



wwPDB EM Validation Summary Report ⓘ

Mar 19, 2024 – 11:35 PM JST

PDB ID : 6JRR
EMDB ID : EMD-9879
Title : Structure of RyR2 (*F/A/C/L-Ca²⁺ dataset)
Authors : Gong, D.S.; Chi, X.M.; Zhou, G.W.; Huang, G.X.Y.; Lei, J.L.; Yan, N.
Deposited on : 2019-04-05
Resolution : 3.90 Å(reported)

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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:

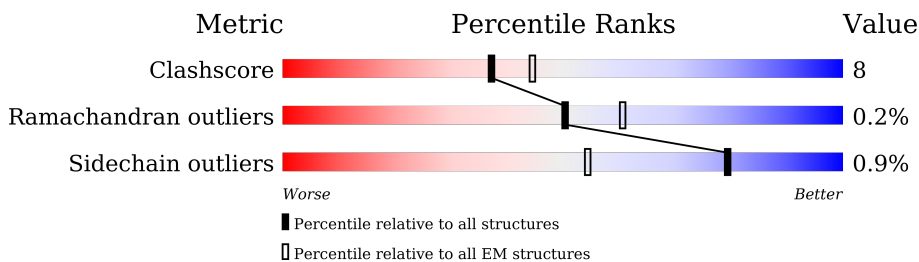
EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (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	4968	
1	C	4968	
1	E	4968	
1	G	4968	
2	B	108	
2	D	108	
2	F	108	
2	H	108	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 109132 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 RyR2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	3460	26417	16833	4528	4900	156	0	0
1	C	3460	26417	16833	4528	4900	156	0	0
1	E	3460	26417	16833	4528	4900	156	0	0
1	G	3460	26417	16833	4528	4900	156	0	0

- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	107	819	516	144	155	4	0	0
2	D	107	819	516	144	155	4	0	0
2	F	107	819	516	144	155	4	0	0
2	H	107	819	516	144	155	4	0	0

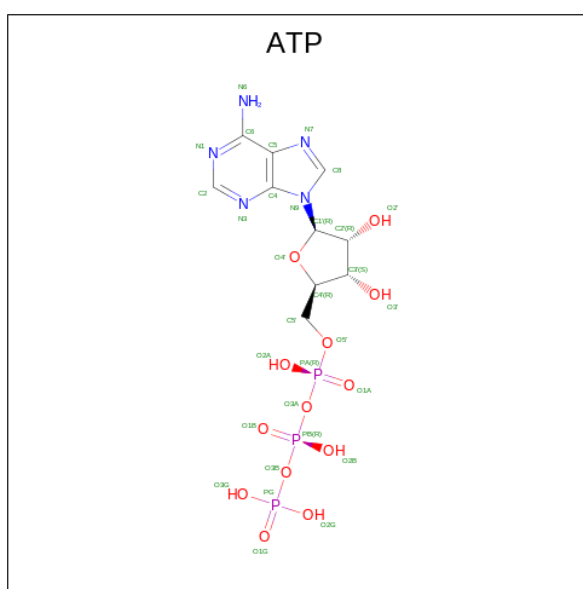
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
3	A	1	Total	Zn	0
			1	1	
3	C	1	Total	Zn	0
			1	1	
3	E	1	Total	Zn	0
			1	1	
3	G	1	Total	Zn	0
			1	1	

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

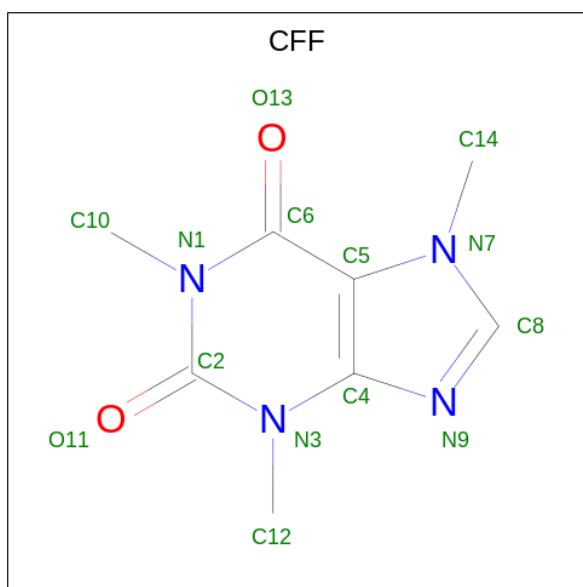
Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Ca	0
			1	1	
4	C	1	Total	Ca	0
			1	1	
4	E	1	Total	Ca	0
			1	1	
4	G	1	Total	Ca	0
			1	1	

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



Mol	Chain	Residues	Atoms					AltConf
5	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
5	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
5	E	1	Total	C	N	O	P	0
			31	10	5	13	3	
5	G	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 6 is CAFFEINE (three-letter code: CFF) (formula: $C_8H_{10}N_4O_2$).

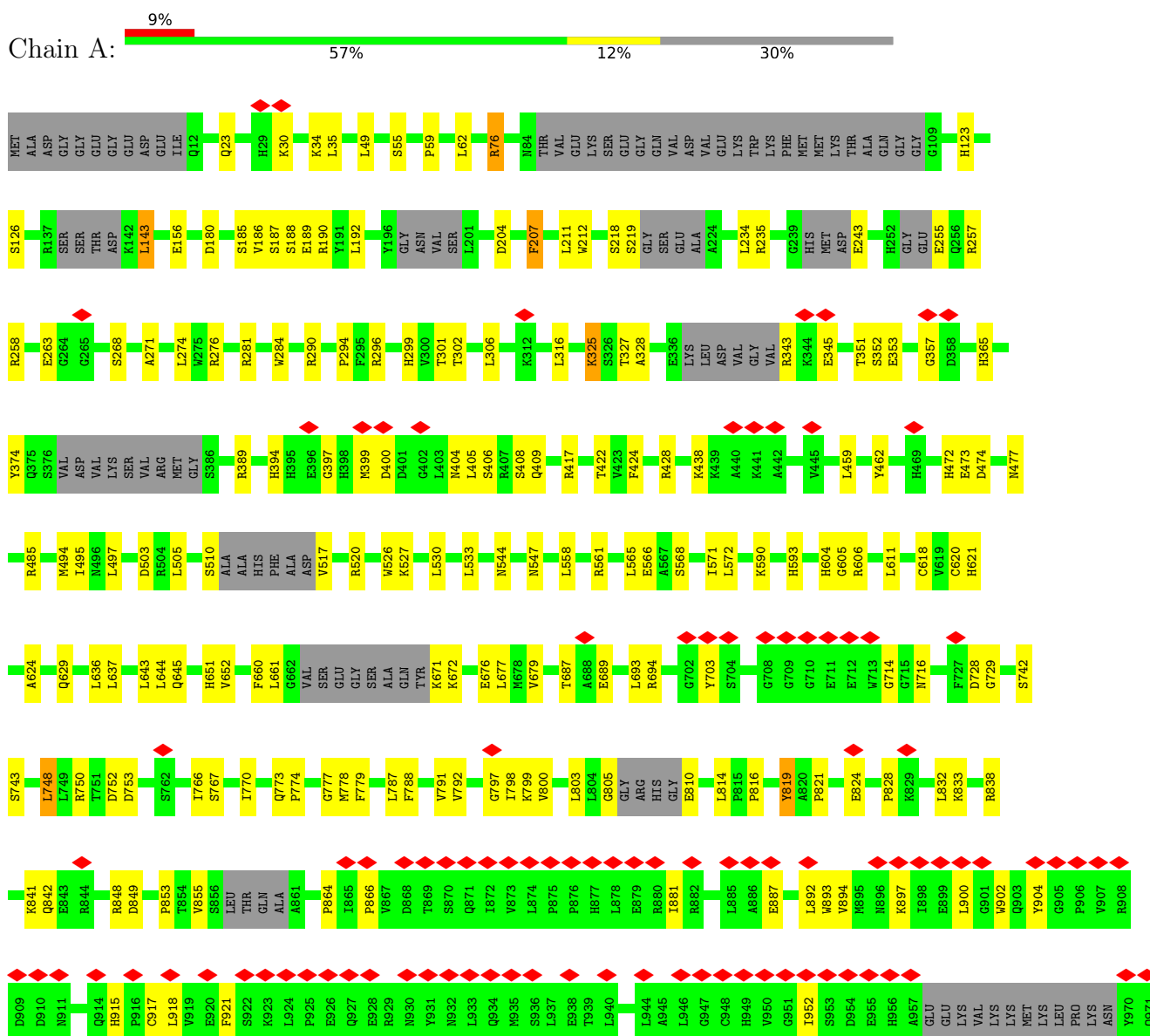


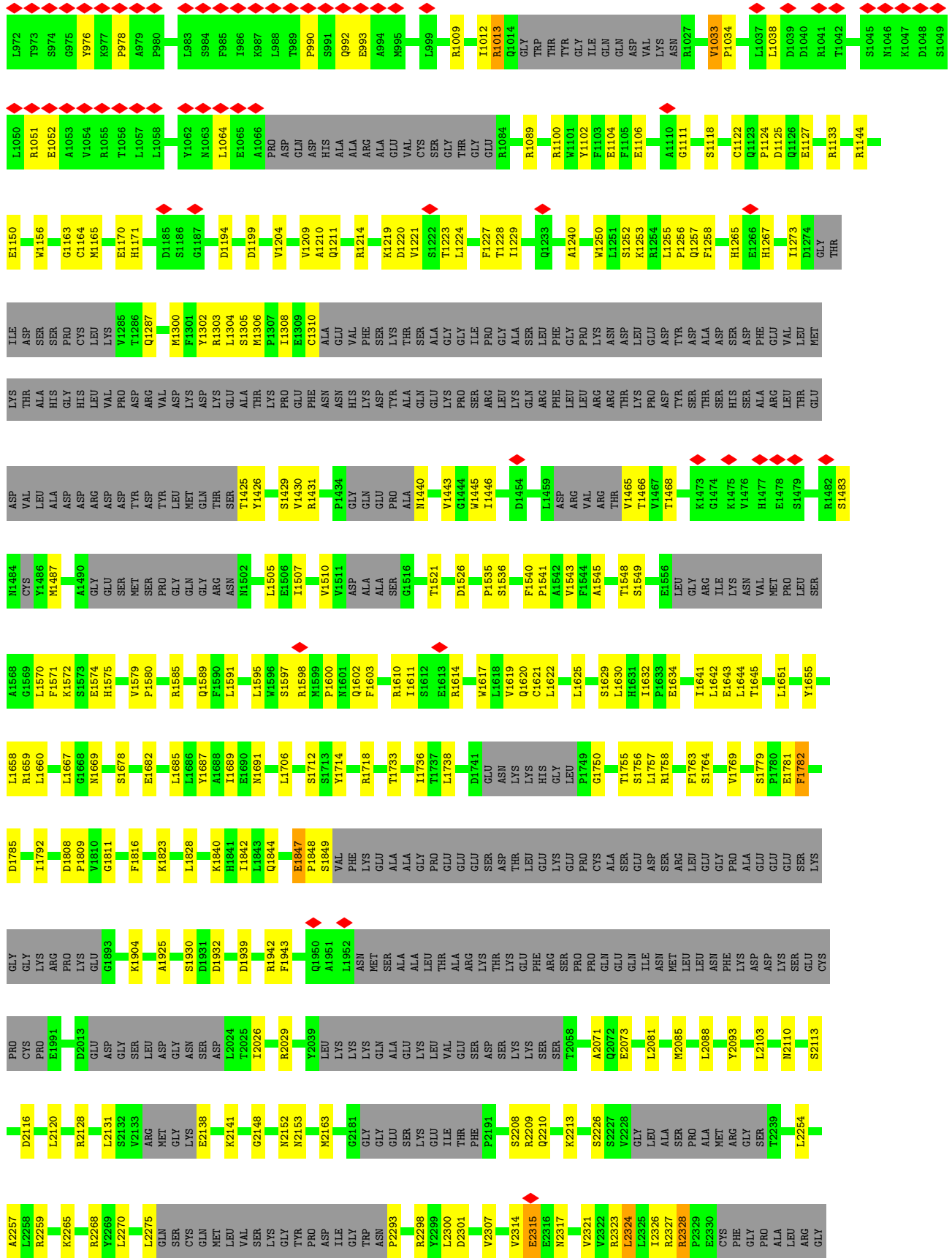
Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
6	A	1	Total 14	8	4	2	0
6	C	1	Total 14	8	4	2	0
6	E	1	Total 14	8	4	2	0
6	G	1	Total 14	8	4	2	0

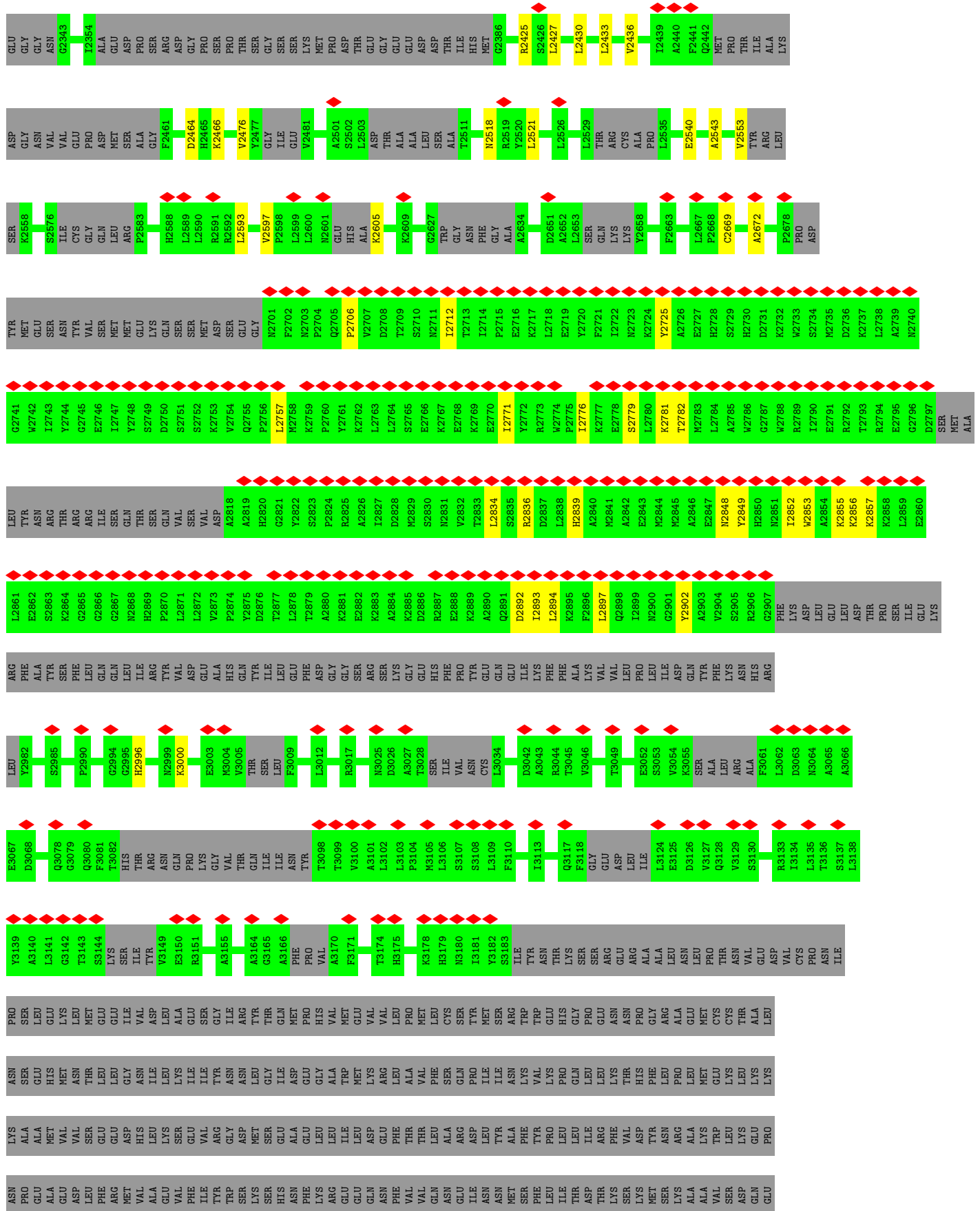
3 Residue-property plots

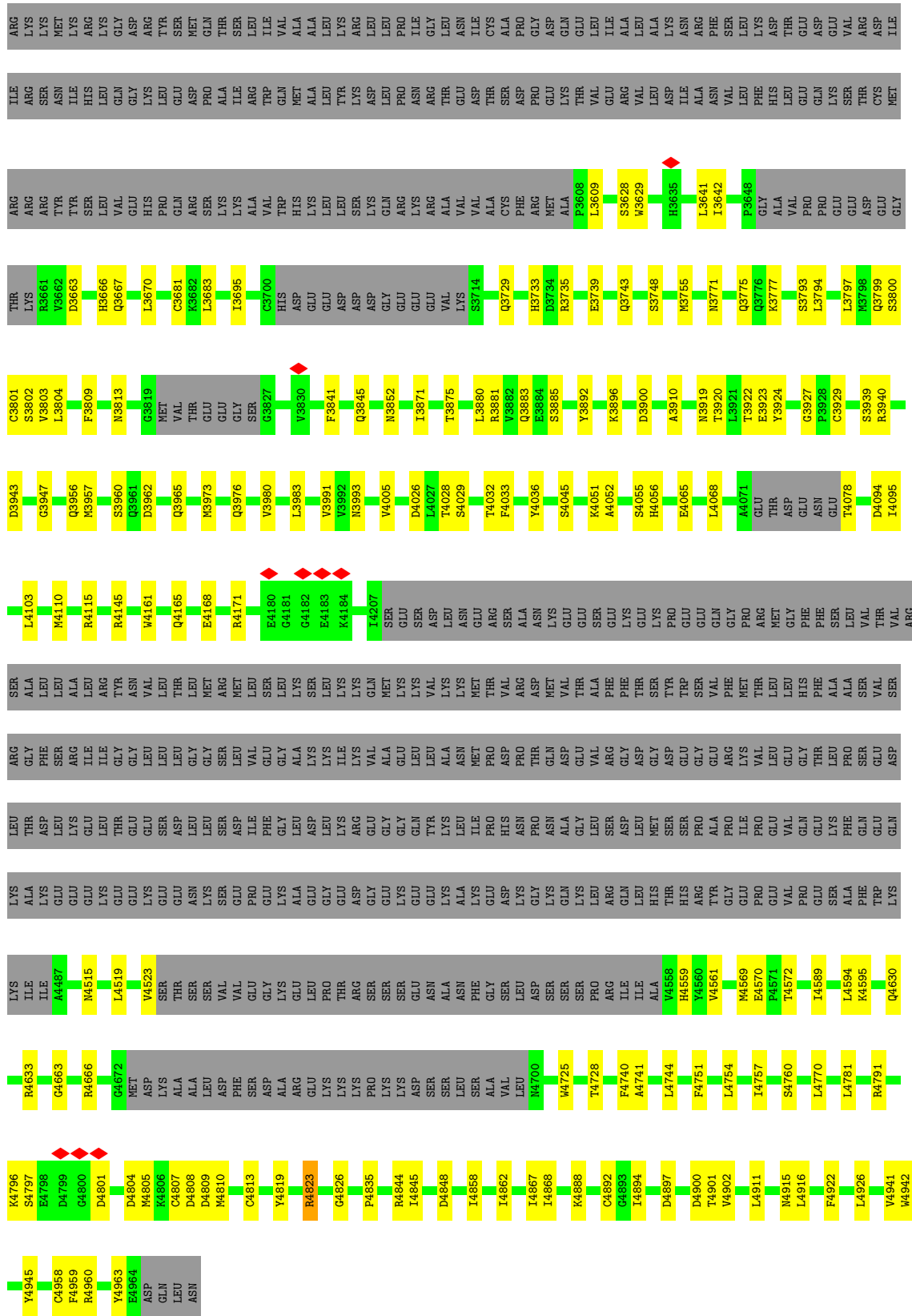
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: RyR2



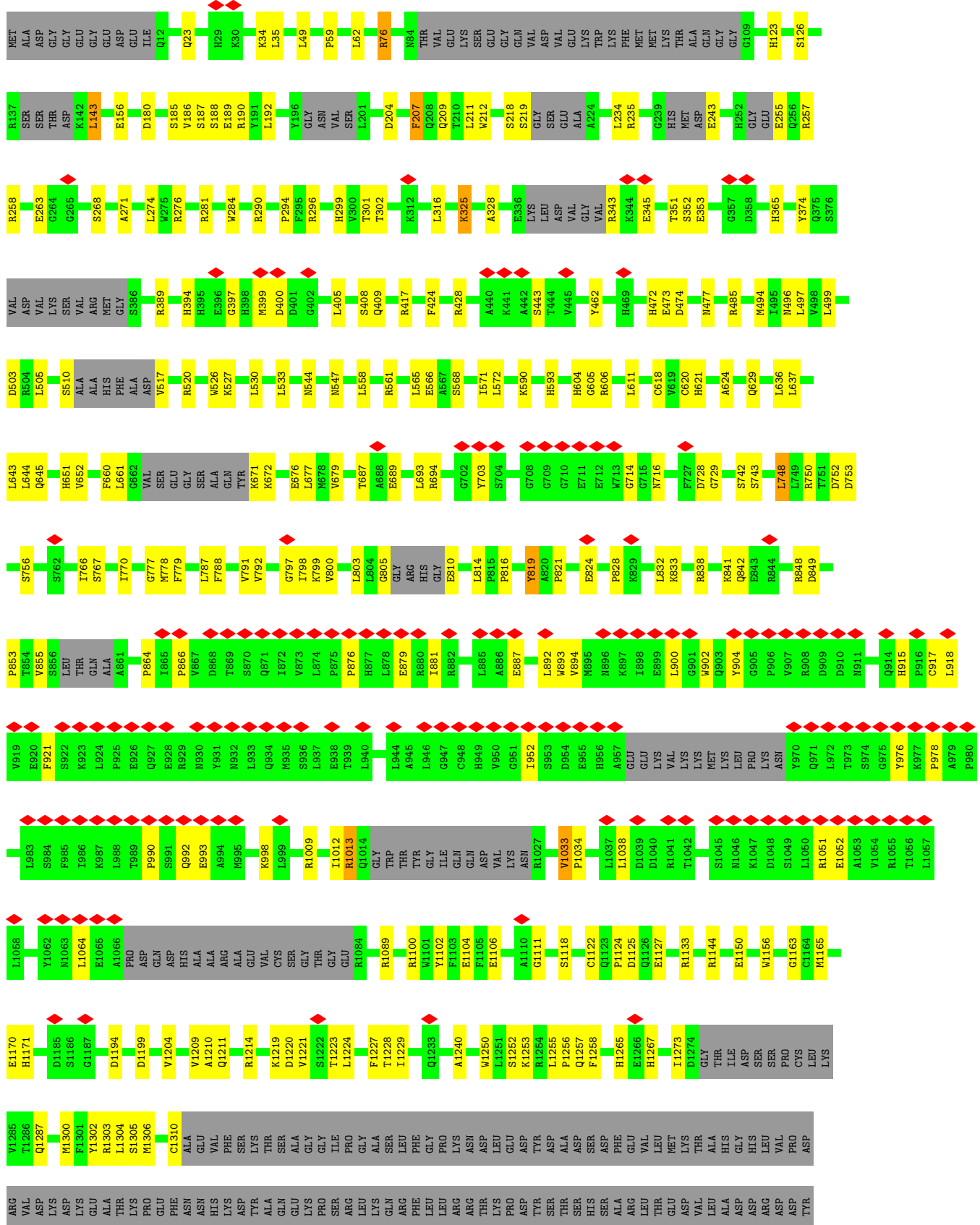


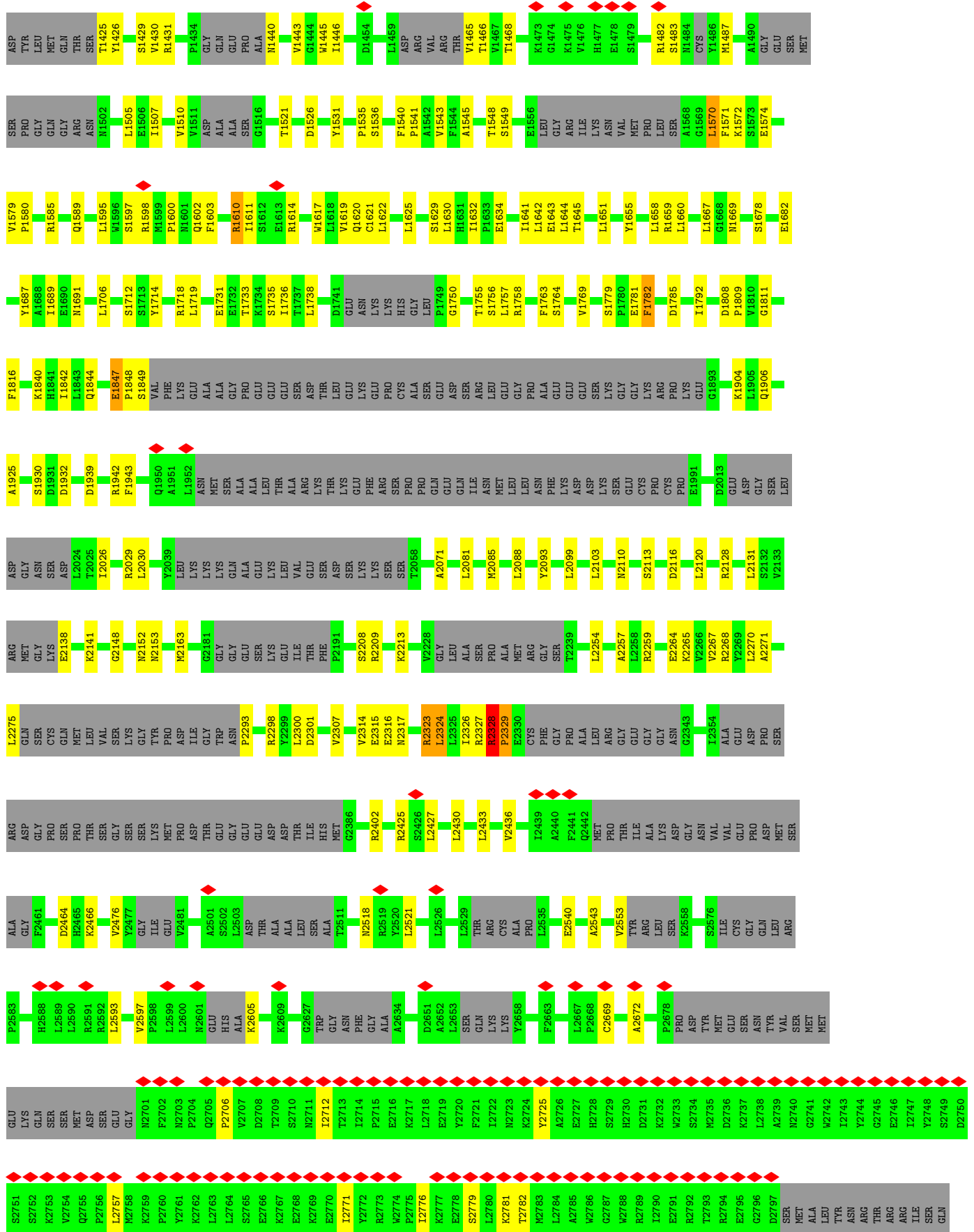


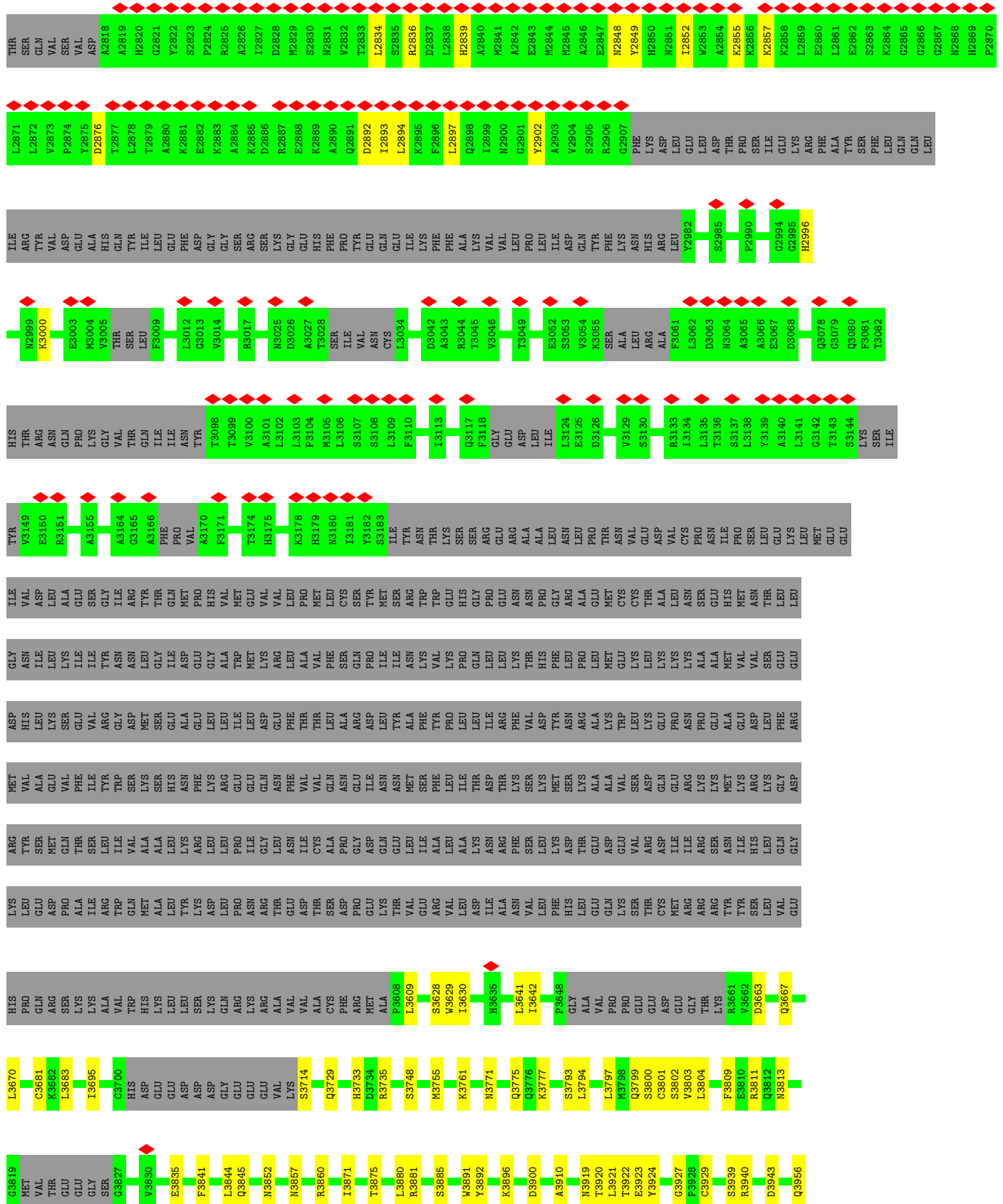


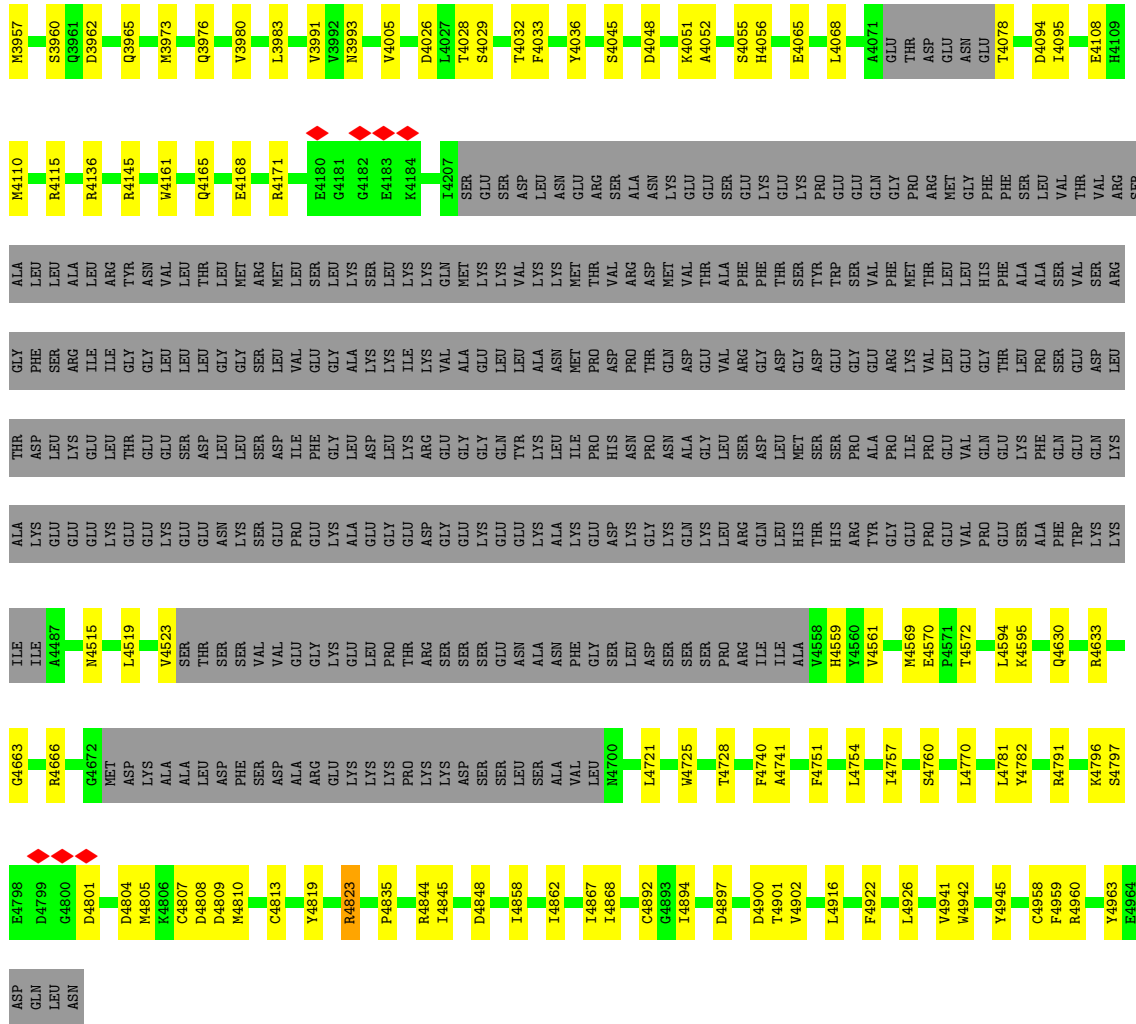
● Molecule 1: RyR2



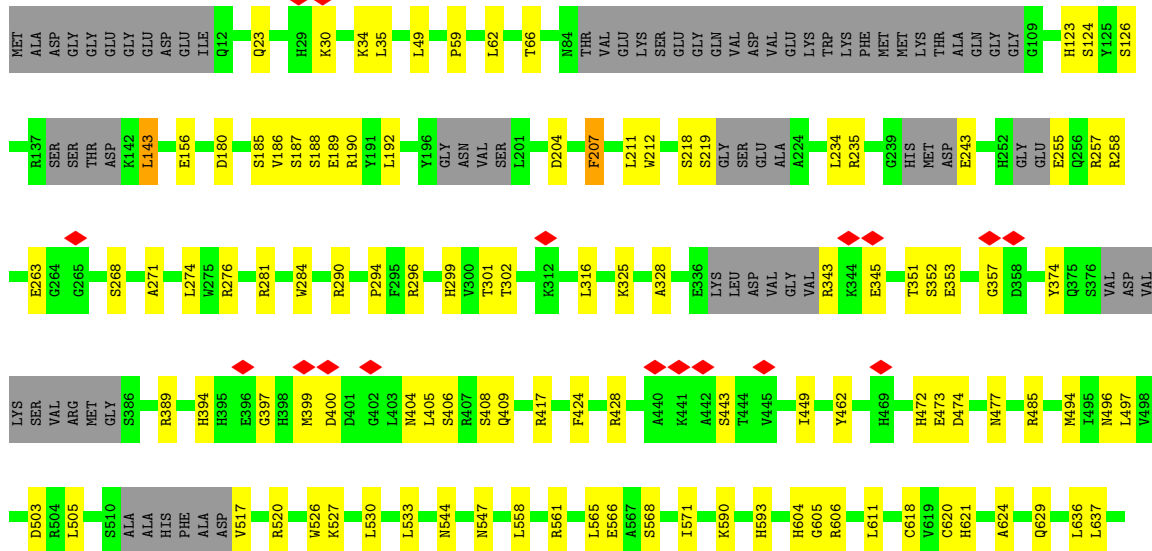


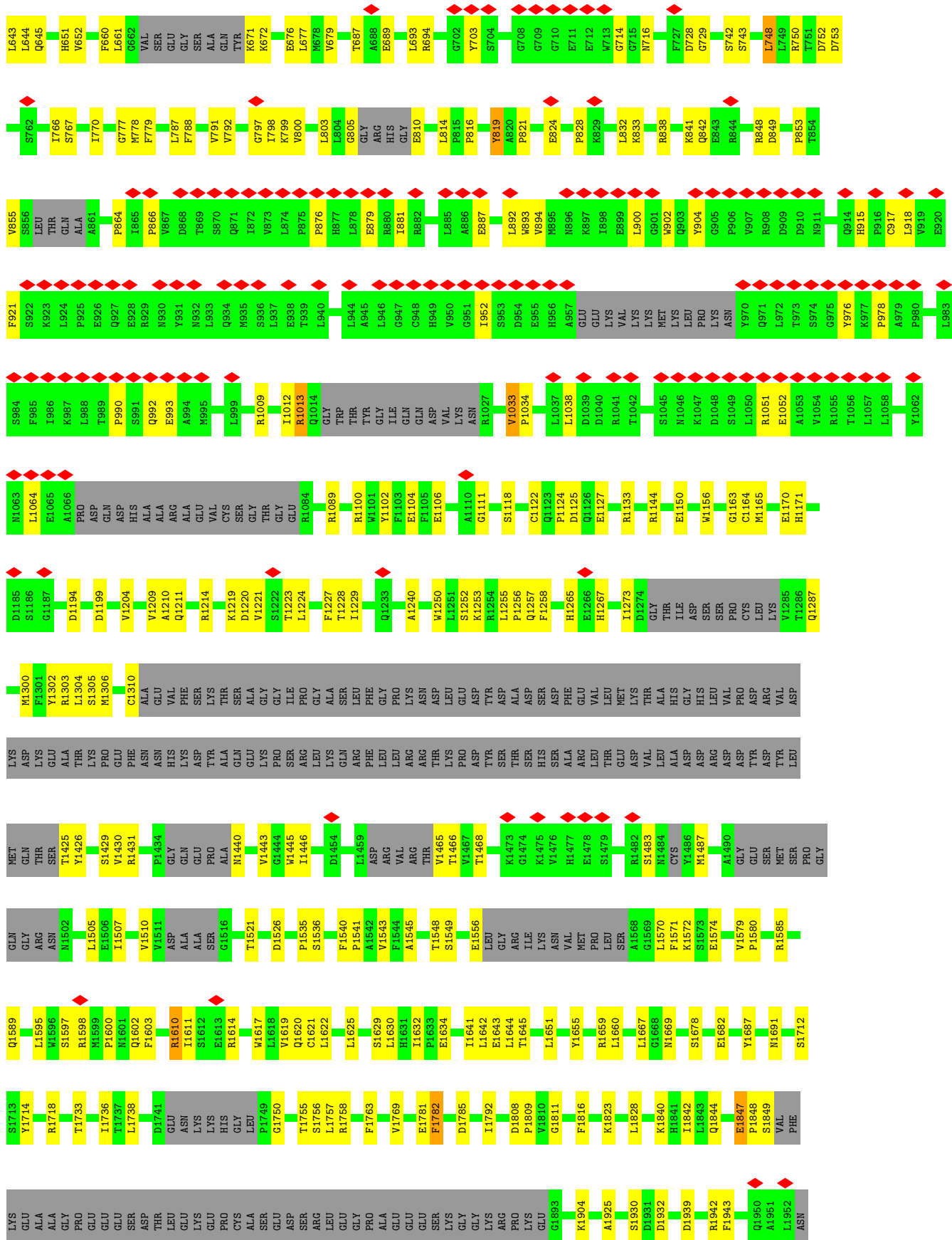




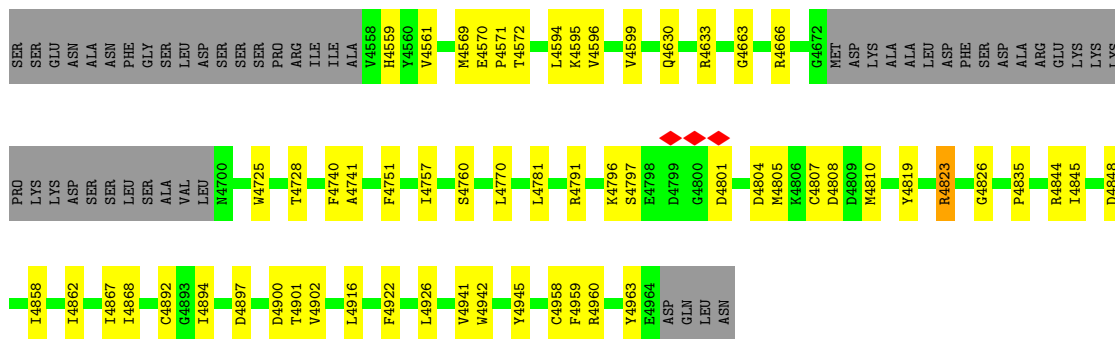


• Molecule 1: RyR2

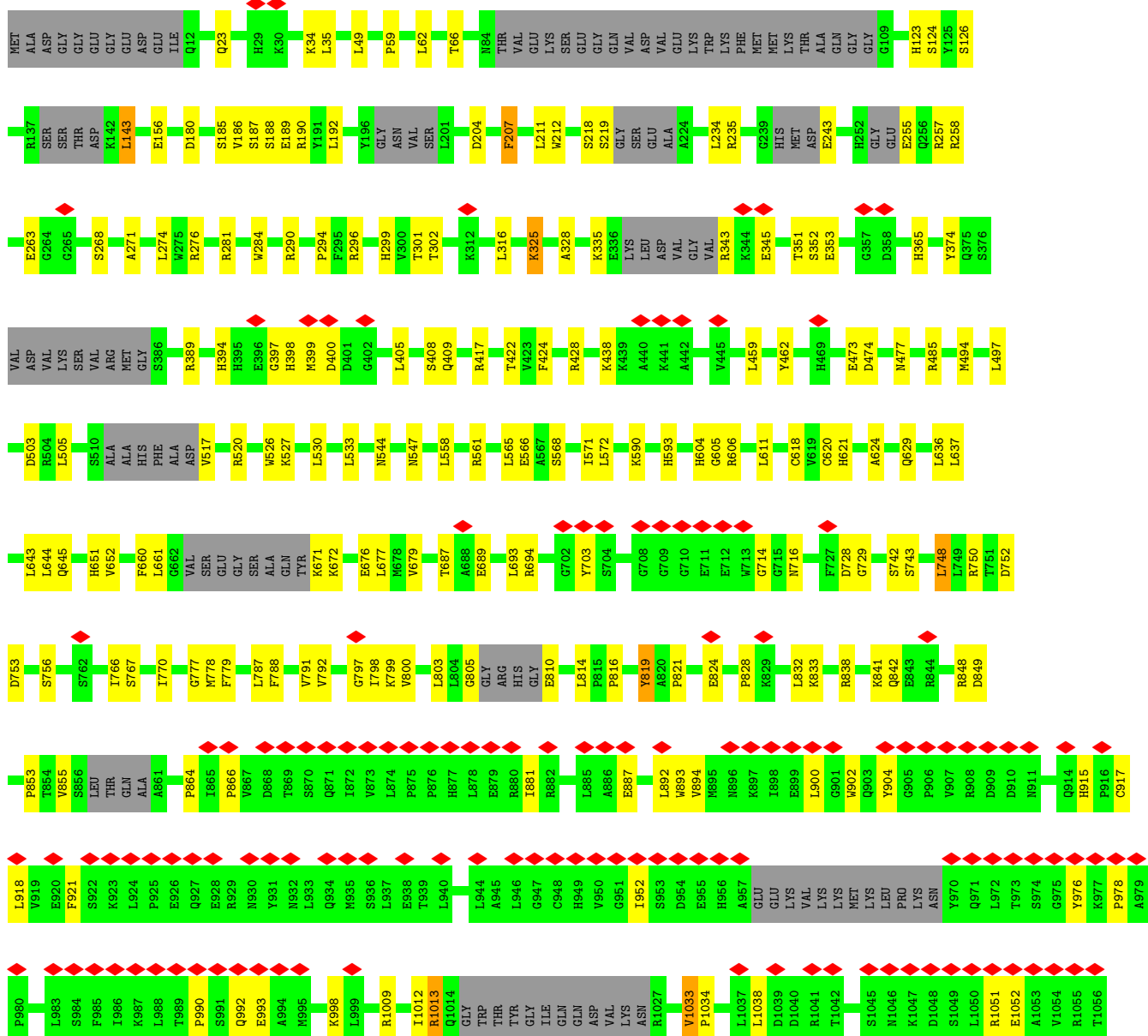


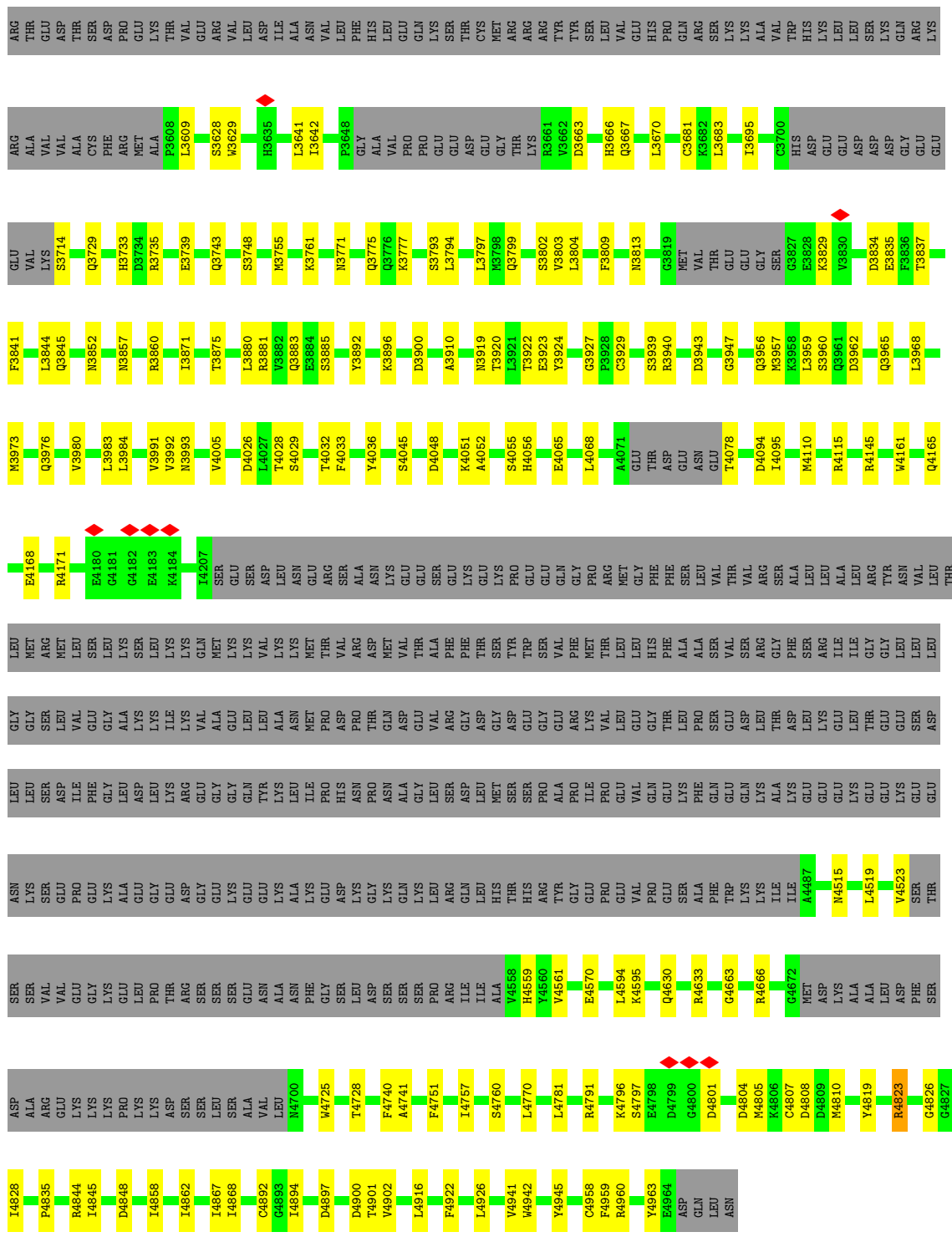


ARG	SER	LYS	GLY	ILE	VAL	ASN	CYS	L3034	D3042	A3043	R3044	T3045	V3046	T3049	E3052	S3053	V3054	K3055	SER	ALA	LEU	ARG	GLN	TYR	PHE	ILE	ASN	ARG	LEU	V2982	E2985	G2986	D3068	Q3078	G3079	Q3080	F3081	T3082	HIS	THR	ARG	ASN	GLN	PRU	LYS	GLY	VAL	THR	GLN	ILE	ILE	ASN	TYR	T3098	T3099	V3100	A3101	L3102	
K2889	A2890	Q2891	D2892	I2893	L2894	K2895	F2896	L2897	Q2898	I2899	N2900	G2901	Y2902	A2903	V2904	S2905	R2906	E2907	PHE	LYS	ASP	LEU	LEU	ASP	GLU	LEU	ASP	THR	PRO	SER	ILE	GLN	TYR	PHE	ALA	VAL	VAL	LEU	PRO	LEU	LEU	ILE	ASP	GLY	THR	ASP	GLY	VAL	THR	GLN	ILE	ILE	ASN	TYR	T3098	T3099	V3100	A3101	L3102
M2829	S2830	M2831	V2832	T2833	L2834	S2835	R2836	D2837	L2838	H2839	A2840	M2841	A2842	E2843	M2844	M2845	A2846	E2847	N2848	Y2849	H2850	M2851	L2852	M2853	K2855	K2856	K2857	K2858	L2859	E2860	L2861	E2862	S2863	K2864	G2865	G2866	G2867	M2868	H2869	P2870	L2871	L2872	V2873	P2874	Y2875	D2876	T2877	L2878	T2879	A2880	K2881	E2882	K2883	A2884	D2886	E2887			
K2769	E2770	I2771	Y2772	M2773	W2774	P2775	L2776	K2777	E2778	S2779	L2780	K2781	T2782	M2783	L2784	A2785	W2786	G2787	W2788	R2789	I2790	E2791	L2792	T2793	R2794	E2795	G2796	D2797	SER	MET	ALA	LEU	TYR	ARG	ILE	THR	ARG	ARG	ILE	GLN	THR	SER	GLN	VAL	VAL	ASP	A2818	A2819	H2820	G2821	Y2822	S2823	P2824	R2825	A2826	I2827	D2828		
T2709	S2710	M2711	L2712	T2713	L2714	P2715	E2716	K2717	L2718	E2719	Y2720	F2721	L2722	N2723	K2724	Y2725	A2726	E2727	H2728	S2729	H2730	D2731	K2732	W2733	S2734	M2735	D2736	K2737	L2738	A2739	N2740	G2741	W2742	I2743	Y2744	G2745	E2746	I2747	Y2748	S2749	D2750	S2751	S2752	K2753	V2754	Q2755	P2756	L2757	M2758	K2759	P2760	Y2761	K2762	L2763	S2765	E2766	K2767	E2768	
K2609	G2627	TRP	GLY	ASN	PHE	GLY	ALA	A2634	D2651	A2652	L2653	SER	GLN	LYS	LYS	Y2658	F2663	L2667	P2668	C2669	A2672	F2678	PRO	ASP	TYR	MET	GLY	SER	ASN	TYR	VAL	VAL	SER	MET	GLU	LYS	GLN	SER	THR	SER	GLN	VAL	VAL	ASP	A2818	A2819	H2820	G2821	Y2822	S2823	P2824	R2825	A2826	I2827	D2828				
ASP	THR	ALA	ALA	LEU	SER	ALA	T2511	M2518	R2519	Y2520	L2521	L2526	L2529	THR	ARG	CYS	ALA	PRO	L2536	E2540	A2543	V2553	TYR	ARG	LEU	SER	K2558	S2576	ILE	CYS	GLY	GLN	LEU	ASN	ARG	H2586	L2589	L2590	R2591	R2592	L2593	V2597	P2596	L2599	L2600	M2601	HIS	ALA	K2605										
GLU	GLY	GLU	GLU	ASP	THR	ILE	HIS	MET	G2386	I2420	R2425	S2426	L2427	L2430	L2433	Y2436	I2439	A2440	F2441	D2442	MET	PRO	THR	ILE	ALA	LYS	ASP	GLY	ASN	VAL	VAL	GLU	PRO	ASP	MET	SER	ALA	F2461	K2466	V2476	Y2477	GLY	ILE	GLU	V2481	A2501	S2502	L2503											
ASN	P2293	R2298	Y2299	L2300	D2301	V2307	V2314	R2208	S2209	E2315	K2213	S2226	S2227	V2228	GLY	LEU	ALA	SER	PRO	ALA	MET	LEU	ARG	GLY	SER	T2239	L2254	A2257	L2258	R2259	E2264	K2265	R2128	L2131	S2132	V2133	ARG	MET	GLY	LYS	E2138	K2141	G2148	N2152	N2153	M2163	G2181	GLY	LYS										
GLU	SER	LYS	ILE	THR	VAL	SER	ASP	R2208	S2209	E2315	K2213	S2226	S2227	V2228	GLY	LEU	ALA	SER	PRO	ALA	MET	LEU	ARG	GLY	SER	T2239	L2254	A2257	L2258	R2259	E2264	K2265	R2128	L2131	S2132	V2133	ARG	MET	GLY	LYS	E2138	K2141	G2148	N2152	N2153	M2163	G2181	GLY	LYS										
MET	SER	ALA	ALA	LEU	THR	ALA	ARG	LYS	THR	LYS	PHE	ARG	SER	PRO	GLN	GLN	ILE	ASN	PRO	MET	LEU	LEU	ASN	PHE	GLY	LYS	ASP	ASP	LYS	SER	GLU	CYS	PRO	CYS	PRO	E1991	D2013	GLU	ASP	GLY	SER	LEU	ASP	GLY	GLY	ASN	ASN	ASP	L2024	T2025	L2026	R2029	T2039	LEU	LYS				



● Molecule 1: RyR2




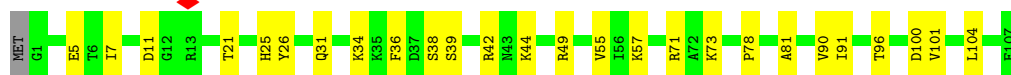


• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B

Chain D:  75% 24%




• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B

Chain F:  73% 26%



• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B

Chain H:  75% 24%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	149212	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	0.141	Depositor
Minimum map value	-0.073	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.006	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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, CA, CFF, 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	0.47	0/26913	0.60	5/36395 (0.0%)
1	C	0.47	0/26913	0.60	5/36395 (0.0%)
1	E	0.47	0/26913	0.60	5/36395 (0.0%)
1	G	0.47	0/26913	0.60	5/36395 (0.0%)
2	B	0.41	0/835	0.58	0/1123
2	D	0.41	0/835	0.58	0/1123
2	F	0.41	0/835	0.58	0/1123
2	H	0.41	0/835	0.58	0/1123
All	All	0.47	0/110992	0.60	20/150072 (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	15
1	C	0	15
1	E	0	15
1	G	0	15
All	All	0	60

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2430	LEU	CA-CB-CG	7.00	131.39	115.30
1	C	2430	LEU	CA-CB-CG	7.00	131.39	115.30
1	E	2430	LEU	CA-CB-CG	7.00	131.39	115.30
1	G	2430	LEU	CA-CB-CG	7.00	131.39	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	3681	CYS	CA-CB-SG	5.68	124.22	114.00

There are no chirality outliers.

5 of 60 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	729	GLY	Peptide
1	A	791	VAL	Peptide
1	A	814	LEU	Peptide
1	A	816	PRO	Peptide
1	A	819	TYR	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	26417	0	24909	474	0
1	C	26417	0	24909	487	0
1	E	26417	0	24909	466	0
1	G	26417	0	24909	457	0
2	B	819	0	824	18	0
2	D	819	0	824	18	0
2	F	819	0	824	19	0
2	H	819	0	824	18	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
3	E	1	0	0	0	0
3	G	1	0	0	0	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
4	G	1	0	0	0	0
5	A	31	0	12	1	0
5	C	31	0	12	1	0
5	E	31	0	12	1	0
5	G	31	0	12	1	0
6	A	14	0	10	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	C	14	0	10	2	0
6	E	14	0	10	2	0
6	G	14	0	10	2	0
All	All	109132	0	103020	1741	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

The worst 5 of 1741 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:A:2427:LEU:HD13	1:G:143:LEU:CB	1.41	1.51
1:E:143:LEU:CB	1:G:2427:LEU:HD13	1.41	1.49
1:A:143:LEU:CB	1:C:2427:LEU:HD13	1.41	1.48
1:C:143:LEU:CB	1:E:2427:LEU:HD13	1.43	1.47
1:A:2427:LEU:CD1	1:G:143:LEU:HB3	1.48	1.42

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	3336/4968 (67%)	2981 (89%)	347 (10%)	8 (0%)	47	79
1	C	3336/4968 (67%)	2982 (89%)	345 (10%)	9 (0%)	41	75
1	E	3336/4968 (67%)	2980 (89%)	347 (10%)	9 (0%)	41	75
1	G	3336/4968 (67%)	2980 (89%)	348 (10%)	8 (0%)	47	79
2	B	105/108 (97%)	100 (95%)	5 (5%)	0	100	100
2	D	105/108 (97%)	100 (95%)	5 (5%)	0	100	100
2	F	105/108 (97%)	100 (95%)	5 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	105/108 (97%)	100 (95%)	5 (5%)	0	100	100
All	All	13764/20304 (68%)	12323 (90%)	1407 (10%)	34 (0%)	50	79

5 of 34 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2328	ARG
1	A	4901	THR
1	C	2328	ARG
1	C	4901	THR
1	E	2328	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	2650/4355 (61%)	2627 (99%)	23 (1%)	78	87
1	C	2650/4355 (61%)	2625 (99%)	25 (1%)	78	87
1	E	2648/4355 (61%)	2623 (99%)	25 (1%)	78	87
1	G	2650/4355 (61%)	2628 (99%)	22 (1%)	81	89
2	B	88/89 (99%)	88 (100%)	0	100	100
2	D	88/89 (99%)	88 (100%)	0	100	100
2	F	88/89 (99%)	88 (100%)	0	100	100
2	H	88/89 (99%)	88 (100%)	0	100	100
All	All	10950/17776 (62%)	10855 (99%)	95 (1%)	79	87

5 of 95 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	1013	ARG
1	E	4823	ARG
1	E	1466	THR
1	E	2327	ARG

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	G	325	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 149 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	394	HIS
1	G	4880	GLN
1	G	550	GLN
1	G	1836	ASN
1	C	914	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	CFE	E	6003	-	8,15,15	2.91	4 (50%)	8,23,23	1.32	1 (12%)
5	ATP	E	6002	-	26,33,33	0.91	1 (3%)	31,52,52	1.66	6 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	ATP	G	6002	-	26,33,33	0.91	1 (3%)	31,52,52	1.66	6 (19%)
6	CFF	C	6003	-	8,15,15	2.93	4 (50%)	8,23,23	1.30	1 (12%)
6	CFF	G	6003	-	8,15,15	2.93	4 (50%)	8,23,23	1.30	1 (12%)
5	ATP	A	6002	-	26,33,33	0.91	1 (3%)	31,52,52	1.66	6 (19%)
6	CFF	A	6003	-	8,15,15	2.93	4 (50%)	8,23,23	1.30	1 (12%)
5	ATP	C	6002	-	26,33,33	0.91	1 (3%)	31,52,52	1.66	6 (19%)

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	CFF	E	6003	-	-	-	0/2/2/2
5	ATP	E	6002	-	-	4/18/38/38	0/3/3/3
5	ATP	G	6002	-	-	4/18/38/38	0/3/3/3
6	CFF	C	6003	-	-	-	0/2/2/2
6	CFF	G	6003	-	-	-	0/2/2/2
5	ATP	A	6002	-	-	4/18/38/38	0/3/3/3
6	CFF	A	6003	-	-	-	0/2/2/2
5	ATP	C	6002	-	-	4/18/38/38	0/3/3/3

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	6003	CFF	C5-C4	-5.46	1.32	1.39
6	C	6003	CFF	C5-C4	-5.46	1.32	1.39
6	G	6003	CFF	C5-C4	-5.46	1.32	1.39
6	E	6003	CFF	C5-C4	-5.39	1.32	1.39
6	A	6003	CFF	C6-N1	-4.45	1.31	1.38

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	6002	ATP	PA-O3A-PB	-4.88	116.07	132.83
5	A	6002	ATP	PA-O3A-PB	-4.87	116.11	132.83
5	C	6002	ATP	PA-O3A-PB	-4.87	116.11	132.83
5	G	6002	ATP	PA-O3A-PB	-4.86	116.15	132.83
5	A	6002	ATP	N3-C2-N1	-3.63	123.01	128.68

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

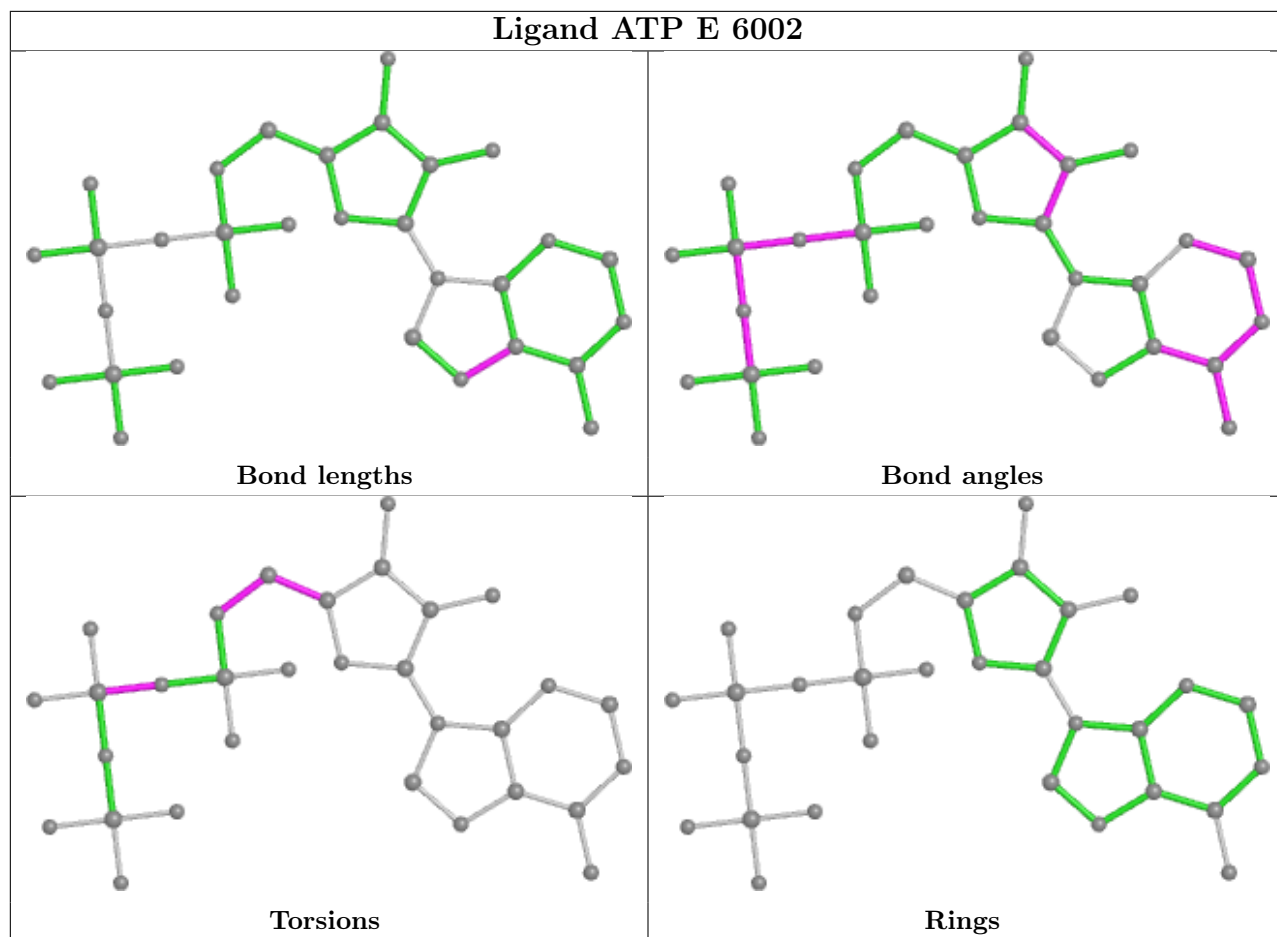
Mol	Chain	Res	Type	Atoms
5	A	6002	ATP	C3'-C4'-C5'-O5'
5	C	6002	ATP	C3'-C4'-C5'-O5'
5	E	6002	ATP	C3'-C4'-C5'-O5'
5	G	6002	ATP	C3'-C4'-C5'-O5'
5	A	6002	ATP	O4'-C4'-C5'-O5'

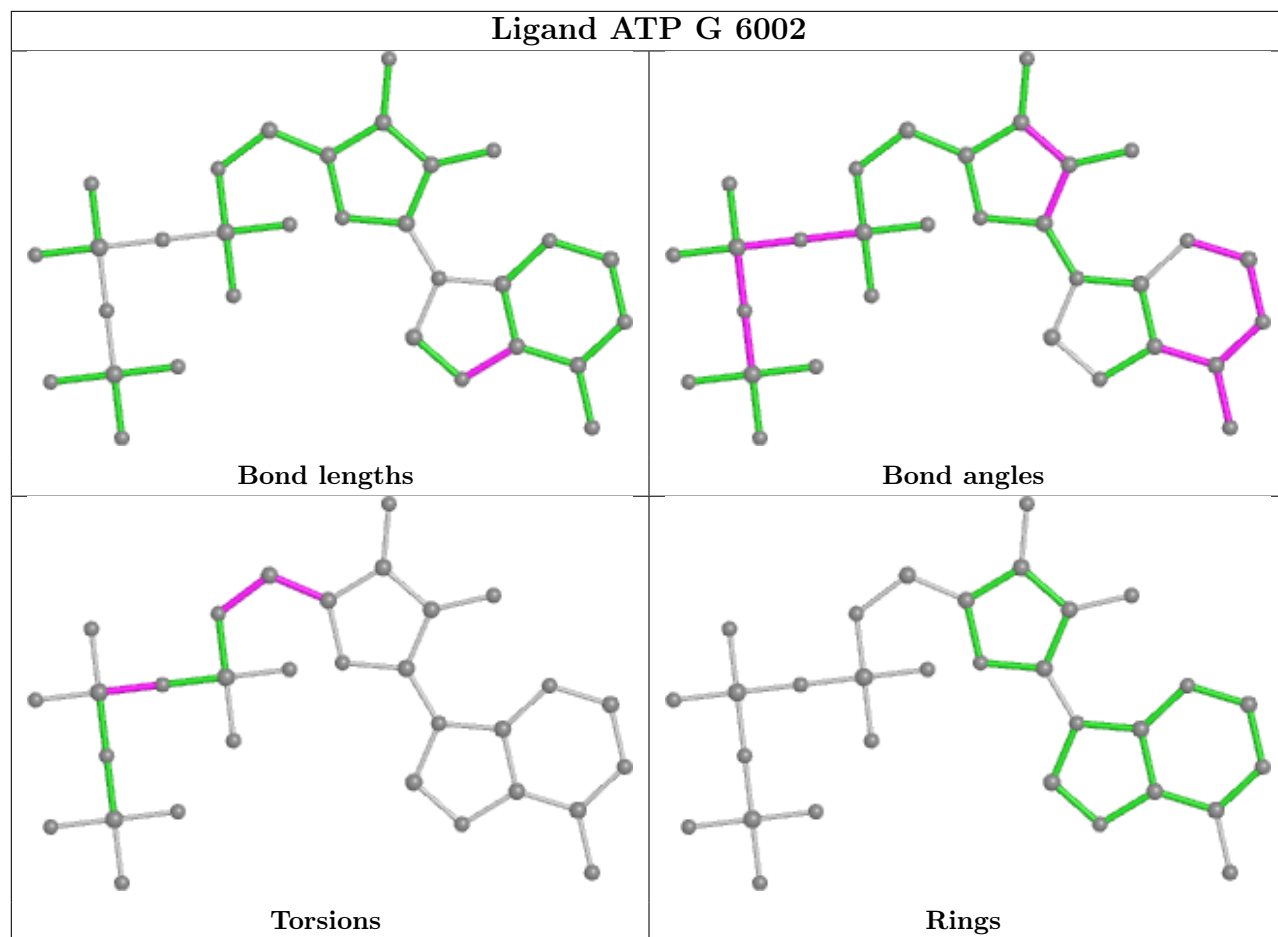
There are no ring outliers.

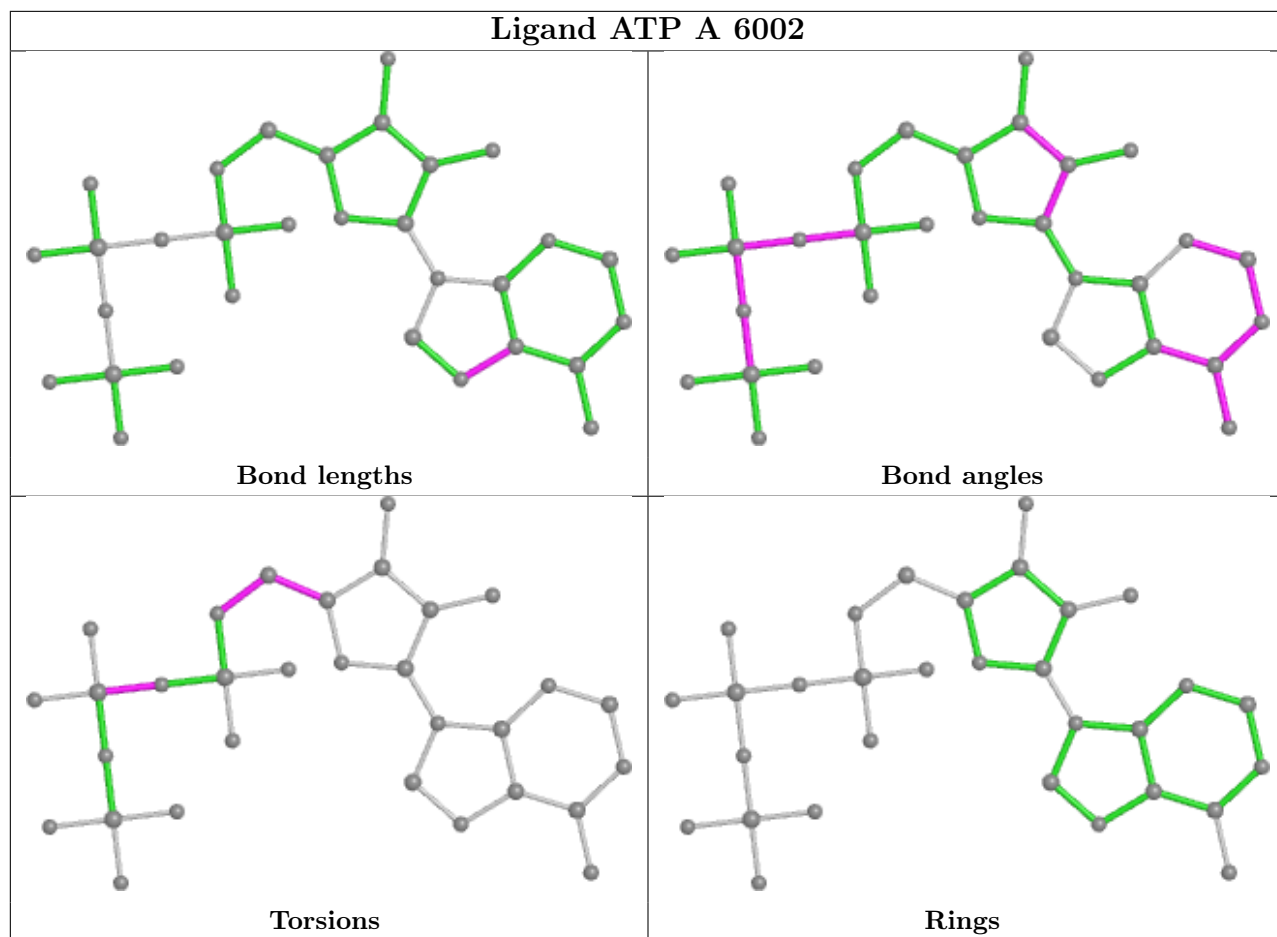
8 monomers are involved in 12 short contacts:

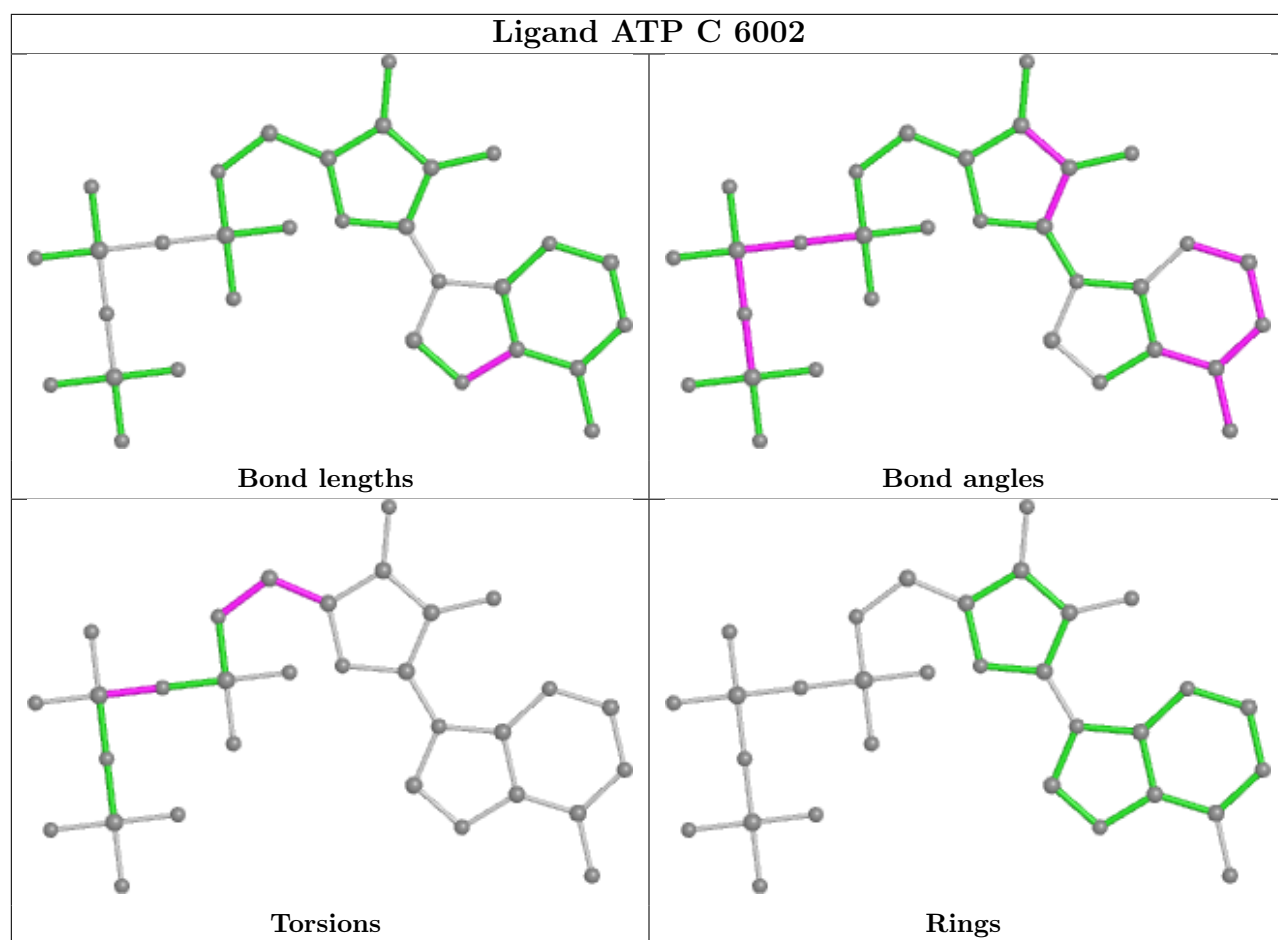
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	E	6003	CFF	2	0
5	E	6002	ATP	1	0
5	G	6002	ATP	1	0
6	C	6003	CFF	2	0
6	G	6003	CFF	2	0
5	A	6002	ATP	1	0
6	A	6003	CFF	2	0
5	C	6002	ATP	1	0

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.

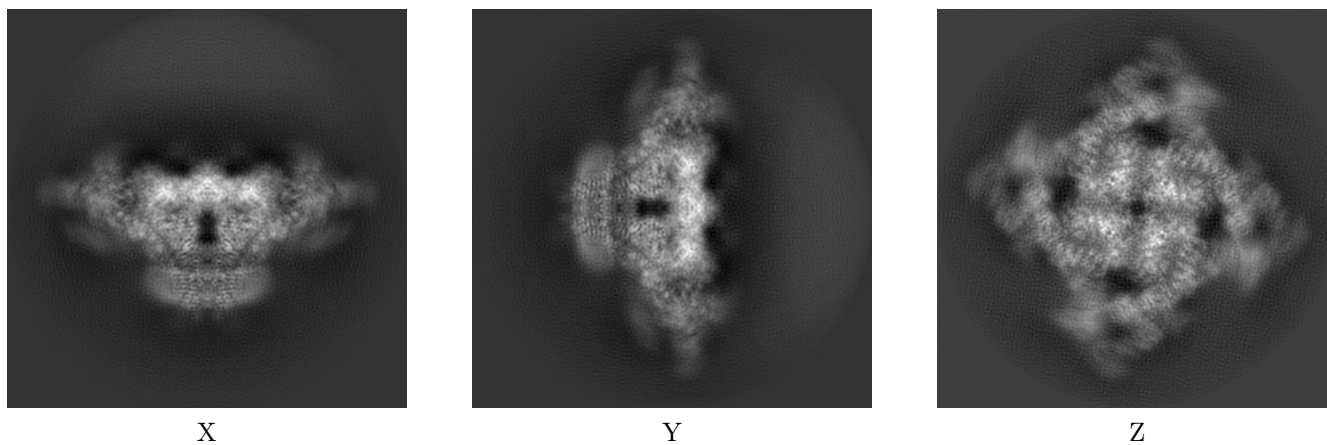
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-9879. 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](#)

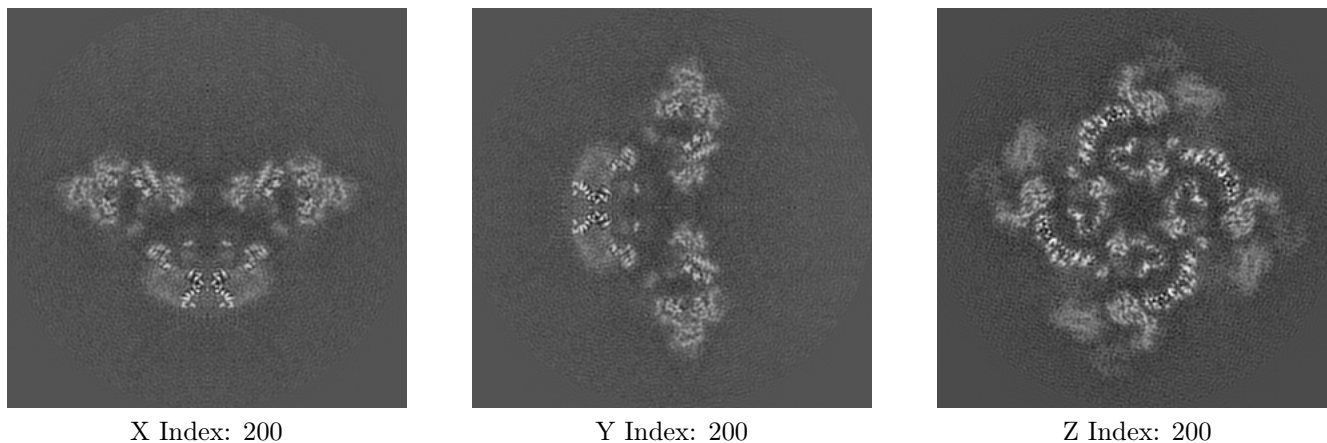
6.1.1 Primary map



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

6.2 Central slices [i](#)

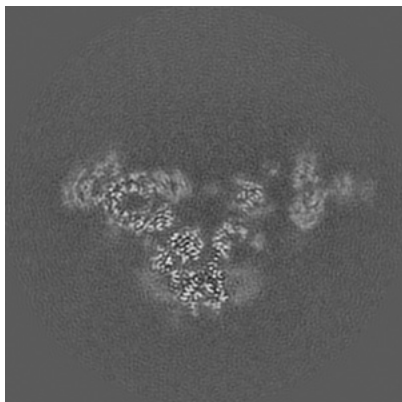
6.2.1 Primary map



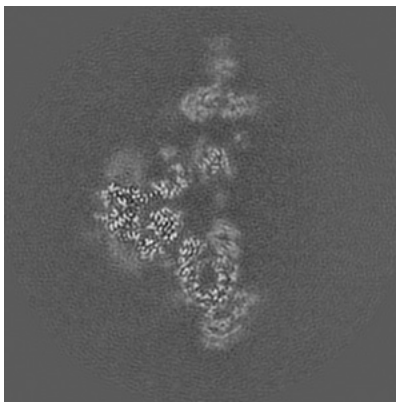
The images above show central slices of the map in three orthogonal directions.

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

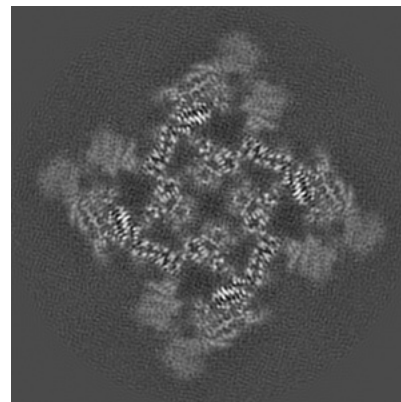
6.3.1 Primary map



X Index: 213



Y Index: 187

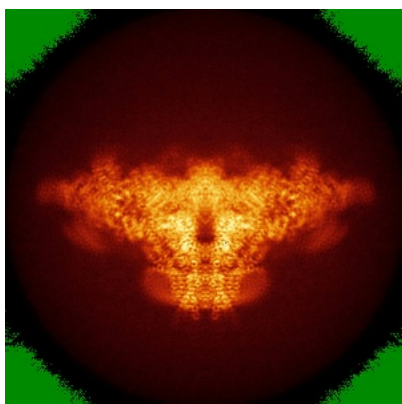


Z Index: 211

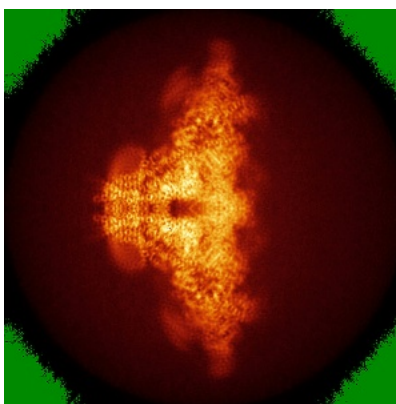
The images above show the largest variance slices of the map in three orthogonal directions.

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

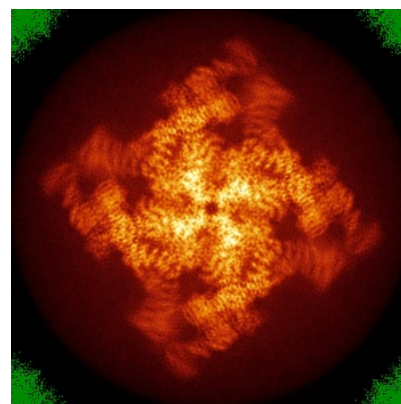
6.4.1 Primary map



X



Y

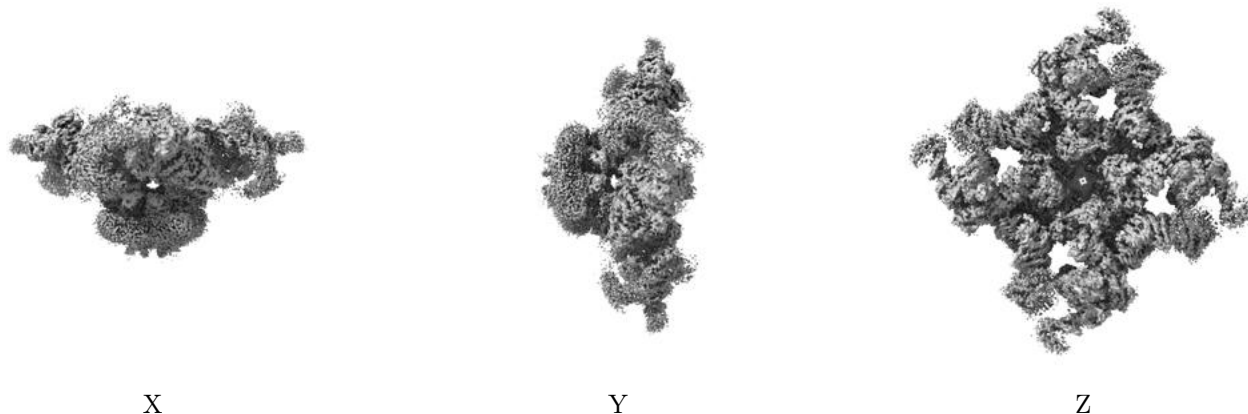


Z

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.

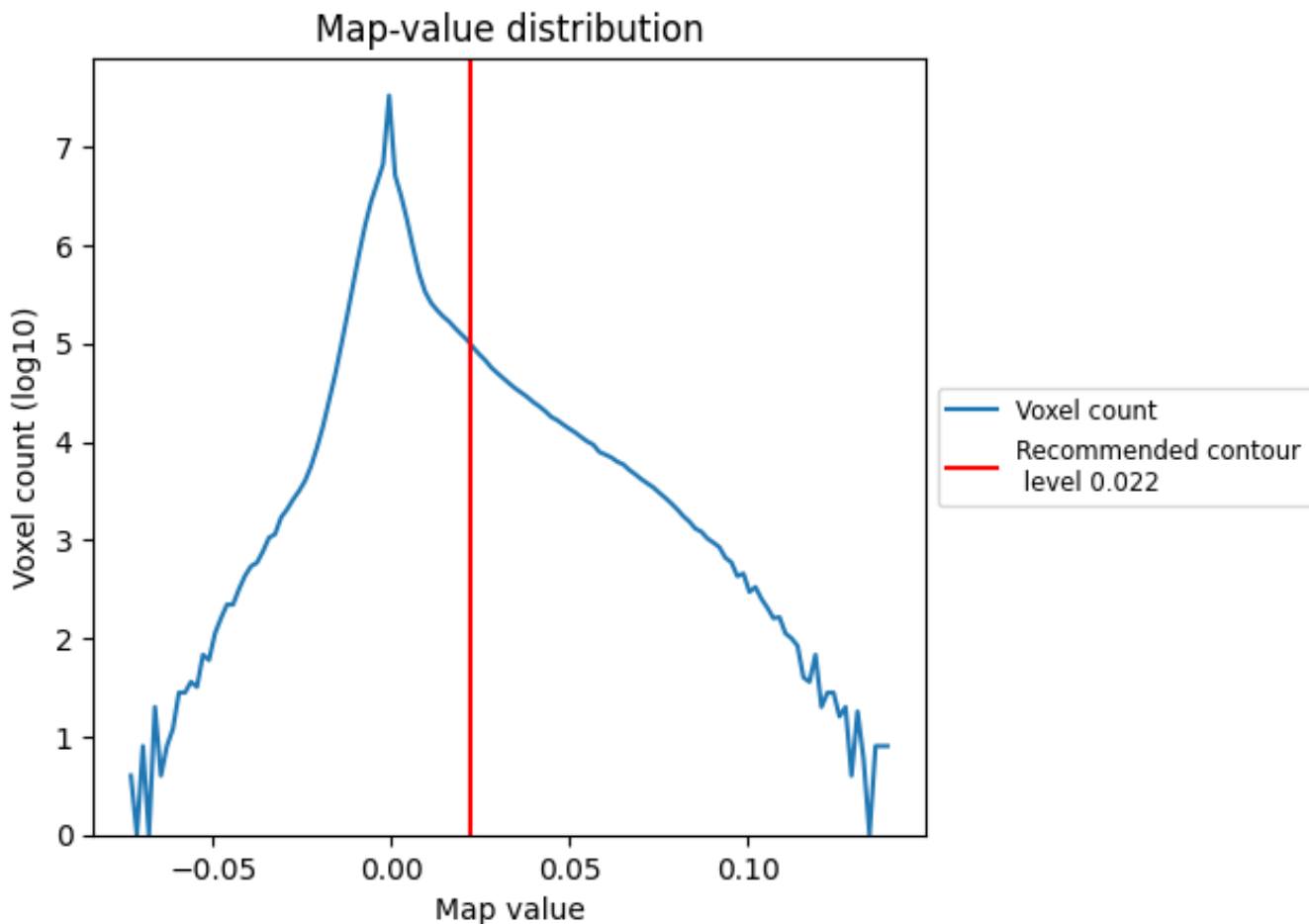
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

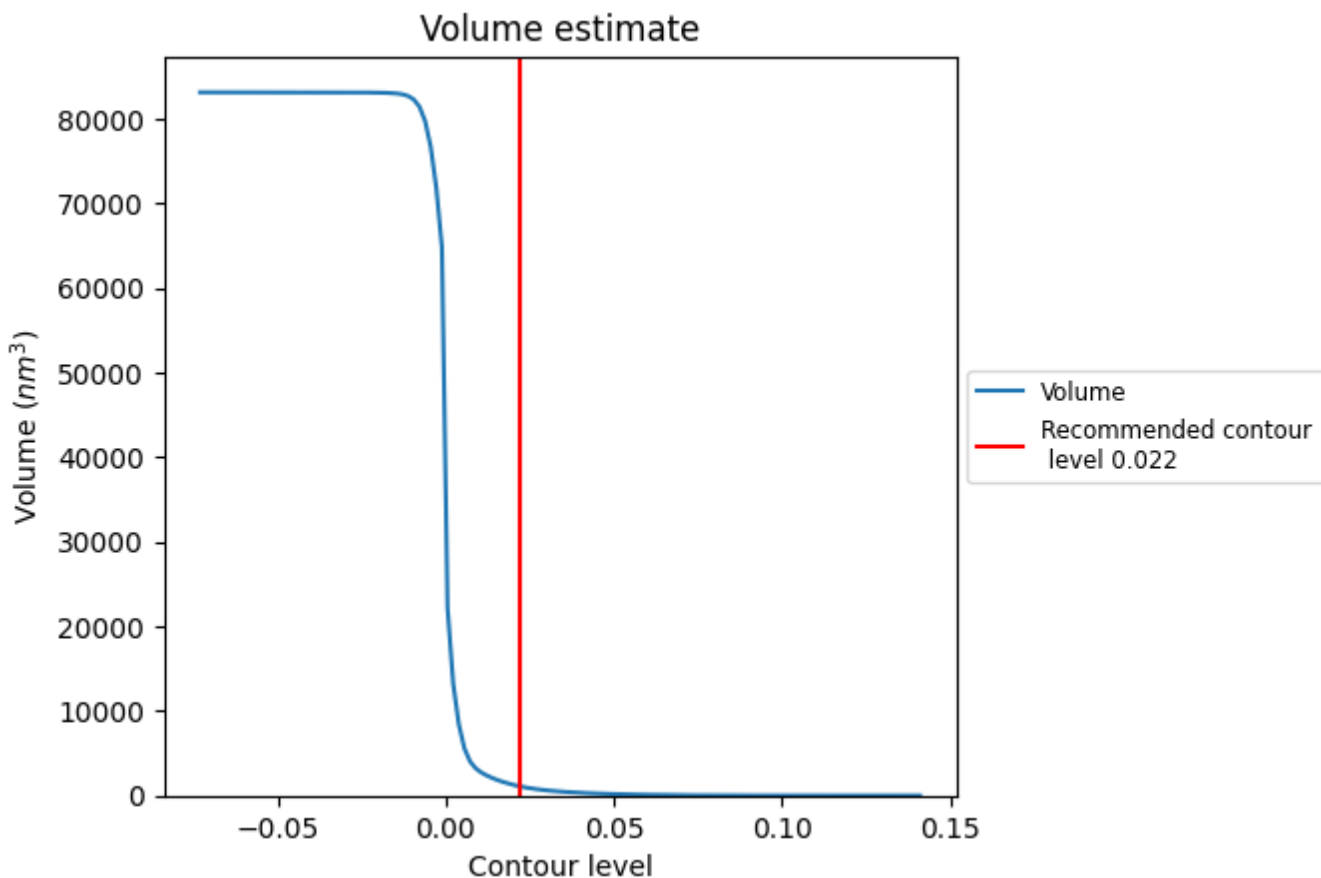
This section contains the results of statistical analysis of the map.

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.

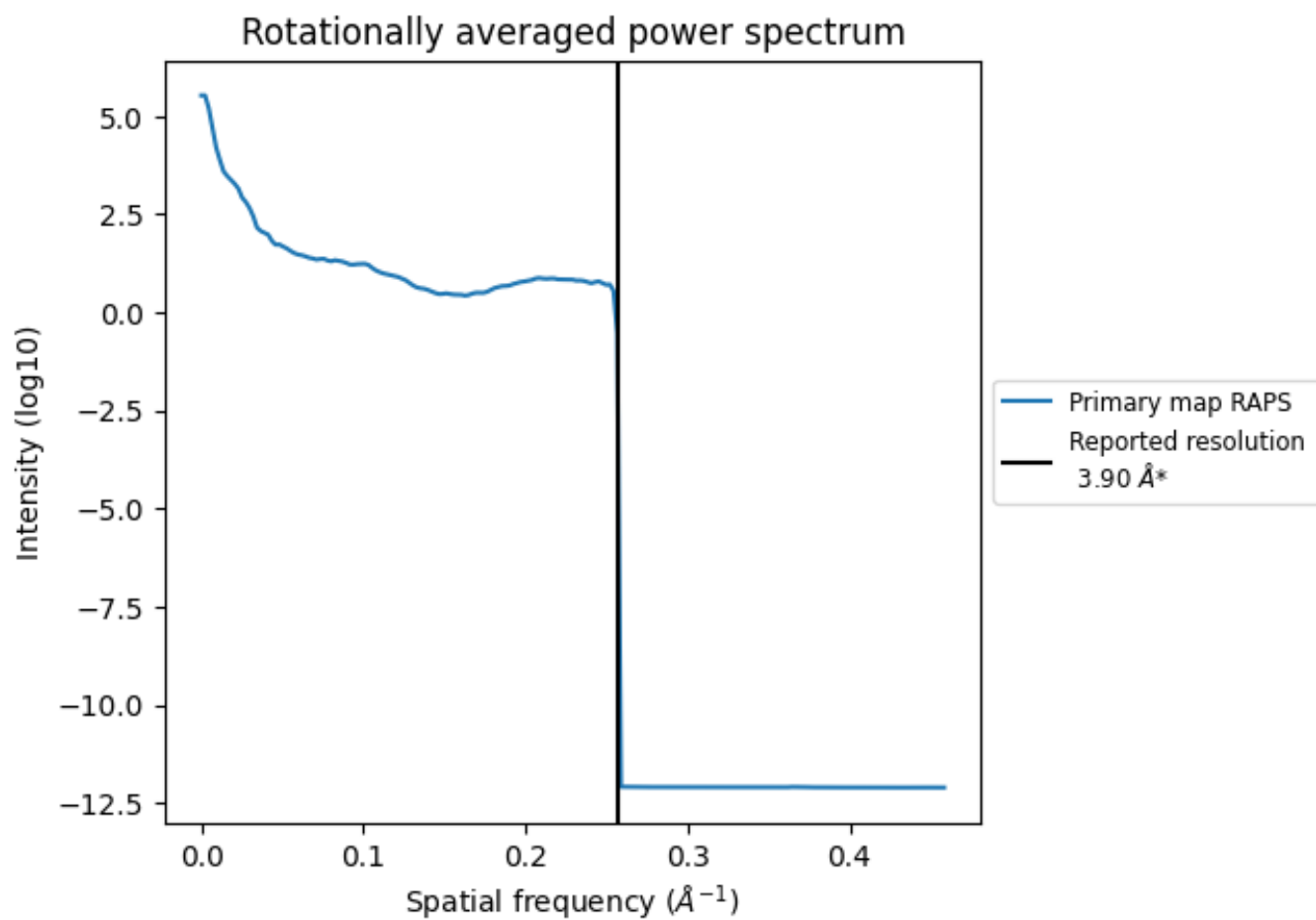
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1096 nm³; this corresponds to an approximate mass of 990 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](#)

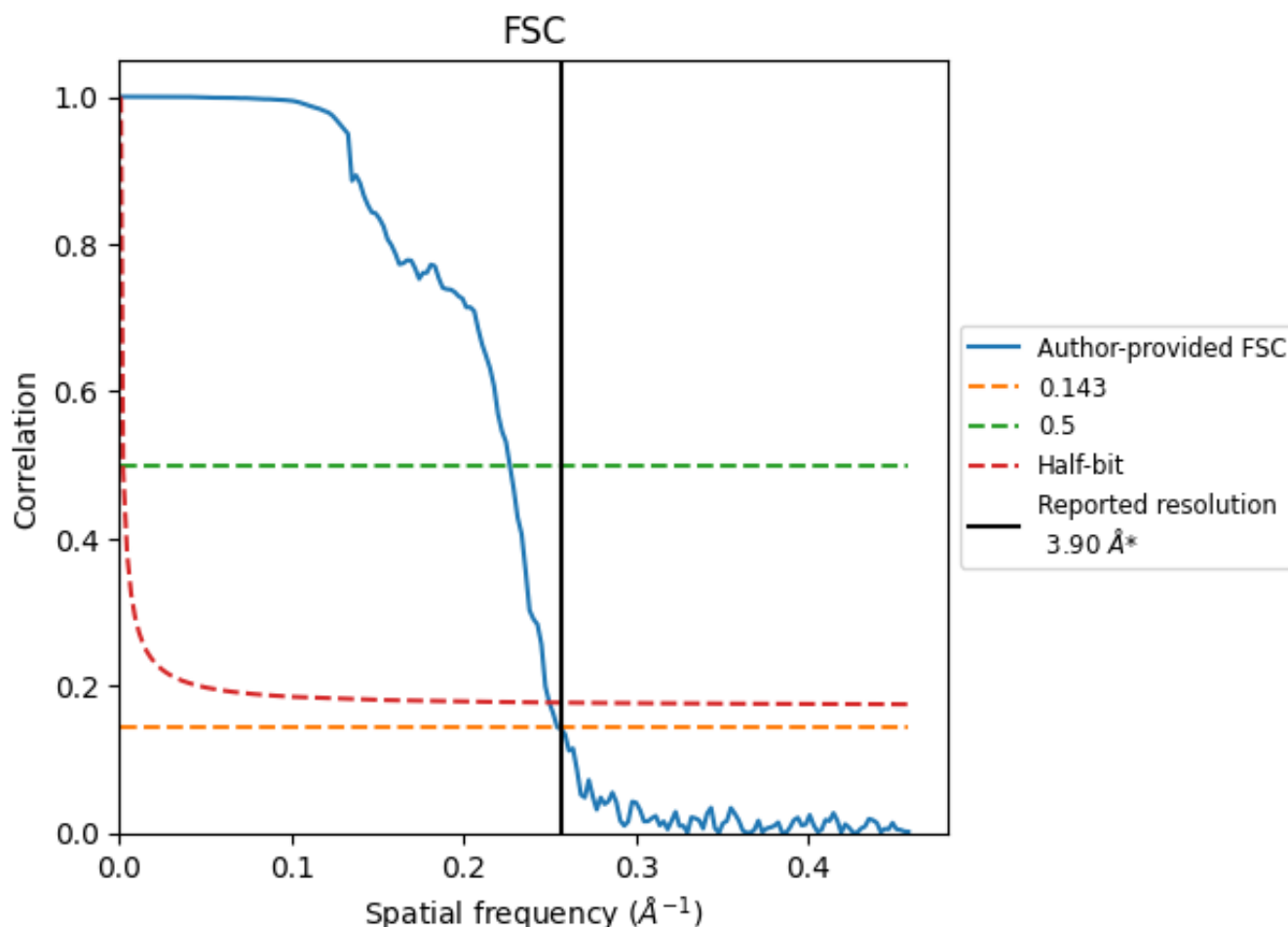


*Reported resolution corresponds to spatial frequency of 0.256 Å⁻¹

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](#)

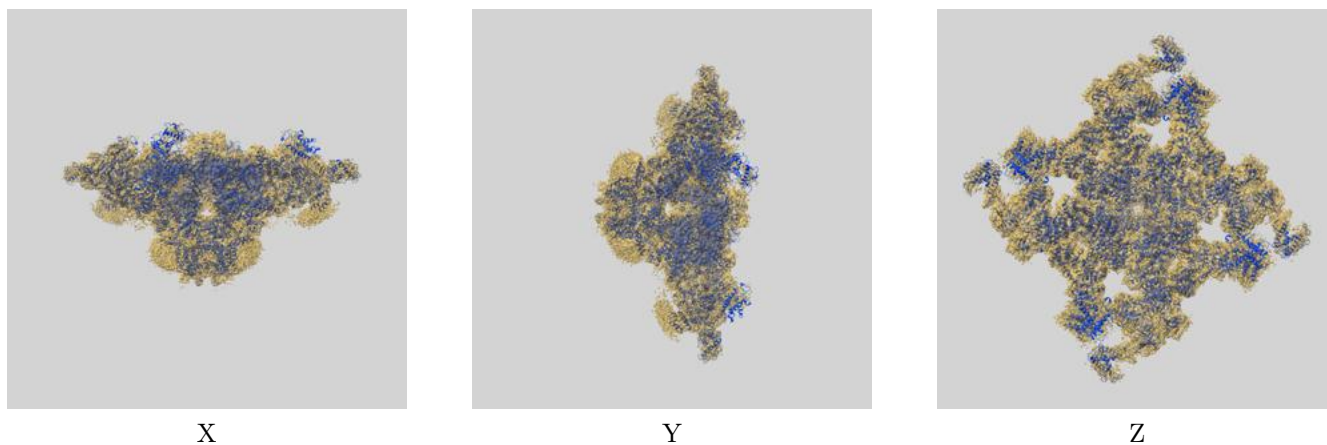
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.93	4.41	4.00
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

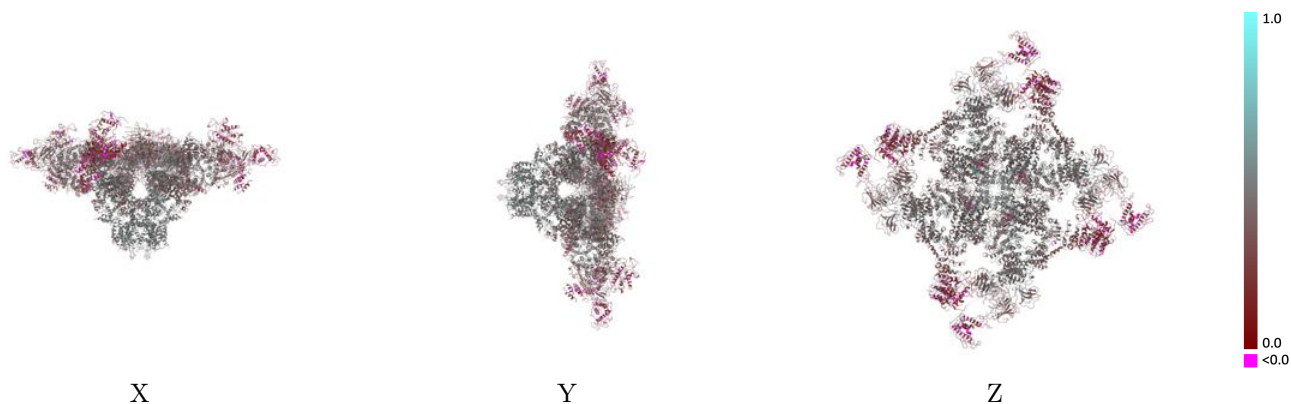
This section contains information regarding the fit between EMDB map EMD-9879 and PDB model 6JRR. Per-residue inclusion information can be found in section 3 on page 6.

9.1 Map-model overlay [i](#)



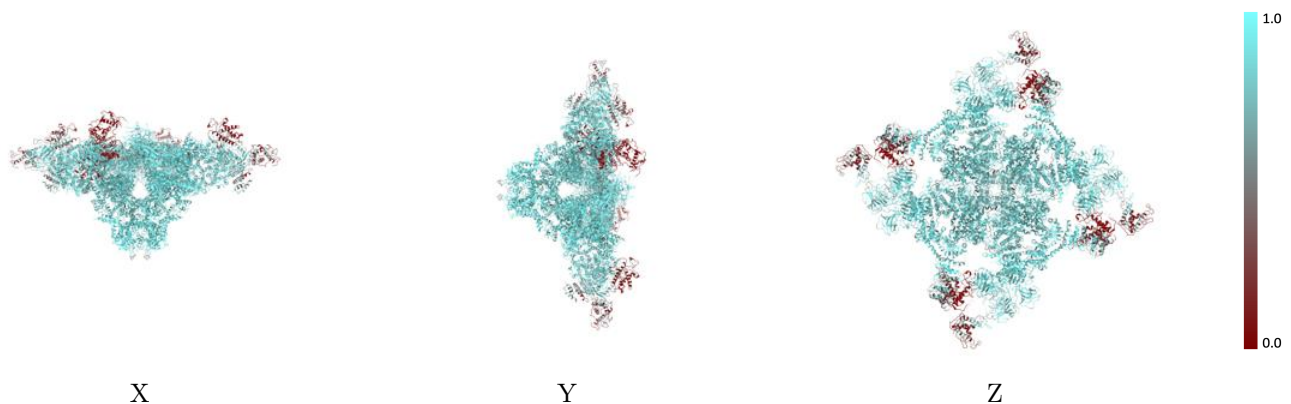
The images above show the 3D surface view of the map at the recommended contour level 0.022 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



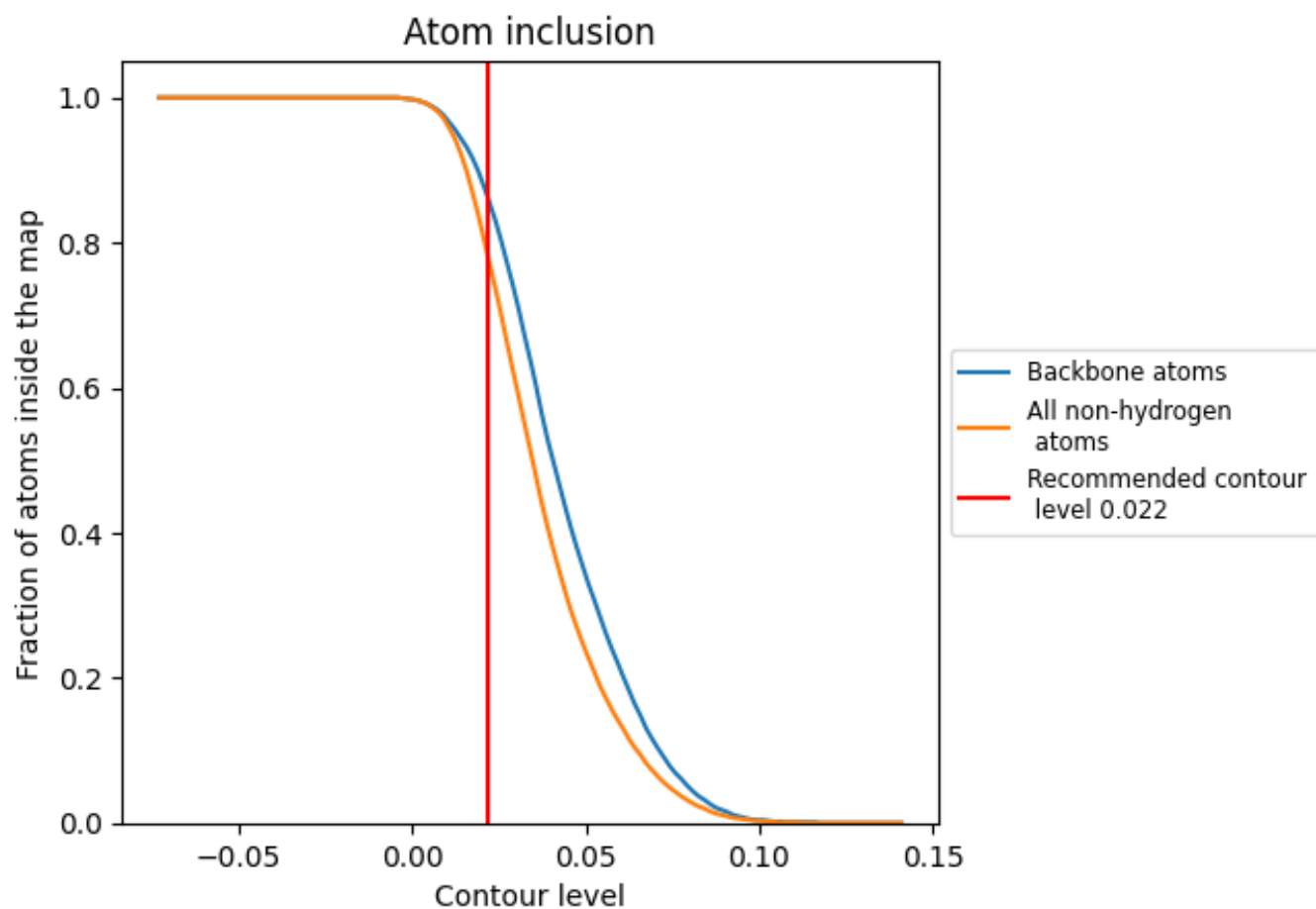
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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



















9.4 Atom inclusion [i](#)



At the recommended contour level, 86% 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 (0.022) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7780	 0.3900
A	 0.7770	 0.3900
B	 0.8140	 0.4170
C	 0.7770	 0.3890
D	 0.8150	 0.4160
E	 0.7770	 0.3890
F	 0.8180	 0.4170
G	 0.7770	 0.3890
H	 0.8150	 0.4160

