



## wwPDB EM Validation Summary Report ⓘ

Mar 24, 2025 – 02:30 PM EDT

PDB ID : 9NJV  
EMDB ID : EMD-40939  
Title : E. coli 70S initiation complex (bL33 absent)  
Authors : Singh, S.; Hunt, J.F.  
Deposited on : 2025-02-28  
Resolution : 3.10 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.dev117  
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) : 2.41.4

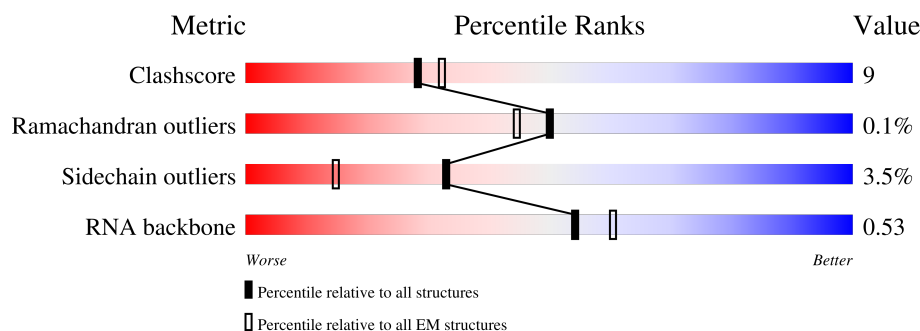
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.10 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  $\geq 3$ , 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	13	142	<div> <div>6%</div> <div>82%</div> <div>17%</div> <div>.</div> </div>
2	14	122	<div> <div>10%</div> <div>80%</div> <div>20%</div> </div>
3	15	144	<div> <div>6%</div> <div>78%</div> <div>22%</div> </div>
4	16	136	<div> <div>12%</div> <div>78%</div> <div>21%</div> <div>.</div> </div>
5	17	120	<div> <div>72%</div> <div>27%</div> <div>.</div> </div>
6	18	116	<div> <div>25%</div> <div>74%</div> <div>26%</div> </div>
7	19	114	<div> <div>14%</div> <div>77%</div> <div>22%</div> <div>.</div> </div>

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Mol	Chain	Length	Quality of chain
8	2	271	
9	20	117	
10	21	103	
11	22	110	
12	23	93	
13	24	102	
14	25	94	
15	27	76	
16	28	77	
17	29	63	
18	3	209	
19	30	58	
20	31	66	
21	32	56	
22	34	46	
23	35	64	
24	36	38	
25	4	201	
26	5	177	
27	6	176	
28	9	149	
29	M	9	
30	R1	2903	
31	R2	119	
32	R3	1531	

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Mol	Chain	Length	Quality of chain
33	sb	218	
34	sc	206	
35	sd	205	
36	se	157	
37	sf	100	
38	sg	151	
39	sh	129	
40	si	127	
41	sj	98	
42	sk	116	
43	sl	123	
44	sm	114	
45	sn	100	
46	so	88	
47	sp	82	
48	sq	80	
49	sr	65	
50	ss	79	
51	st	85	
52	su	65	
53	T	77	

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
53	H2U	T	20	X	-	-	-
53	4OC	T	32	X	-	-	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
53	MUM	T	54	X	-	-	-
53	4SU	T	8	X	-	-	-

## 2 Entry composition

There are 55 unique types of molecules in this entry. The entry contains 143736 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 Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	13	142	Total	C	N	O	S	0	0
			1129	714	212	199	4		

- Molecule 2 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	14	122	Total	C	N	O	S	0	0
			938	587	180	165	6		

- Molecule 3 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	15	144	Total	C	N	O	S	0	0
			1053	654	207	190	2		

- Molecule 4 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	16	136	Total	C	N	O	S	0	0
			1074	686	205	177	6		

- Molecule 5 is a protein called Large ribosomal subunit protein bL17.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	17	120	Total	C	N	O	S	0	0
			960	593	196	166	5		

- Molecule 6 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	18	116	Total	C	N	O	0	0
			892	552	178	162		

- Molecule 7 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	19	114	Total	C	N	O	S	0	0
			917	574	179	163	1		

- Molecule 8 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	2	271	Total	C	N	O	S	0	0
			2082	1288	423	364	7		

- Molecule 9 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	20	117	Total	C	N	O	S	0	0
			947	604	192	151			

- Molecule 10 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	21	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 11 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	22	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 12 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	23	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 13 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	24	102	Total	C	N	O	S	0	0
			779	492	146	141			

- Molecule 14 is a protein called Large ribosomal subunit protein bL25.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	25	94	Total	C	N	O	S	0	0
			753	479	137	134	3		

- Molecule 15 is a protein called Large ribosomal subunit protein bL27.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	27	76	Total	C	N	O	S	0	0
			582	360	117	104	1		

- Molecule 16 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	28	77	Total	C	N	O	S	0	0
			625	388	129	106	2		

- Molecule 17 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	29	63	Total	C	N	O	S	0	0
			509	313	99	95	2		

- Molecule 18 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	3	209	Total	C	N	O	S	0	0
			1565	979	288	294	4		

- Molecule 19 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	30	58	Total	C	N	O	S	0	0
			449	281	87	79	2		

- Molecule 20 is a protein called Large ribosomal subunit protein bL31.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	31	66	Total	C	N	O	S	0	0
			522	323	99	94	6		

- Molecule 21 is a protein called 50S ribosomal protein L32.



Mol	Chain	Residues	Atoms					AltConf	Trace
21	32	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 22 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	34	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 23 is a protein called Large ribosomal subunit protein bL35.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	35	64	Total	C	N	O	S	0	0
			504	323	105	74	2		

- Molecule 24 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	36	38	Total	C	N	O	S	0	0
			302	185	65	48	4		

- Molecule 25 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	4	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 26 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	5	177	Total	C	N	O	S	0	0
			1410	899	249	256	6		

- Molecule 27 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	6	176	Total	C	N	O	S	0	0
			1323	832	243	246	2		

- Molecule 28 is a protein called Large ribosomal subunit protein bL9.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	9	149	Total	C	N	O	S	0	0
			1111	699	197	214	1		

- Molecule 29 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	M	9	Total	C	N	O	P	0	0
			195	88	40	58	9		

- Molecule 30 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	R1	2903	Total	C	N	O	P	0	0
			62318	27801	11467	20148	2902		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R1	1847	G	A	conflict	GB 2019144442

- Molecule 31 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	R2	119	Total	C	N	O	P	0	0
			2546	1135	466	827	118		

- Molecule 32 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	R3	1531	Total	C	N	O	P	0	0
			32850	14652	6028	10640	1530		

- Molecule 33 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	sb	218	Total	C	N	O	S	0	0
			1704	1081	305	311	7		

- Molecule 34 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	sc	206	Total	C	N	O	S	0	0
			1624	1028	305	288	3		

- Molecule 35 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	sd	205	Total	C	N	O	S	0	0
			1643	1026	315	298	4		

- Molecule 36 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	se	157	Total	C	N	O	S	0	0
			1156	719	218	213	6		

- Molecule 37 is a protein called 30S ribosomal protein S6, non-modified isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	sf	100	Total	C	N	O	S	0	0
			817	515	148	148	6		

- Molecule 38 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	sg	151	Total	C	N	O	S	0	0
			1181	735	227	215	4		

- Molecule 39 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	sh	129	Total	C	N	O	S	0	0
			979	616	173	184	6		

- Molecule 40 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	si	127	Total	C	N	O	S	0	0
			1022	634	206	179	3		

- Molecule 41 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	sj	98	Total	C	N	O	S	0	0
			786	493	150	142	1		

- Molecule 42 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	sk	116	Total	C	N	O	S	0	0
			869	535	173	158	3		

- Molecule 43 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	sl	123	Total	C	N	O	S	0	0
			955	590	196	165	4		

- Molecule 44 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	sm	114	Total	C	N	O	S	0	0
			883	546	178	156	3		

- Molecule 45 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	sn	100	Total	C	N	O	S	0	0
			805	499	164	139	3		

- Molecule 46 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	so	88	Total	C	N	O	S	0	0
			714	439	144	130	1		

- Molecule 47 is a protein called Small ribosomal subunit protein bS16.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	sp	82	Total	C	N	O	S	0	0
			649	406	128	114	1		

- Molecule 48 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	sq	80	Total	C	N	O	S	0	0
			648	411	121	113	3		

- Molecule 49 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	sr	65	Total	C	N	O	S	0	0
			535	339	100	95	1		

- Molecule 50 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	ss	79	Total	C	N	O	S	0	0
			637	408	120	107	2		

- Molecule 51 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	st	85	Total	C	N	O	S	0	0
			665	411	137	114	3		

- Molecule 52 is a protein called Small ribosomal subunit protein bS21.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	su	65	Total	C	N	O	S	0	0
			544	335	117	91	1		

- Molecule 53 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
53	T	77	Total	C	N	O	P	S	0	0
			1639	734	294	534	76	1		

- Molecule 54 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
54	R1	111	Total	Mg	0
			111	111	
54	R3	41	Total	Mg	0
			41	41	

- Molecule 55 is N-FORMYLMETHIONINE (three-letter code: FME) (formula: C<sub>6</sub>H<sub>11</sub>NO<sub>3</sub>S).

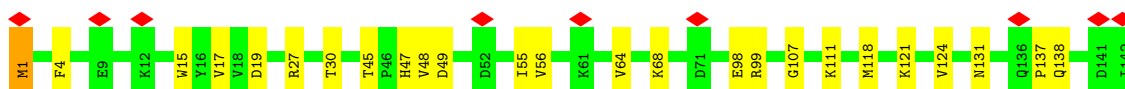
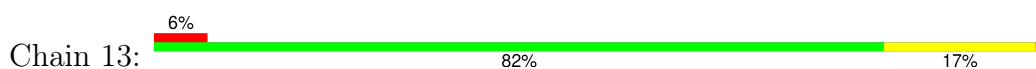


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
55	T	1	10	6	1	2	1	0

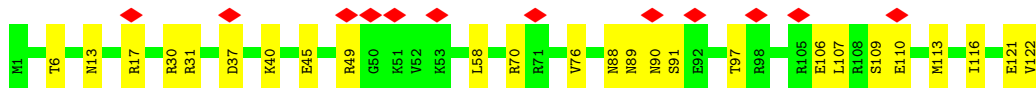
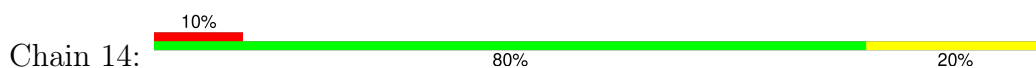
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

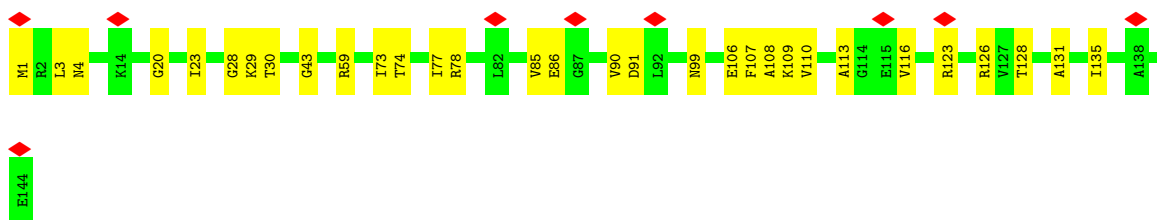
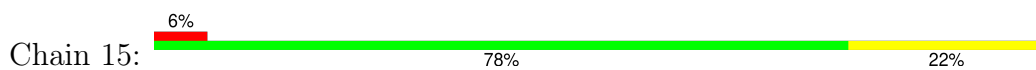
- Molecule 1: Large ribosomal subunit protein uL13



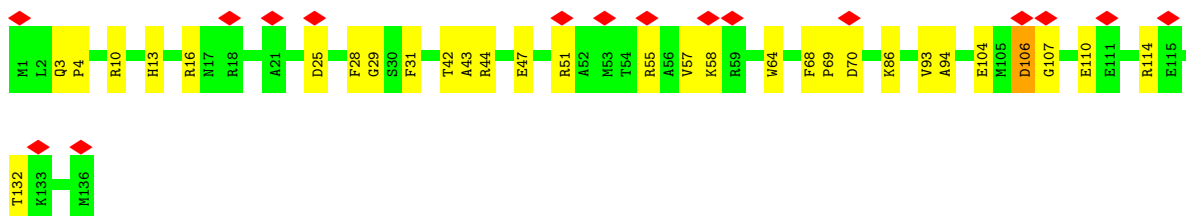
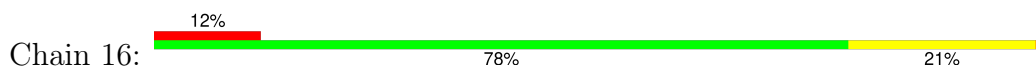
- Molecule 2: 50S ribosomal protein L14



- Molecule 3: Large ribosomal subunit protein uL15

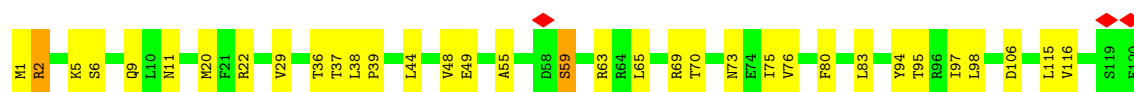


- Molecule 4: 50S ribosomal protein L16




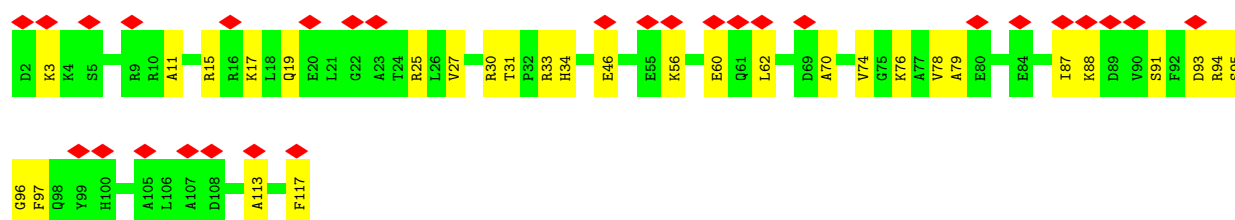
- Molecule 5: Large ribosomal subunit protein bL17

Chain 17: 




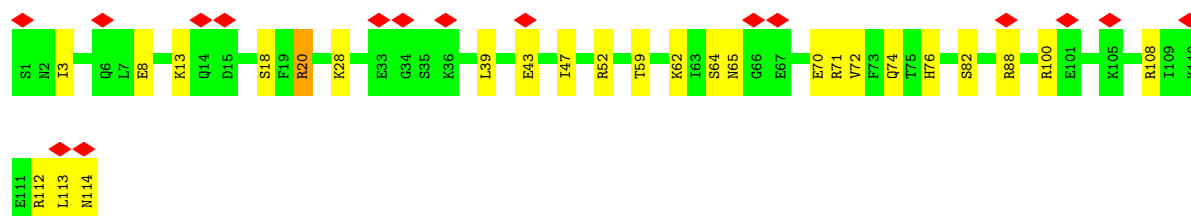
- Molecule 6: Large ribosomal subunit protein uL18

Chain 18: 




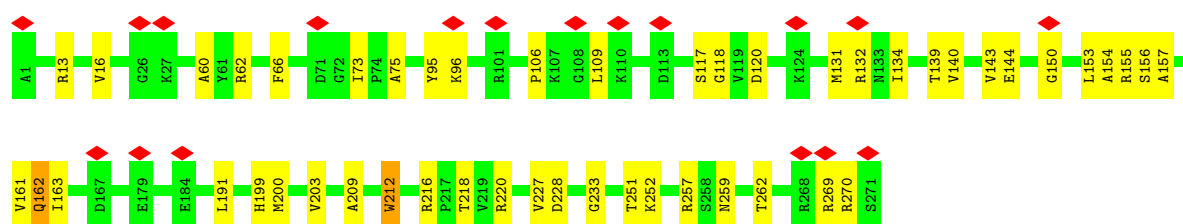
- Molecule 7: 50S ribosomal protein L19

Chain 19: 



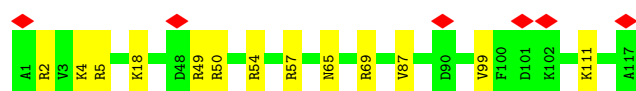
- Molecule 8: 50S ribosomal protein L2

Chain 2: 



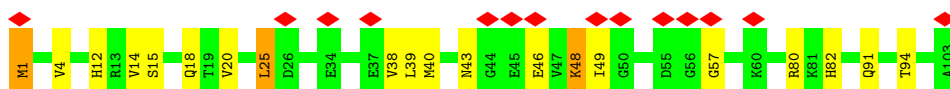
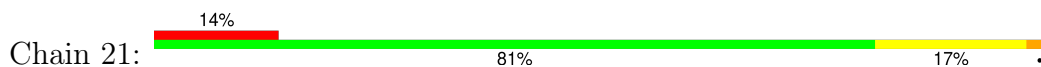
- Molecule 9: Large ribosomal subunit protein bL20

Chain 20: 

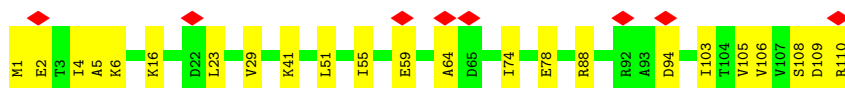
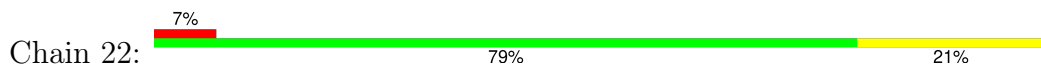


- Molecule 10: Large ribosomal subunit protein bL21

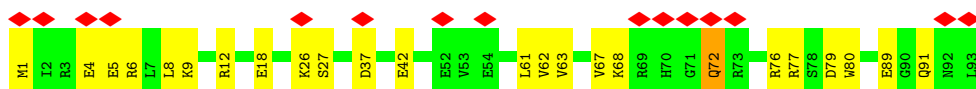




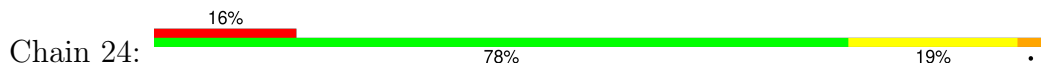
- Molecule 11: Large ribosomal subunit protein uL22



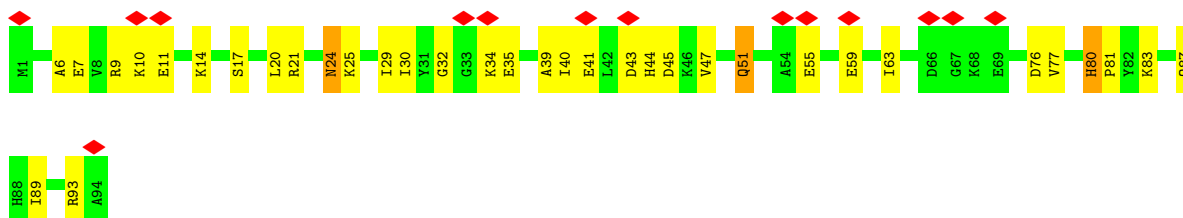
- Molecule 12: Large ribosomal subunit protein uL23



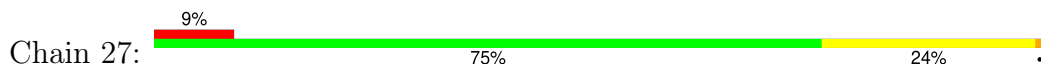
- Molecule 13: Large ribosomal subunit protein uL24



- Molecule 14: Large ribosomal subunit protein bL25

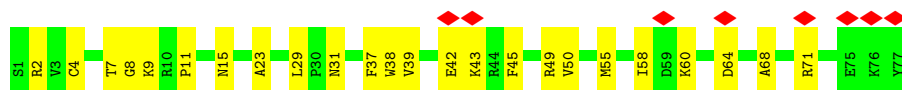


- Molecule 15: Large ribosomal subunit protein bL27

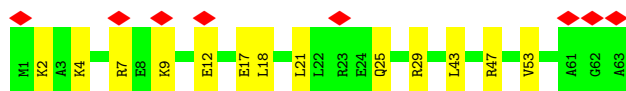
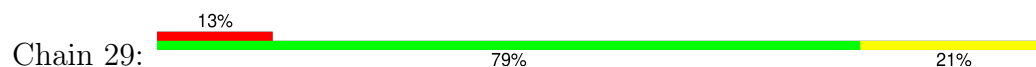


- Molecule 16: 50S ribosomal protein L28

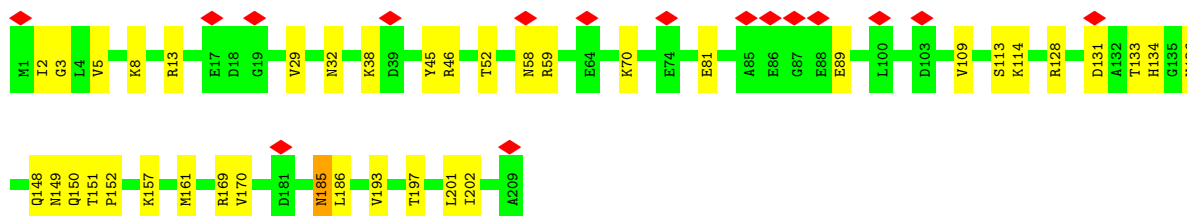
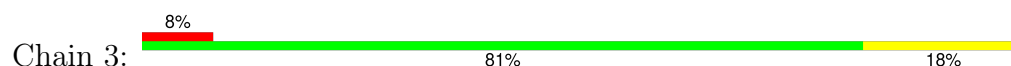




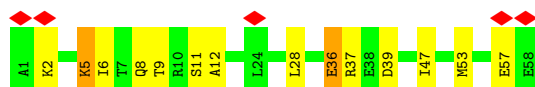
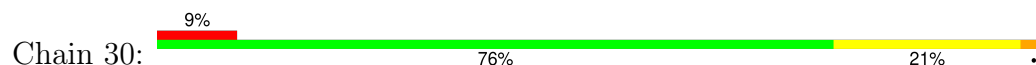
- Molecule 17: Large ribosomal subunit protein uL29



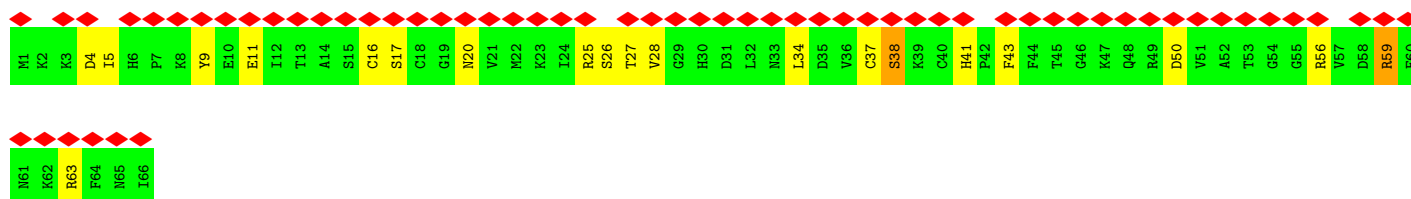
- Molecule 18: 50S ribosomal protein L3



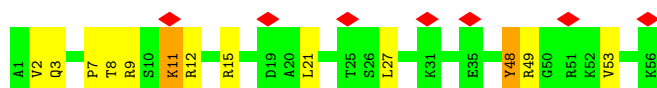
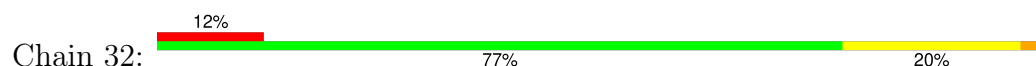
- Molecule 19: 50S ribosomal protein L30



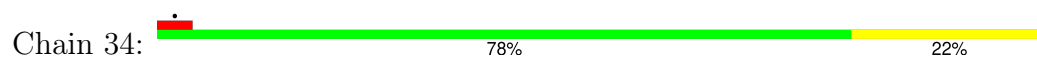
- Molecule 20: Large ribosomal subunit protein bL31



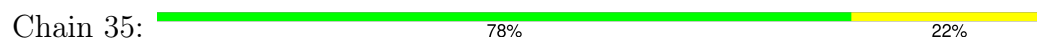
- Molecule 21: 50S ribosomal protein L32



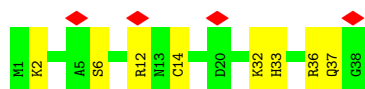
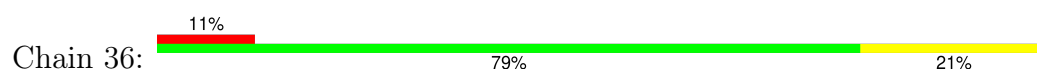
- Molecule 22: 50S ribosomal protein L34



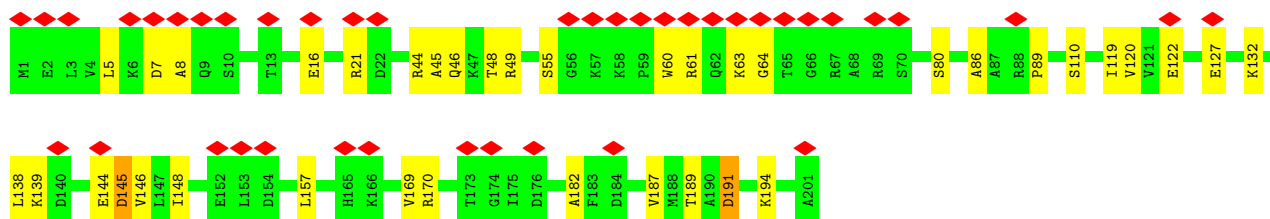
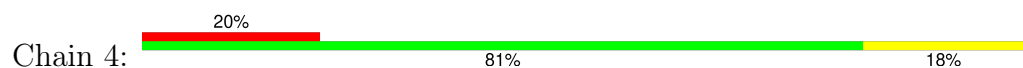
- Molecule 23: Large ribosomal subunit protein bL35



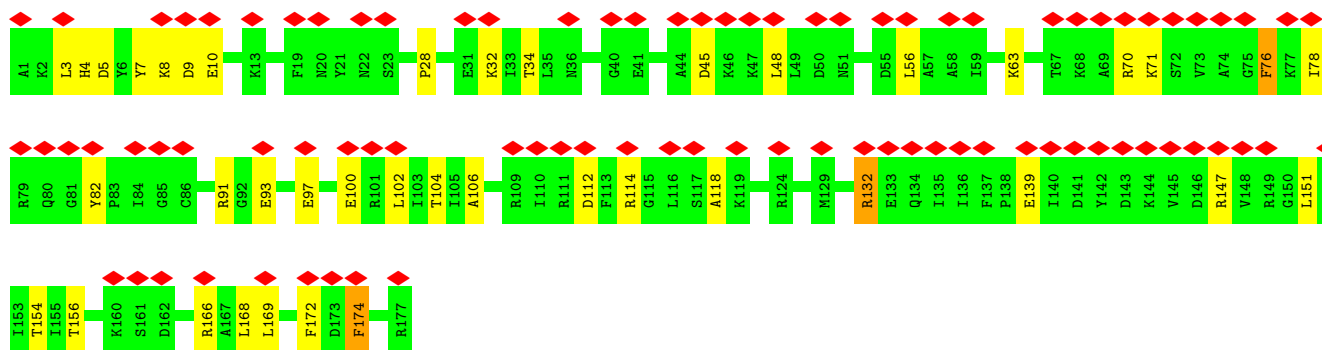
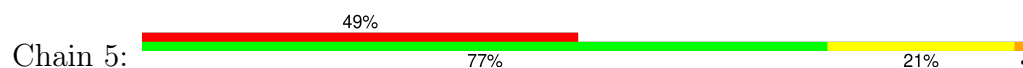
- Molecule 24: 50S ribosomal protein L36



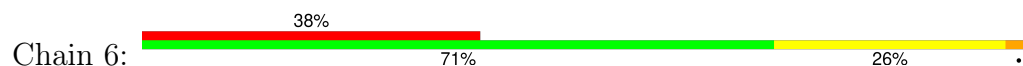
- Molecule 25: Large ribosomal subunit protein uL4

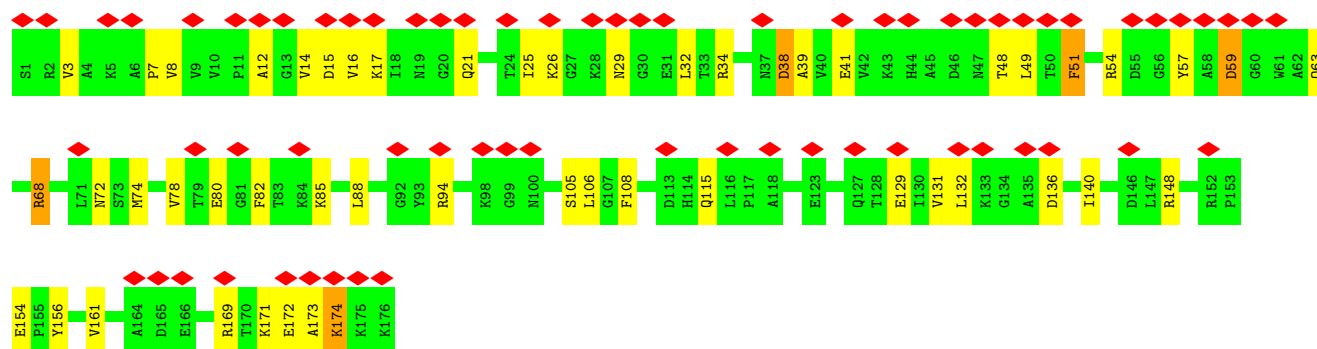


- Molecule 26: 50S ribosomal protein L5

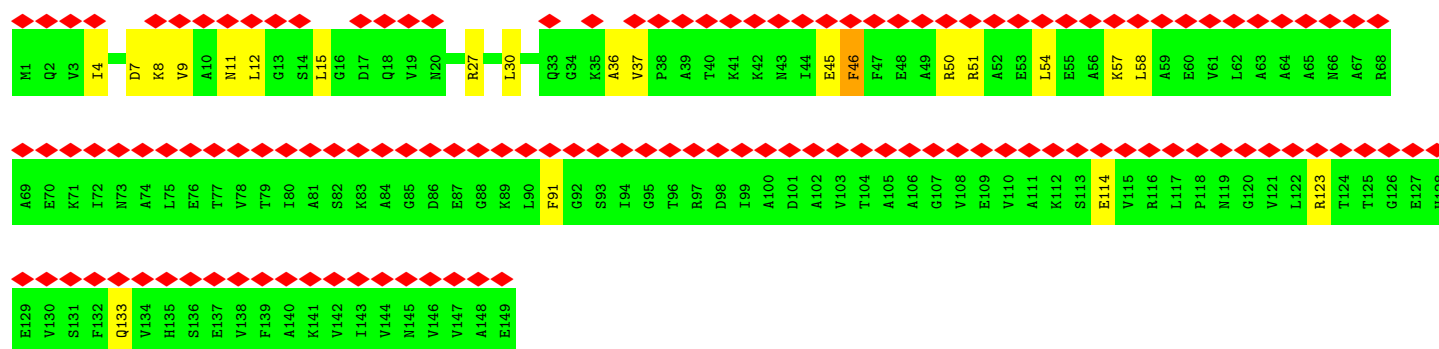
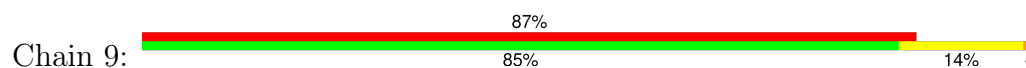


- Molecule 27: Large ribosomal subunit protein uL6

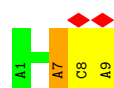




- Molecule 28: Large ribosomal subunit protein bL9

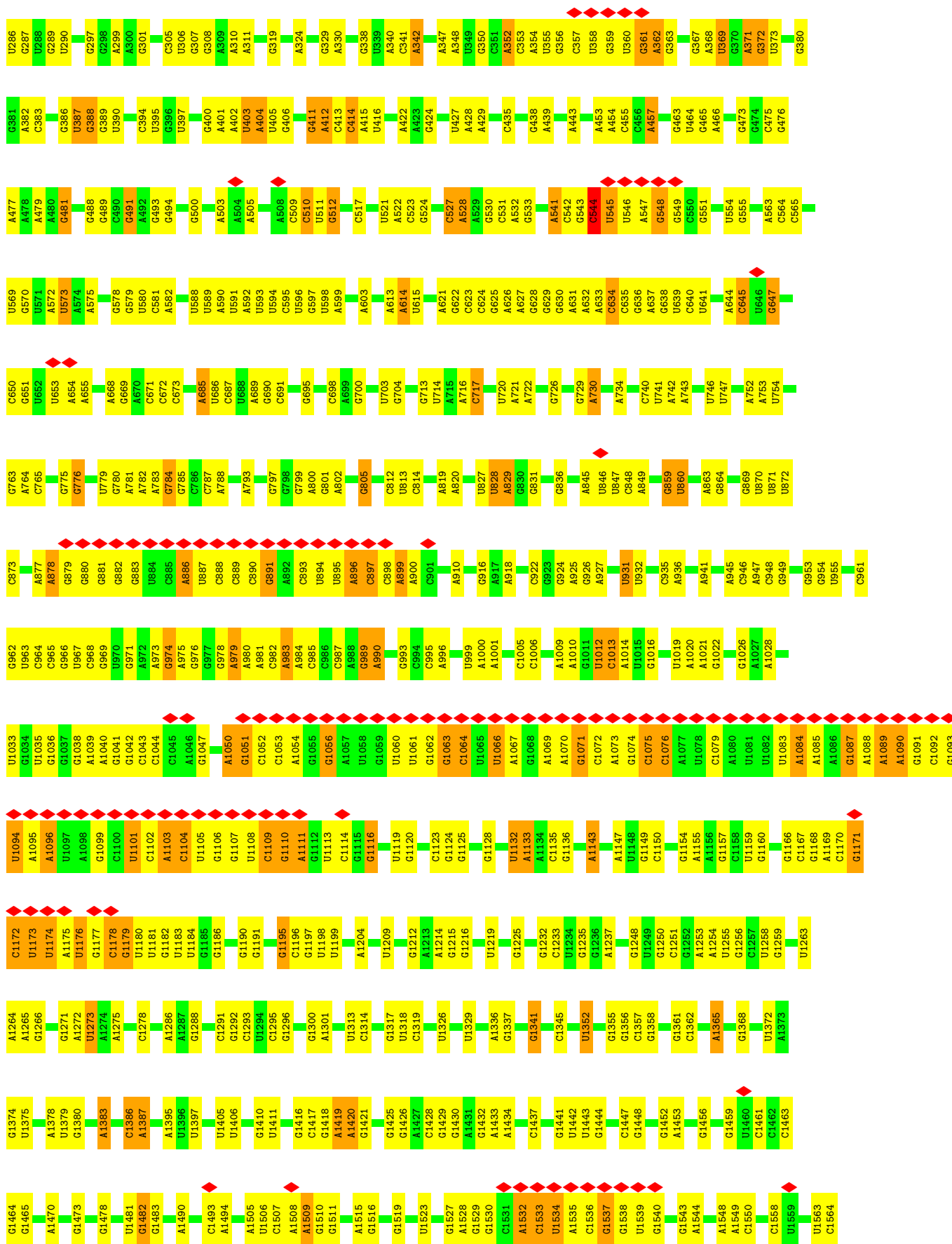


- Molecule 29: mRNA

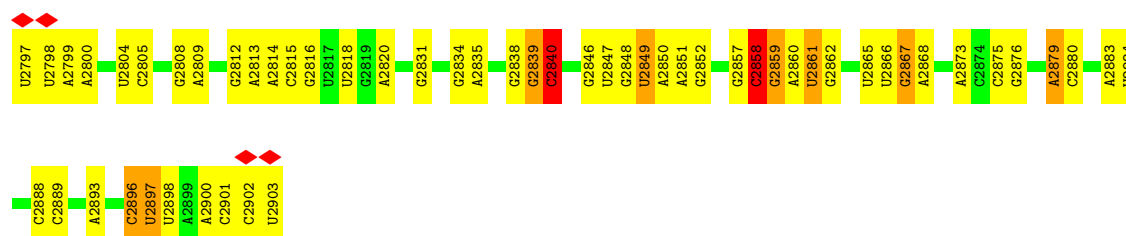


- Molecule 30: 23S ribosomal RNA

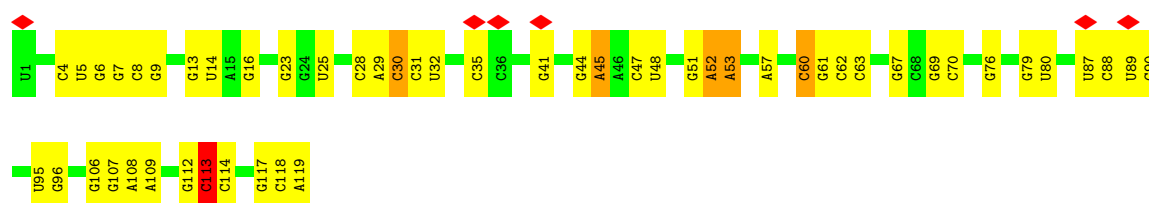




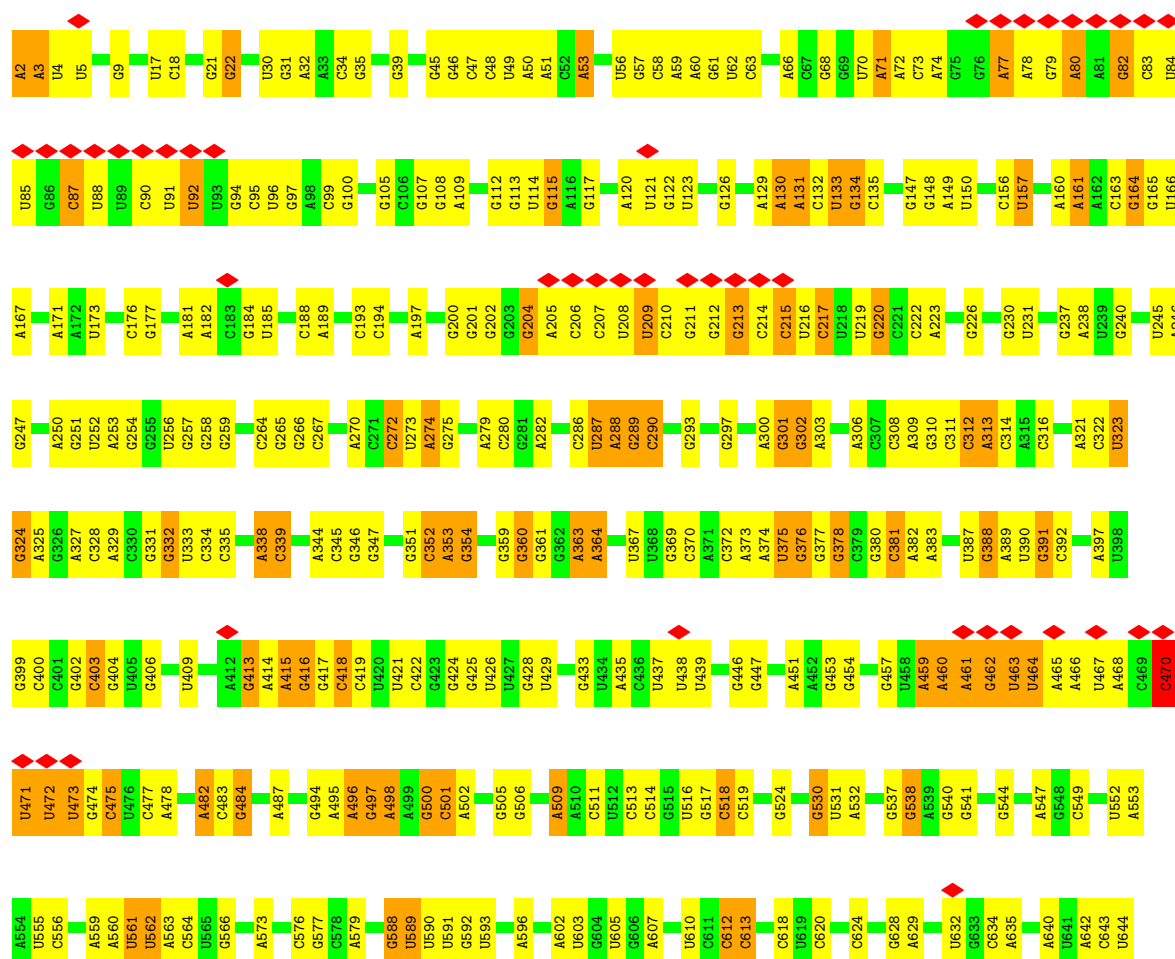
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U2596	G2597	A2598	G2601	A2602	G2603	U2609	G2610	U2613	G2619	G2626	G2627	G2628	U2629	G2630	G2636	U2637	G2638	G2645	G2646	U2647	G2648	U2649	G2650	G2651	G2652	U2653	A2654	A2660	G2661	A2662	G2663	G2664	A2665	G2666	G2667	G2668	G2669	A2670	G2671	G2676	A2679	A2682	G2683	U2684	G2685	G2686	U2687	G2688										
G2515	A2516	G2517	A2518	U2519	G2520	G2521	U2522	A2530	G2536	U2537	G2538	G2545	U2546	A2547	U2548	G2549	G2550	G2553	U2554	U2555	G2556	G2557	G2558	G2559	A2560	U2561	U2562	U2563	A2564	A2565	A2566	G2567	G2570	U2571	A2572	G2573	G2574	G2575	G2576	G2579	U2580	G2581	G2582	G2583	U2584	U2585	U2586	G2589	A2590	G2591	G2592							
U2409	G2412	G2413	G2414	G2415	U2423	G2427	G2428	G2429	A2430	A2434	A2435	G2436	A2439	G2440	G2441	G2442	G2443	G2444	A2448	G2455	A2461	G2462	A2469	A2476	G2481	G2487	G2488	U2491	G2494	G2495	G2496	A2497	U2500	G2501	G2502	G2503	G2504	G2505	U2506	G2507	G2508	A2513	U2514															
U2321	A2322	U2323	G2324	G2325	G2326	A2327	A2328	U2329	G2330	G2331	G2332	A2333	U2334	A2335	G2339	A2340	G2341	G2342	G2345	A2346	G2347	U2348	G2349	G2350	U2356	G2359	G2360	G2361	A2369	G2370	G2371	U2372	G2373	G2374	G2375	A2376	A2377	G2378	G2379	C2380	A2381	G2382	G2383	U2384	G2385	A2386	U2387	U2402	C2403	A2406								
U2229	G2230	U2231	G2232	G2233	G2234	G2235	U2236	G2237	G2238	G2239	U2240	A2241	G2242	U2243	U2244	U2245	G2246	A2247	G2248	U2249	G2250	G2258	A2266	A2278	G2283	A2287	A2288	G2289	G2290	U2291	A2297	G2298	U2299	U2302	G2303	G2304	U2305	G2306	G2307	U2308	A2311	U2312	G2315	G2316	A2317	G2318	G2319	U2320										
C2153	A2154	U2155	G2156	G2157	A2158	G2159	G2160	G2161	G2162	A2163	G2164	G2165	U2166	U2167	G2168	A2169	A2170	A2171	U2172	A2173	G2174	G2175	A2176	G2177	G2178	G2179	U2180	U2181	U2182	A2183	A2184	U2185	G2186	U2187	U2188	U2189	G2190	A2191	U2192	G2193	U2197	A2198	A2199	G2204	G2208	A2211	A2212	U2213	G2214	G2215	G2216	G2217	A2225	G2226				
U2092	G2093	C2096	A2097	U2098	U2099	G2100	A2101	G2102	G2103	G2104	U2105	U2106	G2107	A2108	U2109	G2110	U2111	G2112	U2113	A2114	G2115	G2116	A2117	U2118	A2119	G2120	G2121	U2122	G2123	G2124	G2125	A2126	G2127	G2128	G2129	U2130	U2131	U2132	G2133	A2134	A2135	G2136	U2137	G2138	U2139	G2140	G2141	A2142	G2143	G2144	G2145	G2146	A2147	G2148	U2149	C2150	U2151	G2152
C2008	A2009	G2010	U2011	G2012	A2013	A2014	A2015	U2016	C2021	U2022	G2023	G2024	U2025	U2026	U2027	U2028	G2029	A2030	A2031	G2032	A2033	U2041	A2042	G2043	C2047	G2048	A2051	A2052	C2055	G2056	A2059	A2060	G2061	C2062	G2063	C2064	G2065	U2068	G2069	A2070	A2071	C2072	C2073	U2074	U2075	U2076	A2080	U2081	A2082									
U1880	C1881	U1882	U1883	G1884	A1885	U1886	C1887	A1899	A1900	A1901	G1905	G1906	A1912	A1913	C1914	U1915	A1916	U1917	A1918	A1919	G1922	U1923	A1928	G1929	G1930	U1931	A1936	A1937	A1938	U1943	U1955	G1967	A1970	U1971	G1972	G1983	A1987	G1988	U1991	G1992	U1993	C1994	U1995	G1996	C1997	A1998												
U1779	U1780	U1781	A1784	C1788	A1789	U1796	U1797	U1798	G1799	C1800	A1801	A1802	A1803	A1808	A1809	A1810	U1811	U1812	U1813	C1816	U1820	G1826	U1827	G1828	A1829	C1837	G1838	G1847	A1848	A1858	U1859	G1862	U1863	U1864	U1865	U1866	G1867	U1868	G1869	C1870	G1874	G1875	A1876	A1877	A1878	A1879	U1880	G1881										
G1682	U1683	G1684	C1685	C1686	G1689	C1704	A1705	G1706	G1707	G1708	U1709	A1710	A1711	U1714	G1715	U1716	U1720	G1721	A1722	G1723	G1724	C1725	C1726	C1727	C1728	U1729	A1730	A1735	U1736	U1737	G1738	A1744	A1745	A1746	U1747	G1750	A1754	A1755	G1756	A1757	U1758	U1759	C1760	G1764	G1765	A1766	G1767	A1768	A1769	U1775								
G1565	A1566	A1569	U1570	A1571	U1578	A1579	A1583	U1584	C1585	A1586	G1587	U1588	U1589	A1590	A1591	C1592	U1594	C1595	A1596	A1597	A1598	A1610	U1629	A1630	G1631	A1632	U1636	A1637	C1638	U1647	U1648	G1649	A1654	A1664	A1665	G1666	G1667	A1668	U1669	C1670	G1674	G1675	A1676	A1677	A1678	A1679	U1680	G1681										



• Molecule 31: 5S ribosomal RNA

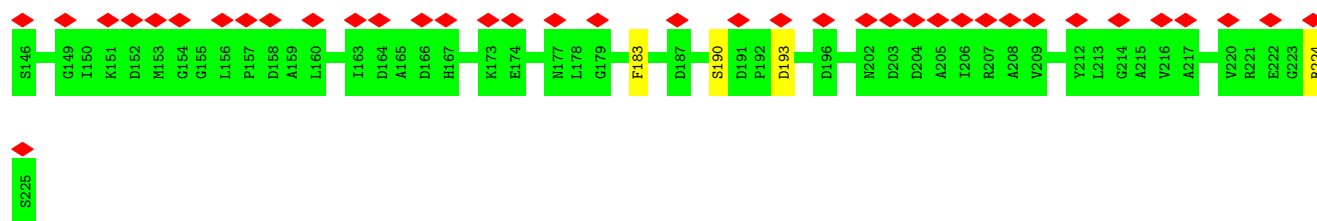


• Molecule 32: 16S ribosomal RNA

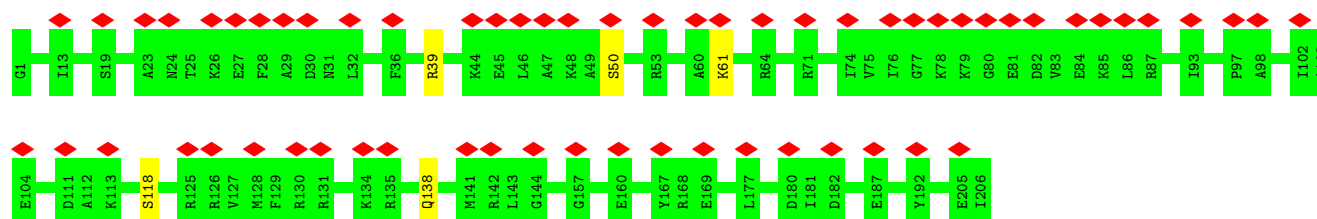




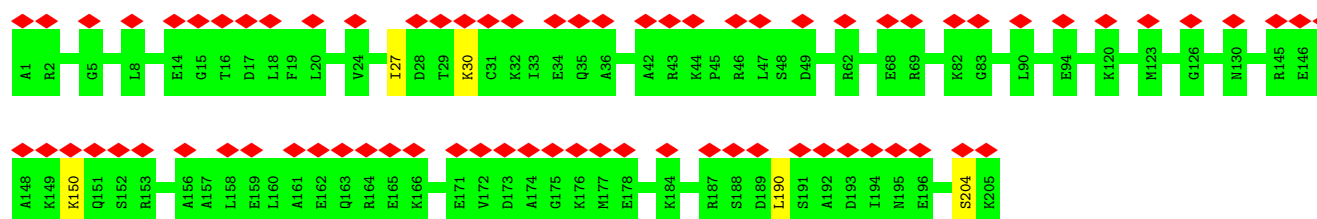




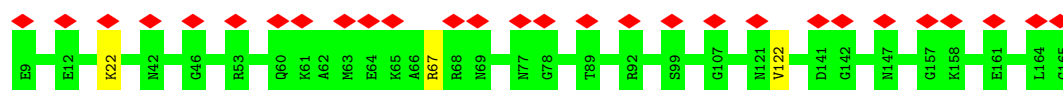
- Molecule 34: Small ribosomal subunit protein uS3



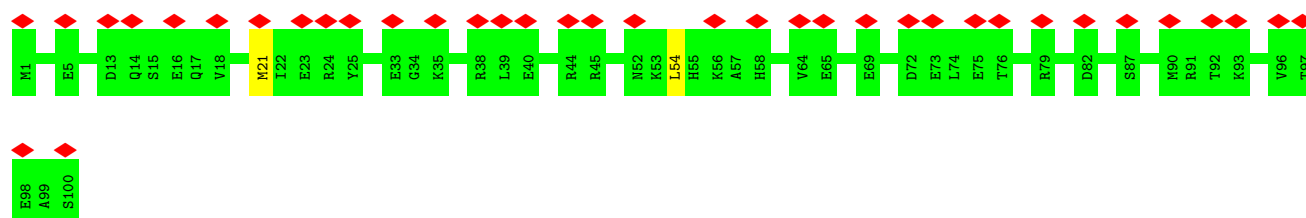
- Molecule 35: 30S ribosomal protein S4



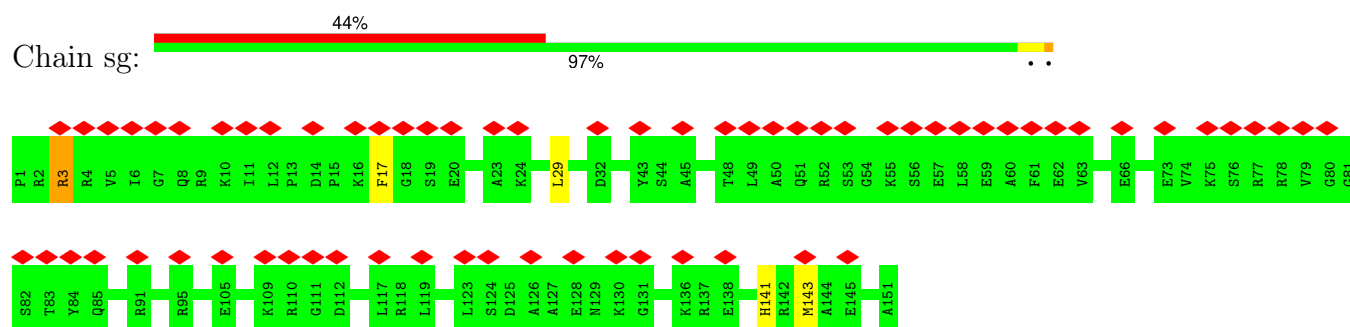
- Molecule 36: Small ribosomal subunit protein uS5



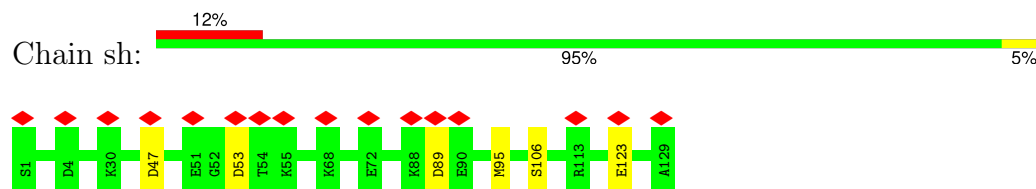
- Molecule 37: 30S ribosomal protein S6, non-modified isoform



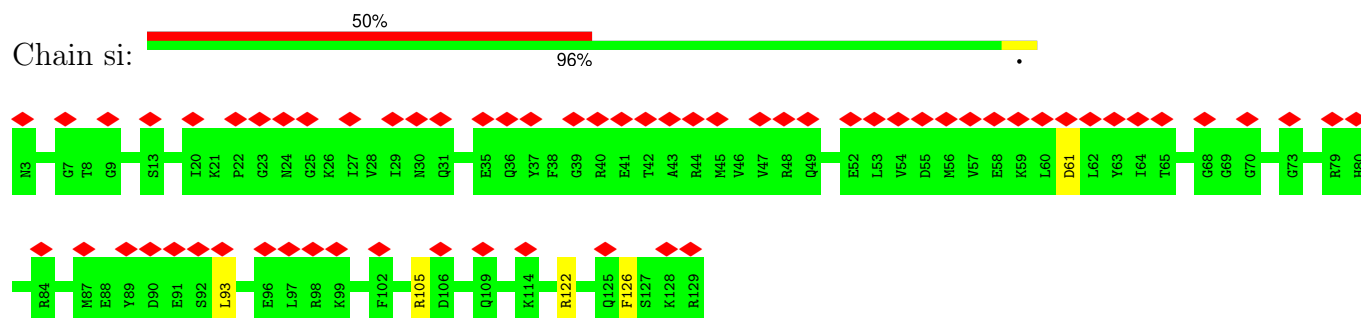
- Molecule 38: 30S ribosomal protein S7



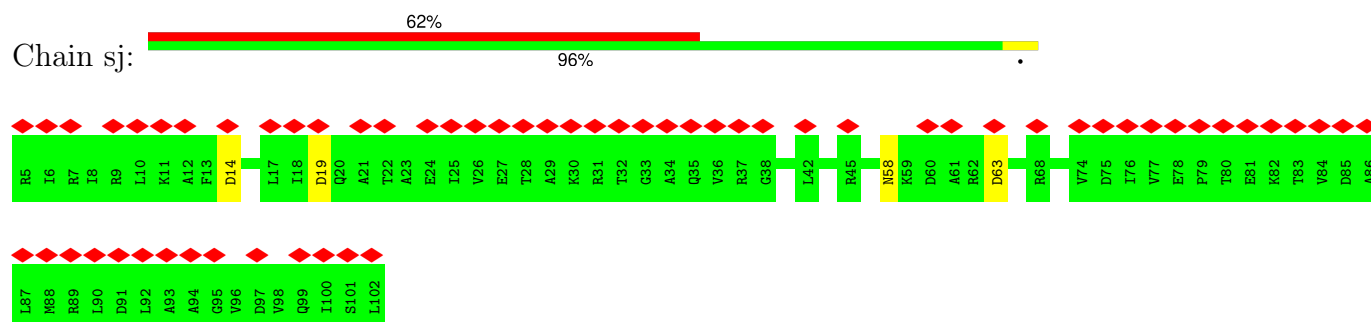
- Molecule 39: 30S ribosomal protein S8



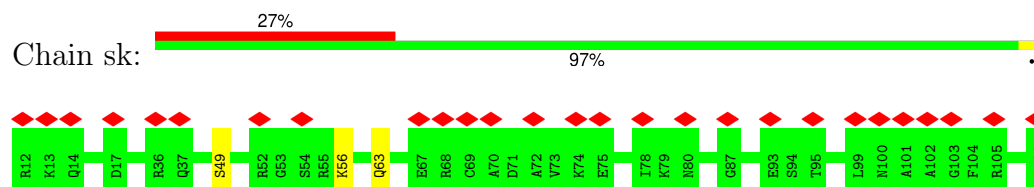
- Molecule 40: Small ribosomal subunit protein uS9



- Molecule 41: 30S ribosomal protein S10

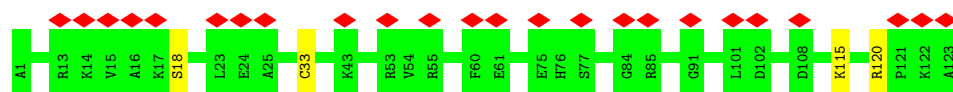


- Molecule 42: Small ribosomal subunit protein uS11

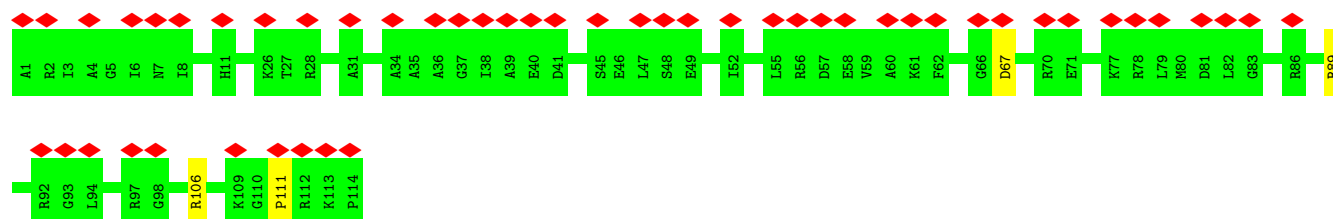


- Molecule 43: Small ribosomal subunit protein uS12

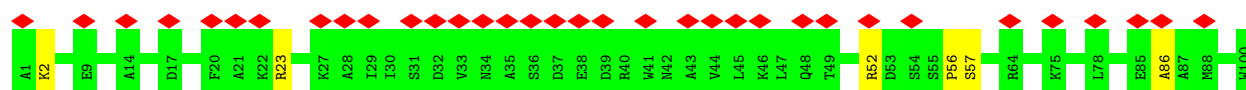




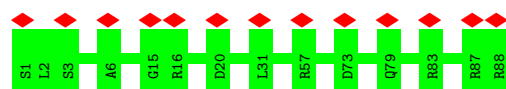
- Molecule 44: 30S ribosomal protein S13



- Molecule 45: Small ribosomal subunit protein uS14



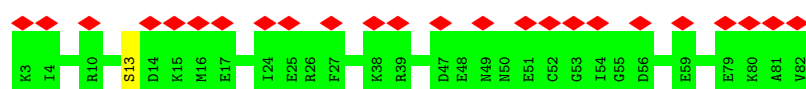
- Molecule 46: Small ribosomal subunit protein uS15



- Molecule 47: Small ribosomal subunit protein bS16

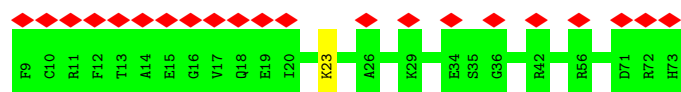


- Molecule 48: Small ribosomal subunit protein uS17

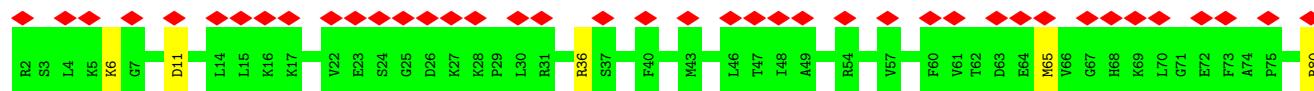


- Molecule 49: 30S ribosomal protein S18

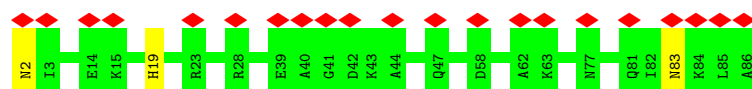




- Molecule 50: 30S ribosomal protein S19



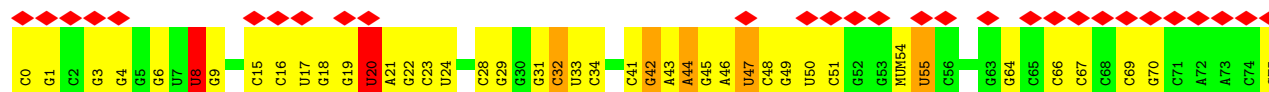
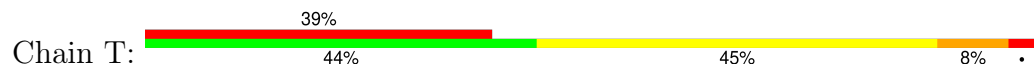
- Molecule 51: 30S ribosomal protein S20



- Molecule 52: Small ribosomal subunit protein bS21



- Molecule 53: tRNA



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	78096	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	64	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	2.651	Depositor
Minimum map value	-1.658	Depositor
Average map value	0.007	Depositor
Map value standard deviation	0.138	Depositor
Recommended contour level	0.55	Depositor
Map size (Å)	380.0, 380.0, 380.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.95, 0.95, 0.95	Depositor

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MUM, 4SU, MG, PSU, H2U, 4OC, FME

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	13	0.28	0/1152	0.54	1/1551 (0.1%)
2	14	0.28	0/947	0.61	0/1268
3	15	0.27	0/1062	0.57	0/1413
4	16	0.28	0/1093	0.59	0/1460
5	17	0.25	0/973	0.58	0/1301
6	18	0.27	0/902	0.57	0/1209
7	19	0.29	0/929	0.57	0/1242
8	2	0.28	0/2121	0.57	0/2852
9	20	0.28	0/960	0.56	0/1278
10	21	0.27	0/829	0.56	0/1107
11	22	0.26	0/864	0.54	0/1156
12	23	0.29	0/744	0.63	0/994
13	24	0.33	0/787	0.64	1/1051 (0.1%)
14	25	0.26	0/766	0.51	0/1025
15	27	0.27	0/589	0.58	0/779
16	28	0.28	0/635	0.61	0/848
17	29	0.25	0/510	0.53	0/677
18	3	0.27	0/1586	0.56	0/2134
19	30	0.26	0/453	0.56	0/605
20	31	0.24	0/531	0.52	0/709
21	32	0.28	0/450	0.57	0/599
22	34	0.25	0/380	0.64	0/498
23	35	0.26	0/513	0.51	0/676
24	36	0.27	0/303	0.62	0/397
25	4	0.27	0/1571	0.50	0/2113
26	5	0.30	0/1434	0.60	1/1926 (0.1%)
27	6	0.27	0/1343	0.55	1/1816 (0.1%)
28	9	0.26	0/1122	0.55	0/1515
29	M	0.24	0/219	0.70	0/339
30	R1	0.32	0/69794	0.81	18/108878 (0.0%)
31	R2	0.26	0/2847	0.80	3/4440 (0.1%)
32	R3	0.30	0/36782	0.84	20/57377 (0.0%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	sb	0.25	0/1735	0.52	1/2338 (0.0%)
34	sc	0.25	0/1651	0.54	0/2225
35	sd	0.27	0/1665	0.59	1/2227 (0.0%)
36	se	0.28	0/1169	0.59	0/1573
37	sf	0.27	0/835	0.66	1/1128 (0.1%)
38	sg	0.25	0/1195	0.58	2/1602 (0.1%)
39	sh	0.27	0/989	0.57	1/1326 (0.1%)
40	si	0.26	0/1034	0.64	0/1375
41	sj	0.25	0/796	0.62	1/1077 (0.1%)
42	sk	0.27	0/885	0.57	0/1195
43	sl	0.27	0/969	0.62	0/1300
44	sm	0.25	0/892	0.61	0/1193
45	sn	0.25	0/817	0.60	0/1088
46	so	0.24	0/722	0.53	0/964
47	sp	0.27	0/659	0.63	1/884 (0.1%)
48	sq	0.28	0/657	0.64	0/881
49	sr	0.25	0/544	0.55	0/731
50	ss	0.29	0/652	0.59	0/877
51	st	0.24	0/671	0.52	0/888
52	su	0.28	0/550	0.77	0/728
53	T	0.24	0/1716	0.80	0/2672
All	All	0.30	0/155994	0.76	53/233505 (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
35	sd	0	1
38	sg	0	1
45	sn	0	1
52	su	0	1
53	T	6	0
All	All	6	4

There are no bond length outliers.

The worst 5 of 53 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	24	47	PRO	CA-N-CD	-8.64	99.41	111.50
37	sf	54	LEU	CA-CB-CG	7.57	132.70	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	R3	470	C	N1-C2-O2	7.49	123.39	118.90
32	R3	470	C	C2-N1-C1'	7.42	126.96	118.80
32	R3	1208	C	C2-N1-C1'	7.23	126.75	118.80

5 of 6 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
53	T	8	4SU	C3',C2'
53	T	20	H2U	C1',C2'
53	T	32	4OC	C2'
53	T	54	MUM	C5

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
35	sd	27	ILE	Peptide
38	sg	3	ARG	Peptide
45	sn	86	ALA	Peptide
52	su	7	GLU	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	13	1129	0	1162	15	0
2	14	938	0	1012	17	0
3	15	1053	0	1129	24	0
4	16	1074	0	1157	19	0
5	17	960	0	1000	23	0
6	18	892	0	923	27	0
7	19	917	0	965	14	0
8	2	2082	0	2157	36	0
9	20	947	0	1022	15	0
10	21	816	0	839	17	0
11	22	857	0	922	17	0
12	23	738	0	807	19	0
13	24	779	0	834	16	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
14	25	753	0	780	28	0
15	27	582	0	599	21	0
16	28	625	0	655	20	0
17	29	509	0	543	12	0
18	3	1565	0	1616	29	0
19	30	449	0	491	10	0
20	31	522	0	524	15	0
21	32	444	0	461	14	0
22	34	377	0	418	6	0
23	35	504	0	574	8	0
24	36	302	0	343	5	0
25	4	1552	0	1619	25	0
26	5	1410	0	1447	30	0
27	6	1323	0	1374	38	0
28	9	1111	0	1148	18	0
29	M	195	0	99	2	0
30	R1	62318	0	31348	810	0
31	R2	2546	0	1292	33	0
32	R3	32850	0	16534	419	0
33	sb	1704	0	1732	0	0
34	sc	1624	0	1699	0	0
35	sd	1643	0	1710	0	0
36	se	1156	0	1199	0	0
37	sf	817	0	808	0	0
38	sg	1181	0	1240	0	0
39	sh	979	0	1034	0	0
40	si	1022	0	1070	0	0
41	sj	786	0	828	0	0
42	sk	869	0	878	0	0
43	sl	955	0	1019	0	0
44	sm	883	0	944	0	0
45	sn	805	0	847	0	0
46	so	714	0	737	0	0
47	sp	649	0	666	0	0
48	sq	648	0	691	0	0
49	sr	535	0	552	0	0
50	ss	637	0	665	0	0
51	st	665	0	714	0	0
52	su	544	0	579	0	0
53	T	1639	0	831	27	0
54	R1	111	0	0	0	0
54	R3	41	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
55	T	10	0	10	0	0
All	All	143736	0	96247	1670	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 9.

The worst 5 of 1670 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)
32:R3:359:G:HO2'	32:R3:360:G:H8	1.04	0.95
30:R1:156:A:H2	30:R1:169:G:H1	1.00	0.94
30:R1:156:A:C2	30:R1:169:G:N1	2.36	0.94
30:R1:2545:G:H21	30:R1:2565:A:H8	1.15	0.92
32:R3:1002:G:H1	32:R3:1038:C:HO2'	0.93	0.92

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	13	140/142 (99%)	137 (98%)	3 (2%)	0	100	100
2	14	120/122 (98%)	104 (87%)	16 (13%)	0	100	100
3	15	142/144 (99%)	129 (91%)	13 (9%)	0	100	100
4	16	134/136 (98%)	124 (92%)	10 (8%)	0	100	100
5	17	118/120 (98%)	112 (95%)	6 (5%)	0	100	100
6	18	114/116 (98%)	110 (96%)	4 (4%)	0	100	100
7	19	112/114 (98%)	106 (95%)	6 (5%)	0	100	100
8	2	269/271 (99%)	250 (93%)	19 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
9	20	115/117 (98%)	113 (98%)	2 (2%)	0	100	100
10	21	101/103 (98%)	92 (91%)	9 (9%)	0	100	100
11	22	108/110 (98%)	101 (94%)	6 (6%)	1 (1%)	14	45
12	23	91/93 (98%)	81 (89%)	10 (11%)	0	100	100
13	24	100/102 (98%)	89 (89%)	10 (10%)	1 (1%)	13	42
14	25	92/94 (98%)	87 (95%)	5 (5%)	0	100	100
15	27	74/76 (97%)	70 (95%)	4 (5%)	0	100	100
16	28	75/77 (97%)	75 (100%)	0	0	100	100
17	29	61/63 (97%)	60 (98%)	1 (2%)	0	100	100
18	3	207/209 (99%)	190 (92%)	17 (8%)	0	100	100
19	30	56/58 (97%)	53 (95%)	3 (5%)	0	100	100
20	31	64/66 (97%)	55 (86%)	9 (14%)	0	100	100
21	32	54/56 (96%)	50 (93%)	4 (7%)	0	100	100
22	34	44/46 (96%)	38 (86%)	6 (14%)	0	100	100
23	35	62/64 (97%)	59 (95%)	3 (5%)	0	100	100
24	36	36/38 (95%)	33 (92%)	3 (8%)	0	100	100
25	4	199/201 (99%)	189 (95%)	10 (5%)	0	100	100
26	5	175/177 (99%)	161 (92%)	14 (8%)	0	100	100
27	6	174/176 (99%)	161 (92%)	13 (8%)	0	100	100
28	9	147/149 (99%)	129 (88%)	18 (12%)	0	100	100
33	sb	216/218 (99%)	198 (92%)	18 (8%)	0	100	100
34	sc	204/206 (99%)	198 (97%)	6 (3%)	0	100	100
35	sd	203/205 (99%)	179 (88%)	24 (12%)	0	100	100
36	se	155/157 (99%)	135 (87%)	19 (12%)	1 (1%)	22	53
37	sf	98/100 (98%)	85 (87%)	13 (13%)	0	100	100
38	sg	149/151 (99%)	141 (95%)	8 (5%)	0	100	100
39	sh	127/129 (98%)	121 (95%)	6 (5%)	0	100	100
40	si	125/127 (98%)	104 (83%)	21 (17%)	0	100	100
41	sj	96/98 (98%)	88 (92%)	8 (8%)	0	100	100
42	sk	114/116 (98%)	104 (91%)	10 (9%)	0	100	100
43	sl	121/123 (98%)	93 (77%)	28 (23%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
44	sm	112/114 (98%)	101 (90%)	11 (10%)	0	100	100
45	sn	98/100 (98%)	82 (84%)	15 (15%)	1 (1%)	13	42
46	so	86/88 (98%)	82 (95%)	4 (5%)	0	100	100
47	sp	80/82 (98%)	70 (88%)	10 (12%)	0	100	100
48	sq	78/80 (98%)	68 (87%)	10 (13%)	0	100	100
49	sr	63/65 (97%)	59 (94%)	4 (6%)	0	100	100
50	ss	77/79 (98%)	68 (88%)	9 (12%)	0	100	100
51	st	83/85 (98%)	81 (98%)	2 (2%)	0	100	100
52	su	63/65 (97%)	42 (67%)	19 (30%)	2 (3%)	3	18
All	All	5532/5628 (98%)	5057 (91%)	469 (8%)	6 (0%)	50	79

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
13	24	88	ASP
36	se	122	VAL
11	22	2	GLU
52	su	22	CYS
52	su	36	PHE

### 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	13	116/116 (100%)	113 (97%)	3 (3%)	41	68
2	14	103/103 (100%)	101 (98%)	2 (2%)	52	75
3	15	103/103 (100%)	103 (100%)	0	100	100
4	16	109/109 (100%)	104 (95%)	5 (5%)	23	52
5	17	100/100 (100%)	96 (96%)	4 (4%)	27	58
6	18	86/86 (100%)	84 (98%)	2 (2%)	45	70
7	19	99/99 (100%)	94 (95%)	5 (5%)	20	49

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
8	2	216/216 (100%)	211 (98%)	5 (2%)	45	70
9	20	89/89 (100%)	89 (100%)	0	100	100
10	21	84/84 (100%)	80 (95%)	4 (5%)	21	51
11	22	93/93 (100%)	91 (98%)	2 (2%)	47	71
12	23	80/80 (100%)	76 (95%)	4 (5%)	20	50
13	24	83/83 (100%)	80 (96%)	3 (4%)	30	60
14	25	78/78 (100%)	75 (96%)	3 (4%)	28	59
15	27	58/58 (100%)	54 (93%)	4 (7%)	13	39
16	28	67/67 (100%)	65 (97%)	2 (3%)	36	64
17	29	55/55 (100%)	55 (100%)	0	100	100
18	3	164/164 (100%)	161 (98%)	3 (2%)	54	76
19	30	48/48 (100%)	46 (96%)	2 (4%)	25	56
20	31	59/59 (100%)	55 (93%)	4 (7%)	13	40
21	32	47/47 (100%)	45 (96%)	2 (4%)	25	55
22	34	38/38 (100%)	36 (95%)	2 (5%)	19	48
23	35	51/51 (100%)	47 (92%)	4 (8%)	10	35
24	36	34/34 (100%)	34 (100%)	0	100	100
25	4	165/165 (100%)	157 (95%)	8 (5%)	21	51
26	5	148/148 (100%)	143 (97%)	5 (3%)	32	62
27	6	137/137 (100%)	128 (93%)	9 (7%)	14	41
28	9	114/114 (100%)	112 (98%)	2 (2%)	54	76
33	sb	180/180 (100%)	169 (94%)	11 (6%)	15	43
34	sc	170/170 (100%)	165 (97%)	5 (3%)	37	65
35	sd	172/172 (100%)	169 (98%)	3 (2%)	56	78
36	se	119/119 (100%)	117 (98%)	2 (2%)	56	78
37	sf	87/87 (100%)	86 (99%)	1 (1%)	70	84
38	sg	124/124 (100%)	121 (98%)	3 (2%)	44	70
39	sh	104/104 (100%)	99 (95%)	5 (5%)	21	51
40	si	105/105 (100%)	100 (95%)	5 (5%)	21	51
41	sj	86/86 (100%)	83 (96%)	3 (4%)	31	61
42	sk	89/89 (100%)	85 (96%)	4 (4%)	23	53

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
43	sl	103/103 (100%)	99 (96%)	4 (4%)	27	58
44	sm	92/92 (100%)	88 (96%)	4 (4%)	25	55
45	sn	83/83 (100%)	79 (95%)	4 (5%)	21	51
46	so	76/76 (100%)	76 (100%)	0	100	100
47	sp	65/65 (100%)	62 (95%)	3 (5%)	23	52
48	sq	74/74 (100%)	73 (99%)	1 (1%)	62	81
49	sr	56/56 (100%)	55 (98%)	1 (2%)	54	76
50	ss	70/70 (100%)	65 (93%)	5 (7%)	12	39
51	st	65/65 (100%)	62 (95%)	3 (5%)	23	52
52	su	55/55 (100%)	52 (94%)	3 (6%)	18	47
All	All	4599/4599 (100%)	4440 (96%)	159 (4%)	33	61

5 of 159 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
39	sh	53	ASP
47	sp	55	ASP
40	si	61	ASP
42	sk	126	ARG
50	ss	36	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
36	se	121	ASN
37	sf	11	HIS
43	sl	4	ASN
37	sf	58	HIS
28	9	66	ASN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
29	M	8/9 (88%)	1 (12%)	0
30	R1	2900/2903 (99%)	566 (19%)	12 (0%)
31	R2	118/119 (99%)	19 (16%)	1 (0%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
32	R3	1530/1531 (99%)	379 (24%)	24 (1%)
53	T	74/77 (96%)	15 (20%)	2 (2%)
All	All	4630/4639 (99%)	980 (21%)	39 (0%)

5 of 980 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
29	M	7	A
30	R1	10	A
30	R1	12	U
30	R1	14	A
30	R1	15	G

5 of 39 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
32	R3	753	A
32	R3	1297	G
32	R3	837	U
32	R3	1132	C
53	T	8	4SU

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

5 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	$\# Z  > 2$
53	4OC	T	32	53	20,23,24	2.47	4 (20%)	25,32,35	1.66	4 (16%)
53	4SU	T	8	53	18,21,22	3.52	7 (38%)	25,30,33	2.31	6 (24%)
53	H2U	T	20	53	18,21,22	4.47	5 (27%)	19,30,33	4.05	6 (31%)
53	PSU	T	55	53	18,21,22	2.15	8 (44%)	21,30,33	2.39	4 (19%)
53	MUM	T	54	53	18,22,22	2.91	5 (27%)	19,32,32	2.16	5 (26%)

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
53	4OC	T	32	53	1/1/5/6	4/9/29/30	0/2/2/2
53	4SU	T	8	53	2/2/5/5	4/7/25/26	0/2/2/2
53	H2U	T	20	53	2/2/8/9	3/7/38/39	0/2/2/2
53	PSU	T	55	53	-	3/7/25/26	0/2/2/2
53	MUM	T	54	53	1/1/9/10	0/7/41/41	0/2/2/2

The worst 5 of 29 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	T	20	H2U	O4-C4	10.55	1.44	1.23
53	T	54	MUM	C6-N1	-10.33	1.34	1.46
53	T	8	4SU	O2-C2	9.74	1.40	1.23
53	T	20	H2U	C2-N1	8.90	1.48	1.35
53	T	32	4OC	O2-C2	8.56	1.39	1.23

The worst 5 of 25 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
53	T	20	H2U	O2-C2-N1	-11.74	108.98	123.10
53	T	20	H2U	O4-C4-N3	-7.55	108.66	120.30
53	T	55	PSU	N1-C2-N3	7.46	123.03	115.17
53	T	20	H2U	O2-C2-N3	-6.90	108.78	121.49
53	T	8	4SU	C4-N3-C2	-6.71	120.89	127.31

5 of 6 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
53	T	8	4SU	C3'
53	T	8	4SU	C2'
53	T	20	H2U	C1'
53	T	20	H2U	C2'
53	T	32	4OC	C2'

5 of 14 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
53	T	8	4SU	O4'-C1'-N1-C2

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Mol	Chain	Res	Type	Atoms
53	T	20	H2U	O4'-C1'-N1-C6
53	T	20	H2U	C2'-C1'-N1-C2
53	T	32	4OC	O4'-C4'-C5'-O5'
53	T	8	4SU	O4'-C4'-C5'-O5'

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
53	T	32	4OC	3	0
53	T	20	H2U	1	0

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 153 ligands modelled in this entry, 152 are monoatomic - leaving 1 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	$\# Z  > 2$
55	FME	T	101	53	8,9,10	0.99	0	8,9,11	0.83	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. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
55	FME	T	101	53	-	1/7/9/11	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
55	T	101	FME	CB-CA-N-CN

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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
30	R1	3
32	R3	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	R3	210:C	O3'	211:G	P	6.02
1	R3	460:A	O3'	461:A	P	5.42
1	R1	2188:U	O3'	2189:U	P	4.22
1	R1	2194:U	O3'	2195:U	P	3.88
1	R1	2097:A	O3'	2098:U	P	3.44

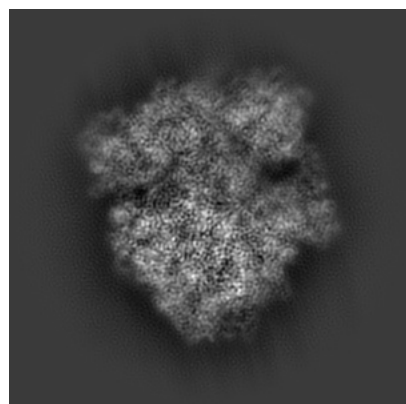
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-40939. These allow visual inspection of the internal detail of the map and identification of artifacts.

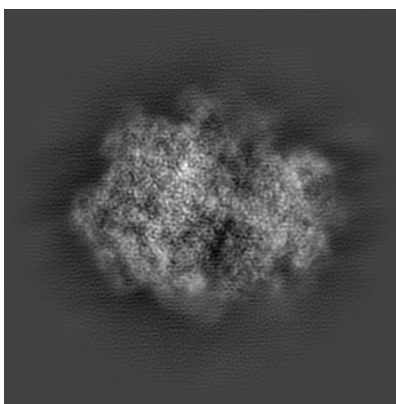
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

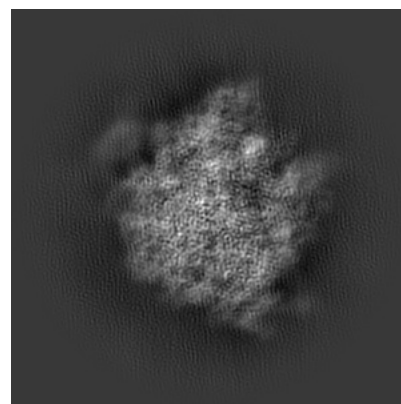
#### 6.1.1 Primary map



X

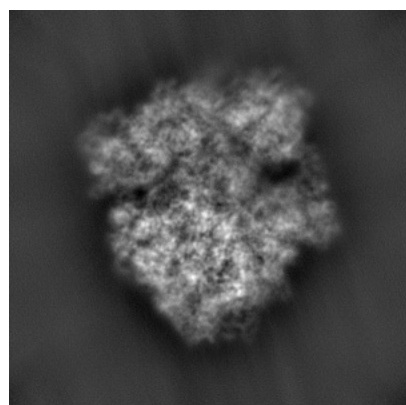


Y

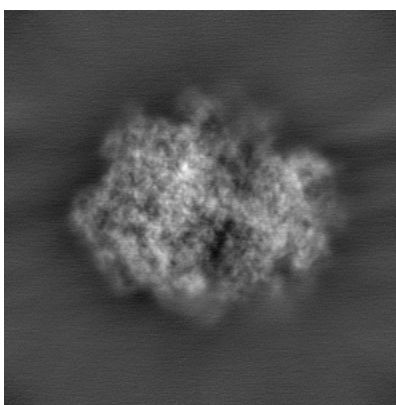


Z

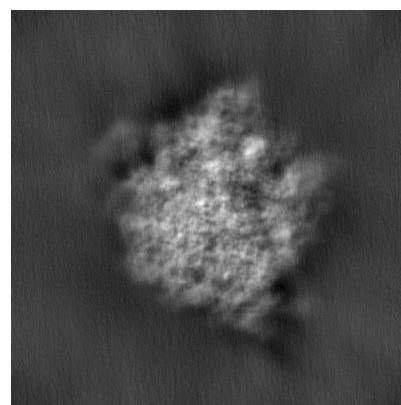
#### 6.1.2 Raw map



X



Y

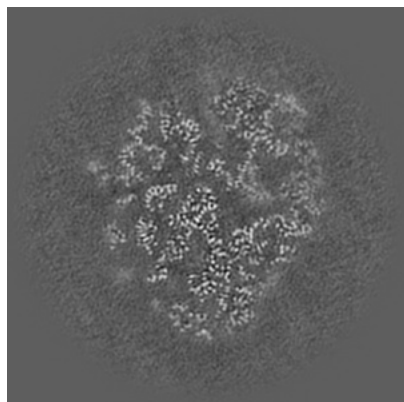


Z

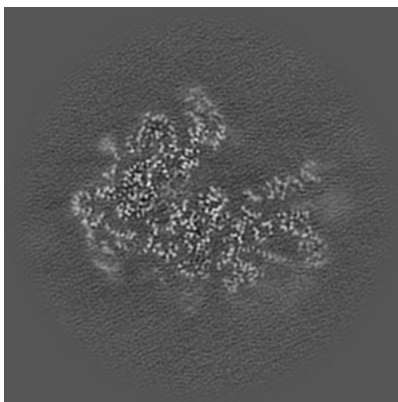
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

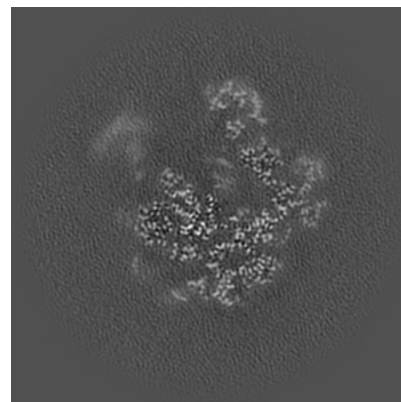
### 6.2.1 Primary map



X Index: 200

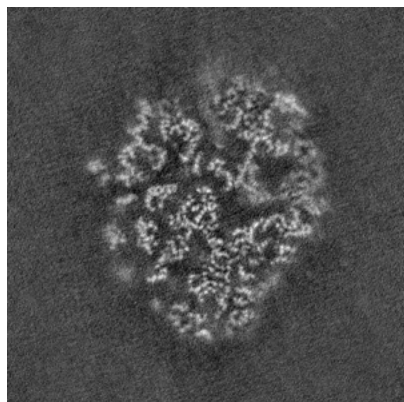


Y Index: 200

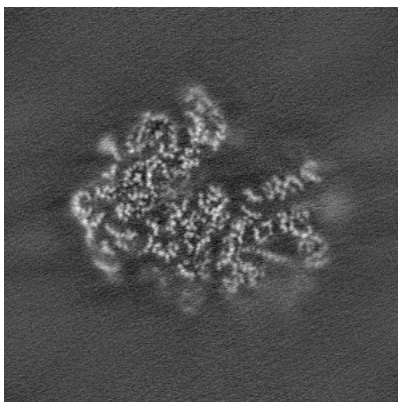


Z Index: 200

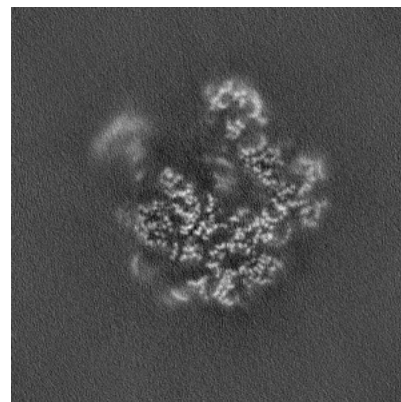
### 6.2.2 Raw map



X Index: 200



Y Index: 200

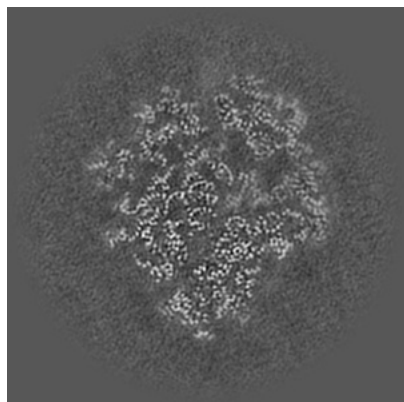


Z Index: 200

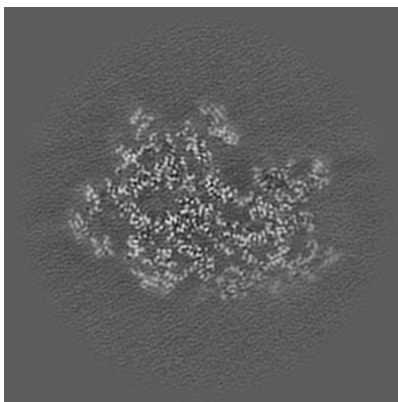
The images above show central slices of the map in three orthogonal directions.

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

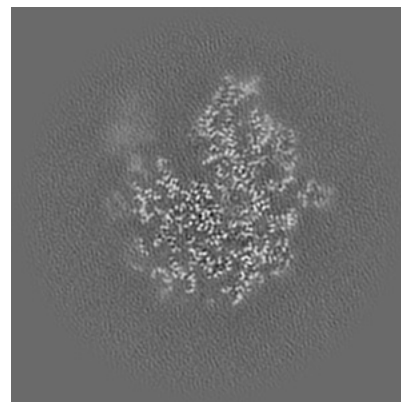
### 6.3.1 Primary map



X Index: 207

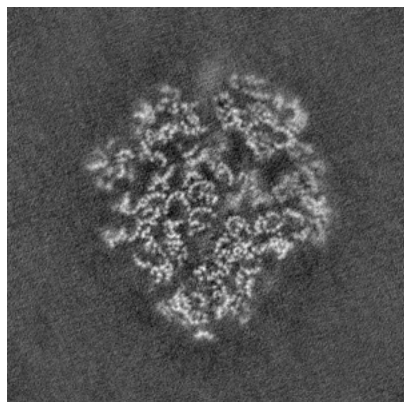


Y Index: 185

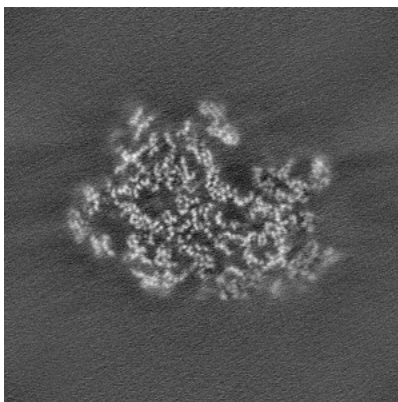


Z Index: 182

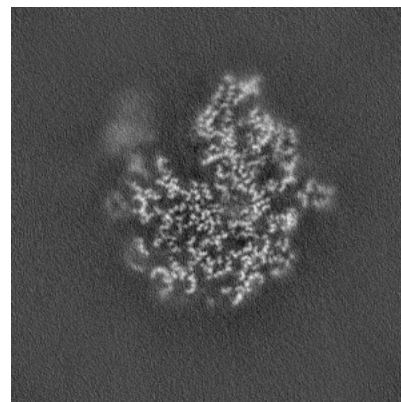
### 6.3.2 Raw map



X Index: 207



Y Index: 184



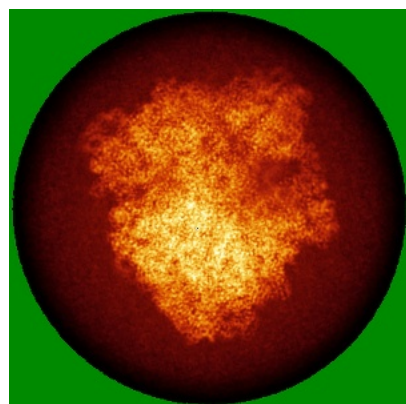
Z Index: 182

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

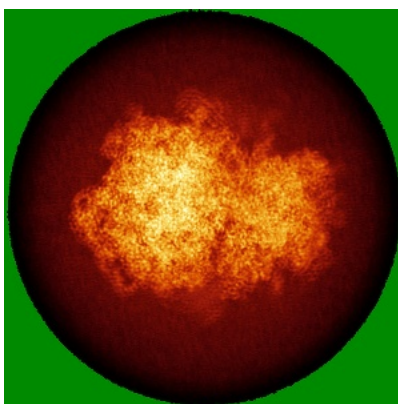


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

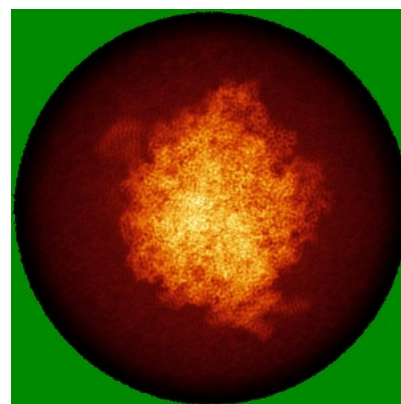
### 6.4.1 Primary map



X

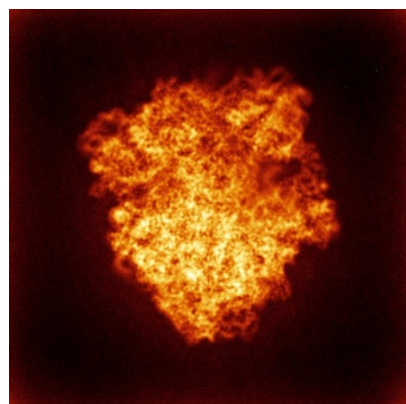


Y

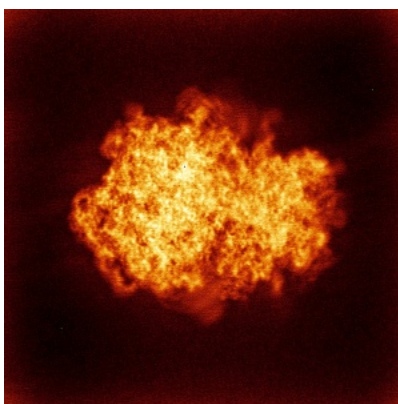


Z

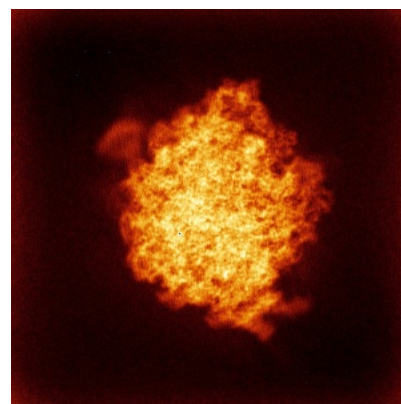
### 6.4.2 Raw map



X



Y

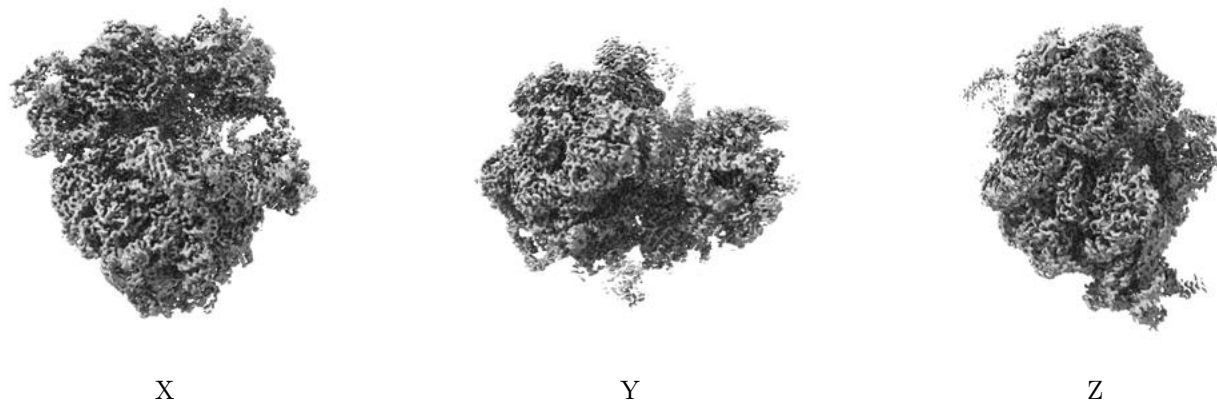


Z

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.

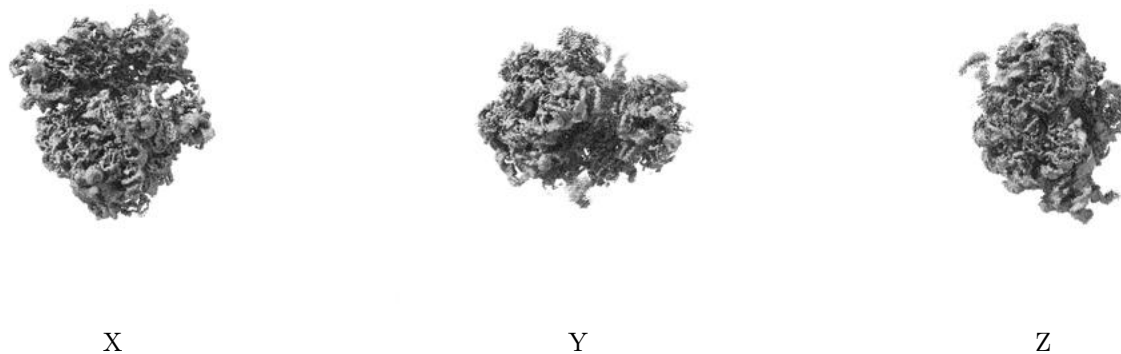
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.55. 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.

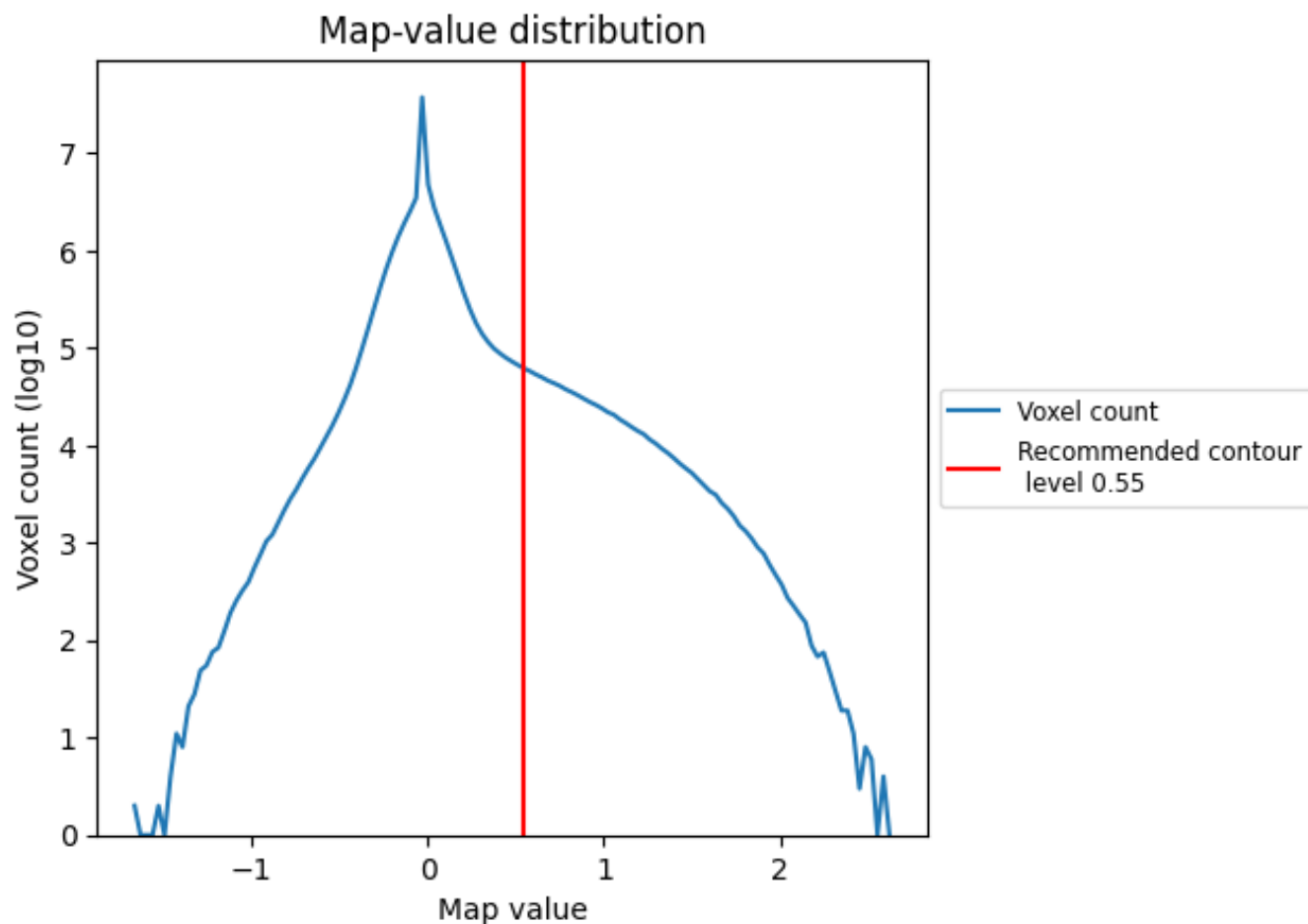
## 6.6 Mask visualisation [i](#)

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.

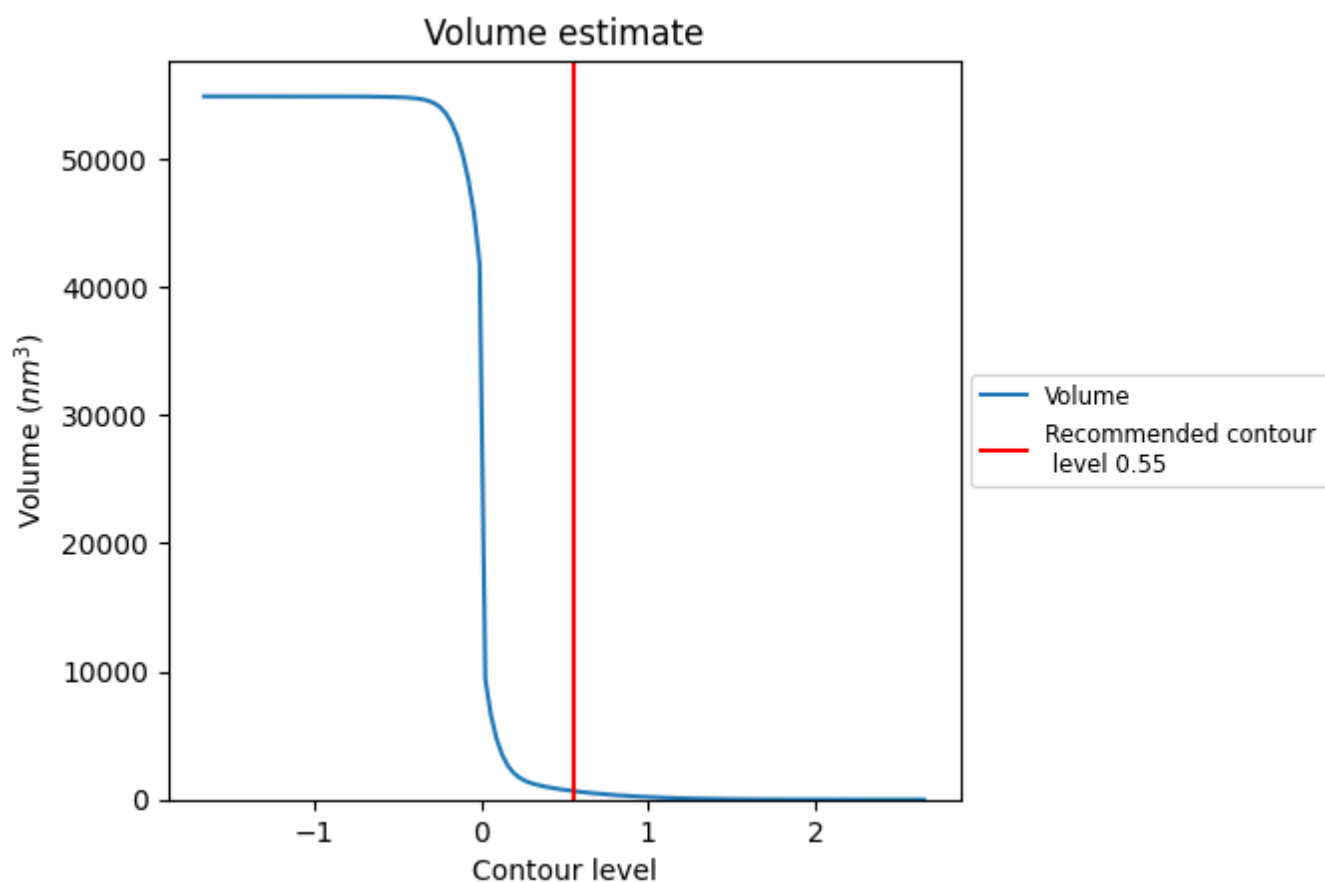
### 7.1 Map-value distribution [i](#)



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.



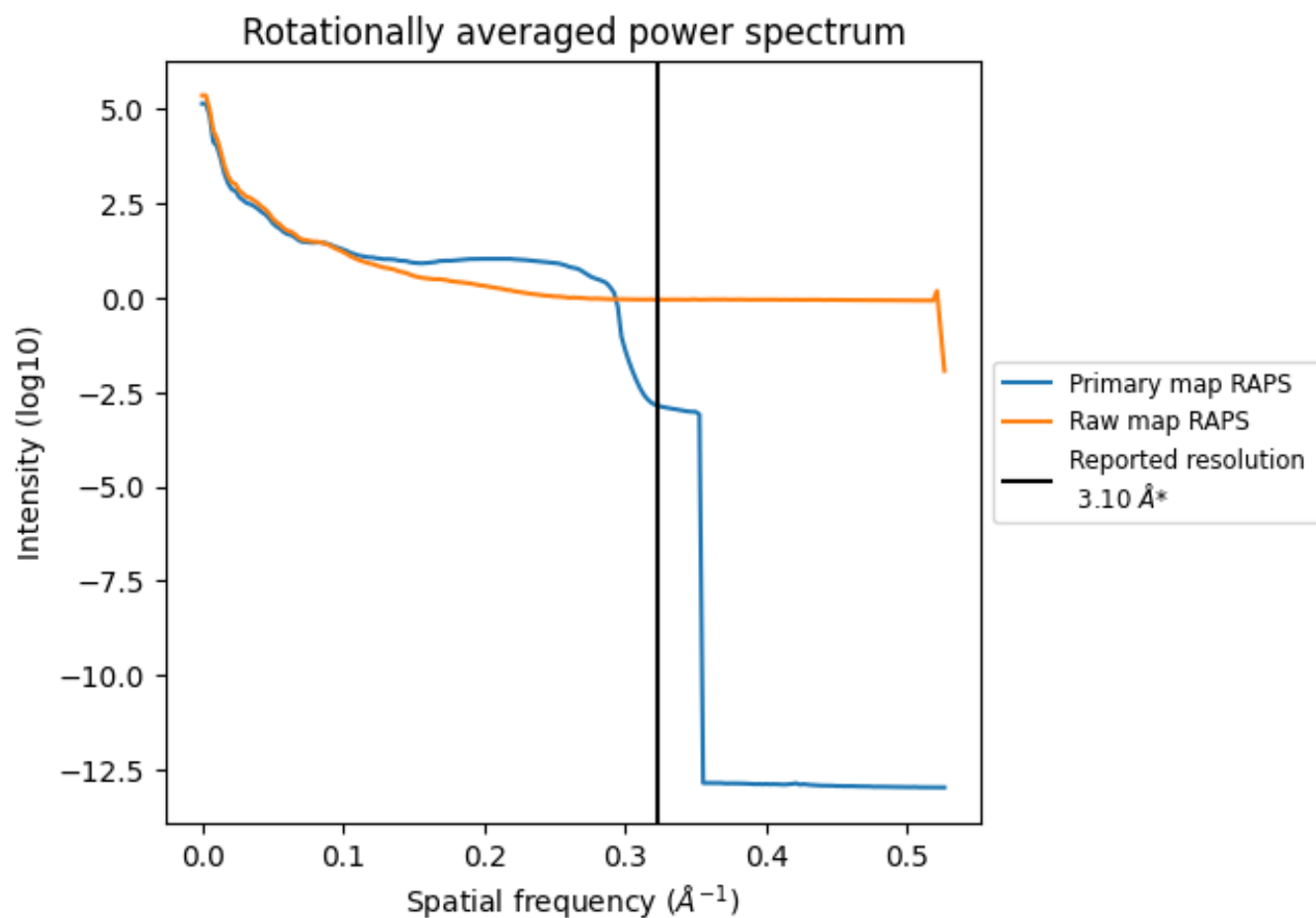
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 668 nm<sup>3</sup>; this corresponds to an approximate mass of 604 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 ⓘ

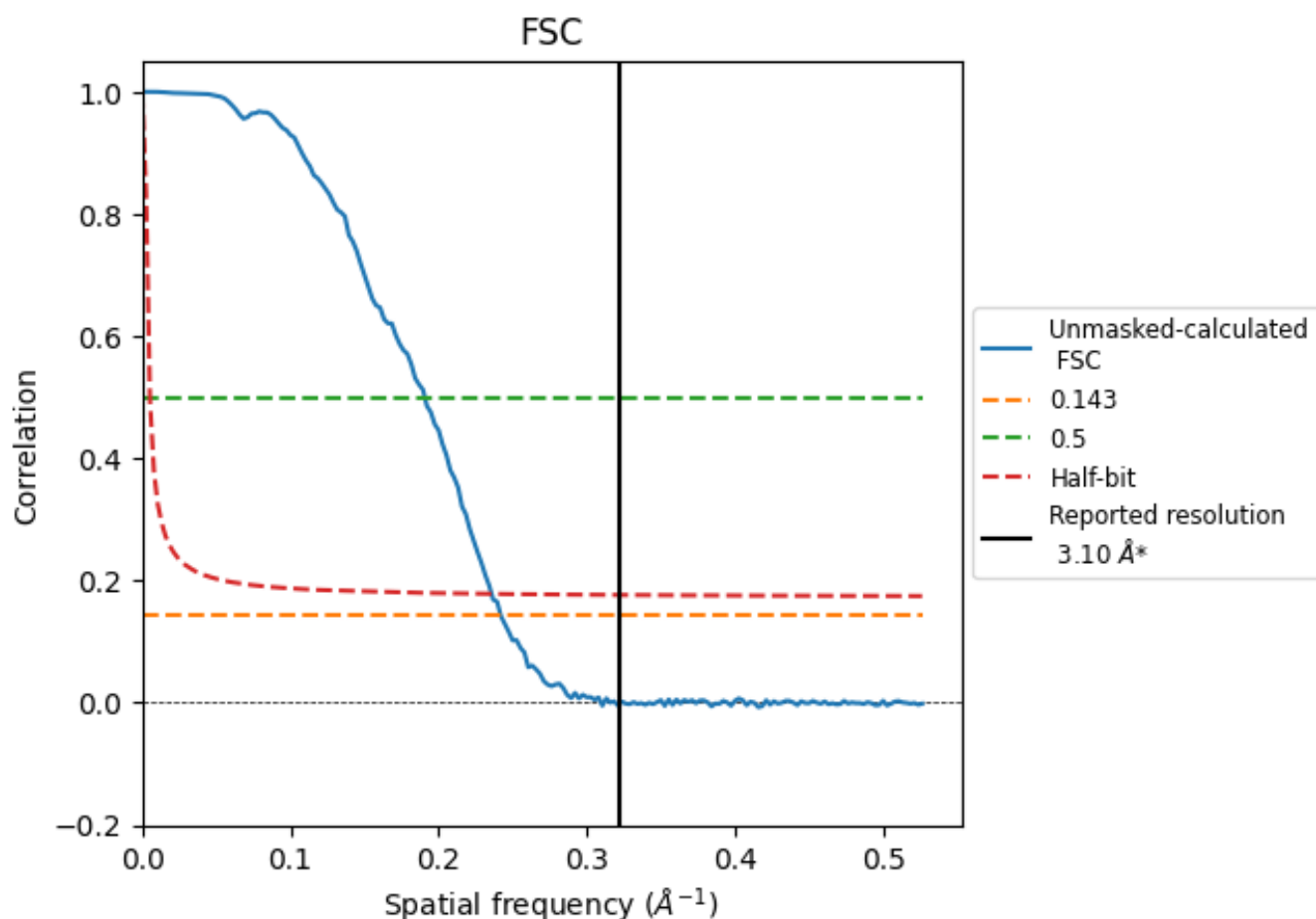


\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

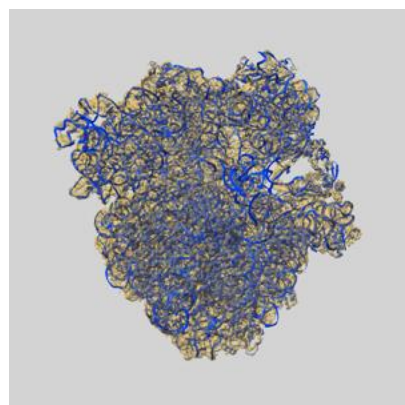
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.13	5.24	4.24

\*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 4.13 differs from the reported value 3.1 by more than 10 %

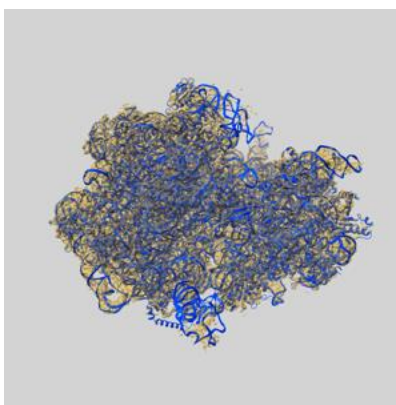
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-40939 and PDB model 9NJV. Per-residue inclusion information can be found in [section 3](#) on [page 15](#).

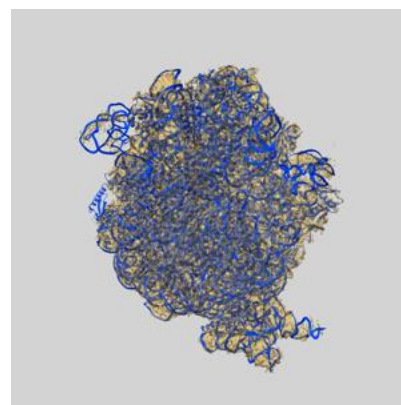
### 9.1 Map-model overlay [i](#)



X



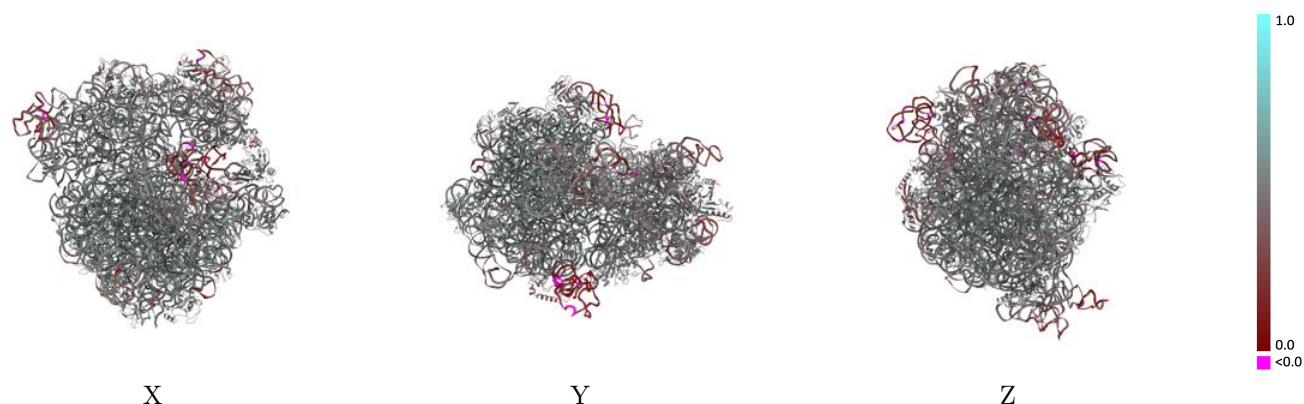
Y



Z

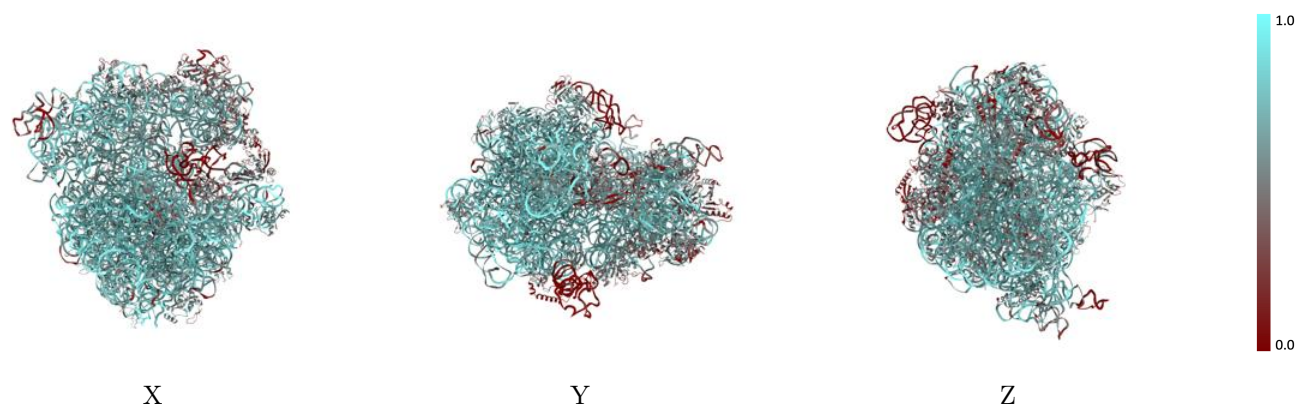
The images above show the 3D surface view of the map at the recommended contour level 0.55 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



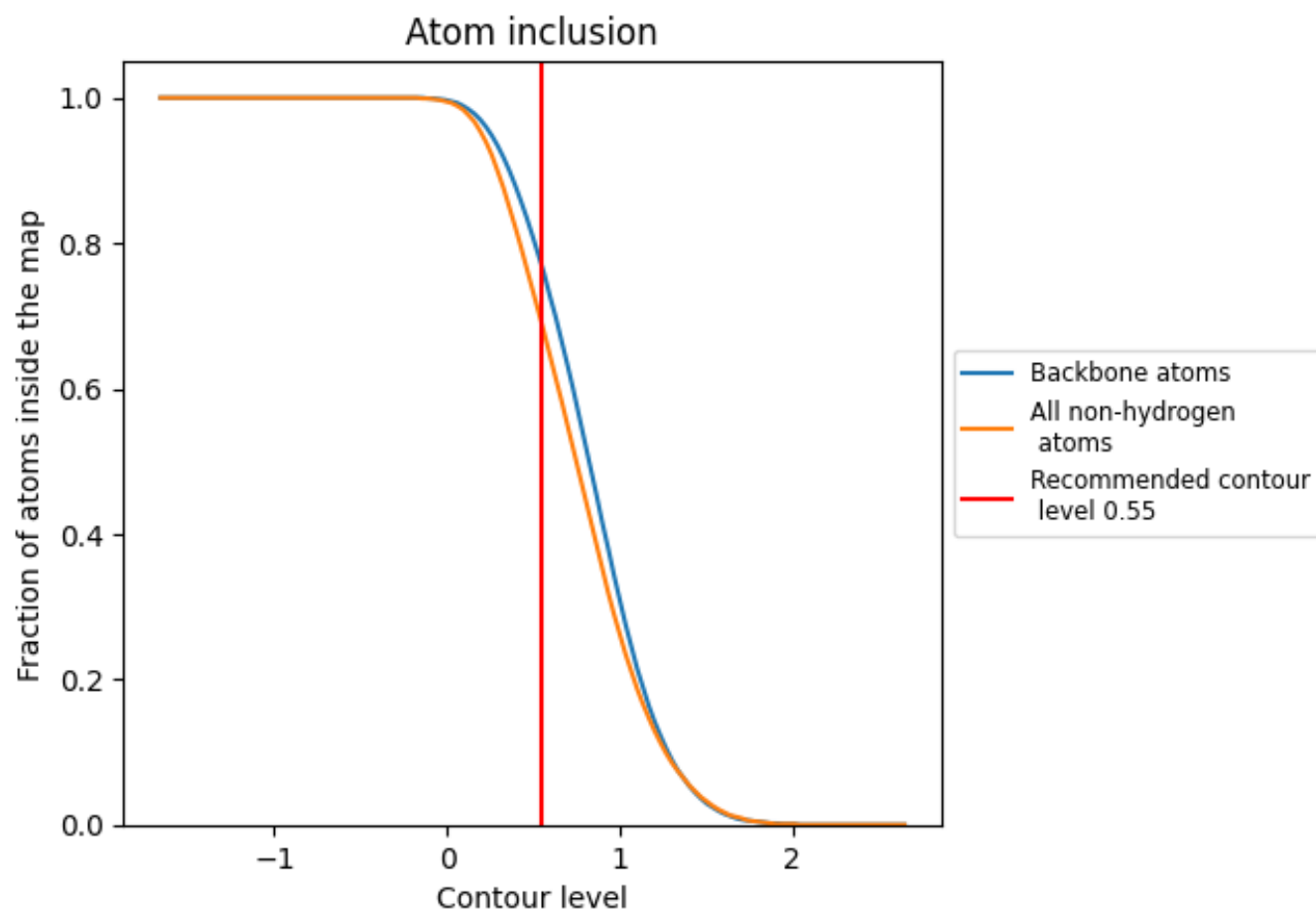
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.55).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 77% of all backbone atoms, 69% 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 (0.55) and Q-score for the entire model and for each chain.







































Chain	Atom inclusion	Q-score
All	 0.6890	 0.4710
13	 0.6700	 0.5280
14	 0.6220	 0.5380
15	 0.6720	 0.5290
16	 0.6290	 0.5340
17	 0.7400	 0.5410
18	 0.5500	 0.4890
19	 0.6340	 0.5400
2	 0.6720	 0.5470
20	 0.7030	 0.5400
21	 0.6440	 0.5200
22	 0.6520	 0.5320
23	 0.5870	 0.5110
24	 0.5890	 0.5000
25	 0.5980	 0.4970
27	 0.6590	 0.5420
28	 0.6750	 0.5390
29	 0.5920	 0.4820
3	 0.6880	 0.5330
30	 0.6480	 0.5200
31	 0.1190	 0.3700
32	 0.6850	 0.5250
34	 0.7180	 0.5530
35	 0.7130	 0.5540
36	 0.6340	 0.5330
4	 0.5840	 0.5160
5	 0.4250	 0.4610
6	 0.4510	 0.4620
9	 0.1070	 0.3380
M	 0.6210	 0.4640
R1	 0.7670	 0.4660
R2	 0.7740	 0.4510
R3	 0.7370	 0.4540
T	 0.4980	 0.4020
sb	 0.3430	 0.4390



*Continued on next page...*



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Chain	Atom inclusion	Q-score
sc	 0.5090	 0.4890
sd	 0.4850	 0.4720
se	 0.5620	 0.5070
sf	 0.4820	 0.4570
sg	 0.4110	 0.4560
sh	 0.6090	 0.5120
si	 0.4190	 0.4510
sj	 0.3180	 0.4360
sk	 0.5310	 0.4940
sl	 0.5640	 0.5190
sm	 0.4350	 0.4620
sn	 0.4650	 0.4700
so	 0.5870	 0.4990
sp	 0.5630	 0.4880
sq	 0.5330	 0.4910
sr	 0.4880	 0.4860
ss	 0.4070	 0.4480
st	 0.5510	 0.4940
su	 0.3210	 0.3830