYS	ASP	ASP	V2114	ASP	Y2477	HIS	HIS	L2871	L2871	E2847	ALA
K1734	ALA	ASP	ASP	E2116	ASP	GLY	ALA	ALA	L2872	L2872	E2847	GLY
L1738	SER	LYS	LYS	D2116	THR	ILE	R2605	R2605	L2873	L2873	E2847	THR
F1739	SER	GLY	GLY	T2117	ILE	GLU	T2612	T2612	L2874	L2874	E2847	THR
P1740	ASP	ASP	ASP	V2133	HIS	Y2481	Y2615	Y2615	L2875	L2875	E2847	GLY
L1748	ARG	ARG	ARG	E2138	MET	L2488	G2627	G2627	L2876	L2876	E2847	GLY
G1752	LEU	LEU	LEU	N2153	G2386	L2489	TRP	TRP	L2877	L2877	E2847	GLY
L1753	GLU	GLU	GLU	K2154	R2402	VAL	GLY	GLY	L2878	L2878	E2847	ASP
				V2155	E2406	L2503	ASN	ASN	L2879	L2879	E2847	ASP
						R2327	PHE	PHE	L2880	L2880	E2847	GLY
						R2328	GLY	GLY	L2881	L2881	E2847	THR
							ALA	ALA	L2882	L2882	E2847	
									L2883	L2883	E2847	
									L2884	L2884	E2847	
									L2885	L2885	E2847	
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									L2895	L2895	E2847	
									L2896	L2896	E2847	
									L2897	L2897	E2847	

T4197	LEU	
Q4206	LEU	
I4207	SER	
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H4056	SER	
E4063	ASP	
L4067	LEU	
C4070	ASN	
E4072	ARG	
A4071	ALA	
T4073	ASN	
D4074	LYS	
E4075	GLU	
M4076	SER	
E4077	GLU	
L4085	LYS	
S3985	GLU	
M3986	LYS	
L3987	PRO	
H4089	PRO	
T4095	GLU	
L4102	GLN	
M4110	PRO	
E4124	ARG	
M4128	MET	
E4136	PHE	
T4146	PHE	
E4147	SER	
R4148	LEU	
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K4163	LEU	
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Q4165	LEU	
V4166	ARG	
K4167	TYR	
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C3801	ASN	
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V3803	PHE	
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L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	
D3734	ASP	
R3735	THR	
A3747	SER	
S3748	ASP	
Q3799	GLU	
S3800	ASN	
C3801	ASN	
S3802	SER	
V3803	PHE	
L3804	GLN	
D3805	VAL	
L3806	VAL	
M3807	ASP	
A3808	THR	
F3809	ARG	
Q3812	LYS	
M3820	VAL	
V3829	THR	
V3830	GLU	
L3831	GLY	
Q3832	GLY	
D3833	SER	
L3844	GLY	
L3880	GLY	
R3881	GLY	
S3885	ASP	
I3886	GLU	
M3891	ASP	
E3901	ASP	
Q3902	GLY	
G3903	GLY	
Q3904	GLU	
R3905	GLU	
M3906	VAL	
M3919	LYS	
T3920	LEU	
L3921	LEU	
T3922	PRO	
A3602	ASN	
R3605	THR	
H3606	GLU	



• Molecule 2: Ryr2

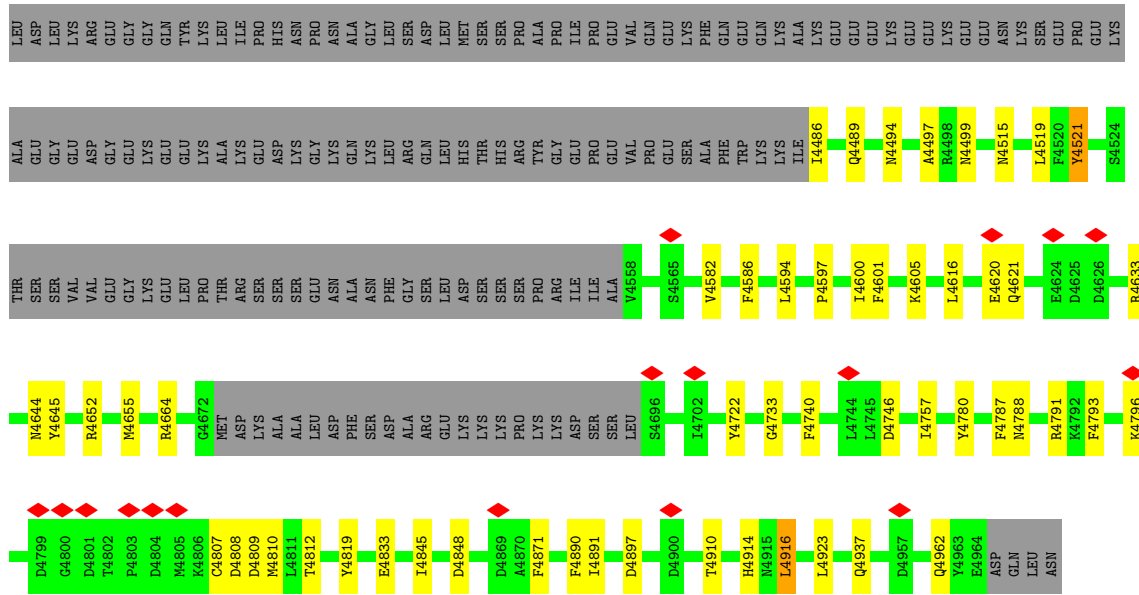




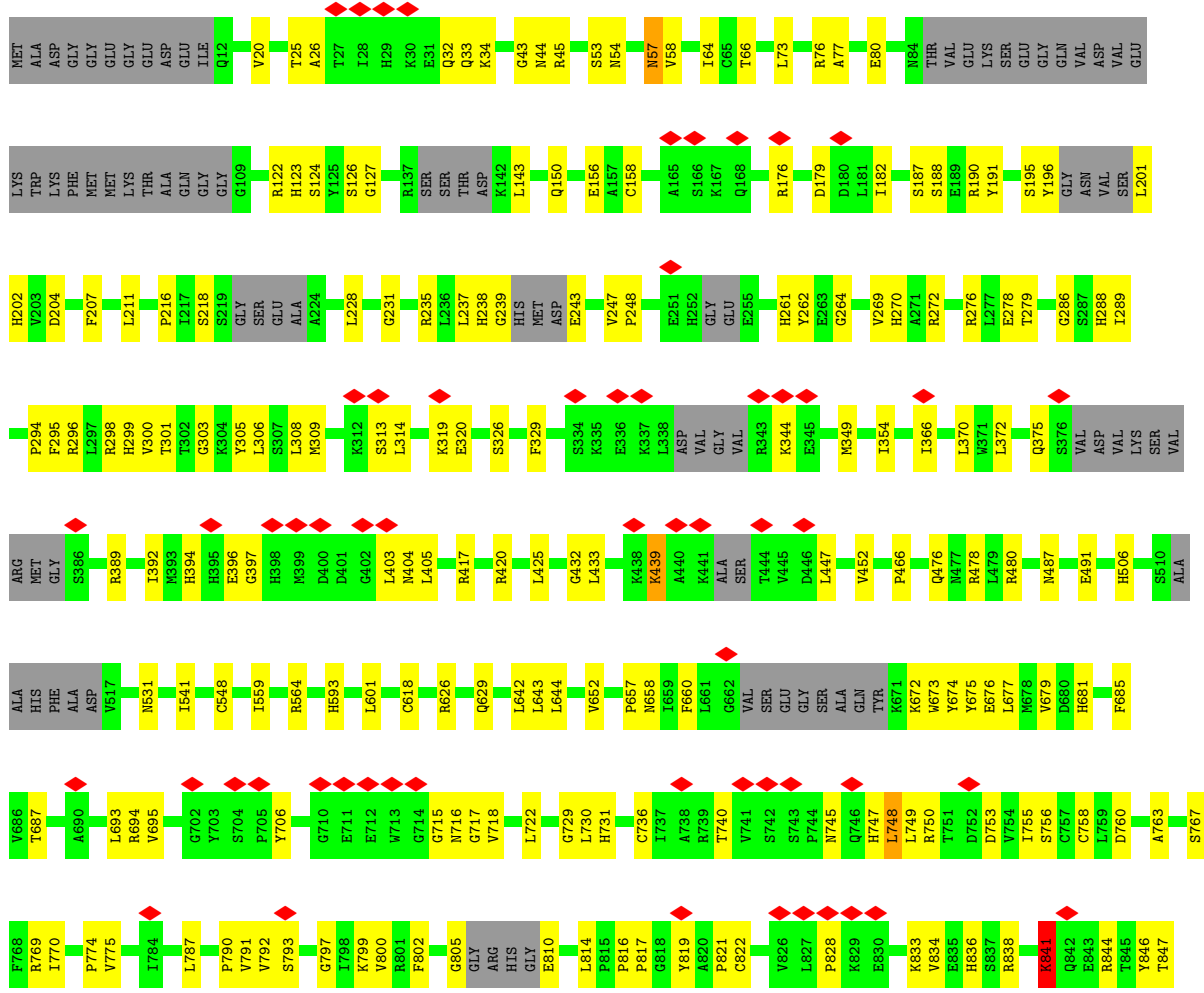








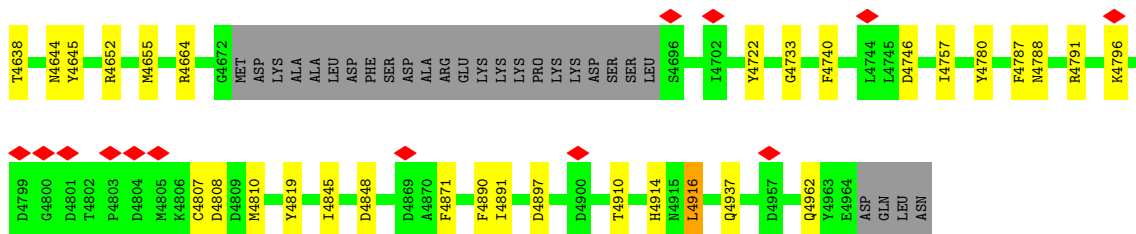
• Molecule 2: Ryr2



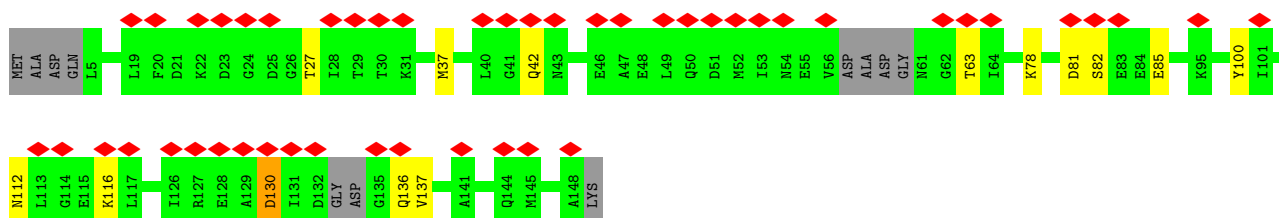
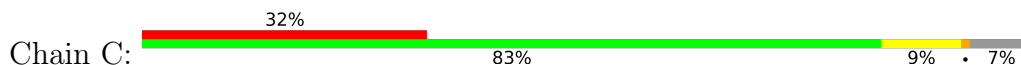




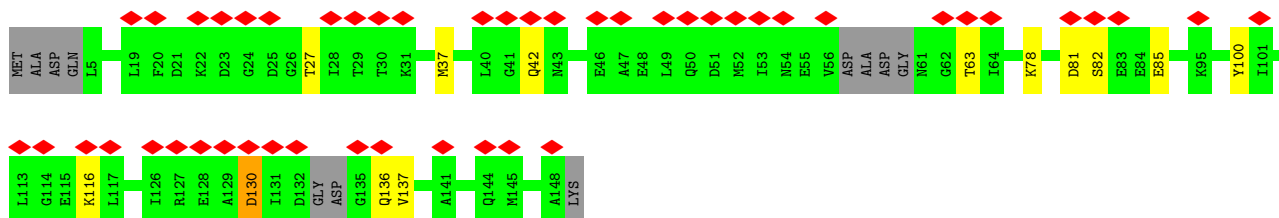
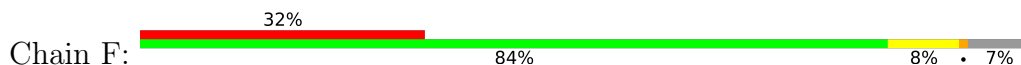




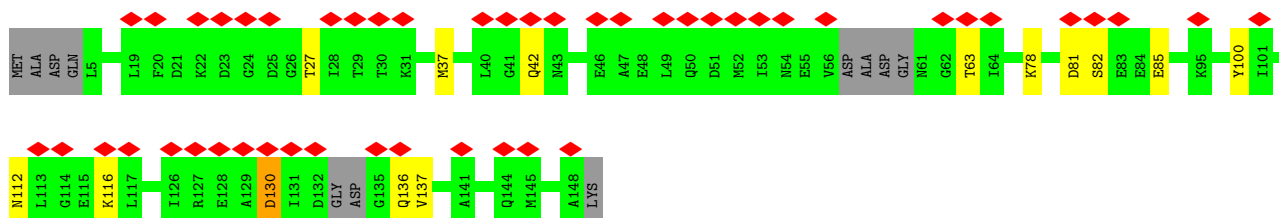
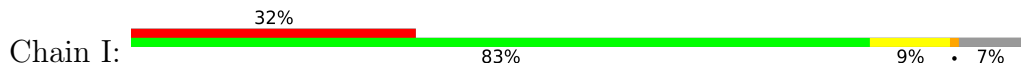
• Molecule 3: Calmodulin-1



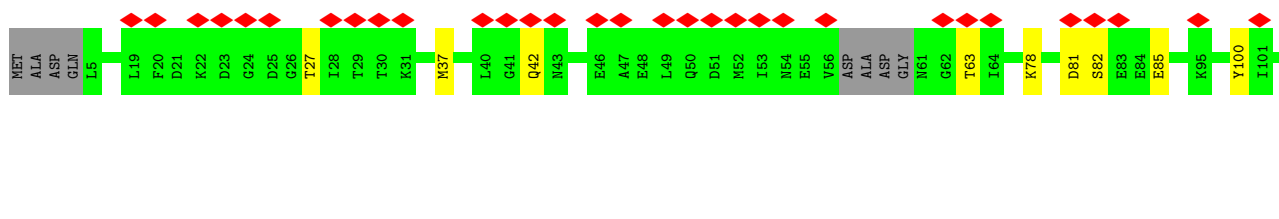
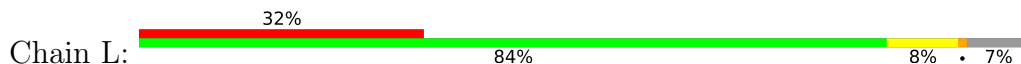
• Molecule 3: Calmodulin-1



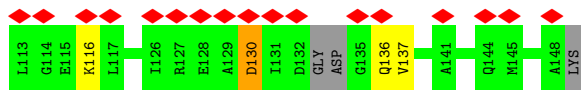
• Molecule 3: Calmodulin-1



• Molecule 3: Calmodulin-1







## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	69556	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)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.096	Depositor
Minimum map value	-0.036	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.022	Depositor
Map size (Å)	436.4, 436.4, 436.4	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.091, 1.091, 1.091	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, CFF, ZN, CA

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	0.38	0/835	0.56	0/1123
1	D	0.38	0/835	0.56	0/1123
1	G	0.38	0/835	0.56	0/1123
1	J	0.38	0/835	0.56	0/1123
2	B	0.41	0/27315	0.61	2/36936 (0.0%)
2	E	0.41	0/27315	0.61	2/36936 (0.0%)
2	H	0.41	0/27315	0.61	2/36936 (0.0%)
2	K	0.41	0/27315	0.61	2/36936 (0.0%)
3	C	0.33	0/1088	0.53	0/1459
3	F	0.33	0/1088	0.53	0/1459
3	I	0.33	0/1088	0.53	0/1459
3	L	0.33	0/1088	0.53	0/1459
All	All	0.41	0/116952	0.60	8/158072 (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
2	B	0	24
2	E	0	24
2	H	0	24
2	K	0	24
All	All	0	96

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(°)
2	H	2517	LEU	CA-CB-CG	6.97	131.33	115.30
2	B	2517	LEU	CA-CB-CG	6.97	131.32	115.30
2	E	2517	LEU	CA-CB-CG	6.95	131.29	115.30
2	K	2517	LEU	CA-CB-CG	6.95	131.29	115.30
2	B	1738	LEU	CA-CB-CG	6.03	129.18	115.30

There are no chirality outliers.

5 of 96 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	685	PHE	Peptide
2	B	729	GLY	Peptide
2	B	748	LEU	Peptide
2	B	791	VAL	Peptide
2	B	816	PRO	Peptide

## 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	819	0	824	13	0
1	D	819	0	824	13	0
1	G	819	0	824	14	0
1	J	819	0	824	14	0
2	B	26813	0	25339	450	0
2	E	26813	0	25339	437	0
2	H	26813	0	25339	441	0
2	K	26813	0	25339	439	0
3	C	1078	0	1032	8	0
3	F	1078	0	1032	7	0
3	I	1078	0	1032	8	0
3	L	1078	0	1032	7	0
4	B	1	0	0	0	0
4	E	1	0	0	0	0
4	H	1	0	0	0	0
4	K	1	0	0	0	0
5	B	1	0	0	0	0
5	E	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	H	1	0	0	0	0
5	K	1	0	0	0	0
6	B	14	0	10	1	0
6	E	14	0	10	1	0
6	H	14	0	10	0	0
6	K	14	0	10	0	0
7	B	31	0	12	4	0
7	E	31	0	12	4	0
7	H	31	0	12	5	0
7	K	31	0	12	4	0
All	All	115028	0	108868	1669	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 7.

The worst 5 of 1669 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:K:1986:GLU:N	2:K:1989:CYS:HG	1.54	1.05
2:B:1986:GLU:N	2:B:1989:CYS:HG	1.54	1.05
2:H:1986:GLU:N	2:H:1989:CYS:HG	1.55	1.03
2:B:4811:LEU:HD13	2:E:4519:LEU:HD21	1.39	1.03
2:E:1986:GLU:N	2:E:1989:CYS:HG	1.56	1.02

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	105/108 (97%)	94 (90%)	11 (10%)	0	100	100
1	D	105/108 (97%)	94 (90%)	11 (10%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	105/108 (97%)	94 (90%)	11 (10%)	0	100	100
1	J	105/108 (97%)	94 (90%)	11 (10%)	0	100	100
2	B	3386/4968 (68%)	2990 (88%)	383 (11%)	13 (0%)	34	72
2	E	3386/4968 (68%)	2986 (88%)	387 (11%)	13 (0%)	34	72
2	H	3386/4968 (68%)	2989 (88%)	384 (11%)	13 (0%)	34	72
2	K	3386/4968 (68%)	2989 (88%)	384 (11%)	13 (0%)	34	72
3	C	132/149 (89%)	119 (90%)	12 (9%)	1 (1%)	19	60
3	F	132/149 (89%)	119 (90%)	12 (9%)	1 (1%)	19	60
3	I	132/149 (89%)	119 (90%)	12 (9%)	1 (1%)	19	60
3	L	132/149 (89%)	119 (90%)	12 (9%)	1 (1%)	19	60
All	All	14492/20900 (69%)	12806 (88%)	1630 (11%)	56 (0%)	38	72

5 of 56 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	1477	HIS
2	E	1477	HIS
2	H	1477	HIS
2	K	1477	HIS
2	B	1580	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	88/89 (99%)	86 (98%)	2 (2%)	50	70
1	D	88/89 (99%)	86 (98%)	2 (2%)	50	70
1	G	88/89 (99%)	86 (98%)	2 (2%)	50	70
1	J	88/89 (99%)	86 (98%)	2 (2%)	50	70
2	B	2698/4355 (62%)	2670 (99%)	28 (1%)	76	86
2	E	2698/4355 (62%)	2670 (99%)	28 (1%)	76	86

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	H	2699/4355 (62%)	2670 (99%)	29 (1%)	73	84
2	K	2699/4355 (62%)	2670 (99%)	29 (1%)	73	84
3	C	115/123 (94%)	114 (99%)	1 (1%)	78	87
3	F	115/123 (94%)	114 (99%)	1 (1%)	78	87
3	I	115/123 (94%)	114 (99%)	1 (1%)	78	87
3	L	115/123 (94%)	114 (99%)	1 (1%)	78	87
All	All	11606/18268 (64%)	11480 (99%)	126 (1%)	74	84

5 of 126 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	4499	ASN
2	K	1760	ARG
2	H	881	ILE
2	K	1089	ARG
2	K	3906	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 184 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	1656	HIS
2	K	261	HIS
2	H	2090	HIS
2	H	3965	GLN
2	K	531	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

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
7	ATP	E	6003	-	26,33,33	0.91	1 (3%)	31,52,52	1.55	4 (12%)
6	CFF	B	6002	-	8,15,15	2.74	4 (50%)	8,23,23	1.28	1 (12%)
7	ATP	K	6003	-	26,33,33	0.91	1 (3%)	31,52,52	1.55	4 (12%)
7	ATP	H	6003	-	26,33,33	0.90	1 (3%)	31,52,52	1.55	4 (12%)
6	CFF	K	6002	-	8,15,15	2.74	4 (50%)	8,23,23	1.27	1 (12%)
7	ATP	B	6003	-	26,33,33	0.91	1 (3%)	31,52,52	1.55	4 (12%)
6	CFF	H	6002	-	8,15,15	2.74	4 (50%)	8,23,23	1.28	1 (12%)
6	CFF	E	6002	-	8,15,15	2.74	4 (50%)	8,23,23	1.28	1 (12%)

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
7	ATP	E	6003	-	-	7/18/38/38	0/3/3/3
6	CFF	B	6002	-	-	-	0/2/2/2
7	ATP	K	6003	-	-	7/18/38/38	0/3/3/3
7	ATP	H	6003	-	-	7/18/38/38	0/3/3/3
6	CFF	K	6002	-	-	-	0/2/2/2
7	ATP	B	6003	-	-	7/18/38/38	0/3/3/3
6	CFF	H	6002	-	-	-	0/2/2/2
6	CFF	E	6002	-	-	-	0/2/2/2

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	6002	CFF	C5-C4	-4.92	1.32	1.39

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*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	E	6002	CFF	C5-C4	-4.91	1.32	1.39
6	H	6002	CFF	C5-C4	-4.91	1.32	1.39
6	K	6002	CFF	C5-C4	-4.91	1.32	1.39
6	E	6002	CFF	C6-N1	-4.82	1.31	1.38

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	6003	ATP	PA-O3A-PB	-3.41	121.14	132.83
7	H	6003	ATP	PA-O3A-PB	-3.41	121.14	132.83
7	E	6003	ATP	PA-O3A-PB	-3.40	121.14	132.83
7	K	6003	ATP	PA-O3A-PB	-3.40	121.16	132.83
7	B	6003	ATP	N3-C2-N1	-3.39	123.38	128.68

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	B	6003	ATP	PB-O3B-PG-O2G
7	B	6003	ATP	PB-O3B-PG-O3G
7	B	6003	ATP	C5'-O5'-PA-O1A
7	B	6003	ATP	C5'-O5'-PA-O2A
7	E	6003	ATP	PB-O3B-PG-O2G

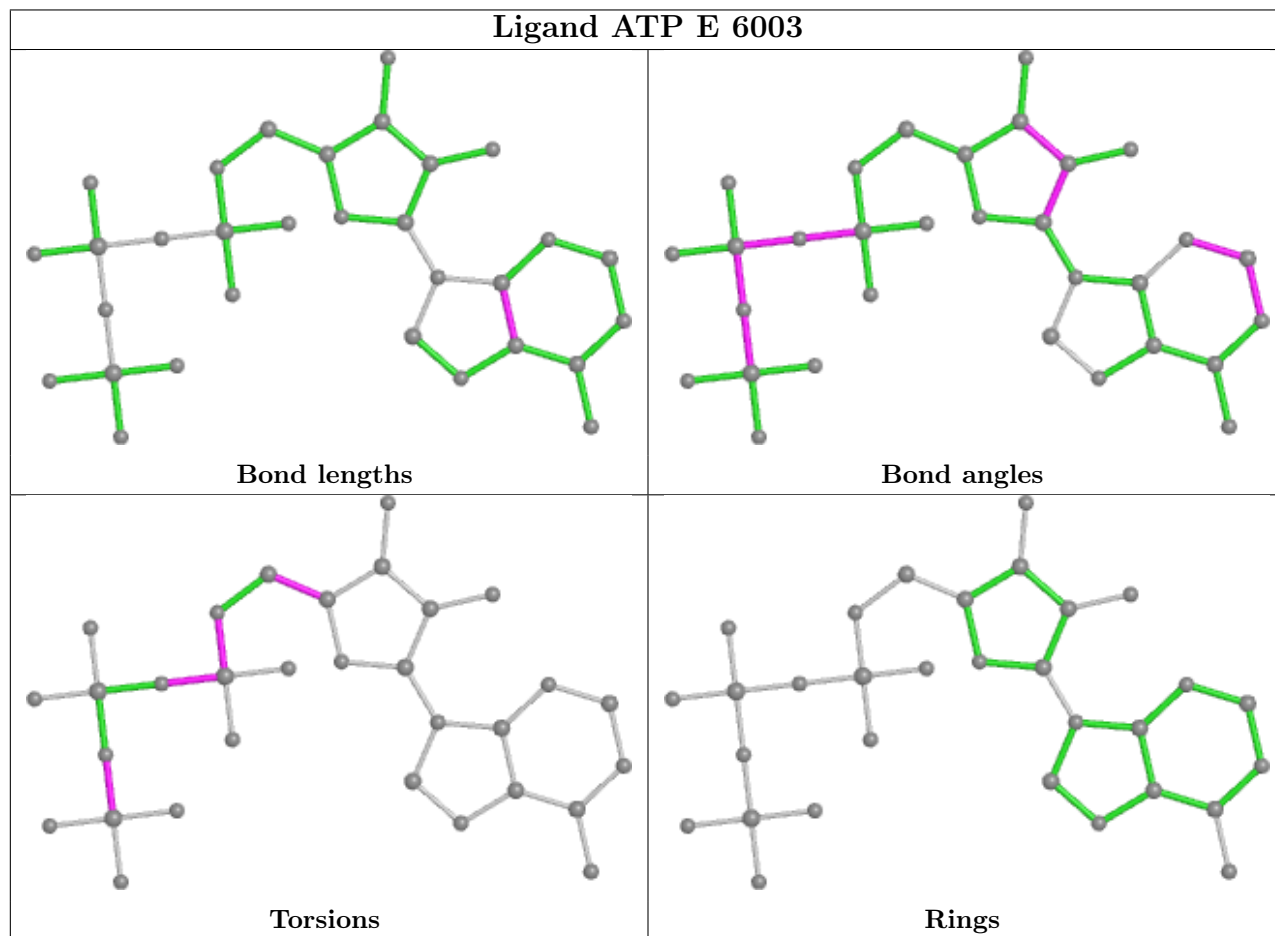
There are no ring outliers.

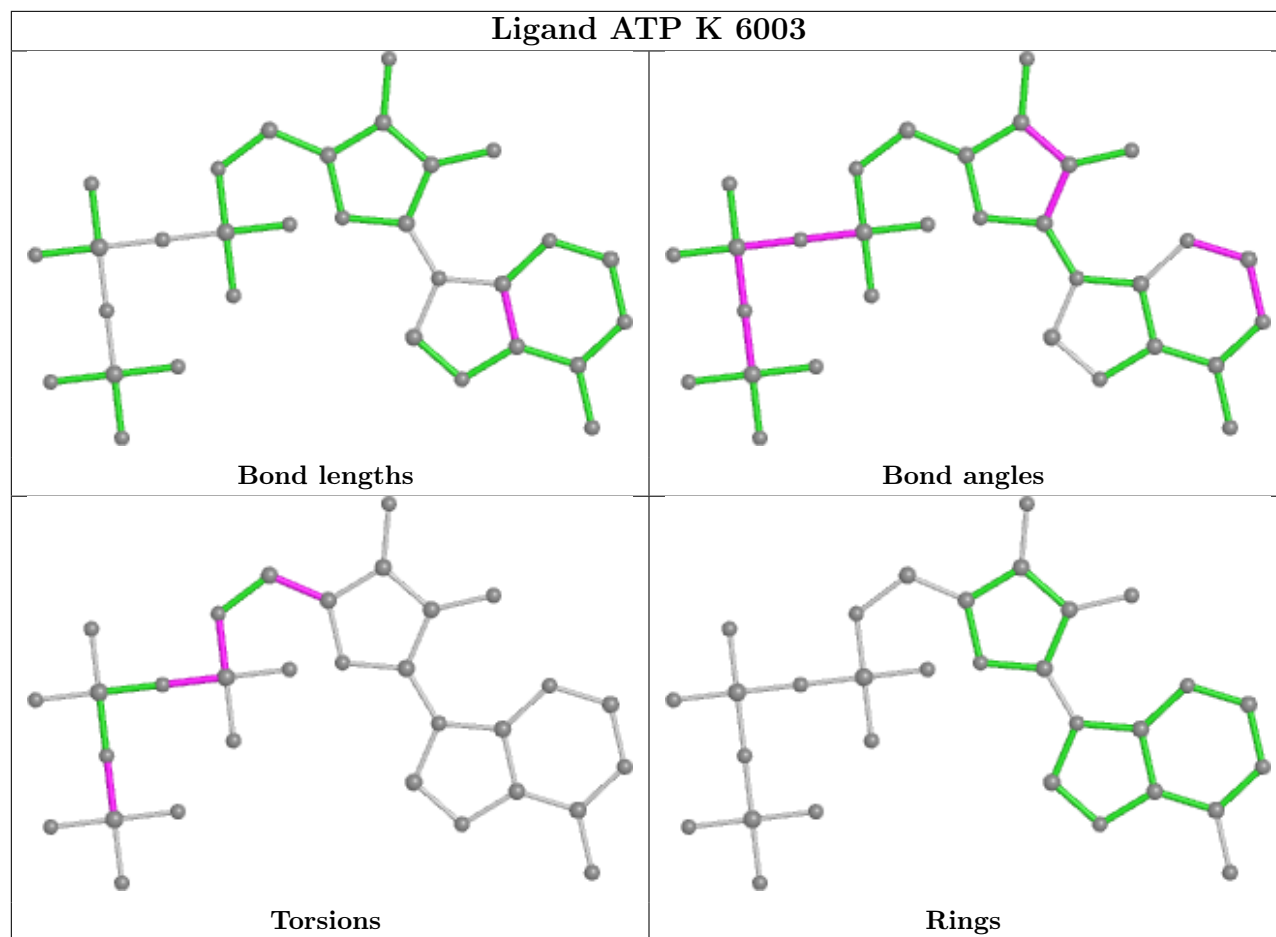
6 monomers are involved in 19 short contacts:

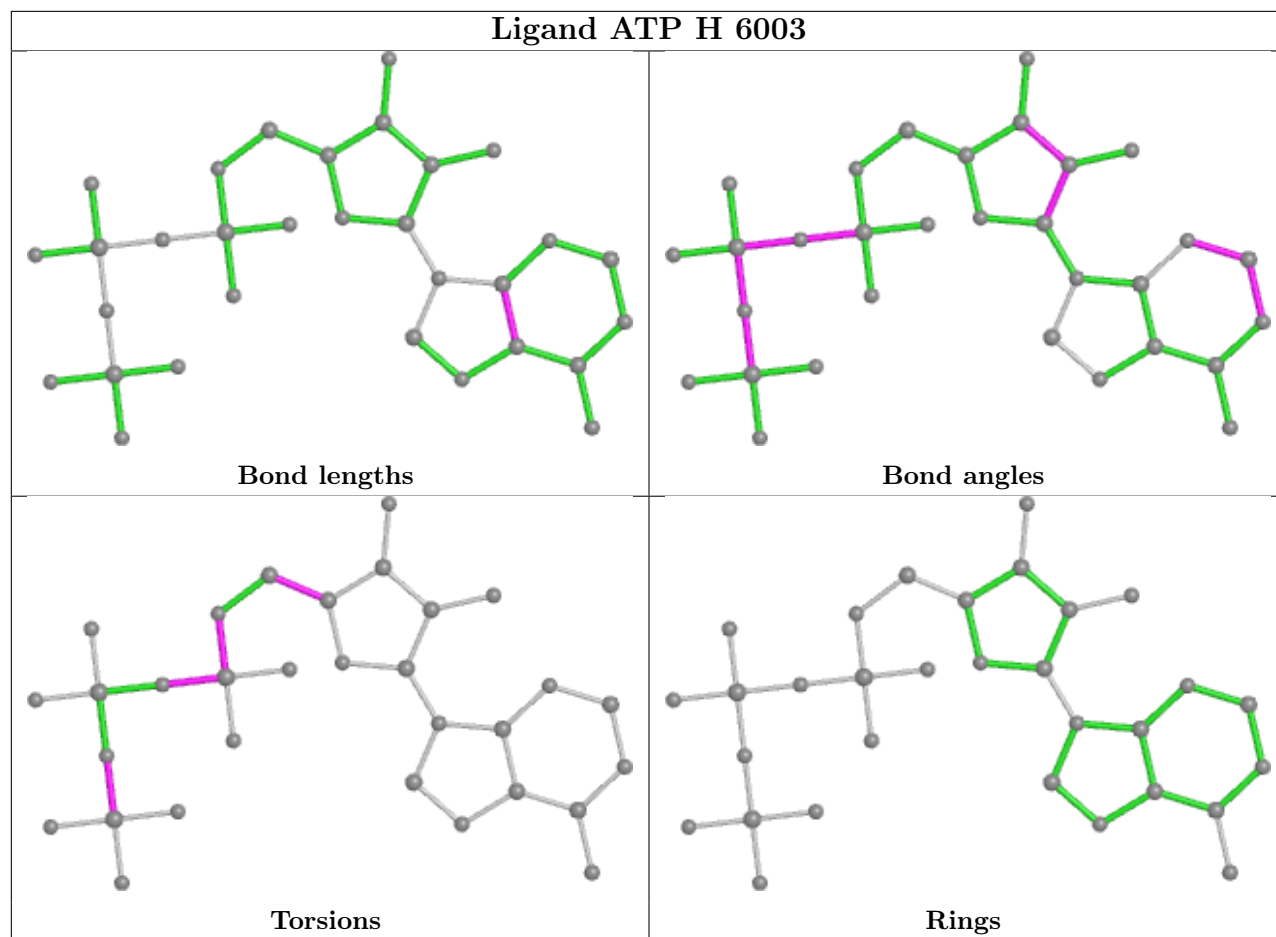
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	E	6003	ATP	4	0
6	B	6002	CFF	1	0
7	K	6003	ATP	4	0
7	H	6003	ATP	5	0
7	B	6003	ATP	4	0
6	E	6002	CFF	1	0

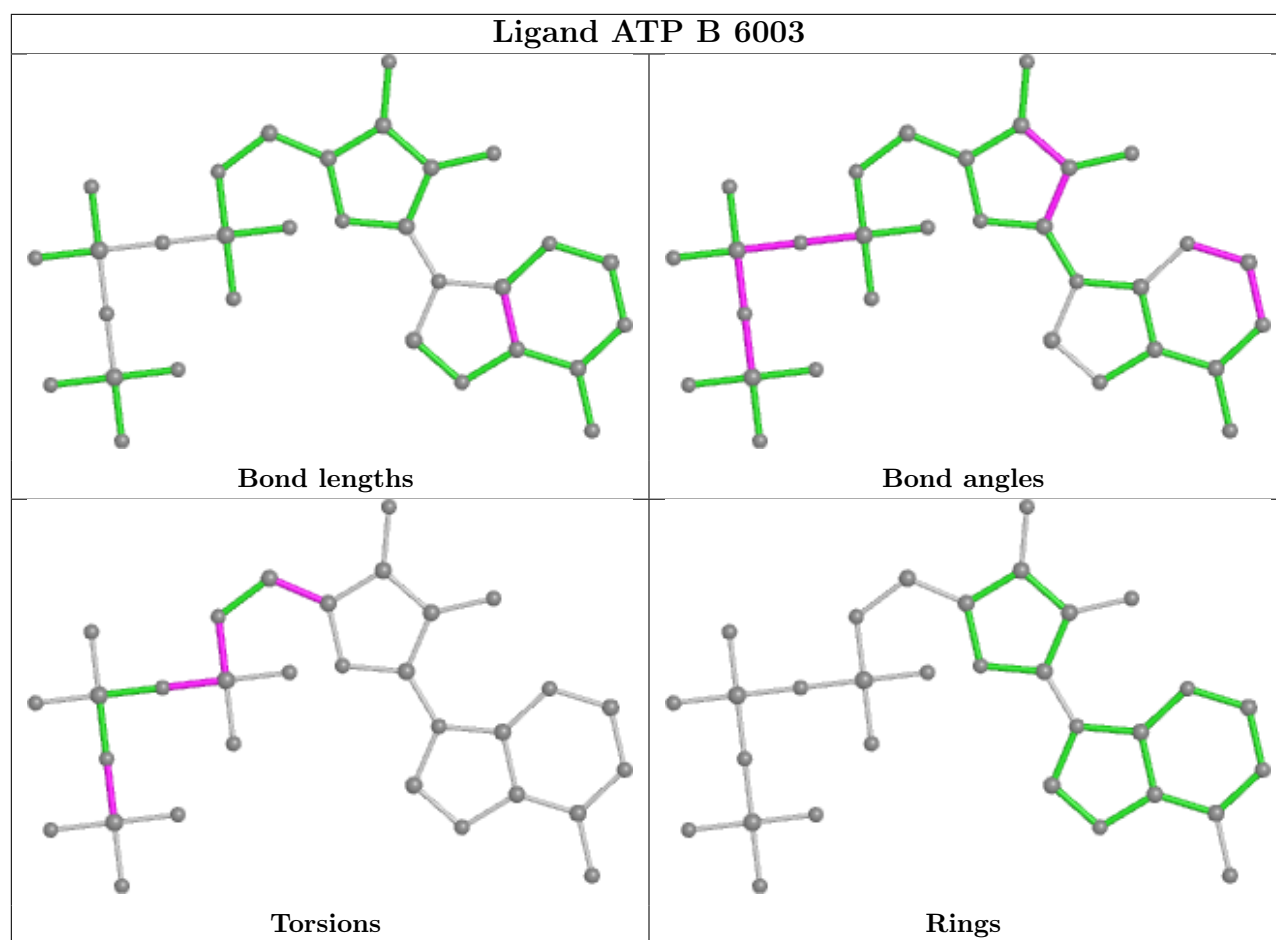
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

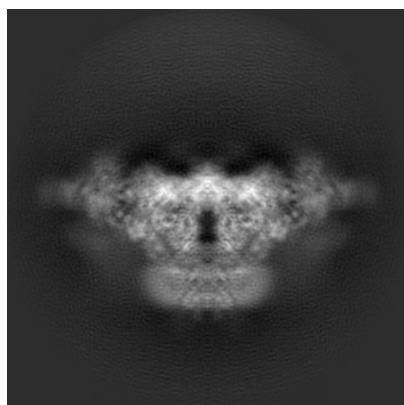
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-9834. These allow visual inspection of the internal detail of the map and identification of artifacts.

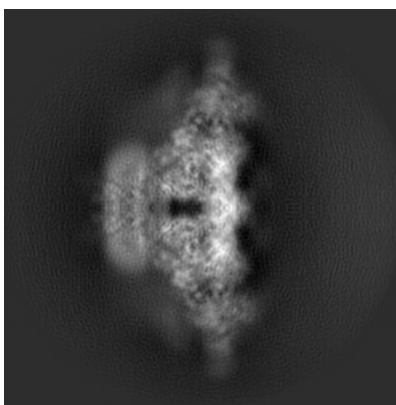
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

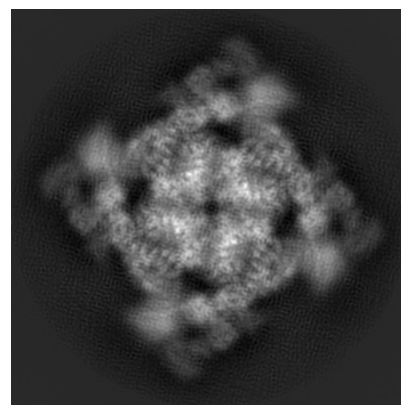
#### 6.1.1 Primary map



X



Y

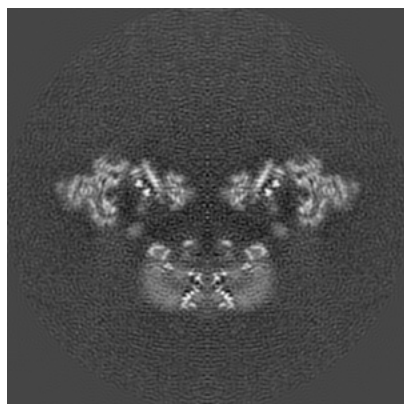


Z

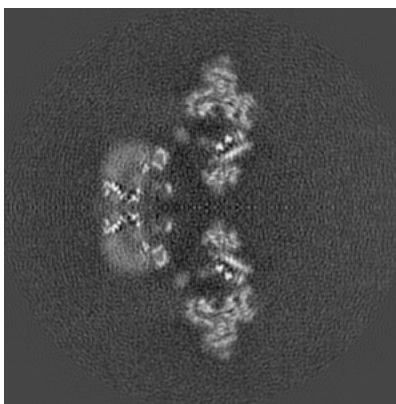
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

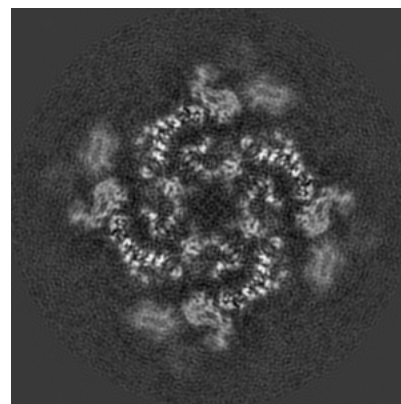
#### 6.2.1 Primary map



X Index: 200



Y Index: 200

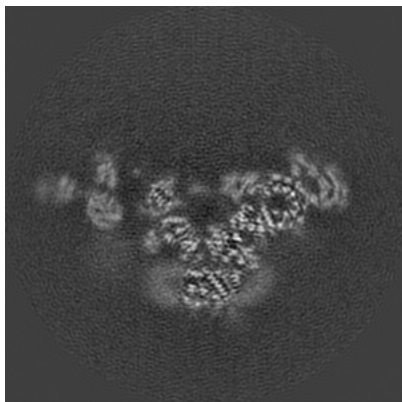


Z Index: 200

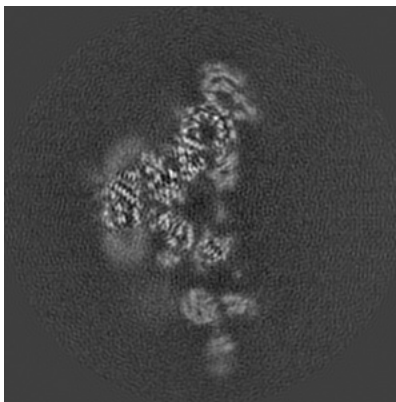
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [\(i\)](#)

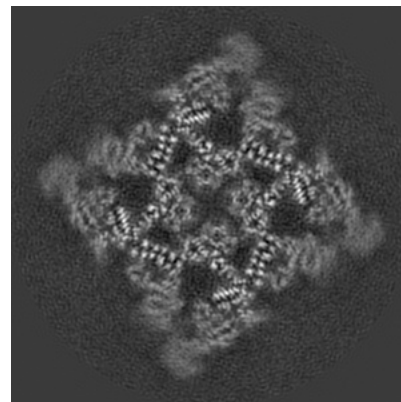
### 6.3.1 Primary map



X Index: 185



Y Index: 215

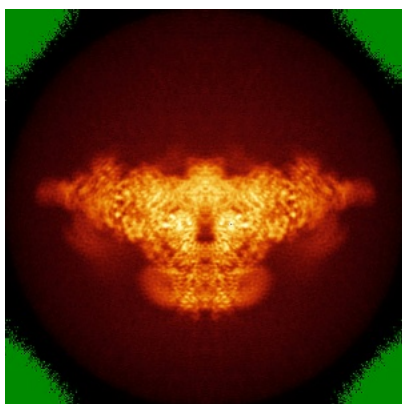


Z Index: 212

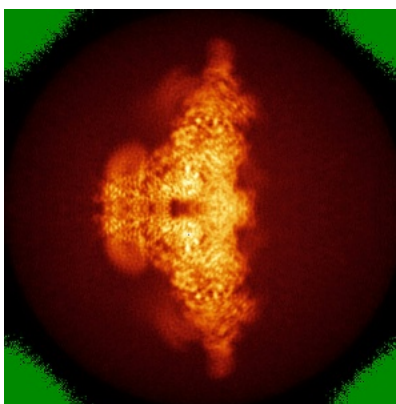
The images above show the largest variance slices of the map in three orthogonal directions.

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

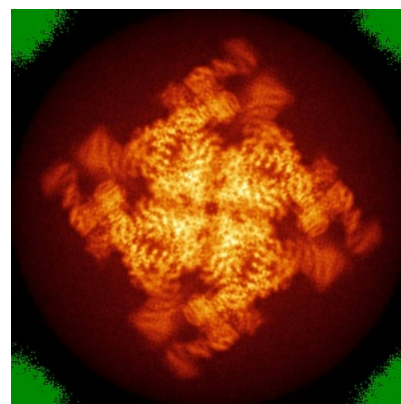
### 6.4.1 Primary map



X



Y

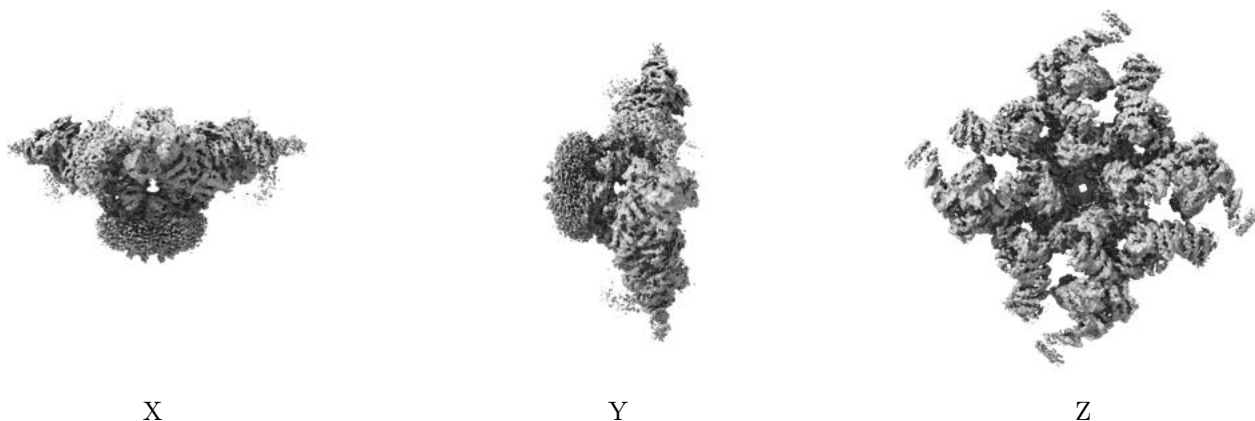


Z

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 0.022. 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](#)

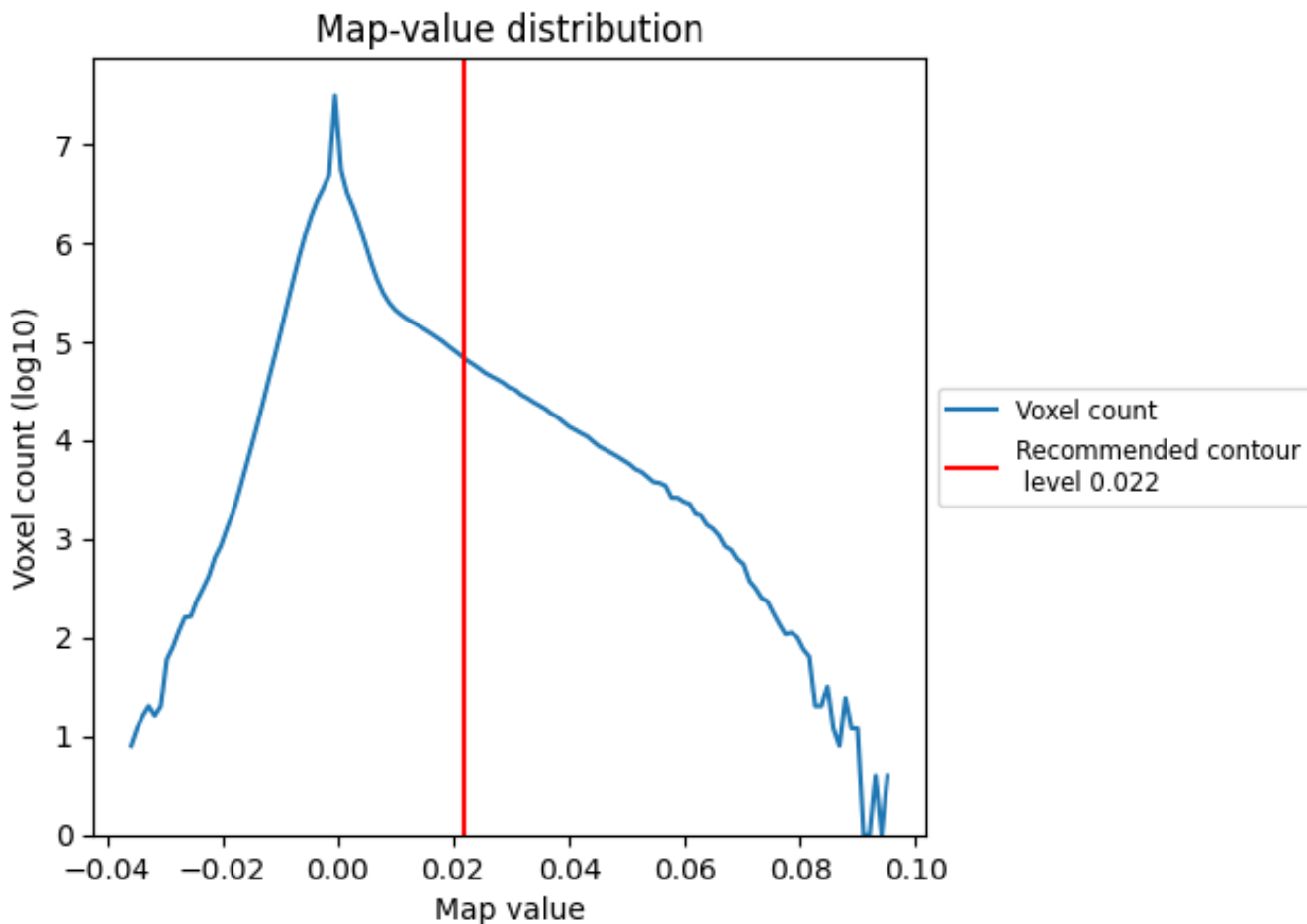
This section was not generated. No masks/segmentation were deposited.



## 7 Map analysis [i](#)

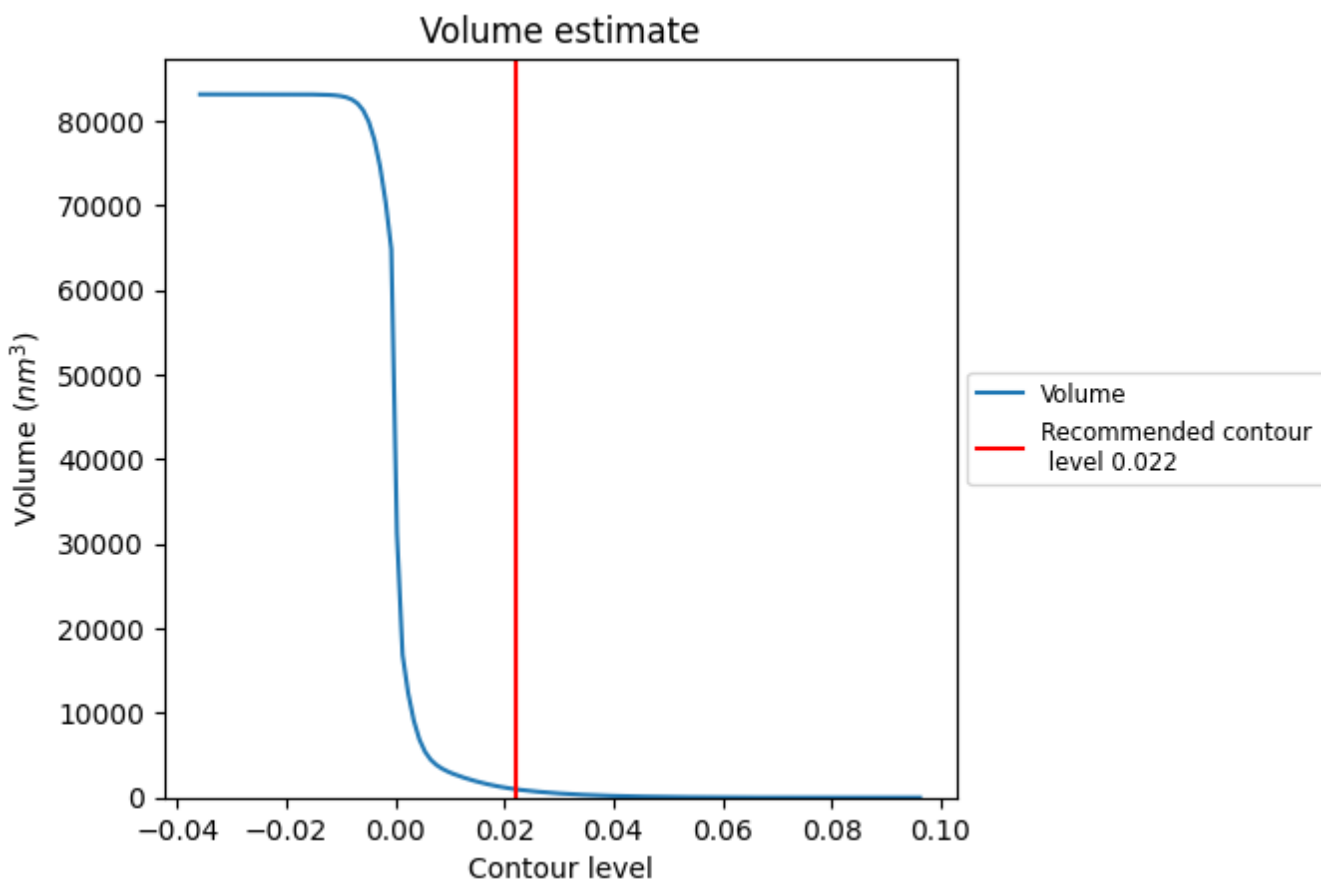
This section contains the results of statistical analysis of the map.

### 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.

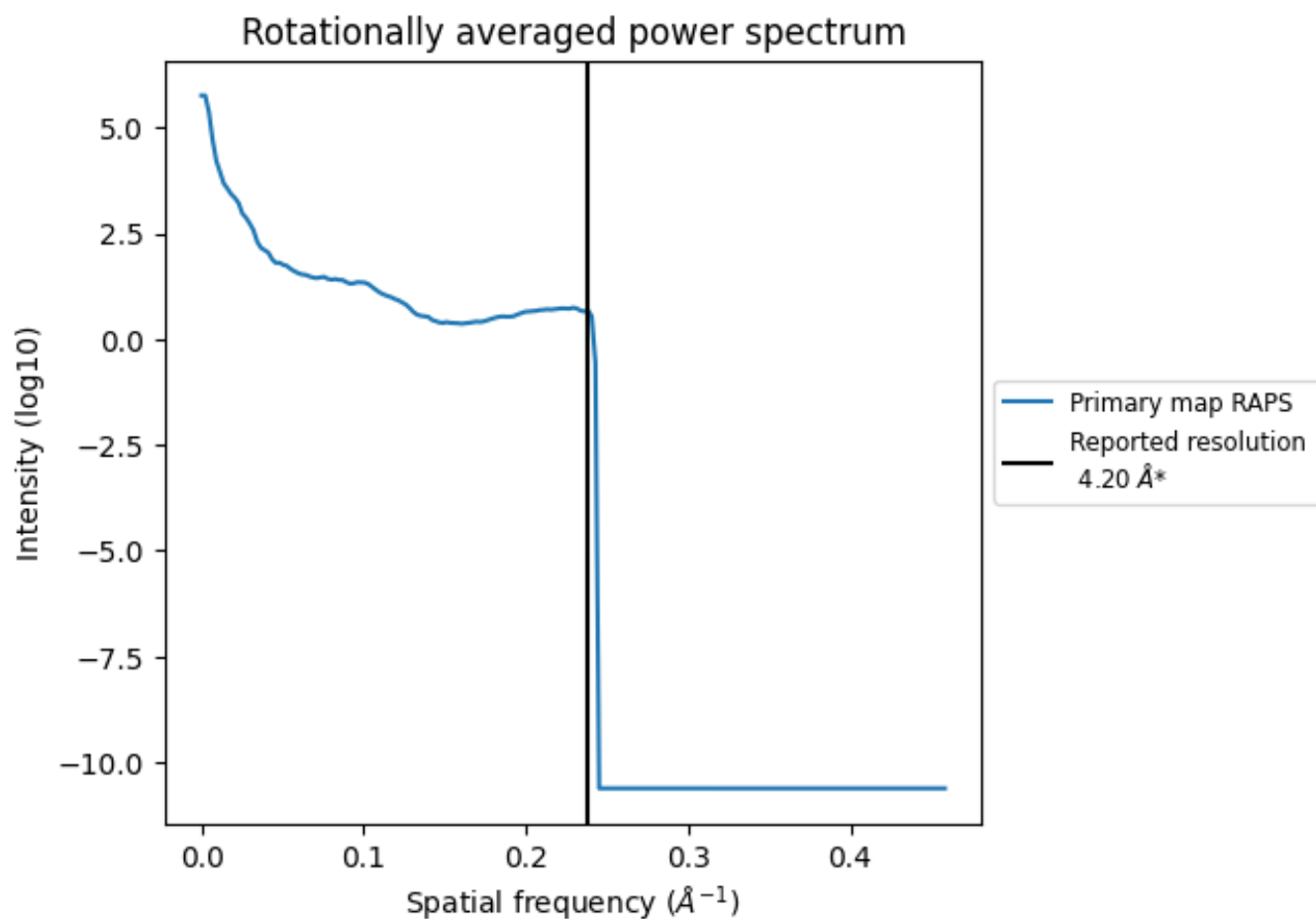
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 992 nm<sup>3</sup>; this corresponds to an approximate mass of 896 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](#)

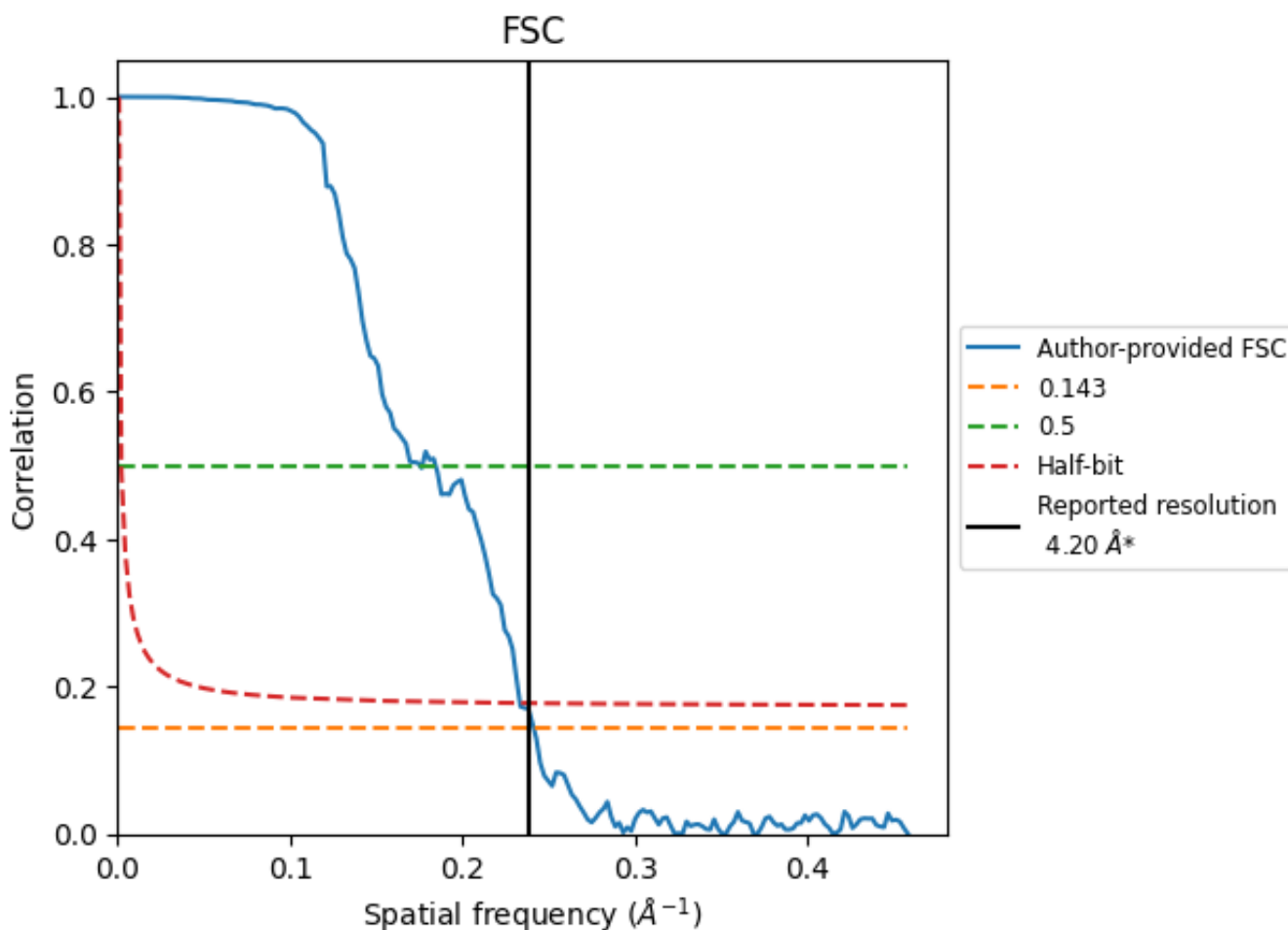


\*Reported resolution corresponds to spatial frequency of 0.238 Å<sup>-1</sup>

## 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 0.238 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

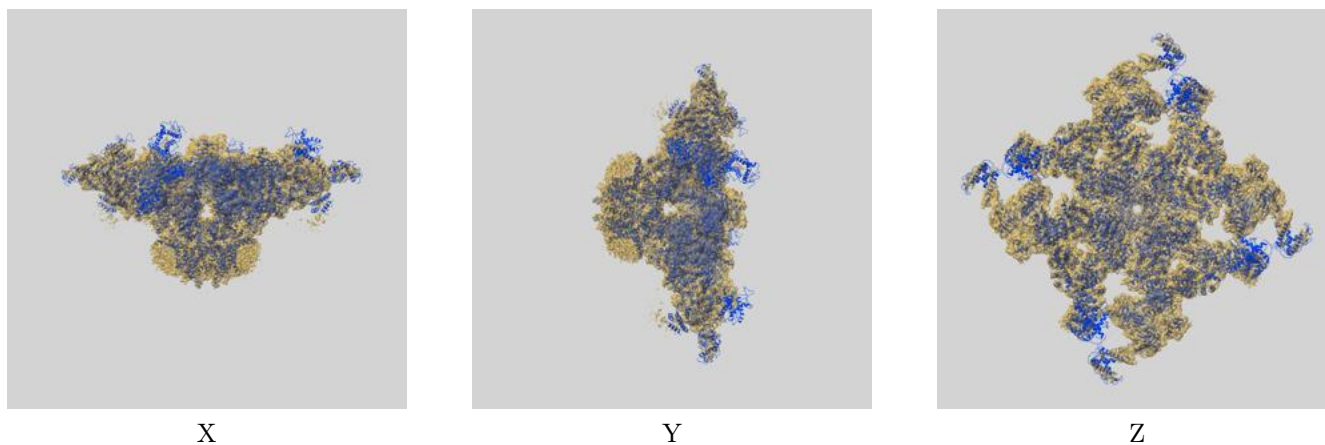
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.20	-	-
Author-provided FSC curve	4.14	5.71	4.28
Unmasked-calculated*	-	-	-

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

## 9 Map-model fit [i](#)

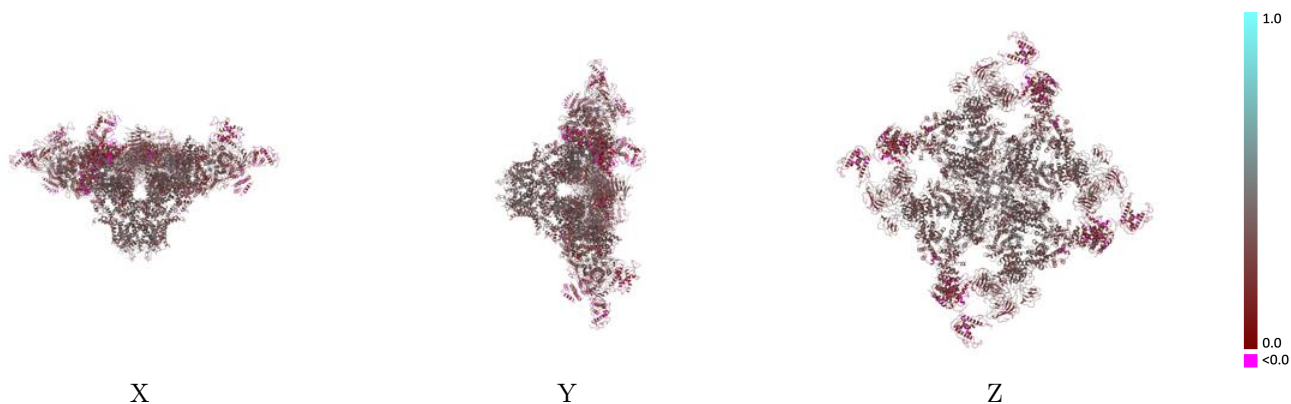
This section contains information regarding the fit between EMDB map EMD-9834 and PDB model 6JII. Per-residue inclusion information can be found in section [3](#) on page [8](#).

### 9.1 Map-model overlay [i](#)



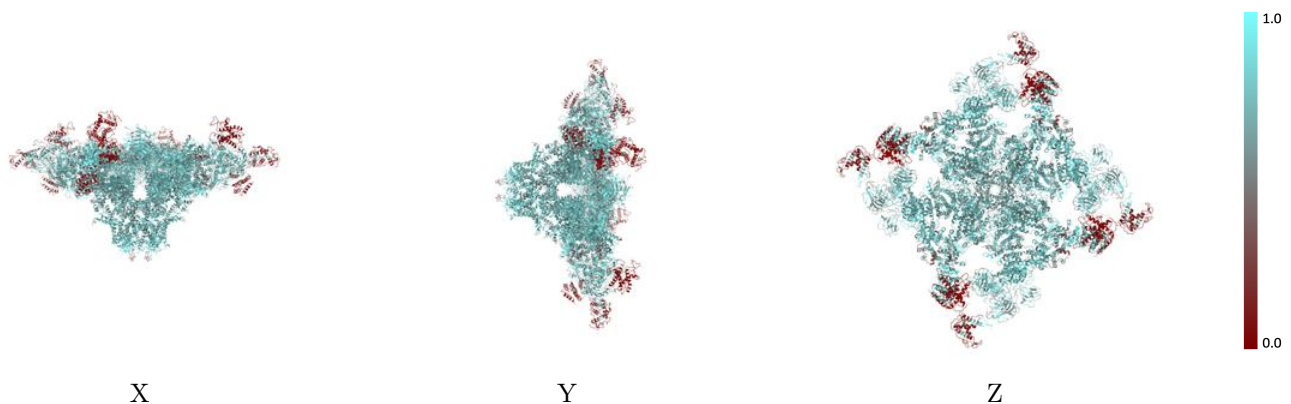
The images above show the 3D surface view of the map at the recommended contour level 0.022 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



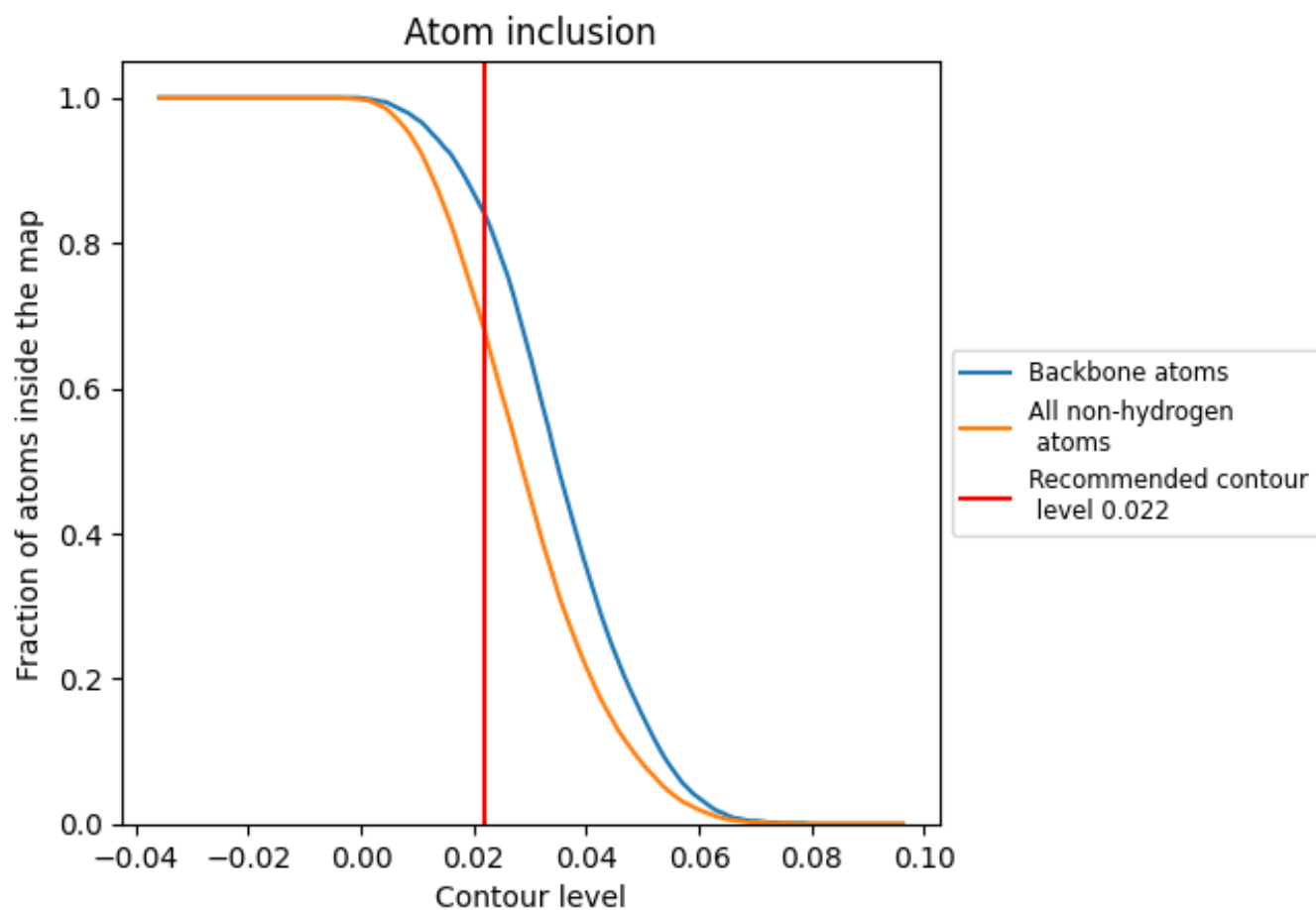
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.022).

## 9.4 Atom inclusion [i](#)





























At the recommended contour level, 84% of all backbone atoms, 68% 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 (0.022) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6770	 0.3190
A	 0.7090	 0.3340
B	 0.6840	 0.3210
C	 0.4910	 0.2490
D	 0.7100	 0.3380
E	 0.6840	 0.3220
F	 0.4910	 0.2470
G	 0.7110	 0.3370
H	 0.6840	 0.3220
I	 0.4910	 0.2480
J	 0.7100	 0.3360
K	 0.6840	 0.3210
L	 0.4910	 0.2490

