



## wwPDB EM Validation Summary Report ⓘ

Nov 8, 2023 – 03:10 PM EST

PDB ID : 8UQ3  
EMDB ID : EMD-42459  
Title : Structure of human RyR2-S2808D in the closed state in the presence of ARM210  
Authors : Miotto, M.C.; Marks, A.R.  
Deposited on : 2023-10-23  
Resolution : 3.18 Å (reported)  
Based on initial model : 7UA5

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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 : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

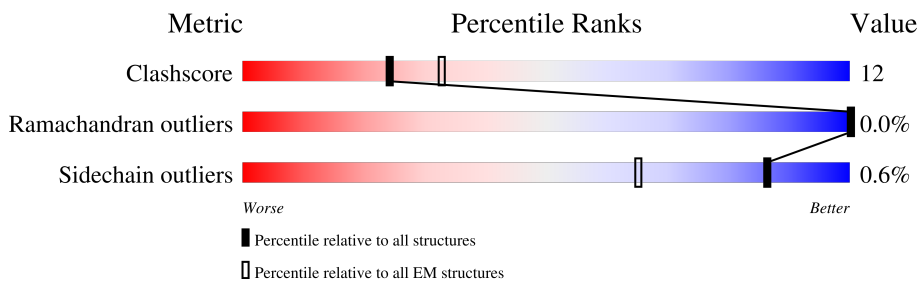
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.18 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	4967	 10% 63% 22% 15%
1	B	4967	 10% 63% 22% 15%
1	C	4967	 10% 63% 22% 15%
1	D	4967	 10% 62% 22% 15%
2	E	108	 10% 67% 31% ..
2	F	108	 10% 68% 31% ..
2	G	108	 10% 65% 33% ..
2	H	108	 10% 67% 31% ..

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
4	ATP	A	5003	-	-	X	-
4	ATP	B	5003	-	-	X	-
4	ATP	C	5003	-	-	X	-
4	ATP	D	5003	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 138700 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 Ryanodine receptor 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	4224	33771	21516	5745	6280	230	2	0
1	B	4224	33771	21516	5745	6280	230	2	0
1	C	4224	33771	21516	5745	6280	230	2	0
1	D	4224	33771	21516	5745	6280	230	2	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2808	ASP	SER	engineered mutation	UNP Q92736
B	2808	ASP	SER	engineered mutation	UNP Q92736
C	2808	ASP	SER	engineered mutation	UNP Q92736
D	2808	ASP	SER	engineered mutation	UNP Q92736

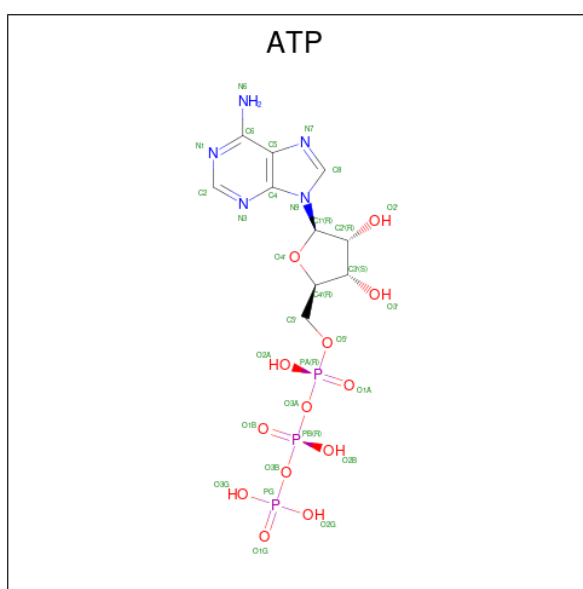
- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	E	107	818	516	144	154	4	0	0
2	F	107	818	516	144	154	4	0	0
2	G	107	818	516	144	154	4	0	0
2	H	107	818	516	144	154	4	0	0

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 4 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



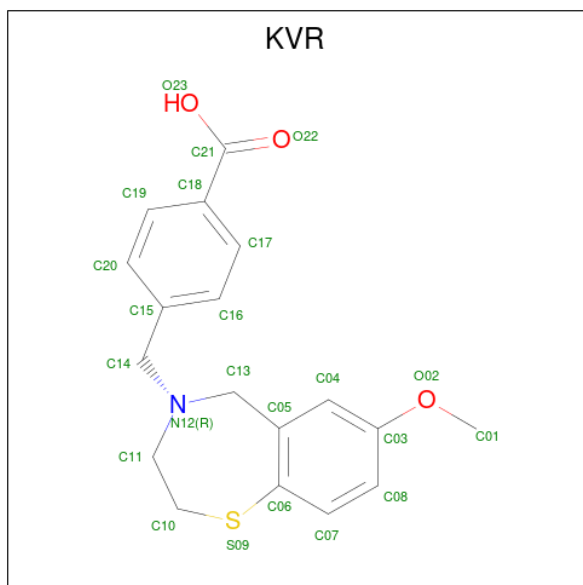
Mol	Chain	Residues	Atoms	AltConf
4	A	1	Total C N O P 31 10 5 13 3	0
4	A	1	Total C N O P 31 10 5 13 3	0
4	B	1	Total C N O P 31 10 5 13 3	0
4	B	1	Total C N O P 31 10 5 13 3	0
4	C	1	Total C N O P 31 10 5 13 3	0
4	C	1	Total C N O P 31 10 5 13 3	0
4	D	1	Total C N O P 31 10 5 13 3	0

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Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
4	D	1	31	10	5	13	3	0

- Molecule 5 is 4-[(7-methoxy-2,3-dihydro-1,4-benzothiazepin-4(5H)-yl)methyl]benzoic acid (three-letter code: KVR) (formula: C<sub>18</sub>H<sub>19</sub>NO<sub>3</sub>S).

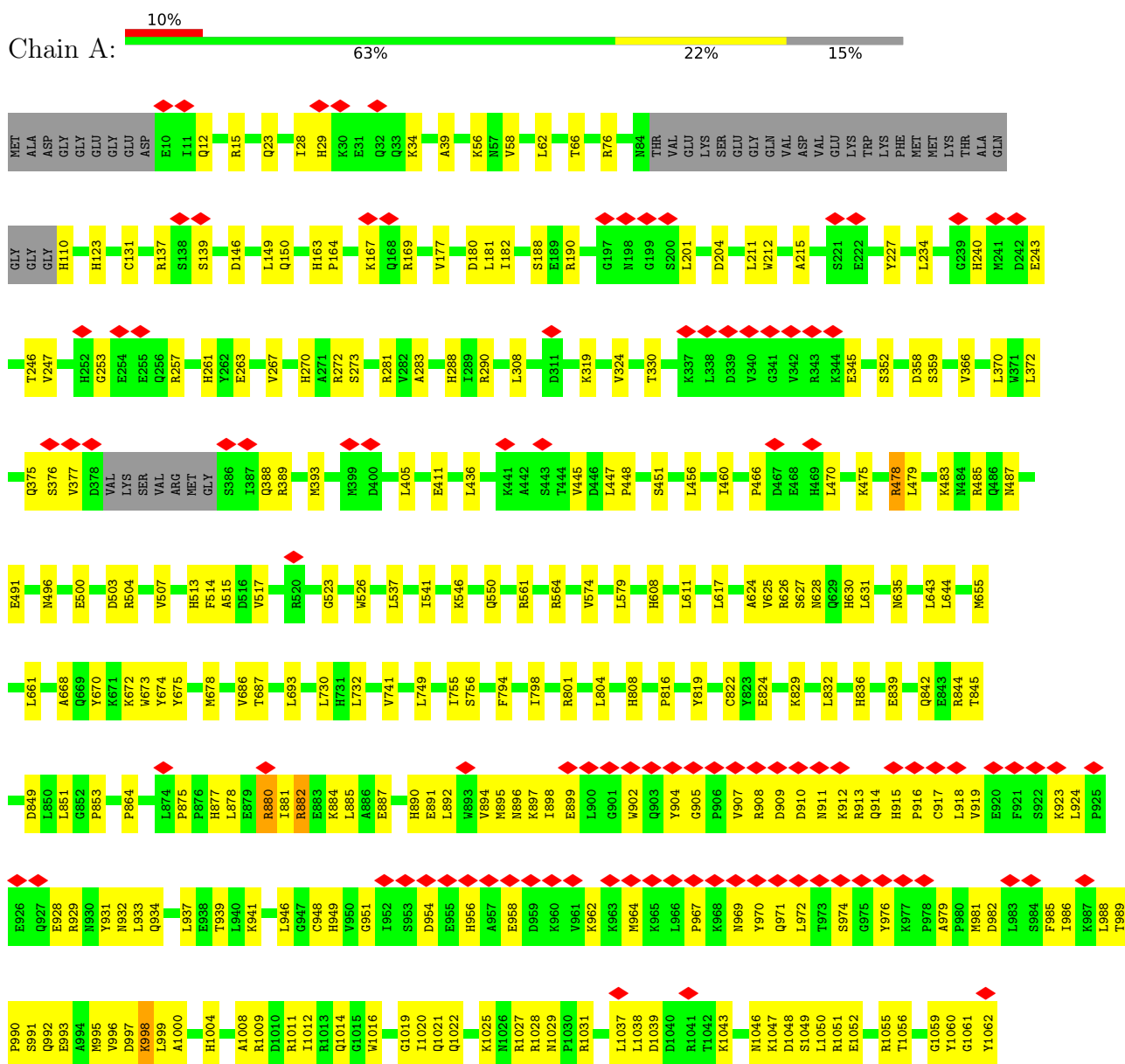


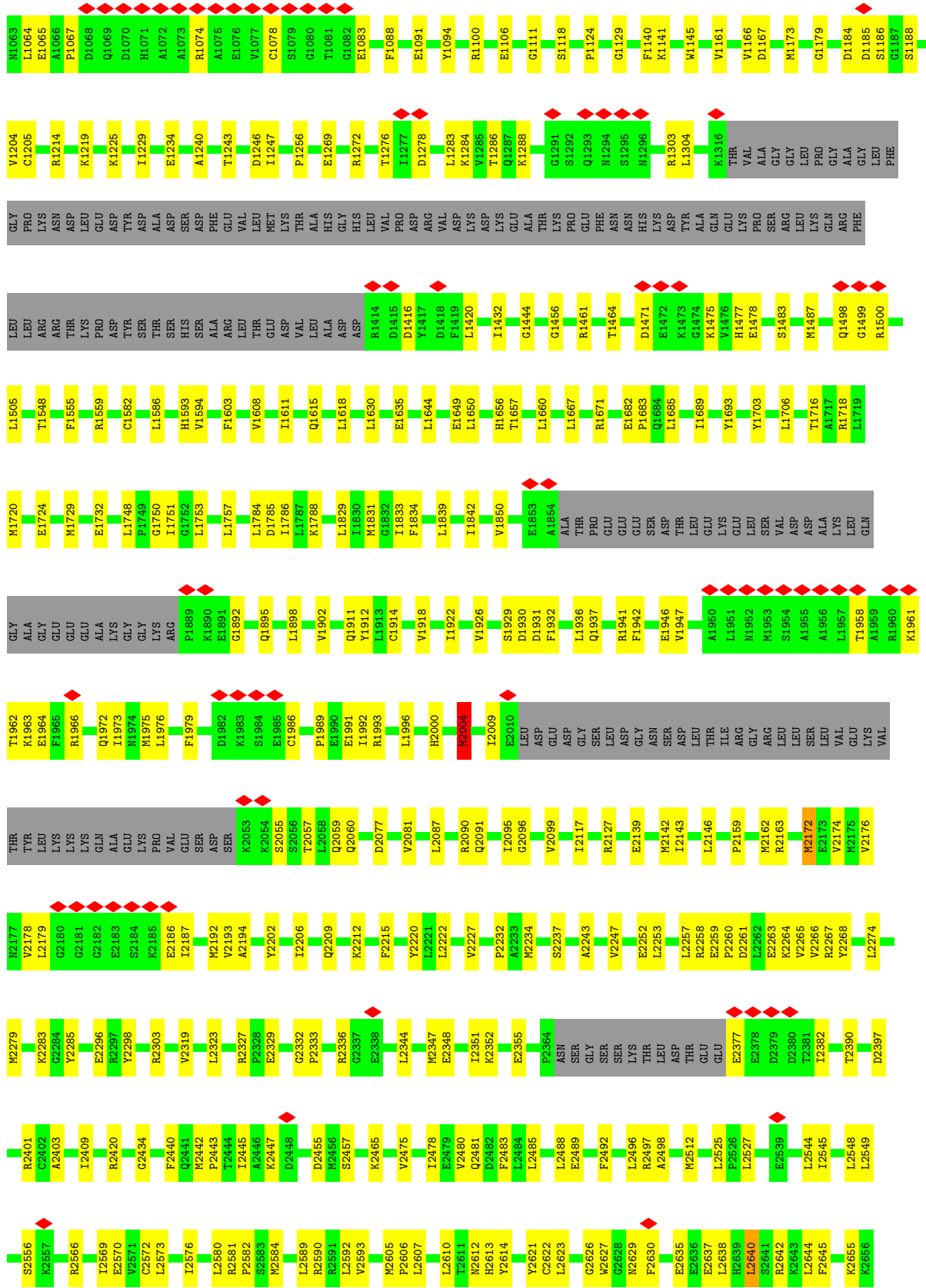
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
5	A	1	23	18	1	3	1	0
5	B	1	23	18	1	3	1	0
5	C	1	23	18	1	3	1	0
5	D	1	23	18	1	3	1	0

### 3 Residue-property plots [i](#)

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.

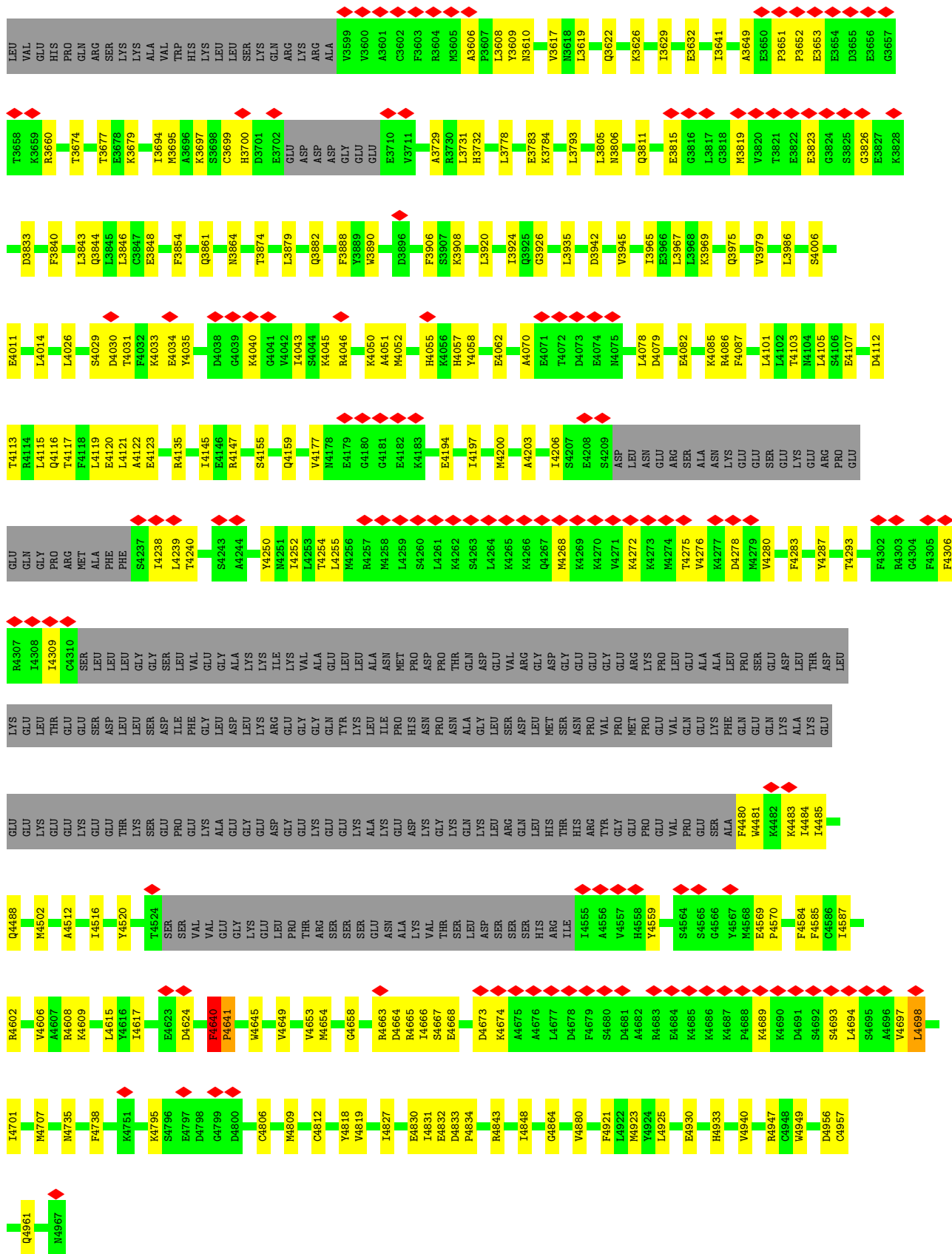
- Molecule 1: Ryanodine receptor 2





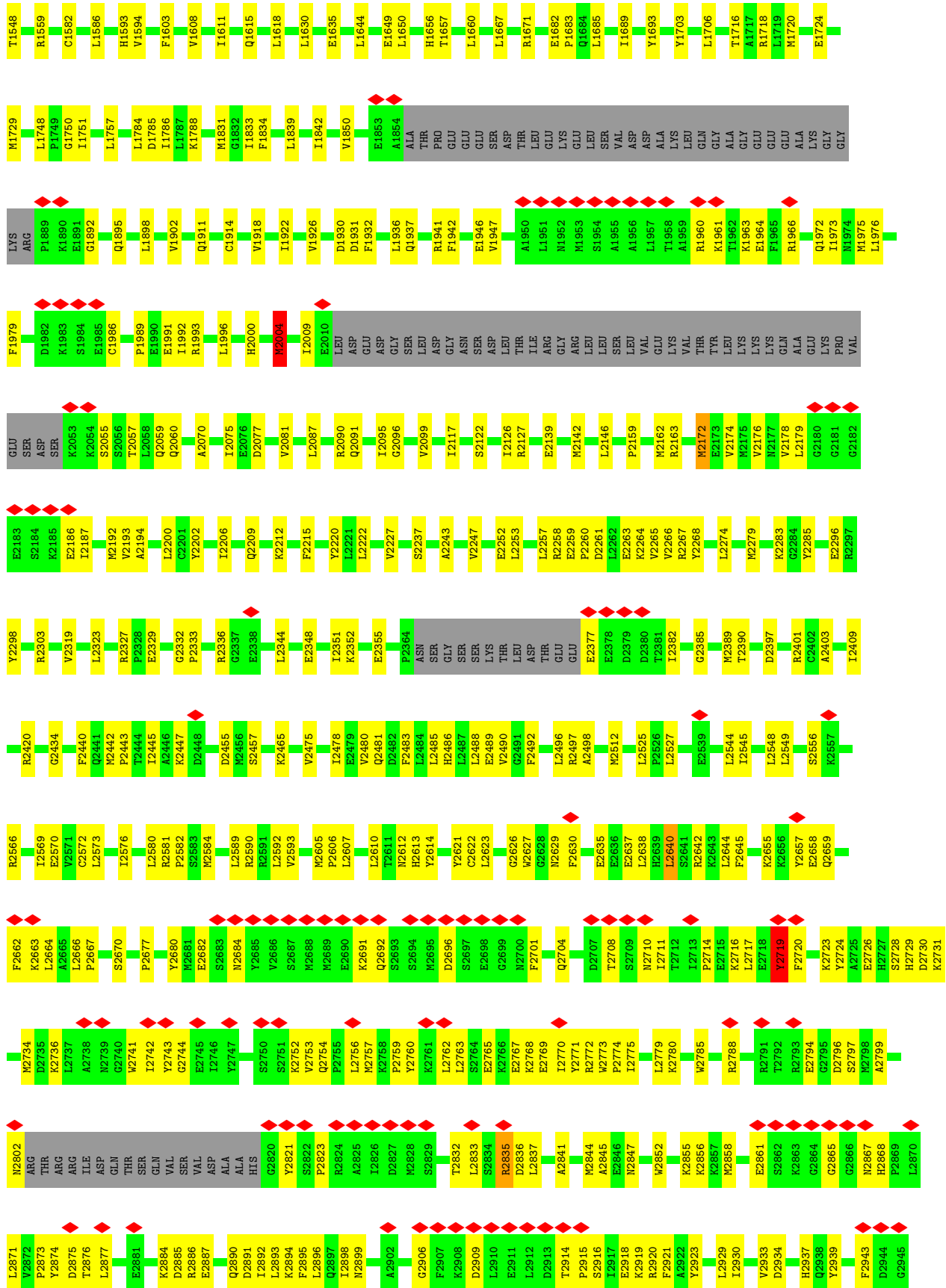






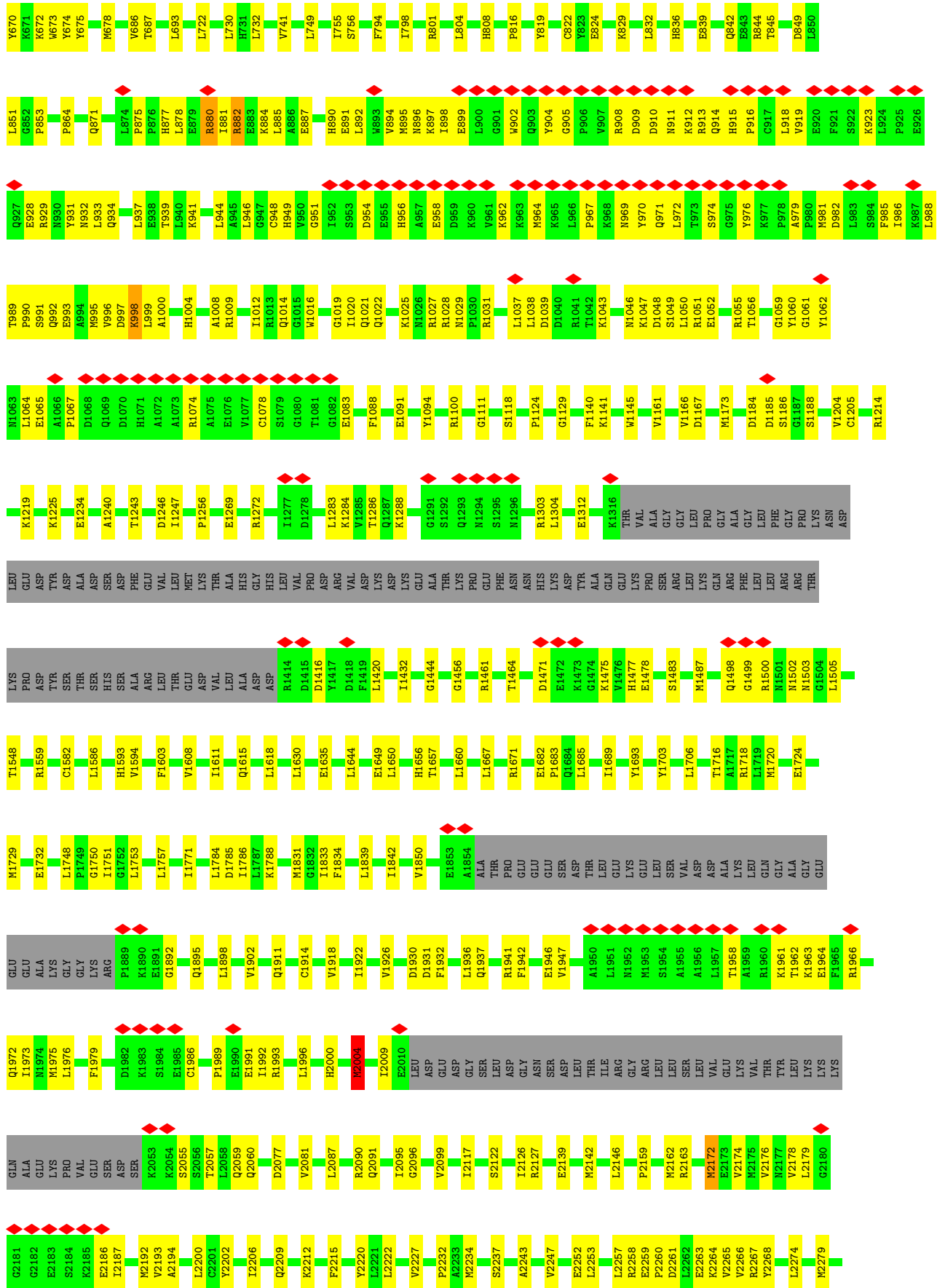
• Molecule 1: Ryanodine receptor 2

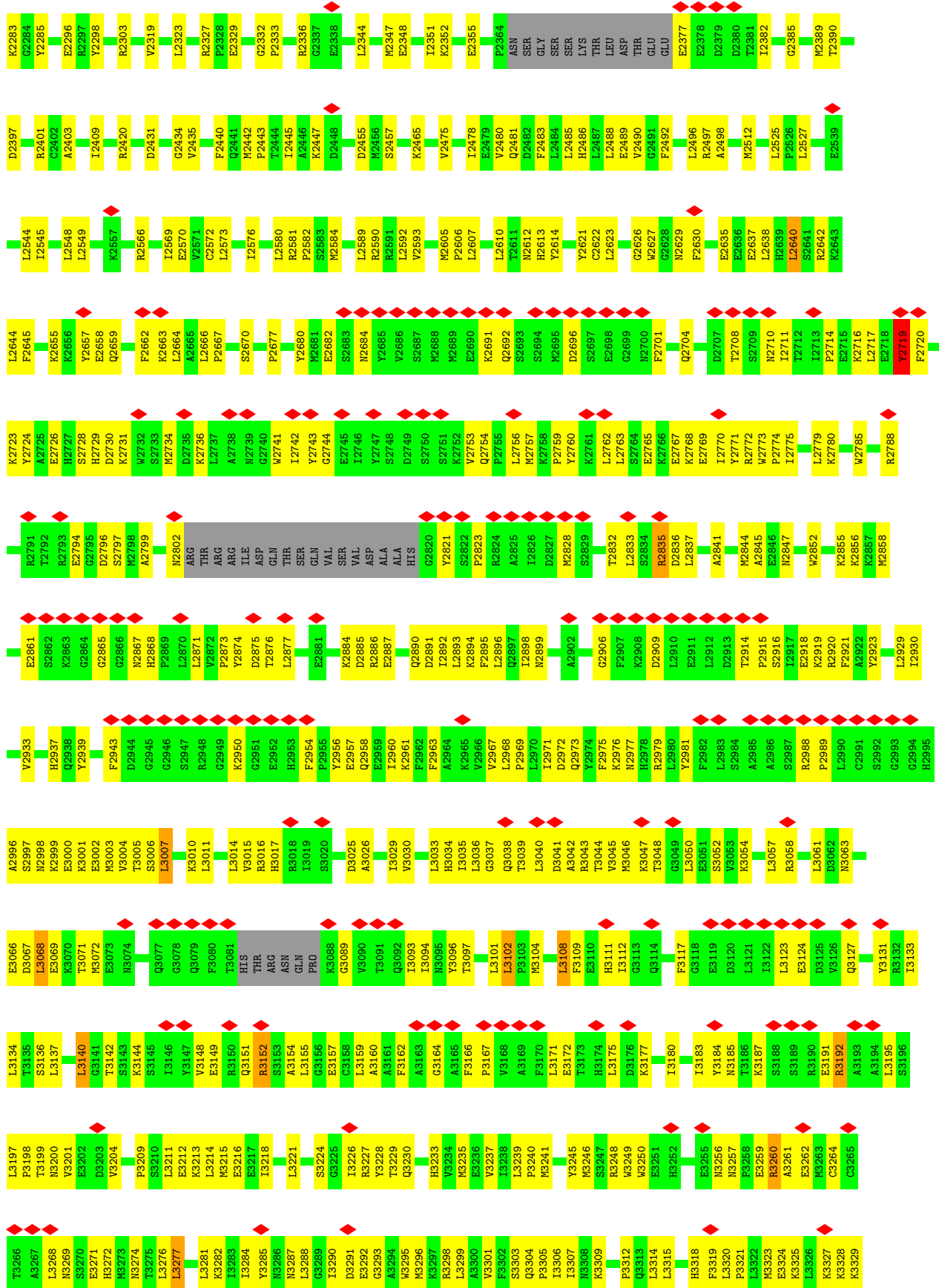




D4038	L3843	HIS	L3975	ASP	P3209	S3145	Q3077	S3006	G2946
G4039	Q3844	PRO	L3276	HIS	S3210	I3146	G3078	L3007	S2947
K4040	L3845	GLN	L3277	VAL	S3211	L3211	G3079	K3010	R2948
G4041	L3846	ARG	ASP	ALA	E3212	V3147	F3080	L3011	G2949
V4042	C3847	SER	THR	GLN	K3213	E3148	F3081	L3014	R2950
L4043	L3848	LYS	ILE	ALA	M3215	R3151	HIS	L3015	G2951
K4045	E3896	ALA	ARG	THR	E3216	R3152	THR	V3016	E2952
R4046	F3854	VAL	TRP	LEU	I3218	A3153	ARG	R3017	H2953
K4050	S3698	HIS	LYS	VAL	I3218	A3154	ASN	I3019	F2954
A4051	C3699	LYS	TRP	ALA	L3221	G3157	GLN	S3020	V2955
M4052	H3700	LEU	ASP	LYS	S3224	E3157	PRO	D3025	E2957
H4055	D3701	LEU	THR	ALA	G3225	C3158	K3088	A3026	O2958
Y4058	GLU	THR	LYS	ALA	I3226	L3159	G3089	I3029	I2960
E4062	ASP	ASP	ASP	GLU	R3227	A3160	V3090	I3029	I2961
T4063	ASP	GLN	LEU	LEU	R3228	A3161	T3091	I3029	K2962
L4067	ASP	ARG	LEU	LEU	R3229	F3162	Q3092	V3030	F2963
A4070	GLY	LYS	GLY	GLN	Q3230	A3163	I3093	L3033	A2964
E4071	GLU	THR	THR	ASN	H3233	G3164	M3095	H3034	K2965
T4072	E3710	ASP	ASP	PHE	V3234	A3165	V3096	I3035	V2966
D4073	V3711	THR	THR	THR	M3235	F3166	T3097	L3036	L2968
F4074	Q3728	VAL	THR	VAL	E3236	V3167	L3101	G3037	F2969
N4075	A3729	PRO	ALA	GLN	V3237	P3168	L3102	Q3038	L2970
L4078	R3730	ASP	PRO	ASN	I3238	A3169	P3103	T3039	L2971
D4079	L3731	GLU	GLY	GLN	R3239	F3170	M3104	D3040	D2972
E4082	H3732	THR	LEU	ASN	M3241	L3171	F3108	A3042	Q2973
K4085	I3785	LEU	ILE	VAL	Y3245	E3172	L3109	L3043	V2974
R4086	L3778	ARG	ALA	PHE	M3246	H3174	E3110	V3045	F2975
F4087	E3783	VAL	LEU	LEU	S3247	L3175	H3111	R2976	K2977
L4101	K3784	LEU	ALA	ILE	R3248	D3176	I3112	M2977	H2978
L4102	L3806	ASN	PHE	THR	M3250	K3177	G3113	K3047	R2979
T4103	N3806	VAL	SER	THR	E3251	I3180	Q3114	T3048	L2980
R4104	Q3811	VAL	LYS	LYS	H3252	T3183	F3117	G3049	V2981
L4105	E3815	VAL	LEU	ASP	E3255	E3184	G3118	L3050	F2982
S4106	G3816	VAL	LEU	THR	N3256	N3185	E3119	E3051	L2983
E4107	G3817	VAL	LEU	LYS	M3257	N3186	D3120	S3052	S2984
D4112	G3818	THR	THR	ASN	R3258	K3187	L3121	K3054	A2985
T4113	M3819	GLU	ALA	LYS	E3259	S3188	I3122	L3057	A2986
L4115	V3820	GLN	ALA	ALA	R3260	S3189	L3123	R3058	S2987
Q4116	T3821	VAL	VAL	TRP	A3261	R3190	E3124	L3061	R2988
T4117	E3822	ASP	ASP	LEU	E3262	R3192	D3125	D3062	P2989
F4118	F3823	GLY	GLY	GLY	M3263	A3193	V3126	N3063	L2990
L4119	G3824	VAL	ILE	ASN	C3264	A3194	Q3127	E3066	C2991
E4122	S3825	ARG	ARG	PRO	C3265	A3196	Y3131	D3067	S2992
A4123	G3826	ARG	SER	GLU	T3266	L3197	R3132	R3068	G2993
	E3827	ARG	GLY	LYS	A3267	P3198	I3133	E3069	G2994
	K3828	HIS	ILE	ALA	L3268	R3199	L3134	K3070	A2995
	D3833	THR	THR	ALA	M3269	P3199	L3135	T3071	A2996
	F3840	VAL	GLY	GLY	S3270	N3200	S3136	M3072	S2997
		LEU	LEU	PHE	H3272	V3201	L3137	E3073	K2999
		GLY	ASP	ARG	M3273	E3202	L3140	N3074	E3000
					N3274	D3203	G3141	K3001	K3002
						V3204	T3142	M3003	V3004
						T3208	S3143	V3004	T3005

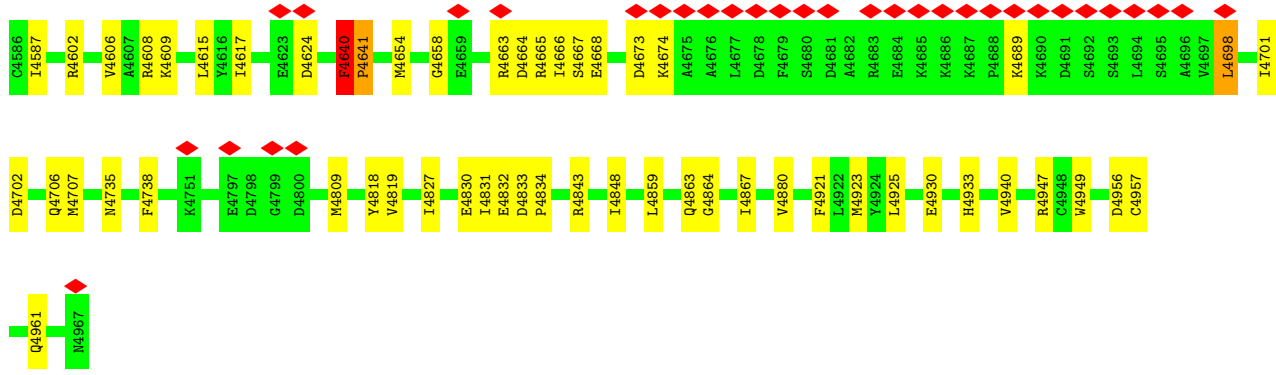




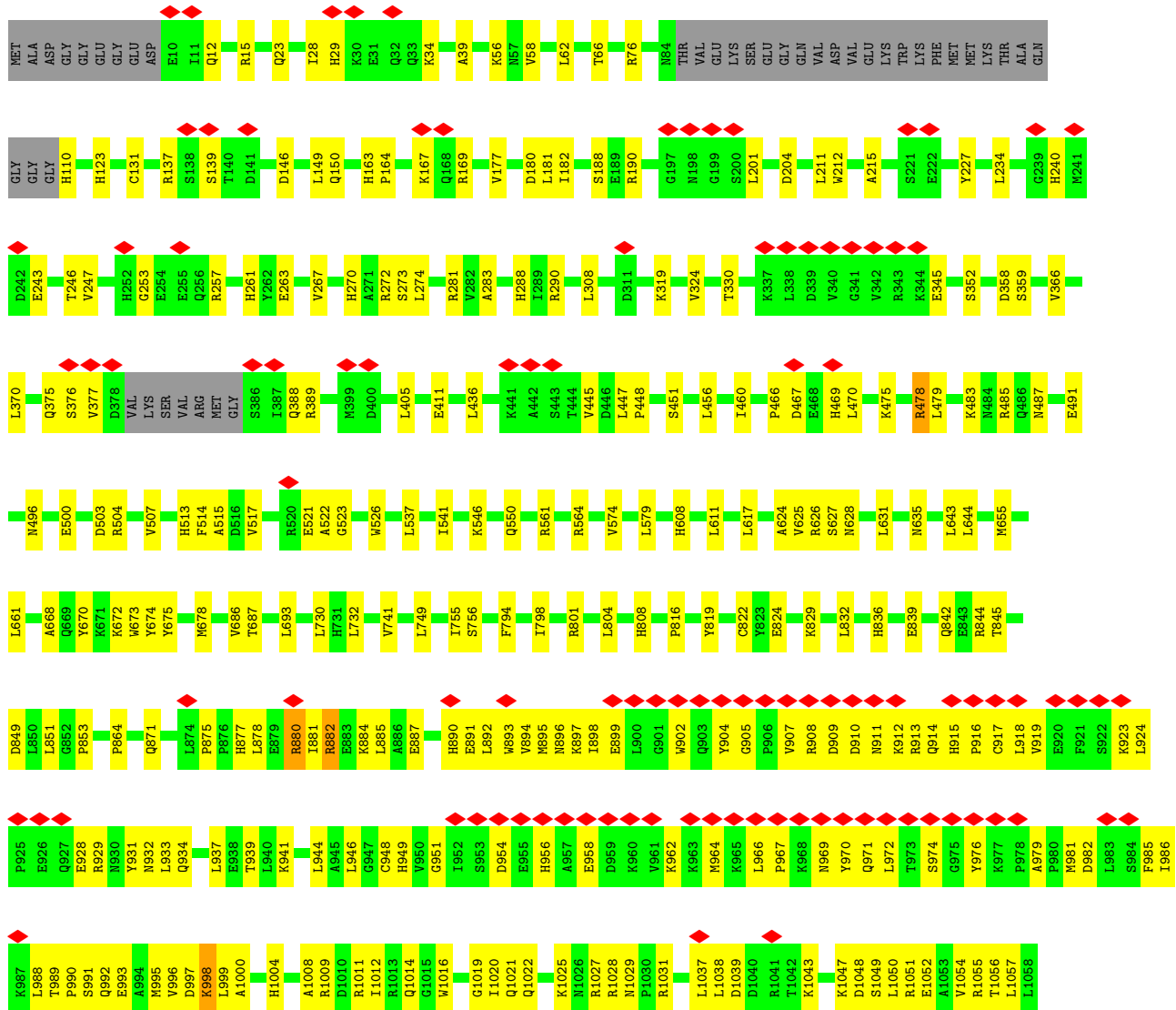


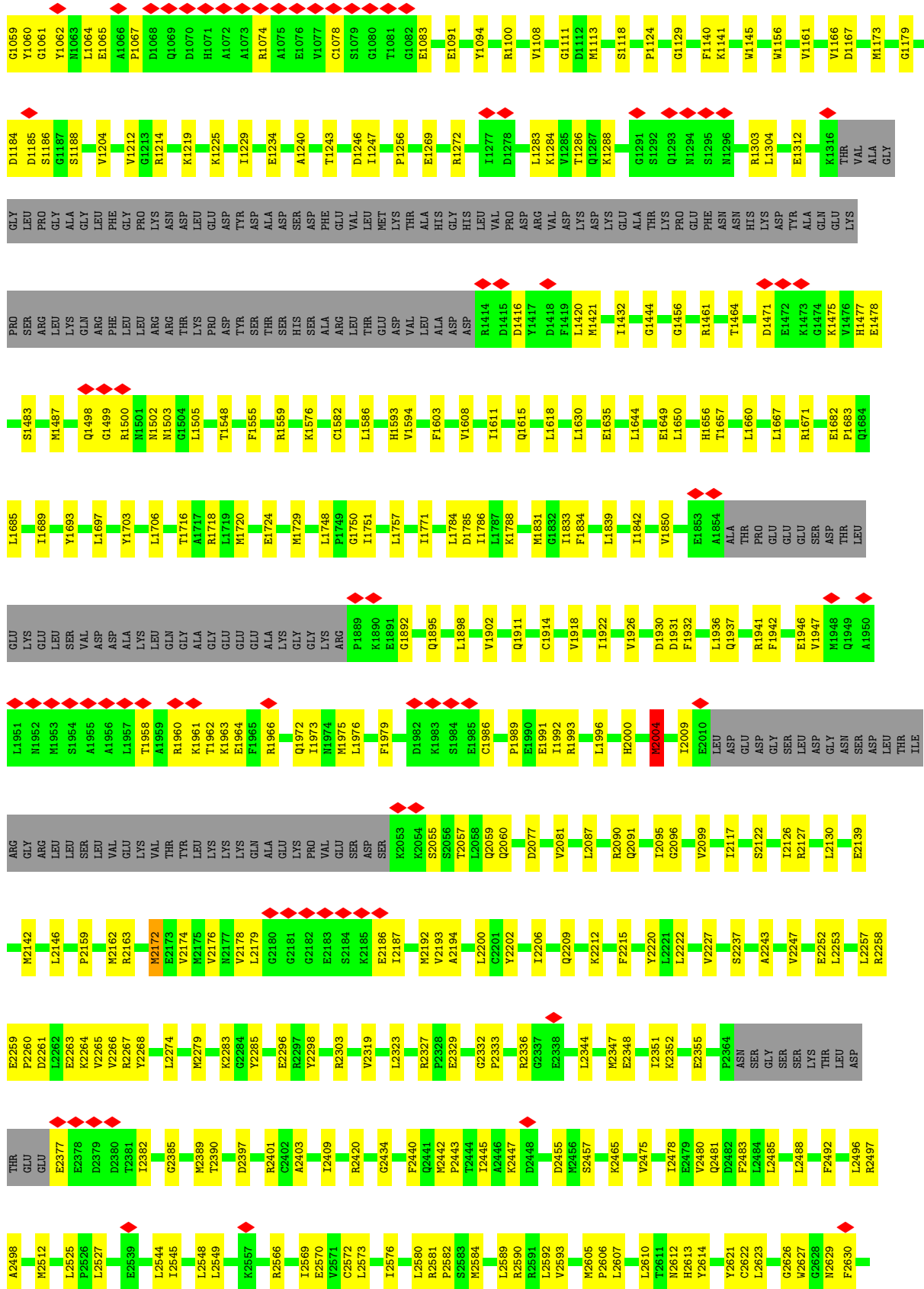




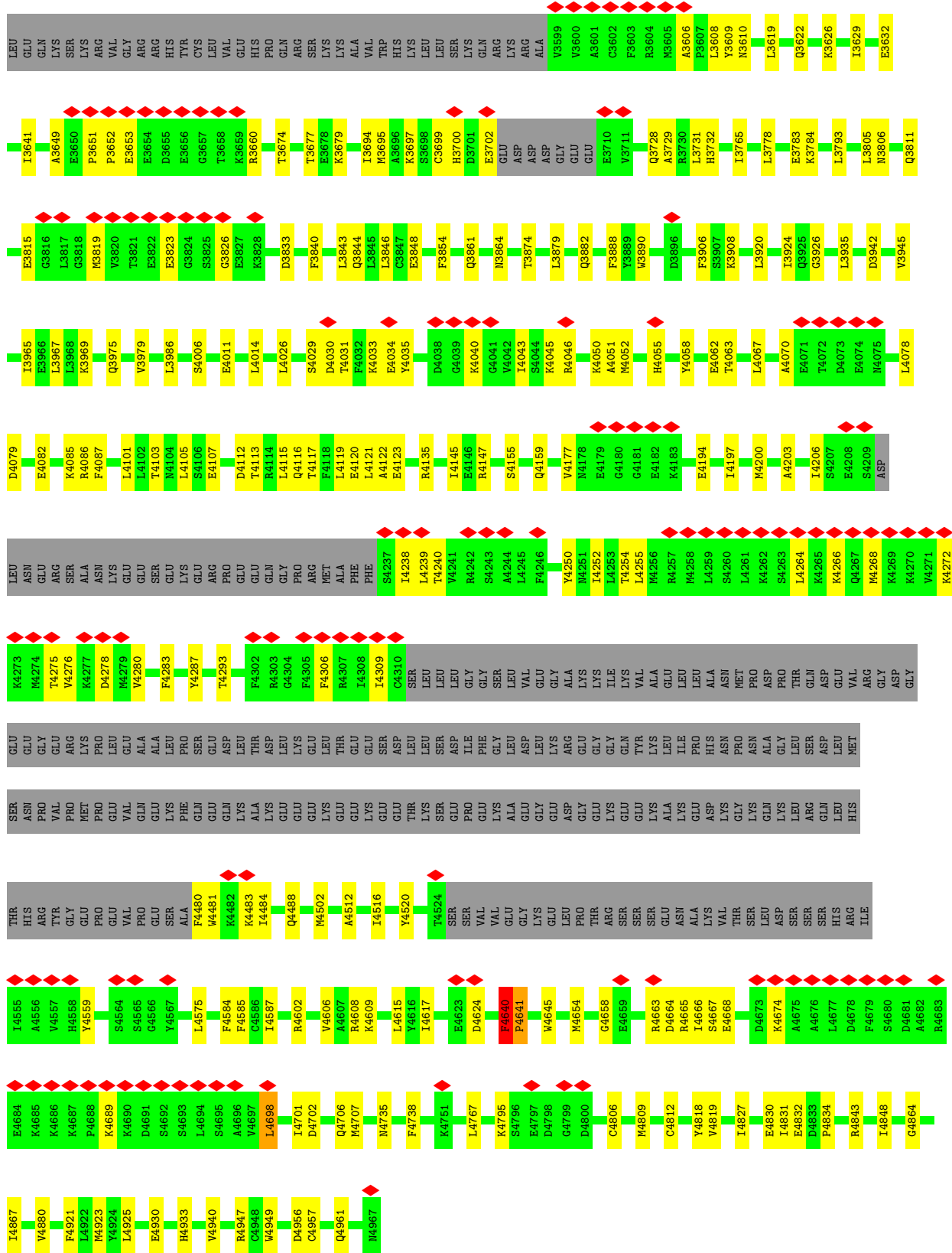


• Molecule 1: Ryanodine receptor 2

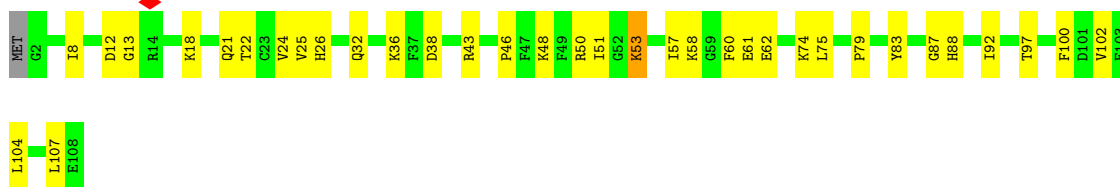




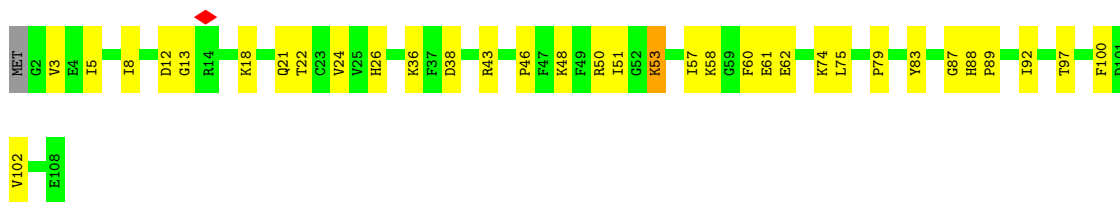




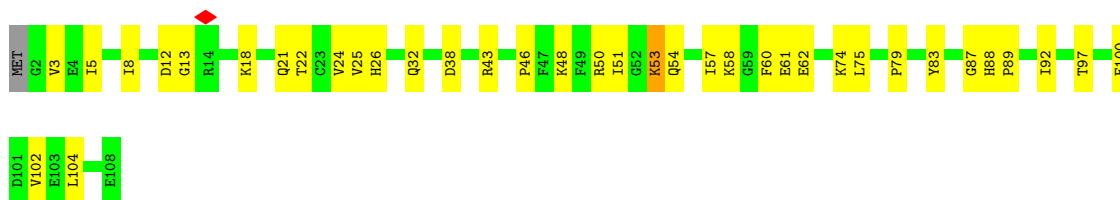
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



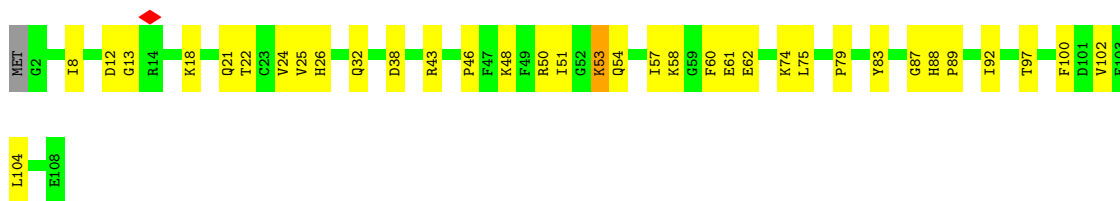
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



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



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



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	83460	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 ( $e^-/\text{\AA}^2$ )	58	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.550	Depositor
Minimum map value	-0.019	Depositor
Average map value	0.009	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.12	Depositor
Map size ( $\text{\AA}$ )	424.96, 424.96, 424.96	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.83, 0.83, 0.83	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, KVR, 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	0.27	0/34511	0.51	9/46614 (0.0%)
1	B	0.27	0/34511	0.51	9/46614 (0.0%)
1	C	0.27	0/34511	0.51	9/46614 (0.0%)
1	D	0.27	0/34511	0.51	9/46614 (0.0%)
2	E	0.29	0/834	0.53	0/1123
2	F	0.29	0/834	0.53	0/1123
2	G	0.29	0/834	0.53	0/1123
2	H	0.29	0/834	0.53	0/1123
All	All	0.27	0/141380	0.51	36/190948 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	3
1	C	0	3
1	D	0	3
All	All	0	12

There are no bond length outliers.

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	3277	LEU	CA-CB-CG	8.45	134.73	115.30
1	A	3277	LEU	CA-CB-CG	8.43	134.69	115.30
1	C	3277	LEU	CA-CB-CG	8.42	134.67	115.30
1	B	3277	LEU	CA-CB-CG	8.42	134.66	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	2640	LEU	CB-CG-CD2	-7.00	99.11	111.00

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	3192	ARG	Sidechain
1	A	3926	GLY	Peptide
1	A	4640	PHE	Peptide
1	B	3192	ARG	Sidechain
1	B	3926	GLY	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	33771	0	33455	796	0
1	B	33771	0	33455	790	0
1	C	33771	0	33455	799	0
1	D	33771	0	33455	809	0
2	E	818	0	821	24	0
2	F	818	0	821	23	0
2	G	818	0	821	25	0
2	H	818	0	821	26	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	62	0	24	9	0
4	B	62	0	24	9	0
4	C	62	0	24	9	0
4	D	62	0	24	10	0
5	A	23	0	0	7	0
5	B	23	0	0	7	0
5	C	23	0	0	7	0
5	D	23	0	0	7	0
All	All	138700	0	137200	3276	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 12.

The worst 5 of 3276 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:C:3227:ARG:HE	1:C:3228:TYR:H	1.13	0.92
1:B:4834:PRO:HB3	1:B:4843:ARG:HD3	1.51	0.92
1:D:4834:PRO:HB3	1:D:4843:ARG:HD3	1.51	0.92
1:A:3227:ARG:HE	1:A:3228:TYR:H	1.13	0.91
1:A:4834:PRO:HB3	1:A:4843:ARG:HD3	1.51	0.91

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	4198/4967 (84%)	4073 (97%)	123 (3%)	2 (0%)	100	100
1	B	4198/4967 (84%)	4075 (97%)	121 (3%)	2 (0%)	100	100
1	C	4198/4967 (84%)	4073 (97%)	123 (3%)	2 (0%)	100	100
1	D	4198/4967 (84%)	4075 (97%)	121 (3%)	2 (0%)	100	100
2	E	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
2	F	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
2	G	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
2	H	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
All	All	17212/20300 (85%)	16700 (97%)	504 (3%)	8 (0%)	100	100

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	4641	PRO

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Mol	Chain	Res	Type
1	B	4641	PRO
1	C	4641	PRO
1	D	4641	PRO
1	A	2770	ILE

### 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	3708/4358 (85%)	3687 (99%)	21 (1%)	86	94
1	B	3708/4358 (85%)	3687 (99%)	21 (1%)	86	94
1	C	3708/4358 (85%)	3687 (99%)	21 (1%)	86	94
1	D	3708/4358 (85%)	3687 (99%)	21 (1%)	86	94
2	E	88/89 (99%)	87 (99%)	1 (1%)	73	88
2	F	88/89 (99%)	87 (99%)	1 (1%)	73	88
2	G	88/89 (99%)	87 (99%)	1 (1%)	73	88
2	H	88/89 (99%)	87 (99%)	1 (1%)	73	88
All	All	15184/17788 (85%)	15096 (99%)	88 (1%)	86	94

5 of 88 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	2950	LYS
1	D	998	LYS
1	C	3140	LEU
1	C	4698	LEU
1	D	2303	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	650	ASN

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Mol	Chain	Res	Type
1	D	4933	HIS
1	D	1593	HIS
1	D	3111	HIS
1	B	2802	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 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	$\# Z  > 2$
5	KVR	D	5004	-	24,25,25	1.42	3 (12%)	32,34,34	1.72	2 (6%)
4	ATP	D	5003	-	26,33,33	0.60	0	31,52,52	0.78	2 (6%)
5	KVR	A	5004	-	24,25,25	1.41	3 (12%)	32,34,34	1.72	2 (6%)
5	KVR	B	5004	-	24,25,25	1.41	3 (12%)	32,34,34	1.71	3 (9%)
4	ATP	A	5003	-	26,33,33	0.60	0	31,52,52	0.79	2 (6%)
4	ATP	B	5002	-	26,33,33	0.61	0	31,52,52	0.78	2 (6%)
4	ATP	A	5002	-	26,33,33	0.61	0	31,52,52	0.78	2 (6%)
4	ATP	D	5002	-	26,33,33	0.61	0	31,52,52	0.79	2 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	ATP	C	5002	-	26,33,33	0.61	0	31,52,52	0.78	2 (6%)
4	ATP	B	5003	-	26,33,33	0.59	0	31,52,52	0.79	2 (6%)
4	ATP	C	5003	-	26,33,33	0.60	0	31,52,52	0.78	2 (6%)
5	KVR	C	5004	-	24,25,25	1.42	3 (12%)	32,34,34	1.72	3 (9%)

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
5	KVR	D	5004	-	-	8/10/20/20	0/2/3/3
4	ATP	D	5003	-	-	8/18/38/38	0/3/3/3
5	KVR	A	5004	-	-	8/10/20/20	0/2/3/3
5	KVR	B	5004	-	-	8/10/20/20	0/2/3/3
4	ATP	A	5003	-	-	8/18/38/38	0/3/3/3
4	ATP	B	5002	-	-	3/18/38/38	0/3/3/3
4	ATP	A	5002	-	-	3/18/38/38	0/3/3/3
4	ATP	D	5002	-	-	3/18/38/38	0/3/3/3
4	ATP	C	5002	-	-	3/18/38/38	0/3/3/3
4	ATP	B	5003	-	-	8/18/38/38	0/3/3/3
4	ATP	C	5003	-	-	8/18/38/38	0/3/3/3
5	KVR	C	5004	-	-	8/10/20/20	0/2/3/3

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	5004	KVR	C06-S09	4.84	1.82	1.77
5	D	5004	KVR	C06-S09	4.84	1.82	1.77
5	A	5004	KVR	C06-S09	4.82	1.82	1.77
5	B	5004	KVR	C06-S09	4.80	1.82	1.77
5	A	5004	KVR	C13-C05	2.55	1.55	1.51

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	5004	KVR	C10-S09-C06	7.29	113.03	102.71
5	A	5004	KVR	C10-S09-C06	7.27	113.02	102.71

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	5004	KVR	C10-S09-C06	7.27	113.00	102.71
5	B	5004	KVR	C10-S09-C06	7.25	112.99	102.71
5	C	5004	KVR	C15-C14-N12	-3.05	107.20	113.12

There are no chirality outliers.

5 of 76 torsion outliers are listed below:

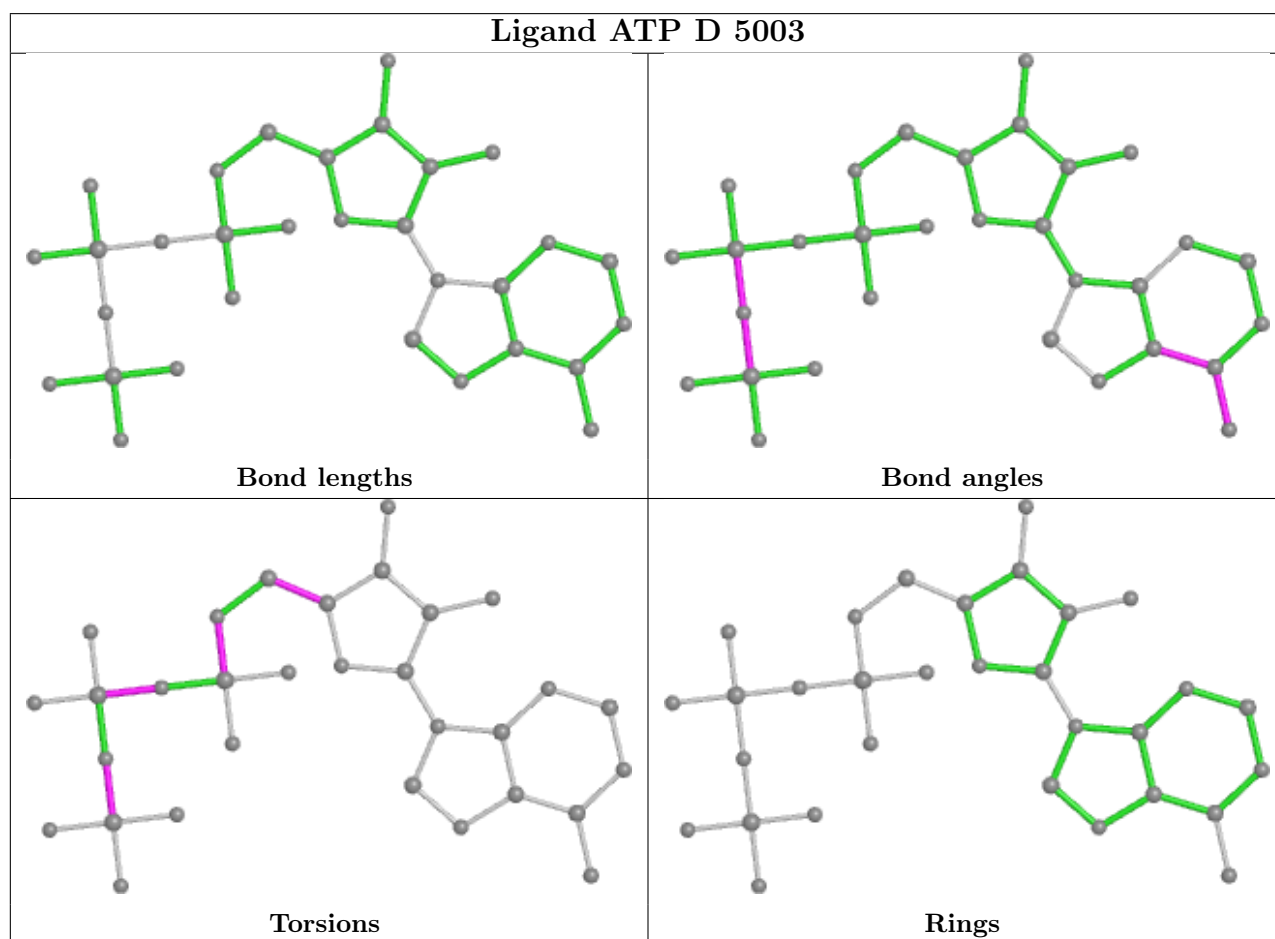
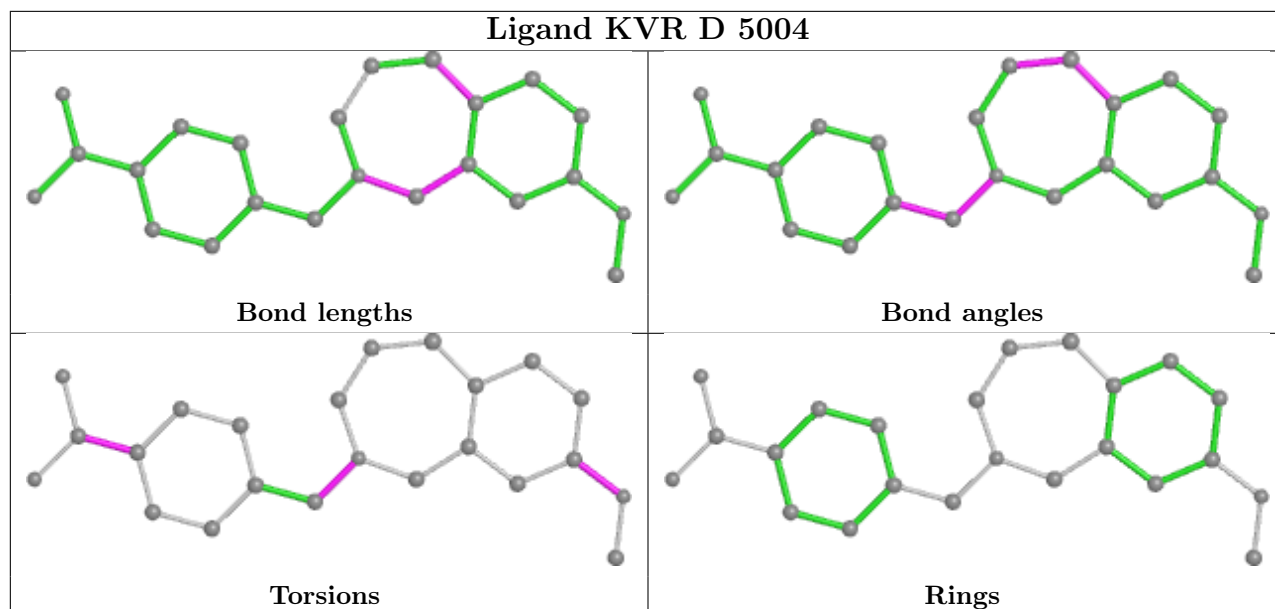
Mol	Chain	Res	Type	Atoms
4	A	5003	ATP	PB-O3B-PG-O2G
4	A	5003	ATP	C5'-O5'-PA-O1A
4	A	5003	ATP	C5'-O5'-PA-O2A
4	B	5003	ATP	PB-O3B-PG-O2G
4	B	5003	ATP	C5'-O5'-PA-O1A

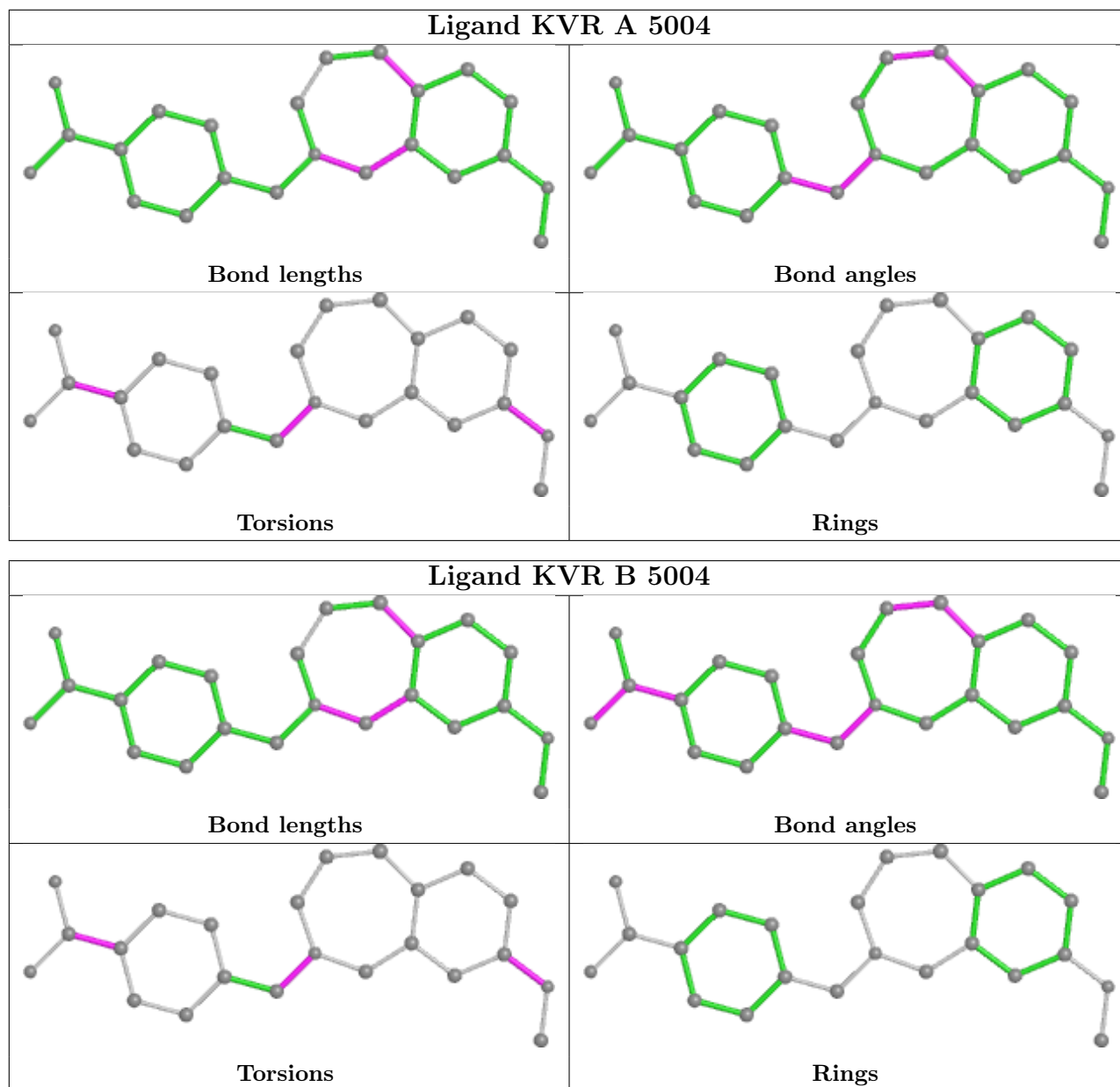
There are no ring outliers.

8 monomers are involved in 41 short contacts:

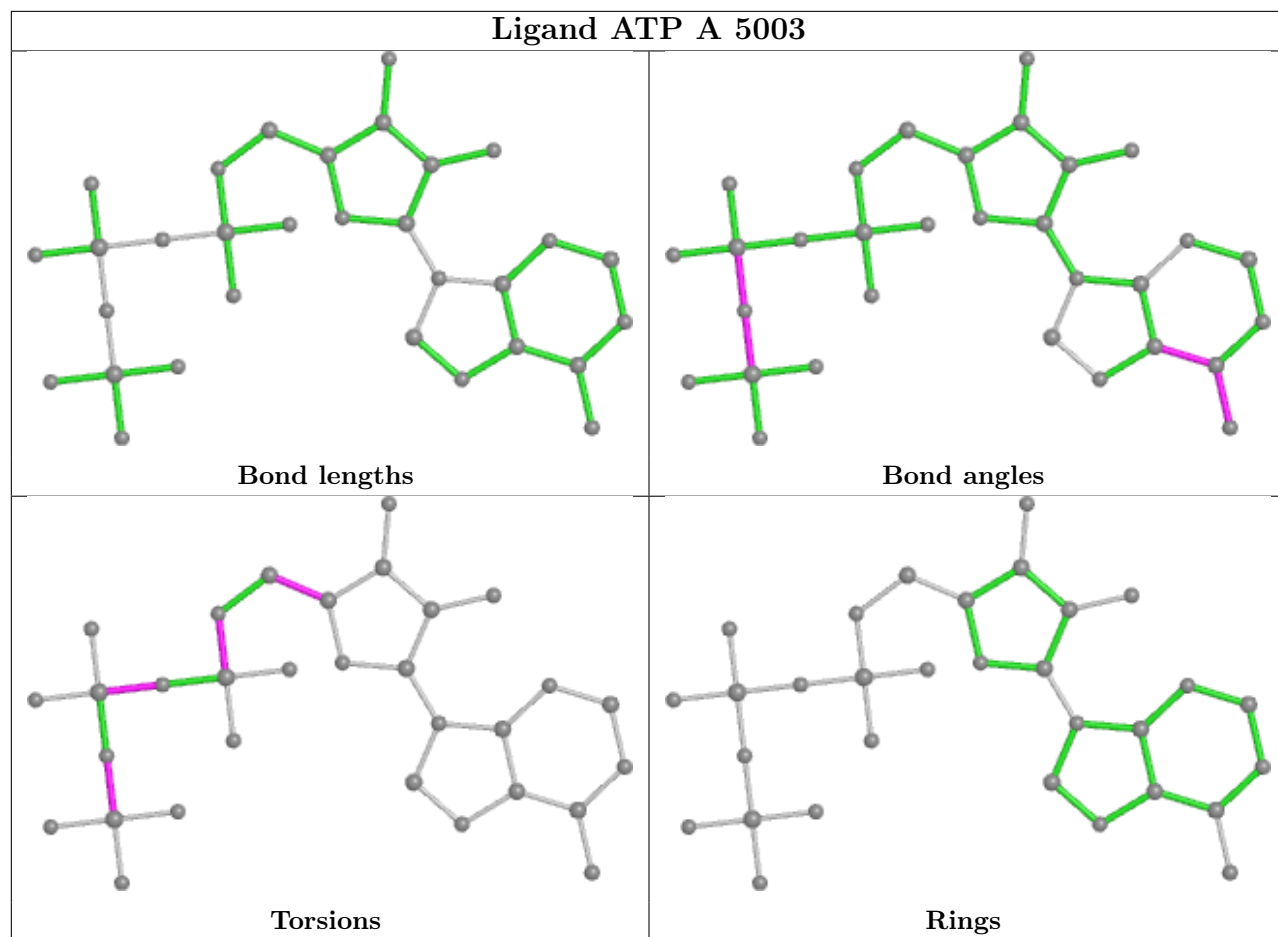
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	5004	KVR	7	0
4	D	5003	ATP	10	0
5	A	5004	KVR	7	0
5	B	5004	KVR	7	0
4	A	5003	ATP	9	0
4	B	5003	ATP	9	0
4	C	5003	ATP	9	0
5	C	5004	KVR	7	0

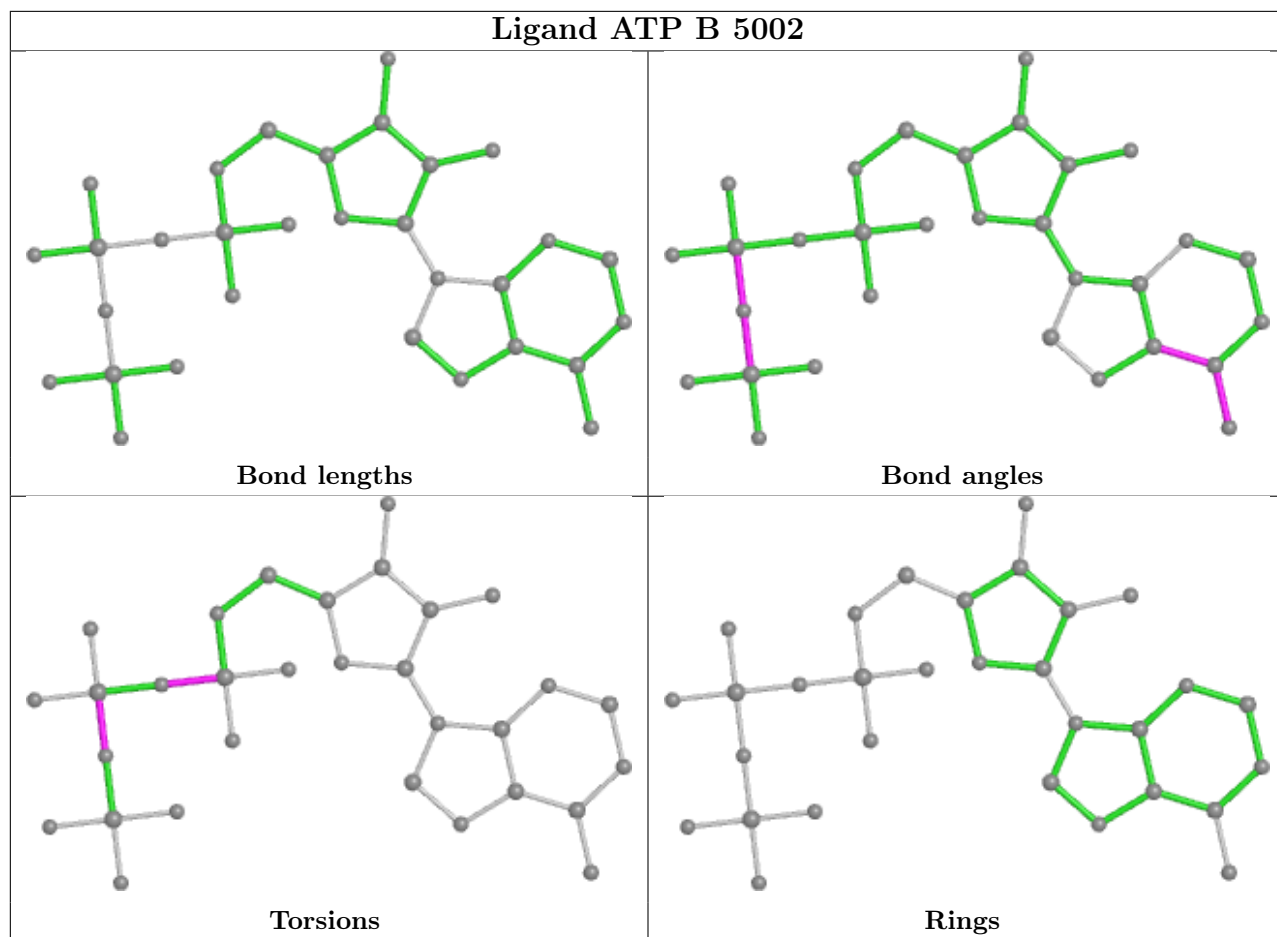
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

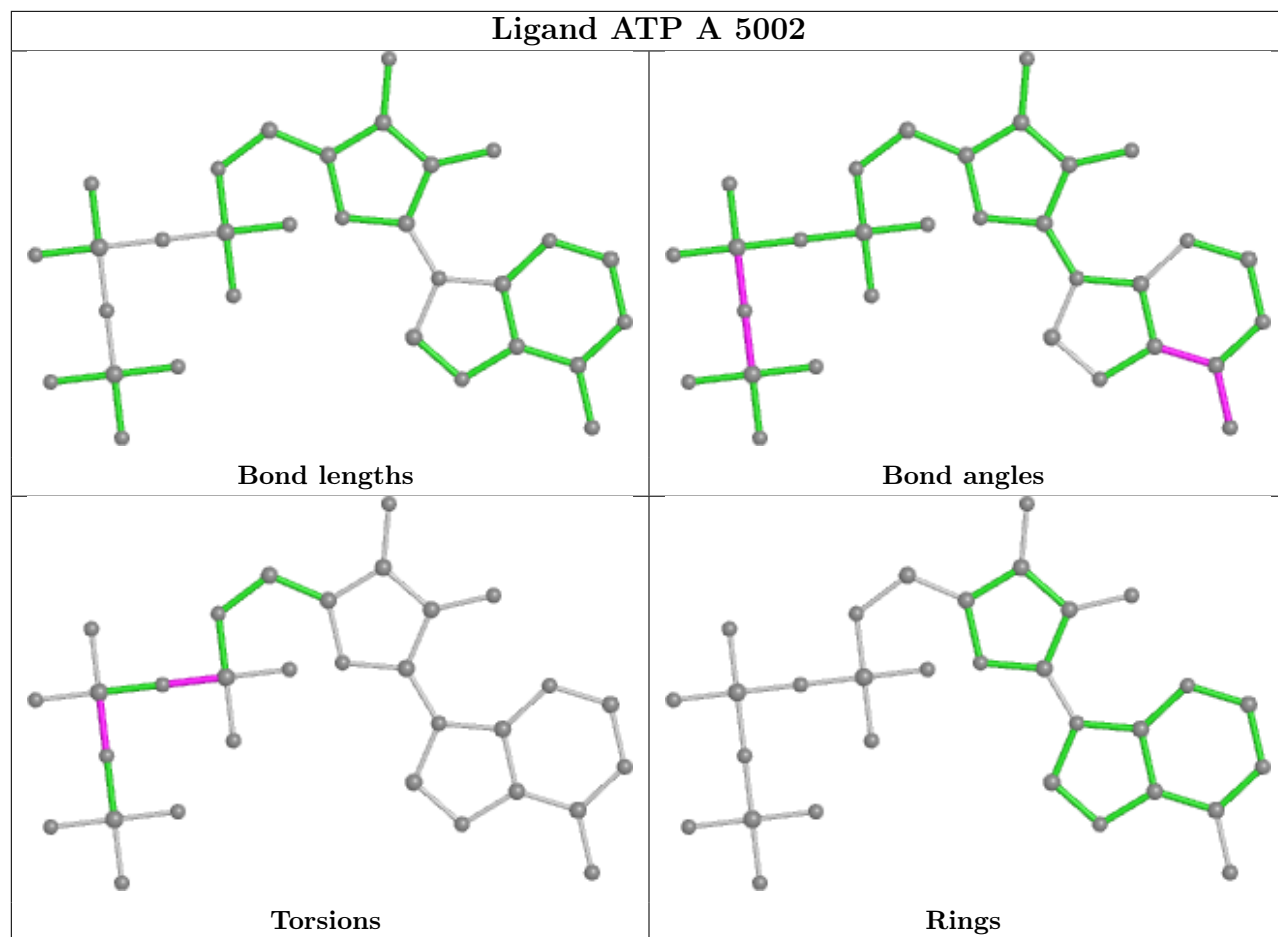


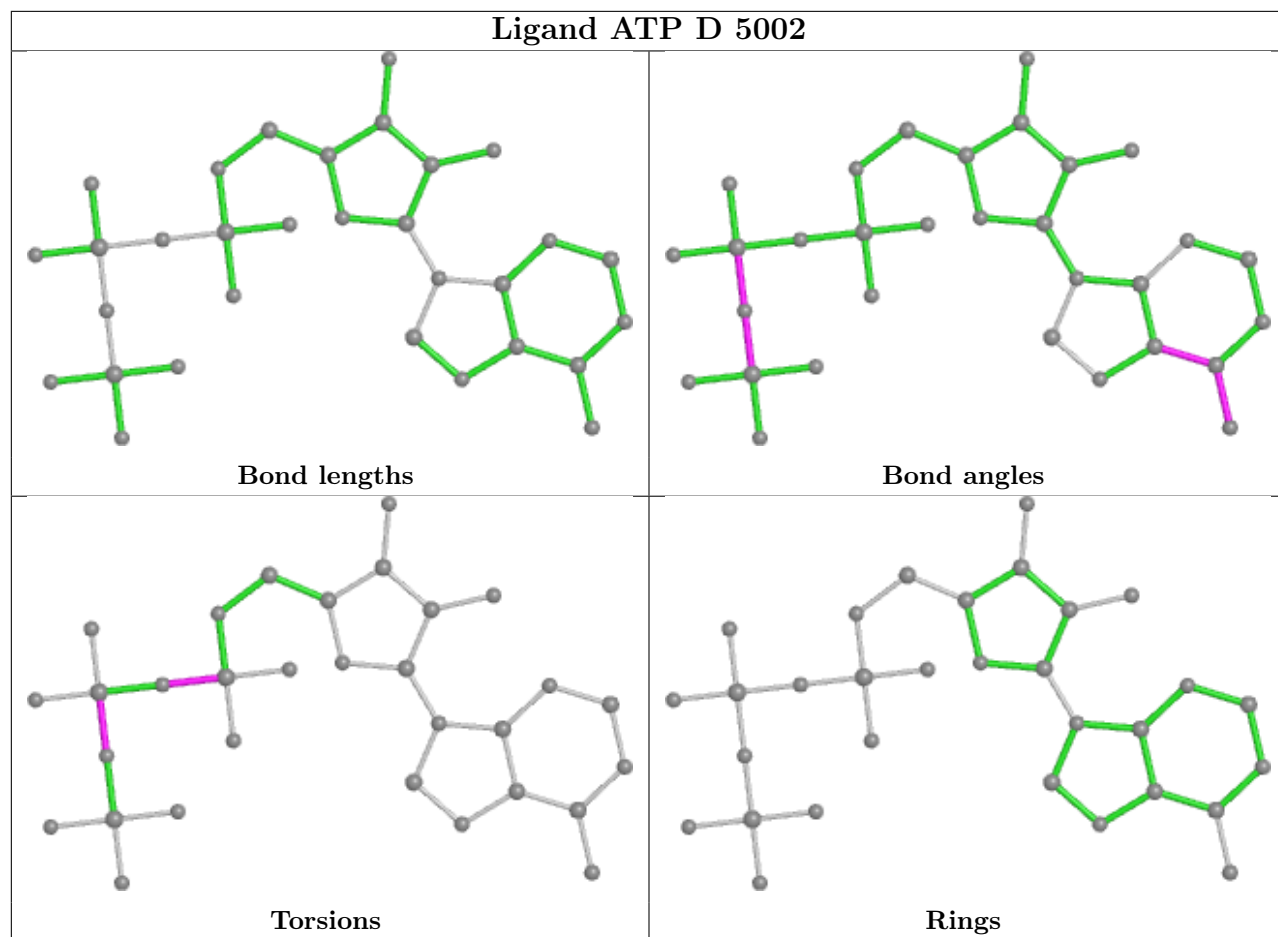


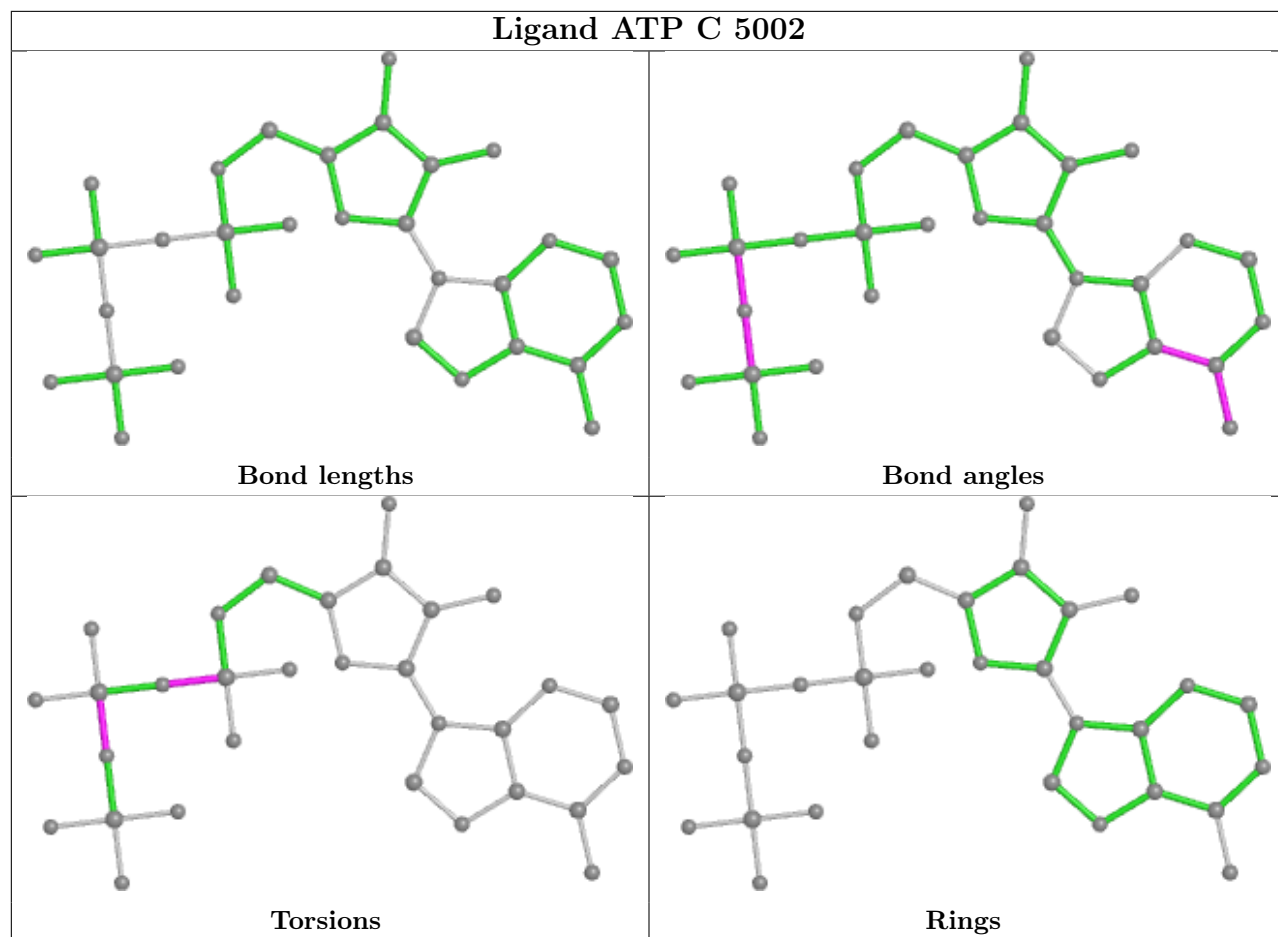


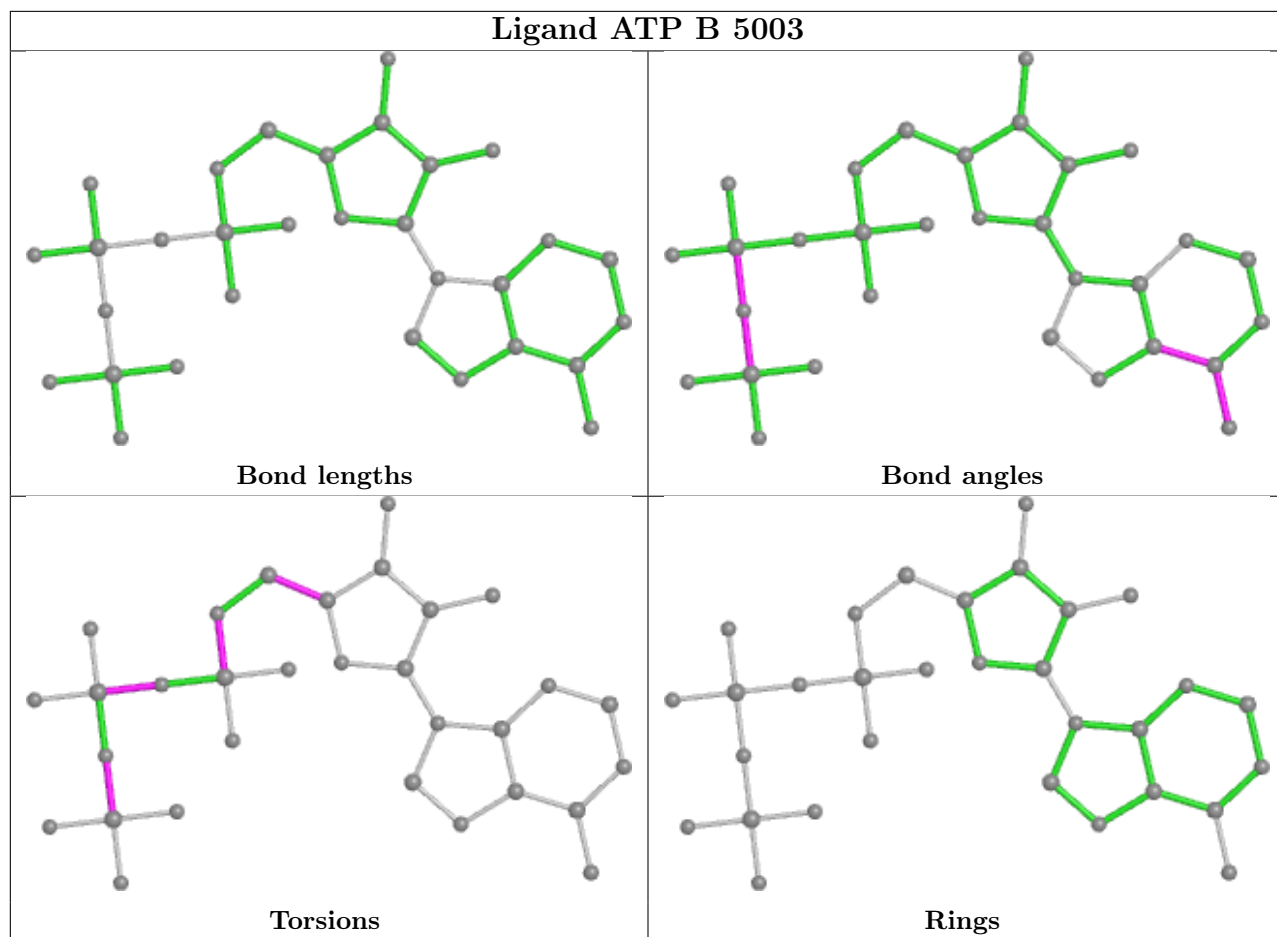


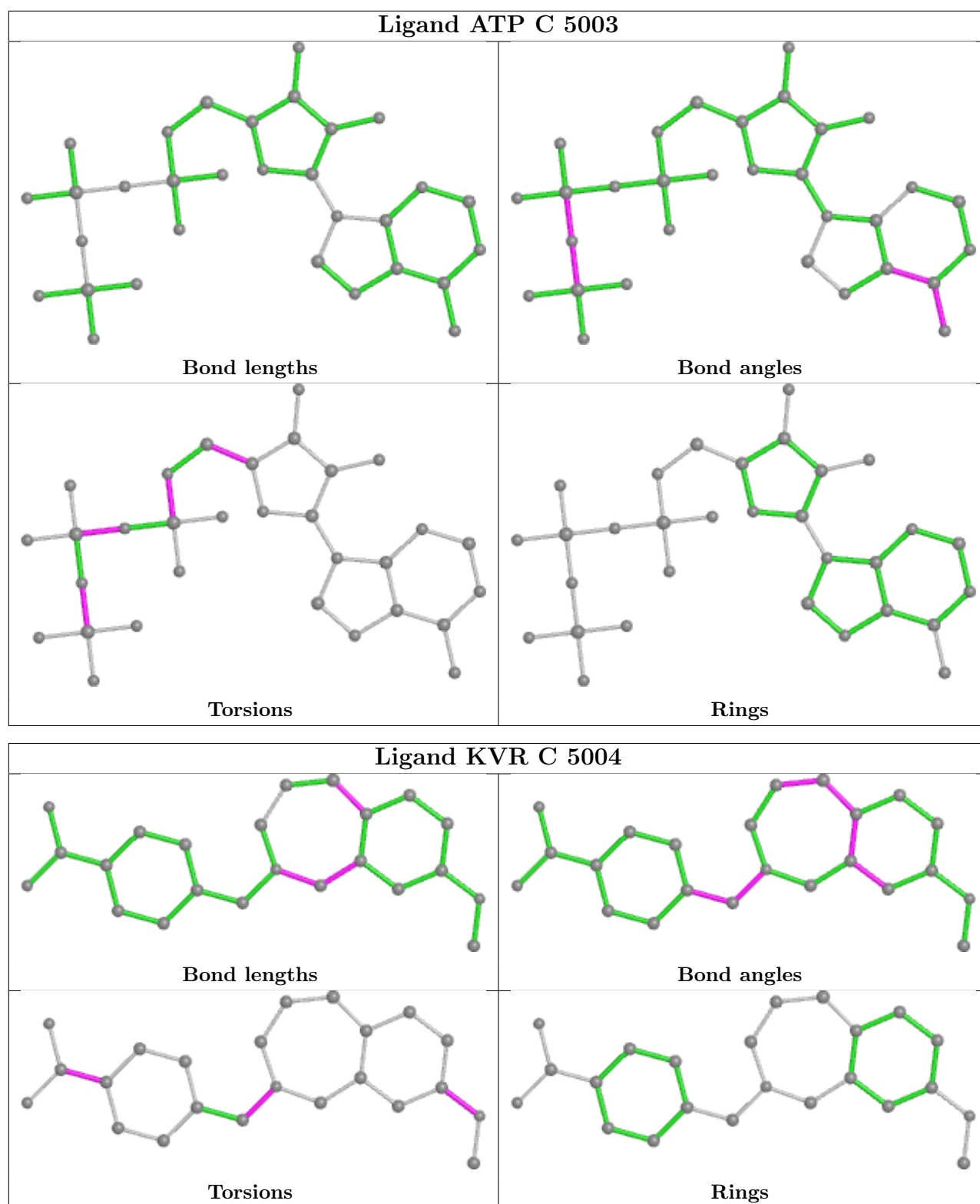












## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.



## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42459. These allow visual inspection of the internal detail of the map and identification of artifacts.

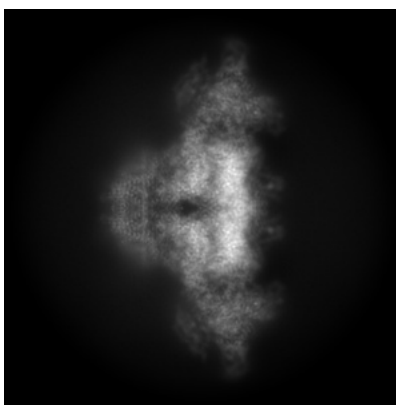
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

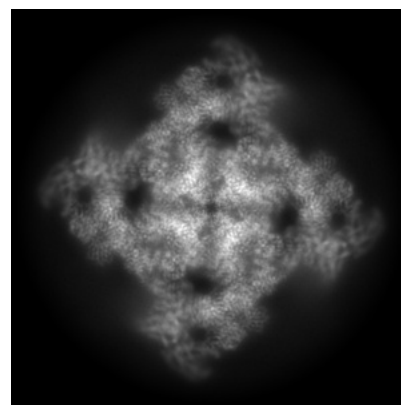
#### 6.1.1 Primary map



X



Y

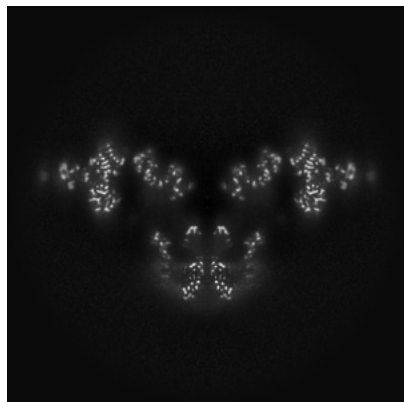


Z

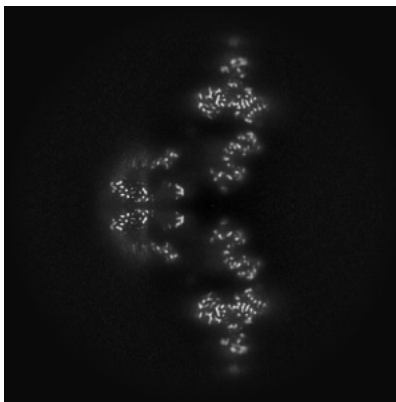
The images above show the map projected in three orthogonal directions.

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

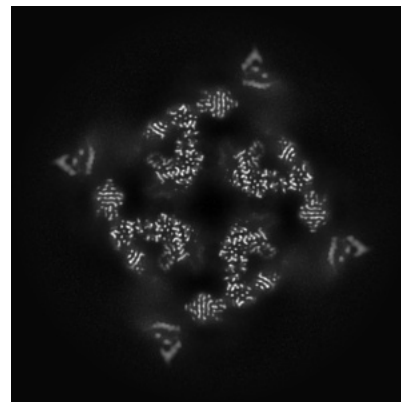
#### 6.2.1 Primary map



X Index: 256



Y Index: 256

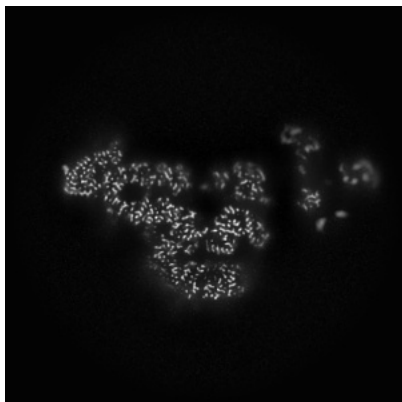


Z Index: 256

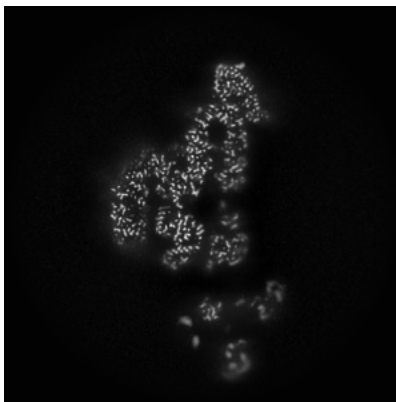
The images above show central slices of the map in three orthogonal directions.

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

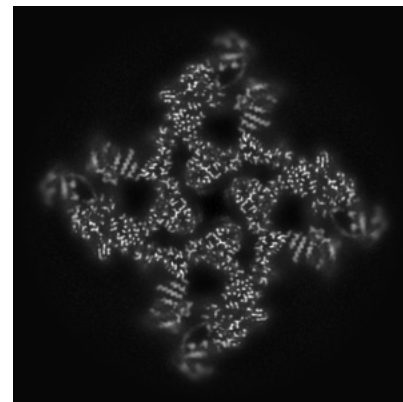
### 6.3.1 Primary map



X Index: 279



Y Index: 279



Z Index: 287

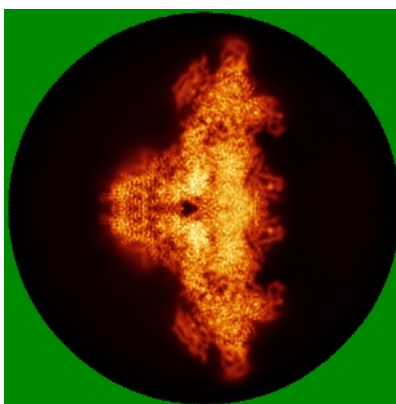
The images above show the largest variance slices of the map in three orthogonal directions.

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

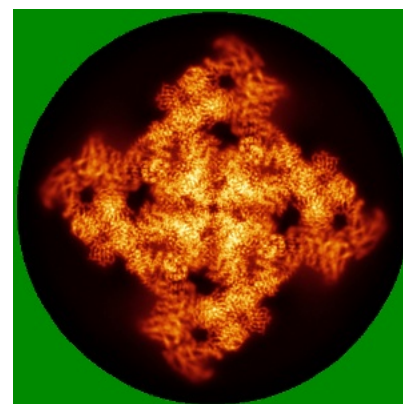
### 6.4.1 Primary map



X



Y

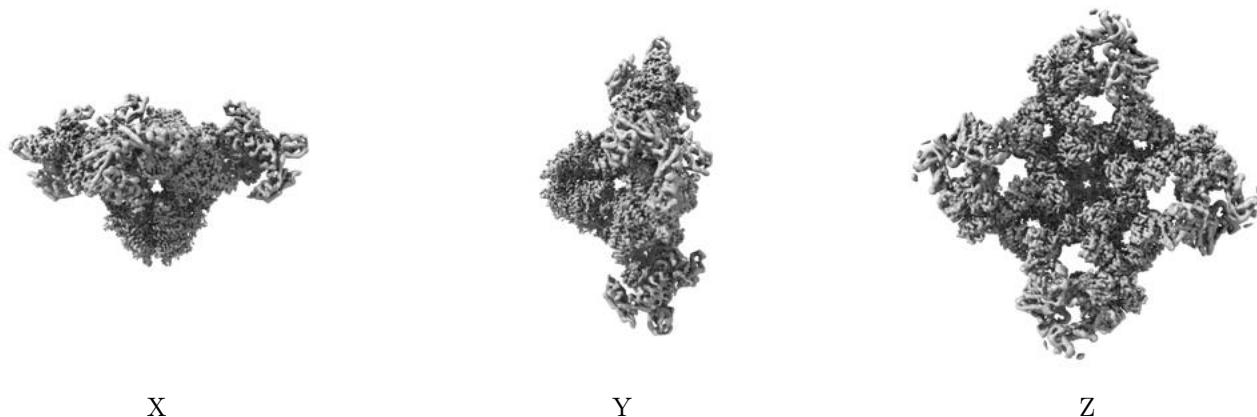


Z

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 0.12. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

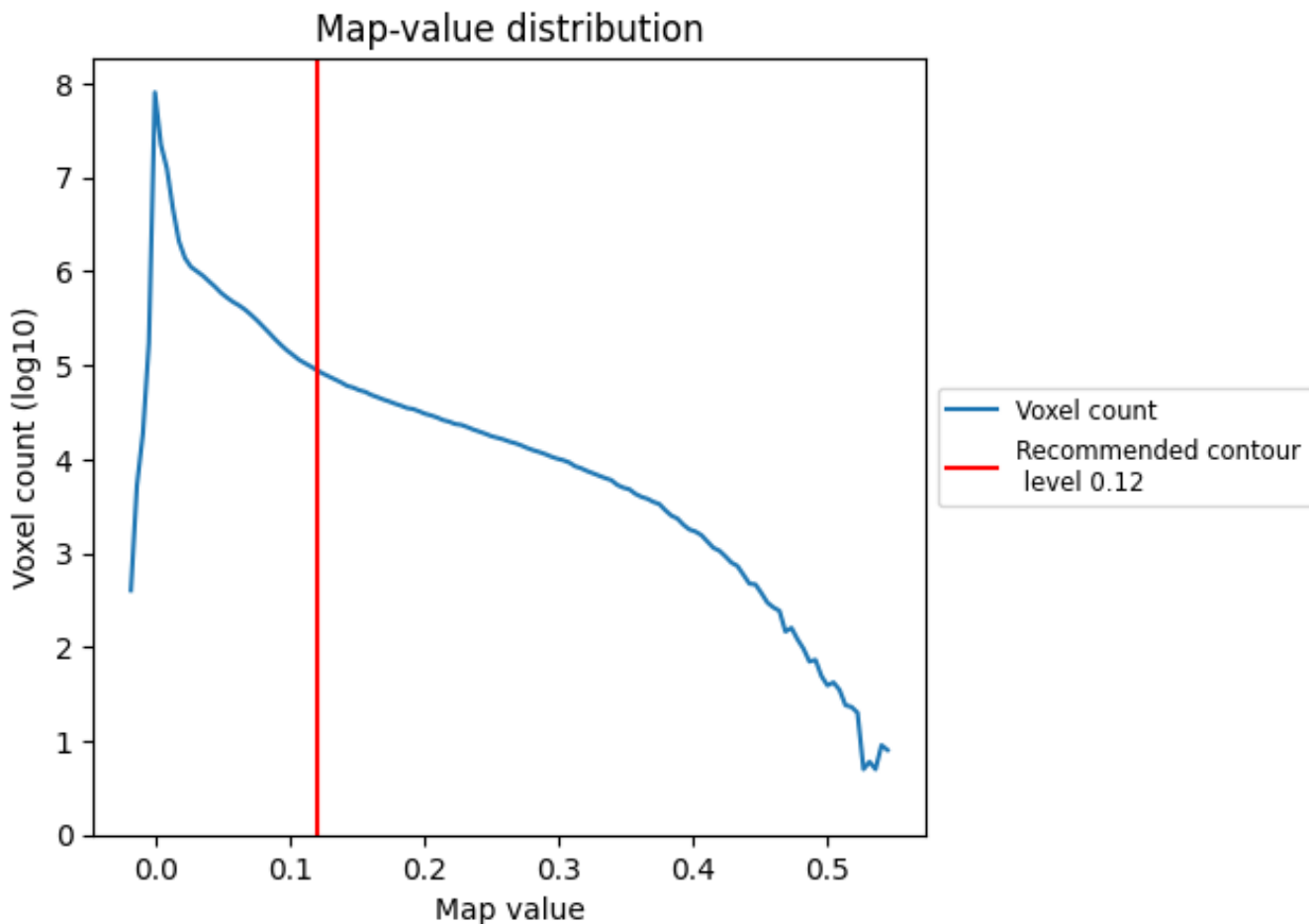
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

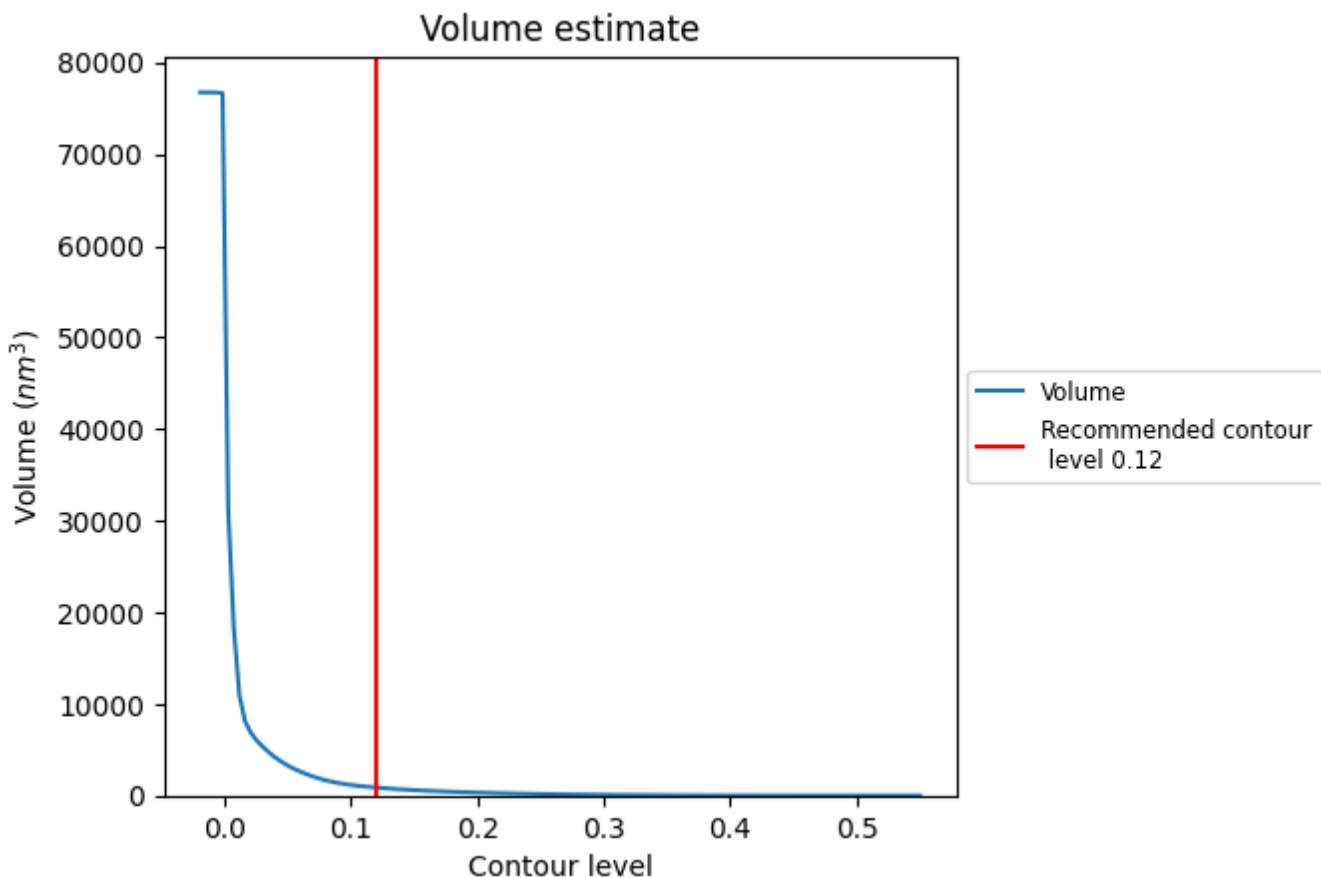
This section contains the results of statistical analysis of the map.

### 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.

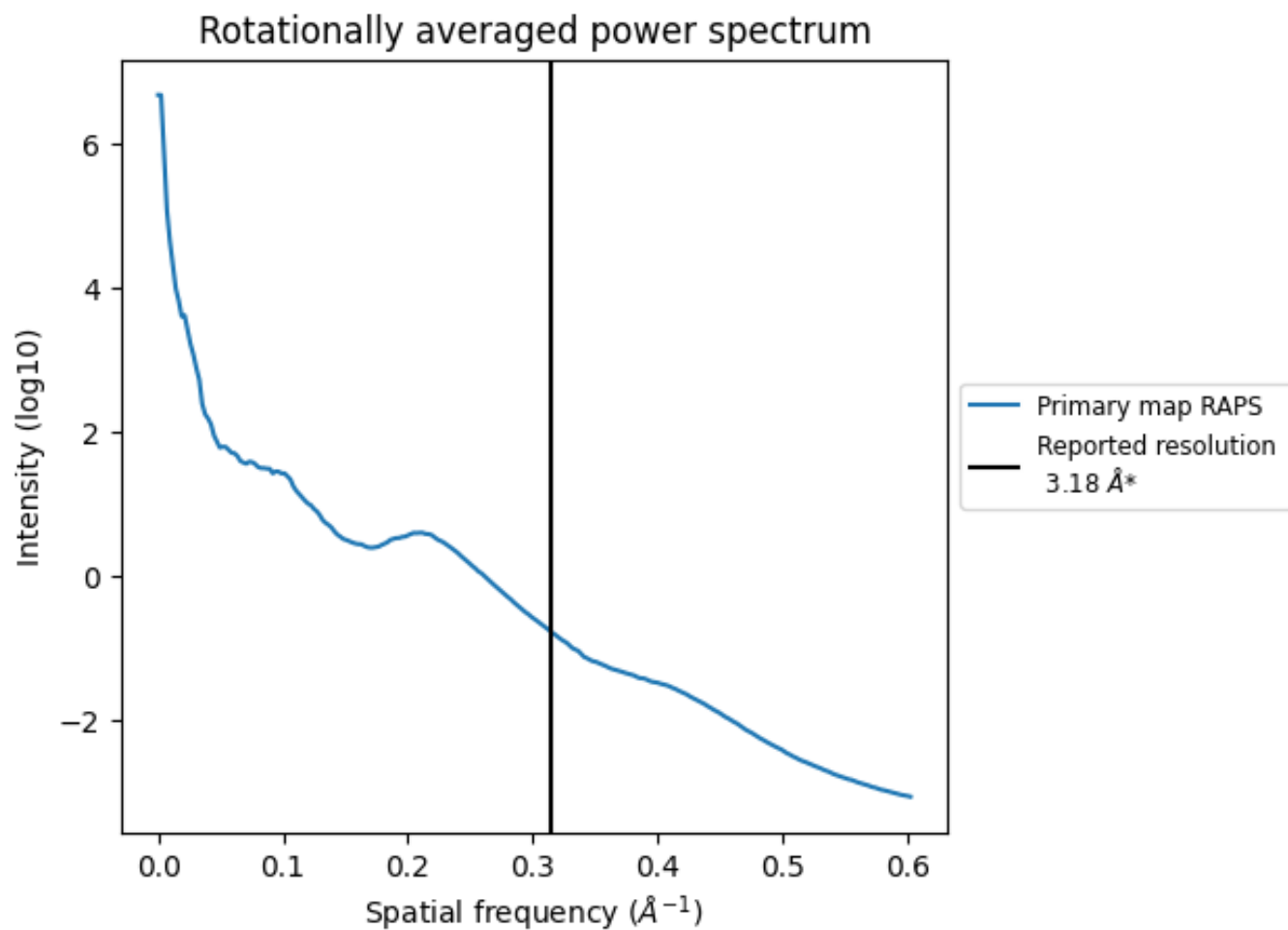
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 868 nm<sup>3</sup>; this corresponds to an approximate mass of 784 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 0.314 Å<sup>-1</sup>

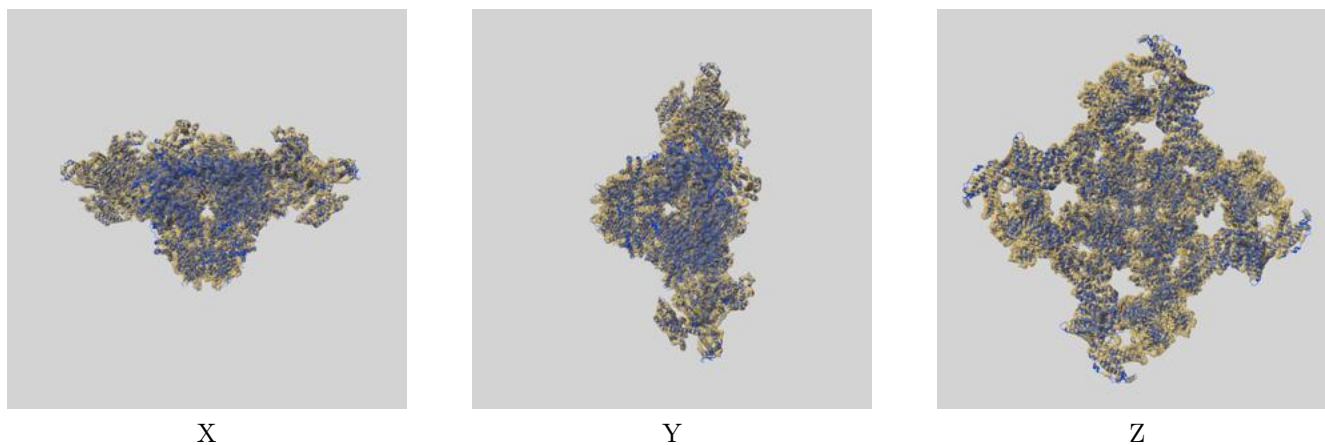
## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

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

This section contains information regarding the fit between EMDB map EMD-42459 and PDB model 8UQ3. Per-residue inclusion information can be found in section 3 on page 7.

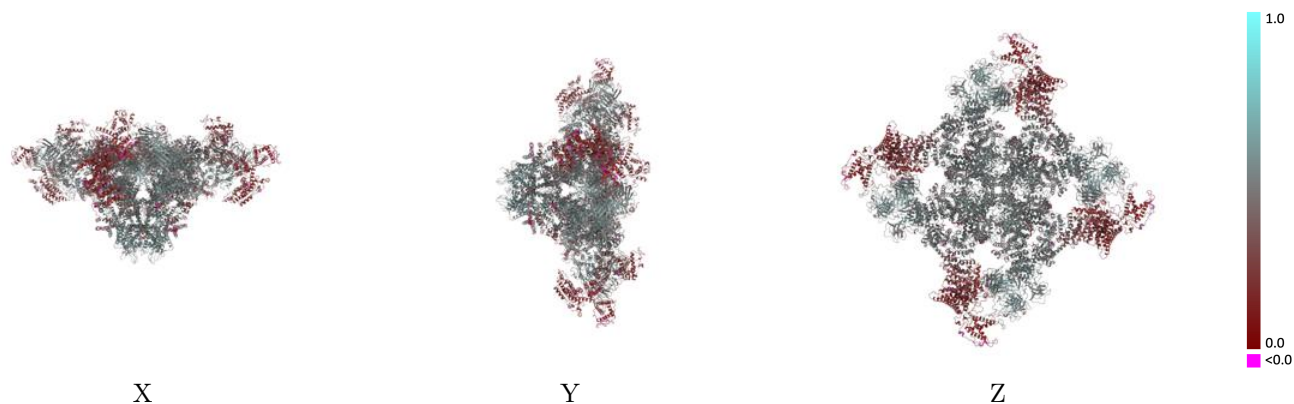
### 9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.12 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.

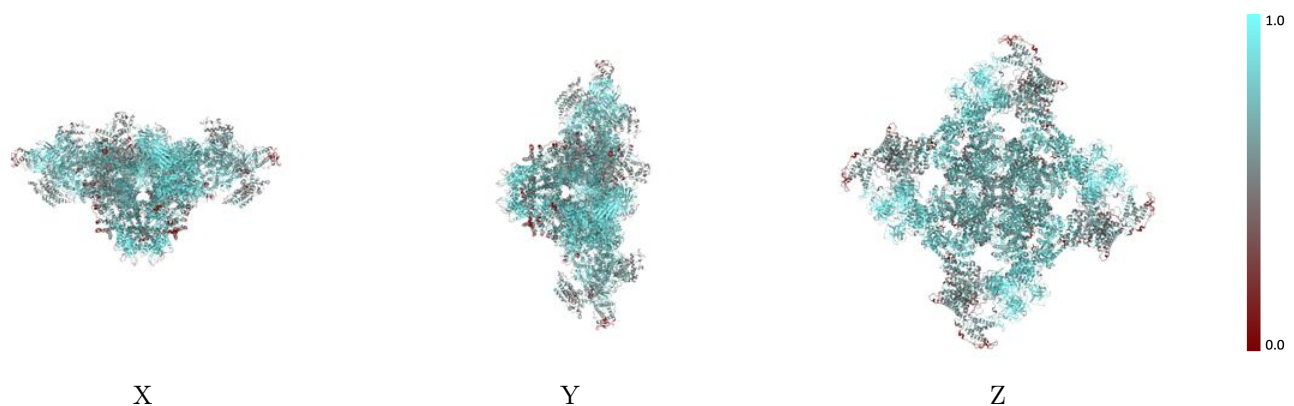


## 9.2 Q-score mapped to coordinate model [i](#)



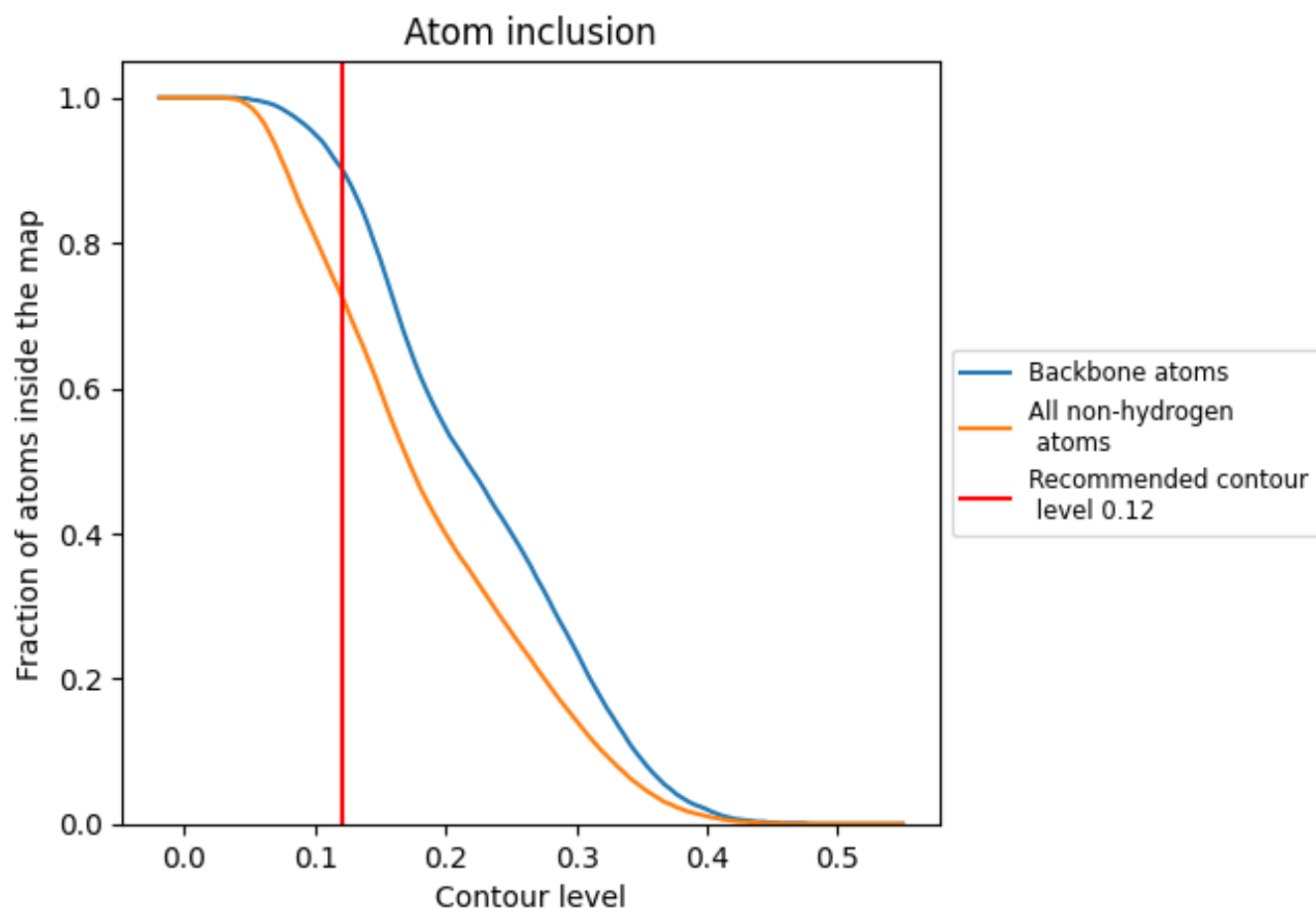
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.12).



















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 73% 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 (0.12) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7280	 0.4180
A	 0.7260	 0.4160
B	 0.7260	 0.4160
C	 0.7250	 0.4150
D	 0.7250	 0.4160
E	 0.8490	 0.5070
F	 0.8500	 0.5100
G	 0.8540	 0.5100
H	 0.8490	 0.5110

