



wwPDB EM Validation Summary Report ⓘ

Jul 7, 2025 – 05:20 PM EDT

PDB ID : 9OFV / pdb_00009ofv
EMDB ID : EMD-70444
Title : Consensus reconstruction of the eukaryotic Ribosome-associated Quality Control complex
Authors : Li, W.; Cahoon, T.; Shen, P.S.
Deposited on : 2025-04-30
Resolution : 3.16 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at
<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

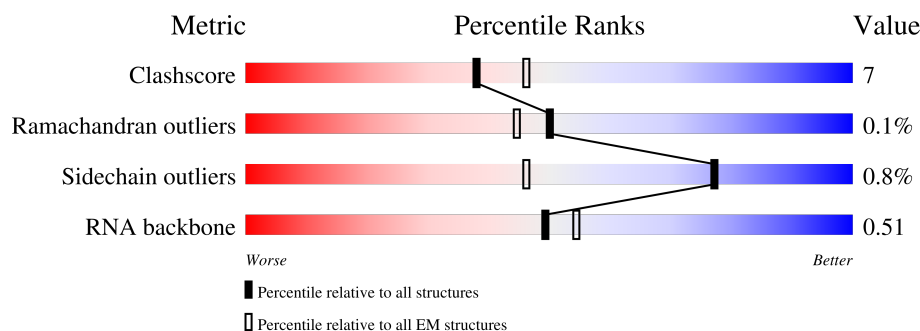
EMDB validation analysis : 0.0.1.dev118
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

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 3.16 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	835	65% 57% 9% 34%
1	B	835	78% 67% 11% 22%
1	C	835	59% 48% 11% 41%
1	D	835	59% 50% 8% 41%
1	E	835	59% 49% 9% 41%
1	F	835	64% 53% 10% 36%
2	H	76	100% 83% 17%

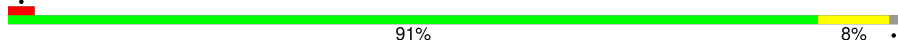
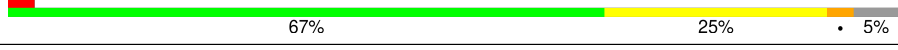
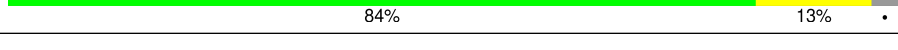
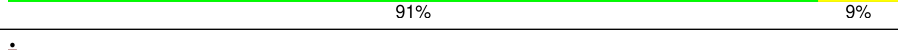
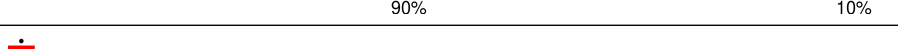
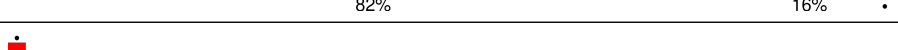
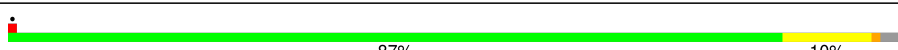
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Mol	Chain	Length	Quality of chain
2	J	76	
2	K	76	
3	G	580	
4	3	184	
5	4	186	
6	5	189	
7	6	172	
8	7	160	
9	8	121	
10	I	137	
11	9	155	
12	L	127	
13	M	136	
14	N	149	
15	O	59	
16	P	105	
17	Q	113	
18	R	130	
19	S	107	
20	T	121	
21	U	120	
22	V	100	
23	W	88	
24	Y	51	
25	Z	128	

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Mol	Chain	Length	Quality of chain
26	b	106	
27	c	92	
28	d	25	
29	f	3395	
30	h	121	
31	i	158	
32	j	254	
33	k	387	
34	l	362	
35	m	297	
36	n	176	
37	o	244	
38	p	256	
39	q	191	
40	r	221	
41	s	174	
42	t	199	
43	u	138	
44	a	1038	
45	e	1562	
46	g	245	
47	x	76	
47	y	76	
48	z	165	
49	0	312	

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Mol	Chain	Length	Quality of chain
50	1	17	
51	w	217	
52	X	78	
53	v	753	
54	2	76	
55	a0	199	
56	b0	142	

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:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
57	ATP	A	901	-	-	X	-
57	ATP	C	1001	-	-	X	-
57	ATP	C	1003	-	-	X	-
57	ATP	D	901	-	-	X	-
57	ATP	D	902	-	-	X	-
57	ATP	E	902	-	-	X	-
57	ATP	F	901	-	-	X	-
58	ADP	E	901	-	-	X	-

2 Entry composition

There are 61 unique types of molecules in this entry. The entry contains 183852 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 Cell division control protein 48.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	547	Total	C	N	O	S	0	0
			4206	2641	732	814	19		
1	B	654	Total	C	N	O	S	0	0
			5049	3184	880	964	21		
1	C	492	Total	C	N	O	S	0	0
			3759	2363	656	723	17		
1	D	489	Total	C	N	O	S	0	0
			3747	2354	659	717	17		
1	E	496	Total	C	N	O	S	0	0
			3786	2380	660	729	17		
1	F	533	Total	C	N	O	S	0	0
			4093	2567	720	787	19		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	588	GLN	GLU	conflict	UNP P25694
B	588	GLN	GLU	conflict	UNP P25694
C	588	GLN	GLU	conflict	UNP P25694
D	588	GLN	GLU	conflict	UNP P25694
E	588	GLN	GLU	conflict	UNP P25694
F	588	GLN	GLU	conflict	UNP P25694

- Molecule 2 is a protein called Ubiquitin.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	K	48	Total	C	N	O		0	0
			376	237	63	76			
2	H	76	Total	C	N	O	S	0	0
			601	375	105	120	1		
2	J	76	Total	C	N	O	S	0	0
			601	375	105	120	1		

- Molecule 3 is a protein called Nuclear protein localization protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	468	Total	C	N	O	S	0	0
			3762	2381	628	732	21		

- Molecule 4 is a protein called 60S ribosomal protein L17-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	3	183	Total	C	N	O		0	0
			1416	879	284	253			

- Molecule 5 is a protein called 60S ribosomal protein L18-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	4	185	Total	C	N	O	S	0	0
			1441	908	290	241	2		

- Molecule 6 is a protein called 60S ribosomal protein L19-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	5	156	Total	C	N	O		0	0
			1258	781	265	212			

- Molecule 7 is a protein called 60S ribosomal protein L20-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	6	171	Total	C	N	O	S	0	0
			1437	925	266	243	3		

- Molecule 8 is a protein called 60S ribosomal protein L21-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	7	159	Total	C	N	O	S	0	0
			1272	802	245	221	4		

- Molecule 9 is a protein called 60S ribosomal protein L22-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	8	100	Total	C	N	O		0	0
			796	516	131	149			

- Molecule 10 is a protein called 60S ribosomal protein L23-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	I	136	Total	C	N	O	S	0	0
			1003	628	189	179	7		

- Molecule 11 is a protein called Large ribosomal subunit protein eL24A.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	9	63	Total	C	N	O	S	0	0
			518	333	102	82	1		

- Molecule 12 is a protein called 60S ribosomal protein L26-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	125	Total	C	N	O		0	0
			984	620	191	173			

- Molecule 13 is a protein called 60S ribosomal protein L27-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	135	Total	C	N	O		0	0
			1080	701	199	180			

- Molecule 14 is a protein called 60S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	148	Total	C	N	O	S	0	0
			1169	747	231	188	3		

- Molecule 15 is a protein called Large ribosomal subunit protein eL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	58	Total	C	N	O		0	0
			462	289	100	73			

- Molecule 16 is a protein called 60S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	96	Total	C	N	O	S	0	0
			737	476	123	137	1		

- Molecule 17 is a protein called 60S ribosomal protein L31-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	109	Total	C	N	O	S	0	0
			876	556	167	152	1		

- Molecule 18 is a protein called Large ribosomal subunit protein eL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	127	Total	C	N	O	S	0	0
			1013	642	205	165	1		

- Molecule 19 is a protein called 60S ribosomal protein L33-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	106	Total	C	N	O	S	0	0
			850	540	165	144	1		

- Molecule 20 is a protein called 60S ribosomal protein L34-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	112	Total	C	N	O	S	0	0
			880	545	179	152	4		

- Molecule 21 is a protein called 60S ribosomal protein L35-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	119	Total	C	N	O	S	0	0
			969	615	186	167	1		

- Molecule 22 is a protein called 60S ribosomal protein L36-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	V	99	Total	C	N	O	S	0	0
			766	478	154	132	2		

- Molecule 23 is a protein called 60S ribosomal protein L37-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	W	81	Total	C	N	O	S	0	0
			645	393	141	106	5		

- Molecule 24 is a protein called 60S ribosomal protein L39.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	Y	50	Total	C	N	O	S	0	0
			436	272	97	65	2		

- Molecule 25 is a protein called Ubiquitin-60S ribosomal protein L40.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	Z	52	Total	C	N	O	S	0	0
			410	254	86	65	5		

- Molecule 26 is a protein called 60S ribosomal protein L42-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	b	103	Total	C	N	O	S	0	0
			824	517	167	135	5		

- Molecule 27 is a protein called 60S ribosomal protein L43-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	c	91	Total	C	N	O	S	0	0
			694	429	138	121	6		

- Molecule 28 is a protein called 60S ribosomal protein L41-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	d	22	Total	C	N	O	S	0	0
			207	127	56	23	1		

- Molecule 29 is a RNA chain called 25S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	f	3216	Total	C	N	O	P	1	0
			68802	30732	12391	22462	3217		

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
f	?	-	G	deletion	GB 1262303
f	1956	U	-	insertion	GB 1262303
f	?	-	A	deletion	GB 1262303
f	2255	U	-	insertion	GB 1262303
f	?	-	G	deletion	GB 1262303

- Molecule 30 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	h	121	Total	C	N	O	P	0	0
			2579	1152	461	845	121		

- Molecule 31 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	i	158	Total	C	N	O	P	0	0
			3353	1500	586	1109	158		

- Molecule 32 is a protein called 60S ribosomal protein L2-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	j	246	Total	C	N	O	S	0	0
			1874	1168	380	325	1		

- Molecule 33 is a protein called Large ribosomal subunit protein uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	k	386	Total	C	N	O	S	0	0
			3075	1950	584	533	8		

- Molecule 34 is a protein called Large ribosomal subunit protein uL4A.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	l	361	Total	C	N	O	S	0	0
			2748	1729	522	494	3		

- Molecule 35 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	m	294	Total	C	N	O	S	0	0
			2351	1484	410	455	2		

- Molecule 36 is a protein called Large ribosomal subunit protein eL6B.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	n	167	Total	C	N	O		0	0
			1307	843	234	230			

- Molecule 37 is a protein called 60S ribosomal protein L7-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	o	222	Total	C	N	O	S	0	0
			1784	1151	324	308	1		

- Molecule 38 is a protein called 60S ribosomal protein L8-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	p	233	Total	C	N	O	S	0	0
			1804	1151	323	327	3		

- Molecule 39 is a protein called 60S ribosomal protein L9-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	q	191	Total	C	N	O	S	0	0
			1508	957	274	273	4		

- Molecule 40 is a protein called Large ribosomal subunit protein uL16.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	r	218	Total	C	N	O	S	0	0
			1764	1117	334	306	7		

- Molecule 41 is a protein called Large ribosomal subunit protein uL5A.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	s	169	Total	C	N	O	S	0	0
			1346	843	252	247	4		

- Molecule 42 is a protein called 60S ribosomal protein L13-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	t	193	Total	C	N	O	S	0	0
			1543	962	315	266			

- Molecule 43 is a protein called 60S ribosomal protein L14-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	u	136	Total	C	N	O	S	0	0
			1053	675	199	177	2		

- Molecule 44 is a protein called Ribosome quality control complex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	a	848	Total	C	N	O	S	0	0
			6573	4191	1139	1226	17		

- Molecule 45 is a protein called E3 ubiquitin-protein ligase listerin.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	e	1530	Total	C	N	O	S	0	0
			11556	7383	1946	2189	38		

- Molecule 46 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	g	225	Total	C	N	O	S	0	0
			1651	1030	282	332	7		

- Molecule 47 is a RNA chain called Ala tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	x	74	Total	C	N	O	P	0	0
			1579	702	278	525	74		
47	y	73	Total	C	N	O	P	0	0
			1556	692	273	518	73		

- Molecule 48 is a protein called Large ribosomal subunit protein uL11A.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	z	148	Total	C	N	O		0	0
			728	432	148	148			

- Molecule 49 is a protein called 60S acidic ribosomal protein P0.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	0	121	Total	C	N	O	S	0	0
			961	618	167	173	3		

- Molecule 50 is a protein called CAT-tailed nascent peptide.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	1	17	Total	C	N	O		0	0
			85	51	17	17			

- Molecule 51 is a protein called Large ribosomal subunit protein uL1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	w	216	Total	C	N	O	S	0	0
			1709	1092	298	310	9		

- Molecule 52 is a protein called Large ribosomal subunit protein eL38.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	X	76	Total	C	N	O		0	0
			608	388	114	106			

- Molecule 53 is a protein called Ribosome quality control complex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	v	531	Total	C	N	O	S	0	0
			4376	2824	729	807	16		

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
v	724	THR	-	expression tag	UNP Q05468
v	725	SER	-	expression tag	UNP Q05468
v	726	GLY	-	expression tag	UNP Q05468
v	727	SER	-	expression tag	UNP Q05468
v	728	PRO	-	expression tag	UNP Q05468
v	729	GLY	-	expression tag	UNP Q05468
v	730	ASP	-	expression tag	UNP Q05468
v	731	TYR	-	expression tag	UNP Q05468
v	732	LYS	-	expression tag	UNP Q05468
v	733	ASP	-	expression tag	UNP Q05468
v	734	ASP	-	expression tag	UNP Q05468
v	735	ASP	-	expression tag	UNP Q05468
v	736	ASP	-	expression tag	UNP Q05468
v	737	LYS	-	expression tag	UNP Q05468
v	738	ASP	-	expression tag	UNP Q05468
v	739	TYR	-	expression tag	UNP Q05468
v	740	LYS	-	expression tag	UNP Q05468
v	741	ASP	-	expression tag	UNP Q05468
v	742	ASP	-	expression tag	UNP Q05468
v	743	ASP	-	expression tag	UNP Q05468
v	744	ASP	-	expression tag	UNP Q05468
v	745	LYS	-	expression tag	UNP Q05468
v	746	ASP	-	expression tag	UNP Q05468
v	747	TYR	-	expression tag	UNP Q05468
v	748	LYS	-	expression tag	UNP Q05468

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Chain	Residue	Modelled	Actual	Comment	Reference
v	749	ASP	-	expression tag	UNP Q05468
v	750	ASP	-	expression tag	UNP Q05468
v	751	ASP	-	expression tag	UNP Q05468
v	752	ASP	-	expression tag	UNP Q05468
v	753	LYS	-	expression tag	UNP Q05468

- Molecule 54 is a protein called Polyubiquitin-C.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	2	76	Total	C	N	O	S	0	0
			602	378	105	118	1		

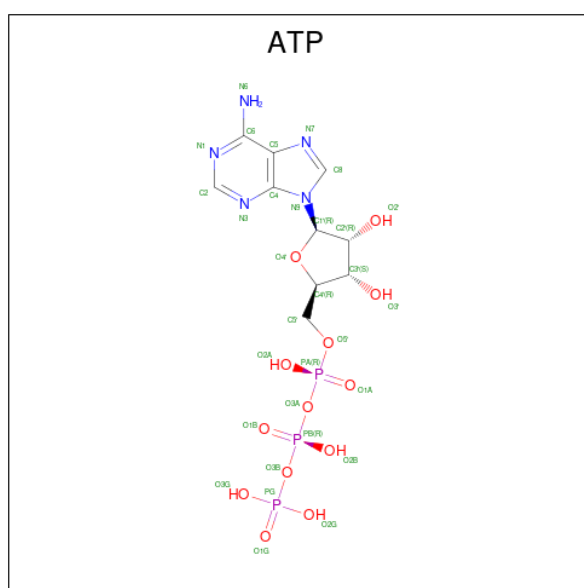
- Molecule 55 is a protein called 60S ribosomal protein L16-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	a0	197	Total	C	N	O	S	0	0
			1555	1003	289	262	1		

- Molecule 56 is a protein called 60S ribosomal protein L25.

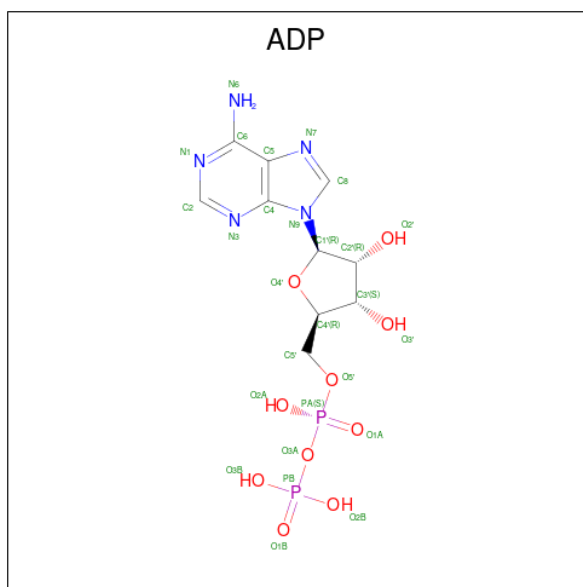
Mol	Chain	Residues	Atoms					AltConf	Trace
56	b0	121	Total	C	N	O	S	0	0
			964	620	169	173	2		

- Molecule 57 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



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

- Molecule 58 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					AltConf
58	E	1	Total	C	N	O	P	0
			27	10	5	10	2	

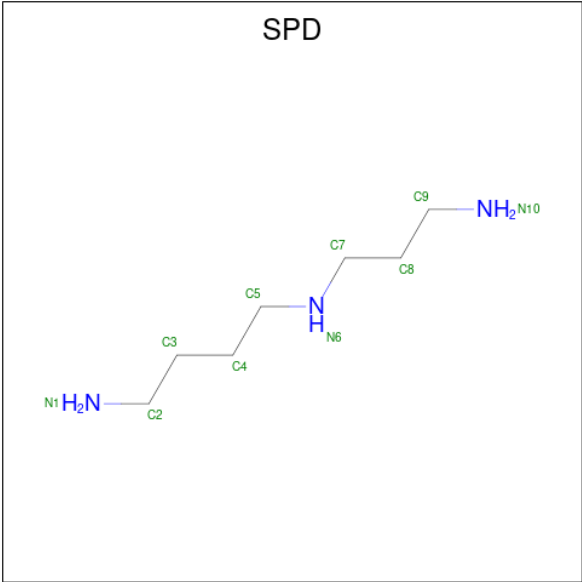
- Molecule 59 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
59	G	2	Total 2	Zn 2	0
59	T	1	Total 1	Zn 1	0
59	W	1	Total 1	Zn 1	0
59	Z	1	Total 1	Zn 1	0
59	b	1	Total 1	Zn 1	0
59	c	1	Total 1	Zn 1	0

- Molecule 60 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
60	3	1	Total 1	Mg 1	0
60	5	1	Total 1	Mg 1	0
60	I	1	Total 1	Mg 1	0
60	R	1	Total 1	Mg 1	0
60	T	1	Total 1	Mg 1	0
60	f	3	Total 3	Mg 3	0
60	h	1	Total 1	Mg 1	0
60	j	2	Total 2	Mg 2	0
60	k	1	Total 1	Mg 1	0

- Molecule 61 is SPERMIDINE (CCD ID: SPD) (formula: C₇H₁₉N₃).

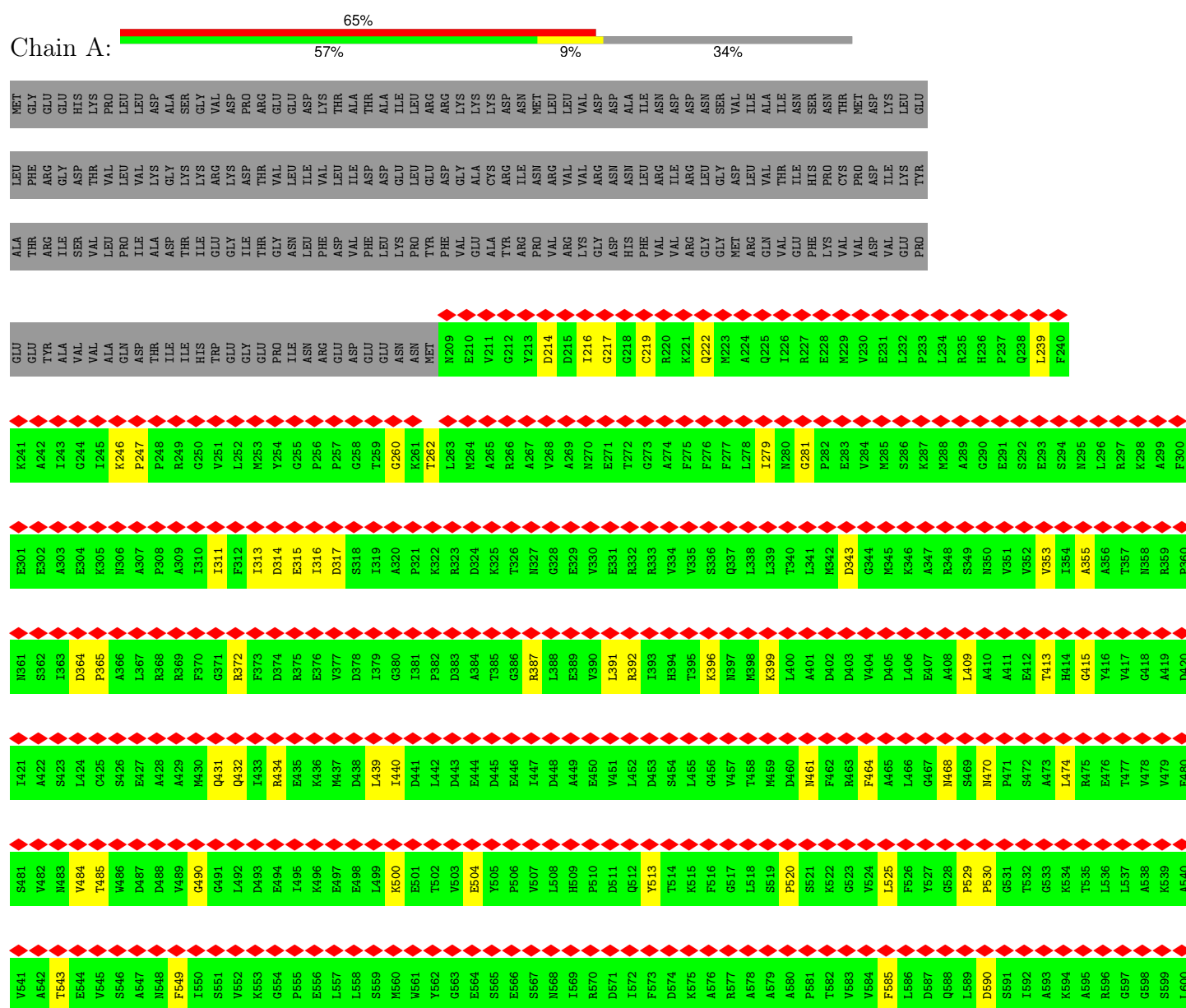


Mol	Chain	Residues	Atoms			AltConf
61	f	1	Total	C	N	0
			10	7	3	

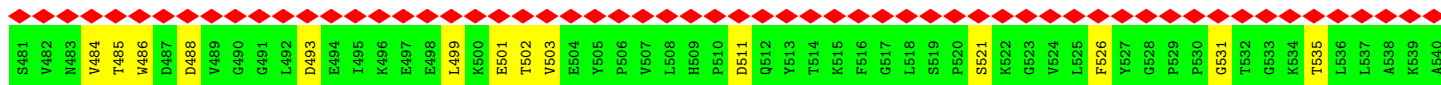
3 Residue-property plots

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.

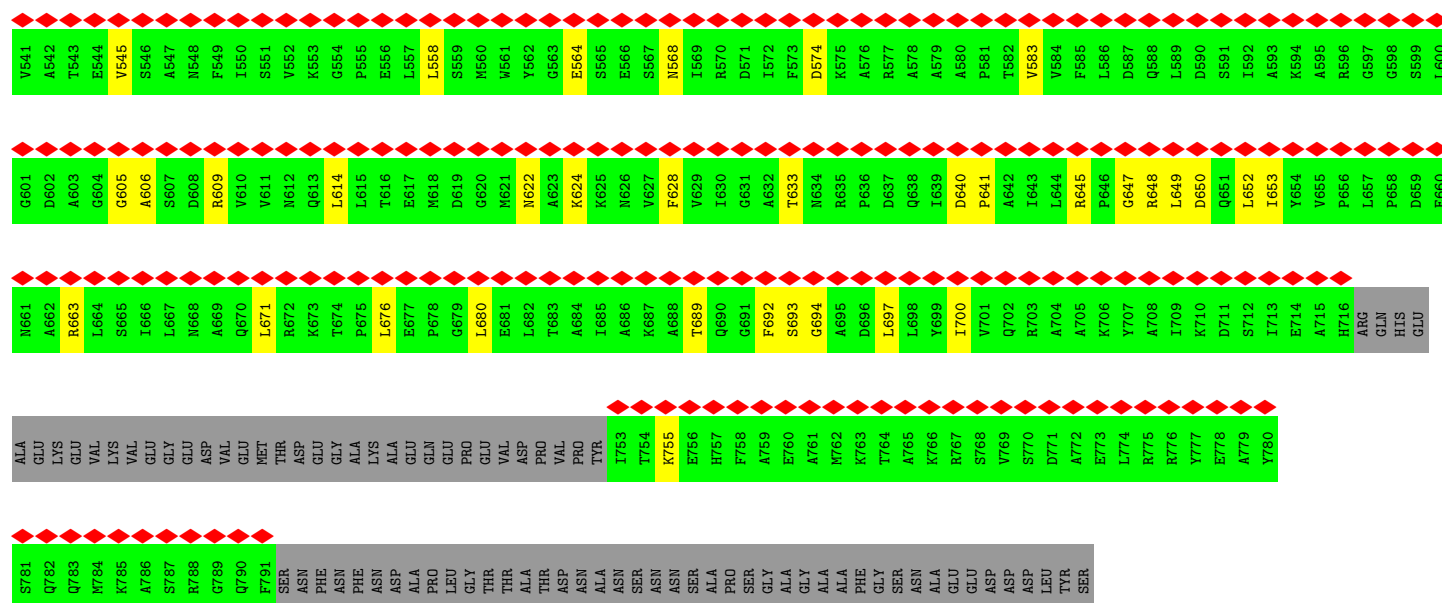
• Molecule 1: Cell division control protein 48



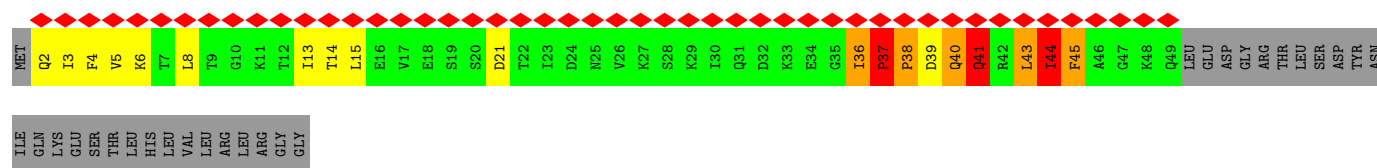
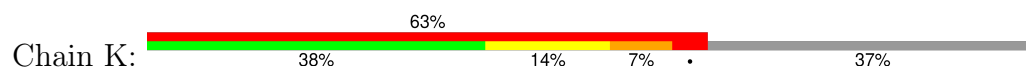




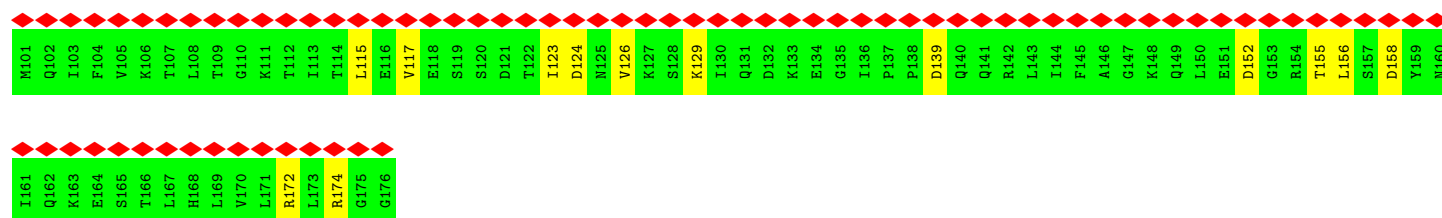
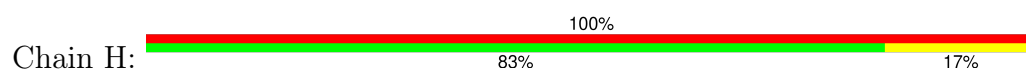




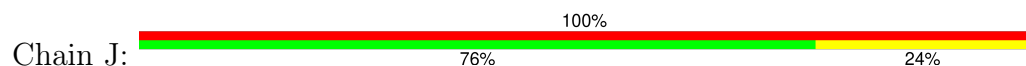
- Molecule 2: Ubiquitin



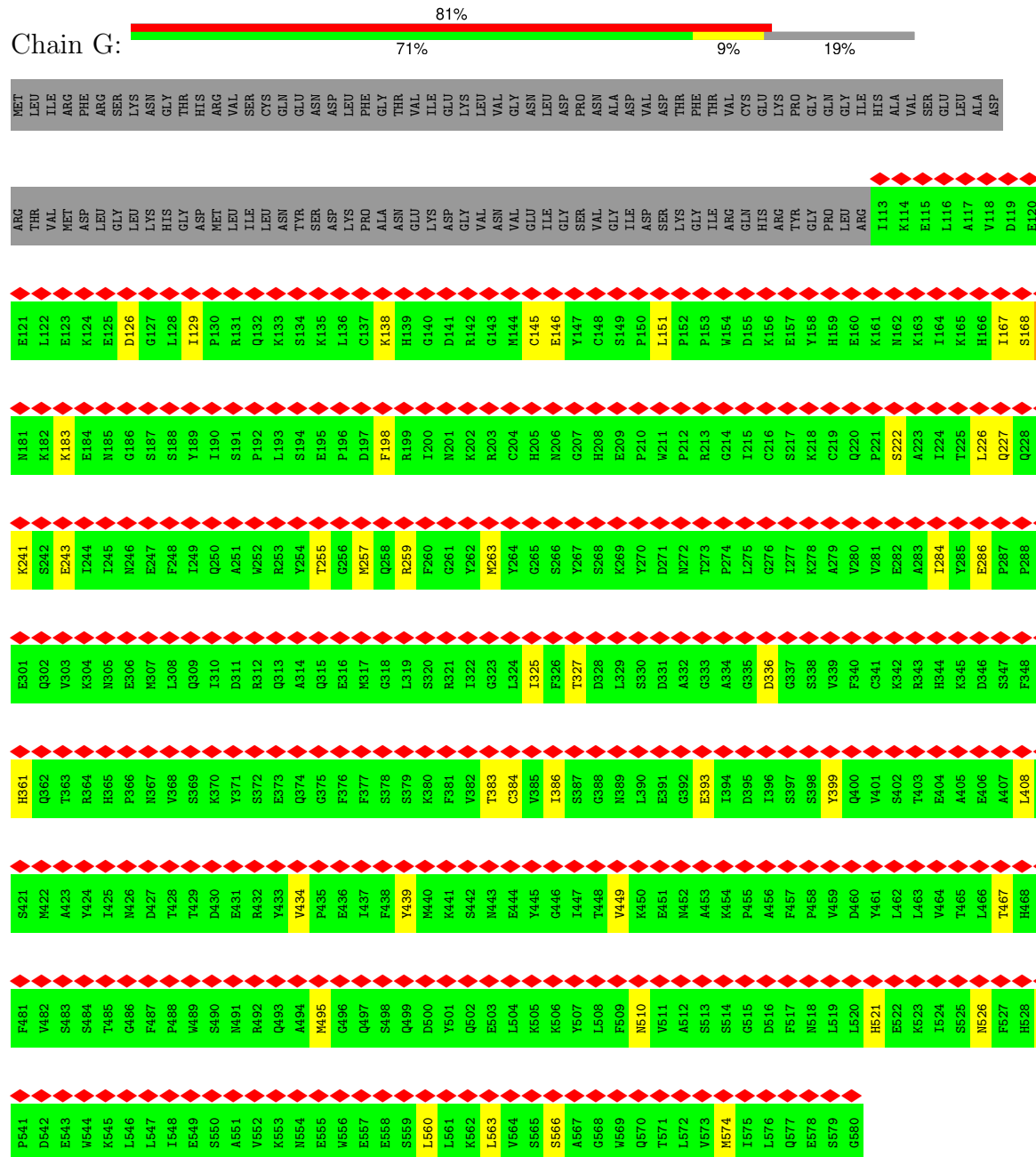
- Molecule 2: Ubiquitin



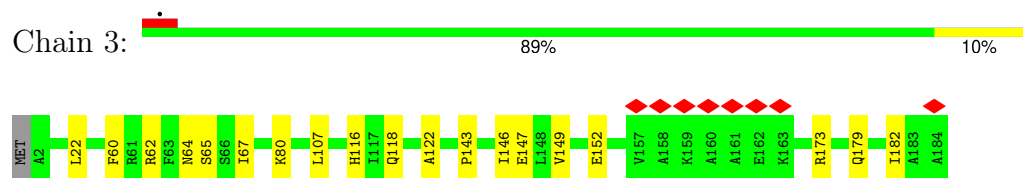
- Molecule 2: Ubiquitin



- Molecule 3: Nuclear protein localization protein 4



- Molecule 4: 60S ribosomal protein L17-A

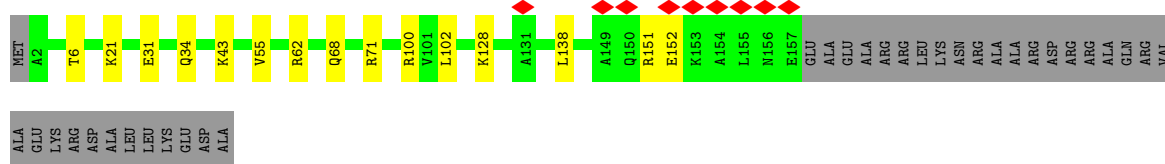
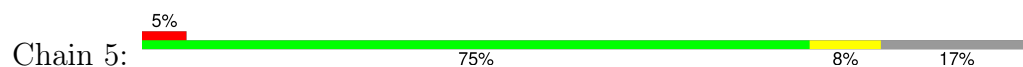


- Molecule 5: 60S ribosomal protein L18-A

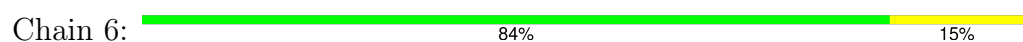




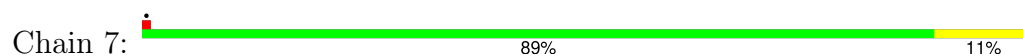
- Molecule 6: 60S ribosomal protein L19-A



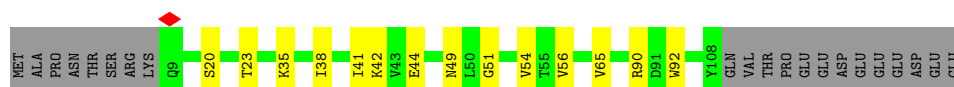
- Molecule 7: 60S ribosomal protein L20-A



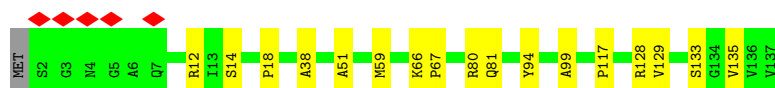
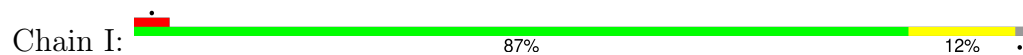
- Molecule 8: 60S ribosomal protein L21-A



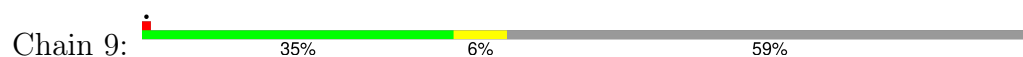
- Molecule 9: 60S ribosomal protein L22-A



- Molecule 10: 60S ribosomal protein L23-A

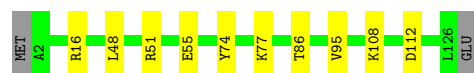


- Molecule 11: Large ribosomal subunit protein eL24A

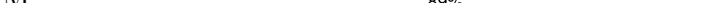


- Molecule 12: 60S ribosomal protein L26-A

Chain L: 91% 8%



- Molecule 13: 60S ribosomal protein L27-A

Chain M:  89% 10%



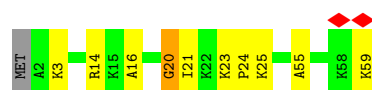
- Molecule 14: 60S ribosomal protein L28

Chain N:  85% 14%

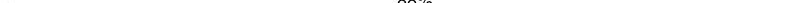


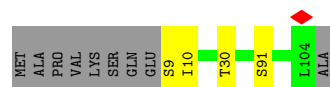
- Molecule 15: Large ribosomal subunit protein eL29

Chain 0:  81% 15% ..



- Molecule 16: 60S ribosomal protein L30

Chain P:  88% . 9%

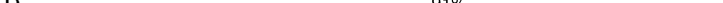


- Molecule 17: 60S ribosomal protein L31-A

Chain Q: 



- Molecule 18: Large ribosomal subunit protein eL32

Chain R:  91% 7% .



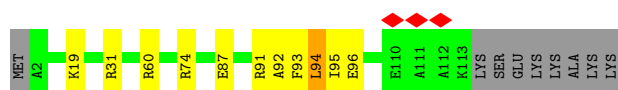
- Molecule 19: 60S ribosomal protein L33-A

Chain S: 89% 10%



- Molecule 20: 60S ribosomal protein L34-A

Chain T: 83% 8% 7%



- Molecule 21: 60S ribosomal protein L35-A

Chain U: 93% 6%



- Molecule 22: 60S ribosomal protein L36-A

Chain V: 91% 8%



- Molecule 23: 60S ribosomal protein L37-A

Chain W: 77% 15% 8%



- Molecule 24: 60S ribosomal protein L39

Chain Y: 88% 10%



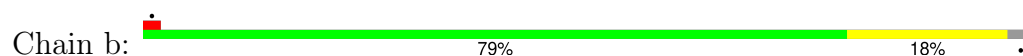
- Molecule 25: Ubiquitin-60S ribosomal protein L40



MET GLN ILE PHE VAL SER THR LEU THR LEU LYS THR ILE THR LEU VAL GLU VAL SER SER ASP THR ILE ILE GLN ASP LYS GLU ILE PRO PRO ASP GLN GLN ARG LEU PHE ALA GLY LYS GLN LEU GLU ASP GLY ARG THR LEU SER ASN

ILE GLN LYS GLU SER THR LEU HIS VAL LEU LEU ARG ARG GLY I77 Y100 R113 K124 K125 K128

- Molecule 26: 60S ribosomal protein L42-A



MET V2 T7 T10 H20 T21 Q22 Y28 K29 A30 S34 L35 R41 R45 K61 A62 K63 V69 L72 V75 K76 H90 G95 K100 L104 GLN PHE

- Molecule 27: 60S ribosomal protein L43-A



MET A2 K3 R4 R17 Y18 H20 K44 R49 G66 R87 E91 A92

- Molecule 28: 60S ribosomal protein L41-A



K4 R5 A6 K7 R8 R9 K10 K11 T12 R13 R14 K17 R18 R19 R20 R21 R22 V23 R24 A25 ARG SER LYS

- Molecule 29: 25S rRNA

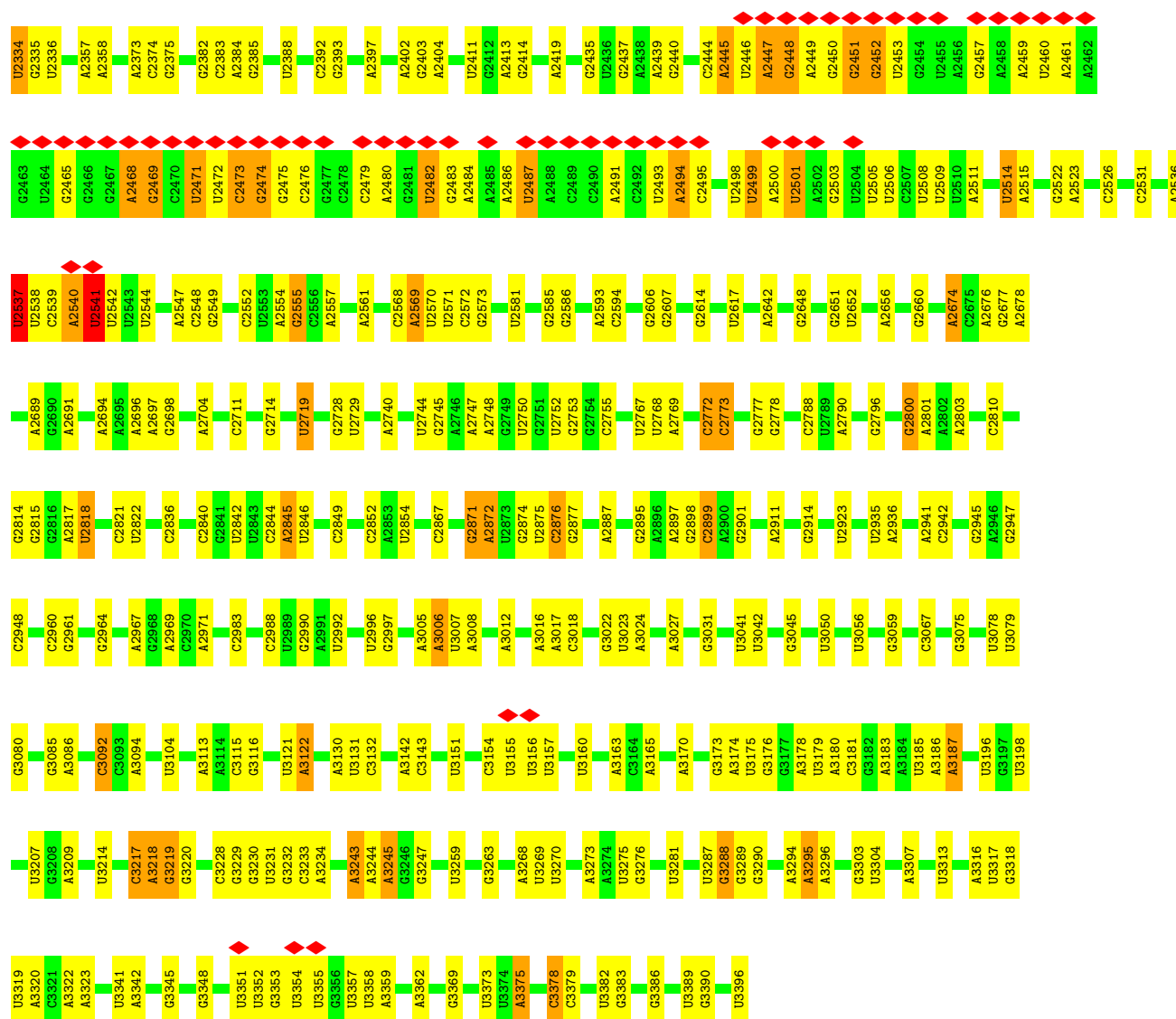


G U U3 A6 A13 A15 A16 U19 A20 G21 A26 A40 A43 A49 G59 A60 A65 A66 A67 C68 G76 G86 G92 G93 G94 A95 G98 A99 A109 G110 C111 A116 G120 A121 A122 A123 U129 A130 U133 U134 C135

G136 G139 G156 A157 G158 A159 A165 C166 G172 G173 U182 G183 A187 U190 U191 C200 G206 U210 A211 G212 A213 G216 U217 G218 A219 A220 G234 U240 G241 C242 G243 G244 U245 U249 U252 G269 G282 G283 A284 A285 U286 A295

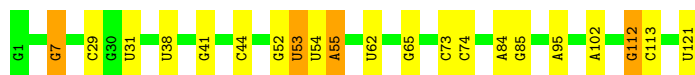
A286 G297 G301 U305 A306 A307 A308 A323 U329 C339 A348 A349 C350 A351 A352 G358 A361 A365 A374 A375 G376 G394 A397 A398 A399 G400 U401 A402 C403 U411 G412 A417 A418 G421 A422 C439 U440 U441 U442 G443 U444 U445 U446 U447

U448 U449 G450 U451 G A C C C U U G C U C C U U A G G G G A U U C U U C G A486 U487 U488 U489 C490 G494 G495 G505 G518 A519 U520 A521 A522 A523 U528 A529 G530 G531 A532



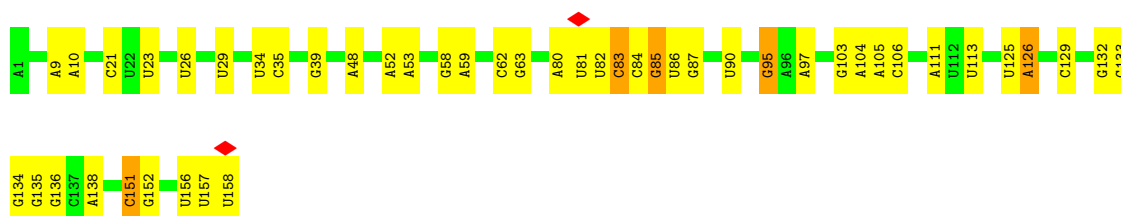
- Molecule 30: 5S rRNA

Chain h: 83% 14%



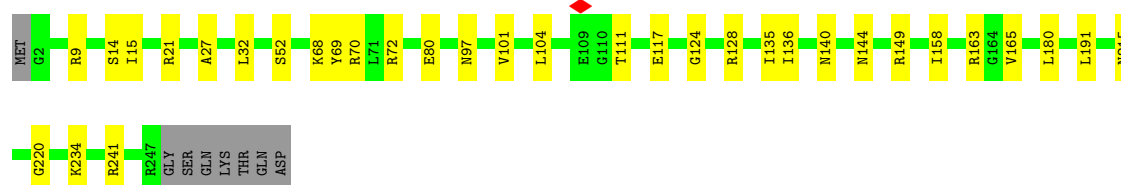
- Molecule 31: 5.8S rRNA

Chain i: 70% 27%



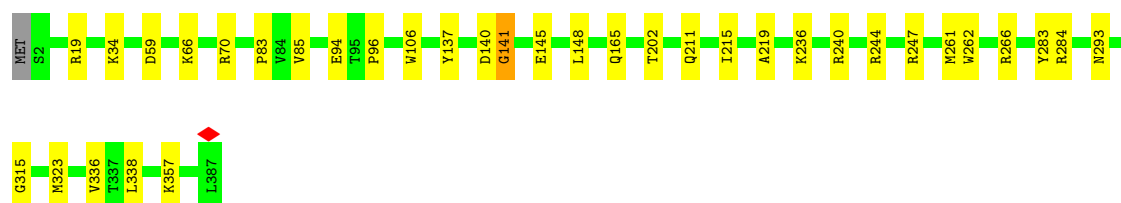
- Molecule 32: 60S ribosomal protein L2-A

Chain j:  84% 13%



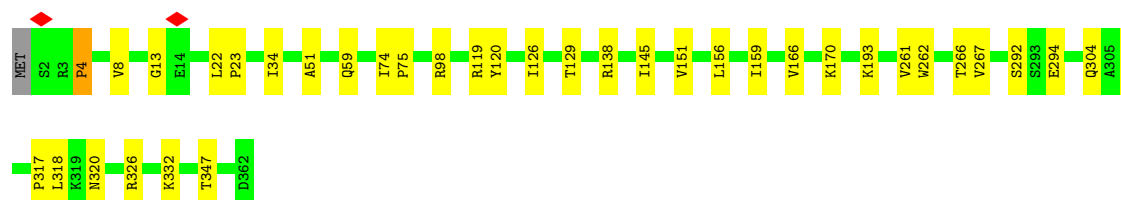
- Molecule 33: Large ribosomal subunit protein uL3

Chain k:  91% 9%



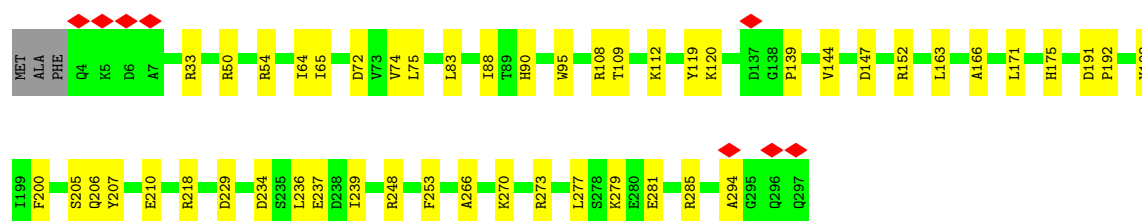
- Molecule 34: Large ribosomal subunit protein uL4A

Chain l:  90% 10%



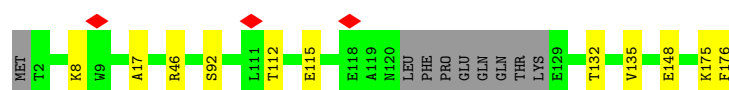
- Molecule 35: Large ribosomal subunit protein uL18

Chain m:  82% 16%

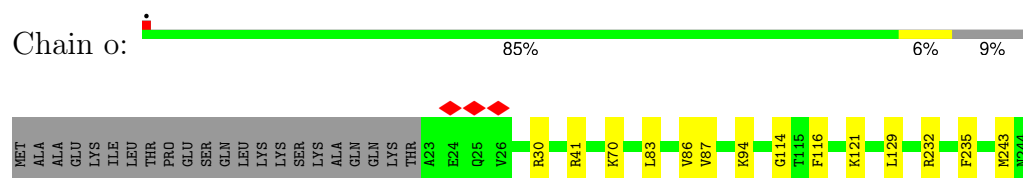


- Molecule 36: Large ribosomal subunit protein eL6B

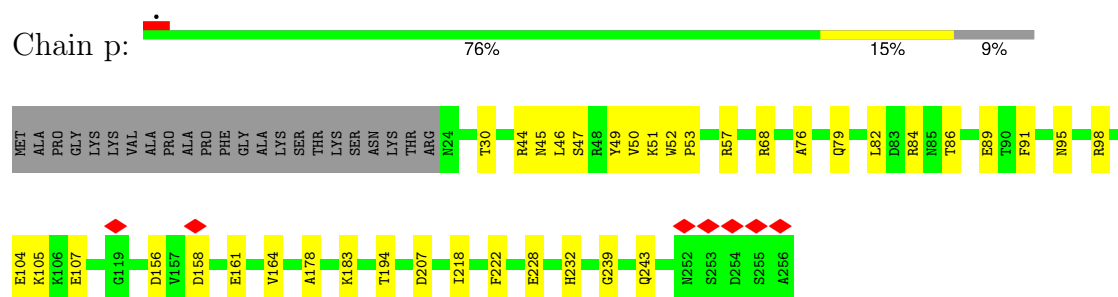
Chain n:  89% 6% 5%



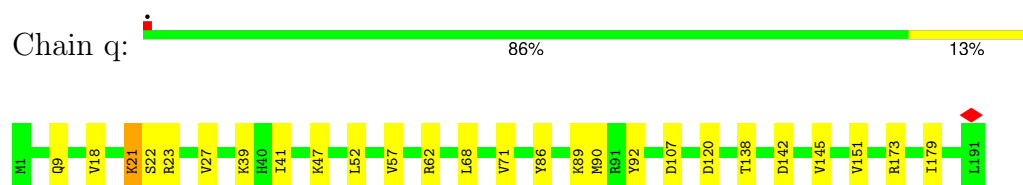
- Molecule 37: 60S ribosomal protein L7-A



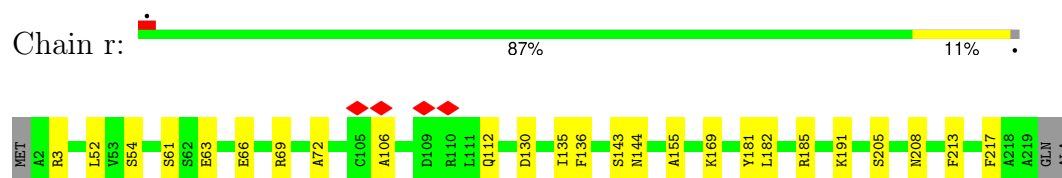
- Molecule 38: 60S ribosomal protein L8-A



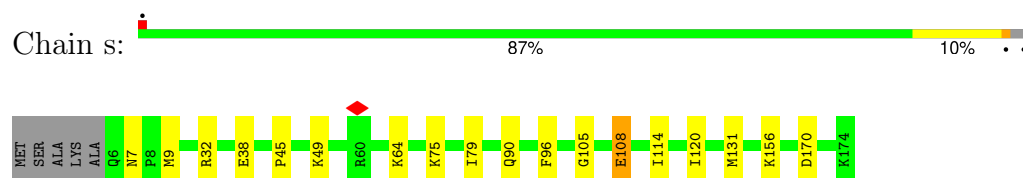
- Molecule 39: 60S ribosomal protein L9-A



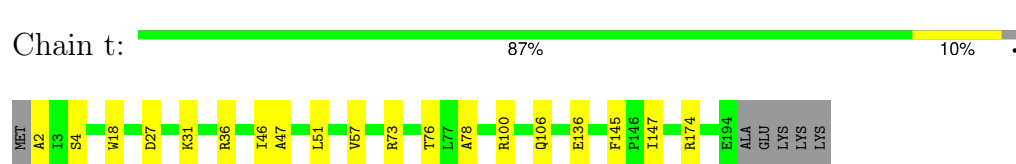
- Molecule 40: Large ribosomal subunit protein uL16



- Molecule 41: Large ribosomal subunit protein uL5A



- Molecule 42: 60S ribosomal protein L13-A

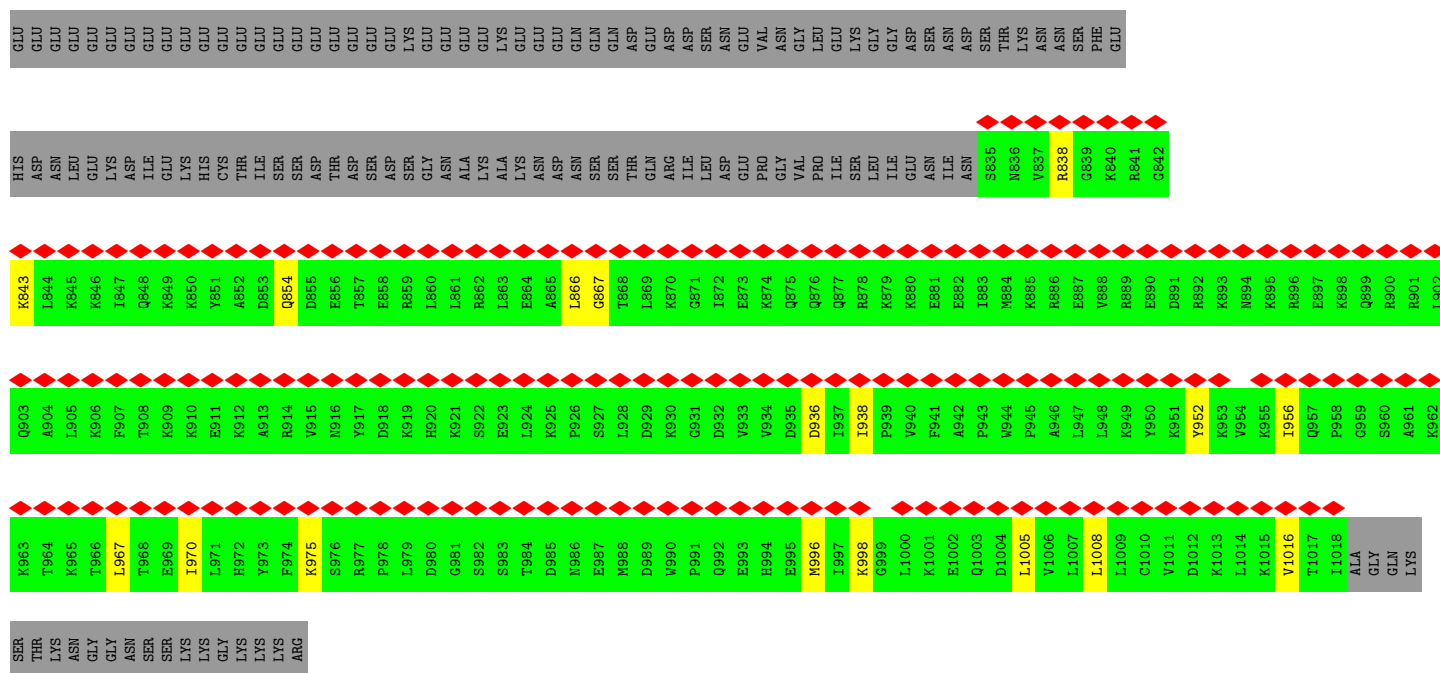


- Molecule 43: 60S ribosomal protein L14-A

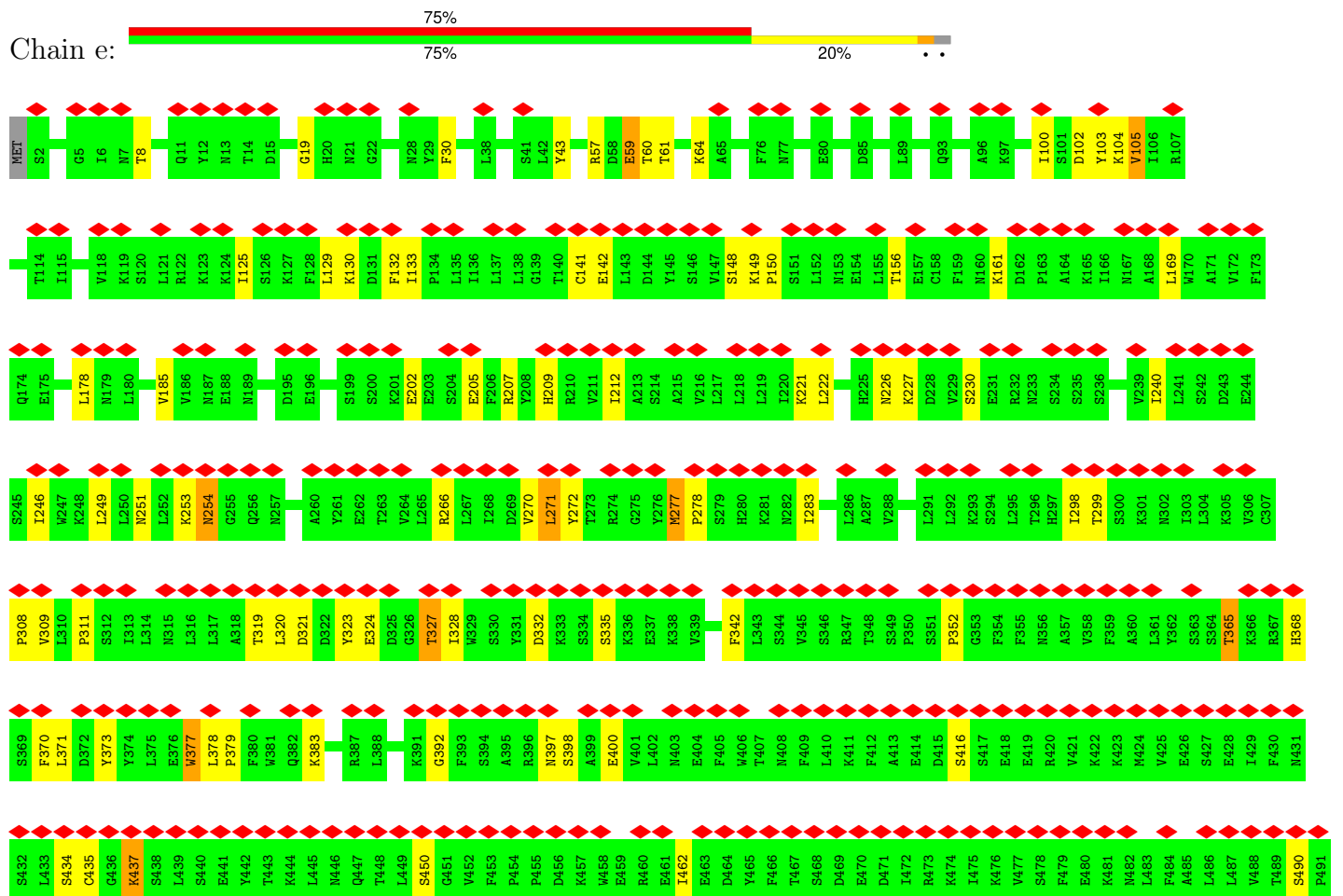


Chain a: 71% 8% 18%

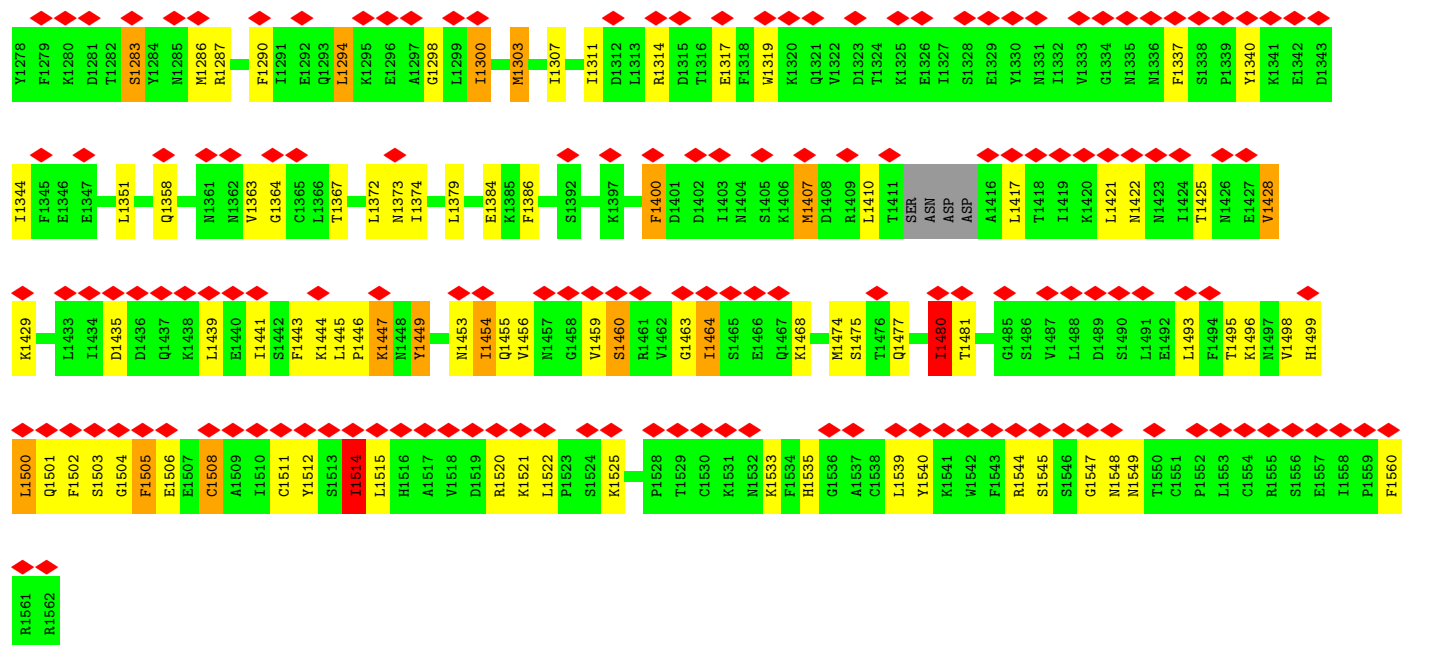




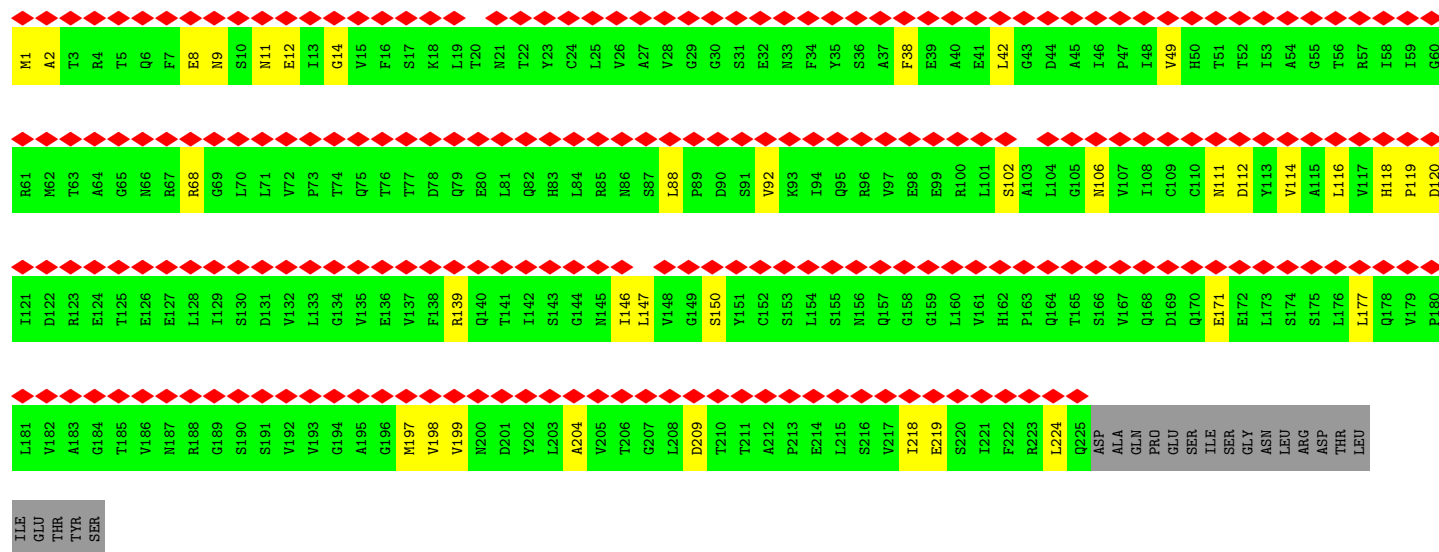
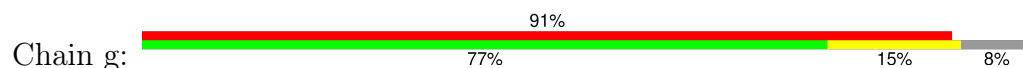
• Molecule 45: E3 ubiquitin-protein ligase listerin



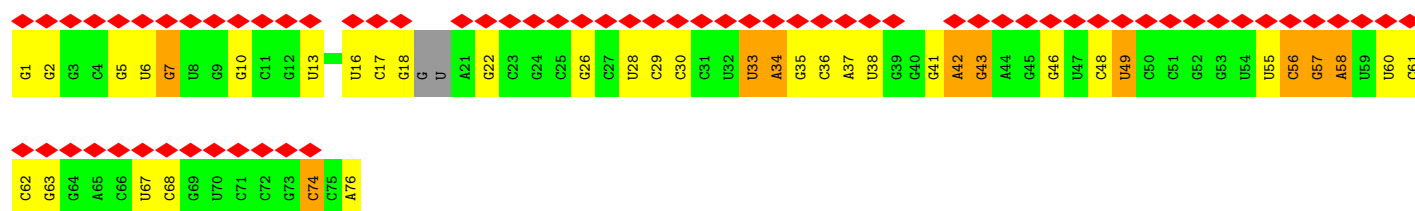
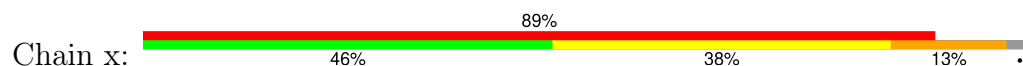
E1214	Y1152	T1092	L1032	E972	V912	S852	T792	Q732	C672	Y612	V552	N492
L1215	Q1153	L1093	K1033	I793	L913	E953	N793	H733	A673	Q613	Q553	N493
L1216	K1154	L1094	W1034	T974	Y914	E854	T794	H734	V674	Q614	E554	E494
L1217	L1095	L1095	L1035	K975	K915	P855	H795	Q735	L675	L615	S555	S495
GLN	Y1156	L1096	D1036	L976	V916	N856	L796	V736	S676	M616	T556	A496
LYS	K1157	E1097	S1037	R977	L917	D857	L797	Y737	K677	K617	Y557	I497
GLN	V1158	L1098	D1038	T978	L918	L858	L798	F738	L678	S618	Q558	S498
THR	Y1159	R1099	L1039	L979	N919	Y859	T799	S739	D679	D619	N559	R499
GLY	S1160	S1100	A1040	L980	S920	Y860	T799	P740	D800	S620	F560	L500
SER	S1161	S1101	Y1041	A981	I921	D861	D801	G741	T881	L621	A561	F501
ASP	M1162	C1102	E1042	S982	D922	F862	K902	A742	F682	E622	G562	D502
GLY	E1163	L1103	P1043	Q983	T923	G863	P903	K743	F683	L623	I563	F503
SER	L1164	M1104	S1044	L984	Y924	H864	I904	E744	S684	E624	M564	F504
ALA	K1165	L1105	F1045	I985	S925	T865	N905	K745	T885	L625	A565	V505
SER	K1166	Y1106	S1046	Q986	S926	F866	L906	Y746	L886	Y626	Q566	Q506
ASP	L1167	L1167	T1047	I987	T927	F867	K907	V747	L887	I627	Y567	L507
ASN	E1168	R988	V1048	R988	T928	K968	N908	T748	L688	E628	Y567	I508
ASP	S1169	L1109	R1049	E989	L929	H869	M909	H749	N899	D629	N569	E509
VAL	Q1170	S1110	L1050	V990	N930	G870	Q910	A750	T890	F630	S570	T510
	Y1171	Q1111	L1051	E991	G931	K871	K911	V751	D891	M631	K571	D511
		GLY	L1052	L992	L932	V872	I912	E752	F692	K632	F572	P512
		VAL	L1053	Y993	L933	N873	R914	L753	L753	M633	F573	S513
		SER	D1054	D994	A934	L874	Y815	I754	S894	Y634	K574	N514
		LYS	F1055	Q995	S935	N875	A816	T755	C695	K635	M575	V515
		ASN	F1056	E996	V936	F876	L817	G756	A696	F636	N576	F516
		GLY	T1057	F997	E937	S877	F818	C757	L697	D637	T577	N517



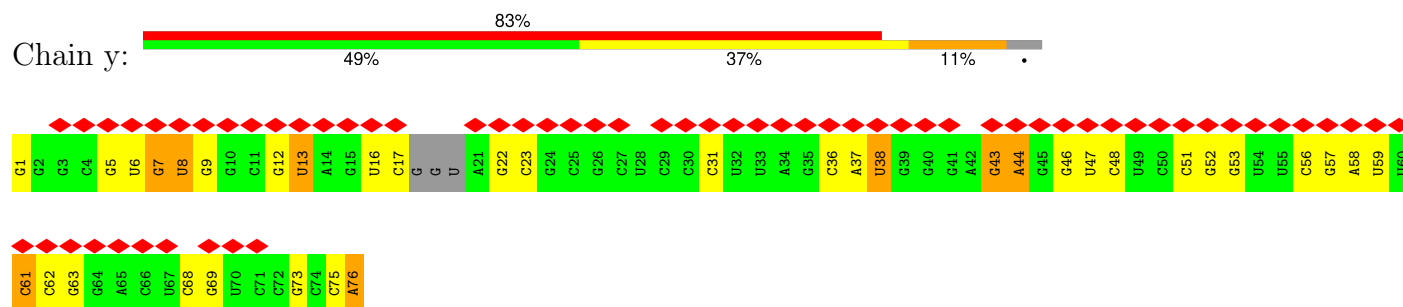
• Molecule 46: Eukaryotic translation initiation factor 6



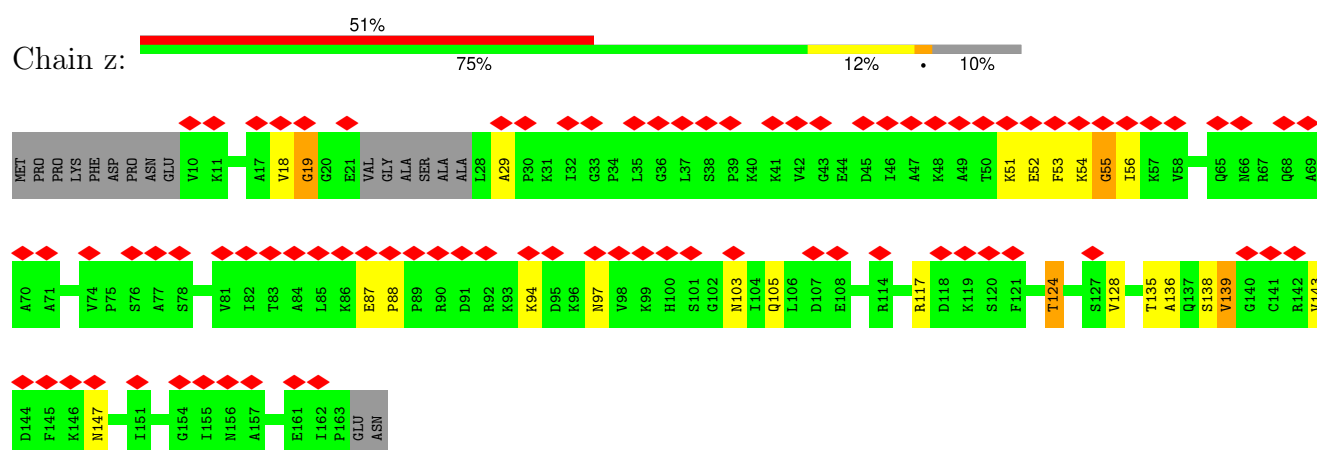
• Molecule 47: Ala tRNA



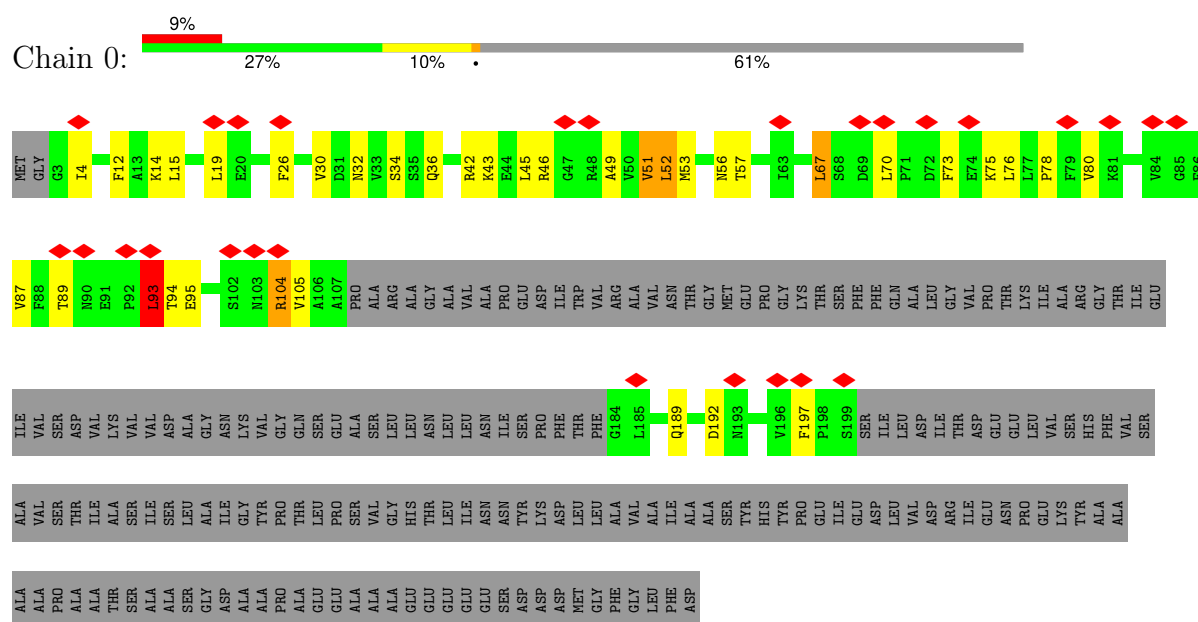
- Molecule 47: Ala tRNA



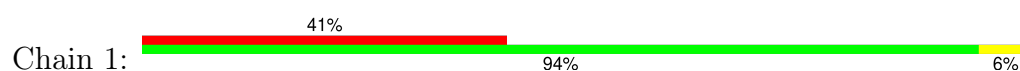
- Molecule 48: Large ribosomal subunit protein uL11A



- Molecule 49: 60S acidic ribosomal protein P0



- Molecule 50: CAT-tailed nascent peptide

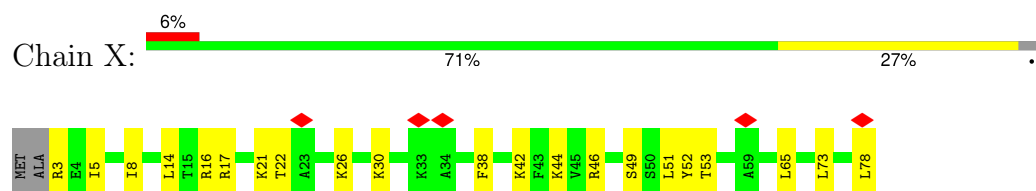




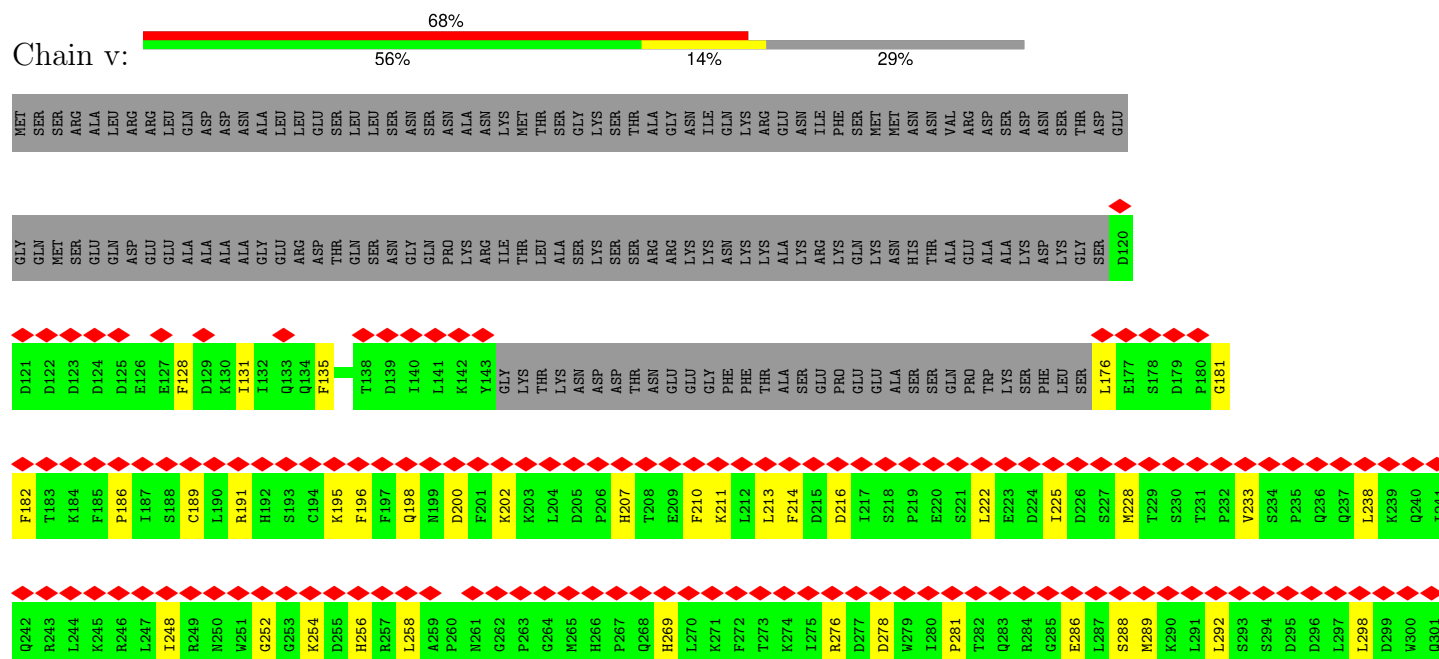
- Molecule 51: Large ribosomal subunit protein uL1A



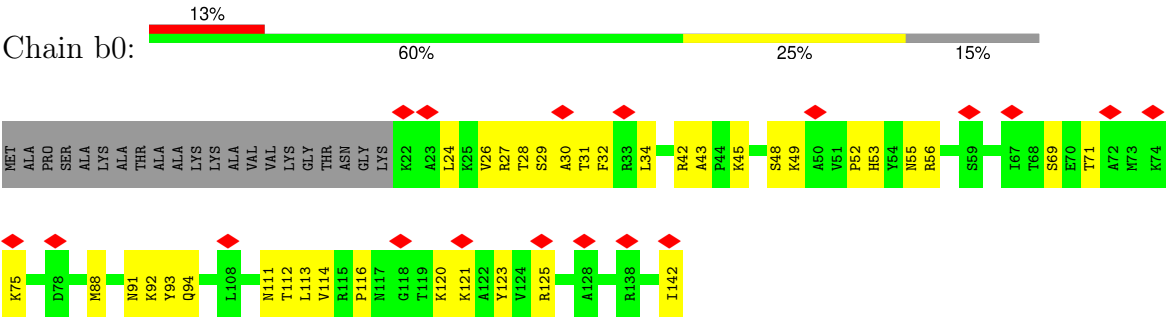
- Molecule 52: Large ribosomal subunit protein eL38



- Molecule 53: Ribosome quality control complex subunit 1



● Molecule 56: 60S ribosomal protein L25



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	28262	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	36	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.553	Depositor
Minimum map value	-0.788	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.051	Depositor
Recommended contour level	0.187	Depositor
Map size (Å)	677.12, 677.12, 677.12	wwPDB
Map dimensions	640, 640, 640	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.058, 1.058, 1.058	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: MG, ATP, ZN, ADP, SPD

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	0.15	0/4273	0.42	0/5775
1	B	0.37	0/5129	0.63	0/6942
1	C	0.18	0/3819	0.46	0/5165
1	D	0.18	0/3808	0.46	0/5148
1	E	0.21	1/3846 (0.0%)	0.45	4/5202 (0.1%)
1	F	0.15	0/4158	0.41	0/5614
2	H	0.17	0/606	0.43	0/812
2	J	0.14	0/606	0.38	0/812
2	K	0.65	0/379	1.15	5/509 (1.0%)
3	G	0.20	0/3851	0.53	2/5201 (0.0%)
4	3	0.30	0/1439	0.61	0/1938
5	4	0.28	0/1465	0.58	0/1965
6	5	0.30	0/1275	0.56	0/1702
7	6	0.31	0/1473	0.56	0/1980
8	7	0.27	0/1296	0.56	0/1739
9	8	0.29	0/812	0.75	2/1099 (0.2%)
10	I	0.27	0/1018	0.50	0/1369
11	9	0.27	0/530	0.52	0/703
12	L	0.27	0/995	0.53	0/1329
13	M	0.27	0/1106	0.56	0/1485
14	N	0.32	0/1200	0.56	1/1607 (0.1%)
15	O	0.26	0/473	0.62	0/629
16	P	0.26	0/745	0.60	0/1001
17	Q	0.31	0/890	0.68	2/1196 (0.2%)
18	R	0.26	0/1034	0.47	0/1385
19	S	0.30	0/868	0.47	0/1168
20	T	0.29	0/890	0.58	2/1189 (0.2%)
21	U	0.27	0/978	0.53	0/1301
22	V	0.28	0/772	0.57	0/1026
23	W	0.32	0/660	0.60	0/875
24	Y	0.29	0/443	0.46	0/588
25	Z	0.28	0/416	0.60	0/553

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
26	b	0.28	0/836	0.53	0/1104
27	c	0.27	0/701	0.56	0/934
28	d	0.22	0/208	0.81	2/267 (0.7%)
29	f	0.31	0/77011	0.40	5/120065 (0.0%)
30	h	0.26	0/2883	0.32	0/4491
31	i	0.30	0/3746	0.36	0/5832
32	j	0.31	0/1908	0.54	0/2564
33	k	0.29	0/3146	0.53	0/4228
34	l	0.29	0/2800	0.57	4/3790 (0.1%)
35	m	0.27	0/2400	0.56	0/3239
36	n	0.28	0/1329	0.60	0/1794
37	o	0.31	0/1821	0.58	0/2451
38	p	0.27	0/1836	0.58	1/2481 (0.0%)
39	q	0.30	0/1529	0.64	2/2060 (0.1%)
40	r	0.25	0/1801	0.49	0/2416
41	s	0.27	0/1367	0.69	4/1834 (0.2%)
42	t	0.29	0/1568	0.62	1/2106 (0.0%)
43	u	0.30	0/1068	0.53	0/1438
44	a	0.26	0/6683	0.55	2/9016 (0.0%)
45	e	0.66	0/11755	0.97	58/15956 (0.4%)
46	g	0.24	0/1672	0.59	1/2281 (0.0%)
47	x	0.35	0/1761	0.61	0/2742
47	y	0.37	0/1735	0.64	0/2701
48	z	0.67	0/726	1.24	13/1006 (1.3%)
49	0	0.49	0/976	0.95	3/1313 (0.2%)
51	w	0.27	0/1736	0.61	0/2332
52	X	0.45	0/614	0.50	0/819
53	v	0.84	3/4492 (0.1%)	1.12	7/6087 (0.1%)
54	2	0.72	0/608	1.02	0/816
55	a0	0.32	0/1585	0.54	0/2128
56	b0	0.31	0/979	0.57	0/1321
All	All	0.35	4/194533 (0.0%)	0.55	121/280619 (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
3	G	0	1
15	O	0	1
21	U	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
33	k	0	1
34	l	0	2
38	p	0	3
39	q	0	1
43	u	0	1
45	e	0	1
46	g	0	1
All	All	0	13

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	v	439	GLN	C-N	21.17	1.61	1.33
53	v	372	LEU	C-N	18.31	1.58	1.33
53	v	286	GLU	C-N	8.53	1.45	1.33
1	E	261	LYS	N-CA	-6.29	1.38	1.46

The worst 5 of 121 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	K	36	ILE	C-N-CD	-13.24	70.72	125.00
45	e	1364	GLY	N-CA-C	12.27	127.34	112.49
53	v	440	ARG	O-C-N	11.96	136.70	122.34
45	e	1514	ILE	CA-C-N	-10.41	106.69	122.09
45	e	1514	ILE	C-N-CA	-10.41	106.69	122.09

There are no chirality outliers.

5 of 13 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	G	510	ASN	Peptide
15	O	20	GLY	Peptide
21	U	83	LYS	Peptide
33	k	141	GLY	Peptide
34	l	13	GLY	Peptide

5.2 Too-close contacts

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	4206	0	4232	63	0
1	B	5049	0	5118	110	0
1	C	3759	0	3798	86	0
1	D	3747	0	3784	127	0
1	E	3786	0	3827	126	0
1	F	4093	0	4121	70	0
2	H	601	0	622	8	0
2	J	601	0	622	10	0
2	K	376	0	392	64	0
3	G	3762	0	3638	45	0
4	3	1416	0	1433	12	0
5	4	1441	0	1543	14	0
6	5	1258	0	1342	18	0
7	6	1437	0	1475	21	0
8	7	1272	0	1312	12	0
9	8	796	0	812	8	0
10	I	1003	0	1048	11	0
11	9	518	0	542	7	0
12	L	984	0	1075	7	0
13	M	1080	0	1122	10	0
14	N	1169	0	1211	16	0
15	O	462	0	491	8	0
16	P	737	0	792	2	0
17	Q	876	0	912	10	0
18	R	1013	0	1077	6	0
19	S	850	0	880	7	0
20	T	880	0	942	9	0
21	U	969	0	1078	4	0
22	V	766	0	842	6	0
23	W	645	0	645	11	0
24	Y	436	0	475	6	0
25	Z	410	0	442	4	0
26	b	824	0	888	12	0
27	c	694	0	734	8	0
28	d	207	0	250	3	0
29	f	68802	0	34573	604	0
30	h	2579	0	1304	9	0
31	i	3353	0	1695	41	0
32	j	1874	0	1943	24	0
33	k	3075	0	3142	26	0
34	l	2748	0	2859	23	0
35	m	2351	0	2294	31	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
36	n	1307	0	1377	8	0
37	o	1784	0	1862	10	0
38	p	1804	0	1877	55	0
39	q	1508	0	1572	17	0
40	r	1764	0	1804	16	0
41	s	1346	0	1370	9	0
42	t	1543	0	1608	15	0
43	u	1053	0	1149	51	0
44	a	6573	0	6471	60	0
45	e	11556	0	10822	475	0
46	g	1651	0	1613	22	0
47	x	1579	0	800	24	0
47	y	1556	0	788	16	0
48	z	728	0	337	20	0
49	0	961	0	979	48	0
50	1	85	0	21	1	0
51	w	1709	0	1797	15	0
52	X	608	0	677	66	0
53	v	4376	0	4289	116	0
54	2	602	0	629	26	0
55	a0	1555	0	1659	133	0
56	b0	964	0	1025	187	0
57	A	31	0	12	23	0
57	B	31	0	12	2	0
57	C	93	0	32	64	0
57	D	62	0	22	49	0
57	E	31	0	10	14	0
57	F	31	0	12	18	0
58	E	27	0	11	23	0
59	G	2	0	0	0	0
59	T	1	0	0	0	0
59	W	1	0	0	0	0
59	Z	1	0	0	0	0
59	b	1	0	0	0	0
59	c	1	0	0	0	0
60	3	1	0	0	0	0
60	5	1	0	0	0	0
60	I	1	0	0	0	0
60	R	1	0	0	0	0
60	T	1	0	0	0	0
60	f	3	0	0	0	0
60	h	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
60	j	2	0	0	0	0
60	k	1	0	0	0	0
61	f	10	0	19	1	0
All	All	183852	0	145983	2352	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 2352 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)
45:e:917:LEU:HD13	45:e:963:MET:SD	1.21	1.74
45:e:272:TYR:HA	45:e:277:MET:SD	1.28	1.66
45:e:277:MET:SD	45:e:278:PRO:HD3	1.34	1.65
1:E:536:LEU:HD22	58:E:901:ADP:C5'	1.23	1.60
1:E:536:LEU:CD2	58:E:901:ADP:H3'	1.14	1.60

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	543/835 (65%)	522 (96%)	21 (4%)	0	100	100
1	B	648/835 (78%)	612 (94%)	36 (6%)	0	100	100
1	C	488/835 (58%)	448 (92%)	40 (8%)	0	100	100
1	D	485/835 (58%)	449 (93%)	36 (7%)	0	100	100
1	E	492/835 (59%)	463 (94%)	27 (6%)	2 (0%)	30	61
1	F	527/835 (63%)	501 (95%)	26 (5%)	0	100	100
2	H	74/76 (97%)	73 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	J	74/76 (97%)	74 (100%)	0	0	100	100
2	K	46/76 (60%)	31 (67%)	10 (22%)	5 (11%)	0	1
3	G	466/580 (80%)	421 (90%)	44 (9%)	1 (0%)	44	72
4	3	181/184 (98%)	172 (95%)	9 (5%)	0	100	100
5	4	183/186 (98%)	176 (96%)	7 (4%)	0	100	100
6	5	154/189 (82%)	151 (98%)	3 (2%)	0	100	100
7	6	169/172 (98%)	163 (96%)	6 (4%)	0	100	100
8	7	157/160 (98%)	149 (95%)	8 (5%)	0	100	100
9	8	98/121 (81%)	93 (95%)	5 (5%)	0	100	100
10	I	134/137 (98%)	132 (98%)	2 (2%)	0	100	100
11	9	61/155 (39%)	61 (100%)	0	0	100	100
12	L	123/127 (97%)	119 (97%)	4 (3%)	0	100	100
13	M	133/136 (98%)	126 (95%)	7 (5%)	0	100	100
14	N	146/149 (98%)	136 (93%)	10 (7%)	0	100	100
15	O	56/59 (95%)	52 (93%)	3 (5%)	1 (2%)	7	31
16	P	94/105 (90%)	93 (99%)	1 (1%)	0	100	100
17	Q	107/113 (95%)	98 (92%)	9 (8%)	0	100	100
18	R	125/130 (96%)	123 (98%)	2 (2%)	0	100	100
19	S	104/107 (97%)	101 (97%)	3 (3%)	0	100	100
20	T	110/121 (91%)	108 (98%)	2 (2%)	0	100	100
21	U	117/120 (98%)	112 (96%)	5 (4%)	0	100	100
22	V	97/100 (97%)	93 (96%)	4 (4%)	0	100	100
23	W	79/88 (90%)	75 (95%)	4 (5%)	0	100	100
24	Y	48/51 (94%)	46 (96%)	2 (4%)	0	100	100
25	Z	50/128 (39%)	48 (96%)	2 (4%)	0	100	100
26	b	101/106 (95%)	95 (94%)	6 (6%)	0	100	100
27	c	89/92 (97%)	85 (96%)	4 (4%)	0	100	100
28	d	20/25 (80%)	19 (95%)	1 (5%)	0	100	100
32	j	244/254 (96%)	226 (93%)	18 (7%)	0	100	100
33	k	384/387 (99%)	363 (94%)	21 (6%)	0	100	100
34	l	359/362 (99%)	329 (92%)	29 (8%)	1 (0%)	37	66

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
35	m	292/297 (98%)	277 (95%)	15 (5%)	0	100	100
36	n	163/176 (93%)	154 (94%)	9 (6%)	0	100	100
37	o	220/244 (90%)	207 (94%)	13 (6%)	0	100	100
38	p	231/256 (90%)	220 (95%)	11 (5%)	0	100	100
39	q	189/191 (99%)	174 (92%)	14 (7%)	1 (0%)	25	57
40	r	216/221 (98%)	206 (95%)	10 (5%)	0	100	100
41	s	167/174 (96%)	161 (96%)	5 (3%)	1 (1%)	22	54
42	t	191/199 (96%)	174 (91%)	16 (8%)	1 (0%)	25	57
43	u	134/138 (97%)	125 (93%)	9 (7%)	0	100	100
44	a	842/1038 (81%)	827 (98%)	15 (2%)	0	100	100
45	e	1518/1562 (97%)	1486 (98%)	30 (2%)	2 (0%)	48	77
46	g	223/245 (91%)	215 (96%)	8 (4%)	0	100	100
48	z	144/165 (87%)	135 (94%)	7 (5%)	2 (1%)	9	36
49	0	117/312 (38%)	116 (99%)	0	1 (1%)	14	45
51	w	214/217 (99%)	211 (99%)	3 (1%)	0	100	100
52	X	74/78 (95%)	74 (100%)	0	0	100	100
53	v	527/753 (70%)	510 (97%)	16 (3%)	1 (0%)	44	72
54	2	74/76 (97%)	73 (99%)	1 (1%)	0	100	100
55	a0	195/199 (98%)	192 (98%)	3 (2%)	0	100	100
56	b0	119/142 (84%)	118 (99%)	1 (1%)	0	100	100
All	All	13416/16565 (81%)	12793 (95%)	604 (4%)	19 (0%)	50	77

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	561	TRP
2	K	37	PRO
2	K	38	PRO
2	K	41	GLN
48	z	88	PRO

5.3.2 Protein sidechains ⓘ

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	448/695 (64%)	447 (100%)	1 (0%)	92	96
1	B	545/695 (78%)	543 (100%)	2 (0%)	89	94
1	C	401/695 (58%)	399 (100%)	2 (0%)	86	92
1	D	398/695 (57%)	397 (100%)	1 (0%)	91	95
1	E	403/695 (58%)	399 (99%)	4 (1%)	73	85
1	F	434/695 (62%)	433 (100%)	1 (0%)	92	96
2	H	69/69 (100%)	69 (100%)	0	100	100
2	J	69/69 (100%)	69 (100%)	0	100	100
2	K	44/69 (64%)	42 (96%)	2 (4%)	23	52
3	G	420/516 (81%)	419 (100%)	1 (0%)	92	96
4	3	138/146 (94%)	138 (100%)	0	100	100
5	4	150/151 (99%)	150 (100%)	0	100	100
6	5	129/154 (84%)	129 (100%)	0	100	100
7	6	155/156 (99%)	155 (100%)	0	100	100
8	7	135/137 (98%)	135 (100%)	0	100	100
9	8	87/107 (81%)	87 (100%)	0	100	100
10	I	104/105 (99%)	104 (100%)	0	100	100
11	9	54/129 (42%)	54 (100%)	0	100	100
12	L	108/110 (98%)	108 (100%)	0	100	100
13	M	112/116 (97%)	112 (100%)	0	100	100
14	N	117/119 (98%)	117 (100%)	0	100	100
15	O	46/47 (98%)	46 (100%)	0	100	100
16	P	81/88 (92%)	81 (100%)	0	100	100
17	Q	92/97 (95%)	92 (100%)	0	100	100
18	R	107/111 (96%)	107 (100%)	0	100	100
19	S	90/91 (99%)	90 (100%)	0	100	100
20	T	95/103 (92%)	95 (100%)	0	100	100
21	U	104/105 (99%)	104 (100%)	0	100	100
22	V	80/82 (98%)	80 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
23	W	67/71 (94%)	67 (100%)	0	100	100
24	Y	45/46 (98%)	45 (100%)	0	100	100
25	Z	45/116 (39%)	45 (100%)	0	100	100
26	b	87/91 (96%)	87 (100%)	0	100	100
27	c	71/72 (99%)	71 (100%)	0	100	100
28	d	20/23 (87%)	20 (100%)	0	100	100
32	j	189/196 (96%)	189 (100%)	0	100	100
33	k	320/323 (99%)	320 (100%)	0	100	100
34	l	288/289 (100%)	288 (100%)	0	100	100
35	m	241/245 (98%)	241 (100%)	0	100	100
36	n	139/155 (90%)	139 (100%)	0	100	100
37	o	186/205 (91%)	186 (100%)	0	100	100
38	p	187/208 (90%)	187 (100%)	0	100	100
39	q	168/171 (98%)	168 (100%)	0	100	100
40	r	185/187 (99%)	184 (100%)	1 (0%)	86	92
41	s	145/150 (97%)	145 (100%)	0	100	100
42	t	154/159 (97%)	154 (100%)	0	100	100
43	u	107/109 (98%)	107 (100%)	0	100	100
44	a	677/949 (71%)	676 (100%)	1 (0%)	92	97
45	e	1157/1451 (80%)	1102 (95%)	55 (5%)	21	50
46	g	180/211 (85%)	180 (100%)	0	100	100
49	0	104/254 (41%)	94 (90%)	10 (10%)	7	25
51	w	197/198 (100%)	197 (100%)	0	100	100
52	X	68/69 (99%)	68 (100%)	0	100	100
53	v	492/686 (72%)	484 (98%)	8 (2%)	58	77
54	2	68/68 (100%)	68 (100%)	0	100	100
55	a0	160/162 (99%)	160 (100%)	0	100	100
56	b0	104/118 (88%)	104 (100%)	0	100	100
All	All	11066/14029 (79%)	10977 (99%)	89 (1%)	77	89

5 of 89 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
45	e	1367	THR
49	0	30	VAL
45	e	1379	LEU
45	e	1441	ILE
49	0	76	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 156 such sidechains are listed below:

Mol	Chain	Res	Type
45	e	189	ASN
53	v	198	GLN
45	e	397	ASN
45	e	1141	GLN
53	v	610	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
29	f	3211/3395 (94%)	601 (18%)	0
30	h	120/121 (99%)	12 (10%)	0
31	i	157/158 (99%)	32 (20%)	0
47	x	72/76 (94%)	26 (36%)	0
47	y	71/76 (93%)	26 (36%)	0
All	All	3631/3826 (94%)	697 (19%)	0

5 of 697 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
29	f	6	A
29	f	13	A
29	f	14	U
29	f	26	A
29	f	40	A

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 30 ligands modelled in this entry, 19 are monoatomic - leaving 11 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
57	ATP	C	1002	-	28,33,33	0.99	0	34,52,52	1.22	3 (8%)
57	ATP	F	901	-	28,33,33	0.99	1 (3%)	34,52,52	1.21	3 (8%)
57	ATP	C	1001	-	28,33,33	0.99	0	34,52,52	1.21	3 (8%)
57	ATP	D	901	-	28,33,33	0.99	0	34,52,52	1.23	3 (8%)
61	SPD	f	3401	-	9,9,9	0.31	0	8,8,8	0.85	0
57	ATP	A	901	-	28,33,33	0.98	0	34,52,52	1.22	3 (8%)
57	ATP	D	902	-	28,33,33	0.98	0	34,52,52	1.22	3 (8%)
57	ATP	C	1003	-	28,33,33	0.99	0	34,52,52	1.22	3 (8%)
58	ADP	E	901	-	24,29,29	0.92	0	29,45,45	1.26	3 (10%)
57	ATP	E	902	-	28,33,33	0.99	1 (3%)	34,52,52	1.23	3 (8%)
57	ATP	B	901	-	28,33,33	0.99	0	34,52,52	1.23	3 (8%)

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
57	ATP	C	1002	-	-	5/18/38/38	0/3/3/3
57	ATP	F	901	-	-	1/18/38/38	0/3/3/3
57	ATP	C	1001	-	-	5/18/38/38	0/3/3/3
57	ATP	D	901	-	-	4/18/38/38	0/3/3/3
61	SPD	f	3401	-	-	5/7/7/7	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
57	ATP	A	901	-	-	5/18/38/38	0/3/3/3
57	ATP	D	902	-	-	5/18/38/38	0/3/3/3
57	ATP	C	1003	-	-	5/18/38/38	0/3/3/3
58	ADP	E	901	-	-	3/12/32/32	0/3/3/3
57	ATP	E	902	-	-	5/18/38/38	0/3/3/3
57	ATP	B	901	-	-	3/18/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
57	F	901	ATP	O4'-C1'	2.06	1.43	1.40
57	E	902	ATP	O4'-C1'	2.02	1.43	1.40

The worst 5 of 30 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
57	D	901	ATP	N3-C2-N1	-3.70	123.65	128.67
57	E	902	ATP	N3-C2-N1	-3.70	123.65	128.67
57	B	901	ATP	N3-C2-N1	-3.69	123.66	128.67
57	C	1002	ATP	N3-C2-N1	-3.68	123.68	128.67
57	C	1003	ATP	N3-C2-N1	-3.67	123.70	128.67

There are no chirality outliers.

5 of 46 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
57	A	901	ATP	O4'-C4'-C5'-O5'
57	A	901	ATP	C3'-C4'-C5'-O5'
57	C	1001	ATP	O4'-C4'-C5'-O5'
57	C	1001	ATP	C3'-C4'-C5'-O5'
57	C	1002	ATP	O4'-C4'-C5'-O5'

There are no ring outliers.

11 monomers are involved in 194 short contacts:

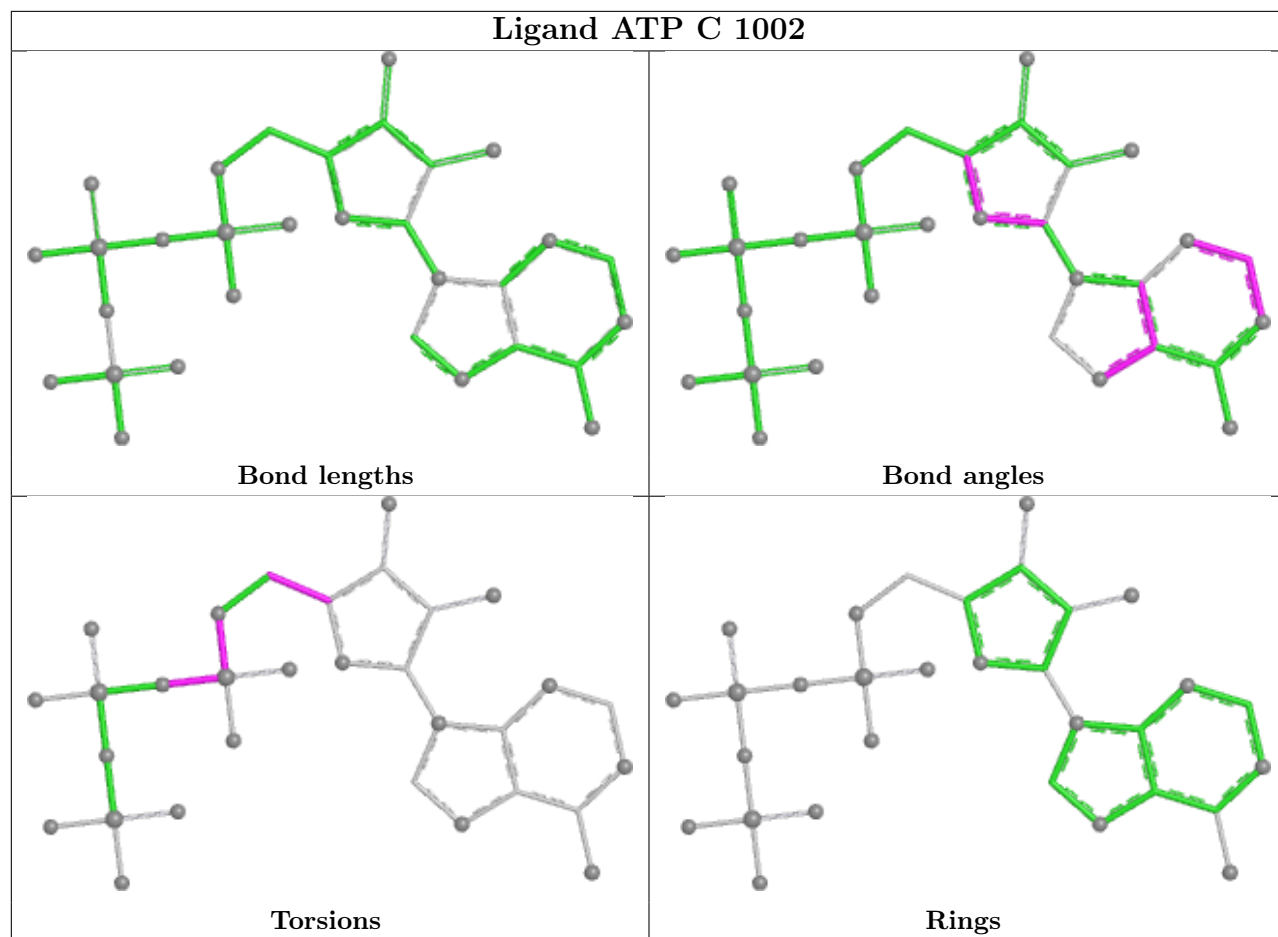
Mol	Chain	Res	Type	Clashes	Symm-Clashes
57	C	1002	ATP	4	0
57	F	901	ATP	18	0
57	C	1001	ATP	42	0

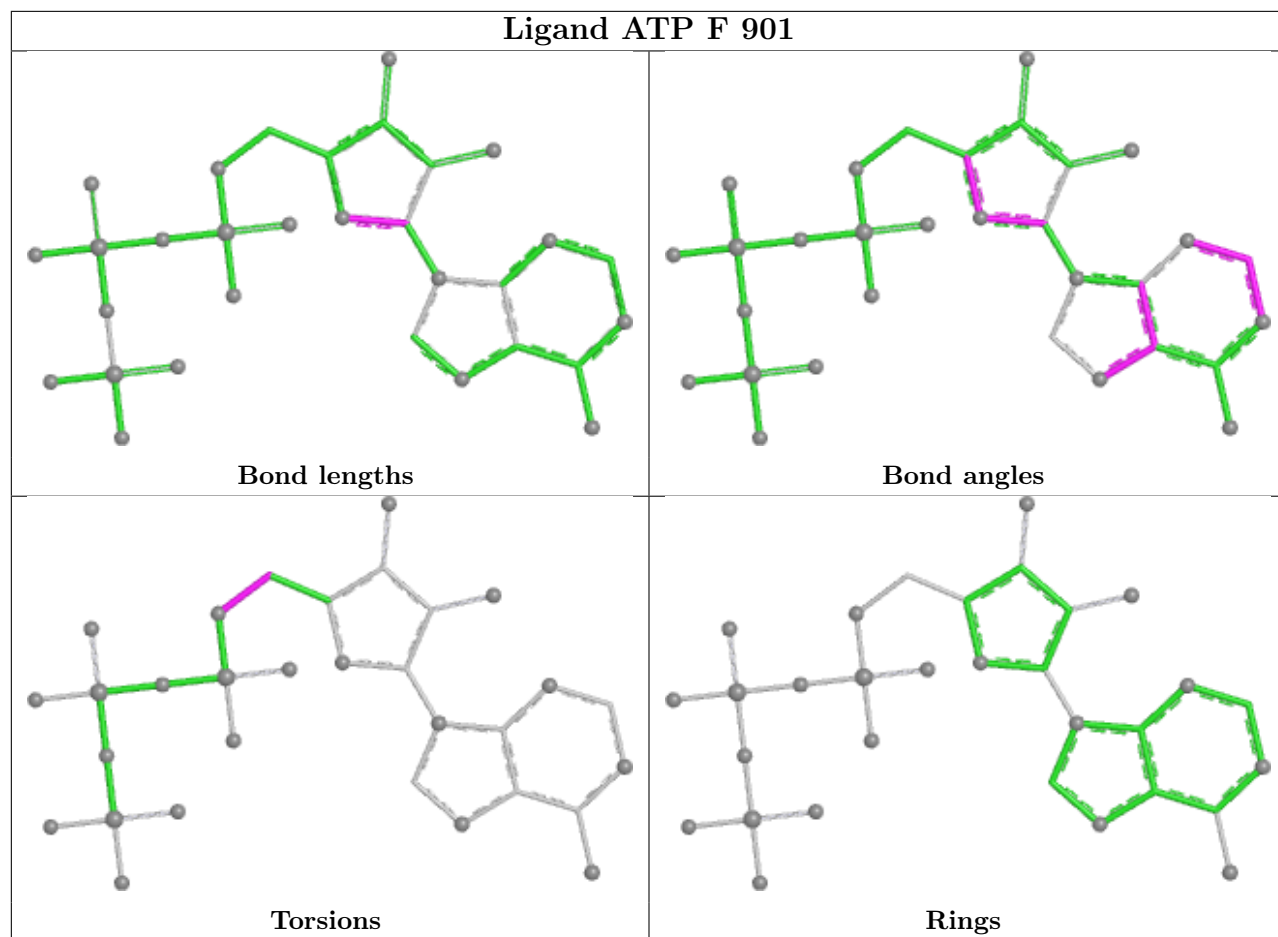
Continued on next page...

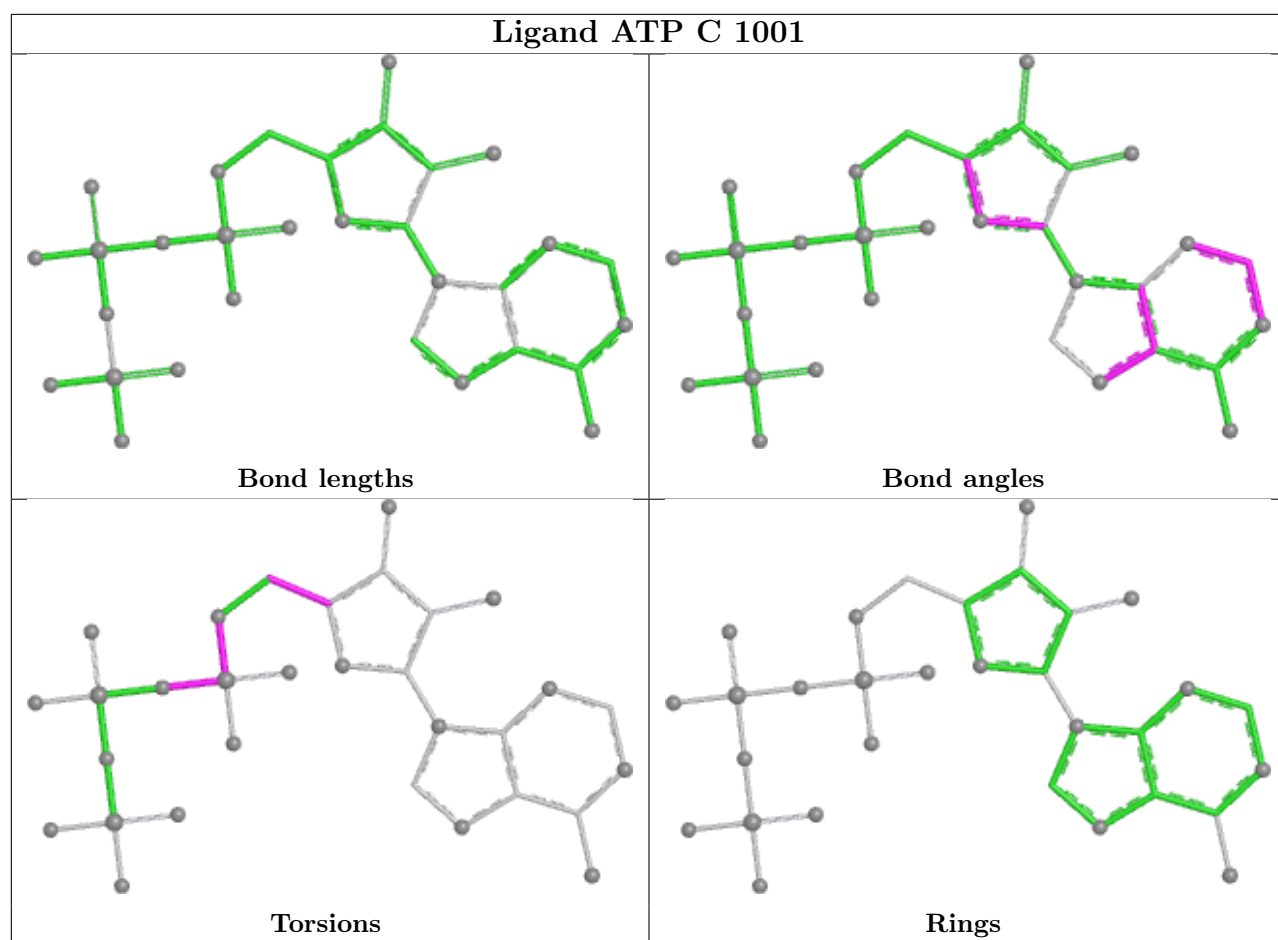
Continued from previous page...

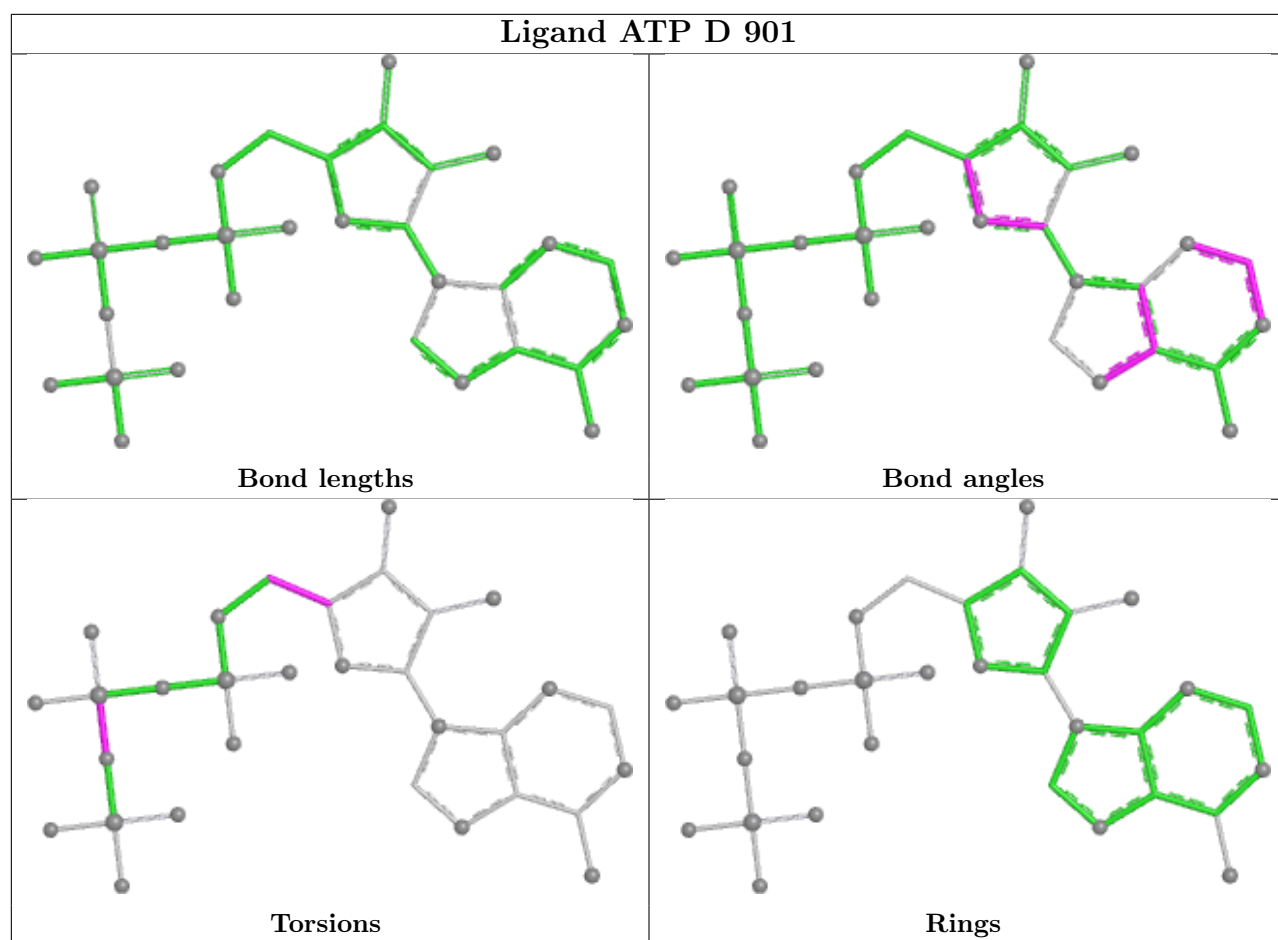
Mol	Chain	Res	Type	Clashes	Symm-Clashes
57	D	901	ATP	20	0
61	f	3401	SPD	1	0
57	A	901	ATP	23	0
57	D	902	ATP	29	0
57	C	1003	ATP	18	0
58	E	901	ADP	23	0
57	E	902	ATP	14	0
57	B	901	ATP	2	0

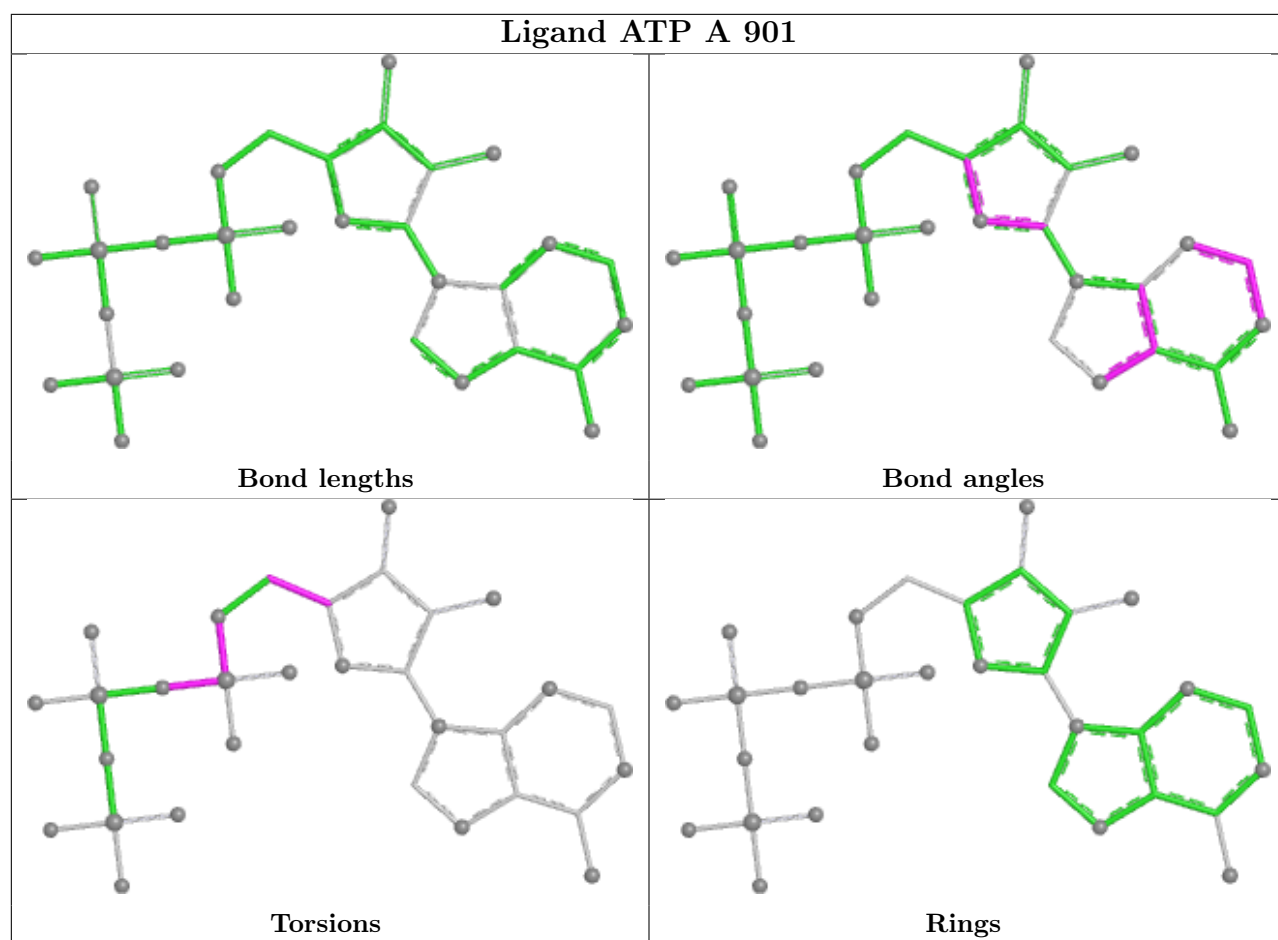
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

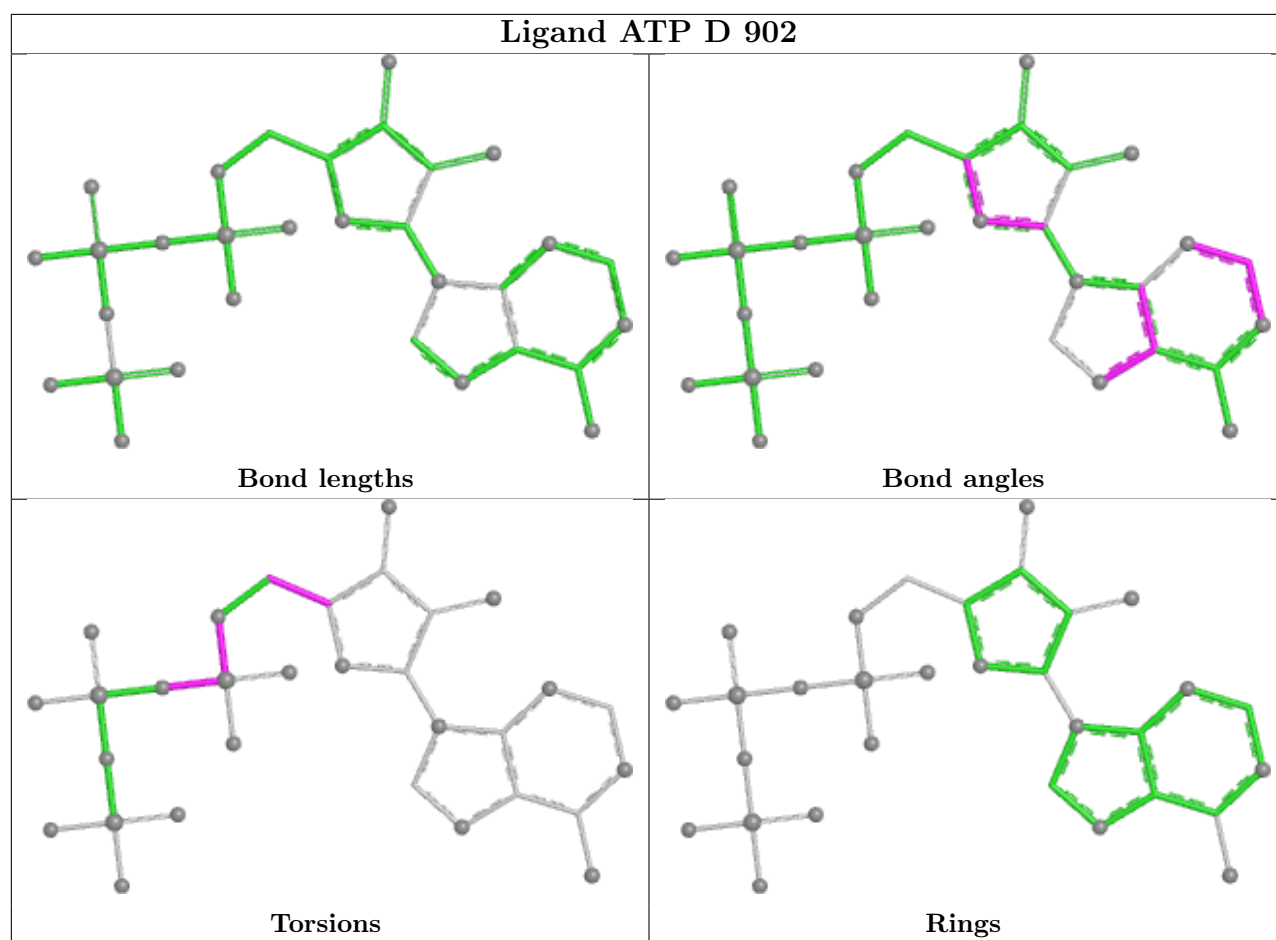


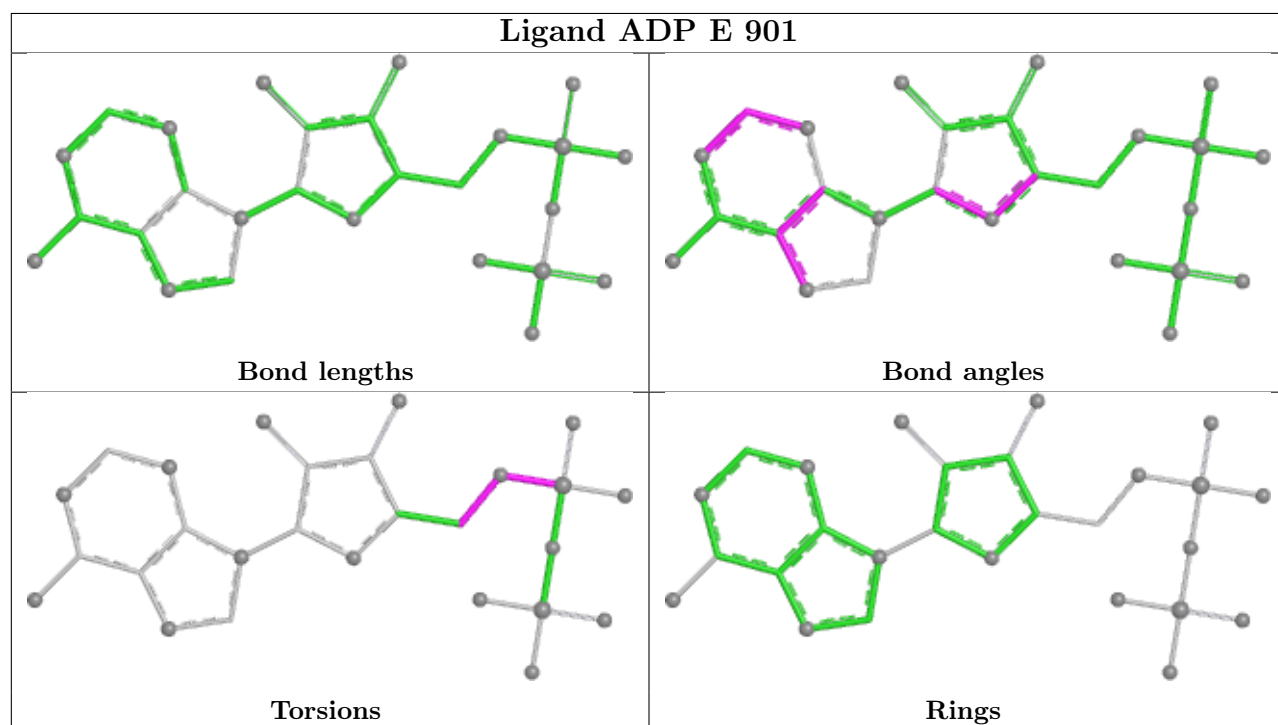
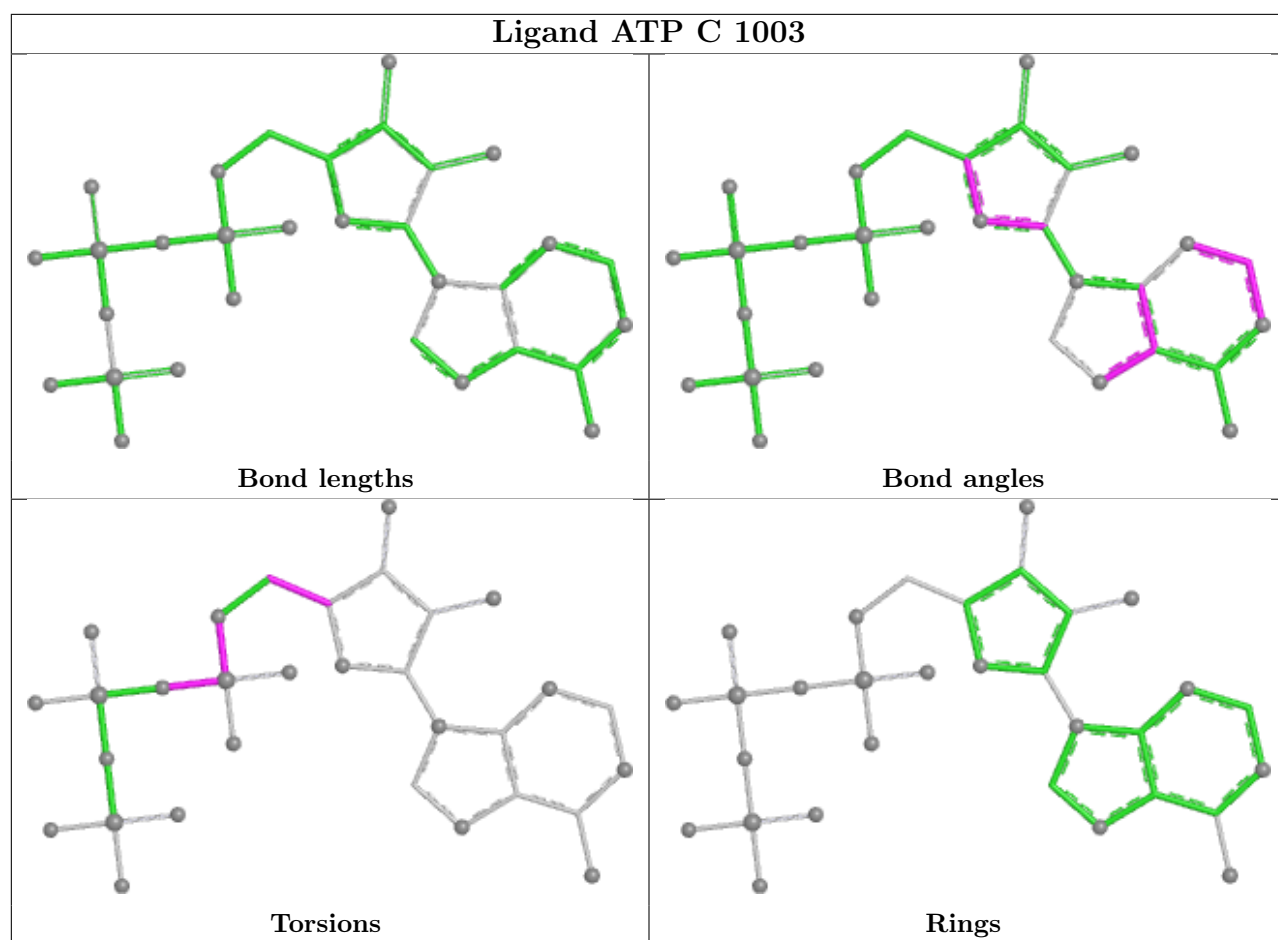


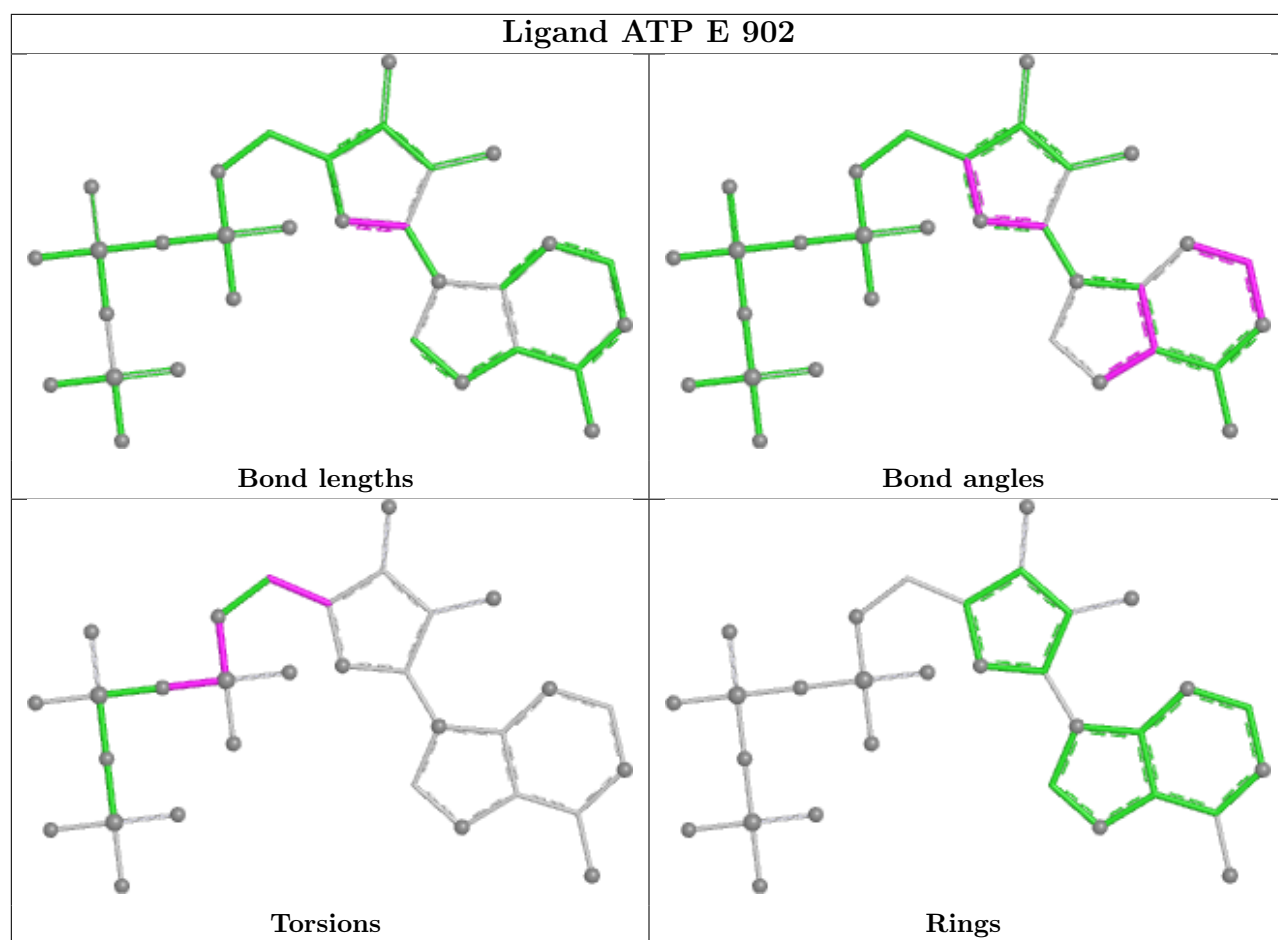


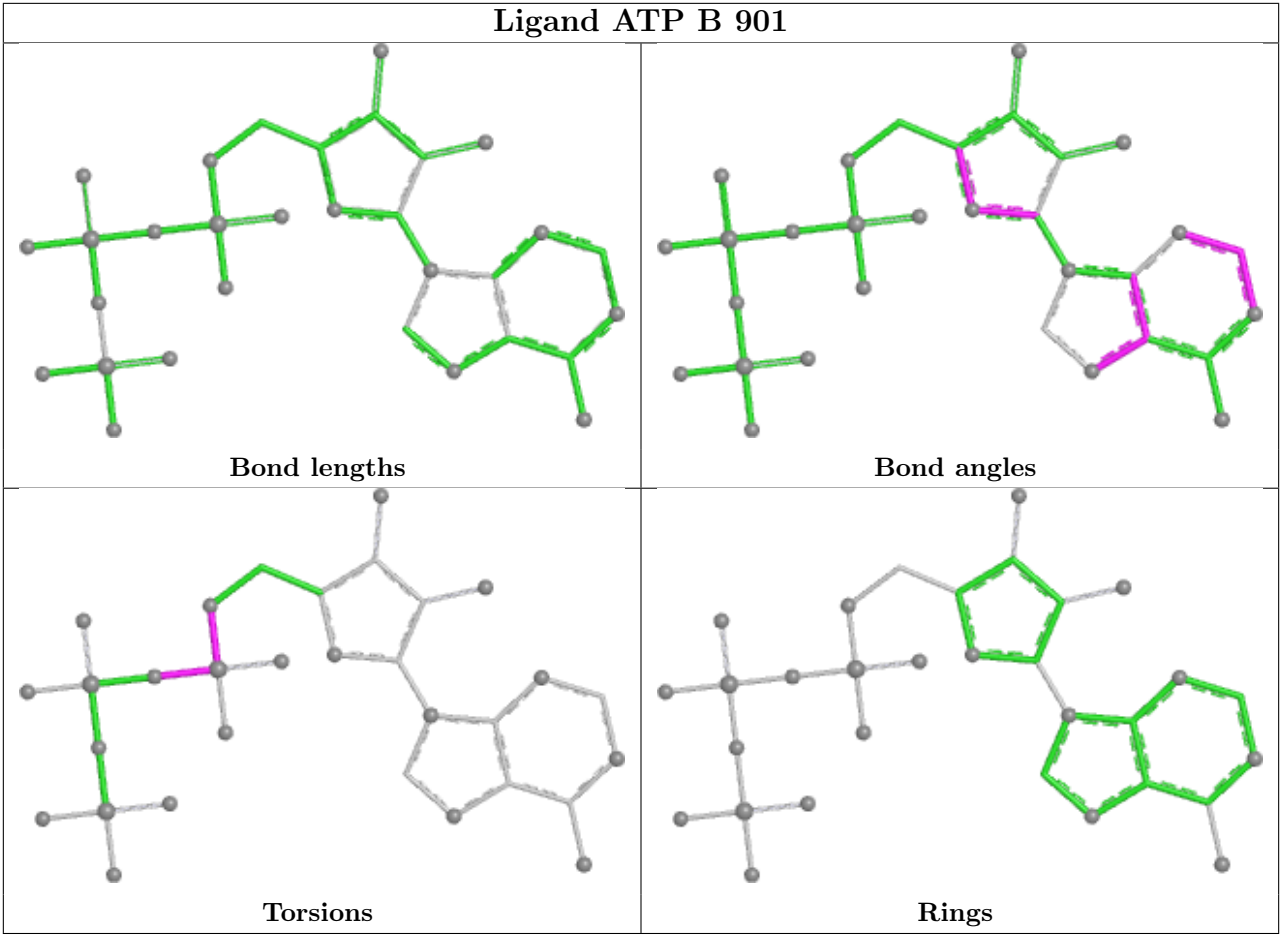












5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
45	e	2
53	v	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	e	1071:THR	C	1072:ALA	N	3.98
1	e	932:LEU	C	933:LEU	N	2.01
1	v	439:GLN	C	440:ARG	N	1.62

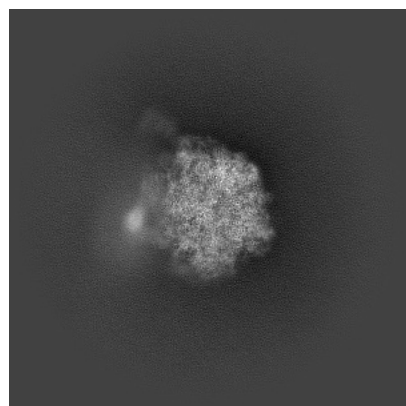
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-70444. These allow visual inspection of the internal detail of the map and identification of artifacts.

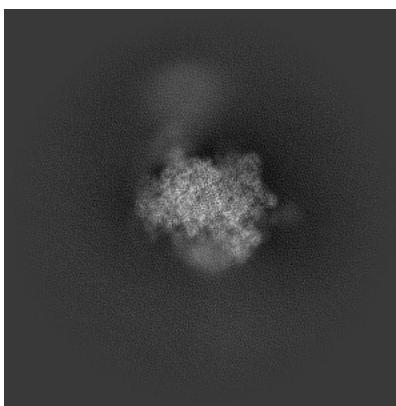
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

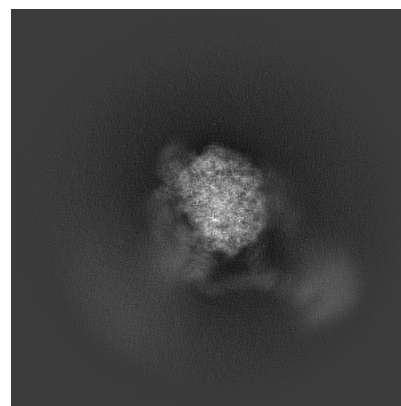
6.1.1 Primary map



X

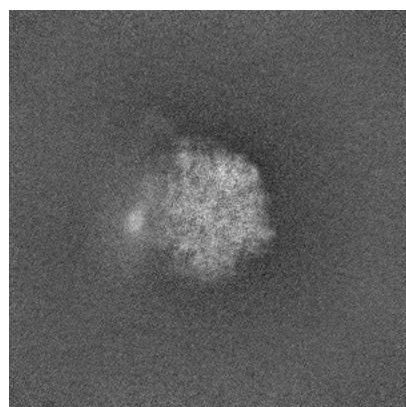


Y

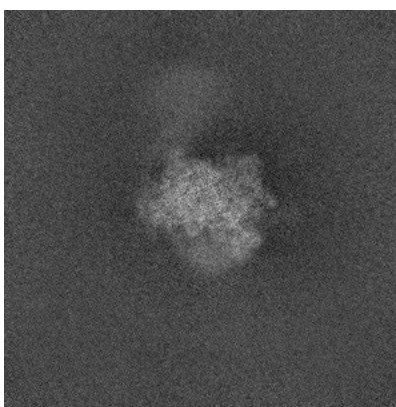


Z

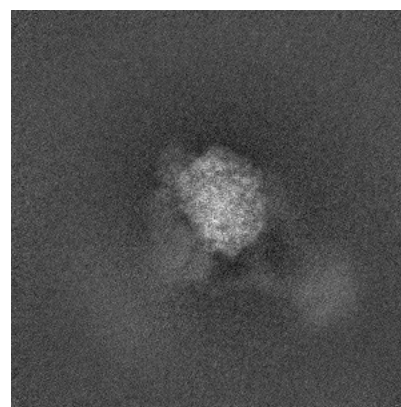
6.1.2 Raw map



X



Y

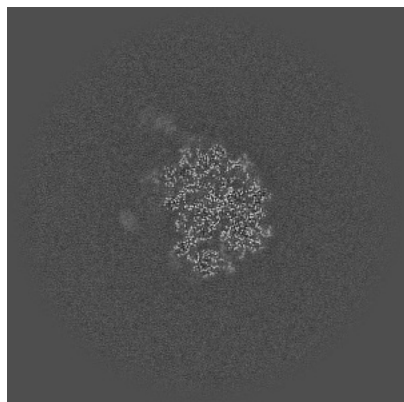


Z

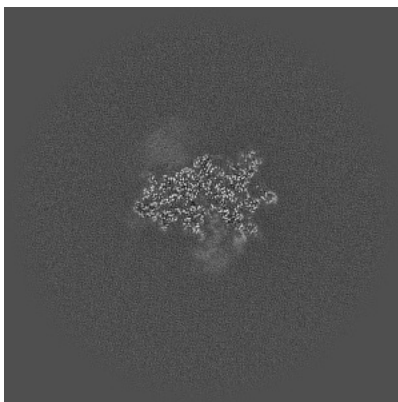
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

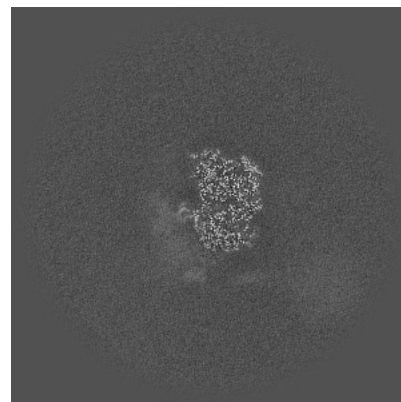
6.2.1 Primary map



X Index: 320

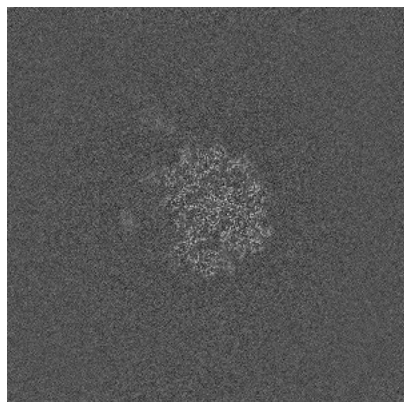


Y Index: 320

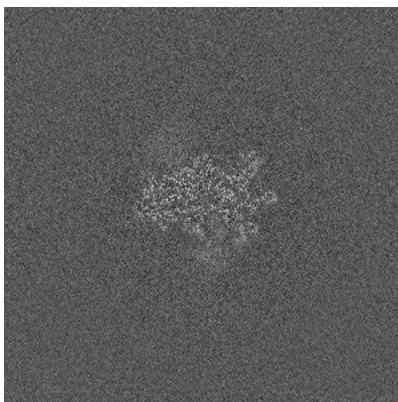


Z Index: 320

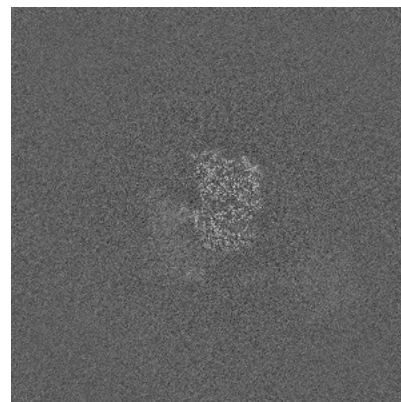
6.2.2 Raw map



X Index: 320



Y Index: 320

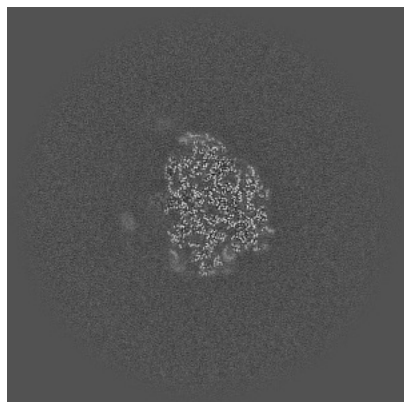


Z Index: 320

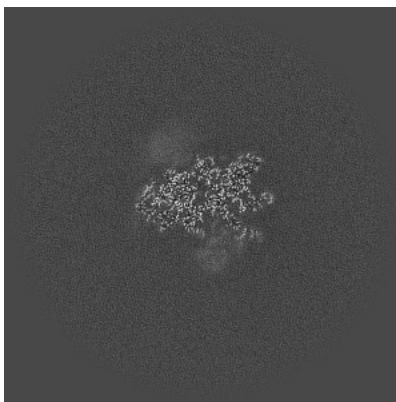
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

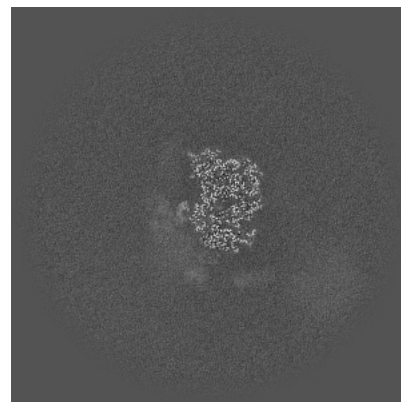
6.3.1 Primary map



X Index: 331

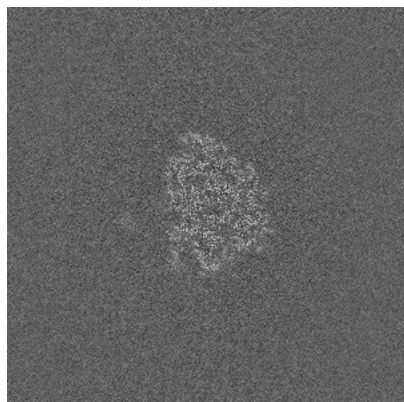


Y Index: 325

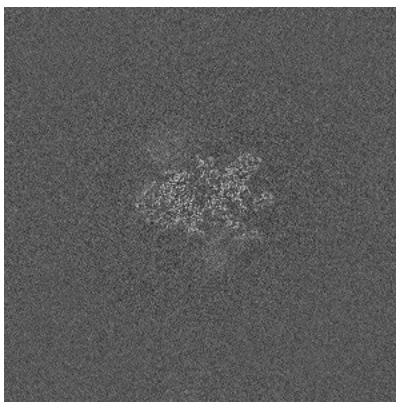


Z Index: 318

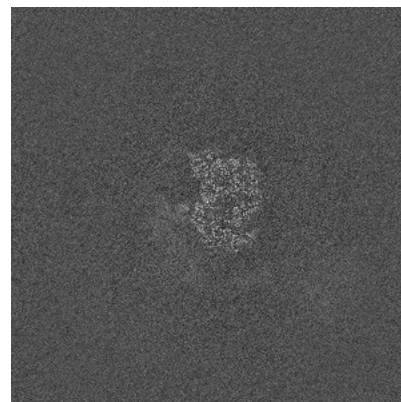
6.3.2 Raw map



X Index: 333



Y Index: 326

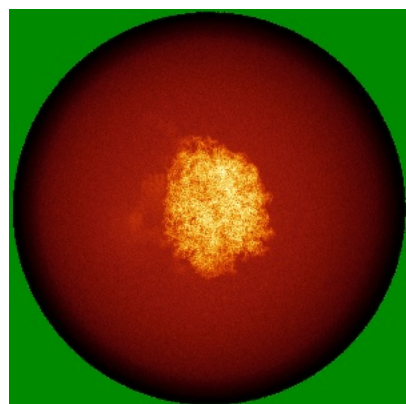


Z Index: 317

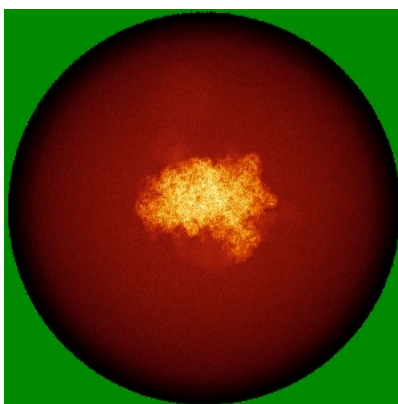
The images above show the largest variance slices of the map in three orthogonal directions.

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

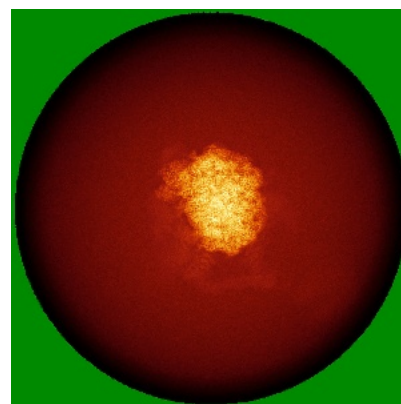
6.4.1 Primary map



X

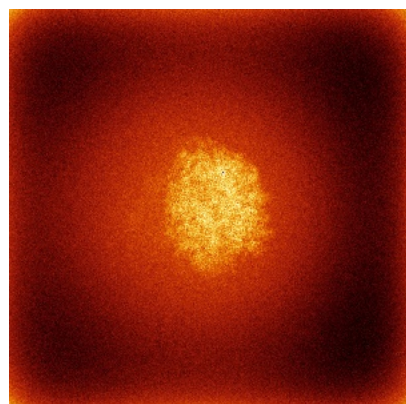


Y

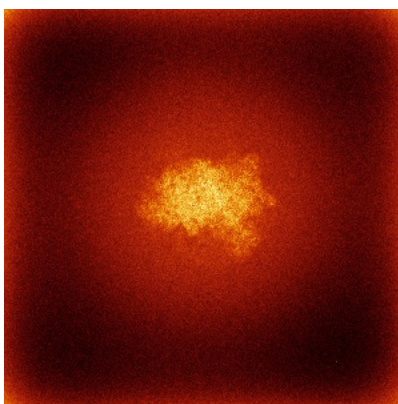


Z

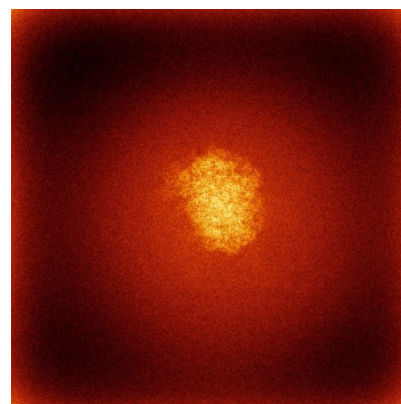
6.4.2 Raw map



X



Y

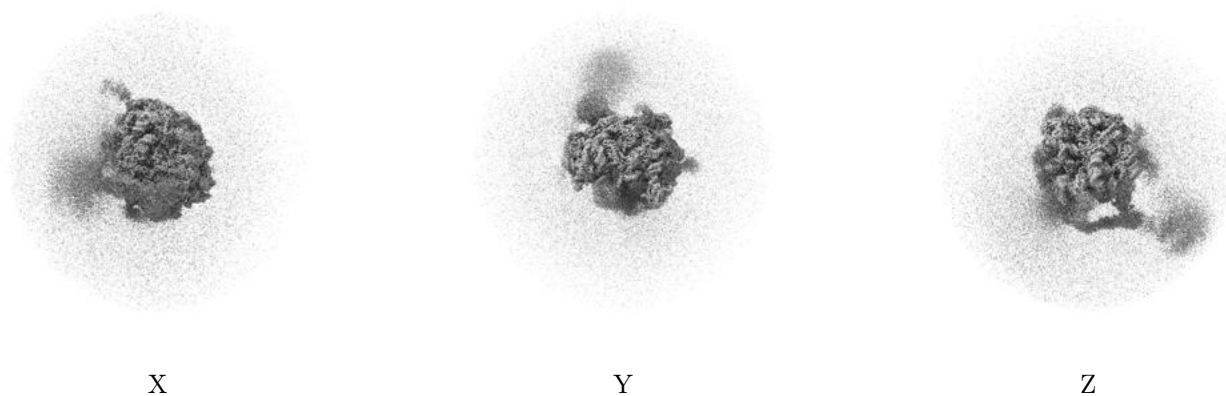


Z

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

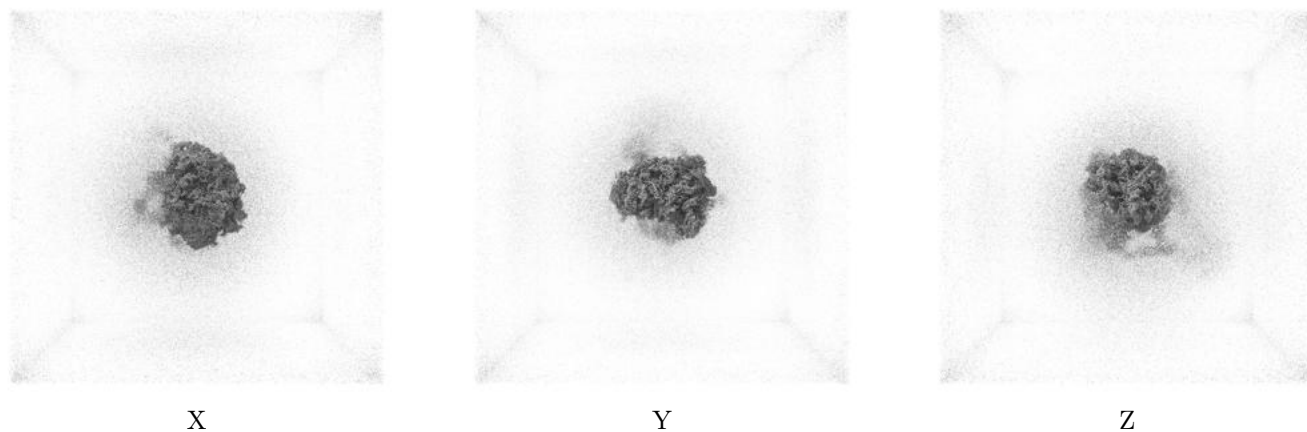
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.187. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

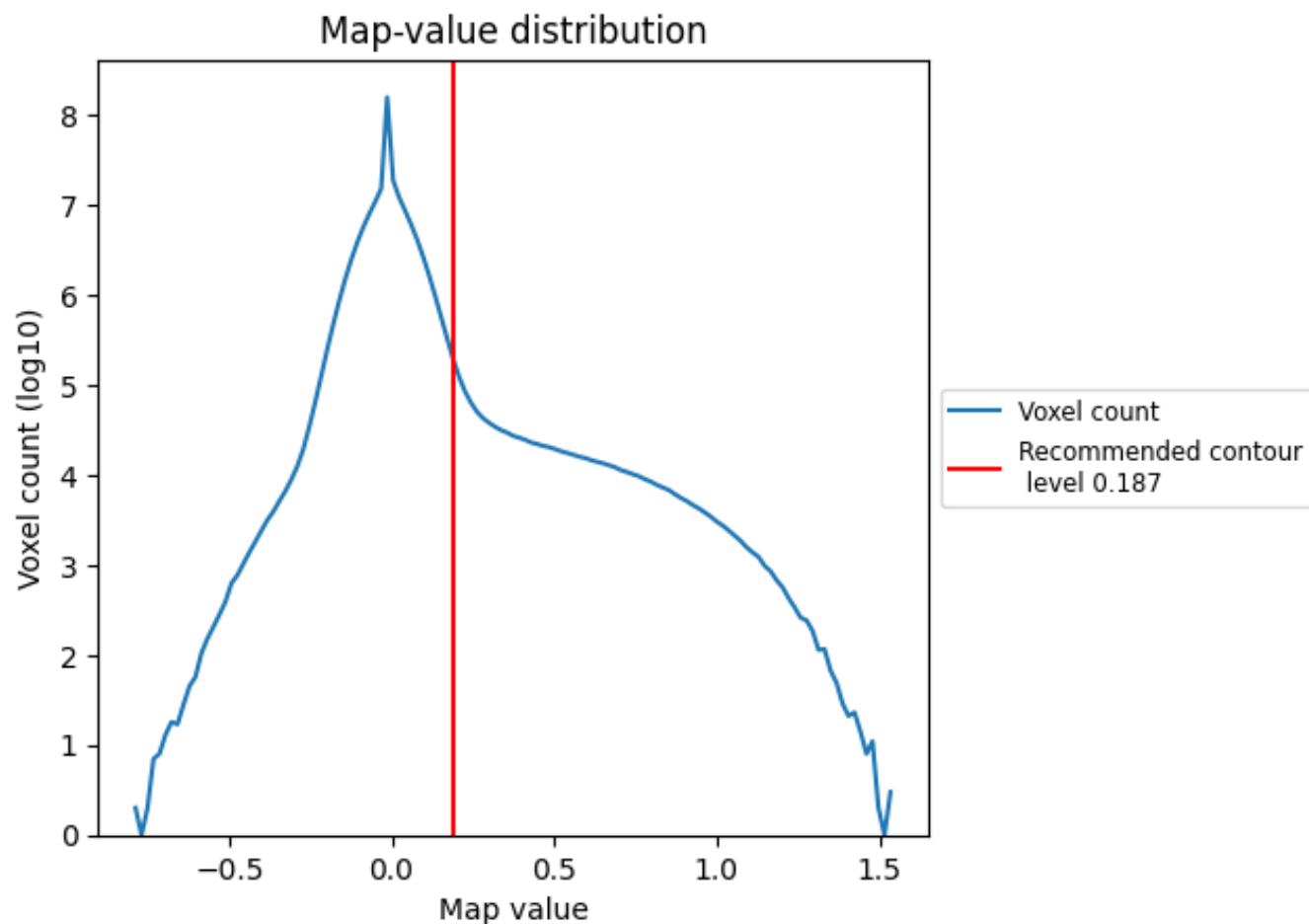
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

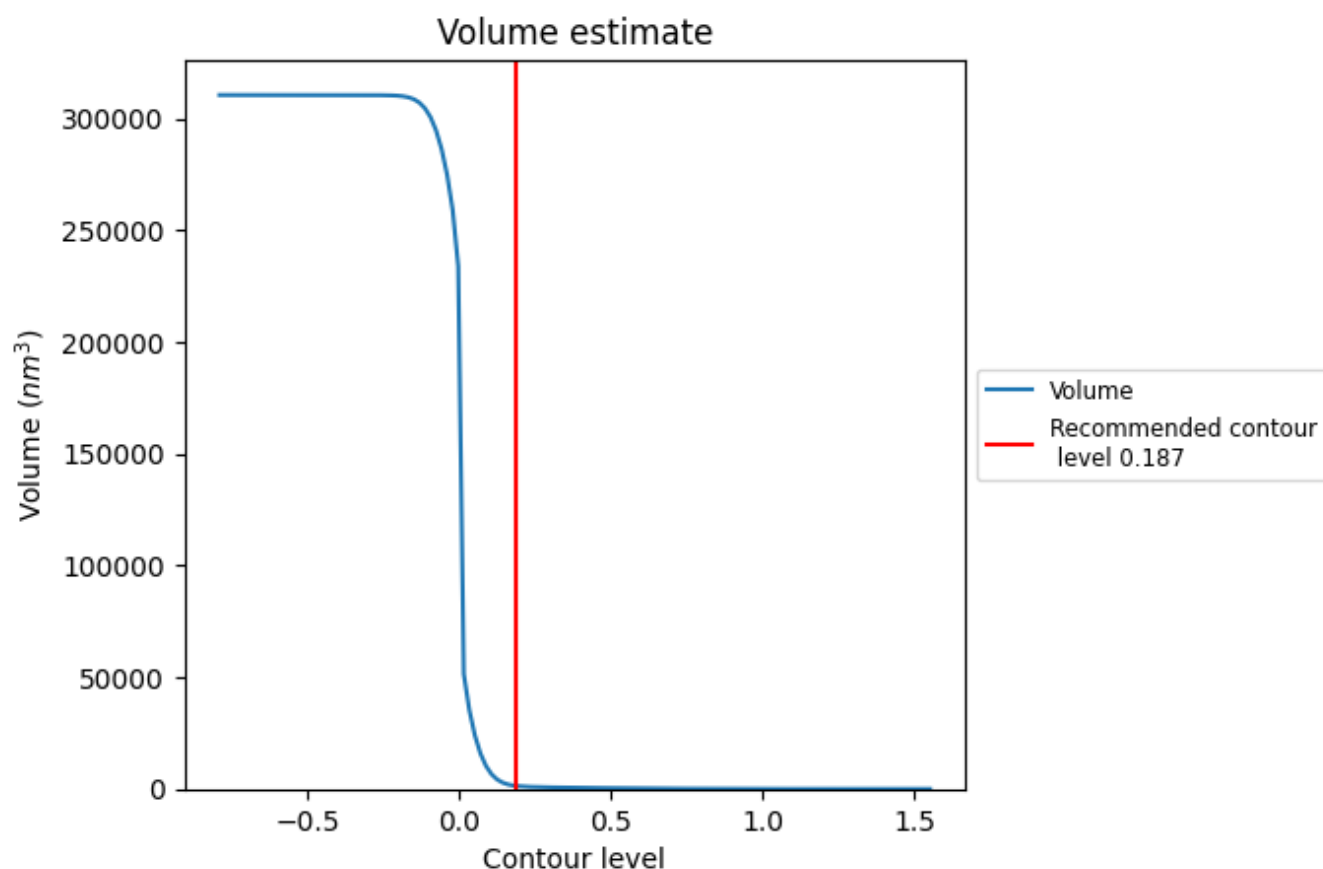
This section contains the results of statistical analysis of the map.

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.

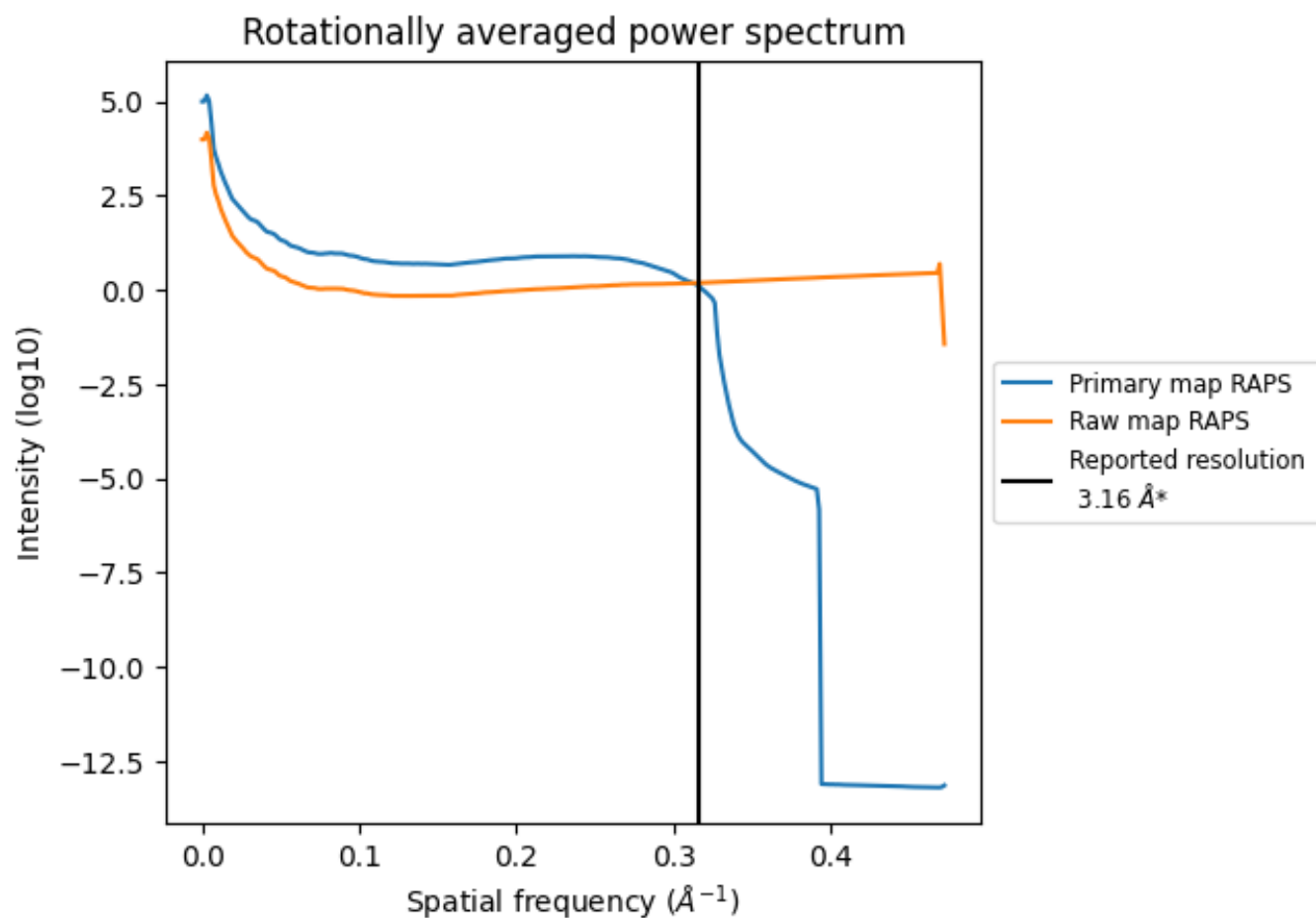
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1424 nm³; this corresponds to an approximate mass of 1287 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 ⓘ

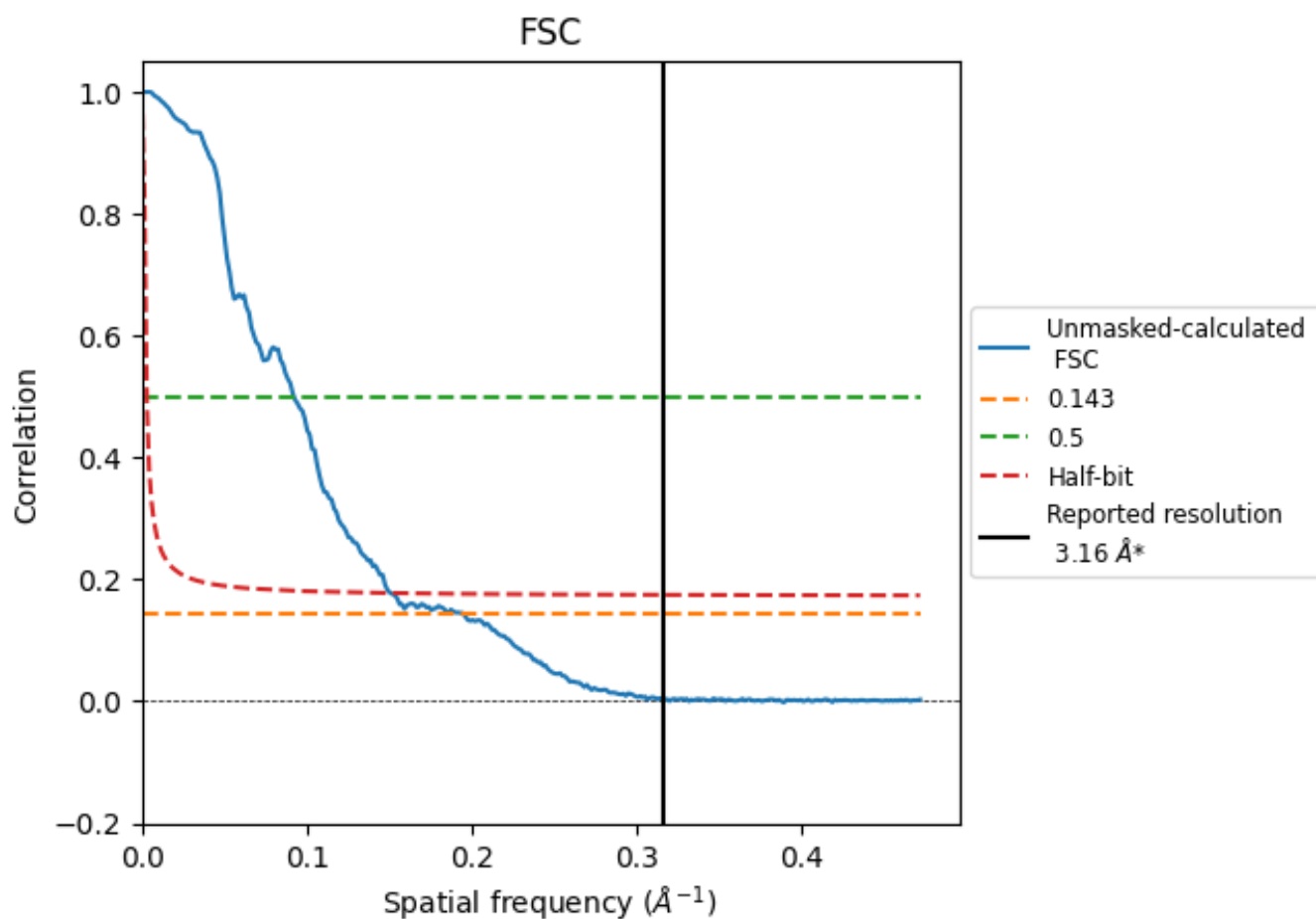


*Reported resolution corresponds to spatial frequency of 0.316 $\text{\AA}^{-1}$

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 0.316 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

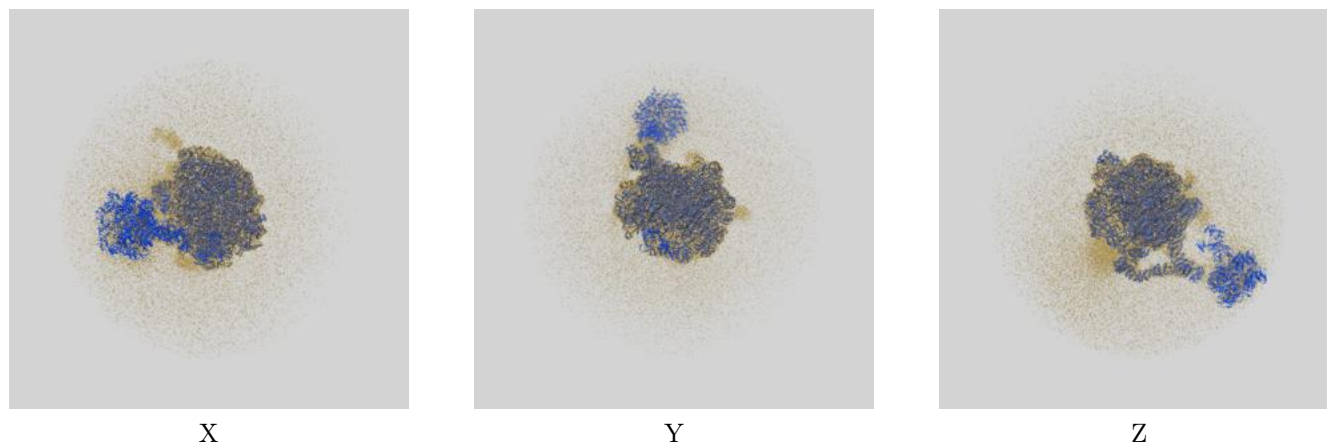
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.16	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	5.12	10.83	6.62

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 5.12 differs from the reported value 3.16 by more than 10 %

9 Map-model fit [i](#)

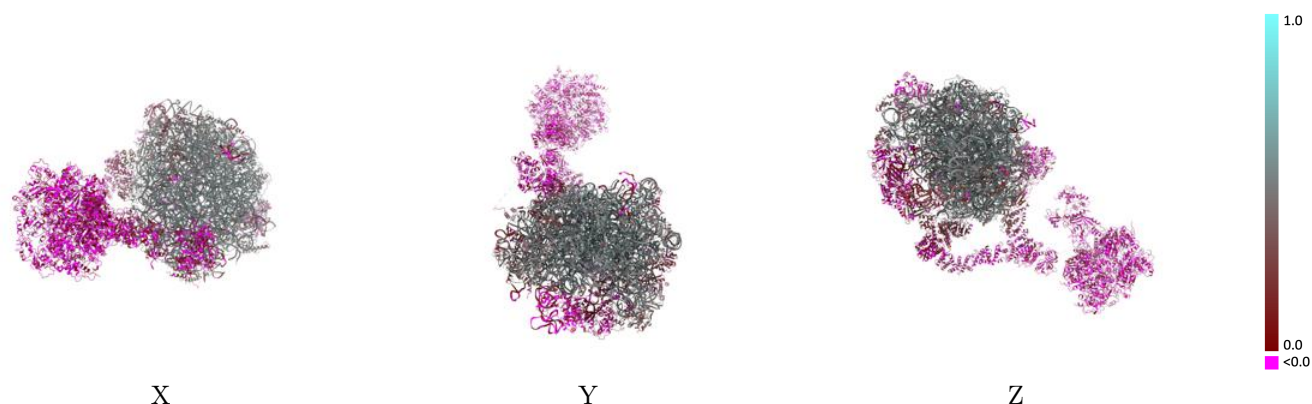
This section contains information regarding the fit between EMDB map EMD-70444 and PDB model 9OFV. Per-residue inclusion information can be found in section 3 on page 19.

9.1 Map-model overlay [i](#)



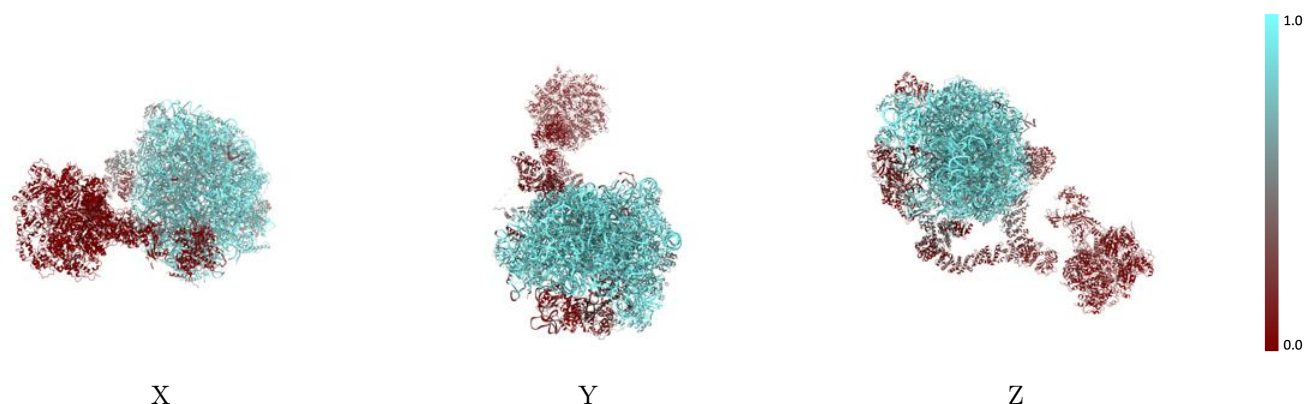
The images above show the 3D surface view of the map at the recommended contour level 0.187 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



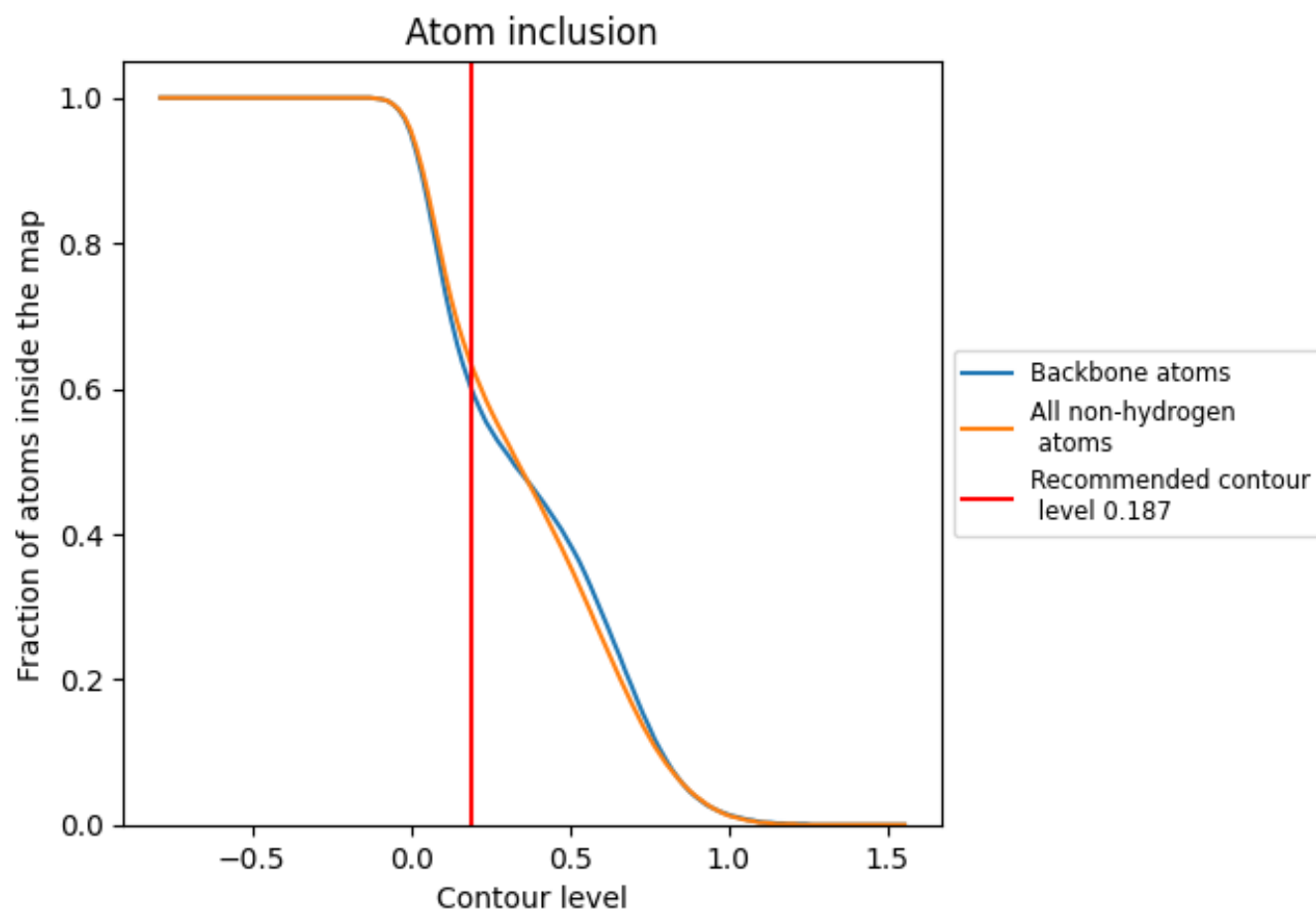
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.187).

9.4 Atom inclusion [i](#)



At the recommended contour level, 60% of all backbone atoms, 64% 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 (0.187) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6360	 0.3290
0	 0.5700	 0.2150
1	 0.5770	 0.3690
2	 0.0370	 -0.0080
3	 0.8750	 0.5180
4	 0.9070	 0.5240
5	 0.8230	 0.4600
6	 0.8890	 0.5070
7	 0.8730	 0.5020
8	 0.7950	 0.4250
9	 0.8670	 0.4790
A	 0.0140	 0.0070
B	 0.0140	 0.0020
C	 0.0070	 -0.0160
D	 0.0080	 -0.0000
E	 0.0070	 0.0060
F	 0.0070	 0.0010
G	 0.0030	 0.0110
H	 0.0000	 0.0090
I	 0.8320	 0.4920
J	 0.0020	 0.0010
K	 0.0000	 0.0050
L	 0.8780	 0.4980
M	 0.8280	 0.4230
N	 0.9090	 0.5300
O	 0.8500	 0.4870
P	 0.8180	 0.4310
Q	 0.8330	 0.4800
R	 0.8980	 0.5310
S	 0.9000	 0.5270
T	 0.8420	 0.4740
U	 0.8560	 0.4850
V	 0.8450	 0.4450
W	 0.9210	 0.5440
X	 0.7280	 0.3320



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Chain	Atom inclusion	Q-score
Y	 0.9060	 0.5280
Z	 0.8720	 0.4990
a	 0.1590	 0.0670
a0	 0.7390	 0.3180
b	 0.8670	 0.5000
b0	 0.6670	 0.2380
c	 0.8510	 0.4680
d	 0.2180	 0.2700
e	 0.2610	 0.0850
f	 0.9320	 0.4770
g	 0.0740	 0.2270
h	 0.9720	 0.4930
i	 0.9530	 0.4990
j	 0.8840	 0.5060
k	 0.8870	 0.5090
l	 0.8930	 0.5050
m	 0.8370	 0.4270
n	 0.8270	 0.4420
o	 0.8820	 0.4900
p	 0.8250	 0.4280
q	 0.8530	 0.4740
r	 0.8410	 0.4820
s	 0.8110	 0.3930
t	 0.8930	 0.4940
u	 0.8530	 0.4610
v	 0.0890	 0.0090
w	 0.0490	 0.0010
x	 0.1830	 0.0950
y	 0.2690	 0.0980
z	 0.4600	 0.1380