



## wwPDB EM Validation Summary Report ⓘ

Nov 11, 2024 – 06:22 PM EST

PDB ID : 9E71  
EMDB ID : EMD-47628  
Title : Cryo-EM structure of the Pyrobaculum calidifontis 70S ribosome  
Authors : Nissley, A.J.; Cate, J.H.D.  
Deposited on : 2024-10-31  
Resolution : 2.36 Å (reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : 0.0.1.dev113  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

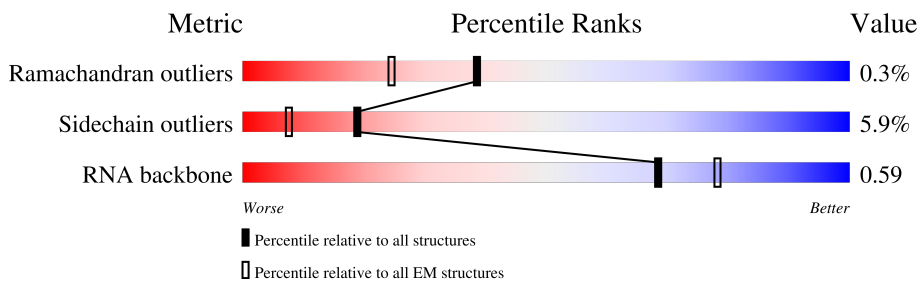
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.36 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)
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  $\geq 3$ , 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	2	129	
2	1	3024	
3	4	1498	
4	AA	244	
5	AB	338	
6	AC	285	
7	AD	178	
8	AE	196	

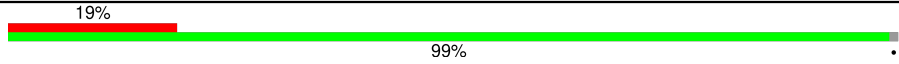
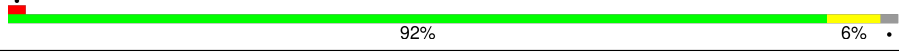
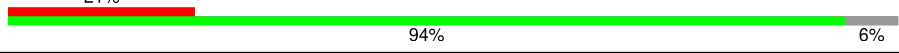
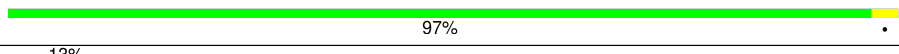
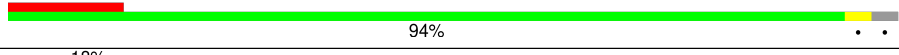
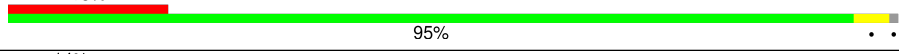




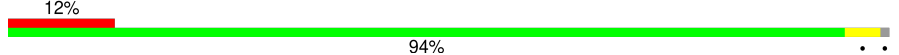
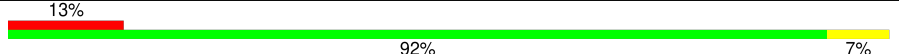
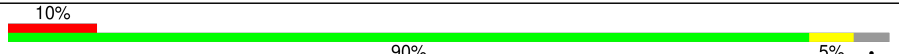

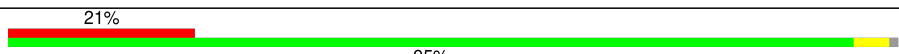
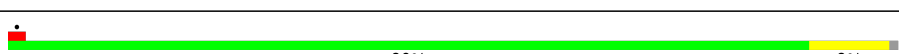
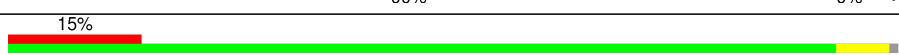
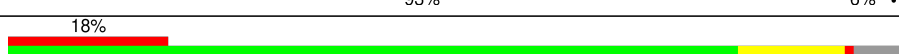



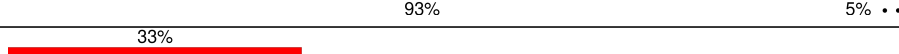


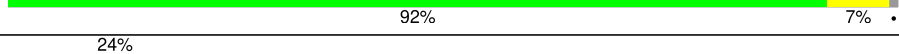
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Mol	Chain	Length	Quality of chain
9	AF	149	29% 93%
10	AG	186	8% 95%
11	AH	157	6% 96%
12	AI	144	94%
13	AJ	103	36% 91% 7%
13	AK	103	36% 80% 8% 13%
14	AL	156	16% 92% 6%
15	AM	189	6% 93%
16	AN	178	10% 92% 5%
17	AO	205	96%
18	AP	122	98%
19	AQ	147	6% 95% 5%
20	AR	78	10% 88% 9%
21	AS	99	97%
22	AT	184	96%
23	AU	81	6% 96%
24	AV	128	12% 88% 7% 5%
25	AW	62	6% 89% 10%
26	AX	79	24% 81% 15%
27	AY	179	8% 89% 7%
28	AZ	101	15% 91% 6%
29	Aa	91	9% 95%
30	Ab	153	10% 88% 8%
31	Ac	84	96%
32	Ad	52	98%

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Mol	Chain	Length	Quality of chain
33	Ae	67	
34	Af	51	
35	Ag	53	
36	Ah	91	
37	Ai	102	
38	Aj	184	
39	Ak	93	
40	BA	222	
41	BB	208	
42	BC	216	
43	BD	159	
44	BE	237	
45	BF	202	
46	BG	151	
47	BH	223	
48	BI	130	
49	BJ	131	
50	BK	142	
51	BL	106	
52	BM	141	
53	BN	147	
54	BO	153	
55	BP	54	
56	BQ	151	
57	BR	147	

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Mol	Chain	Length	Quality of chain
58	BS	71	
59	BT	158	
60	BU	158	
61	BV	128	
62	BW	110	
63	BX	100	
64	BY	67	
65	BZ	77	
66	Ba	54	
67	Bb	68	
68	Bc	65	

## 2 Entry composition [i](#)

There are 72 unique types of molecules in this entry. The entry contains 171357 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 RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	2	129	2769	1231	512	897	129	0	0

- Molecule 2 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	1	2849	61386	27335	11453	19749	2849	0	0

- Molecule 3 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	4	1430	30817	13730	5745	9912	1430	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
4	5	4AC	C	conflict	GB 343200235
4	1318	4AC	C	conflict	GB 343200235

- Molecule 4 is a protein called Large ribosomal subunit protein uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	AA	239	1803	1136	354	308	5	0	0

- Molecule 5 is a protein called Large ribosomal subunit protein uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	AB	336	2611	1681	476	450	4	0	0

- Molecule 6 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
6	AC	278	Total	C	N	O	S	0	0
			2178	1406	395	371	6		

- Molecule 7 is a protein called Large ribosomal subunit protein uL5.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
7	AD	178	Total	C	N	O	S	0	0
			1412	894	273	238	7		

- Molecule 8 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
8	AE	195	Total	C	N	O	S	0	0
			1520	990	254	272	4		

- Molecule 9 is a protein called Large ribosomal subunit protein eL8.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
9	AF	145	Total	C	N	O	S	0	0
			1095	705	187	202	1		

- Molecule 10 is a protein called Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
10	AG	183	Total	C	N	O	S	0	0
			1510	979	278	246	7		

- Molecule 11 is a protein called Large ribosomal subunit protein eL13.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
11	AH	155	Total	C	N	O	S	0	0
			1244	785	249	209	1		

- Molecule 12 is a protein called Large ribosomal subunit protein uL14.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
12	AI	138	Total	C	N	O	S	0	0
			1068	682	202	181	3		

- Molecule 13 is a protein called Large ribosomal subunit protein eL14.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	AJ	101	Total	C	N	O	S	0	0
			788	500	143	144	1		
13	AK	90	Total	C	N	O	S	0	0
			700	441	130	128	1		

- Molecule 14 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	AL	152	Total	C	N	O	S	0	0
			1198	761	232	202	3		

- Molecule 15 is a protein called 50S ribosomal protein L15e.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	AM	184	Total	C	N	O	S	0	0
			1558	992	315	245	6		

- Molecule 16 is a protein called Large ribosomal subunit protein uL16.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	AN	169	Total	C	N	O	S	0	0
			1336	847	254	227	8		

- Molecule 17 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	AO	200	Total	C	N	O	S	0	0
			1615	1027	309	278	1		

- Molecule 18 is a protein called Large ribosomal subunit protein eL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	AP	121	Total	C	N	O	S	0	0
			920	583	181	155	1		

- Molecule 19 is a protein called Large ribosomal subunit protein eL19.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	AQ	146	Total	C	N	O	S	0	0
			1214	759	244	208	3		

- Molecule 20 is a protein called Large ribosomal subunit protein eL20.



Mol	Chain	Residues	Atoms					AltConf	Trace
20	AR	76	Total	C	N	O	S	0	0
			603	382	109	109	3		

- Molecule 21 is a protein called Large ribosomal subunit protein eL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	AS	98	Total	C	N	O	S	0	0
			788	503	150	134	1		

- Molecule 22 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	AT	183	Total	C	N	O	S	0	0
			1496	978	268	247	3		

- Molecule 23 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	AU	81	Total	C	N	O	S	0	0
			651	417	115	117	2		

- Molecule 24 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	AV	121	Total	C	N	O	S	0	0
			976	619	194	161	2		

- Molecule 25 is a protein called Large ribosomal subunit protein eL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	AW	56	Total	C	N	O	S	0	0
			449	287	86	70	6		

- Molecule 26 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	AX	67	Total	C	N	O	S	0	0
			554	343	117	92	2		

- Molecule 27 is a protein called Large ribosomal subunit protein uL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	AY	172	Total	C	N	O	S	0	0
			1374	888	245	235	6		

- Molecule 28 is a protein called Large ribosomal subunit protein eL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	AZ	98	Total	C	N	O	S	0	0
			742	481	128	132	1		

- Molecule 29 is a protein called Large ribosomal subunit protein eL31.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	Aa	88	Total	C	N	O	0	0
			726	460	146	120		

- Molecule 30 is a protein called Large ribosomal subunit protein eL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Ab	140	Total	C	N	O	S	0	0
			1183	757	239	186	1		

- Molecule 31 is a protein called Large ribosomal subunit protein eL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	Ac	83	Total	C	N	O	S	0	0
			649	407	138	102	2		

- Molecule 32 is a protein called Large ribosomal subunit protein eL37.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	Ad	52	Total	C	N	O	S	0	0
			429	265	93	65	6		

- Molecule 33 is a protein called LSU ribosomal protein L38E.

Mol	Chain	Residues	Atoms				AltConf	Trace
33	Ae	66	Total	C	N	O	0	0
			552	363	93	96		

- Molecule 34 is a protein called Large ribosomal subunit protein eL39.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	Af	50	Total	C	N	O	0	0
			415	260	96	59		

- Molecule 35 is a protein called Large ribosomal subunit protein eL40.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	Ag	50	Total	C	N	O	S	0	0
			417	259	88	66	4		

- Molecule 36 is a protein called eL42.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	Ah	91	Total	C	N	O	S	0	0
			739	467	142	123	7		

- Molecule 37 is a protein called Large ribosomal subunit protein eL43.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	Ai	99	Total	C	N	O	S	0	0
			769	489	148	127	5		

- Molecule 38 is a protein called DJ-1/PfpI domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	Aj	183	Total	C	N	O	S	0	0
			1469	954	248	265	2		

- Molecule 39 is a protein called PaREP1 domain containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	Ak	90	Total	C	N	O	S	0	0
			743	478	127	136	2		

- Molecule 40 is a protein called Small ribosomal subunit protein eS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	BA	187	Total	C	N	O	S	0	0
			1487	965	263	256	3		

- Molecule 41 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	BB	198	Total	C	N	O	S	0	0
			1600	1037	277	279	7		

- Molecule 42 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	BC	77	Total	C	N	O	S	0	0
			611	393	110	107	1		

- Molecule 43 is a protein called Small ribosomal subunit protein uS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	BD	157	Total	C	N	O	S	0	0
			1284	831	240	209	4		

- Molecule 44 is a protein called Small ribosomal subunit protein eS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	BE	236	Total	C	N	O	S	0	0
			1883	1223	336	322	2		

- Molecule 45 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	BF	194	Total	C	N	O	S	0	0
			1498	951	272	271	4		

- Molecule 46 is a protein called Small ribosomal subunit protein eS6.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	BG	140	Total	C	N	O	S	0	0
			1065	685	190	188	2		

- Molecule 47 is a protein called Small ribosomal subunit protein uS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	BH	220	Total	C	N	O	S	0	0
			1773	1128	325	313	7		

- Molecule 48 is a protein called Small ribosomal subunit protein uS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	BI	129	1036	676	177	180	3	0	0

- Molecule 49 is a protein called Small ribosomal subunit protein eS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	BJ	130	1007	636	198	172	1	0	0

- Molecule 50 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	BK	134	1058	680	191	182	5	0	0

- Molecule 51 is a protein called Small ribosomal subunit protein uS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	BL	38	315	201	64	49	1	0	0

- Molecule 52 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	BM	127	941	592	182	164	3	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
BM	128	IAS	ASP	conflict	UNP A3MX63

- Molecule 53 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	BN	144	1133	730	211	189	3	0	0

- Molecule 54 is a protein called Small ribosomal subunit protein uS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	BO	143	Total	C	N	O	S	0	0
			1108	700	211	195	2		

- Molecule 55 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	BP	29	Total	C	N	O	S	0	0
			241	150	51	36	4		

- Molecule 56 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	BQ	149	Total	C	N	O	S	0	0
			1224	782	233	208	1		

- Molecule 57 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
57	BR	144	Total	C	N	O	S	0	0
			1171	756	216	194	5		

- Molecule 58 is a protein called Small ribosomal subunit protein eS17.

Mol	Chain	Residues	Atoms				AltConf	Trace
58	BS	64	Total	C	N	O	0	0
			517	332	94	91		

- Molecule 59 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
59	BT	135	Total	C	N	O	S	0	0
			1111	720	203	182	6		

- Molecule 60 is a protein called Small ribosomal subunit protein eS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
60	BU	155	Total	C	N	O	S	0	0
			1225	789	225	209	2		

- Molecule 61 is a protein called Small ribosomal subunit protein eS24.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
61	BV	115	950	597	185	168	0	0

- Molecule 62 is a protein called SSU ribosomal protein S25E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
62	BW	68	544	351	96	96	1	0	0

- Molecule 63 is a protein called SSU ribosomal protein S26E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
63	BX	95	772	490	150	128	4	0	0

- Molecule 64 is a protein called Small ribosomal subunit protein eS27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
64	BY	65	501	317	100	79	5	0	0

- Molecule 65 is a protein called eS28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
65	BZ	71	552	344	108	99	1	0	0

- Molecule 66 is a protein called SSU ribosomal protein S30E.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
66	Ba	43	357	222	80	55	0	0

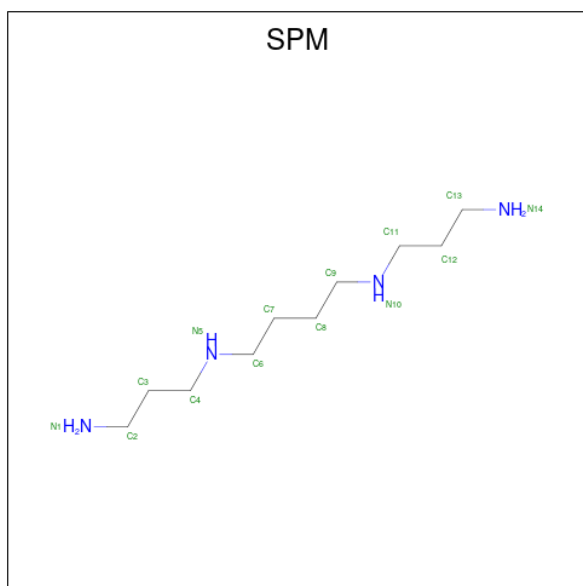
- Molecule 67 is a protein called aS35.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
67	Bb	60	479	301	95	83	0	0

- Molecule 68 is a protein called Small zinc finger protein HVO-2753-like zinc-binding pocket domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
68	Bc	64	477	301	90	82	4	0	0

- Molecule 69 is SPERMINE (three-letter code: SPM) (formula: C<sub>10</sub>H<sub>26</sub>N<sub>4</sub>).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	N	
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0

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Mol	Chain	Residues	Atoms			AltConf
			Total	C	N	
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	1	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0
69	4	1	14	10	4	0

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Mol	Chain	Residues	Atoms			AltConf
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	4	1	Total	C	N	0
			14	10	4	
69	AL	1	Total	C	N	0
			14	10	4	
69	Ah	1	Total	C	N	0
			14	10	4	

- Molecule 70 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
70	1	170	Total	Mg	0
			170	170	
70	4	78	Total	Mg	0
			78	78	
70	AA	1	Total	Mg	0
			1	1	
70	AL	2	Total	Mg	0
			2	2	
70	BK	1	Total	Mg	0
			1	1	

- Molecule 71 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
71	AW	1	Total	Zn	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
71	Ad	1	Total 1	Zn 1	0
71	Ag	1	Total 1	Zn 1	0
71	Ah	1	Total 1	Zn 1	0
71	Ai	1	Total 1	Zn 1	0
71	BF	1	Total 1	Zn 1	0
71	BP	1	Total 1	Zn 1	0
71	BR	1	Total 1	Zn 1	0
71	BX	1	Total 1	Zn 1	0
71	BY	1	Total 1	Zn 1	0
71	Bc	1	Total 1	Zn 1	0

- Molecule 72 is water.

Mol	Chain	Residues	Atoms		AltConf
72	2	181	Total 181	O 181	0
72	1	5640	Total 5640	O 5640	0
72	4	1487	Total 1487	O 1487	0
72	AA	12	Total 12	O 12	0
72	AB	1	Total 1	O 1	0
72	AC	6	Total 6	O 6	0
72	AG	2	Total 2	O 2	0
72	AH	3	Total 3	O 3	0
72	AL	10	Total 10	O 10	0

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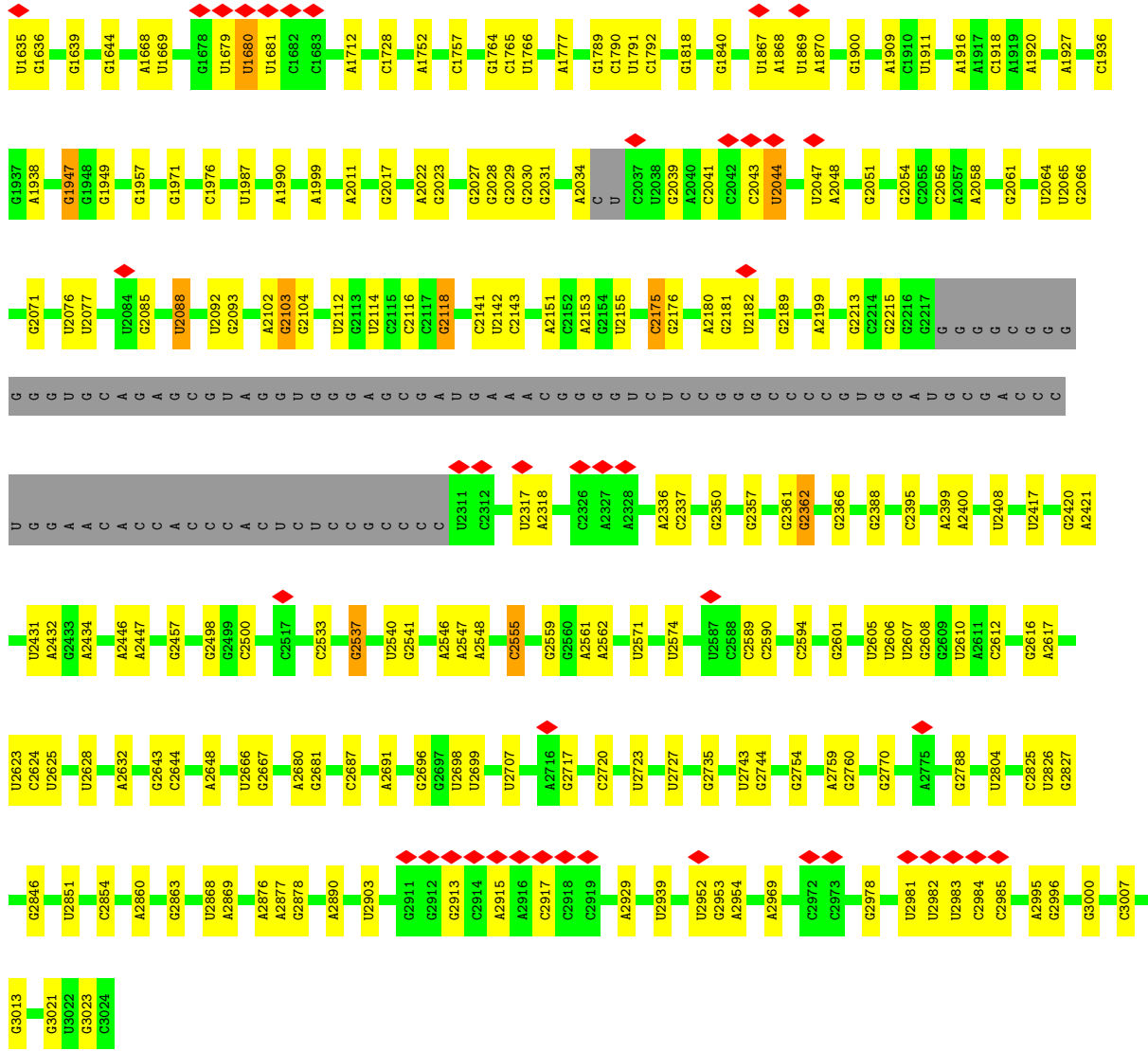
Mol	Chain	Residues	Atoms		AltConf
72	AM	2	Total 2	O 2	0
72	AN	2	Total 2	O 2	0
72	AO	2	Total 2	O 2	0
72	AP	1	Total 1	O 1	0
72	AQ	1	Total 1	O 1	0
72	AT	2	Total 2	O 2	0
72	AU	1	Total 1	O 1	0
72	AX	22	Total 22	O 22	0
72	AY	2	Total 2	O 2	0
72	Aa	1	Total 1	O 1	0
72	Ab	6	Total 6	O 6	0
72	Ad	3	Total 3	O 3	0
72	Ah	1	Total 1	O 1	0
72	BA	18	Total 18	O 18	0
72	BB	18	Total 18	O 18	0
72	BC	9	Total 9	O 9	0
72	BD	28	Total 28	O 28	0
72	BE	23	Total 23	O 23	0
72	BF	32	Total 32	O 32	0
72	BG	19	Total 19	O 19	0
72	BH	26	Total 26	O 26	0

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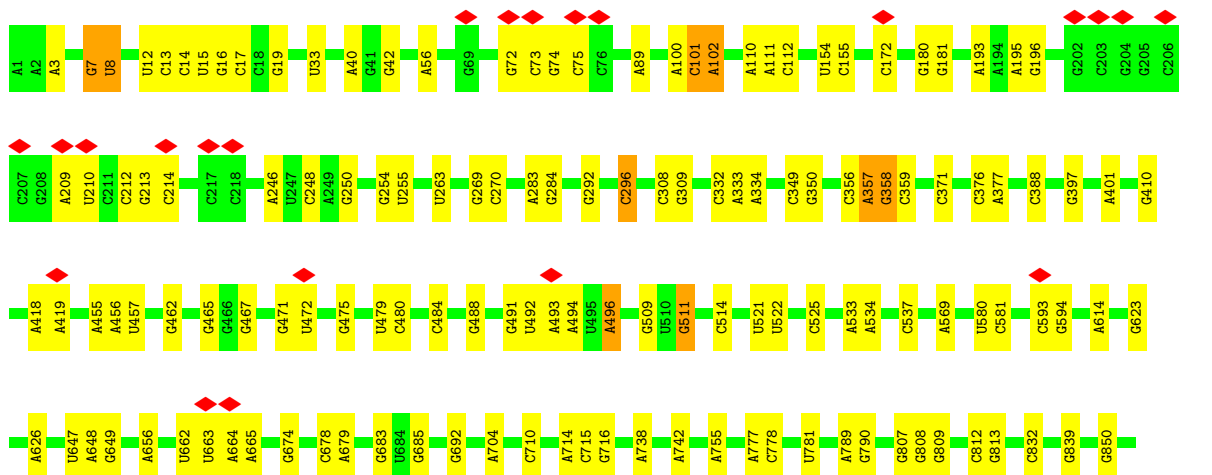
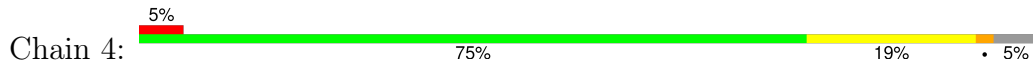
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Mol	Chain	Residues	Atoms		AltConf
72	BI	20	Total 20	O 20	0
72	BJ	13	Total 13	O 13	0
72	BK	12	Total 12	O 12	0
72	BL	7	Total 7	O 7	0
72	BM	9	Total 9	O 9	0
72	BN	12	Total 12	O 12	0
72	BO	26	Total 26	O 26	0
72	BP	8	Total 8	O 8	0
72	BQ	15	Total 15	O 15	0
72	BR	12	Total 12	O 12	0
72	BS	5	Total 5	O 5	0
72	BT	17	Total 17	O 17	0
72	BU	13	Total 13	O 13	0
72	BV	9	Total 9	O 9	0
72	BW	8	Total 8	O 8	0
72	BX	12	Total 12	O 12	0
72	BY	10	Total 10	O 10	0
72	BZ	12	Total 12	O 12	0
72	Ba	8	Total 8	O 8	0
72	Bb	7	Total 7	O 7	0
72	Bc	16	Total 16	O 16	0

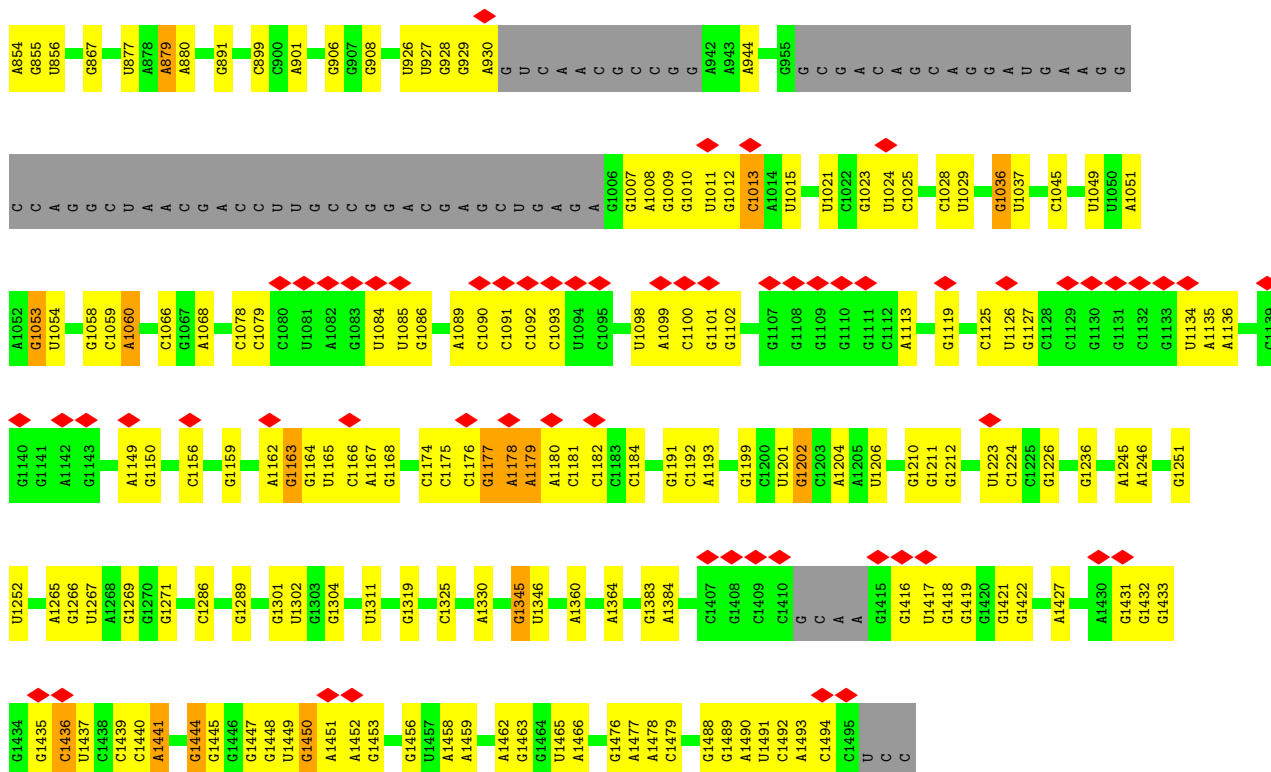




• Molecule 3: 16S rRNA



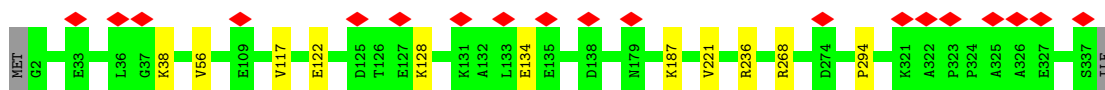




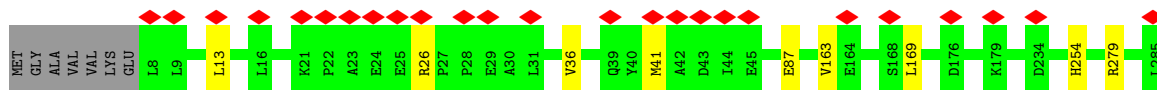
• Molecule 4: Large ribosomal subunit protein uL2



• Molecule 5: Large ribosomal subunit protein uL3



• Molecule 6: Large ribosomal subunit protein uL4

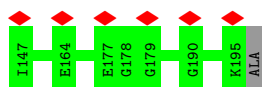
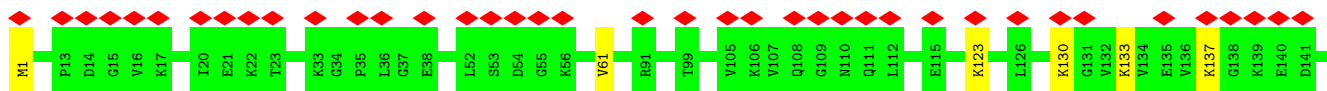


• Molecule 7: Large ribosomal subunit protein uL5

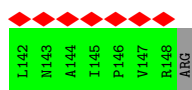
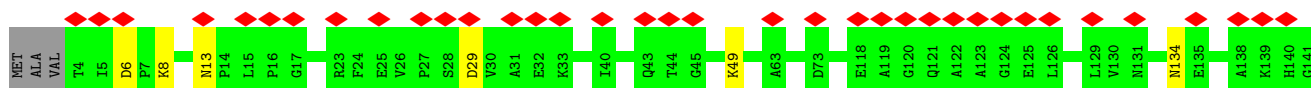




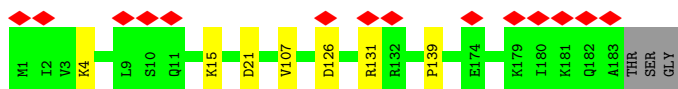
- Molecule 8: Large ribosomal subunit protein uL6



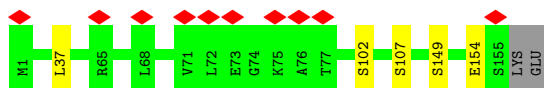
- Molecule 9: Large ribosomal subunit protein eL8



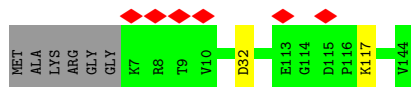
- Molecule 10: Large ribosomal subunit protein uL13



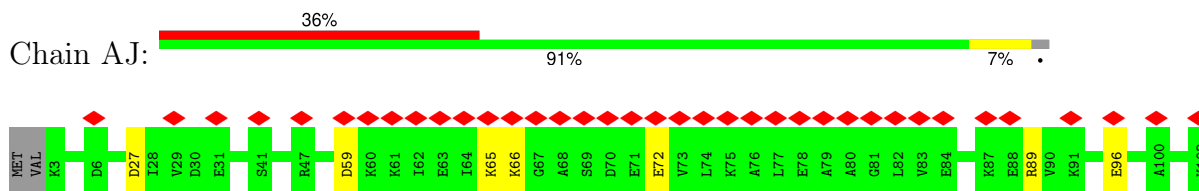
- Molecule 11: Large ribosomal subunit protein eL13



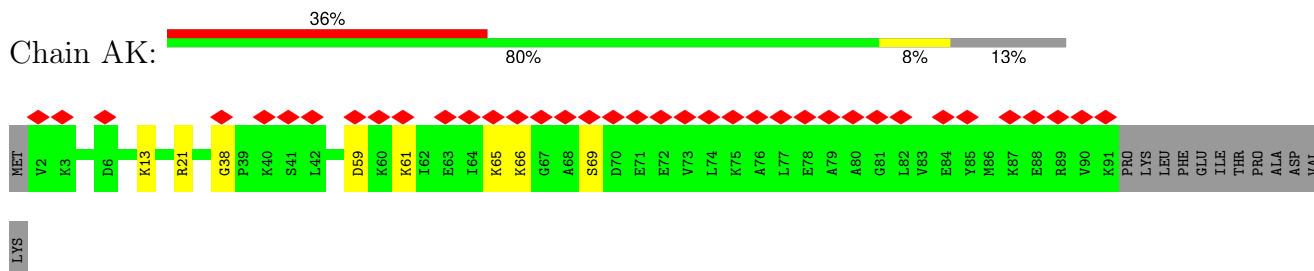
- Molecule 12: Large ribosomal subunit protein uL14



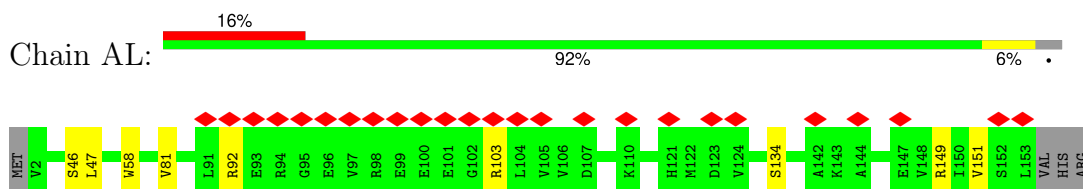
- Molecule 13: Large ribosomal subunit protein eL14



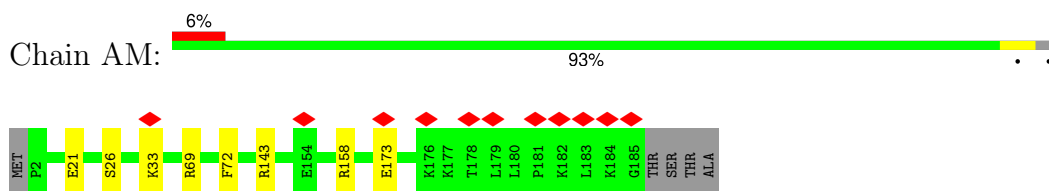
- Molecule 13: Large ribosomal subunit protein eL14



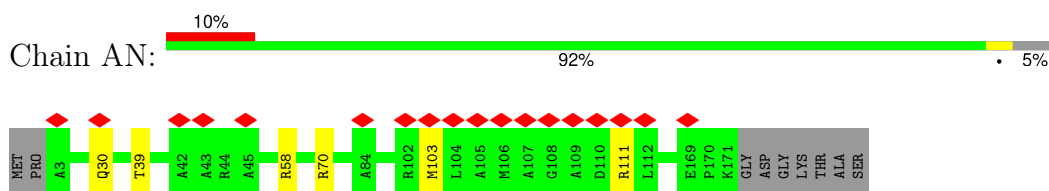
- Molecule 14: Large ribosomal subunit protein uL15



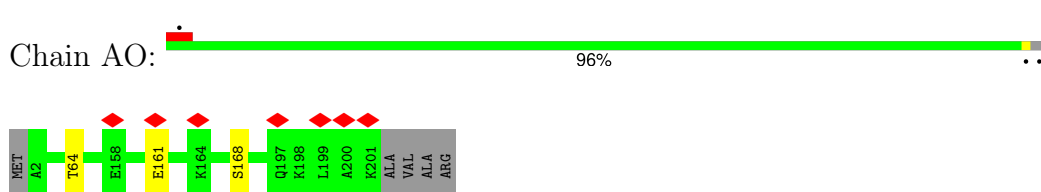
- Molecule 15: 50S ribosomal protein L15e



- Molecule 16: Large ribosomal subunit protein uL16

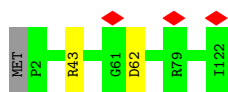


- Molecule 17: Large ribosomal subunit protein uL18



- Molecule 18: Large ribosomal subunit protein eL18

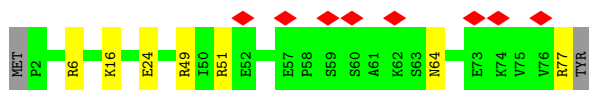
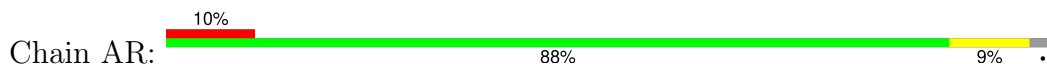




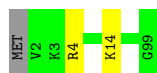
- Molecule 19: Large ribosomal subunit protein eL19



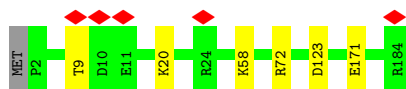
- Molecule 20: Large ribosomal subunit protein eL20



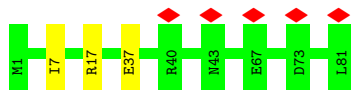
- Molecule 21: Large ribosomal subunit protein eL21



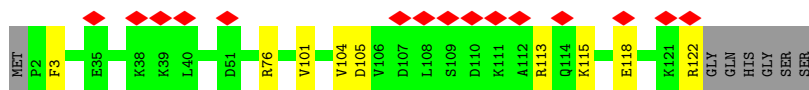
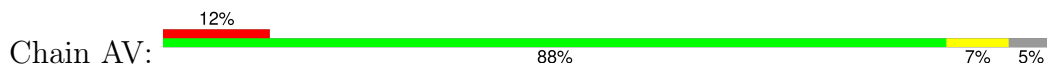
- Molecule 22: Large ribosomal subunit protein uL22



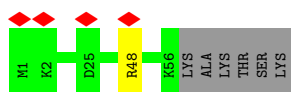
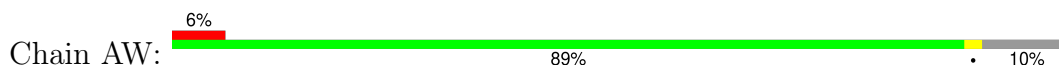
- Molecule 23: Large ribosomal subunit protein uL23



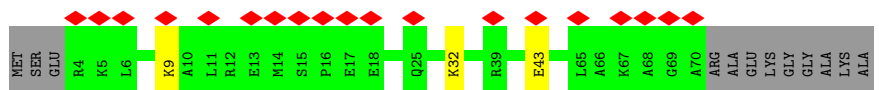
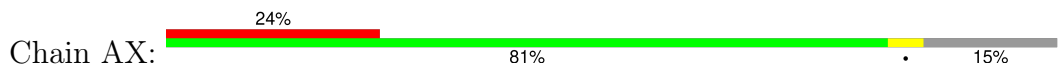
- Molecule 24: Large ribosomal subunit protein uL24



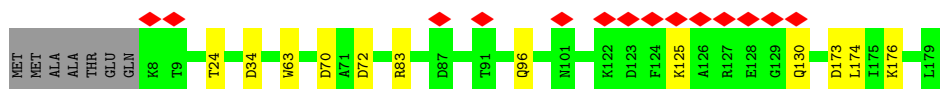
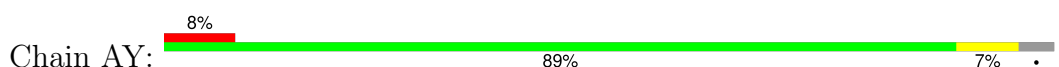
- Molecule 25: Large ribosomal subunit protein eL24



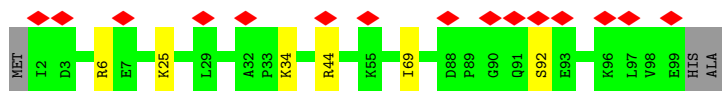
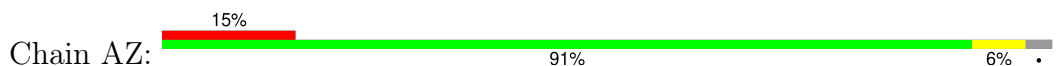
- Molecule 26: Large ribosomal subunit protein uL29



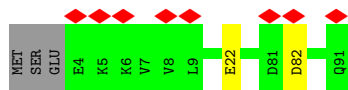
- Molecule 27: Large ribosomal subunit protein uL30



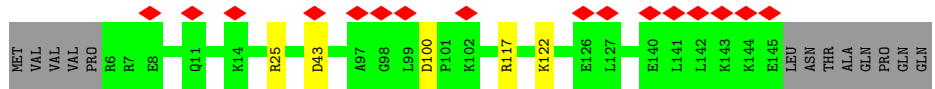
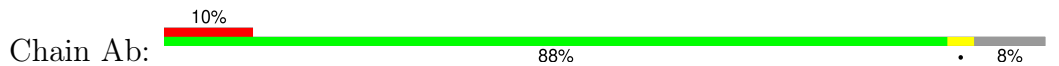
- Molecule 28: Large ribosomal subunit protein eL30



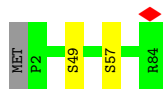
- Molecule 29: Large ribosomal subunit protein eL31



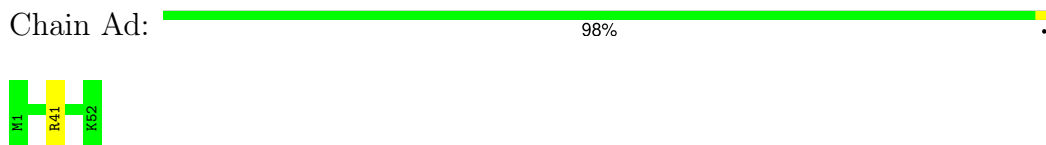
- Molecule 30: Large ribosomal subunit protein eL32



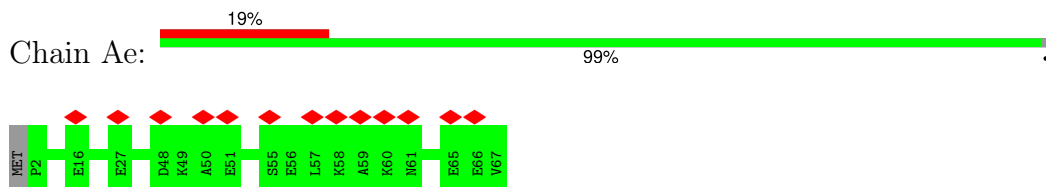
- Molecule 31: Large ribosomal subunit protein eL34



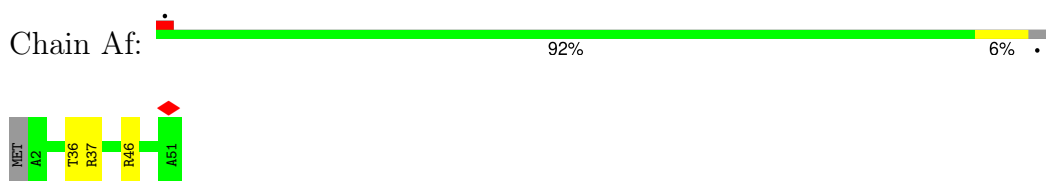
- Molecule 32: Large ribosomal subunit protein eL37



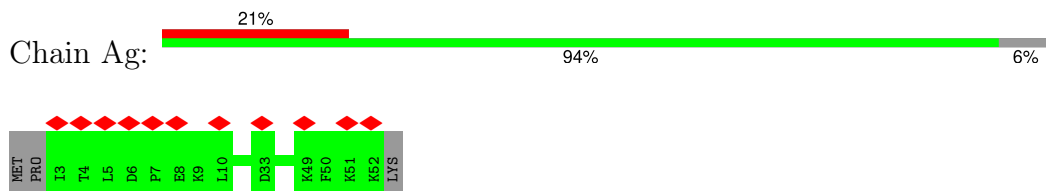
- Molecule 33: LSU ribosomal protein L38E



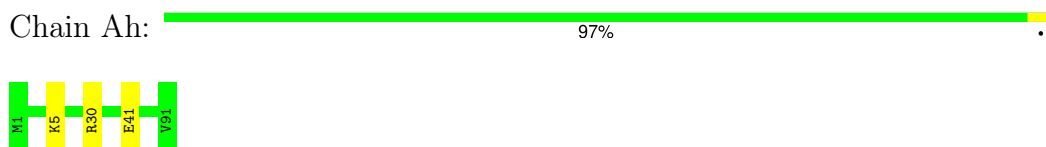
- Molecule 34: Large ribosomal subunit protein eL39



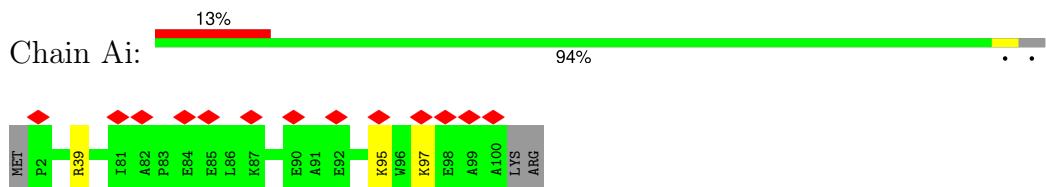
- Molecule 35: Large ribosomal subunit protein eL40



- Molecule 36: eL42

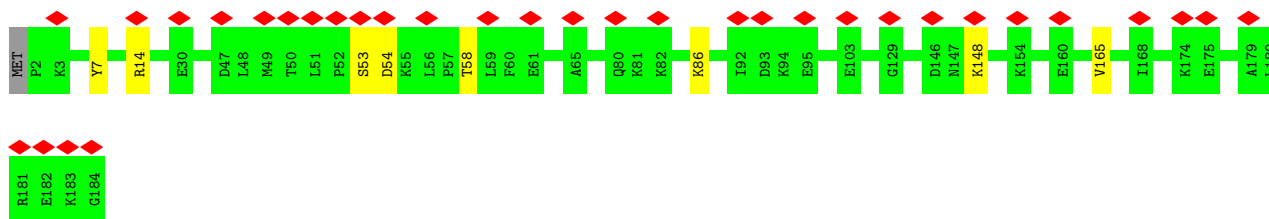


- Molecule 37: Large ribosomal subunit protein eL43

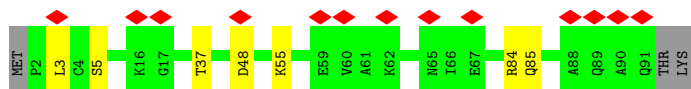
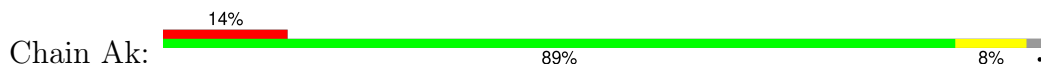


- Molecule 38: DJ-1/PfpI domain-containing protein

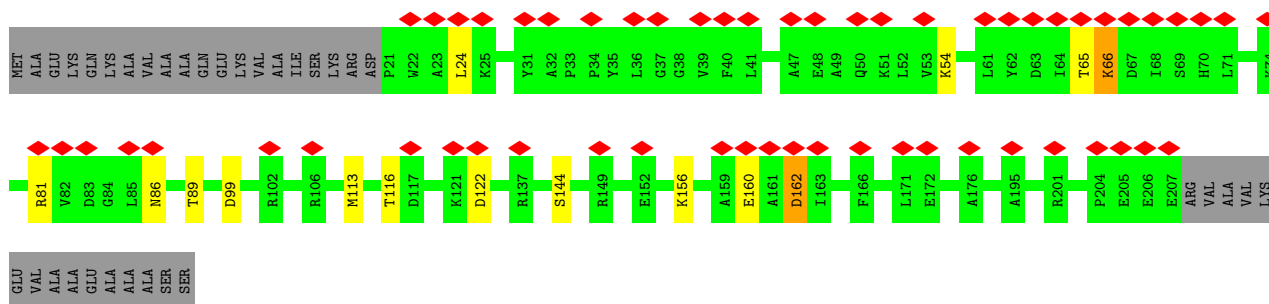
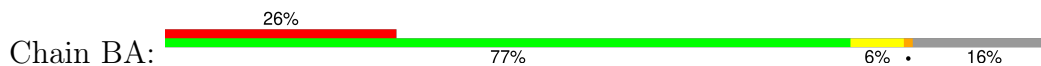




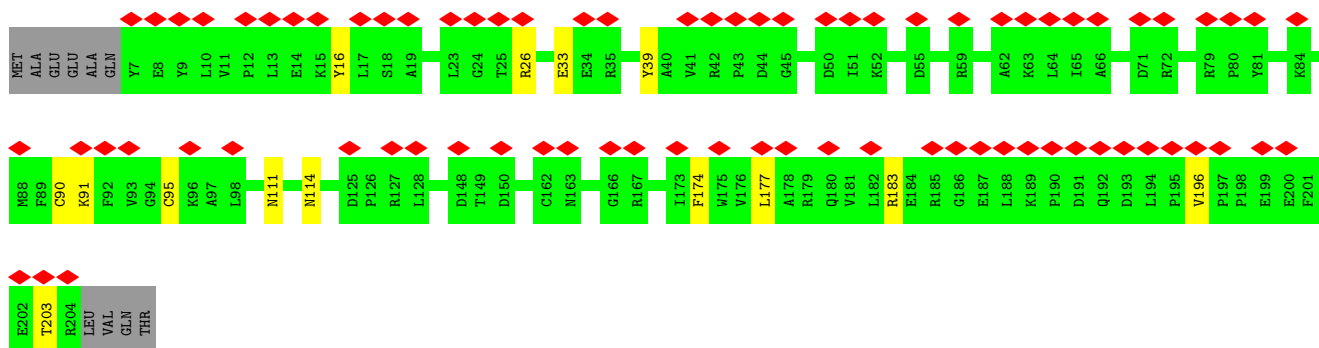
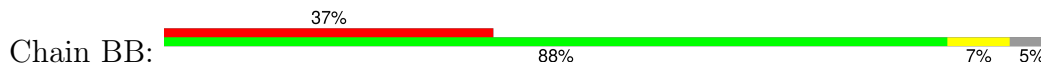
• Molecule 39: PaREP1 domain containing protein



• Molecule 40: Small ribosomal subunit protein eS1



• Molecule 41: Small ribosomal subunit protein uS2

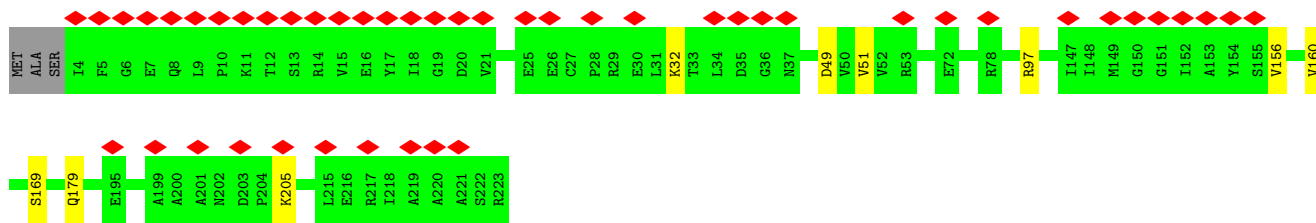


• Molecule 42: Small ribosomal subunit protein uS3

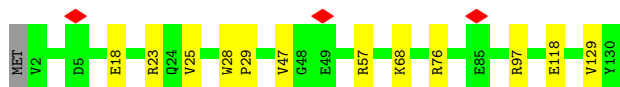
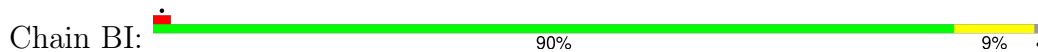








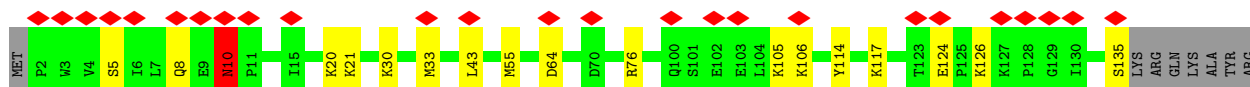
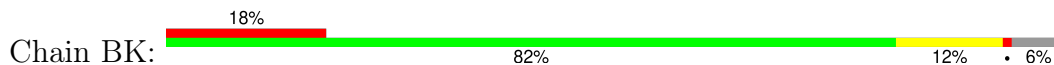
• Molecule 48: Small ribosomal subunit protein uS8



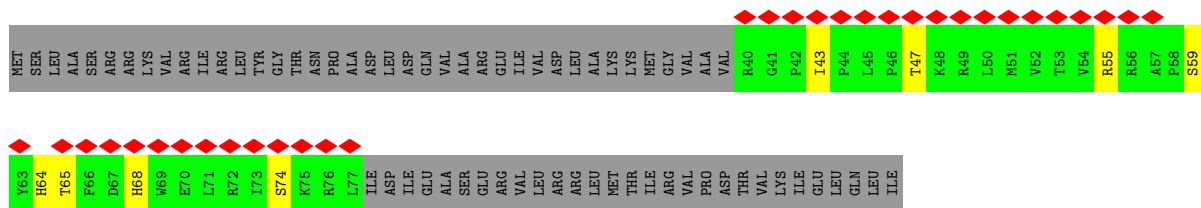
• Molecule 49: Small ribosomal subunit protein eS8



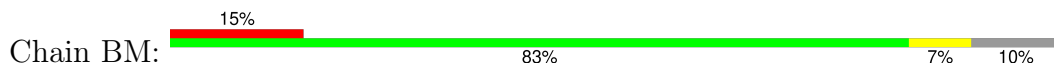
• Molecule 50: Small ribosomal subunit protein uS9



• Molecule 51: Small ribosomal subunit protein uS10

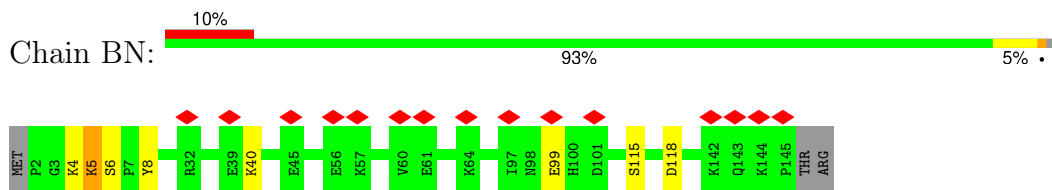


• Molecule 52: Small ribosomal subunit protein uS11

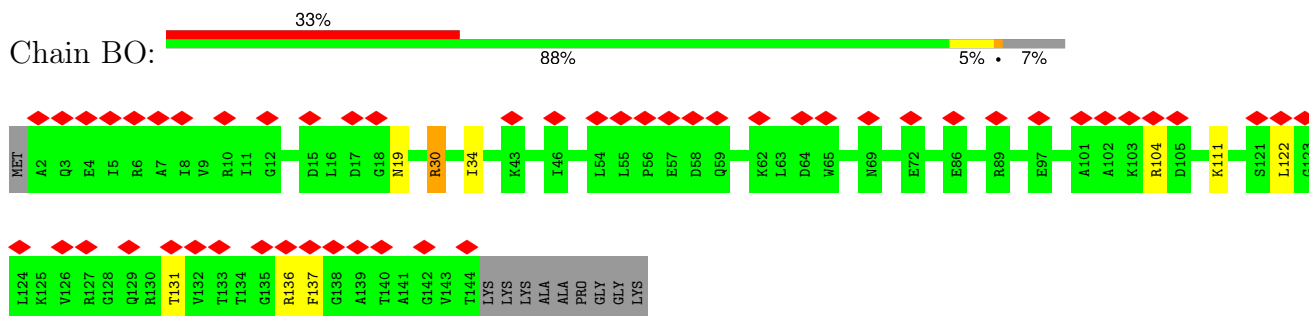


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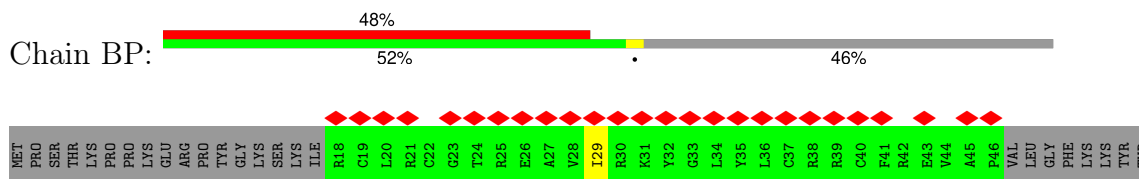
- Molecule 53: Small ribosomal subunit protein uS12



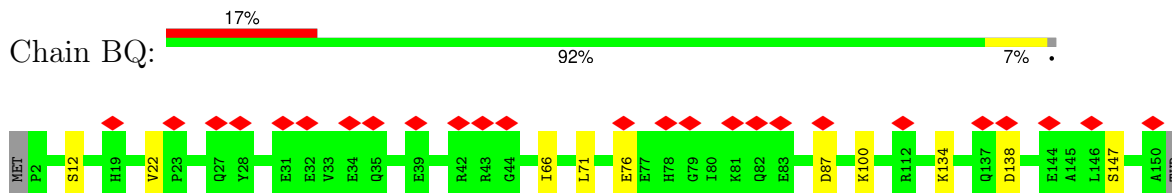
- Molecule 54: Small ribosomal subunit protein uS13



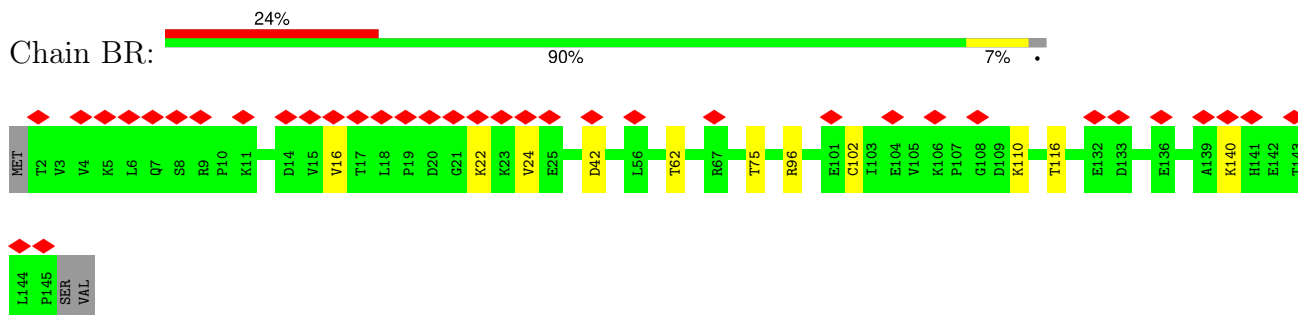
- Molecule 55: Small ribosomal subunit protein uS14



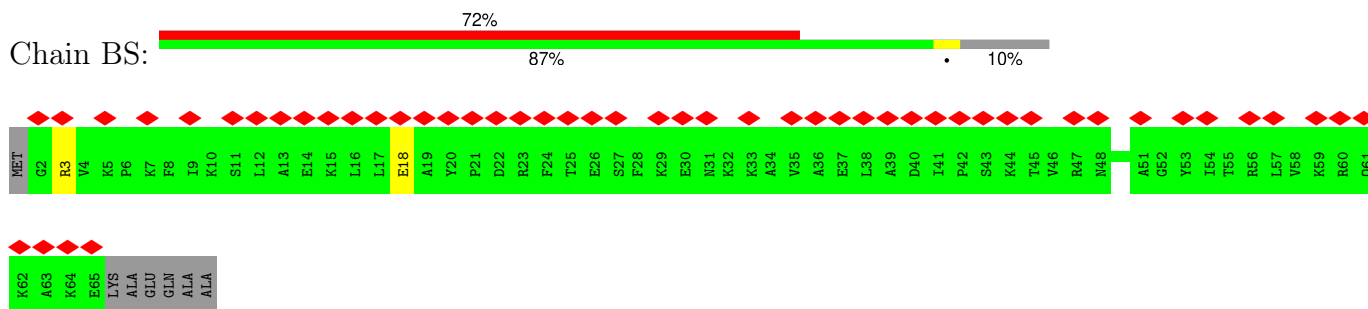
- Molecule 56: Small ribosomal subunit protein uS15



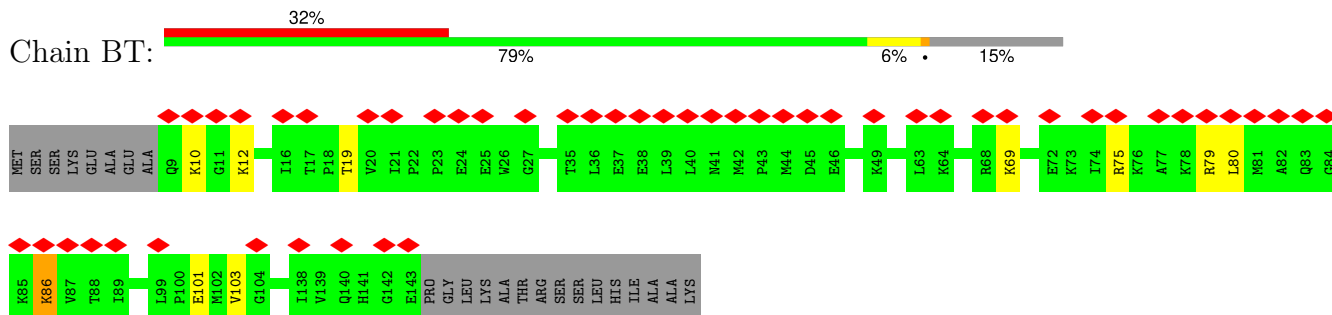
- Molecule 57: Small ribosomal subunit protein uS17



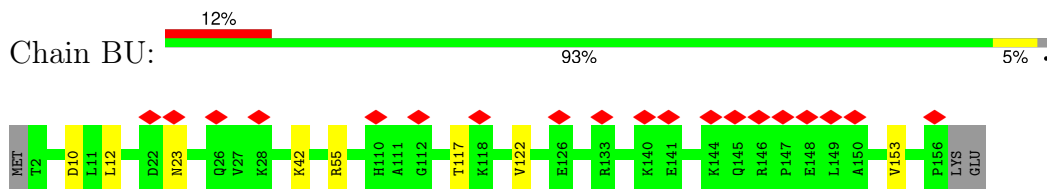
- Molecule 58: Small ribosomal subunit protein eS17



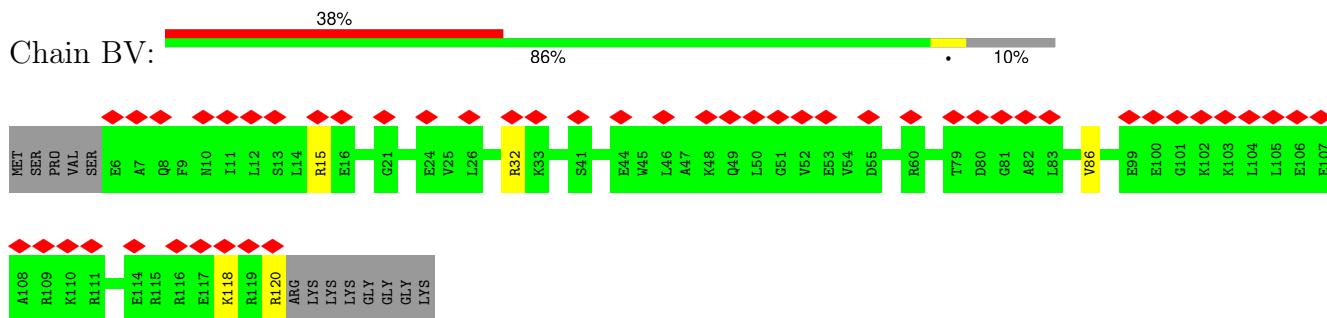
• Molecule 59: Small ribosomal subunit protein uS19



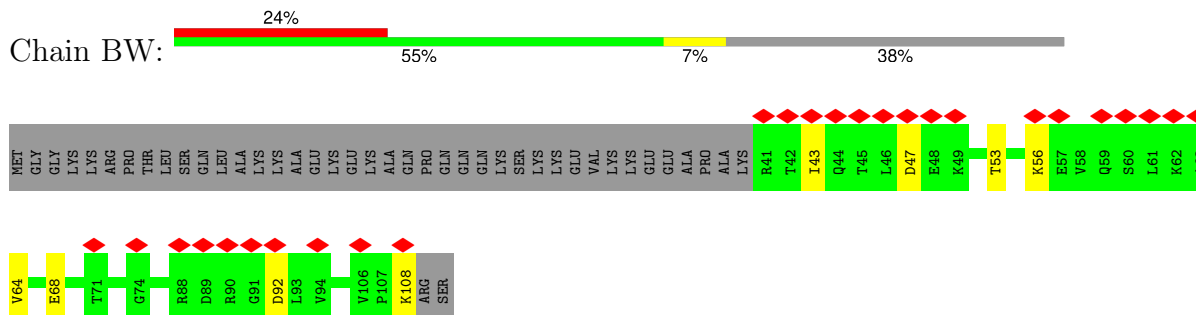
• Molecule 60: Small ribosomal subunit protein eS19



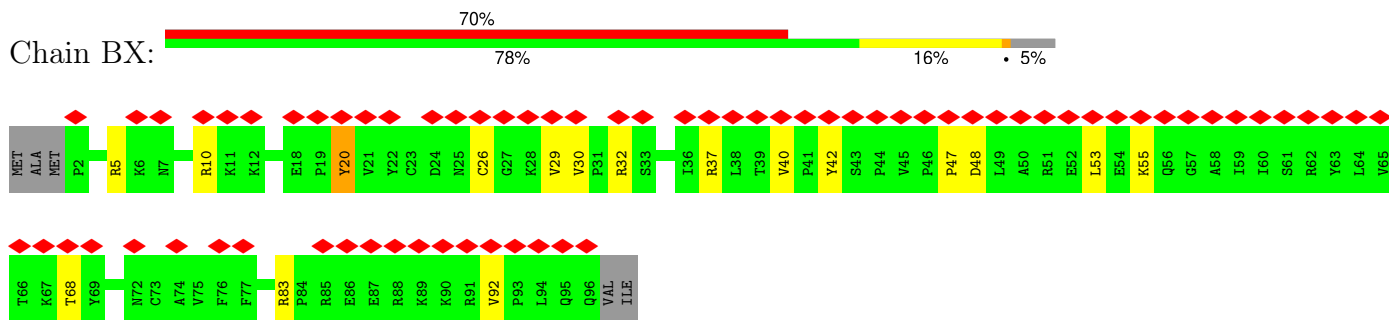
• Molecule 61: Small ribosomal subunit protein eS24



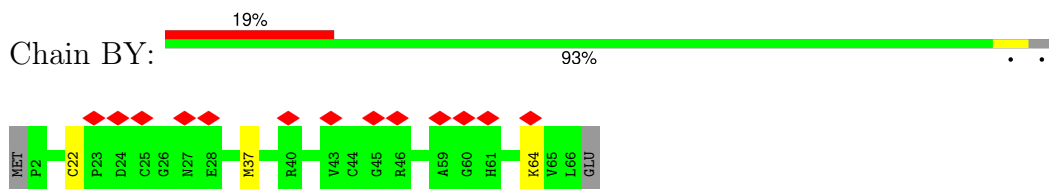
• Molecule 62: SSU ribosomal protein S25E



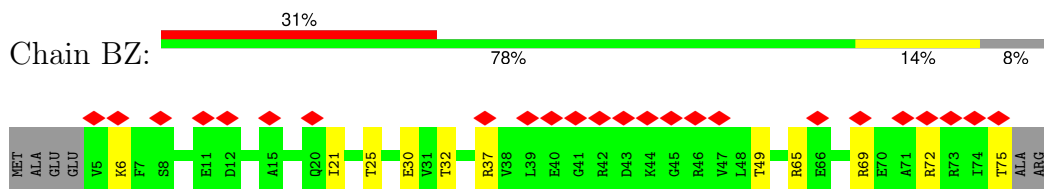
• Molecule 63: SSU ribosomal protein S26E



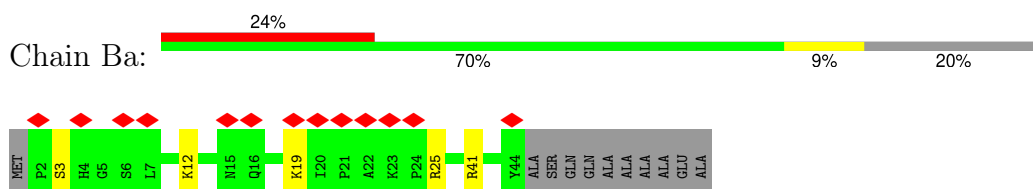
• Molecule 64: Small ribosomal subunit protein eS27



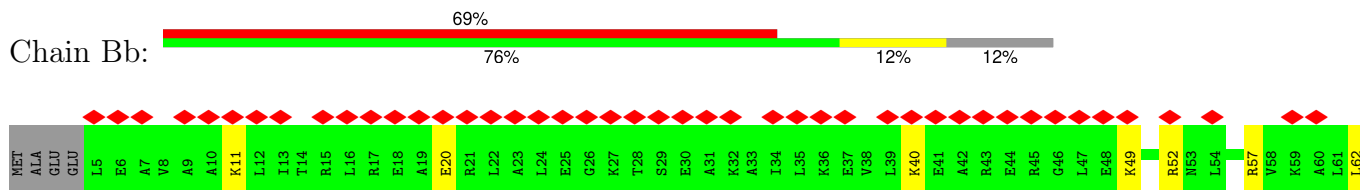
• Molecule 65: eS28



• Molecule 66: SSU ribosomal protein S30E



• Molecule 67: aS35



• Molecule 68: Small zinc finger protein HVO-2753-like zinc-binding pocket domain-containing protein





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	129829	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 ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.526	Depositor
Minimum map value	-0.618	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.049	Depositor
Recommended contour level	0.215	Depositor
Map size (Å)	504.2144, 504.2144, 504.2144	wwPDB
Map dimensions	608, 608, 608	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8293, 0.8293, 0.8293	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: MA6, 6MZ, IAS, PSU, A2M, 4AC, OMC, B8T, OMU, MG, UR3, M7A, SPM, 5MC, G7M, ZN, OMG

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	2	0.73	0/3096	0.90	1/4830 (0.0%)
2	1	0.60	0/67134	0.88	29/104802 (0.0%)
3	4	0.51	1/33464 (0.0%)	0.92	53/52215 (0.1%)
4	AA	0.37	0/1847	0.61	0/2489
5	AB	0.34	0/2678	0.56	0/3643
6	AC	0.32	0/2234	0.57	1/3024 (0.0%)
7	AD	0.36	0/1431	0.58	0/1913
8	AE	0.34	0/1548	0.55	0/2087
9	AF	0.32	0/1114	0.55	1/1513 (0.1%)
10	AG	0.32	0/1542	0.56	2/2076 (0.1%)
11	AH	0.30	0/1265	0.57	0/1692
12	AI	0.36	0/1093	0.66	1/1487 (0.1%)
13	AJ	0.35	0/795	0.68	1/1068 (0.1%)
13	AK	0.31	0/704	0.60	0/944
14	AL	0.34	0/1225	0.58	0/1639
15	AM	0.33	0/1594	0.58	0/2138
16	AN	0.34	0/1365	0.60	0/1841
17	AO	0.38	0/1647	0.58	0/2212
18	AP	0.30	0/933	0.57	0/1263
19	AQ	0.32	0/1233	0.68	2/1645 (0.1%)
20	AR	0.38	0/610	0.63	0/817
21	AS	0.43	0/805	0.61	0/1081
22	AT	0.32	0/1536	0.57	1/2075 (0.0%)
23	AU	0.30	0/655	0.58	1/877 (0.1%)
24	AV	0.34	0/990	0.67	1/1325 (0.1%)
25	AW	0.36	0/460	0.57	0/613
26	AX	0.36	0/557	0.66	0/738
27	AY	0.35	0/1407	0.62	1/1905 (0.1%)
28	AZ	0.33	0/754	0.58	0/1021
29	Aa	0.32	0/735	0.64	1/986 (0.1%)
30	Ab	0.32	0/1209	0.63	2/1621 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
31	Ac	0.32	0/663	0.60	0/889
32	Ad	0.34	0/442	0.59	0/587
33	Ae	0.30	0/562	0.49	0/753
34	Af	0.30	0/423	0.63	0/566
35	Ag	0.31	0/424	0.59	0/564
36	Ah	0.40	0/753	0.59	0/1001
37	Ai	0.35	0/788	0.62	0/1057
38	Aj	0.35	0/1497	0.56	0/2029
39	Ak	0.35	0/754	0.49	0/1005
40	BA	0.32	0/1515	0.69	2/2043 (0.1%)
41	BB	0.37	1/1638 (0.1%)	0.62	0/2221
42	BC	0.30	0/620	0.73	1/831 (0.1%)
43	BD	0.30	0/1308	0.57	0/1755
44	BE	0.35	0/1929	0.63	1/2621 (0.0%)
45	BF	0.34	0/1522	0.60	3/2059 (0.1%)
46	BG	0.32	0/1087	0.66	1/1465 (0.1%)
47	BH	0.32	0/1809	0.59	1/2444 (0.0%)
48	BI	0.36	0/1055	0.57	0/1425
49	BJ	0.33	0/1023	0.61	1/1370 (0.1%)
50	BK	0.32	0/1079	0.59	0/1452
51	BL	0.29	0/324	0.66	0/437
52	BM	0.33	0/951	0.63	0/1288
53	BN	0.38	0/1157	0.63	1/1551 (0.1%)
54	BO	0.30	0/1125	0.61	1/1518 (0.1%)
55	BP	0.29	0/244	0.70	0/324
56	BQ	0.30	0/1254	0.53	0/1692
57	BR	0.33	0/1200	0.58	1/1629 (0.1%)
58	BS	0.31	0/524	0.57	0/698
59	BT	0.31	0/1139	0.60	0/1533
60	BU	0.32	0/1253	0.56	0/1695
61	BV	0.32	0/960	0.59	0/1280
62	BW	0.36	0/551	0.58	0/741
63	BX	0.32	0/787	0.69	0/1054
64	BY	0.33	0/511	0.62	0/689
65	BZ	0.37	0/555	0.71	0/745
66	Ba	0.27	0/364	0.59	0/486
67	Bb	0.30	0/478	0.67	0/634
68	Bc	0.37	0/491	0.62	0/670
All	All	0.49	2/172419 (0.0%)	0.80	111/254381 (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
7	AD	0	2
13	AK	0	1
48	BI	0	3
50	BK	0	1
All	All	0	7

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
41	BB	90	CYS	CB-SG	-6.38	1.71	1.82
3	4	1345	G	P-O5'	5.56	1.65	1.59

The worst 5 of 111 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	4	102	A	OP1-P-OP2	14.34	141.12	119.60
3	4	812	C	OP1-P-O3'	-14.14	74.10	105.20
3	4	101	C	OP1-P-O3'	-14.12	74.14	105.20
3	4	812	C	OP2-P-O3'	-11.60	79.69	105.20
2	1	1603	G	OP1-P-O3'	-11.16	80.64	105.20

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	AD	77	ARG	Sidechain
7	AD	78	ARG	Sidechain
13	AK	38	GLY	Peptide
48	BI	28	TRP	Peptide
48	BI	76	ARG	Sidechain

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

Due to software issues we are unable to calculate clashes - this section is therefore empty.

## 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	
4	AA	237/244 (97%)	228 (96%)	9 (4%)	0	100	100
5	AB	334/338 (99%)	326 (98%)	8 (2%)	0	100	100
6	AC	276/285 (97%)	271 (98%)	5 (2%)	0	100	100
7	AD	176/178 (99%)	169 (96%)	7 (4%)	0	100	100
8	AE	193/196 (98%)	189 (98%)	4 (2%)	0	100	100
9	AF	143/149 (96%)	141 (99%)	2 (1%)	0	100	100
10	AG	181/186 (97%)	177 (98%)	4 (2%)	0	100	100
11	AH	153/157 (98%)	151 (99%)	2 (1%)	0	100	100
12	AI	136/144 (94%)	134 (98%)	2 (2%)	0	100	100
13	AJ	99/103 (96%)	95 (96%)	4 (4%)	0	100	100
13	AK	88/103 (85%)	83 (94%)	5 (6%)	0	100	100
14	AL	150/156 (96%)	144 (96%)	6 (4%)	0	100	100
15	AM	182/189 (96%)	178 (98%)	4 (2%)	0	100	100
16	AN	167/178 (94%)	162 (97%)	5 (3%)	0	100	100
17	AO	198/205 (97%)	198 (100%)	0	0	100	100
18	AP	119/122 (98%)	118 (99%)	1 (1%)	0	100	100
19	AQ	144/147 (98%)	143 (99%)	1 (1%)	0	100	100
20	AR	74/78 (95%)	74 (100%)	0	0	100	100
21	AS	96/99 (97%)	89 (93%)	7 (7%)	0	100	100
22	AT	181/184 (98%)	180 (99%)	1 (1%)	0	100	100
23	AU	79/81 (98%)	76 (96%)	3 (4%)	0	100	100
24	AV	119/128 (93%)	117 (98%)	1 (1%)	1 (1%)	16	17
25	AW	54/62 (87%)	53 (98%)	1 (2%)	0	100	100
26	AX	65/79 (82%)	65 (100%)	0	0	100	100
27	AY	170/179 (95%)	161 (95%)	8 (5%)	1 (1%)	22	24

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
28	AZ	96/101 (95%)	93 (97%)	3 (3%)	0	100	100
29	Aa	86/91 (94%)	85 (99%)	1 (1%)	0	100	100
30	Ab	138/153 (90%)	137 (99%)	1 (1%)	0	100	100
31	Ac	81/84 (96%)	80 (99%)	1 (1%)	0	100	100
32	Ad	50/52 (96%)	48 (96%)	2 (4%)	0	100	100
33	Ae	64/67 (96%)	63 (98%)	1 (2%)	0	100	100
34	Af	48/51 (94%)	45 (94%)	3 (6%)	0	100	100
35	Ag	48/53 (91%)	48 (100%)	0	0	100	100
36	Ah	89/91 (98%)	89 (100%)	0	0	100	100
37	Ai	97/102 (95%)	89 (92%)	8 (8%)	0	100	100
38	Aj	181/184 (98%)	172 (95%)	9 (5%)	0	100	100
39	Ak	88/93 (95%)	87 (99%)	1 (1%)	0	100	100
40	BA	185/222 (83%)	180 (97%)	4 (2%)	1 (0%)	25	28
41	BB	196/208 (94%)	187 (95%)	9 (5%)	0	100	100
42	BC	75/216 (35%)	58 (77%)	16 (21%)	1 (1%)	10	8
43	BD	155/159 (98%)	153 (99%)	2 (1%)	0	100	100
44	BE	234/237 (99%)	219 (94%)	13 (6%)	2 (1%)	14	14
45	BF	192/202 (95%)	180 (94%)	11 (6%)	1 (0%)	25	28
46	BG	138/151 (91%)	130 (94%)	8 (6%)	0	100	100
47	BH	218/223 (98%)	206 (94%)	12 (6%)	0	100	100
48	BI	127/130 (98%)	121 (95%)	5 (4%)	1 (1%)	16	17
49	BJ	128/131 (98%)	124 (97%)	4 (3%)	0	100	100
50	BK	132/142 (93%)	119 (90%)	11 (8%)	2 (2%)	8	7
51	BL	36/106 (34%)	30 (83%)	5 (14%)	1 (3%)	4	2
52	BM	123/141 (87%)	116 (94%)	7 (6%)	0	100	100
53	BN	142/147 (97%)	130 (92%)	10 (7%)	2 (1%)	9	7
54	BO	141/153 (92%)	129 (92%)	12 (8%)	0	100	100
55	BP	27/54 (50%)	21 (78%)	5 (18%)	1 (4%)	2	1
56	BQ	147/151 (97%)	146 (99%)	1 (1%)	0	100	100
57	BR	142/147 (97%)	139 (98%)	3 (2%)	0	100	100
58	BS	62/71 (87%)	57 (92%)	5 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
59	BT	133/158 (84%)	128 (96%)	4 (3%)	1 (1%)	16	17
60	BU	153/158 (97%)	146 (95%)	7 (5%)	0	100	100
61	BV	113/128 (88%)	111 (98%)	2 (2%)	0	100	100
62	BW	66/110 (60%)	64 (97%)	1 (2%)	1 (2%)	8	7
63	BX	93/100 (93%)	69 (74%)	18 (19%)	6 (6%)	1	0
64	BY	63/67 (94%)	57 (90%)	6 (10%)	0	100	100
65	BZ	69/77 (90%)	63 (91%)	6 (9%)	0	100	100
66	Ba	41/54 (76%)	41 (100%)	0	0	100	100
67	Bb	58/68 (85%)	57 (98%)	1 (2%)	0	100	100
68	Bc	62/65 (95%)	59 (95%)	3 (5%)	0	100	100
All	All	8331/9068 (92%)	7998 (96%)	311 (4%)	22 (0%)	38	43

5 of 22 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
44	BE	185	GLY
44	BE	186	GLY
50	BK	10	ASN
53	BN	5	LYS
53	BN	6	SER

### 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	
4	AA	181/186 (97%)	174 (96%)	7 (4%)	27	36
5	AB	280/282 (99%)	269 (96%)	11 (4%)	27	36
6	AC	226/231 (98%)	218 (96%)	8 (4%)	31	40
7	AD	149/149 (100%)	138 (93%)	11 (7%)	11	11
8	AE	165/165 (100%)	159 (96%)	6 (4%)	30	39
9	AF	115/118 (98%)	110 (96%)	5 (4%)	25	31

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
10	AG	163/165 (99%)	158 (97%)	5 (3%)	35	44
11	AH	133/135 (98%)	128 (96%)	5 (4%)	28	37
12	AI	115/118 (98%)	114 (99%)	1 (1%)	75	85
13	AJ	87/89 (98%)	81 (93%)	6 (7%)	13	13
13	AK	77/89 (86%)	70 (91%)	7 (9%)	7	7
14	AL	121/125 (97%)	112 (93%)	9 (7%)	11	11
15	AM	161/165 (98%)	153 (95%)	8 (5%)	20	25
16	AN	134/140 (96%)	128 (96%)	6 (4%)	23	29
17	AO	166/169 (98%)	163 (98%)	3 (2%)	54	67
18	AP	99/100 (99%)	97 (98%)	2 (2%)	50	63
19	AQ	127/128 (99%)	122 (96%)	5 (4%)	27	36
20	AR	69/71 (97%)	62 (90%)	7 (10%)	6	5
21	AS	84/85 (99%)	82 (98%)	2 (2%)	44	55
22	AT	157/158 (99%)	152 (97%)	5 (3%)	34	43
23	AU	71/71 (100%)	69 (97%)	2 (3%)	38	49
24	AV	107/112 (96%)	100 (94%)	7 (6%)	14	15
25	AW	48/53 (91%)	47 (98%)	1 (2%)	48	61
26	AX	58/65 (89%)	55 (95%)	3 (5%)	19	23
27	AY	147/152 (97%)	137 (93%)	10 (7%)	13	14
28	AZ	77/79 (98%)	71 (92%)	6 (8%)	10	10
29	Aa	78/81 (96%)	77 (99%)	1 (1%)	65	77
30	Ab	125/137 (91%)	122 (98%)	3 (2%)	44	55
31	Ac	67/68 (98%)	65 (97%)	2 (3%)	36	46
32	Ad	44/44 (100%)	43 (98%)	1 (2%)	45	56
33	Ae	60/61 (98%)	60 (100%)	0	100	100
34	Af	42/43 (98%)	39 (93%)	3 (7%)	12	12
35	Ag	46/49 (94%)	46 (100%)	0	100	100
36	Ah	82/82 (100%)	79 (96%)	3 (4%)	29	38
37	Ai	77/80 (96%)	74 (96%)	3 (4%)	27	36
38	Aj	161/162 (99%)	153 (95%)	8 (5%)	20	25
39	Ak	79/82 (96%)	72 (91%)	7 (9%)	8	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
40	BA	157/181 (87%)	143 (91%)	14 (9%)	8	7
41	BB	174/182 (96%)	161 (92%)	13 (8%)	11	11
42	BC	63/183 (34%)	49 (78%)	14 (22%)	1	0
43	BD	136/138 (99%)	129 (95%)	7 (5%)	20	24
44	BE	203/204 (100%)	189 (93%)	14 (7%)	13	13
45	BF	161/169 (95%)	151 (94%)	10 (6%)	15	17
46	BG	114/121 (94%)	108 (95%)	6 (5%)	19	23
47	BH	191/193 (99%)	183 (96%)	8 (4%)	25	32
48	BI	109/110 (99%)	100 (92%)	9 (8%)	9	9
49	BJ	105/106 (99%)	98 (93%)	7 (7%)	13	14
50	BK	110/117 (94%)	93 (84%)	17 (16%)	2	2
51	BL	34/94 (36%)	27 (79%)	7 (21%)	1	1
52	BM	93/106 (88%)	84 (90%)	9 (10%)	6	6
53	BN	117/120 (98%)	111 (95%)	6 (5%)	20	24
54	BO	113/119 (95%)	104 (92%)	9 (8%)	10	10
55	BP	25/48 (52%)	25 (100%)	0	100	100
56	BQ	135/137 (98%)	125 (93%)	10 (7%)	11	11
57	BR	131/134 (98%)	121 (92%)	10 (8%)	11	11
58	BS	55/59 (93%)	53 (96%)	2 (4%)	30	39
59	BT	120/137 (88%)	110 (92%)	10 (8%)	9	9
60	BU	127/130 (98%)	119 (94%)	8 (6%)	15	16
61	BV	101/111 (91%)	96 (95%)	5 (5%)	20	25
62	BW	59/94 (63%)	52 (88%)	7 (12%)	4	4
63	BX	85/89 (96%)	73 (86%)	12 (14%)	3	2
64	BY	55/57 (96%)	52 (94%)	3 (6%)	18	20
65	BZ	59/63 (94%)	48 (81%)	11 (19%)	1	1
66	Ba	39/44 (89%)	34 (87%)	5 (13%)	3	3
67	Bb	49/56 (88%)	41 (84%)	8 (16%)	2	1
68	Bc	51/52 (98%)	48 (94%)	3 (6%)	16	18
All	All	7149/7643 (94%)	6726 (94%)	423 (6%)	19	18

5 of 423 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
44	BE	66	ILE
50	BK	33	MET
65	BZ	30	GLU
44	BE	214	GLU
47	BH	156	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
45	BF	61	GLN
48	BI	108	GLN
38	Aj	131	HIS
38	Aj	150	ASN
42	BC	178	HIS

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	129/129 (100%)	10 (7%)	2 (1%)
2	1	2841/3024 (93%)	341 (12%)	28 (0%)
3	4	1418/1498 (94%)	258 (18%)	38 (2%)
All	All	4388/4651 (94%)	609 (13%)	68 (1%)

5 of 609 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	2	C
1	2	8	A
1	2	28	G
1	2	48	A
1	2	54	G

5 of 68 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	4	1162	A
3	4	1178	A
3	4	1444	G
2	1	2420	G
2	1	2361	G

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

106 non-standard protein/DNA/RNA residues are modelled in this entry.

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
3	M7A	4	508	3	19,25,26	0.29	0	25,37,40	0.57	0
3	OMG	4	462	3	19,26,27	0.93	1 (5%)	21,38,41	1.12	2 (9%)
3	OMG	4	674	3	19,26,27	0.89	1 (5%)	21,38,41	1.05	2 (9%)
3	4AC	4	1318	3	21,24,25	0.39	0	28,34,37	0.70	0
3	A2M	4	1060	3	18,25,26	0.67	0	20,36,39	0.85	1 (5%)
2	OMC	1	2018	2	19,22,23	0.79	0	25,31,34	0.75	0
2	OMC	1	2624	2	19,22,23	0.80	0	25,31,34	0.85	1 (4%)
2	OMC	1	2555	2	19,22,23	0.80	0	25,31,34	0.86	1 (4%)
2	OMG	1	2366	2	19,26,27	0.93	1 (5%)	21,38,41	1.07	2 (9%)
3	OMG	4	1289	3,70	19,26,27	0.90	1 (5%)	21,38,41	1.03	2 (9%)
2	PSU	1	1911	2	18,21,22	0.93	1 (5%)	21,30,33	0.78	0
2	OMC	1	492	2	19,22,23	0.77	0	25,31,34	0.82	0
3	A2M	4	569	3,70	18,25,26	0.67	0	20,36,39	0.72	1 (5%)
2	G7M	1	3023	2	20,26,27	2.36	3 (15%)	16,39,42	0.59	0
2	OMU	1	2574	2	19,22,23	1.25	3 (15%)	25,31,34	1.76	4 (16%)
2	OMG	1	1949	2	19,26,27	0.90	1 (5%)	21,38,41	1.05	2 (9%)
2	OMG	1	2066	2	19,26,27	0.91	1 (5%)	21,38,41	1.08	2 (9%)
2	OMC	1	2704	2	19,22,23	0.80	0	25,31,34	0.88	0
3	PSU	4	263	3	18,21,22	0.93	1 (5%)	21,30,33	0.63	0
2	OMU	1	2077	2	19,22,23	1.32	3 (15%)	25,31,34	1.78	5 (20%)
3	B8T	4	1469	3	19,22,23	0.43	0	25,31,34	0.42	0
2	OMC	1	1816	2	19,22,23	0.80	0	25,31,34	0.71	0
3	OMC	4	572	3	19,22,23	0.80	0	25,31,34	0.79	0
2	OMG	1	2362	2	19,26,27	0.91	1 (5%)	21,38,41	1.07	2 (9%)
2	B8T	1	2937	2	19,22,23	0.41	0	25,31,34	0.32	0
2	OMU	1	875	2	19,22,23	1.27	3 (15%)	25,31,34	1.87	5 (20%)
3	OMU	4	15	3	19,22,23	1.33	4 (21%)	25,31,34	1.82	4 (16%)
2	OMC	1	2720	2	19,22,23	0.79	0	25,31,34	0.93	1 (4%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	PSU	1	1987	2	18,21,22	0.91	1 (5%)	21,30,33	0.68	0
3	A2M	4	880	3	18,25,26	0.69	0	20,36,39	0.80	1 (5%)
2	OMG	1	1957	2	19,26,27	0.93	1 (5%)	21,38,41	1.09	2 (9%)
2	OMC	1	2538	2	19,22,23	0.78	0	25,31,34	0.79	0
3	B8T	4	1035	3	19,22,23	0.41	0	25,31,34	0.56	0
2	OMU	1	2628	2	19,22,23	1.27	3 (15%)	25,31,34	1.81	5 (20%)
3	OMC	4	1045	3	19,22,23	0.76	0	25,31,34	0.80	0
2	OMG	1	2176	2,70	19,26,27	0.92	1 (5%)	21,38,41	1.09	2 (9%)
2	5MC	1	2056	2,70	19,22,23	1.52	3 (15%)	26,32,35	1.16	3 (11%)
2	OMU	1	2851	2	19,22,23	1.28	4 (21%)	25,31,34	1.84	4 (16%)
2	OMG	1	2103	2	19,26,27	0.94	1 (5%)	21,38,41	1.06	2 (9%)
3	OMG	4	1211	3	19,26,27	0.93	1 (5%)	21,38,41	1.09	1 (4%)
3	OMG	4	908	3	19,26,27	0.90	1 (5%)	21,38,41	1.09	2 (9%)
2	PSU	1	2607	2	18,21,22	0.96	1 (5%)	21,30,33	0.81	0
2	OMC	1	872	2	19,22,23	0.78	0	25,31,34	0.83	1 (4%)
2	OMG	1	2388	2	19,26,27	0.91	1 (5%)	21,38,41	1.18	2 (9%)
3	OMG	4	7	3	19,26,27	0.93	1 (5%)	21,38,41	1.36	3 (14%)
2	A2M	1	2691	2,70	18,25,26	0.66	0	20,36,39	0.73	1 (5%)
2	A2M	1	1990	2	18,25,26	0.69	0	20,36,39	0.86	1 (5%)
3	OMG	4	1163	3	19,26,27	0.90	1 (5%)	21,38,41	1.12	2 (9%)
3	OMG	4	465	3	19,26,27	0.94	1 (5%)	21,38,41	1.05	2 (9%)
3	OMG	4	1210	3	19,26,27	0.91	1 (5%)	21,38,41	1.04	1 (4%)
2	OMC	1	2143	2	19,22,23	0.27	0	25,31,34	0.30	0
3	OMG	4	1212	3	19,26,27	0.93	1 (5%)	21,38,41	1.11	2 (9%)
2	OMU	1	2408	2	19,22,23	1.33	4 (21%)	25,31,34	1.92	4 (16%)
2	OMC	1	2116	2	19,22,23	0.81	0	25,31,34	0.72	0
2	A2M	1	2011	2	18,25,26	0.67	0	20,36,39	0.71	1 (5%)
2	B8T	1	79	2	19,22,23	0.41	0	25,31,34	0.37	0
2	OMU	1	2623	2	19,22,23	1.26	3 (15%)	25,31,34	1.85	5 (20%)
2	OMC	1	493	2	19,22,23	0.79	0	25,31,34	0.81	0
3	OMG	4	19	3	19,26,27	0.95	1 (5%)	21,38,41	1.13	2 (9%)
3	A2M	4	40	3	18,25,26	0.67	0	20,36,39	0.73	1 (5%)
3	OMC	4	1184	3	19,22,23	0.80	0	25,31,34	0.85	1 (4%)
3	OMG	4	906	3	19,26,27	0.89	1 (5%)	21,38,41	1.11	2 (9%)
2	PSU	1	2625	2	18,21,22	0.92	1 (5%)	21,30,33	0.71	0
2	OMC	1	673	2	19,22,23	0.79	0	25,31,34	0.83	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	MA6	4	1478	3	19,26,27	0.92	1 (5%)	18,38,41	0.83	1 (5%)
2	A2M	1	2059	2,70	18,25,26	0.71	0	20,36,39	0.91	0
2	4AC	1	2016	2	21,24,25	0.39	0	28,34,37	0.60	0
3	OMG	4	511	3	19,26,27	0.89	1 (5%)	21,38,41	1.06	2 (9%)
3	MA6	4	1477	3	19,26,27	0.93	1 (5%)	18,38,41	0.82	1 (5%)
2	OMU	1	2155	2	19,22,23	1.26	3 (15%)	25,31,34	1.86	5 (20%)
2	OMG	1	902	2,70	19,26,27	0.87	1 (5%)	21,38,41	1.14	2 (9%)
2	OMG	1	1971	2	19,26,27	0.92	1 (5%)	21,38,41	1.08	2 (9%)
3	OMG	4	475	3	19,26,27	0.94	1 (5%)	21,38,41	1.06	2 (9%)
3	4AC	4	5	3	21,24,25	0.43	0	28,34,37	0.66	0
2	OMG	1	2667	2	19,26,27	0.91	1 (5%)	21,38,41	1.08	2 (9%)
3	A2M	4	879	3	18,25,26	0.66	0	20,36,39	0.73	1 (5%)
2	OMG	1	2104	2	19,26,27	0.93	1 (5%)	21,38,41	1.14	2 (9%)
3	OMC	4	1034	3	19,22,23	0.80	0	25,31,34	0.81	0
3	OMG	4	1202	3,70	19,26,27	0.91	1 (5%)	21,38,41	1.12	2 (9%)
2	UR3	1	2698	2	19,22,23	0.93	0	26,32,35	1.72	2 (7%)
3	A2M	4	496	3	18,25,26	0.67	0	20,36,39	0.82	1 (5%)
2	OMG	1	2071	2	19,26,27	0.90	1 (5%)	21,38,41	1.05	2 (9%)
2	OMG	1	2017	2	19,26,27	0.90	1 (5%)	21,38,41	1.04	2 (9%)
2	OMU	1	908	2,70	19,22,23	1.32	4 (21%)	25,31,34	1.96	7 (28%)
2	OMG	1	2601	2,70	19,26,27	0.92	1 (5%)	21,38,41	1.08	2 (9%)
3	6MZ	4	1459	3,70	17,25,26	0.82	0	15,36,39	1.96	2 (13%)
2	OMU	1	2707	2	19,22,23	1.28	4 (21%)	25,31,34	1.88	5 (20%)
3	OMC	4	1368	3	19,22,23	0.79	0	25,31,34	0.79	0
3	OMC	4	489	3	19,22,23	0.81	0	25,31,34	0.88	0
2	PSU	1	2571	2	18,21,22	0.94	1 (5%)	21,30,33	0.73	0
2	PSU	1	2044	2	18,21,22	0.90	1 (5%)	21,30,33	0.67	0
2	OMG	1	2608	2	19,26,27	0.92	1 (5%)	21,38,41	1.12	2 (9%)
2	OMC	1	1976	2	19,22,23	0.83	0	25,31,34	0.91	1 (4%)
2	PSU	1	2610	2	18,21,22	0.90	1 (5%)	21,30,33	0.79	0
2	OMC	1	2885	2	19,22,23	0.81	0	25,31,34	0.78	0
52	IAS	BM	128	52	6,7,8	1.32	1 (16%)	3,8,10	1.47	1 (33%)
2	OMC	1	2115	2	19,22,23	0.80	0	25,31,34	0.80	0
2	OMG	1	2537	2	19,26,27	0.91	1 (5%)	21,38,41	1.08	2 (9%)
3	OMU	4	877	3	19,22,23	1.26	3 (15%)	25,31,34	1.84	5 (20%)
2	5MC	1	38	2	19,22,23	1.46	3 (15%)	26,32,35	1.21	3 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	OMG	4	467	3	19,26,27	0.84	1 (5%)	21,38,41	1.06	1 (4%)
2	OMC	1	2884	2	19,22,23	0.79	0	25,31,34	0.81	0
3	OMC	4	514	3	19,22,23	0.82	0	25,31,34	0.91	1 (4%)
2	OMU	1	2666	2	19,22,23	1.26	3 (15%)	25,31,34	1.85	5 (20%)
2	OMU	1	2088	2	19,22,23	1.28	3 (15%)	25,31,34	1.80	4 (16%)
2	OMG	1	1947	2	19,26,27	0.90	1 (5%)	21,38,41	1.22	2 (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
3	M7A	4	508	3	-	3/7/37/38	0/3/3/3
3	OMG	4	462	3	-	1/5/27/28	0/3/3/3
3	OMG	4	674	3	-	0/5/27/28	0/3/3/3
3	4AC	4	1318	3	-	0/11/29/30	0/2/2/2
3	A2M	4	1060	3	-	3/5/27/28	0/3/3/3
2	OMC	1	2018	2	-	0/9/27/28	0/2/2/2
2	OMC	1	2624	2	-	0/9/27/28	0/2/2/2
2	OMC	1	2555	2	-	2/9/27/28	0/2/2/2
2	OMG	1	2366	2	-	0/5/27/28	0/3/3/3
3	OMG	4	1289	3,70	-	0/5/27/28	0/3/3/3
2	PSU	1	1911	2	-	0/7/25/26	0/2/2/2
2	OMC	1	492	2	-	2/9/27/28	0/2/2/2
3	A2M	4	569	3,70	-	0/5/27/28	0/3/3/3
2	G7M	1	3023	2	-	1/3/25/26	0/3/3/3
2	OMU	1	2574	2	-	0/9/27/28	0/2/2/2
2	OMG	1	1949	2	-	0/5/27/28	0/3/3/3
2	OMG	1	2066	2	-	0/5/27/28	0/3/3/3
2	OMC	1	2704	2	-	0/9/27/28	0/2/2/2
3	PSU	4	263	3	-	0/7/25/26	0/2/2/2
2	OMU	1	2077	2	-	1/9/27/28	0/2/2/2
3	B8T	4	1469	3	-	0/7/27/28	0/2/2/2
2	OMC	1	1816	2	-	0/9/27/28	0/2/2/2
3	OMC	4	572	3	-	1/9/27/28	0/2/2/2
2	OMG	1	2362	2	-	1/5/27/28	0/3/3/3
2	B8T	1	2937	2	-	1/7/27/28	0/2/2/2
2	OMU	1	875	2	-	1/9/27/28	0/2/2/2
3	OMU	4	15	3	-	0/9/27/28	0/2/2/2
2	OMC	1	2720	2	-	0/9/27/28	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PSU	1	1987	2	-	0/7/25/26	0/2/2/2
3	A2M	4	880	3	-	0/5/27/28	0/3/3/3
2	OMG	1	1957	2	-	0/5/27/28	0/3/3/3
2	OMC	1	2538	2	-	0/9/27/28	0/2/2/2
3	B8T	4	1035	3	-	0/7/27/28	0/2/2/2
2	OMU	1	2628	2	-	0/9/27/28	0/2/2/2
3	OMC	4	1045	3	-	2/9/27/28	0/2/2/2
2	OMG	1	2176	2,70	-	0/5/27/28	0/3/3/3
2	5MC	1	2056	2,70	-	1/7/25/26	0/2/2/2
2	OMU	1	2851	2	-	2/9/27/28	0/2/2/2
2	OMG	1	2103	2	-	0/5/27/28	0/3/3/3
3	OMG	4	1211	3	-	2/5/27/28	0/3/3/3
3	OMG	4	908	3	-	4/5/27/28	0/3/3/3
2	PSU	1	2607	2	-	0/7/25/26	0/2/2/2
2	OMC	1	872	2	-	0/9/27/28	0/2/2/2
2	OMG	1	2388	2	-	2/5/27/28	0/3/3/3
3	OMG	4	7	3	-	0/5/27/28	0/3/3/3
2	A2M	1	2691	2,70	-	1/5/27/28	0/3/3/3
2	A2M	1	1990	2	-	0/5/27/28	0/3/3/3
3	OMG	4	1163	3	-	3/5/27/28	0/3/3/3
3	OMG	4	465	3	-	2/5/27/28	0/3/3/3
3	OMG	4	1210	3	-	1/5/27/28	0/3/3/3
2	OMC	1	2143	2	-	0/9/27/28	0/2/2/2
3	OMG	4	1212	3	-	0/5/27/28	0/3/3/3
2	OMU	1	2408	2	-	0/9/27/28	0/2/2/2
2	OMC	1	2116	2	-	2/9/27/28	0/2/2/2
2	A2M	1	2011	2	-	0/5/27/28	0/3/3/3
2	B8T	1	79	2	-	0/7/27/28	0/2/2/2
2	OMU	1	2623	2	-	2/9/27/28	0/2/2/2
2	OMC	1	493	2	-	1/9/27/28	0/2/2/2
3	OMG	4	19	3	-	1/5/27/28	0/3/3/3
3	A2M	4	40	3	-	1/5/27/28	0/3/3/3
3	OMC	4	1184	3	-	1/9/27/28	0/2/2/2
3	OMG	4	906	3	-	0/5/27/28	0/3/3/3
2	PSU	1	2625	2	-	2/7/25/26	0/2/2/2
2	OMC	1	673	2	-	0/9/27/28	0/2/2/2
3	MA6	4	1478	3	-	2/7/29/30	0/3/3/3
2	A2M	1	2059	2,70	-	1/5/27/28	0/3/3/3
2	4AC	1	2016	2	-	0/11/29/30	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	OMG	4	511	3	-	3/5/27/28	0/3/3/3
3	MA6	4	1477	3	-	0/7/29/30	0/3/3/3
2	OMU	1	2155	2	-	2/9/27/28	0/2/2/2
2	OMG	1	902	2,70	-	0/5/27/28	0/3/3/3
2	OMG	1	1971	2	-	0/5/27/28	0/3/3/3
3	OMG	4	475	3	-	0/5/27/28	0/3/3/3
3	4AC	4	5	3	-	2/11/29/30	0/2/2/2
2	OMG	1	2667	2	-	0/5/27/28	0/3/3/3
3	A2M	4	879	3	-	4/5/27/28	0/3/3/3
2	OMG	1	2104	2	-	0/5/27/28	0/3/3/3
3	OMC	4	1034	3	-	0/9/27/28	0/2/2/2
3	OMG	4	1202	3,70	-	3/5/27/28	0/3/3/3
2	UR3	1	2698	2	-	0/7/25/26	0/2/2/2
3	A2M	4	496	3	-	3/5/27/28	0/3/3/3
2	OMG	1	2071	2	-	0/5/27/28	0/3/3/3
2	OMG	1	2017	2	-	1/5/27/28	0/3/3/3
2	OMU	1	908	2,70	-	4/9/27/28	0/2/2/2
2	OMG	1	2601	2,70	-	0/5/27/28	0/3/3/3
3	6MZ	4	1459	3,70	-	0/5/27/28	0/3/3/3
2	OMU	1	2707	2	-	0/9/27/28	0/2/2/2
3	OMC	4	1368	3	-	1/9/27/28	0/2/2/2
3	OMC	4	489	3	-	1/9/27/28	0/2/2/2
2	PSU	1	2571	2	-	0/7/25/26	0/2/2/2
2	PSU	1	2044	2	-	2/7/25/26	0/2/2/2
2	OMG	1	2608	2	-	2/5/27/28	0/3/3/3
2	OMC	1	1976	2	-	1/9/27/28	0/2/2/2
2	PSU	1	2610	2	-	0/7/25/26	0/2/2/2
2	OMC	1	2885	2	-	0/9/27/28	0/2/2/2
52	IAS	BM	128	52	-	1/7/7/8	-
2	OMC	1	2115	2	-	0/9/27/28	0/2/2/2
2	OMG	1	2537	2	-	2/5/27/28	0/3/3/3
3	OMU	4	877	3	-	0/9/27/28	0/2/2/2
2	5MC	1	38	2	-	1/7/25/26	0/2/2/2
3	OMG	4	467	3	-	0/5/27/28	0/3/3/3
2	OMC	1	2884	2	-	0/9/27/28	0/2/2/2
3	OMC	4	514	3	-	1/9/27/28	0/2/2/2
2	OMU	1	2666	2	-	0/9/27/28	0/2/2/2
2	OMU	1	2088	2	-	0/9/27/28	0/2/2/2
2	OMG	1	1947	2	-	2/5/27/28	0/3/3/3

The worst 5 of 101 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	1	3023	G7M	C8-N9	7.19	1.46	1.33
2	1	3023	G7M	C8-N7	6.72	1.45	1.33
2	1	2056	5MC	C5-C4	5.34	1.48	1.44
2	1	38	5MC	C5-C4	5.00	1.47	1.44
2	1	2607	PSU	C6-C5	3.62	1.39	1.35

The worst 5 of 162 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	1	2698	UR3	C4-N3-C2	-6.86	119.06	124.58
3	4	1459	6MZ	C2-N1-C6	6.07	121.31	116.60
2	1	2408	OMU	C4-N3-C2	-5.28	120.06	126.61
2	1	2155	OMU	C4-N3-C2	-5.07	120.31	126.61
3	4	877	OMU	C4-N3-C2	-5.02	120.38	126.61

There are no chirality outliers.

5 of 86 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	4	40	A2M	C1'-C2'-O2'-CM'
3	4	496	A2M	C1'-C2'-O2'-CM'
3	4	879	A2M	C3'-C4'-C5'-O5'
3	4	879	A2M	C1'-C2'-O2'-CM'
3	4	1045	OMC	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 327 ligands modelled in this entry, 263 are monoatomic - leaving 64 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	$\# Z  > 2$
69	SPM	1	3109	-	13,13,13	0.17	0	12,12,12	0.36	0
69	SPM	1	3115	-	13,13,13	0.18	0	12,12,12	0.45	0
69	SPM	1	3116	-	13,13,13	0.15	0	12,12,12	0.26	0
69	SPM	4	3017	-	13,13,13	0.21	0	12,12,12	1.70	1 (8%)
69	SPM	AL	201	-	13,13,13	0.16	0	12,12,12	0.40	0
69	SPM	1	3108	-	13,13,13	0.19	0	12,12,12	0.66	0
69	SPM	1	3121	-	13,13,13	0.24	0	12,12,12	0.30	0
69	SPM	1	3135	-	13,13,13	0.16	0	12,12,12	0.64	0
69	SPM	1	3138	-	13,13,13	0.17	0	12,12,12	0.82	0
69	SPM	1	3132	-	13,13,13	0.16	0	12,12,12	0.40	0
69	SPM	1	3129	-	13,13,13	0.17	0	12,12,12	0.37	0
69	SPM	1	3101	-	13,13,13	0.18	0	12,12,12	0.66	0
69	SPM	1	3133	-	13,13,13	0.17	0	12,12,12	0.37	0
69	SPM	4	3007	-	13,13,13	0.24	0	12,12,12	0.53	0
69	SPM	1	3111	-	13,13,13	0.15	0	12,12,12	0.25	0
69	SPM	1	3117	-	13,13,13	0.17	0	12,12,12	0.36	0
69	SPM	1	3105	-	13,13,13	0.15	0	12,12,12	0.16	0
69	SPM	1	3126	-	13,13,13	0.17	0	12,12,12	0.59	0
69	SPM	1	3144	-	13,13,13	0.16	0	12,12,12	0.40	0
69	SPM	4	3010	-	13,13,13	0.15	0	12,12,12	0.69	0
69	SPM	1	3127	-	13,13,13	0.17	0	12,12,12	0.30	0
69	SPM	1	3120	-	13,13,13	0.18	0	12,12,12	0.22	0
69	SPM	1	3103	-	13,13,13	0.16	0	12,12,12	0.44	0
69	SPM	1	3122	-	13,13,13	0.18	0	12,12,12	0.25	0
69	SPM	1	3102	-	13,13,13	0.16	0	12,12,12	0.43	0
69	SPM	4	3014	-	13,13,13	0.19	0	12,12,12	0.57	0
69	SPM	4	3011	-	13,13,13	0.16	0	12,12,12	0.43	0
69	SPM	Ah	101	-	13,13,13	0.17	0	12,12,12	0.19	0
69	SPM	4	3009	-	13,13,13	0.17	0	12,12,12	0.35	0
69	SPM	1	3130	-	13,13,13	0.14	0	12,12,12	0.18	0
69	SPM	4	3016	-	13,13,13	0.16	0	12,12,12	0.22	0
69	SPM	1	3113	-	13,13,13	0.18	0	12,12,12	0.19	0
69	SPM	1	3125	-	13,13,13	0.17	0	12,12,12	0.29	0
69	SPM	1	3128	-	13,13,13	0.18	0	12,12,12	0.21	0
69	SPM	1	3136	-	13,13,13	0.14	0	12,12,12	0.29	0
69	SPM	1	3106	-	13,13,13	0.17	0	12,12,12	0.19	0
69	SPM	4	3003	-	13,13,13	0.18	0	12,12,12	0.38	0
69	SPM	4	3013	-	13,13,13	0.16	0	12,12,12	0.28	0
69	SPM	1	3123	-	13,13,13	0.16	0	12,12,12	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
69	SPM	1	3110	-	13,13,13	0.16	0	12,12,12	0.29	0
69	SPM	1	3119	-	13,13,13	0.21	0	12,12,12	0.26	0
69	SPM	1	3114	-	13,13,13	0.16	0	12,12,12	0.19	0
69	SPM	1	3137	-	13,13,13	0.17	0	12,12,12	0.43	0
69	SPM	1	3104	-	13,13,13	0.16	0	12,12,12	0.31	0
69	SPM	4	3001	-	13,13,13	0.16	0	12,12,12	0.33	0
69	SPM	4	3002	-	13,13,13	0.21	0	12,12,12	0.47	0
69	SPM	4	3008	-	13,13,13	0.15	0	12,12,12	0.27	0
69	SPM	4	3005	-	13,13,13	0.14	0	12,12,12	0.16	0
69	SPM	1	3131	-	13,13,13	0.16	0	12,12,12	0.34	0
69	SPM	1	3112	-	13,13,13	0.17	0	12,12,12	0.32	0
69	SPM	1	3134	-	13,13,13	0.15	0	12,12,12	0.43	0
69	SPM	1	3118	-	13,13,13	0.15	0	12,12,12	0.17	0
69	SPM	1	3107	-	13,13,13	0.18	0	12,12,12	0.19	0
69	SPM	1	3124	-	13,13,13	0.15	0	12,12,12	0.23	0
69	SPM	4	3006	-	13,13,13	0.15	0	12,12,12	0.24	0
69	SPM	1	3140	-	13,13,13	0.15	0	12,12,12	0.39	0
69	SPM	1	3142	-	13,13,13	0.18	0	12,12,12	0.34	0
69	SPM	4	3012	-	13,13,13	0.19	0	12,12,12	0.20	0
69	SPM	1	3143	-	13,13,13	0.21	0	12,12,12	0.46	0
69	SPM	4	3004	-	13,13,13	0.16	0	12,12,12	0.26	0
69	SPM	4	3018	-	13,13,13	0.15	0	12,12,12	0.32	0
69	SPM	1	3141	-	13,13,13	0.20	0	12,12,12	0.62	0
69	SPM	1	3139	-	13,13,13	0.16	0	12,12,12	0.25	0
69	SPM	4	3015	-	13,13,13	0.15	0	12,12,12	0.35	0

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
69	SPM	1	3109	-	-	1/11/11/11	-
69	SPM	1	3115	-	-	1/11/11/11	-
69	SPM	1	3116	-	-	2/11/11/11	-
69	SPM	4	3017	-	-	4/11/11/11	-
69	SPM	AL	201	-	-	1/11/11/11	-
69	SPM	1	3108	-	-	3/11/11/11	-
69	SPM	1	3121	-	-	1/11/11/11	-
69	SPM	1	3135	-	-	2/11/11/11	-
69	SPM	1	3138	-	-	6/11/11/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
69	SPM	1	3132	-	-	3/11/11/11	-
69	SPM	1	3129	-	-	2/11/11/11	-
69	SPM	1	3101	-	-	4/11/11/11	-
69	SPM	1	3133	-	-	3/11/11/11	-
69	SPM	4	3007	-	-	5/11/11/11	-
69	SPM	1	3111	-	-	0/11/11/11	-
69	SPM	1	3117	-	-	2/11/11/11	-
69	SPM	1	3105	-	-	1/11/11/11	-
69	SPM	1	3126	-	-	3/11/11/11	-
69	SPM	1	3144	-	-	3/11/11/11	-
69	SPM	4	3010	-	-	2/11/11/11	-
69	SPM	1	3127	-	-	0/11/11/11	-
69	SPM	1	3120	-	-	1/11/11/11	-
69	SPM	1	3103	-	-	0/11/11/11	-
69	SPM	1	3122	-	-	1/11/11/11	-
69	SPM	1	3102	-	-	0/11/11/11	-
69	SPM	4	3014	-	-	2/11/11/11	-
69	SPM	4	3011	-	-	2/11/11/11	-
69	SPM	Ah	101	-	-	2/11/11/11	-
69	SPM	4	3009	-	-	2/11/11/11	-
69	SPM	1	3130	-	-	0/11/11/11	-
69	SPM	4	3016	-	-	1/11/11/11	-
69	SPM	1	3113	-	-	4/11/11/11	-
69	SPM	1	3125	-	-	1/11/11/11	-
69	SPM	1	3128	-	-	2/11/11/11	-
69	SPM	1	3136	-	-	2/11/11/11	-
69	SPM	1	3106	-	-	5/11/11/11	-
69	SPM	4	3003	-	-	5/11/11/11	-
69	SPM	4	3013	-	-	1/11/11/11	-
69	SPM	1	3123	-	-	1/11/11/11	-
69	SPM	1	3110	-	-	1/11/11/11	-
69	SPM	1	3119	-	-	4/11/11/11	-
69	SPM	1	3114	-	-	4/11/11/11	-
69	SPM	1	3137	-	-	2/11/11/11	-
69	SPM	1	3104	-	-	3/11/11/11	-
69	SPM	4	3001	-	-	0/11/11/11	-
69	SPM	4	3002	-	-	4/11/11/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
69	SPM	4	3008	-	-	0/11/11/11	-
69	SPM	4	3005	-	-	1/11/11/11	-
69	SPM	1	3131	-	-	4/11/11/11	-
69	SPM	1	3112	-	-	1/11/11/11	-
69	SPM	1	3134	-	-	3/11/11/11	-
69	SPM	1	3118	-	-	0/11/11/11	-
69	SPM	1	3107	-	-	1/11/11/11	-
69	SPM	1	3124	-	-	0/11/11/11	-
69	SPM	4	3006	-	-	2/11/11/11	-
69	SPM	1	3140	-	-	1/11/11/11	-
69	SPM	1	3142	-	-	3/11/11/11	-
69	SPM	4	3012	-	-	4/11/11/11	-
69	SPM	1	3143	-	-	1/11/11/11	-
69	SPM	4	3004	-	-	3/11/11/11	-
69	SPM	4	3018	-	-	0/11/11/11	-
69	SPM	1	3141	-	-	4/11/11/11	-
69	SPM	1	3139	-	-	1/11/11/11	-
69	SPM	4	3015	-	-	2/11/11/11	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
69	4	3017	SPM	C7-C8-C9	5.69	139.82	113.56

There are no chirality outliers.

5 of 130 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
69	1	3106	SPM	C12-C11-N10-C9
69	4	3017	SPM	C6-C7-C8-C9
69	1	3101	SPM	C7-C8-C9-N10
69	4	3007	SPM	C7-C8-C9-N10
69	1	3134	SPM	N5-C6-C7-C8

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

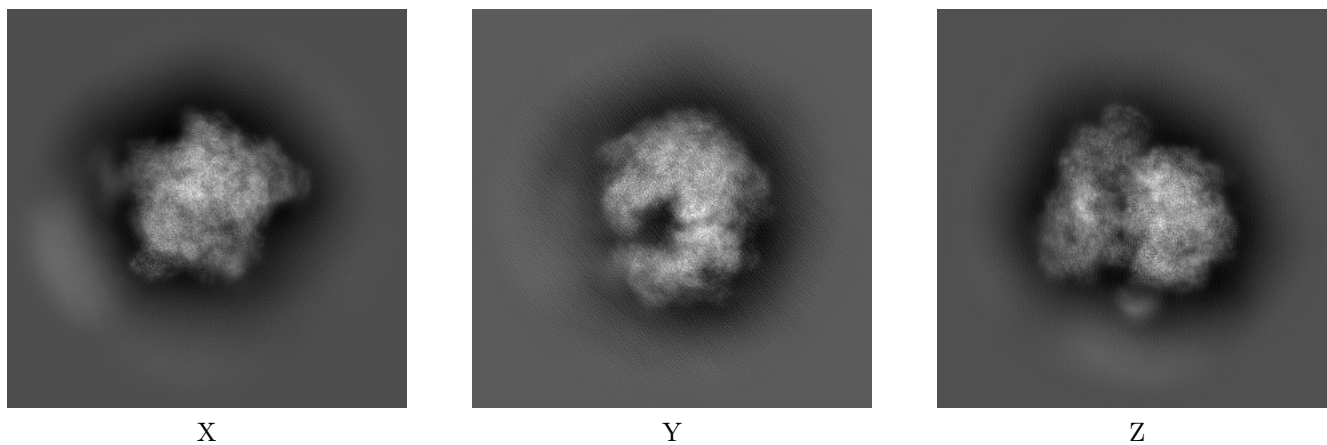
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47628. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

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

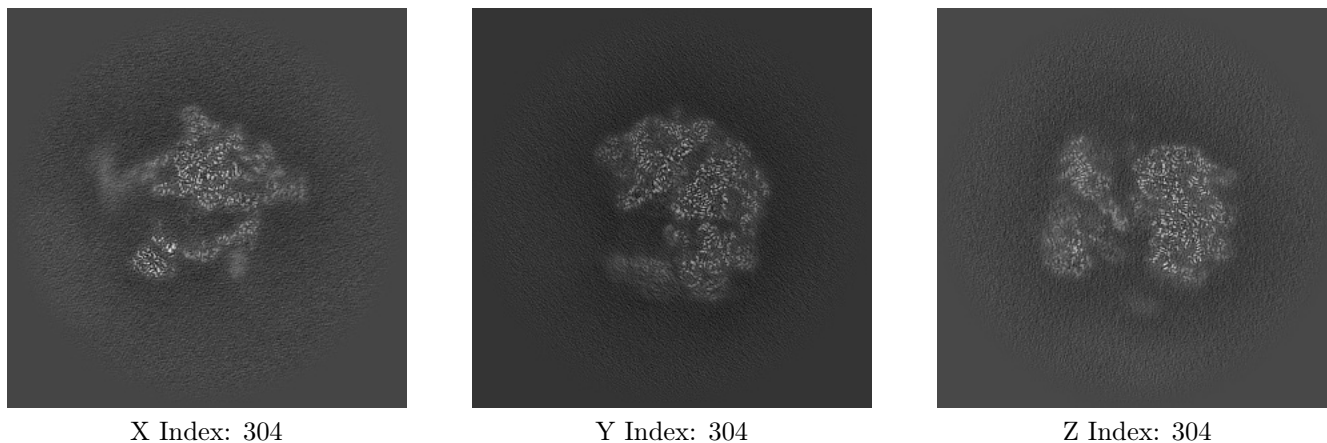
#### 6.1.1 Primary map



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

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

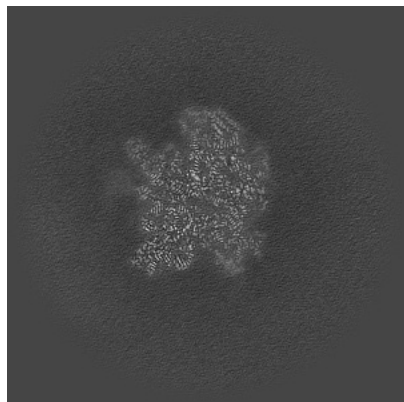
#### 6.2.1 Primary map



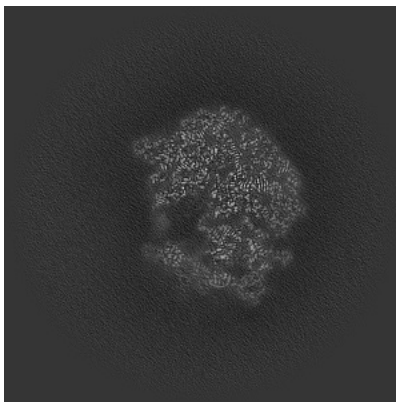
The images above show central slices of the map in three orthogonal directions.

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

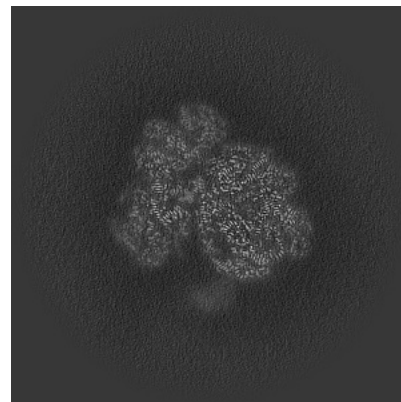
### 6.3.1 Primary map



X Index: 334



Y Index: 288

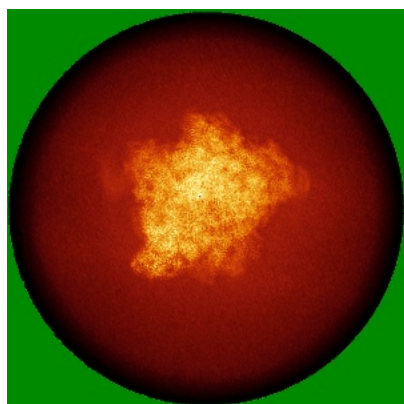


Z Index: 326

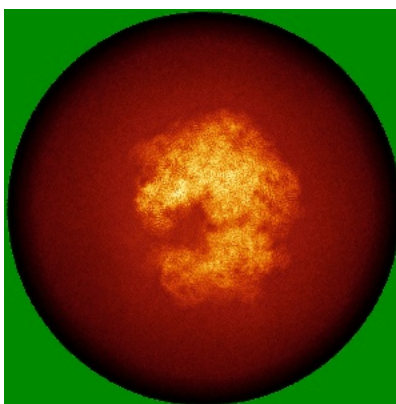
The images above show the largest variance slices of the map in three orthogonal directions.

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

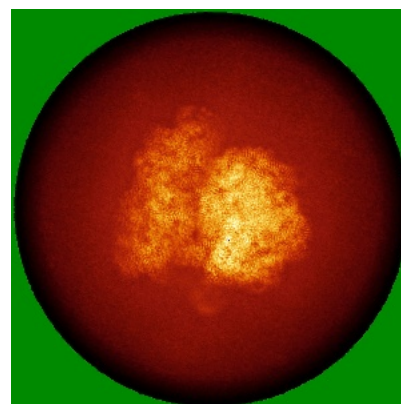
### 6.4.1 Primary map



X



Y

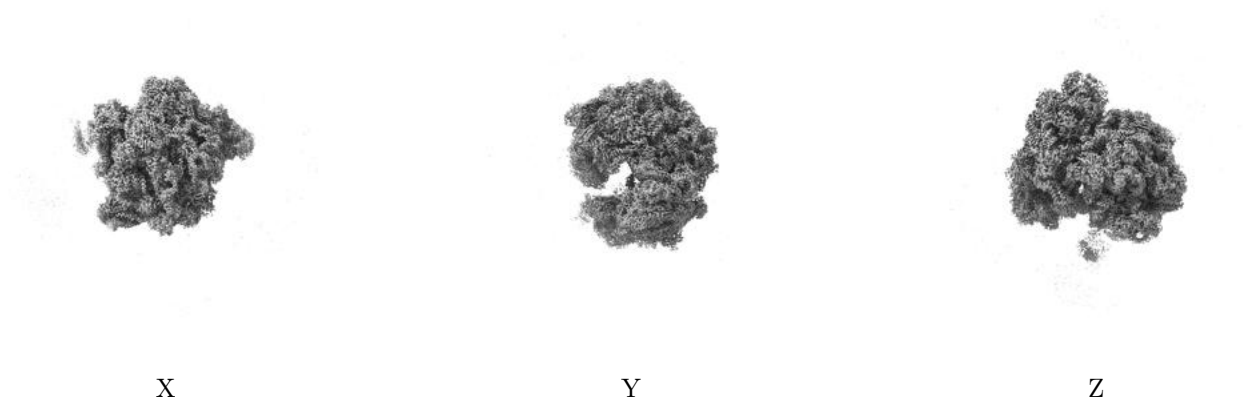


Z

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

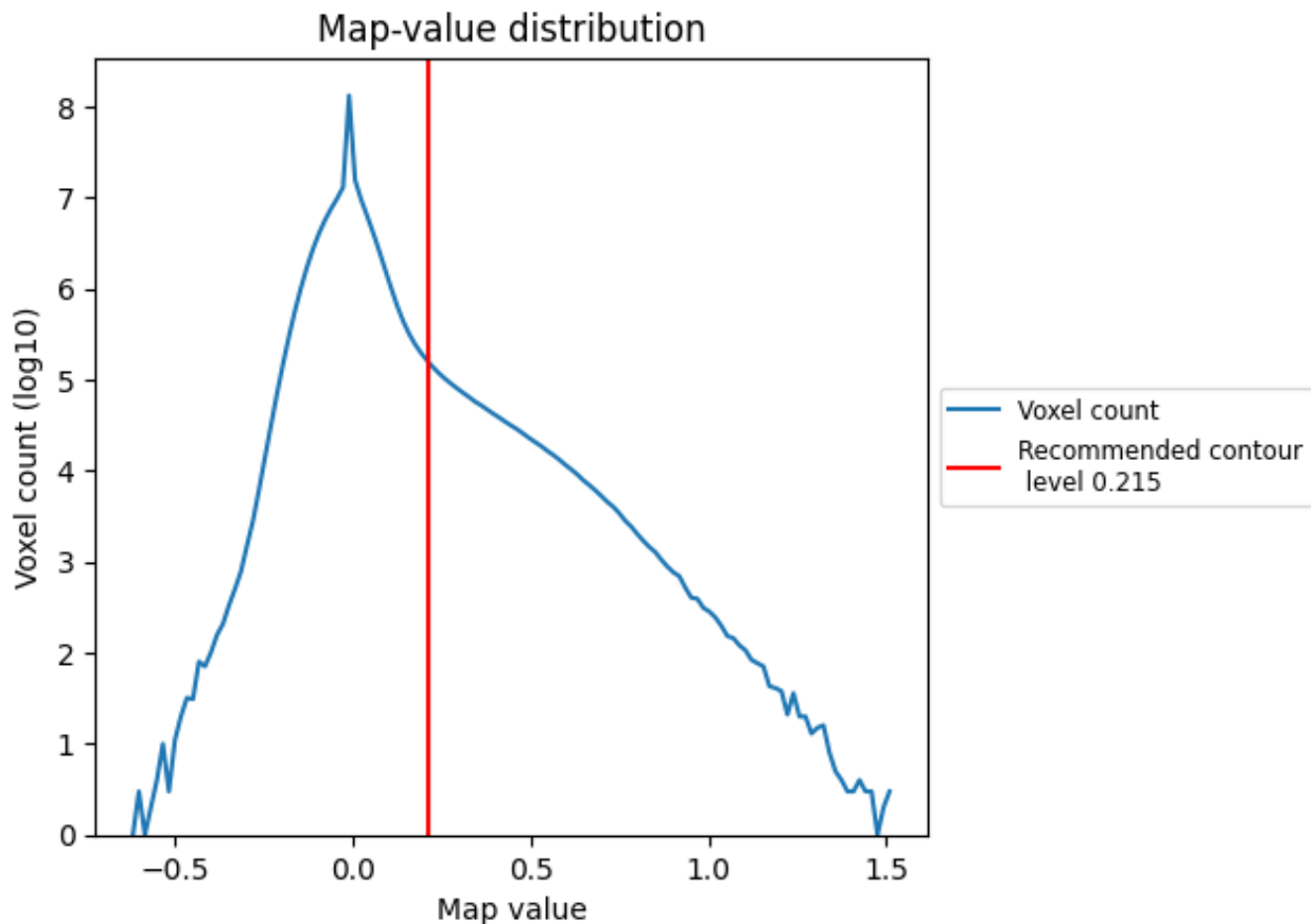
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

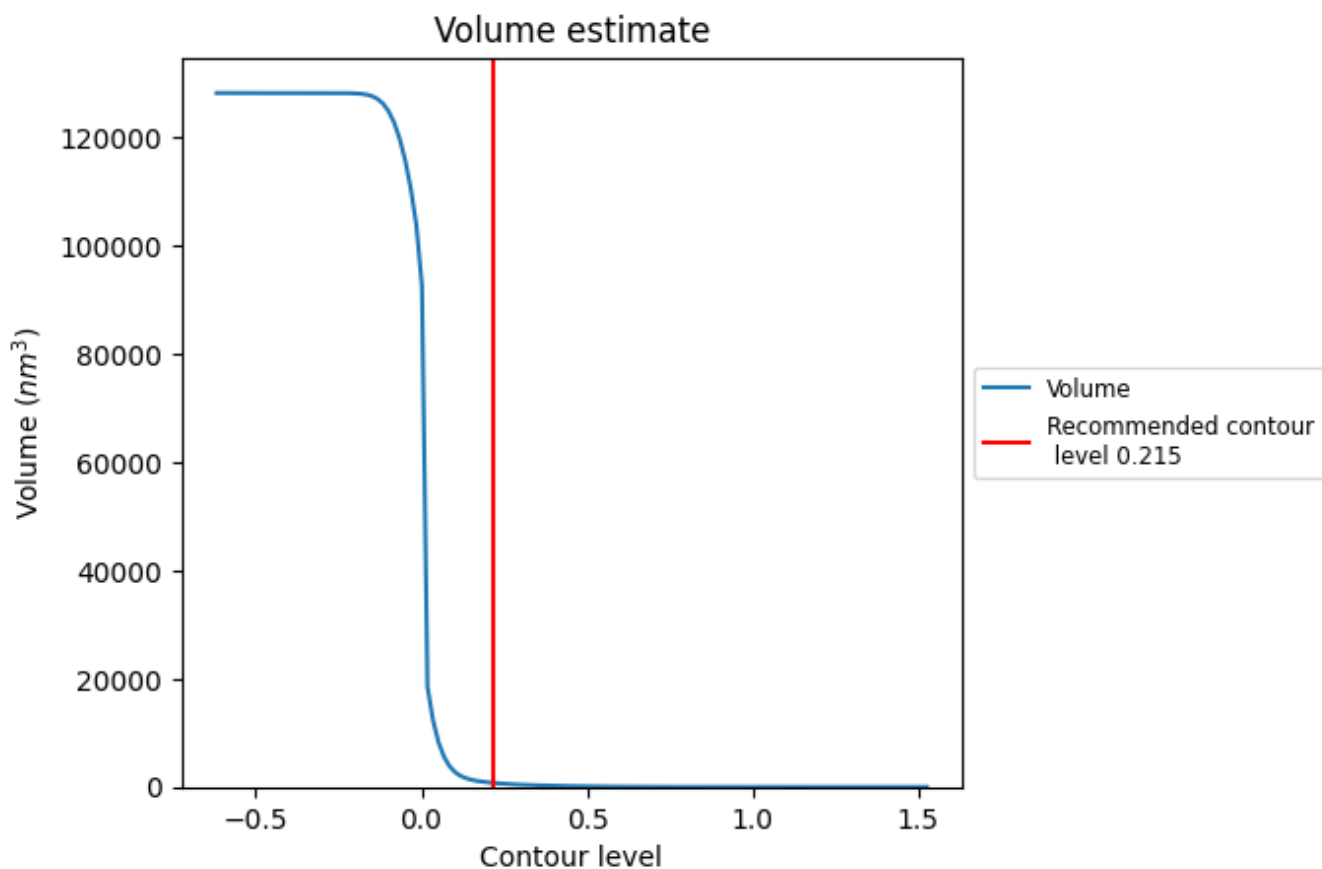
This section contains the results of statistical analysis of the map.

### 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](#)

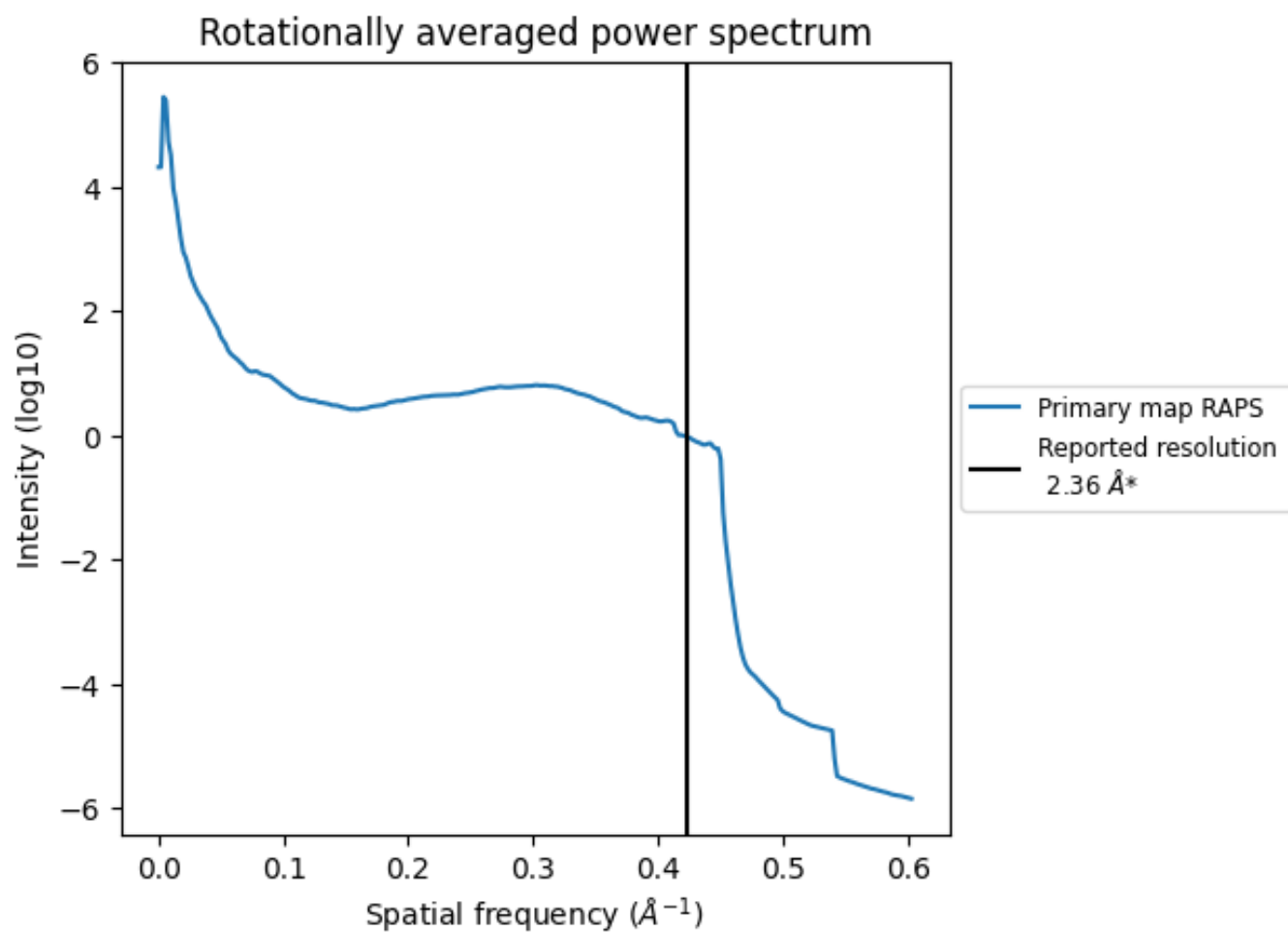


The volume at the recommended contour level is 756  $\text{nm}^3$ ; this corresponds to an approximate mass of 683 kDa.

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  $0.424 \text{\AA}^{-1}$

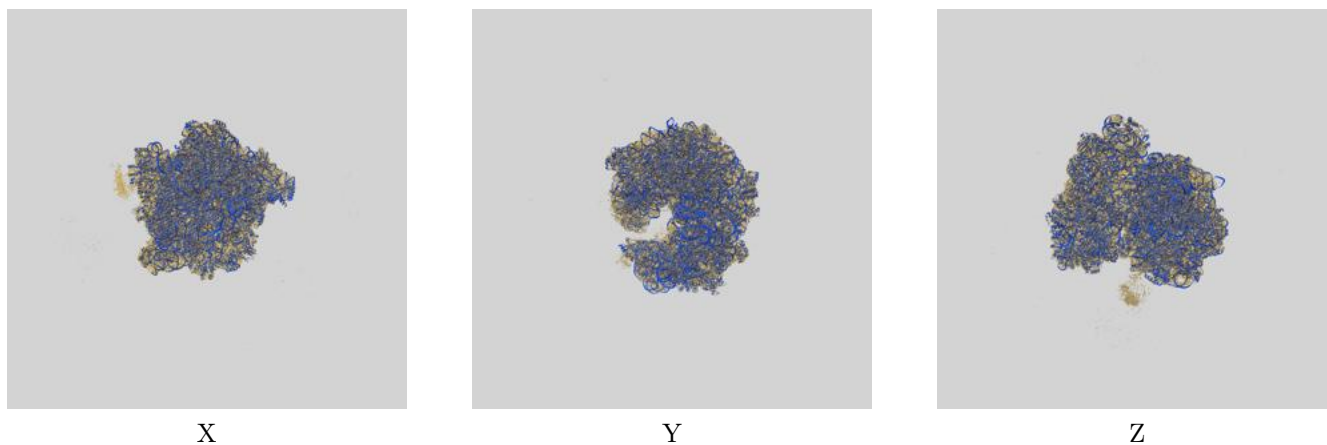
## 8 Fourier-Shell correlation

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

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

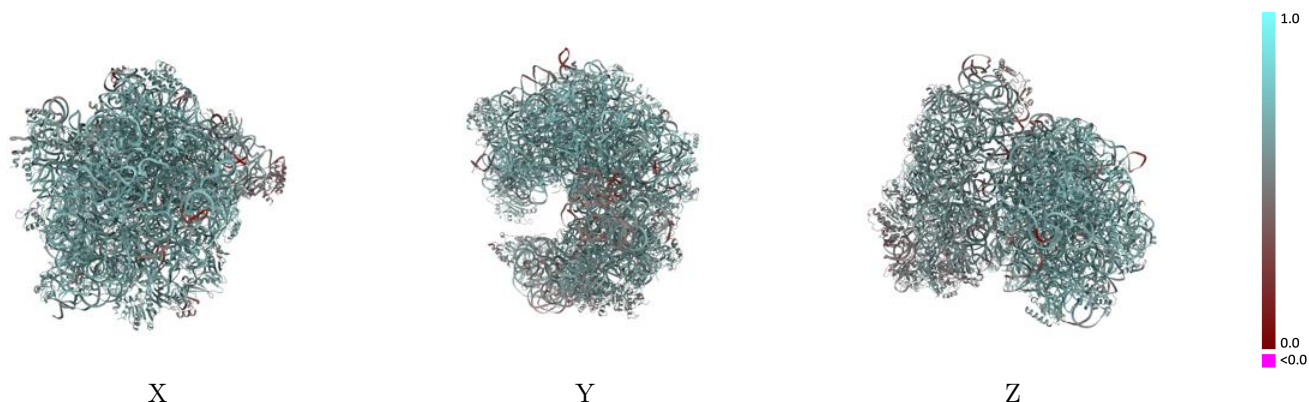
This section contains information regarding the fit between EMDB map EMD-47628 and PDB model 9E71. Per-residue inclusion information can be found in section 3 on page 23.

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



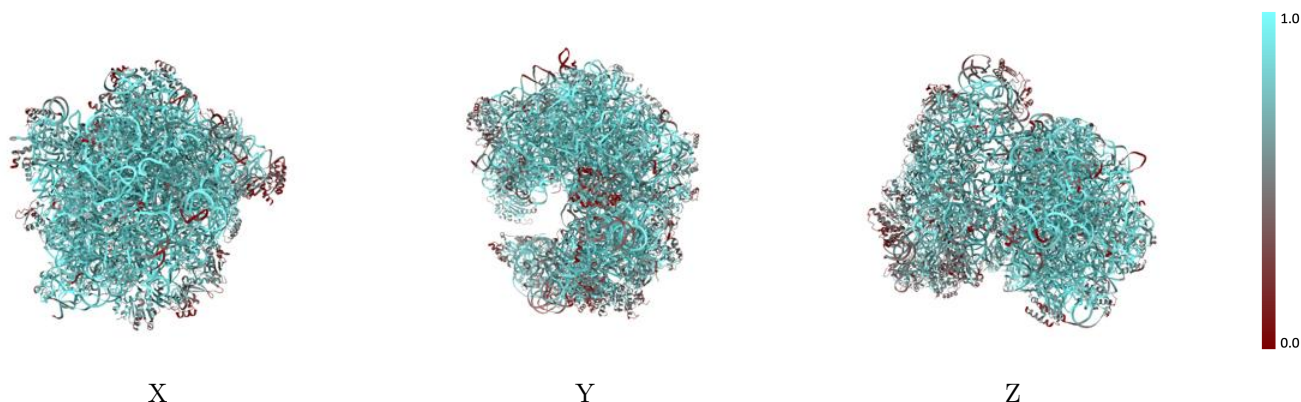
The images above show the 3D surface view of the map at the recommended contour level 0.215 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



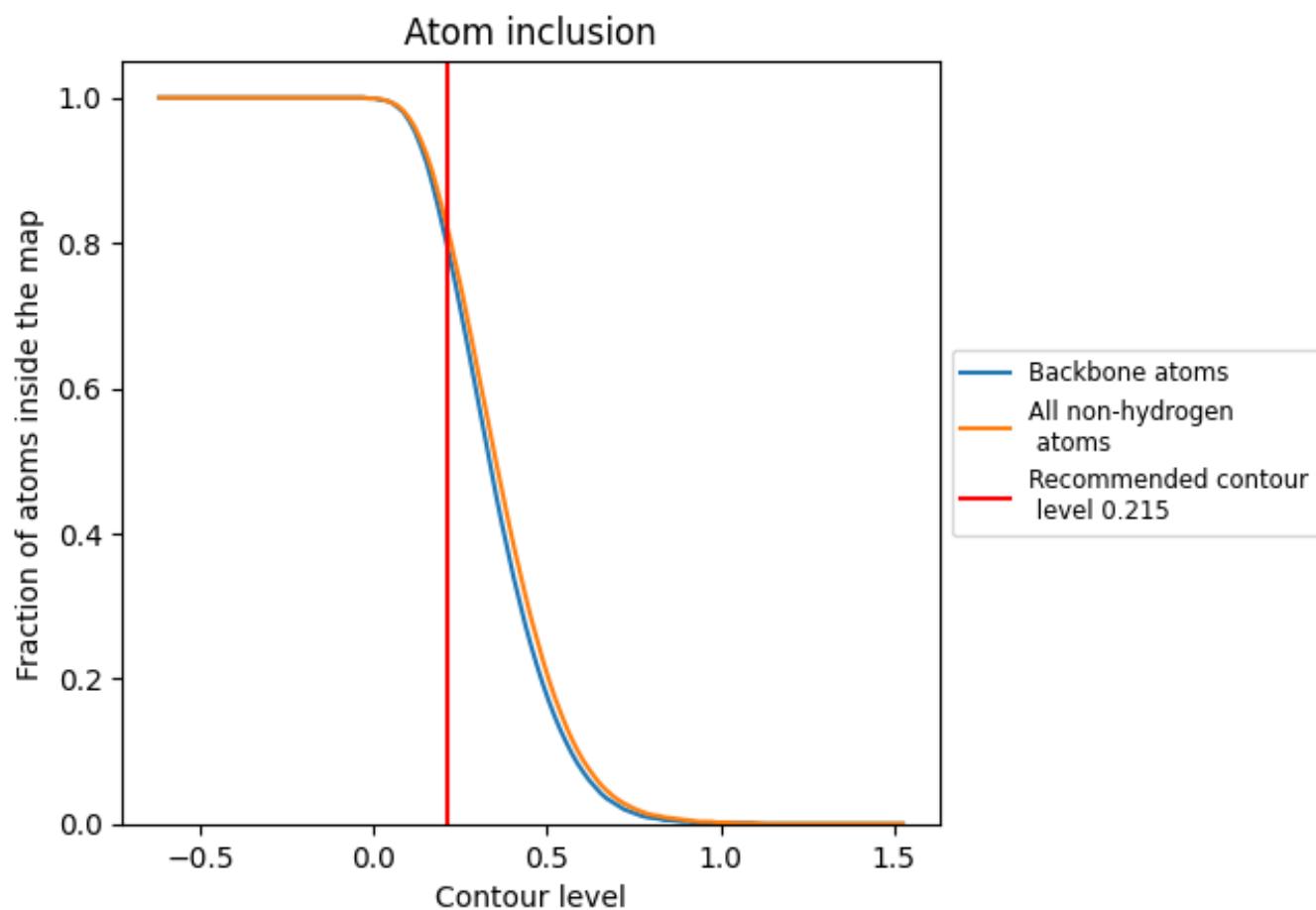
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.215).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 79% of all backbone atoms, 82% 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 (0.215) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8160	 0.6140
1	 0.9300	 0.6510
2	 0.9230	 0.6430
4	 0.8380	 0.5700
AA	 0.8830	 0.6710
AB	 0.8490	 0.6750
AC	 0.8070	 0.6490
AD	 0.7750	 0.6090
AE	 0.5900	 0.5970
AF	 0.5750	 0.5870
AG	 0.8080	 0.6520
AH	 0.8180	 0.6540
AI	 0.8270	 0.6530
AJ	 0.5520	 0.5570
AK	 0.5190	 0.5690
AL	 0.7420	 0.6260
AM	 0.8600	 0.6640
AN	 0.7920	 0.6340
AO	 0.8770	 0.6530
AP	 0.8330	 0.6490
AQ	 0.8250	 0.6440
AR	 0.6960	 0.6010
AS	 0.9430	 0.6800
AT	 0.8680	 0.6700
AU	 0.8050	 0.6680
AV	 0.7400	 0.6280
AW	 0.8320	 0.6530
AX	 0.6420	 0.6150
AY	 0.8380	 0.6470
AZ	 0.6670	 0.5790
Aa	 0.8080	 0.6560
Ab	 0.8120	 0.6530
Ac	 0.9160	 0.6590
Ad	 0.9830	 0.7140
Ae	 0.7110	 0.6450



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Chain	Atom inclusion	Q-score
Af	 0.9470	 0.6810
Ag	 0.6910	 0.6150
Ah	 0.9020	 0.6710
Ai	 0.7920	 0.6270
Aj	 0.6470	 0.6020
Ak	 0.6880	 0.6160
BA	 0.5200	 0.5220
BB	 0.4950	 0.5050
BC	 0.1640	 0.3990
BD	 0.7110	 0.5830
BE	 0.6780	 0.5840
BF	 0.6980	 0.5740
BG	 0.3720	 0.4690
BH	 0.6510	 0.5460
BI	 0.7930	 0.5960
BJ	 0.7190	 0.5880
BK	 0.6360	 0.5360
BL	 0.1690	 0.4480
BM	 0.6630	 0.5330
BN	 0.7040	 0.5810
BO	 0.5280	 0.5410
BP	 0.1730	 0.4250
BQ	 0.6570	 0.5710
BR	 0.6460	 0.5780
BS	 0.2220	 0.4030
BT	 0.5290	 0.5350
BU	 0.6990	 0.5720
BV	 0.4610	 0.5190
BW	 0.5220	 0.5330
BX	 0.2220	 0.4380
BY	 0.6210	 0.5710
BZ	 0.5230	 0.5050
Ba	 0.5900	 0.5470
Bb	 0.2760	 0.4360
Bc	 0.6180	 0.5340