



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 01:11 AM UTC

PDB ID : 8BTD / pdb_00008btd
EMDB ID : EMD-16228
Title : Giardia Ribosome in PRE-T Hybrid State (D1)
Authors : Majumdar, S.; Emmerich, A.G.; Sanyal, S.
Deposited on : 2022-11-28
Resolution : 4.90 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

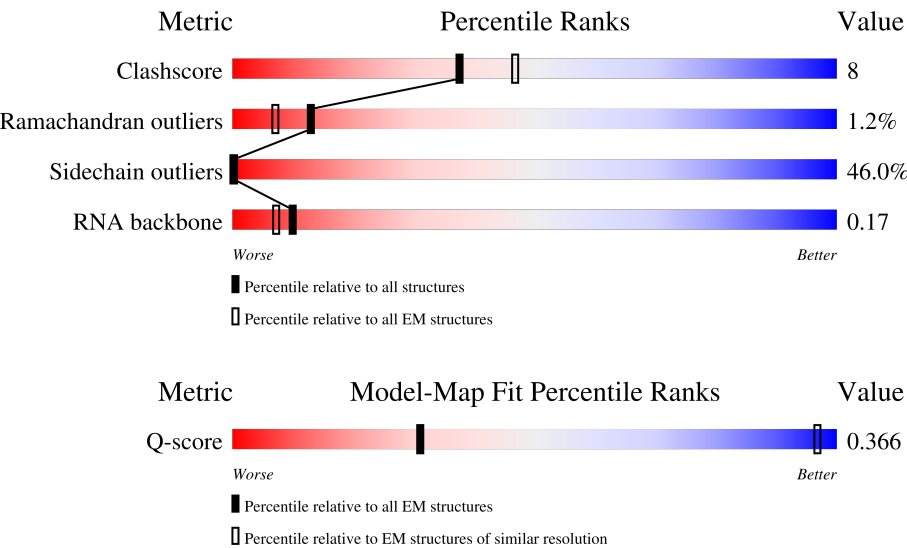
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 4.90 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	1274 (4.40 - 5.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	LA	251	
2	LB	379	
3	LC	316	

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Mol	Chain	Length	Quality of chain
4	LD	142	
5	LE	121	
6	LF	297	
7	LG	51	
8	LH	235	
9	LI	225	
10	LJ	185	
11	LK	210	
12	LL	173	
13	LM	234	
14	LN	131	
15	LO	204	
16	LP	197	
17	LQ	164	
18	LR	179	
19	LS	196	
20	LT	173	
21	LU	159	
22	LV	124	
23	LW	142	
24	LX	189	
25	LY	141	
26	LZ	135	
27	La	135	
28	Lb	149	

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Mol	Chain	Length	Quality of chain
29	Lc	62	
30	Ld	109	
31	Le	106	
32	Lf	136	
33	Lg	123	
34	Lh	120	
35	Li	124	
36	Lj	90	
37	Lk	89	
38	Ll	77	
39	Ln	217	
40	Lo	25	
41	Lp	106	
42	Lq	94	
43	Ls	127	
44	Lt	2697	
45	SA	245	
46	SB	242	
47	SC	217	
48	SD	248	
49	SE	268	
50	SF	190	
51	SG	248	
52	SH	190	
53	SI	174	

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Mol	Chain	Length	Quality of chain
54	SJ	130	
55	SK	189	
56	SL	134	
57	SM	154	
58	SO	144	
59	SP	154	
60	SQ	145	
61	SR	145	
62	ST	158	
63	SU	137	
64	SV	154	
65	SW	139	
66	SX	126	
67	SY	89	
68	Sb	132	
69	Sc	88	
70	Sd	109	
71	Se	81	
72	Sg	64	
73	Sh	51	
74	Sj	69	
75	St	1454	
76	u	75	
77	v	75	
78	y	11	

2 Entry composition

There are 78 unique types of molecules in this entry. The entry contains 178901 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 Ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	LA	250	Total	C	N	O	S	0	0
			1886	1163	389	322	12		

- Molecule 2 is a protein called Ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	LB	378	Total	C	N	O	S	0	0
			2987	1886	566	514	21		

- Molecule 3 is a protein called Ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	LC	315	Total	C	N	O	S	0	0
			2454	1543	476	426	9		

- Molecule 4 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	LD	142	Total	C	N	O	P	0	0
			3038	1350	563	983	142		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
5	LE	117	Total	C	N	O	P	0	0
			2502	1116	457	812	117		

- Molecule 6 is a protein called Ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	LF	293	Total	C	N	O	S	0	0
			2355	1490	439	418	8		

- Molecule 7 is a protein called Ribosomal protein L39.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	LG	50	Total	C	N	O	0	0
			439	281	94	64		

- Molecule 8 is a protein called Ribosomal protein L7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	LH	216	Total	C	N	O	S	0	0
			1742	1106	317	314	5		

- Molecule 9 is a protein called Ribosomal protein L7a.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	LI	195	Total	C	N	O	S	0	0
			1554	989	284	276	5		

- Molecule 10 is a protein called Ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	LJ	184	Total	C	N	O	S	0	0
			1452	917	264	261	10		

- Molecule 11 is a protein called Ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	LK	206	Total	C	N	O	S	0	0
			1671	1046	330	286	9		

- Molecule 12 is a protein called Ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	LL	168	Total	C	N	O	S	0	0
			1349	850	250	244	5		

- Molecule 13 is a protein called Ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	LM	201	Total	C	N	O	S	0	0
			1605	999	325	274	7		

- Molecule 14 is a protein called Ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	LN	130	Total	C	N	O	S	0	0
			1024	649	186	183	6		

- Molecule 15 is a protein called Ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	LO	203	Total	C	N	O	S	0	0
			1708	1080	357	265	6		

- Molecule 16 is a protein called Ribosomal protein L13a.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	LP	194	Total	C	N	O	S	0	0
			1578	994	306	266	12		

- Molecule 17 is a protein called Ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	LQ	156	Total	C	N	O	S	0	0
			1254	793	242	215	4		

- Molecule 18 is a protein called Ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	LR	178	Total	C	N	O	S	0	0
			1402	871	279	243	9		

- Molecule 19 is a protein called Ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	LS	192	Total	C	N	O	S	0	0
			1592	983	334	270	5		

- Molecule 20 is a protein called Ribosomal protein L18a.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	LT	170	Total	C	N	O	S	0	0
			1423	899	272	243	9		

- Molecule 21 is a protein called Ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	LU	157	Total	C	N	O	S	0	0
			1264	789	260	208	7		

- Molecule 22 is a protein called Ribosomal protein L22e.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	LV	115	Total	C	N	O	S	0	0
			935	589	157	187	2		

- Molecule 23 is a protein called Ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	LW	135	Total	C	N	O	S	0	0
			1029	648	196	180	5		

- Molecule 24 is a protein called Ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	LX	63	Total	C	N	O	S	0	0
			538	340	109	82	7		

- Molecule 25 is a protein called Ribosomal protein L23A.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	LY	119	Total	C	N	O	S	0	0
			962	619	174	166	3		

- Molecule 26 is a protein called Ribosomal protein L26.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	LZ	133	Total	C	N	O	S	0	0
			1076	665	219	184	8		

- Molecule 27 is a protein called Ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	La	132	Total	C	N	O	S	0	0
			1051	660	198	186	7		

- Molecule 28 is a protein called Ribosomal protein L27a.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	Lb	148	Total	C	N	O	S	0	0
			1201	759	240	199	3		

- Molecule 29 is a protein called Ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Lc	55	Total	C	N	O	S	0	0
			456	275	103	76	2		

- Molecule 30 is a protein called Ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Ld	97	Total	C	N	O	S	0	0
			731	461	127	139	4		

- Molecule 31 is a protein called Ribosomal protein L31B.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	Le	100	Total	C	N	O		0	0
			818	518	158	142			

- Molecule 32 is a protein called Ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	Lf	130	Total	C	N	O	S	0	0
			1077	683	215	173	6		

- Molecule 33 is a protein called Ribosomal protein L35a.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	Lg	98	Total	C	N	O	S	0	0
			778	498	147	130	3		

- Molecule 34 is a protein called Ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	Lh	116	Total	C	N	O	S	0	0
			914	563	189	158	4		

- Molecule 35 is a protein called Ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	Li	122	Total	C	N	O	S	0	0
			983	623	192	163	5		

- Molecule 36 is a protein called Ribosomal protein L36-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	Lj	89	Total	C	N	O	S	0	0
			731	462	146	119	4		

- Molecule 37 is a protein called Ribosomal protein L37.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	Lk	88	Total	C	N	O	S	0	0
			711	435	152	117	7		

- Molecule 38 is a protein called Ribosomal protein L38e.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	Ll	72	Total	C	N	O	S	0	0
			558	353	99	102	4		

- Molecule 39 is a protein called Ribosomal protein L10a.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	Ln	200	Total	C	N	O	S	0	0
			1592	1025	278	284	5		

- Molecule 40 is a protein called Ribosomal protein L41.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	Lo	25	Total	C	N	O	S	0	0
			227	140	57	27	3		

- Molecule 41 is a protein called Ribosomal protein L44.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	Lp	93	Total	C	N	O	S	0	0
			767	478	159	125	5		

- Molecule 42 is a protein called Ribosomal protein L37a.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	Lq	91	Total	C	N	O	S	0	0
			708	437	144	120	7		

- Molecule 43 is a protein called Ubiquitin/Ribosomal protein L40e.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	Ls	47	Total	C	N	O	S	0	0
			388	234	83	64	7		

- Molecule 44 is a RNA chain called Large Subunit rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	Lt	2593	Total	C	N	O	P	0	0
			55643	24727	10311	18012	2593		

- Molecule 45 is a protein called Ribosomal protein SA.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	SA	197	Total	C	N	O	S	0	0
			1578	1018	276	276	8		

- Molecule 46 is a protein called Ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	SB	216	Total	C	N	O	S	0	0
			1667	1059	302	301	5		

- Molecule 47 is a protein called Ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	SC	210	Total	C	N	O	S	0	0
			1665	1050	306	293	16		

- Molecule 48 is a protein called Ribosomal protein S3a.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	SD	231	Total	C	N	O	S	0	0
			1868	1180	349	326	13		

- Molecule 49 is a protein called Ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	SE	260	Total	C	N	O	S	0	0
			2085	1333	384	356	12		

- Molecule 50 is a protein called Ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	SF	186	Total	C	N	O	S	0	0
			1442	896	275	262	9		

- Molecule 51 is a protein called Ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	SG	238	Total	C	N	O	S	0	0
			1889	1188	360	331	10		

- Molecule 52 is a protein called Ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	SH	184	Total	C	N	O	S	0	0
			1481	948	258	268	7		

- Molecule 53 is a protein called Ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	SI	173	Total	C	N	O	S	0	0
			1357	850	260	244	3		

- Molecule 54 is a protein called Ribosomal protein S15A.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	SJ	129	Total	C	N	O	S	0	0
			1031	659	192	177	3		

- Molecule 55 is a protein called Ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	SK	176	Total	C	N	O	S	0	0
			1423	889	281	247	6		

- Molecule 56 is a protein called Ribosomal protein S10B.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	SL	107	Total	C	N	O	S	0	0
			876	568	147	158	3		

- Molecule 57 is a protein called Ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
57	SM	153	Total	C	N	O	S	0	0
			1265	802	248	209	6		

- Molecule 58 is a protein called Ribosomal protein S23.

Mol	Chain	Residues	Atoms					AltConf	Trace
58	SO	140	Total	C	N	O	S	0	0
			1089	688	216	182	3		

- Molecule 59 is a protein called Ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
59	SP	150	Total	C	N	O	S	0	0
			1193	762	225	202	4		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
SP	6	ALA	SER	conflict	UNP A8BE02
SP	7	PRO	LYS	conflict	UNP A8BE02
SP	38	TYR	CYS	conflict	UNP A8BE02
SP	49	GLN	ARG	conflict	UNP A8BE02

- Molecule 60 is a protein called Ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
60	SQ	127	Total	C	N	O	S	0	0
			926	569	190	164	3		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
SQ	110	GLY	GLN	conflict	UNP E2RU83
SQ	112	SER	GLY	conflict	UNP E2RU83
SQ	113	ALA	SER	conflict	UNP E2RU83
SQ	115	GLY	ALA	conflict	UNP E2RU83

- Molecule 61 is a protein called Ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
61	SR	116	Total	C	N	O	S	0	0
			943	601	184	150	8		

- Molecule 62 is a protein called Ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
62	ST	151	Total	C	N	O	S	0	0
			1180	736	229	212	3		

- Molecule 63 is a protein called Ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
63	SU	121	Total	C	N	O	S	0	0
			965	598	184	178	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
SU	104	THR	ALA	conflict	UNP A8BRG5

- Molecule 64 is a protein called Ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
64	SV	146	Total	C	N	O	S	0	0
			1162	715	238	203	6		

- Molecule 65 is a protein called Ribosomal protein S19e.

Mol	Chain	Residues	Atoms					AltConf	Trace
65	SW	138	Total	C	N	O	S	0	0
			1080	686	204	187	3		

- Molecule 66 is a protein called Ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
66	SX	101	Total	C	N	O	S	0	0
			802	511	146	140	5		

- Molecule 67 is a protein called Ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
67	SY	86	Total	C	N	O	S	0	0
			651	403	120	122	6		

- Molecule 68 is a protein called Ribosomal protein S24.

Mol	Chain	Residues	Atoms					AltConf	Trace
68	Sb	120	Total	C	N	O	S	0	0
			952	604	179	163	6		

- Molecule 69 is a protein called Ribosomal protein S25.

Mol	Chain	Residues	Atoms					AltConf	Trace
69	Sc	75	Total	C	N	O	S	0	0
			597	377	107	107	6		

- Molecule 70 is a protein called Ribosomal protein S26.

Mol	Chain	Residues	Atoms					AltConf	Trace
70	Sd	108	Total	C	N	O	S	0	0
			884	544	184	149	7		

- Molecule 71 is a protein called Ribosomal protein S27.

Mol	Chain	Residues	Atoms					AltConf	Trace
71	Se	80	Total	C	N	O	S	0	0
			629	397	110	116	6		

- Molecule 72 is a protein called Ribosomal protein S28.

Mol	Chain	Residues	Atoms					AltConf	Trace
72	Sg	63	Total	C	N	O	S	0	0
			505	311	100	92	2		

- Molecule 73 is a protein called Ribosomal protein S29A.

Mol	Chain	Residues	Atoms					AltConf	Trace
73	Sh	50	Total	C	N	O	S	0	0
			417	264	80	67	6		

- Molecule 74 is a protein called Ribosomal protein S30.

Mol	Chain	Residues	Atoms					AltConf	Trace
74	Sj	67	Total	C	N	O	S	0	0
			543	341	114	87	1		

- Molecule 75 is a RNA chain called Small Subunit rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
75	St	1454	Total	C	N	O	P	0	0
			31176	13861	5772	10090	1453		

- Molecule 76 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
76	u	75	Total	C	N	O	P	0	0
			1604	717	298	515	74		

- Molecule 77 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
77	v	75	Total	C	N	O	P	0	0
			1602	716	296	516	74		

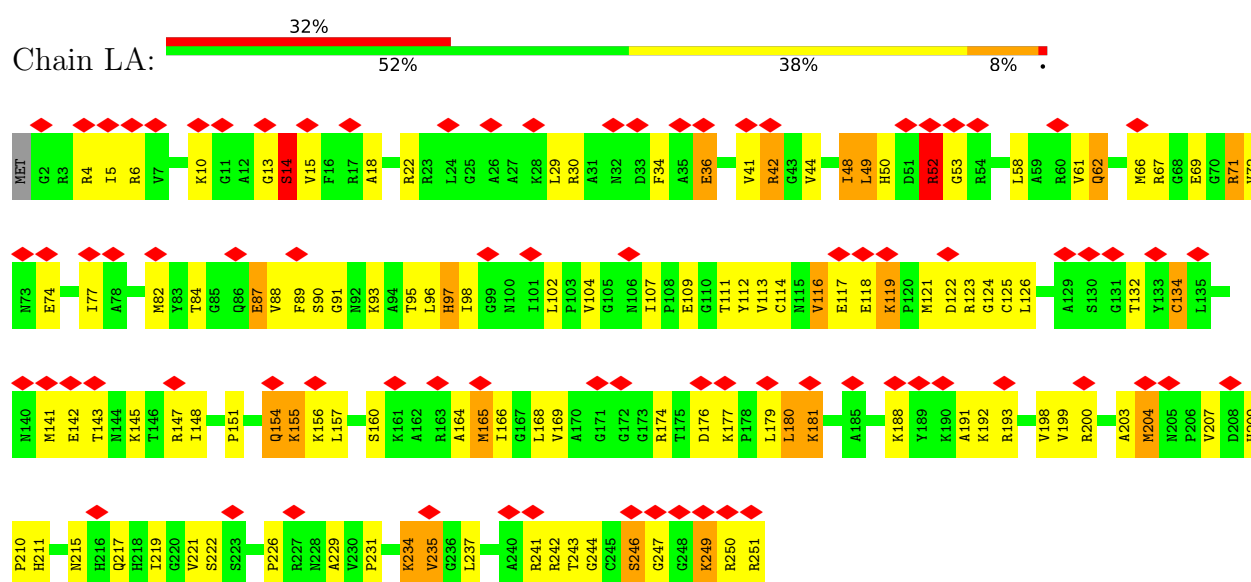
- Molecule 78 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
78	y	10	Total	C	N	O	P	0	0
			221	99	47	65	10		

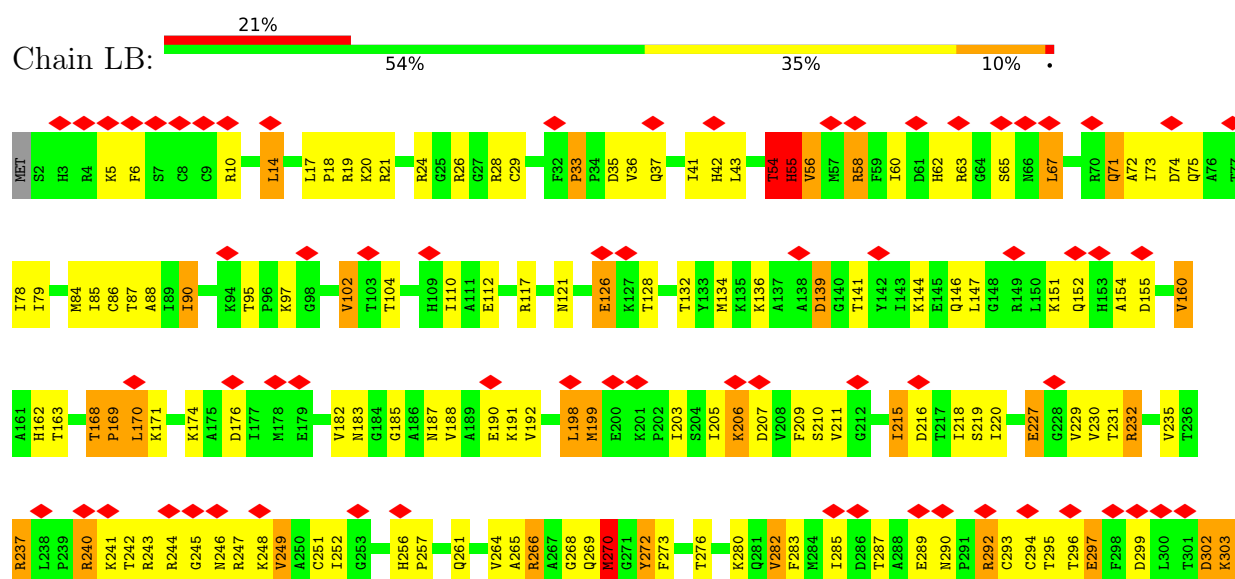
3 Residue-property plots

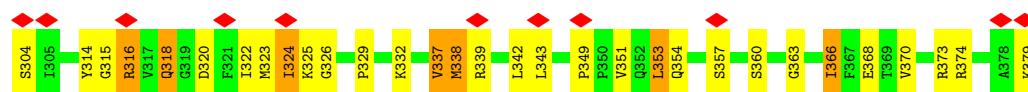
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

• Molecule 1: Ribosomal protein L2

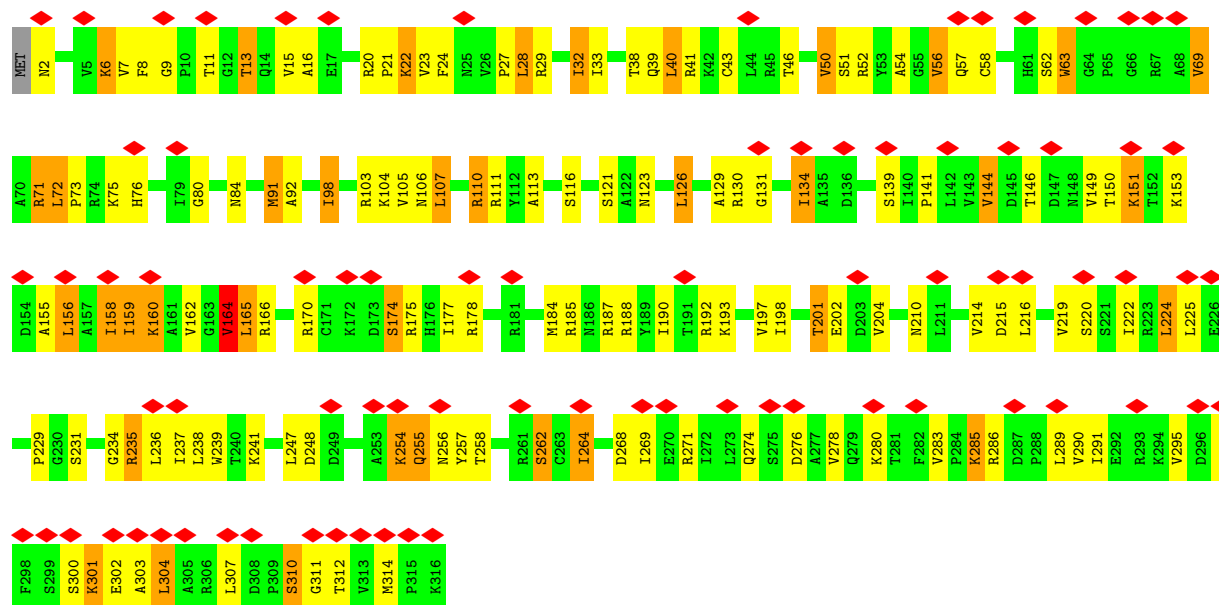


• Molecule 2: Ribosomal protein L3

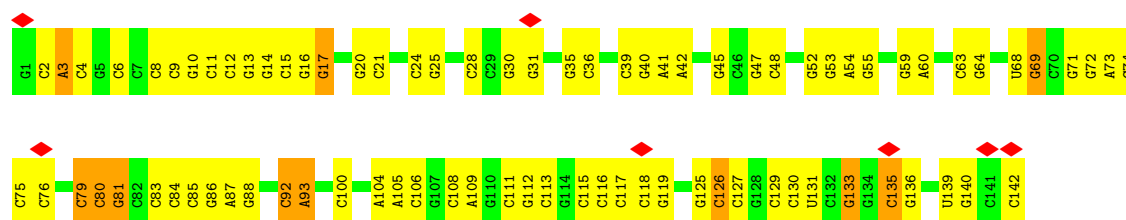




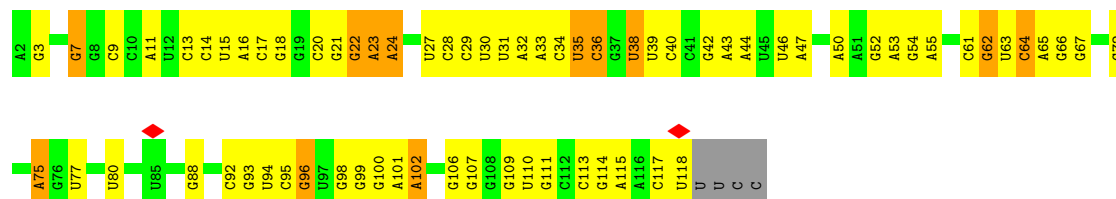
• Molecule 3: Ribosomal protein L4



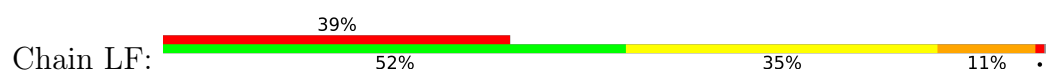
• Molecule 4: 5.8S rRNA

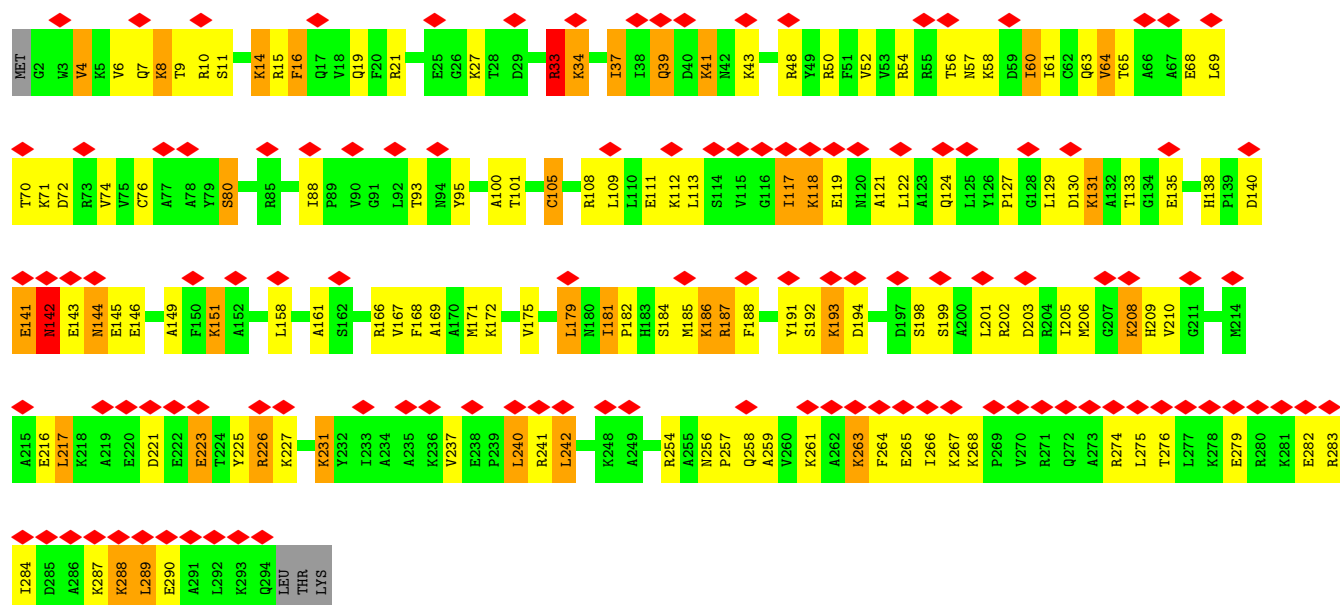


• Molecule 5: 5S rRNA



• Molecule 6: Ribosomal protein L5

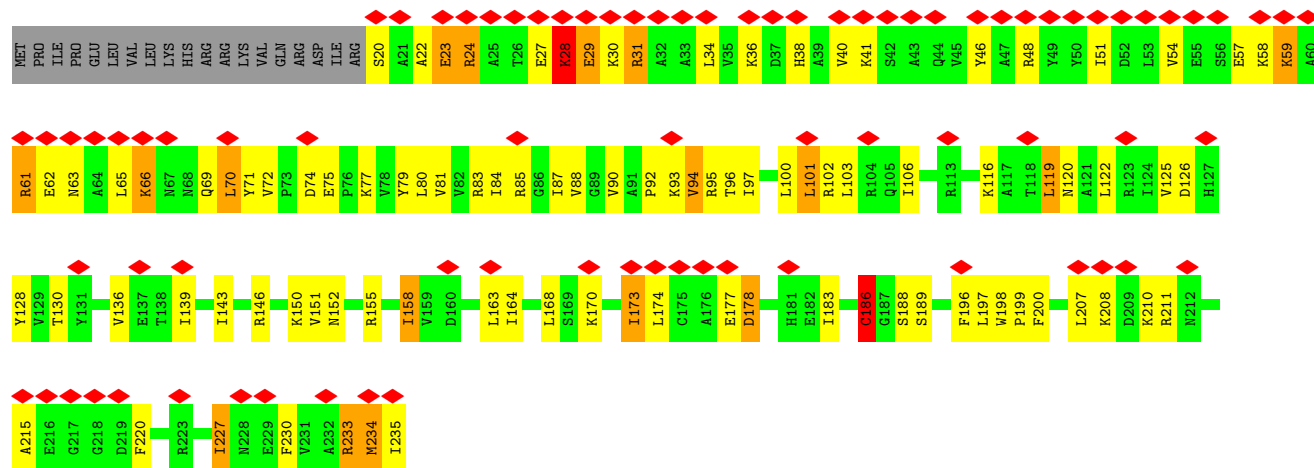




• Molecule 7: Ribosomal protein L39

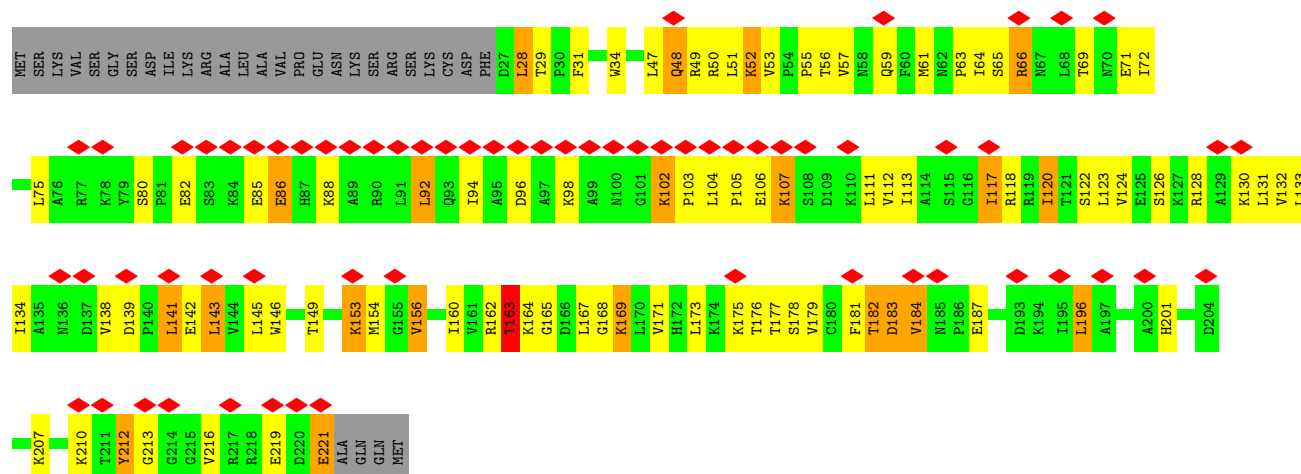


• Molecule 8: Ribosomal protein L7



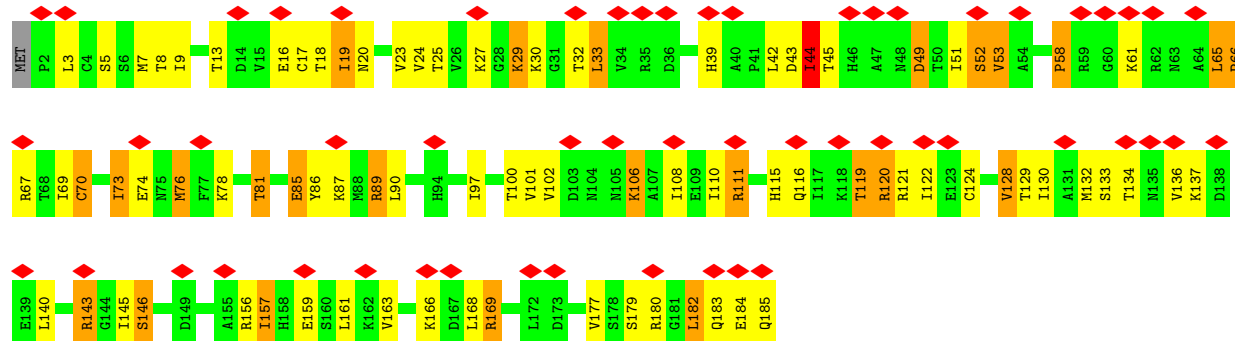
• Molecule 9: Ribosomal protein L7a





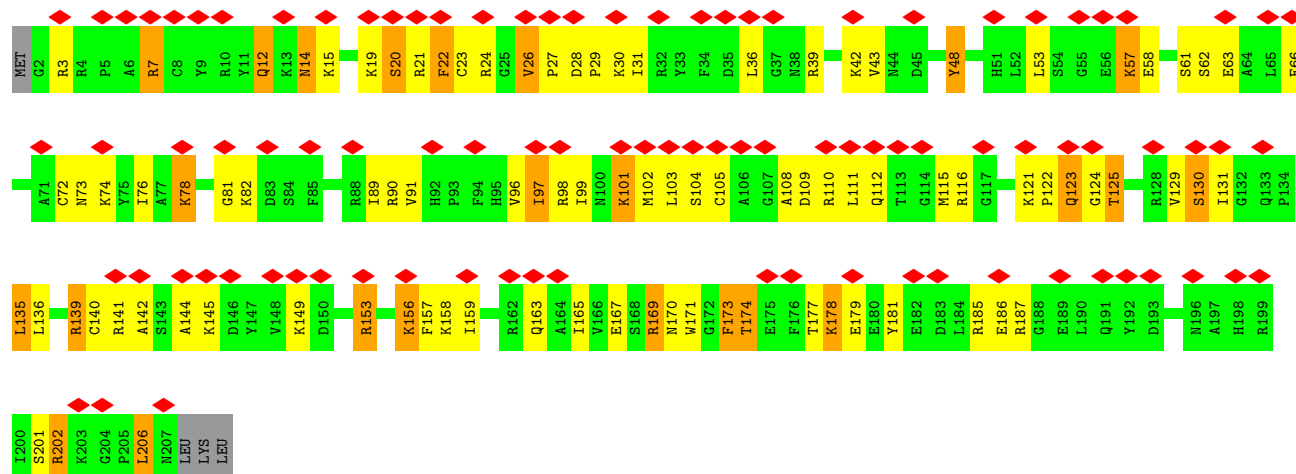
• Molecule 10: Ribosomal protein L6

Chain LJ: 30% 52% 33% 14% ..

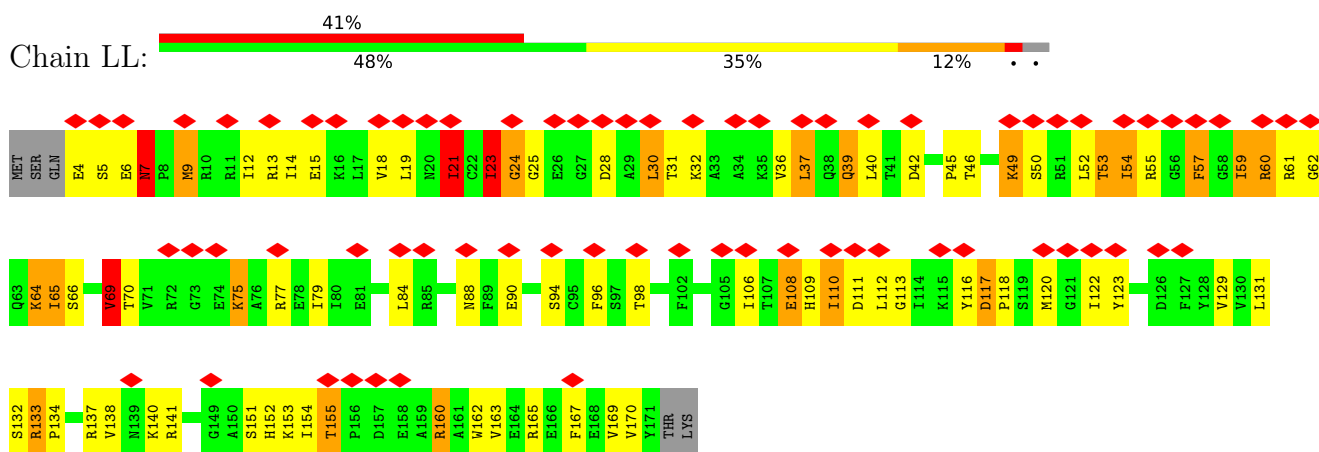


• Molecule 11: Ribosomal protein L10

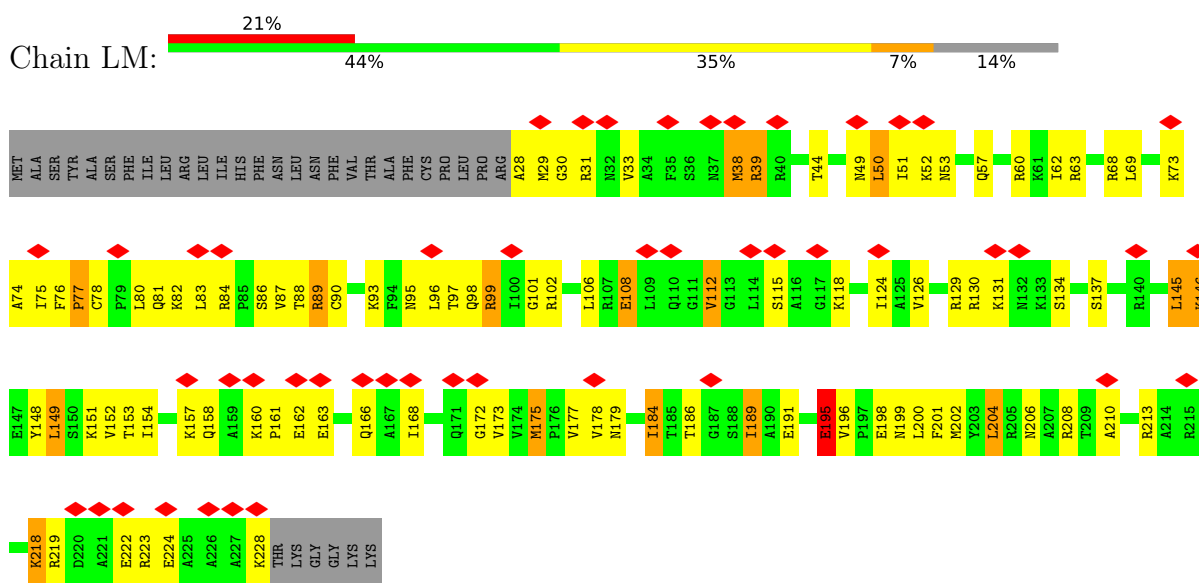
Chain LK: 45% 53% 34% 11% .



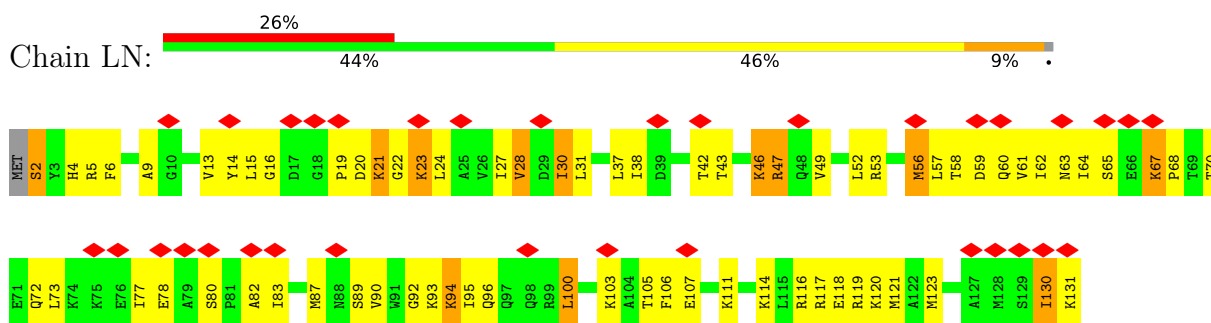
• Molecule 12: Ribosomal protein L11



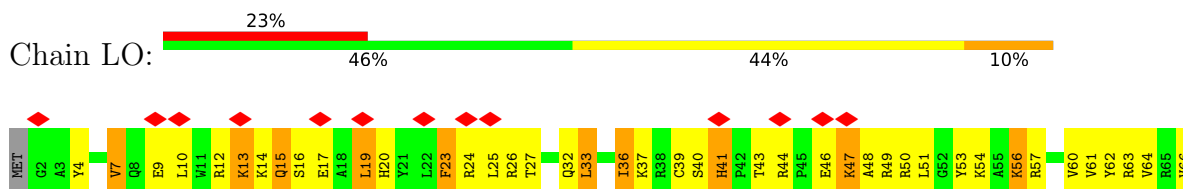
• Molecule 13: Ribosomal protein L13

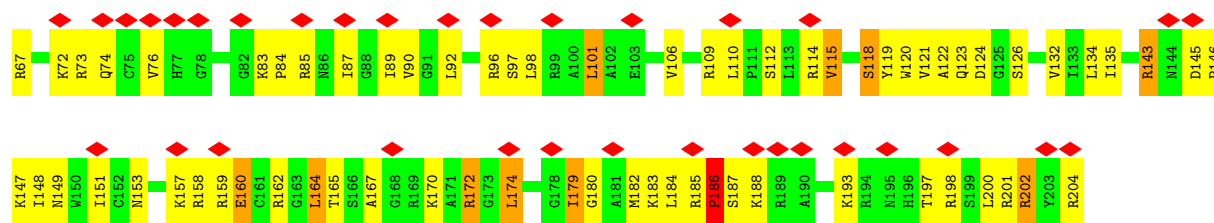


• Molecule 14: Ribosomal protein L14

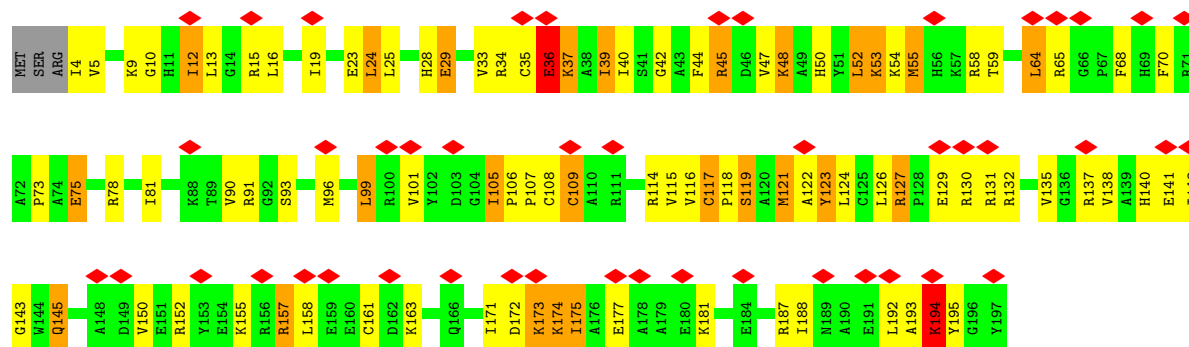


• Molecule 15: Ribosomal protein L15

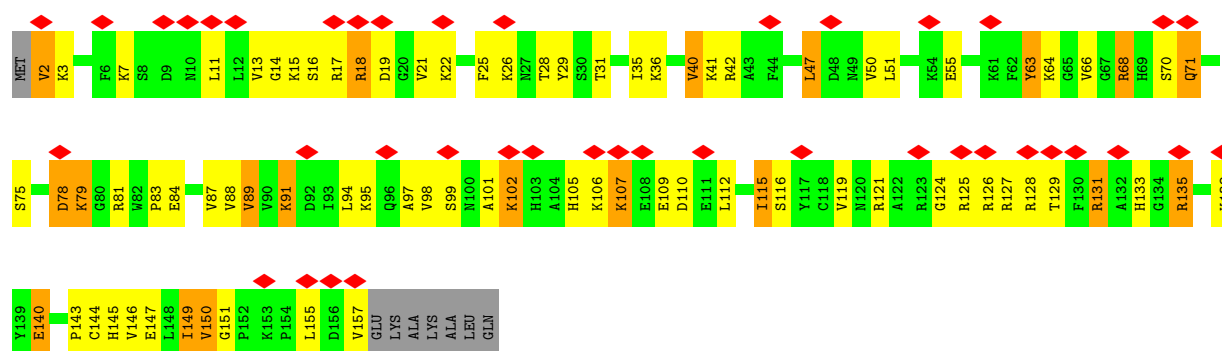




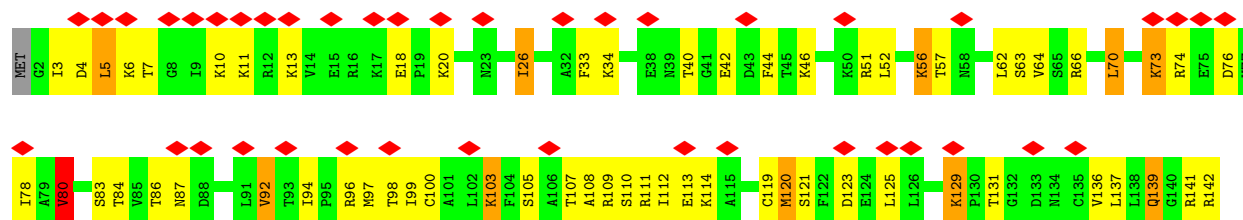
• Molecule 16: Ribosomal protein L13a

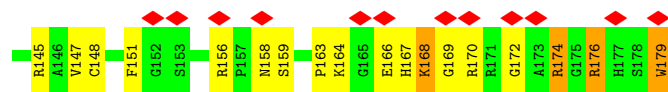


• Molecule 17: Ribosomal protein L17

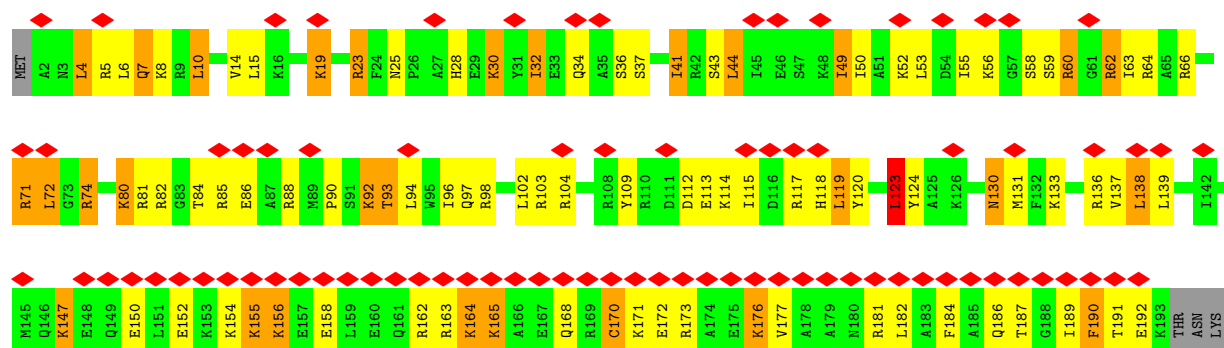
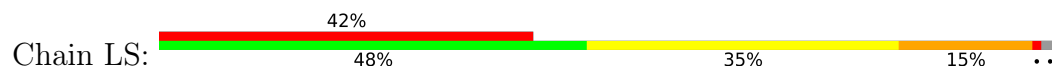


• Molecule 18: Ribosomal protein L18

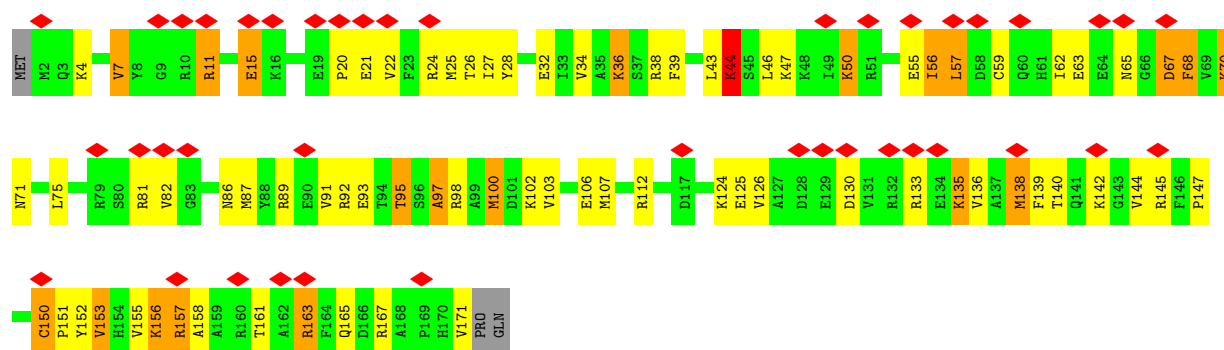




• Molecule 19: Ribosomal protein L19



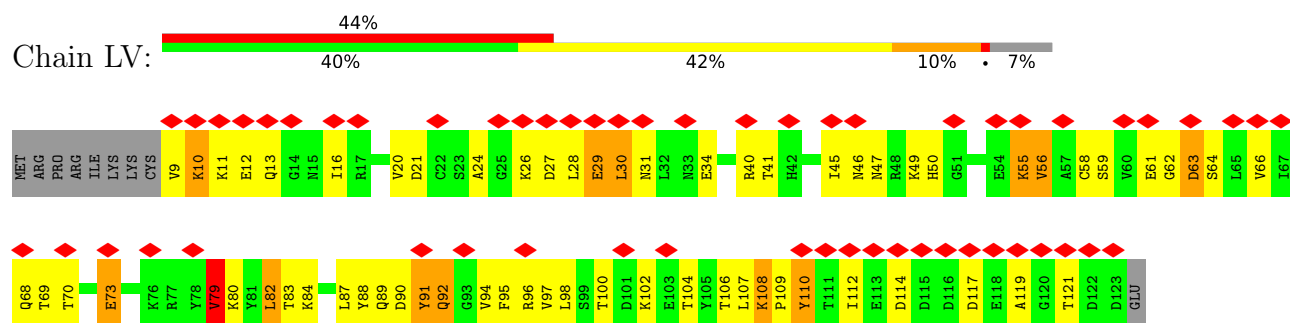
• Molecule 20: Ribosomal protein L18a



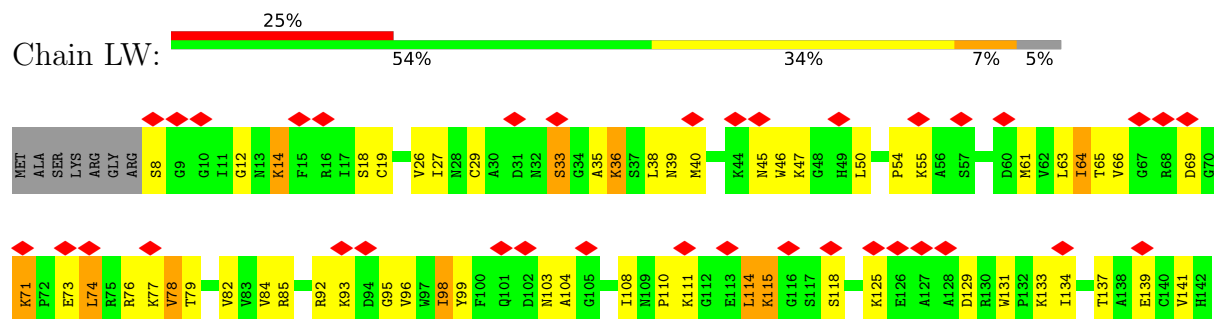
• Molecule 21: Ribosomal protein L21



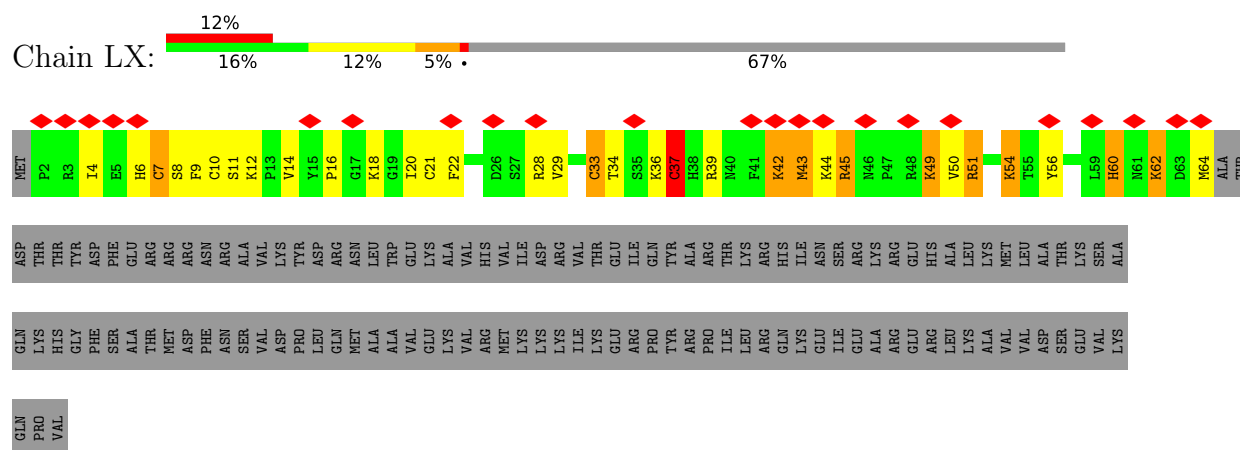
• Molecule 22: Ribosomal protein L22e



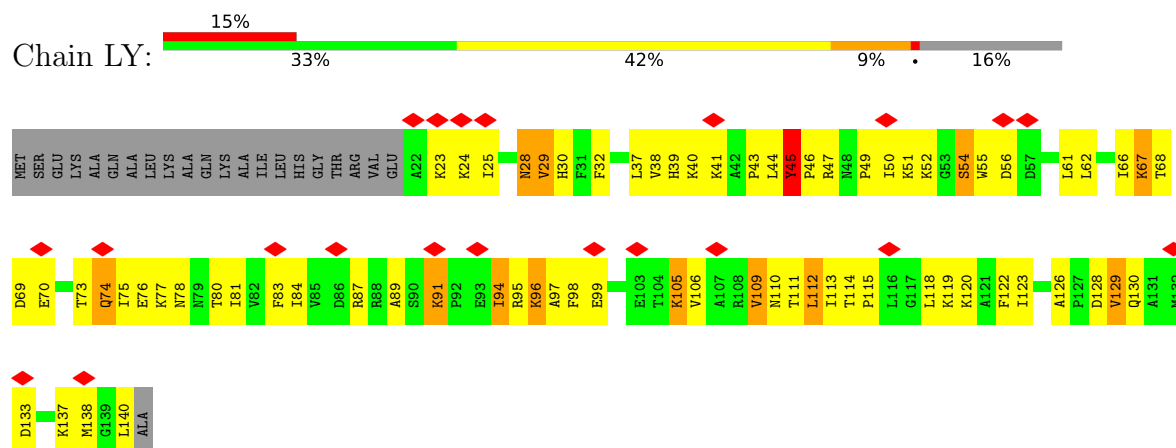
• Molecule 23: Ribosomal protein L23



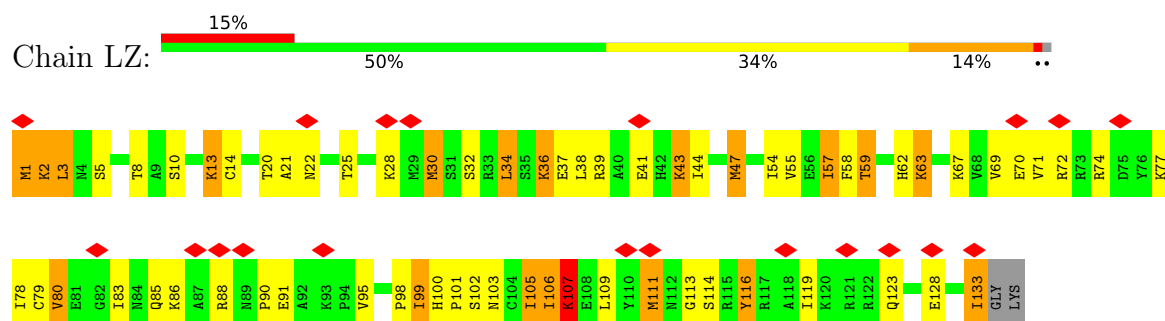
• Molecule 24: Ribosomal protein L24



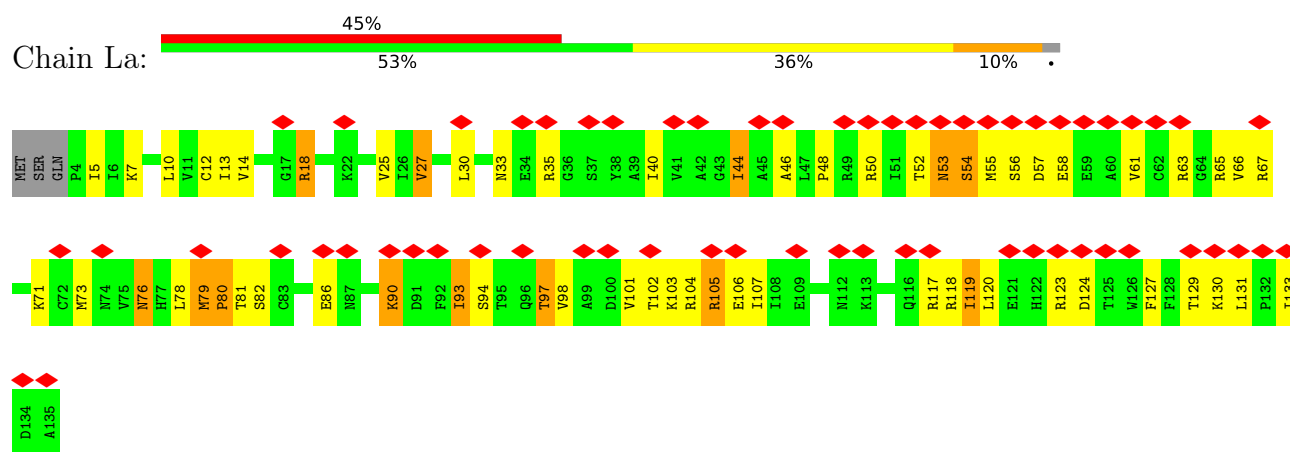
• Molecule 25: Ribosomal protein L23A



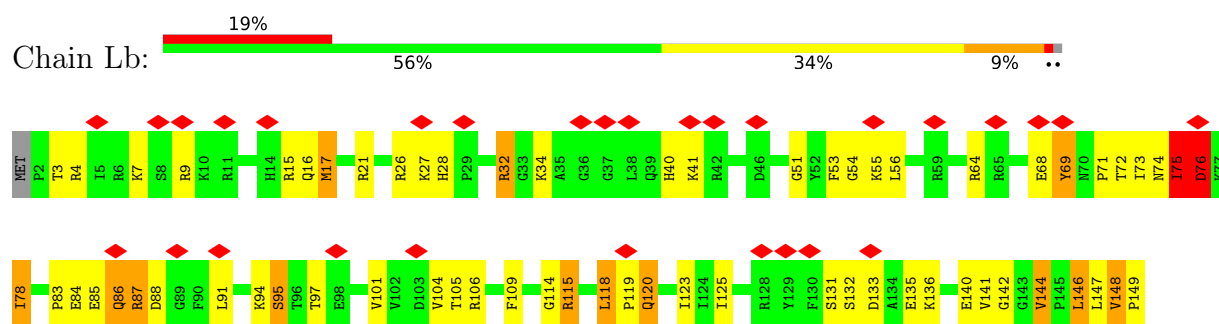
- Molecule 26: Ribosomal protein L26



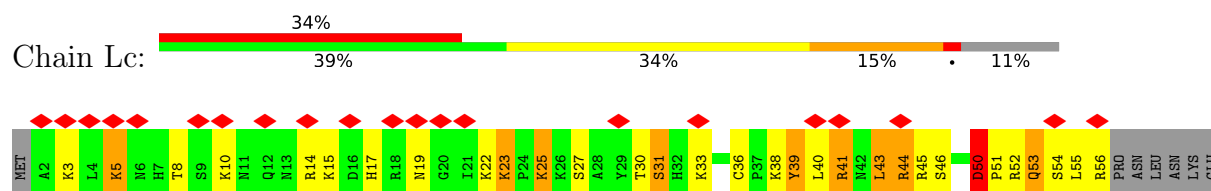
- Molecule 27: Ribosomal protein L27



- Molecule 28: Ribosomal protein L27a

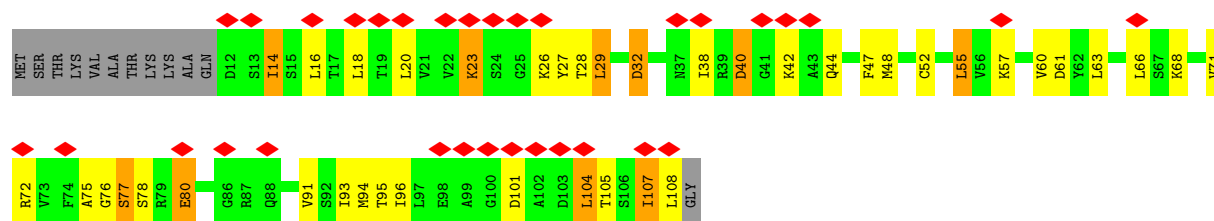


- Molecule 29: Ribosomal protein L29

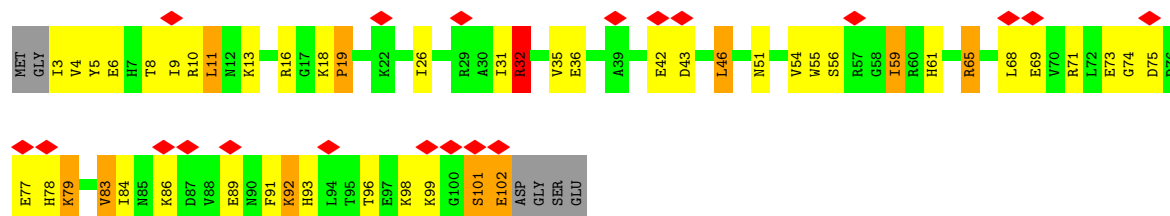


- Molecule 30: Ribosomal protein L30

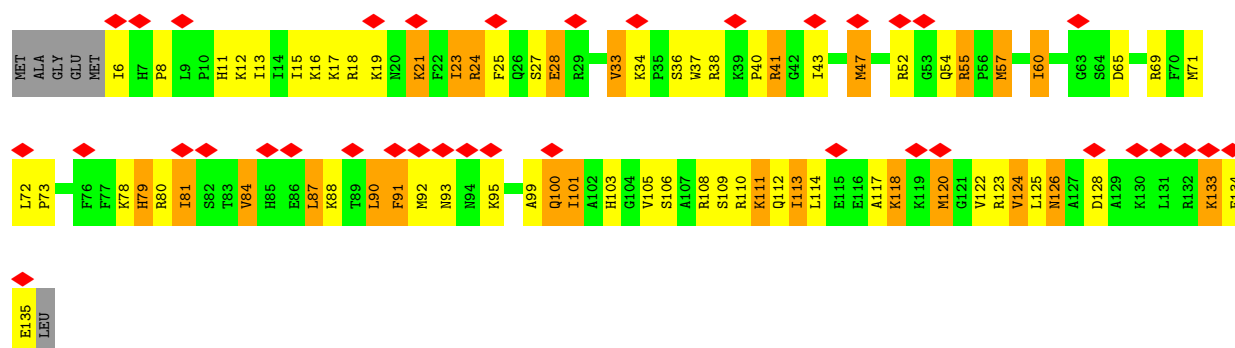
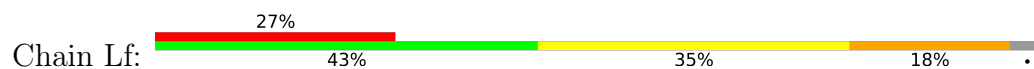




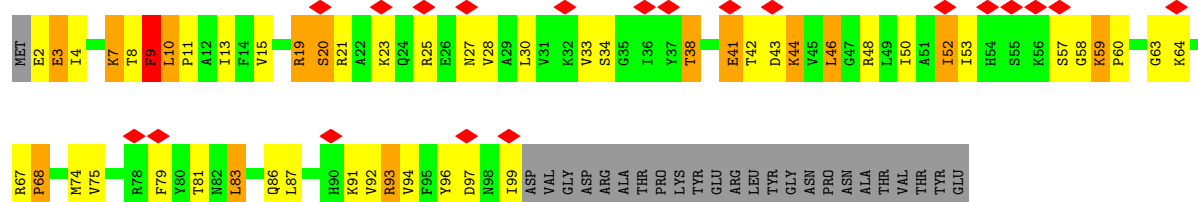
• Molecule 31: Ribosomal protein L31B



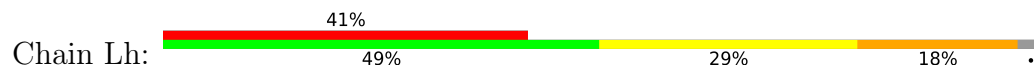
• Molecule 32: Ribosomal protein L32

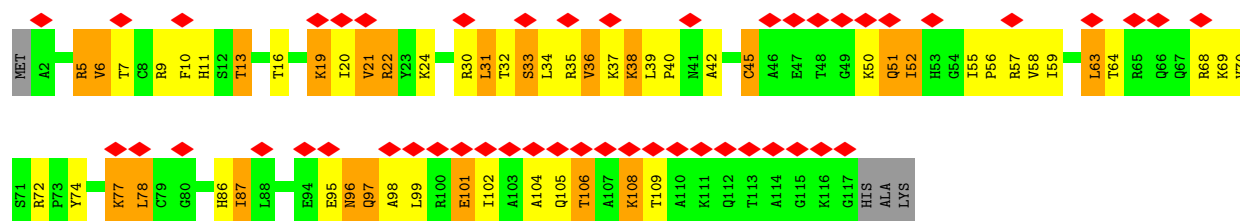


• Molecule 33: Ribosomal protein L35a

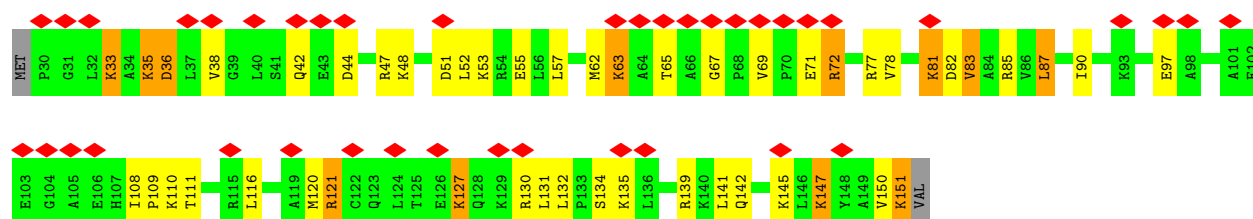


• Molecule 34: Ribosomal protein L34

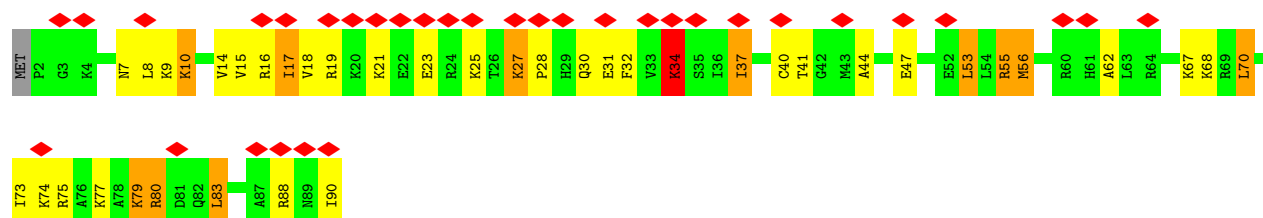




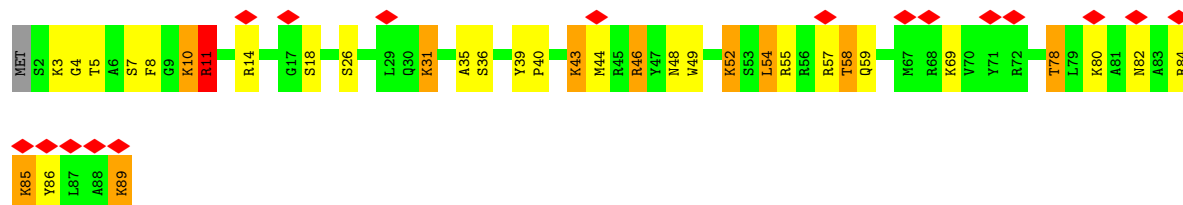
• Molecule 35: Ribosomal protein L29



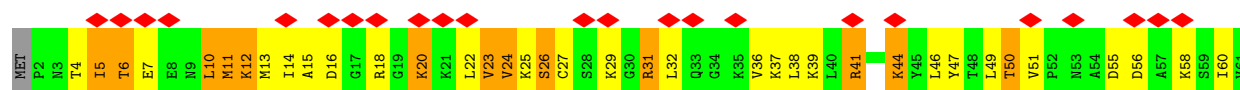
• Molecule 36: Ribosomal protein L36-1

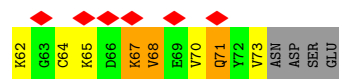


• Molecule 37: Ribosomal protein L37

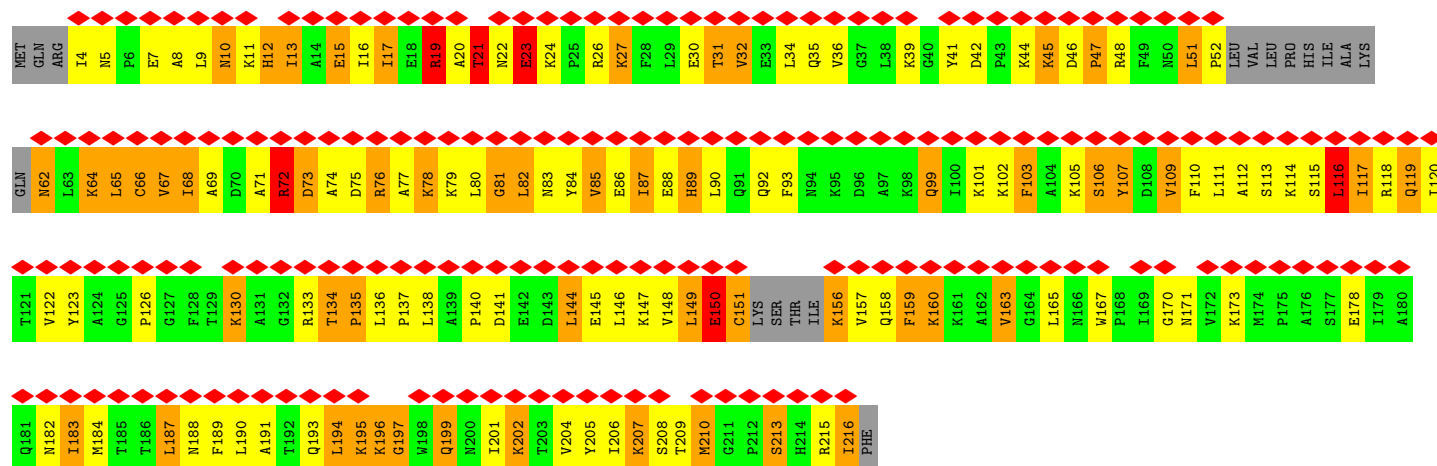
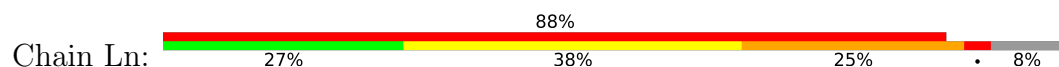


• Molecule 38: Ribosomal protein L38e

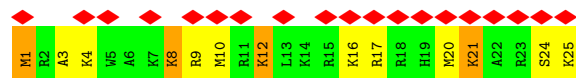
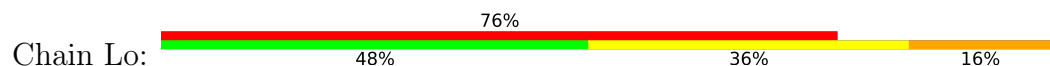




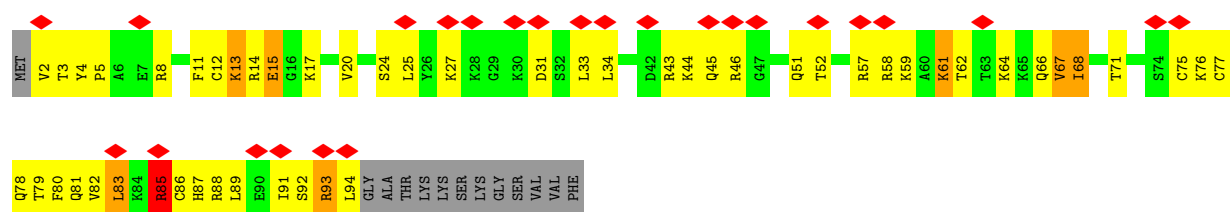
• Molecule 39: Ribosomal protein L10a



• Molecule 40: Ribosomal protein L41

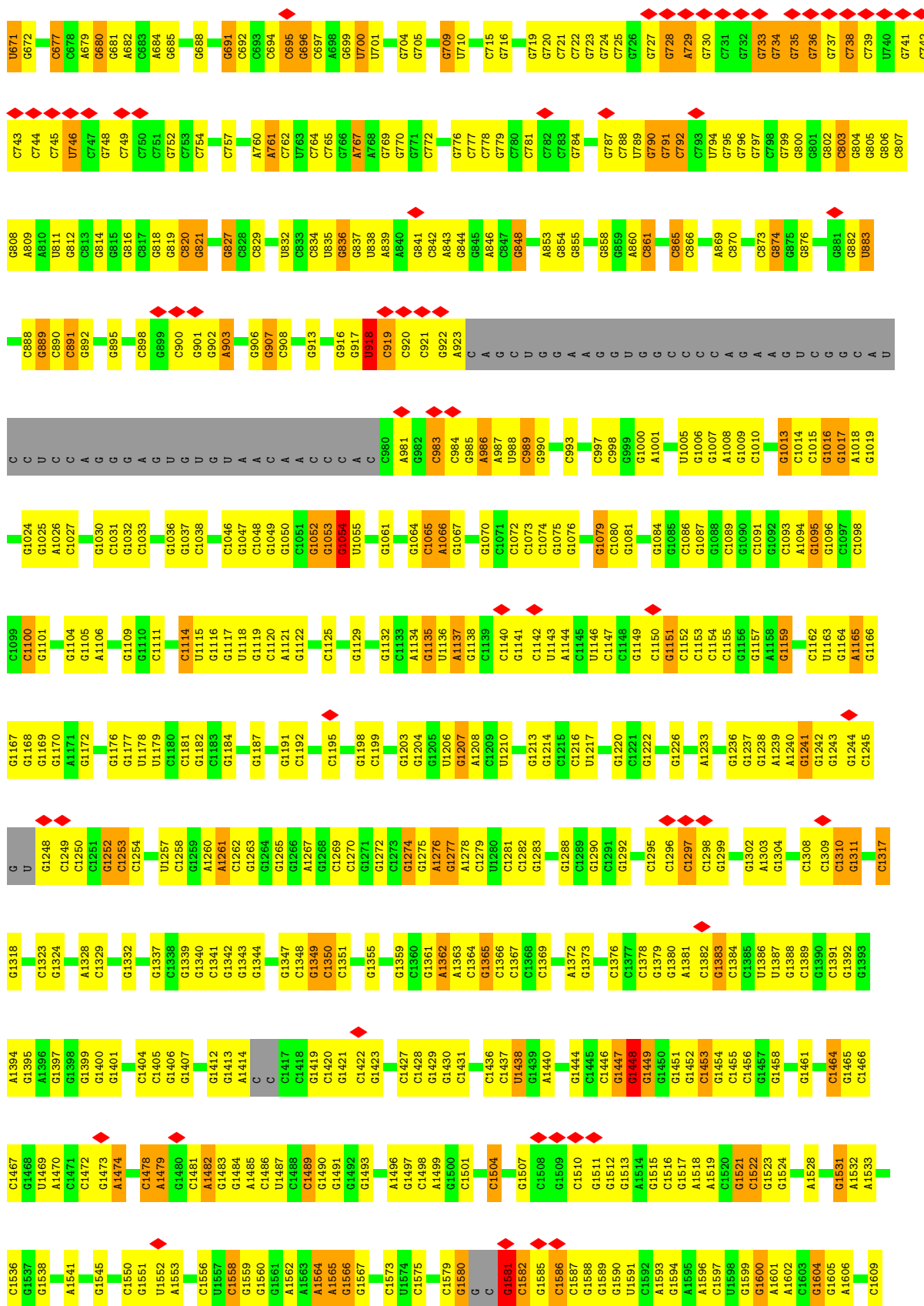


• Molecule 41: Ribosomal protein L44

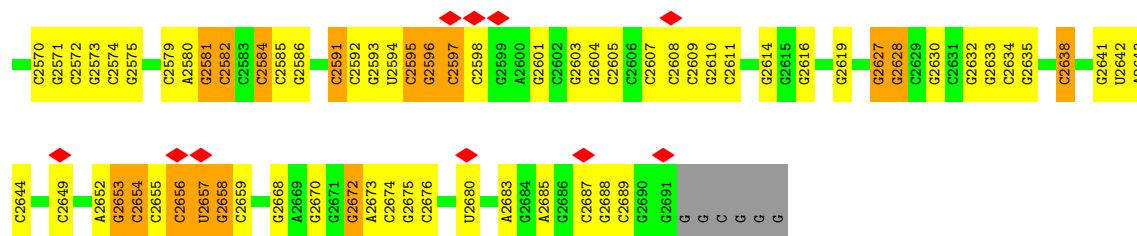


• Molecule 42: Ribosomal protein L37a

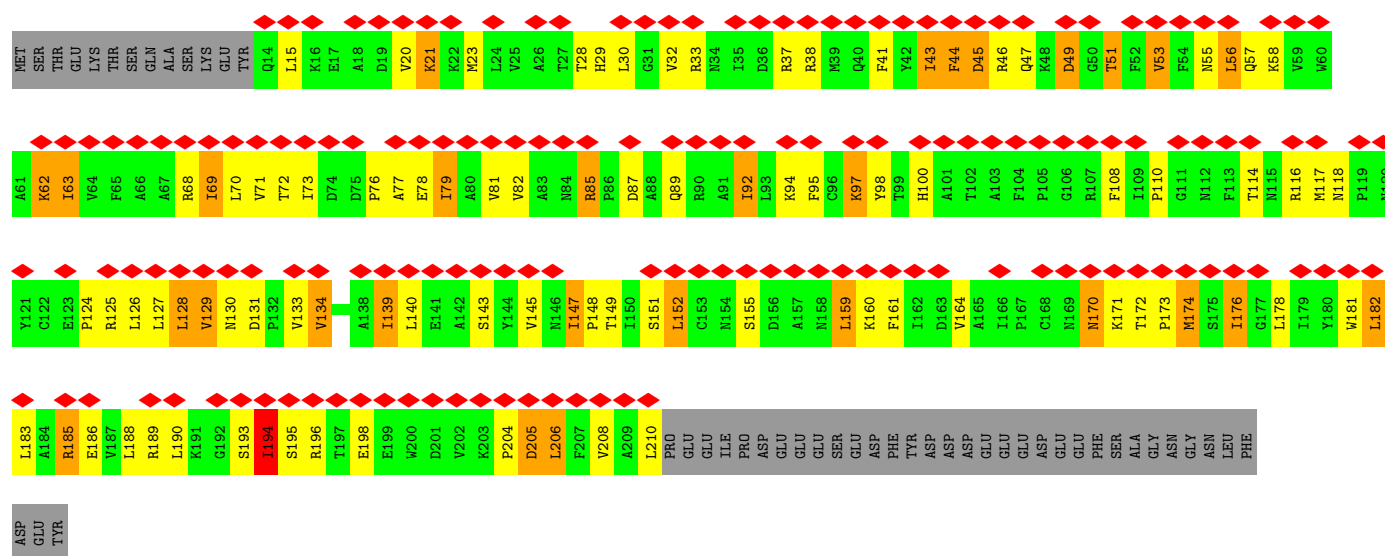




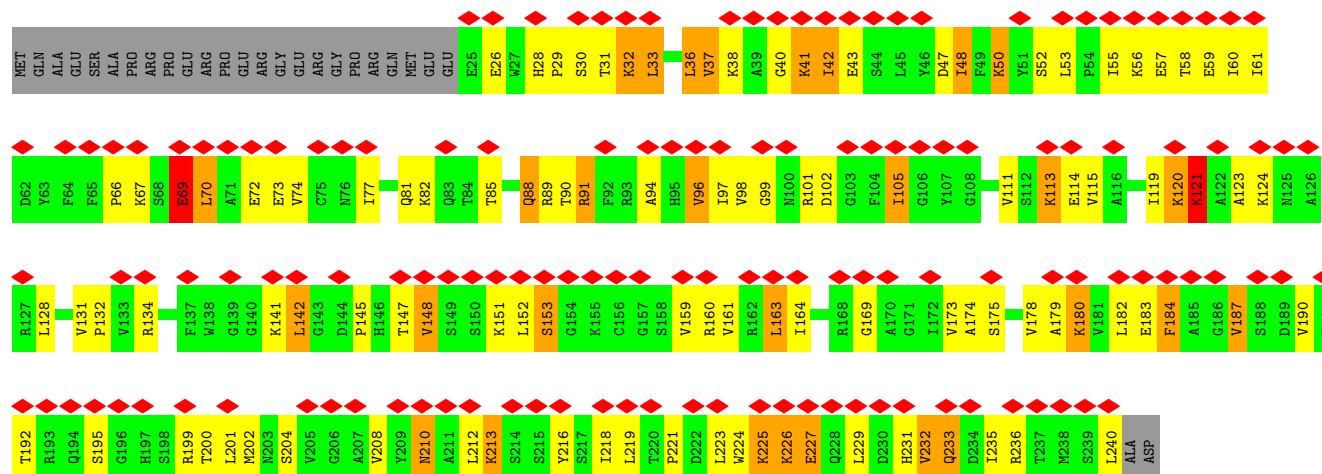
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C2410	U2411	G2412	G2413	G2414	C2415	C2416	G2417	G2418	G2419	G2420	G2421	G2422	A2424	G2427	G2428	A2429	C2430	G2431	G2434	C2437	C2438	A2439	G2440	U2441	A2442	G2448	G2449	A2450	A2451	G2456	G2457	C2458	C2459	G2462	G2463	G2464	G2465	C2466	G2467	A2470	G2471	C2472	C2473	C2474	C2475	G2479	U2480	G2481	G2482	C2483					
C2324	C2325	G2326	G2327	C2328	G2329	C2330	A2334	G2335	C2339	C2340	G2341	U2344	G2345	U2346	U2347	C2348	U2355	C2356	A2357	A2358	G2359	G2360	G2361	A2362	U2363	C2364	G2365	G2369	C2370	U2371	G2372	C2373	G2374	U2375	U2376	U2377	C2382	G2383	G2388	A2393	G2394	A2398	G2399	A2400	U2401	U2402	U2403	A2404	C2405						
C2256	C2259	G2260	A2261	G2262	C2263	G2264	C2265	G2268	C2269	A2270	G2271	G2272	G2273	A2274	G2275	G2276	C2277	G2278	U2282	U2283	U2284	U2285	G2286	C2289	G2290	U2291	U2292	G2293	G2294	A2295	U2296	G2297	U2298	C2299	U2303	C2304	U2305	U2306	C2307	U2309	A2310	C2311	U2314	C2315	G2316	G2317	G2318	G2319	C2320	G2321	C2322	A2323			
G2185	A2186	C2192	G2193	C2194	C2195	G2196	C2199	C2200	G2201	G2202	C2203	C2204	G2205	C2206	G2207	G2208	G2209	C2210	G2211	C2212	G2213	G2214	A2215	G2216	G2217	U2218	G2219	G2220	C2221	A2222	G2223	A2224	A2225	A2226	A2227	U2230	A2231	C2232	G2233	A2234	G2239	A2240	U2241	A2242	A2243	C2244	U2245	G2246	U2249	U2250	G2251	G2254	C2255		
G2113	G2114	A2115	G2116	G2117	A2118	G2119	A2120	A2121	G2122	A2126	C2127	A2128	A2129	G2130	C2131	C2132	C2133	G2134	C2135	C2136	C2137	C2138	A2139	C2144	G2145	C2146	C2150	G2151	G2152	U2153	C2154	C2155	G2158	C2159	G2160	G2161	G2162	G2163	G2164	C2168	G2169	A2170	A2171	C2174	G2175	G2176	G2177	G2178	C2179	A2182	C2183	C2184			
G2043	G2044	G2045	C2046	G2047	G2048	C2049	G2050	C2051	G2052	C2053	G2054	U2055	G2056	C2057	U2058	A2059	A2061	C2062	G2065	A2066	G2067	C2068	G2072	G2073	C2074	U2076	C2079	A2080	C2081	G2082	G2083	C2084	G2085	C2090	A2091	G2092	C2093	G2094	A2095	A2098	G2101	A2102	G2103	A2104	C2105	C2106	U2107	C2108	G2111	C2112					
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U1757	A1758	U1688	G1760	G1761	U1762	A1763	G1764	A1767	A1768	A1769	C1772	C1773	U1774	C1775	G1776	U1777	C1778	G1779	G1780	G1781	C1782	A1783	U1786	C1789	G1790	G1791	C1792	G1793	U1794	G1795	C1796	A1797	U1798	A1801	U1802	G1803	G1804	A1805	G1806	C1807	A1808	G1811	A1812	U1822	G1823	U1824	C1827	G1828	A1829	C1832					
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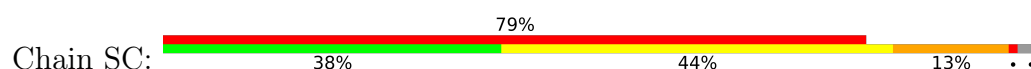
• Molecule 45: Ribosomal protein SA

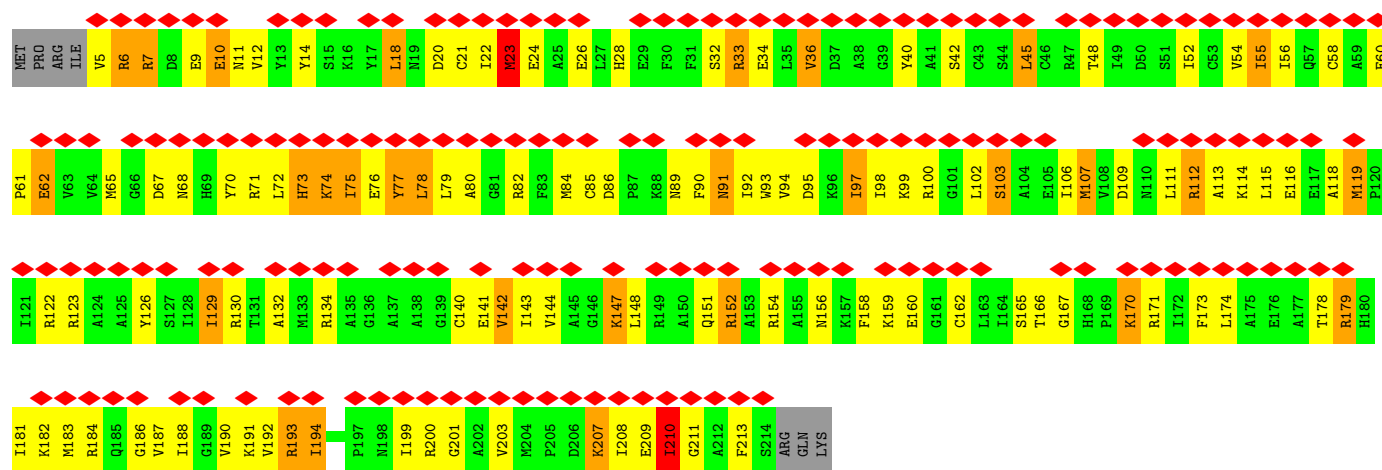


• Molecule 46: Ribosomal protein S2

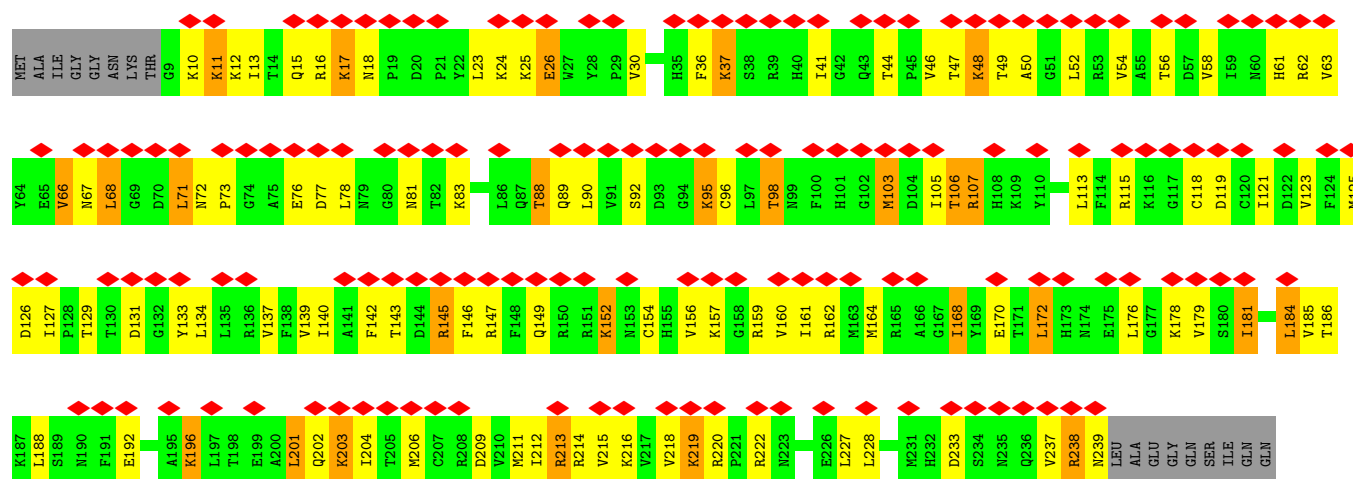


• Molecule 47: Ribosomal protein S3

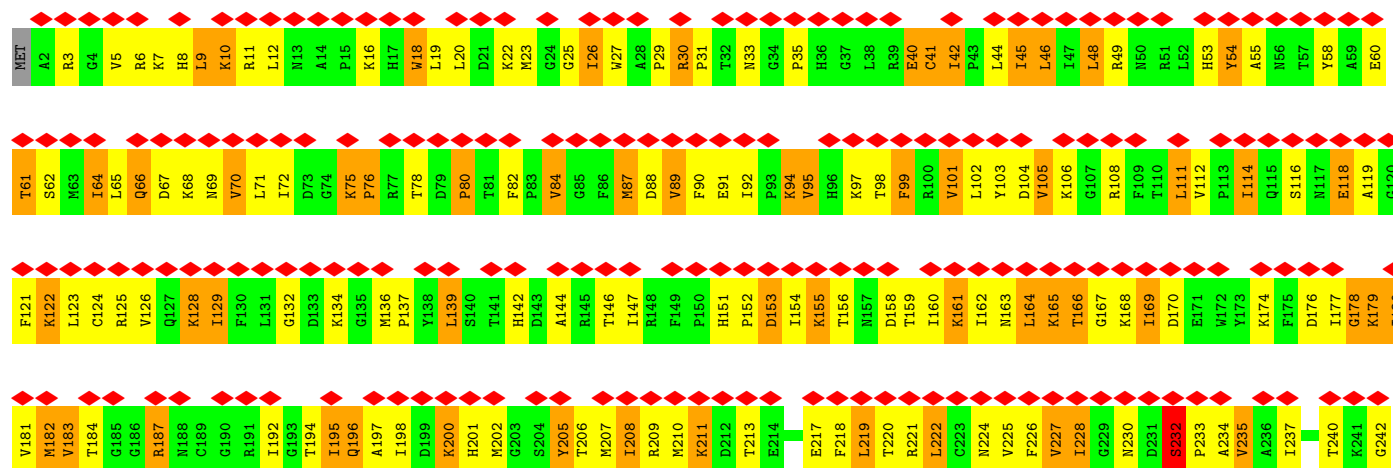
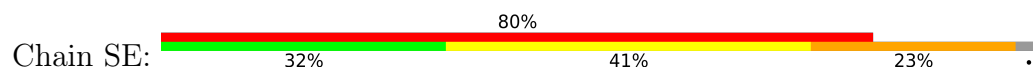


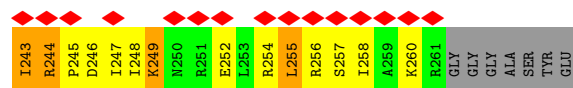


• Molecule 48: Ribosomal protein S3a

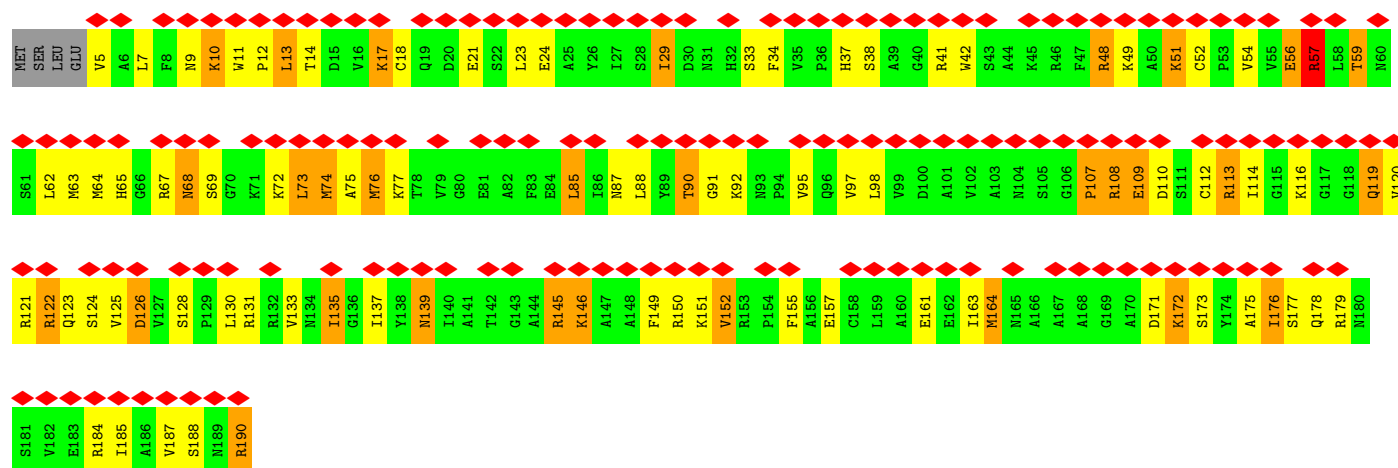
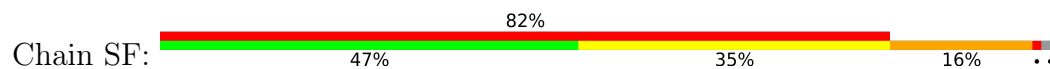


• Molecule 49: Ribosomal protein S4

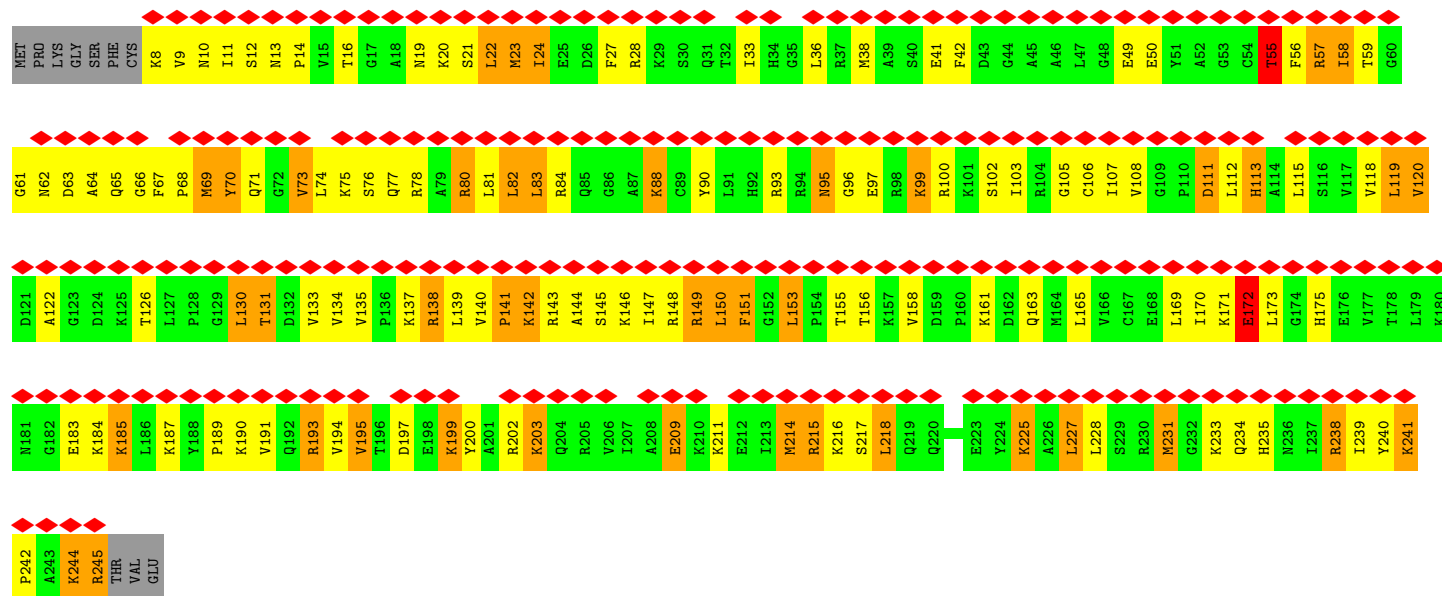
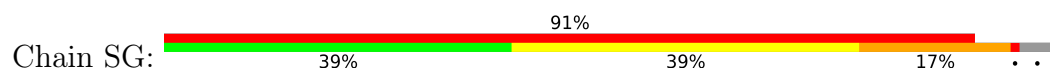




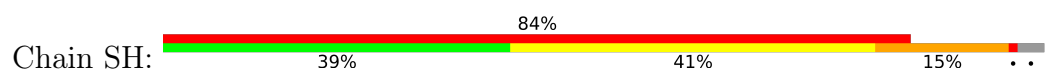
• Molecule 50: Ribosomal protein S5

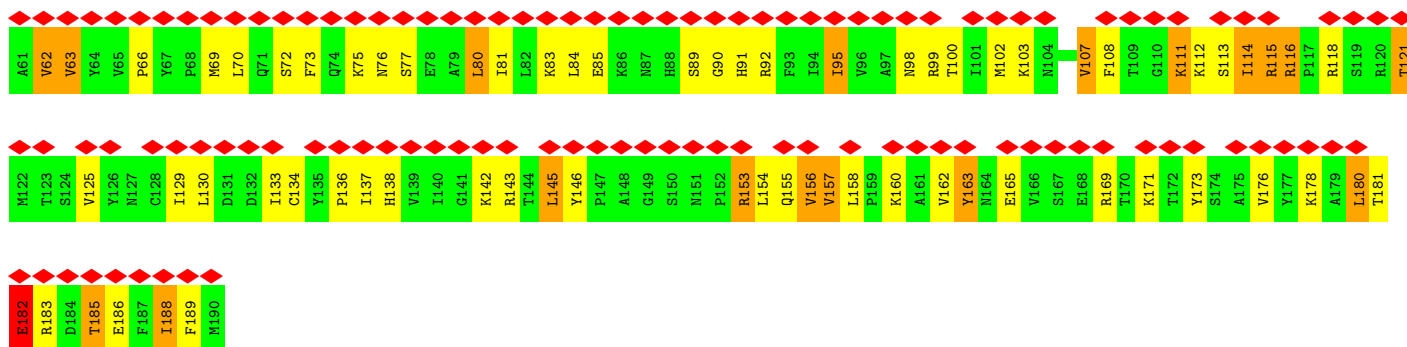


• Molecule 51: Ribosomal protein S6

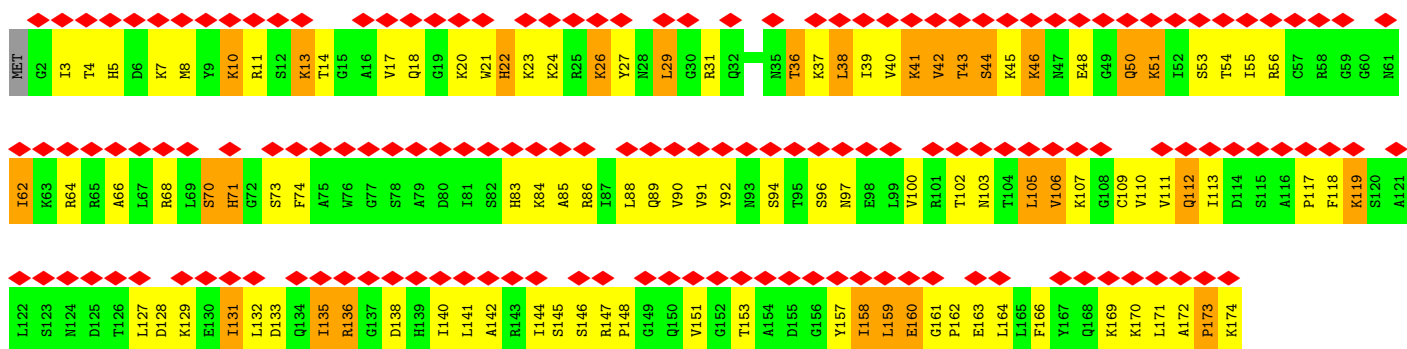
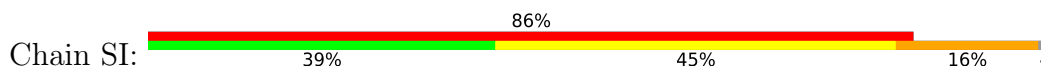


• Molecule 52: Ribosomal protein S7





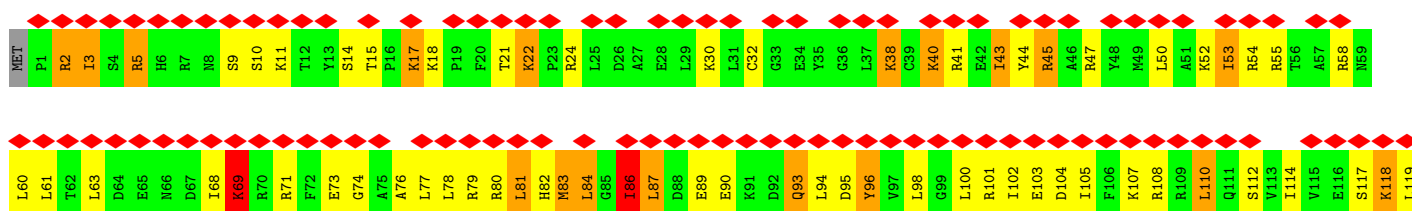
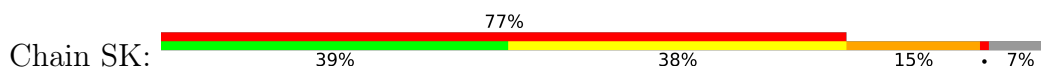
• Molecule 53: Ribosomal protein S8



• Molecule 54: Ribosomal protein S15A



• Molecule 55: Ribosomal protein S9



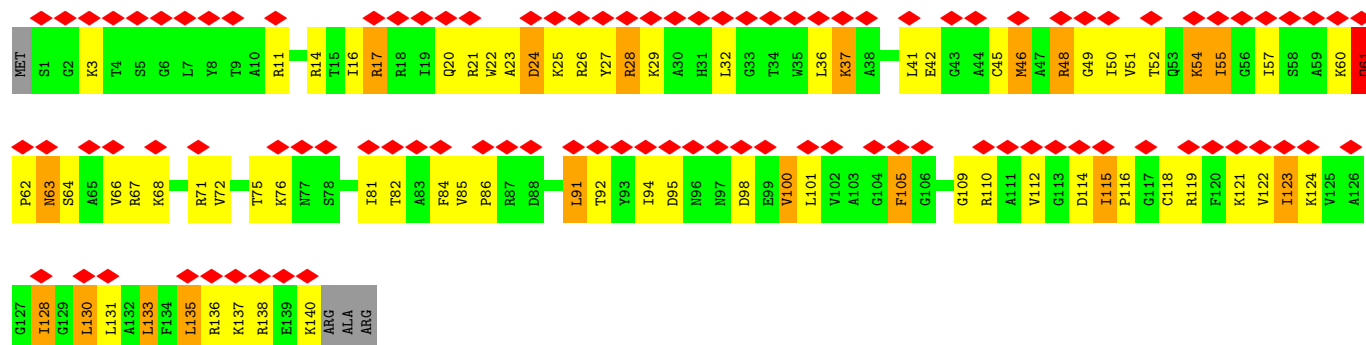
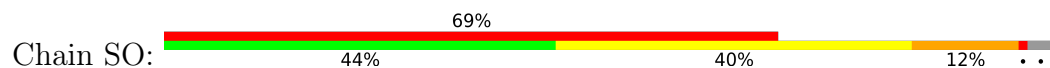
- Molecule 56: Ribosomal protein S10B



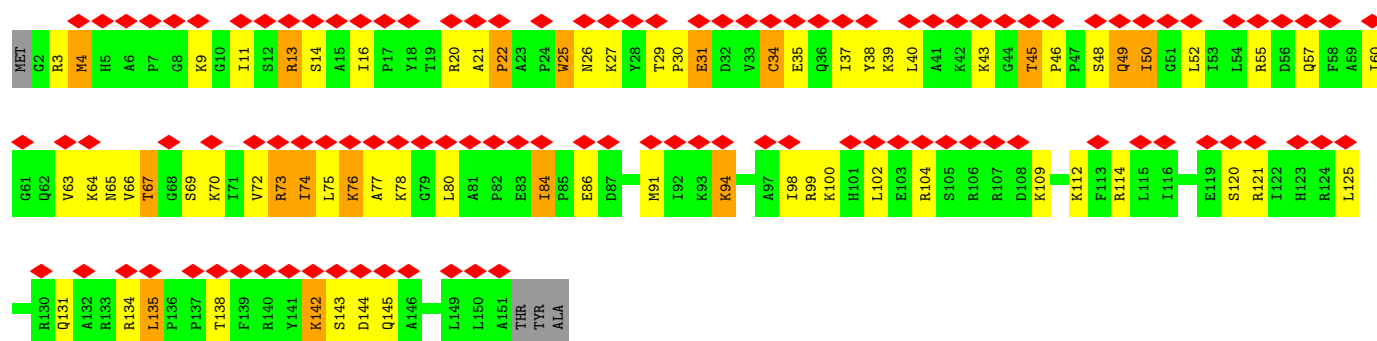
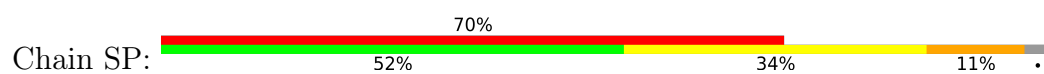
- Molecule 57: Ribosomal protein S11



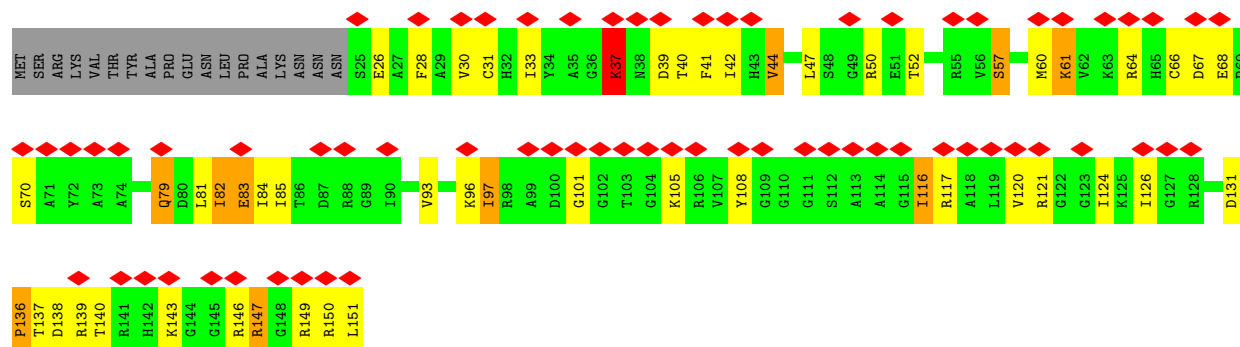
- Molecule 58: Ribosomal protein S23



- Molecule 59: Ribosomal protein S13



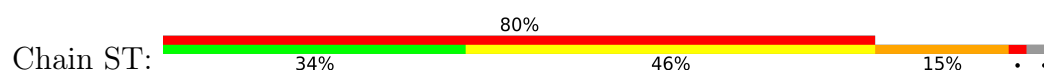
• Molecule 60: Ribosomal protein S14



• Molecule 61: Ribosomal protein S15

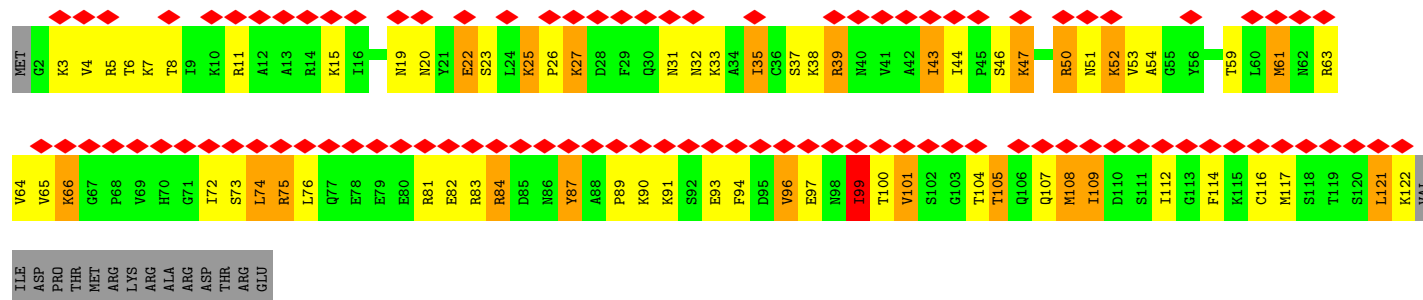


• Molecule 62: Ribosomal protein S16

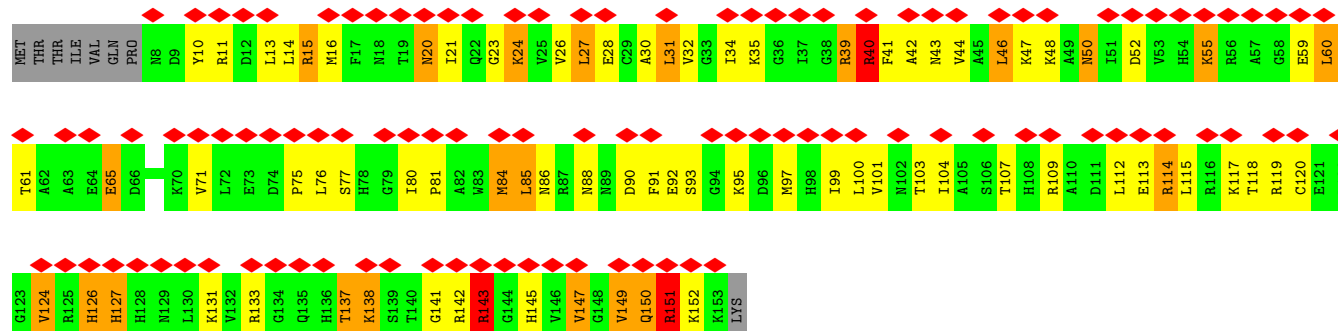
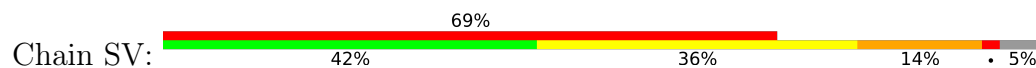




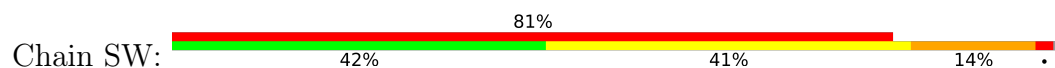
• Molecule 63: Ribosomal protein S17



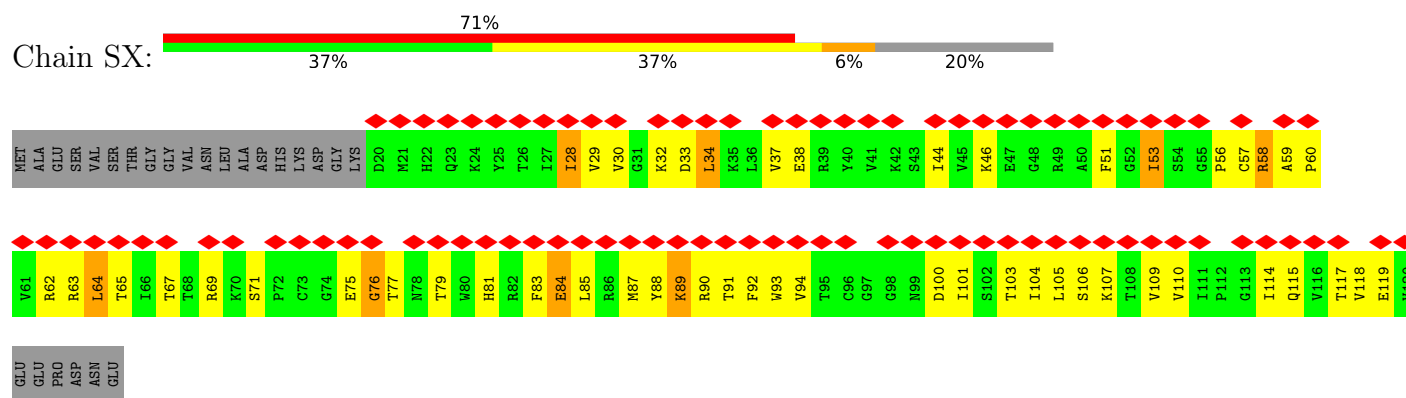
• Molecule 64: Ribosomal protein S18



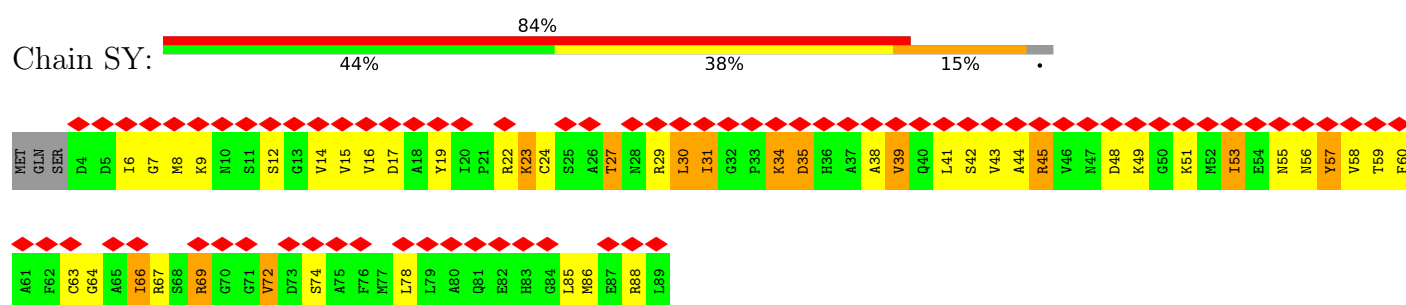
• Molecule 65: Ribosomal protein S19e



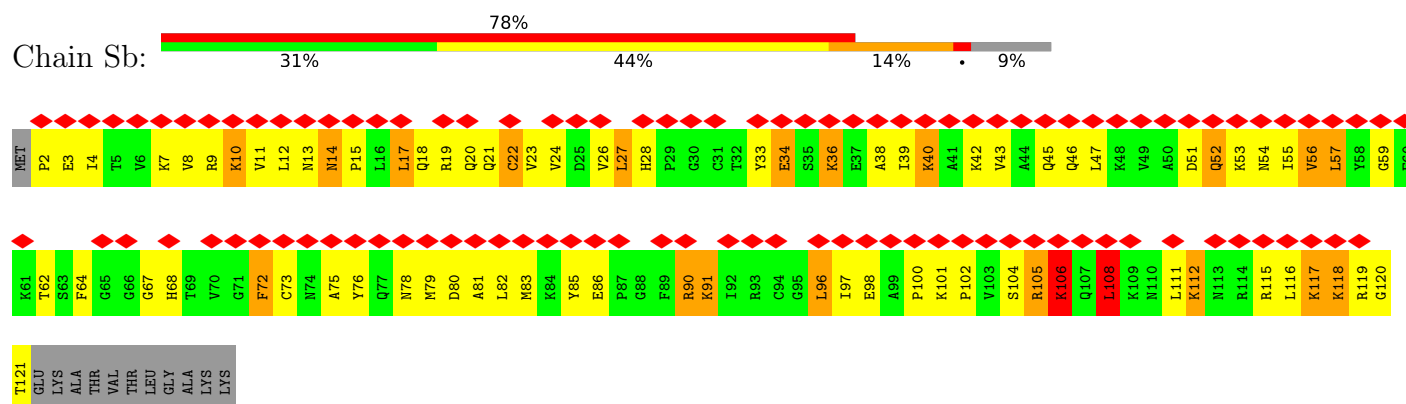
- Molecule 66: Ribosomal protein S20



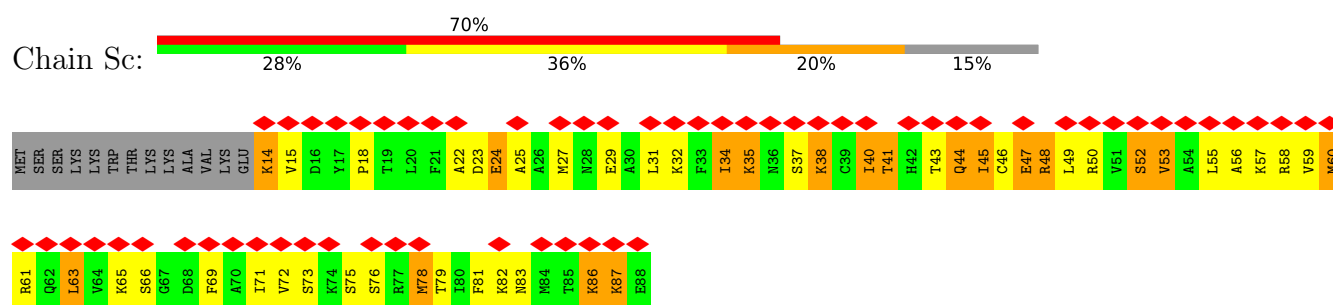
- Molecule 67: Ribosomal protein S21



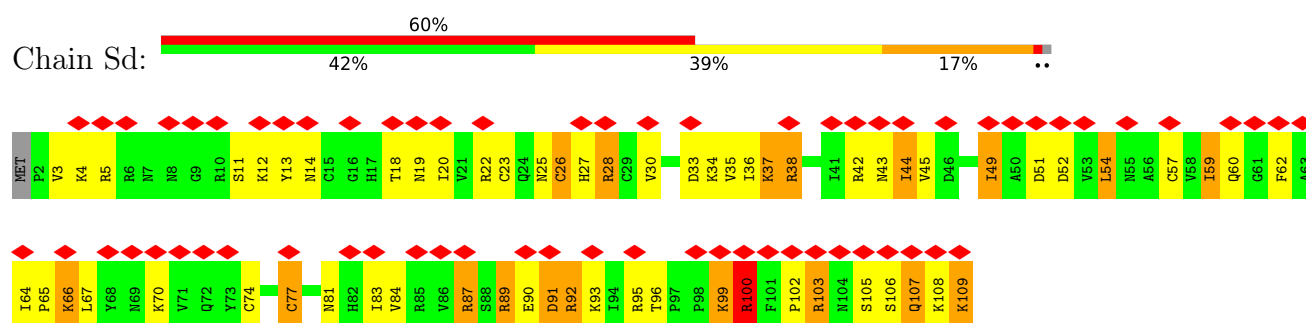
- Molecule 68: Ribosomal protein S24



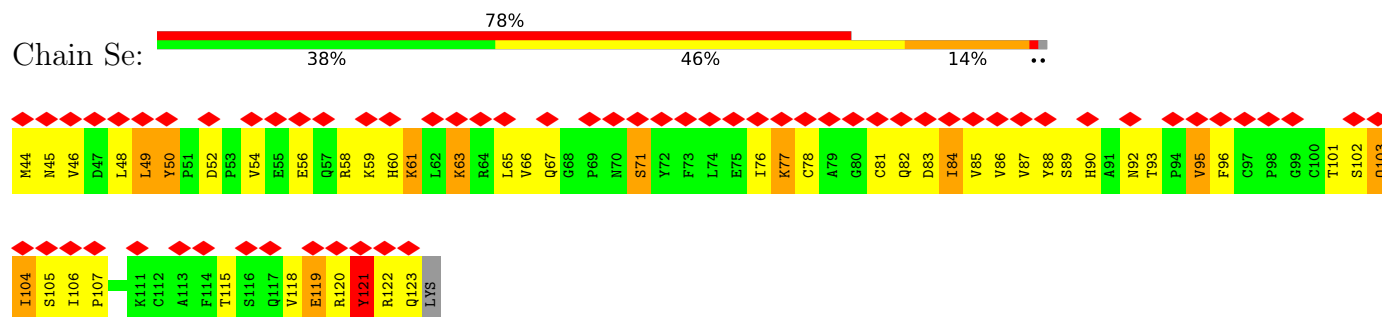
- Molecule 69: Ribosomal protein S25



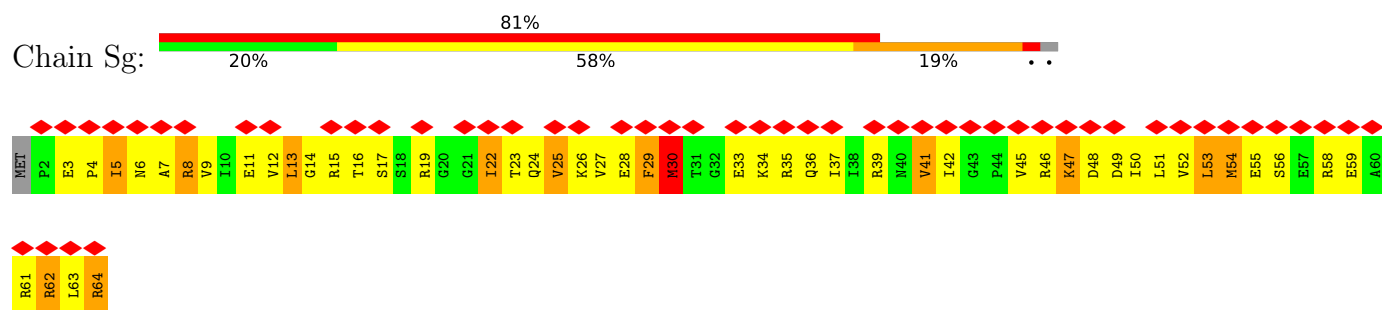
- Molecule 70: Ribosomal protein S26



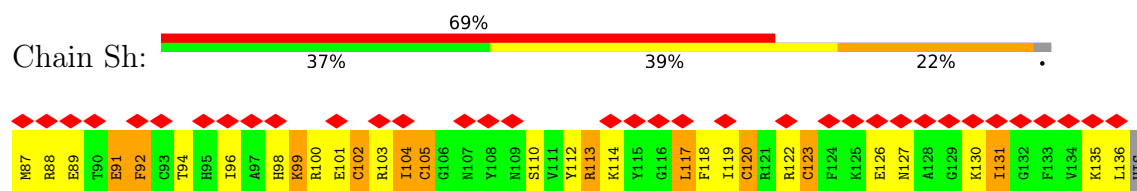
• Molecule 71: Ribosomal protein S27



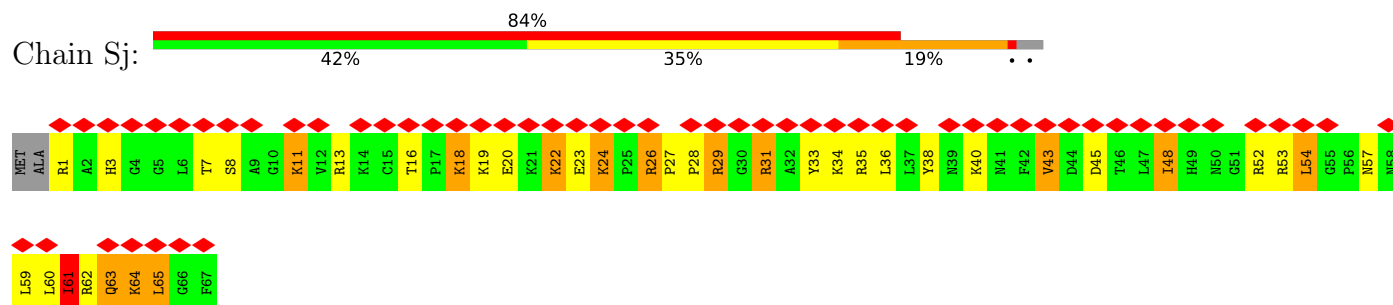
• Molecule 72: Ribosomal protein S28



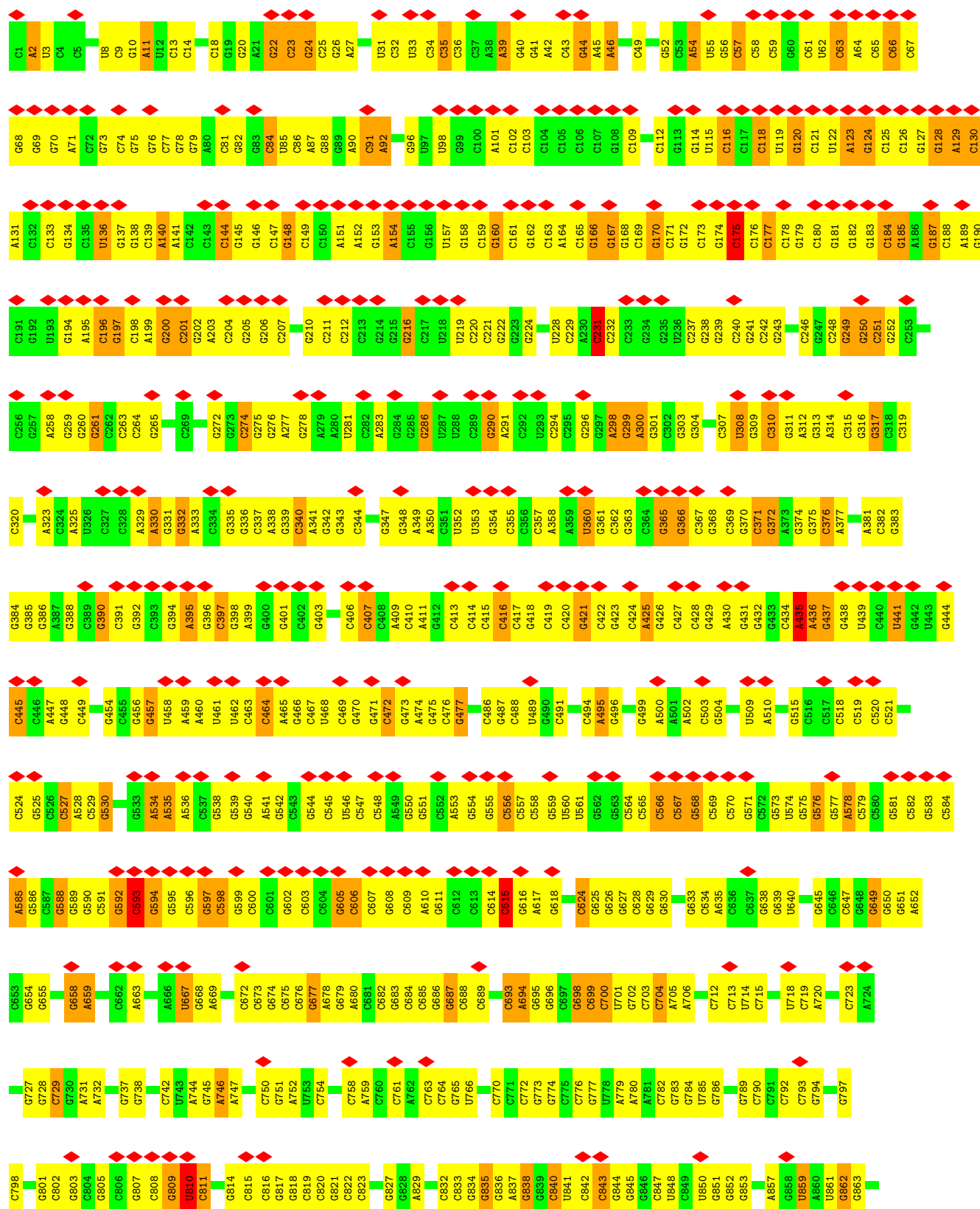
• Molecule 73: Ribosomal protein S29A

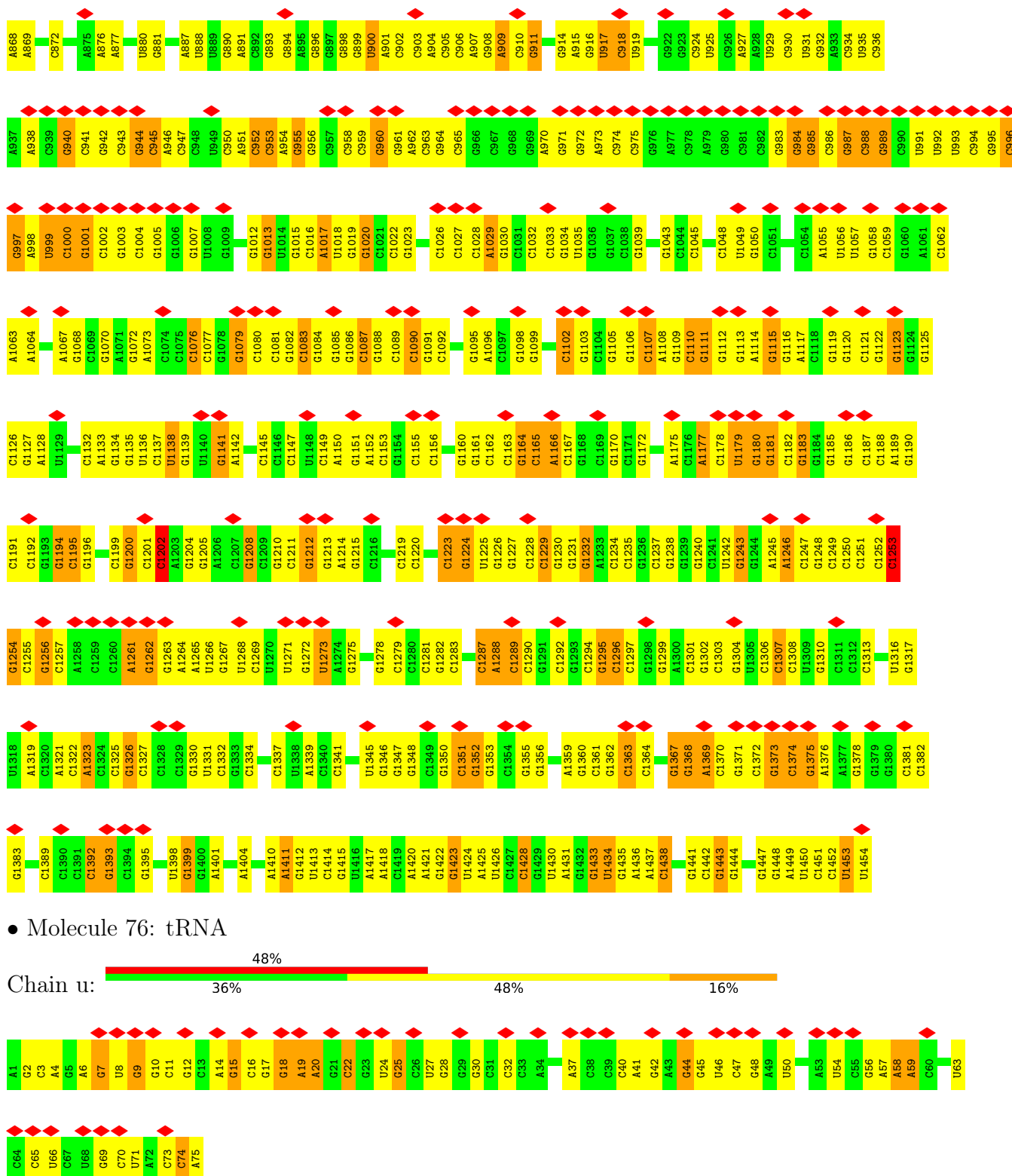


• Molecule 74: Ribosomal protein S30



• Molecule 75: Small Subunit rRNA

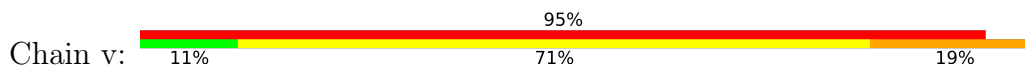


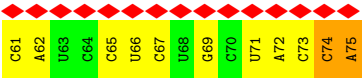


- Molecule 76: tRNA

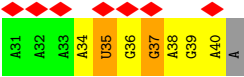


- Molecule 77: tRNA





● Molecule 78: mRNA



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	4500	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	30.0	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	1900	Depositor
Magnification	Not provided	
Image detector	GATAN K2 BASE (4k x 4k)	Depositor
Maximum map value	13.691	Depositor
Minimum map value	-8.031	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	4	Depositor
Map size (Å)	410.0, 410.0, 410.0	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.82, 0.82, 0.82	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	LA	0.94	0/1919	1.41	4/2577 (0.2%)
2	LB	0.91	0/3058	1.43	10/4129 (0.2%)
3	LC	0.89	0/2506	1.42	10/3400 (0.3%)
4	LD	0.58	0/3393	0.80	1/5292 (0.0%)
5	LE	0.55	0/2798	0.78	1/4361 (0.0%)
6	LF	0.86	0/2398	1.42	9/3216 (0.3%)
7	LG	0.87	0/450	1.36	0/601
8	LH	0.87	0/1772	1.46	10/2389 (0.4%)
9	LI	0.89	0/1583	1.45	3/2140 (0.1%)
10	LJ	0.89	0/1479	1.41	9/1997 (0.5%)
11	LK	0.89	0/1708	1.38	6/2288 (0.3%)
12	LL	0.86	0/1374	1.40	10/1845 (0.5%)
13	LM	0.89	0/1628	1.46	8/2180 (0.4%)
14	LN	0.88	0/1037	1.40	1/1390 (0.1%)
15	LO	0.86	0/1751	1.37	6/2346 (0.3%)
16	LP	0.87	0/1610	1.46	16/2160 (0.7%)
17	LQ	0.88	0/1280	1.46	1/1713 (0.1%)
18	LR	0.88	0/1425	1.39	3/1907 (0.2%)
19	LS	0.85	0/1609	1.39	7/2129 (0.3%)
20	LT	0.88	0/1457	1.38	3/1957 (0.2%)
21	LU	0.90	0/1290	1.38	3/1735 (0.2%)
22	LV	0.85	0/951	1.43	4/1281 (0.3%)
23	LW	0.92	0/1049	1.42	2/1414 (0.1%)
24	LX	0.84	0/553	1.57	8/736 (1.1%)
25	LY	0.92	0/982	1.38	3/1326 (0.2%)
26	LZ	0.88	0/1091	1.42	4/1454 (0.3%)
27	La	0.91	0/1069	1.42	6/1442 (0.4%)
28	Lb	0.88	0/1231	1.40	3/1647 (0.2%)
29	Lc	0.87	0/463	1.42	4/612 (0.7%)
30	Ld	0.90	0/739	1.47	7/1000 (0.7%)
31	Le	0.89	0/832	1.38	4/1118 (0.4%)
32	Lf	0.87	0/1101	1.35	2/1467 (0.1%)
33	Lg	0.87	0/793	1.38	4/1062 (0.4%)
34	Lh	0.93	0/929	1.43	4/1247 (0.3%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
35	Li	0.86	0/996	1.40	2/1328 (0.2%)
36	Lj	0.85	0/741	1.40	3/982 (0.3%)
37	Lk	0.90	0/727	1.40	4/963 (0.4%)
38	Ll	0.85	0/562	1.38	1/749 (0.1%)
39	Ln	0.99	0/1621	1.53	19/2183 (0.9%)
40	Lo	0.76	0/229	1.23	0/291
41	Lp	0.85	0/778	1.43	4/1029 (0.4%)
42	Lq	0.87	0/717	1.54	3/955 (0.3%)
43	Ls	0.92	0/392	1.41	1/522 (0.2%)
44	Lt	0.58	0/62214	0.82	57/97098 (0.1%)
45	SA	0.93	0/1612	1.44	10/2190 (0.5%)
46	SB	0.94	0/1700	1.45	6/2293 (0.3%)
47	SC	0.92	0/1692	1.48	11/2272 (0.5%)
48	SD	0.89	0/1903	1.38	5/2562 (0.2%)
49	SE	0.97	0/2131	1.47	14/2874 (0.5%)
50	SF	0.89	0/1465	1.50	13/1970 (0.7%)
51	SG	0.95	0/1915	1.45	11/2560 (0.4%)
52	SH	0.91	0/1508	1.42	8/2032 (0.4%)
53	SI	0.95	0/1378	1.40	5/1848 (0.3%)
54	SJ	0.92	0/1048	1.49	8/1412 (0.6%)
55	SK	0.89	0/1443	1.44	8/1930 (0.4%)
56	SL	0.90	0/901	1.42	4/1226 (0.3%)
57	SM	0.93	0/1294	1.36	5/1731 (0.3%)
58	SO	0.92	0/1104	1.41	5/1478 (0.3%)
59	SP	0.90	0/1218	1.40	5/1640 (0.3%)
60	SQ	0.95	0/938	1.45	6/1259 (0.5%)
61	SR	0.93	0/961	1.36	3/1284 (0.2%)
62	ST	0.95	0/1192	1.44	8/1594 (0.5%)
63	SU	0.93	0/975	1.43	3/1303 (0.2%)
64	SV	0.89	0/1178	1.48	8/1577 (0.5%)
65	SW	0.95	0/1104	1.49	9/1484 (0.6%)
66	SX	0.91	0/817	1.40	5/1103 (0.5%)
67	SY	0.92	0/659	1.43	3/883 (0.3%)
68	Sb	0.91	0/967	1.44	5/1294 (0.4%)
69	Sc	0.96	0/603	1.45	2/802 (0.2%)
70	Sd	0.92	0/899	1.39	3/1205 (0.2%)
71	Se	0.93	0/643	1.38	4/871 (0.5%)
72	Sg	0.96	0/508	1.41	3/677 (0.4%)
73	Sh	0.87	0/425	1.47	3/563 (0.5%)
74	Sj	0.88	0/553	1.38	3/736 (0.4%)
75	St	0.60	0/34858	0.84	28/54401 (0.1%)
76	u	0.57	0/1795	0.79	1/2798 (0.0%)
77	v	0.61	0/1792	0.87	0/2793

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
78	y	0.58	0/249	0.94	1/387 (0.3%)
All	All	0.74	0/191713	1.11	486/280690 (0.2%)

There are no bond length outliers.

The worst 5 of 486 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	LC	204	VAL	N-CA-C	-11.60	102.06	113.20
17	LQ	50	VAL	N-CA-C	-11.15	102.22	111.81
9	LI	167	LEU	N-CA-C	-11.12	100.26	114.04
16	LP	106	PRO	N-CA-C	10.38	123.36	110.70
24	LX	33	CYS	CB-CA-C	-10.04	95.04	110.90

There are no chirality outliers.

There are no planarity outliers.

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	LA	1886	0	1948	37	0
2	LB	2987	0	3024	58	0
3	LC	2454	0	2541	48	0
4	LD	3038	0	1556	16	0
5	LE	2502	0	1268	15	0
6	LF	2355	0	2416	49	0
7	LG	439	0	479	6	0
8	LH	1742	0	1776	28	0
9	LI	1554	0	1636	30	0
10	LJ	1452	0	1495	23	0
11	LK	1671	0	1689	29	0
12	LL	1349	0	1362	31	0
13	LM	1605	0	1704	30	0
14	LN	1024	0	1091	24	0
15	LO	1708	0	1785	31	0
16	LP	1578	0	1616	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
17	LQ	1254	0	1289	29	0
18	LR	1402	0	1478	26	0
19	LS	1592	0	1697	40	0
20	LT	1423	0	1426	36	0
21	LU	1264	0	1303	26	0
22	LV	935	0	902	18	0
23	LW	1029	0	1068	18	0
24	LX	538	0	547	13	0
25	LY	962	0	1021	23	0
26	LZ	1076	0	1140	25	0
27	La	1051	0	1083	17	0
28	Lb	1201	0	1233	22	0
29	Lc	456	0	482	11	0
30	Ld	731	0	762	8	0
31	Le	818	0	857	11	0
32	Lf	1077	0	1133	34	0
33	Lg	778	0	816	15	0
34	Lh	914	0	956	22	0
35	Li	983	0	1081	16	0
36	Lj	731	0	794	15	0
37	Lk	711	0	712	16	0
38	Ll	558	0	612	17	0
39	Ln	1592	0	1667	61	0
40	Lo	227	0	272	6	0
41	Lp	767	0	822	13	0
42	Lq	708	0	753	14	0
43	Ls	388	0	401	17	0
44	Lt	55643	0	28280	345	0
45	SA	1578	0	1618	39	0
46	SB	1667	0	1713	45	0
47	SC	1665	0	1705	43	0
48	SD	1868	0	1927	30	0
49	SE	2085	0	2174	79	0
50	SF	1442	0	1469	34	0
51	SG	1889	0	2011	71	0
52	SH	1481	0	1544	31	0
53	SI	1357	0	1421	42	0
54	SJ	1031	0	1082	24	0
55	SK	1423	0	1515	41	0
56	SL	876	0	869	18	0
57	SM	1265	0	1298	29	0
58	SO	1089	0	1177	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
59	SP	1193	0	1258	23	0
60	SQ	926	0	933	13	0
61	SR	943	0	1020	27	0
62	ST	1180	0	1250	46	0
63	SU	965	0	1017	25	0
64	SV	1162	0	1195	33	0
65	SW	1080	0	1106	26	0
66	SX	802	0	840	20	0
67	SY	651	0	655	27	0
68	Sb	952	0	1013	35	0
69	Sc	597	0	636	25	0
70	Sd	884	0	917	25	0
71	Se	629	0	623	15	0
72	Sg	505	0	540	18	0
73	Sh	417	0	416	12	0
74	Sj	543	0	587	16	0
75	St	31176	0	15856	275	0
76	u	1604	0	816	11	0
77	v	1602	0	816	18	0
78	y	221	0	110	1	0
All	All	178901	0	135100	2357	0

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

The worst 5 of 2357 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)
66: SX:93: TRP:CH2	75: St:1087: C:OP1	1.81	1.32
50: SF:145: ARG:NH1	50: SF:145: ARG:HG3	1.55	1.07
66: SX:93: TRP:CZ3	75: St:1087: C:OP1	2.10	1.04
50: SF:145: ARG:HH11	50: SF:145: ARG:CG	1.72	1.02
50: SF:145: ARG:HG3	50: SF:145: ARG:HH11	0.83	0.98

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	LA	248/251 (99%)	228 (92%)	19 (8%)	1 (0%)	30	67
2	LB	376/379 (99%)	359 (96%)	15 (4%)	2 (0%)	24	63
3	LC	313/316 (99%)	294 (94%)	17 (5%)	2 (1%)	21	58
6	LF	291/297 (98%)	272 (94%)	19 (6%)	0	100	100
7	LG	48/51 (94%)	46 (96%)	2 (4%)	0	100	100
8	LH	214/235 (91%)	202 (94%)	12 (6%)	0	100	100
9	LI	193/225 (86%)	172 (89%)	17 (9%)	4 (2%)	5	29
10	LJ	182/185 (98%)	167 (92%)	14 (8%)	1 (0%)	24	63
11	LK	204/210 (97%)	188 (92%)	13 (6%)	3 (2%)	8	38
12	LL	166/173 (96%)	153 (92%)	10 (6%)	3 (2%)	6	33
13	LM	199/234 (85%)	186 (94%)	12 (6%)	1 (0%)	24	63
14	LN	128/131 (98%)	125 (98%)	3 (2%)	0	100	100
15	LO	201/204 (98%)	190 (94%)	10 (5%)	1 (0%)	24	63
16	LP	192/197 (98%)	180 (94%)	9 (5%)	3 (2%)	7	37
17	LQ	154/164 (94%)	146 (95%)	8 (5%)	0	100	100
18	LR	176/179 (98%)	164 (93%)	11 (6%)	1 (1%)	21	58
19	LS	190/196 (97%)	183 (96%)	6 (3%)	1 (0%)	24	63
20	LT	168/173 (97%)	163 (97%)	5 (3%)	0	100	100
21	LU	155/159 (98%)	134 (86%)	17 (11%)	4 (3%)	4	25
22	LV	113/124 (91%)	96 (85%)	14 (12%)	3 (3%)	4	25
23	LW	133/142 (94%)	131 (98%)	2 (2%)	0	100	100
24	LX	61/189 (32%)	59 (97%)	2 (3%)	0	100	100
25	LY	117/141 (83%)	102 (87%)	12 (10%)	3 (3%)	4	25
26	LZ	131/135 (97%)	128 (98%)	2 (2%)	1 (1%)	16	52
27	La	130/135 (96%)	117 (90%)	13 (10%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
28	Lb	146/149 (98%)	136 (93%)	8 (6%)	2 (1%)	9	39
29	Lc	53/62 (86%)	46 (87%)	5 (9%)	2 (4%)	2	19
30	Ld	95/109 (87%)	90 (95%)	4 (4%)	1 (1%)	11	45
31	Le	98/106 (92%)	95 (97%)	3 (3%)	0	100	100
32	Lf	128/136 (94%)	121 (94%)	7 (6%)	0	100	100
33	Lg	96/123 (78%)	91 (95%)	5 (5%)	0	100	100
34	Lh	114/120 (95%)	105 (92%)	8 (7%)	1 (1%)	14	49
35	Li	120/124 (97%)	114 (95%)	5 (4%)	1 (1%)	16	52
36	Lj	87/90 (97%)	78 (90%)	9 (10%)	0	100	100
37	Lk	86/89 (97%)	80 (93%)	6 (7%)	0	100	100
38	Ll	70/77 (91%)	64 (91%)	6 (9%)	0	100	100
39	Ln	194/217 (89%)	145 (75%)	37 (19%)	12 (6%)	1	13
40	Lo	23/25 (92%)	23 (100%)	0	0	100	100
41	Lp	91/106 (86%)	90 (99%)	0	1 (1%)	11	45
42	Lq	89/94 (95%)	85 (96%)	4 (4%)	0	100	100
43	Ls	45/127 (35%)	39 (87%)	3 (7%)	3 (7%)	1	12
45	SA	195/245 (80%)	186 (95%)	8 (4%)	1 (0%)	24	63
46	SB	214/242 (88%)	197 (92%)	14 (6%)	3 (1%)	9	39
47	SC	208/217 (96%)	190 (91%)	13 (6%)	5 (2%)	4	27
48	SD	229/248 (92%)	217 (95%)	11 (5%)	1 (0%)	30	67
49	SE	258/268 (96%)	222 (86%)	29 (11%)	7 (3%)	4	25
50	SF	184/190 (97%)	170 (92%)	12 (6%)	2 (1%)	11	45
51	SG	236/248 (95%)	213 (90%)	20 (8%)	3 (1%)	9	41
52	SH	182/190 (96%)	163 (90%)	13 (7%)	6 (3%)	3	20
53	SI	171/174 (98%)	154 (90%)	14 (8%)	3 (2%)	6	33
54	SJ	127/130 (98%)	120 (94%)	5 (4%)	2 (2%)	7	37
55	SK	174/189 (92%)	161 (92%)	11 (6%)	2 (1%)	11	45
56	SL	105/134 (78%)	98 (93%)	6 (6%)	1 (1%)	12	47
57	SM	151/154 (98%)	132 (87%)	18 (12%)	1 (1%)	18	55
58	SO	138/144 (96%)	127 (92%)	8 (6%)	3 (2%)	5	28
59	SP	148/154 (96%)	144 (97%)	4 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
60	SQ	125/145 (86%)	110 (88%)	14 (11%)	1 (1%)	16	52
61	SR	114/145 (79%)	100 (88%)	11 (10%)	3 (3%)	4	25
62	ST	149/158 (94%)	140 (94%)	6 (4%)	3 (2%)	6	31
63	SU	119/137 (87%)	101 (85%)	15 (13%)	3 (2%)	4	26
64	SV	144/154 (94%)	122 (85%)	16 (11%)	6 (4%)	2	17
65	SW	136/139 (98%)	125 (92%)	9 (7%)	2 (2%)	8	38
66	SX	99/126 (79%)	95 (96%)	4 (4%)	0	100	100
67	SY	84/89 (94%)	78 (93%)	5 (6%)	1 (1%)	10	42
68	Sb	118/132 (89%)	103 (87%)	11 (9%)	4 (3%)	3	20
69	Sc	73/88 (83%)	68 (93%)	5 (7%)	0	100	100
70	Sd	106/109 (97%)	100 (94%)	5 (5%)	1 (1%)	14	49
71	Se	78/81 (96%)	77 (99%)	1 (1%)	0	100	100
72	Sg	61/64 (95%)	52 (85%)	9 (15%)	0	100	100
73	Sh	48/51 (94%)	45 (94%)	3 (6%)	0	100	100
74	Sj	65/69 (94%)	58 (89%)	6 (9%)	1 (2%)	8	38
All	All	10257/11193 (92%)	9455 (92%)	680 (7%)	122 (1%)	13	42

5 of 122 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	LB	55	HIS
9	LI	102	LYS
12	LL	24	GLY
16	LP	107	PRO
19	LS	130	ASN

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	LA	191/192 (100%)	100 (52%)	91 (48%)	0	0

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	LB	312/313 (100%)	187 (60%)	125 (40%)	0	1
3	LC	262/263 (100%)	156 (60%)	106 (40%)	0	1
6	LF	238/242 (98%)	133 (56%)	105 (44%)	0	0
7	LG	47/48 (98%)	27 (57%)	20 (43%)	0	0
8	LH	185/204 (91%)	111 (60%)	74 (40%)	0	1
9	LI	172/198 (87%)	100 (58%)	72 (42%)	0	0
10	LJ	163/164 (99%)	92 (56%)	71 (44%)	0	0
11	LK	173/177 (98%)	102 (59%)	71 (41%)	0	0
12	LL	144/149 (97%)	87 (60%)	57 (40%)	0	1
13	LM	169/197 (86%)	92 (54%)	77 (46%)	0	0
14	LN	110/111 (99%)	58 (53%)	52 (47%)	0	0
15	LO	174/175 (99%)	88 (51%)	86 (49%)	0	0
16	LP	162/165 (98%)	95 (59%)	67 (41%)	0	0
17	LQ	133/139 (96%)	73 (55%)	60 (45%)	0	0
18	LR	154/155 (99%)	88 (57%)	66 (43%)	0	0
19	LS	163/167 (98%)	86 (53%)	77 (47%)	0	0
20	LT	151/154 (98%)	93 (62%)	58 (38%)	0	1
21	LU	131/133 (98%)	80 (61%)	51 (39%)	0	1
22	LV	101/110 (92%)	53 (52%)	48 (48%)	0	0
23	LW	109/114 (96%)	68 (62%)	41 (38%)	0	1
24	LX	61/174 (35%)	37 (61%)	24 (39%)	0	1
25	LY	107/123 (87%)	53 (50%)	54 (50%)	0	0
26	LZ	114/115 (99%)	63 (55%)	51 (45%)	0	0
27	La	116/119 (98%)	73 (63%)	43 (37%)	0	1
28	Lb	126/127 (99%)	74 (59%)	52 (41%)	0	0
29	Lc	50/57 (88%)	27 (54%)	23 (46%)	0	0
30	Ld	83/92 (90%)	51 (61%)	32 (39%)	0	1
31	Le	88/92 (96%)	48 (54%)	40 (46%)	0	0
32	Lf	116/120 (97%)	61 (53%)	55 (47%)	0	0
33	Lg	82/103 (80%)	39 (48%)	43 (52%)	0	0
34	Lh	97/100 (97%)	51 (53%)	46 (47%)	0	0

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles		
35	Li	105/107 (98%)	65 (62%)	40 (38%)	0	1	
36	Lj	77/78 (99%)	45 (58%)	32 (42%)	0	0	
37	Lk	73/74 (99%)	47 (64%)	26 (36%)	0	1	
38	Ll	63/68 (93%)	25 (40%)	38 (60%)	0	0	
39	Ln	173/189 (92%)	73 (42%)	100 (58%)	0	0	
40	Lo	22/22 (100%)	11 (50%)	11 (50%)	0	0	
41	Lp	83/93 (89%)	45 (54%)	38 (46%)	0	0	
42	Lq	71/73 (97%)	34 (48%)	37 (52%)	0	0	
43	Ls	43/110 (39%)	23 (54%)	20 (46%)	0	0	
45	SA	172/217 (79%)	101 (59%)	71 (41%)	0	0	
46	SB	179/201 (89%)	96 (54%)	83 (46%)	0	0	
47	SC	175/182 (96%)	88 (50%)	87 (50%)	0	0	
48	SD	208/220 (94%)	112 (54%)	96 (46%)	0	0	
49	SE	228/232 (98%)	106 (46%)	122 (54%)	0	0	
50	SF	153/157 (98%)	79 (52%)	74 (48%)	0	0	
51	SG	204/213 (96%)	102 (50%)	102 (50%)	0	0	
52	SH	165/170 (97%)	82 (50%)	83 (50%)	0	0	
53	SI	147/148 (99%)	74 (50%)	73 (50%)	0	0	
54	SJ	114/115 (99%)	53 (46%)	61 (54%)	0	0	
55	SK	155/164 (94%)	78 (50%)	77 (50%)	0	0	
56	SL	96/119 (81%)	57 (59%)	39 (41%)	0	1	
57	SM	135/136 (99%)	65 (48%)	70 (52%)	0	0	
58	SO	111/114 (97%)	57 (51%)	54 (49%)	0	0	
59	SP	124/129 (96%)	69 (56%)	55 (44%)	0	0	
60	SQ	87/112 (78%)	47 (54%)	40 (46%)	0	0	
61	SR	104/128 (81%)	54 (52%)	50 (48%)	0	0	
62	ST	125/130 (96%)	66 (53%)	59 (47%)	0	0	
63	SU	109/124 (88%)	54 (50%)	55 (50%)	0	0	
64	SV	123/131 (94%)	61 (50%)	62 (50%)	0	0	
65	SW	114/115 (99%)	57 (50%)	57 (50%)	0	0	
66	SX	90/110 (82%)	55 (61%)	35 (39%)	0	1	

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
67	SY	69/72 (96%)	41 (59%)	28 (41%)	0	1
68	Sb	104/113 (92%)	57 (55%)	47 (45%)	0	0
69	Sc	67/79 (85%)	27 (40%)	40 (60%)	0	0
70	Sd	102/103 (99%)	52 (51%)	50 (49%)	0	0
71	Se	72/73 (99%)	33 (46%)	39 (54%)	0	0
72	Sg	56/57 (98%)	15 (27%)	41 (73%)	0	0
73	Sh	44/45 (98%)	19 (43%)	25 (57%)	0	0
74	Sj	57/58 (98%)	25 (44%)	32 (56%)	0	0
All	All	8883/9573 (93%)	4796 (54%)	4087 (46%)	0	0

5 of 4087 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
33	Lg	7	LYS
62	ST	70	ILE
45	SA	49	ASP
61	SR	111	MET
67	SY	8	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 259 such sidechains are listed below:

Mol	Chain	Res	Type
64	SV	88	ASN
67	SY	56	ASN
25	LY	28	ASN
23	LW	142	HIS
68	Sb	77	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
4	LD	141/142 (99%)	72 (51%)	9 (6%)
44	Lt	2588/2697 (95%)	1300 (50%)	0
5	LE	116/121 (95%)	60 (51%)	7 (6%)
75	St	1453/1454 (99%)	831 (57%)	0
76	u	74/75 (98%)	42 (56%)	0
77	v	74/75 (98%)	57 (77%)	0

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
78	y	9/11 (81%)	6 (66%)	0
All	All	4455/4575 (97%)	2368 (53%)	16 (0%)

5 of 2368 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
4	LD	3	A
4	LD	6	C
4	LD	8	C
4	LD	9	C
4	LD	10	G

5 of 16 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	LE	63	U
5	LE	62	G
4	LD	117	C
5	LE	50	A
4	LD	87	A

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

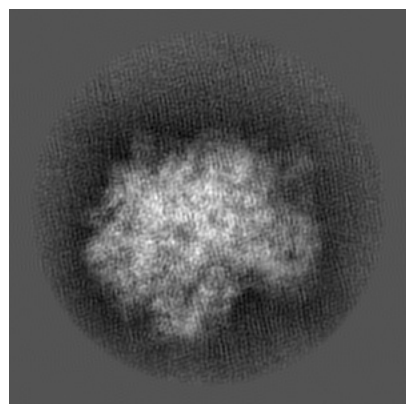
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16228. These allow visual inspection of the internal detail of the map and identification of artifacts.

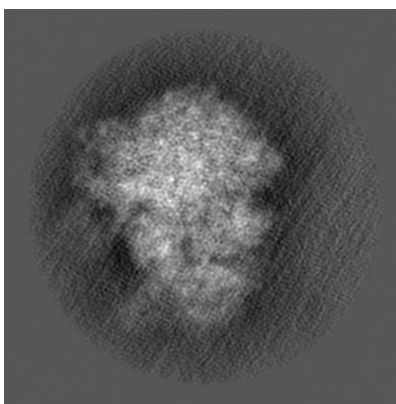
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

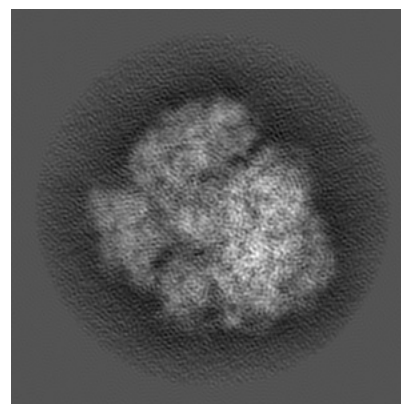
6.1.1 Primary map



X

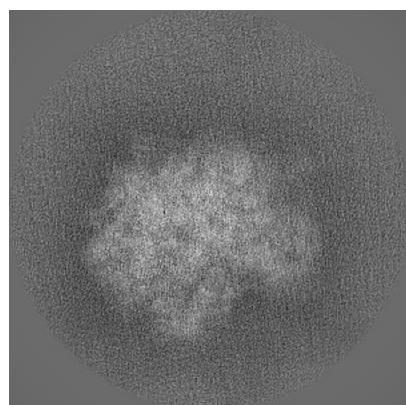


Y

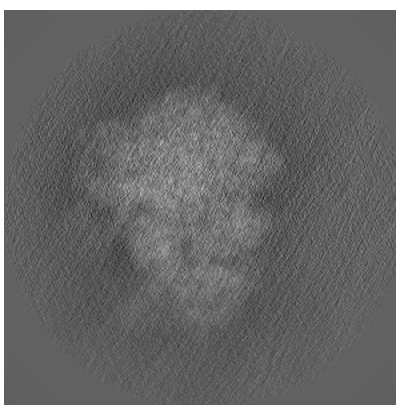


Z

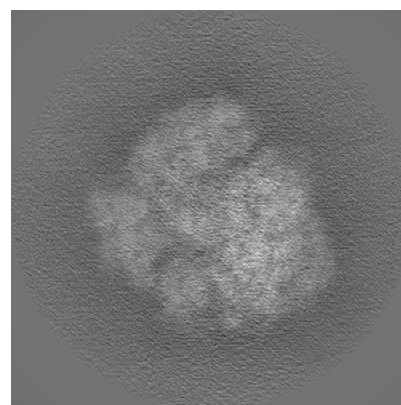
6.1.2 Raw map



X



Y

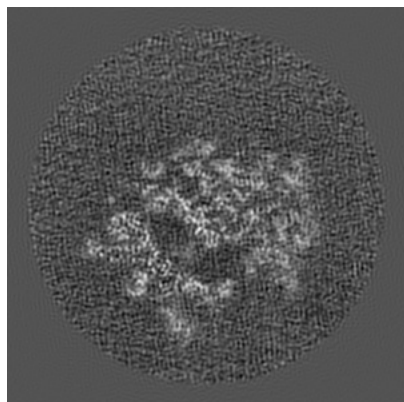


Z

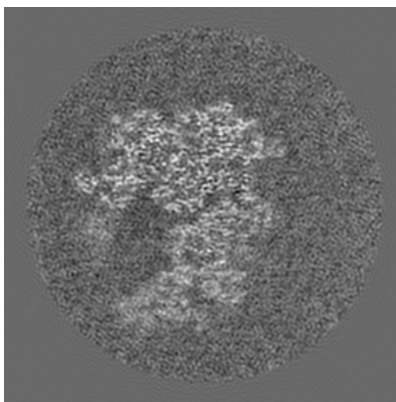
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

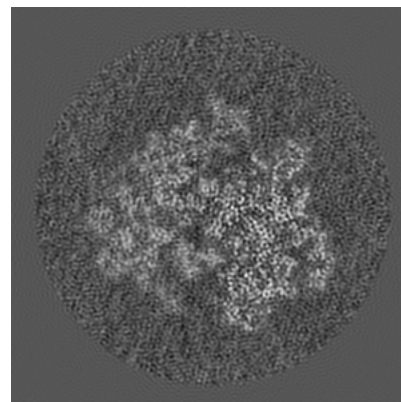
6.2.1 Primary map



X Index: 250

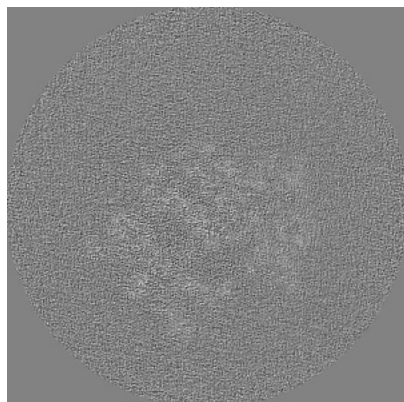


Y Index: 250

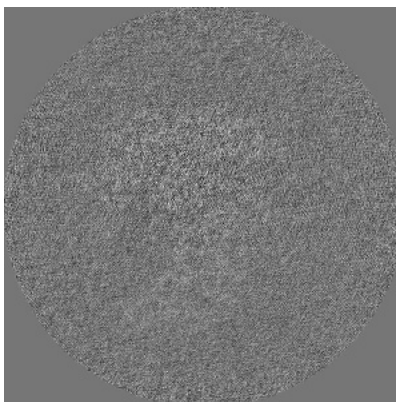


Z Index: 250

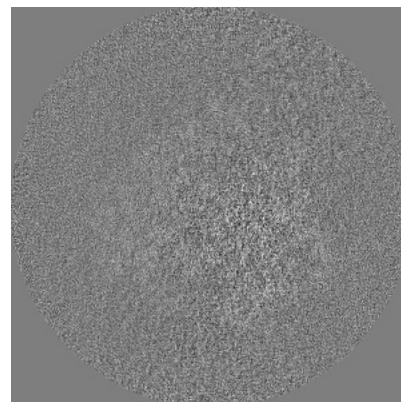
6.2.2 Raw map



X Index: 250



Y Index: 250

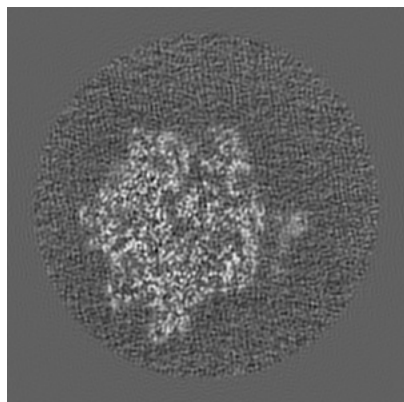


Z Index: 250

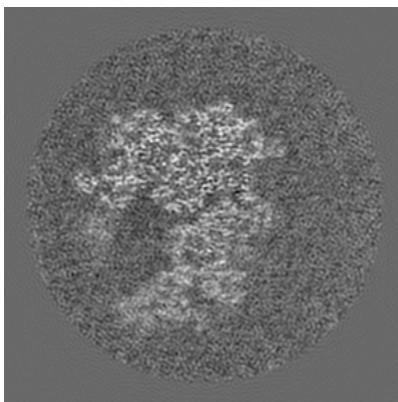
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

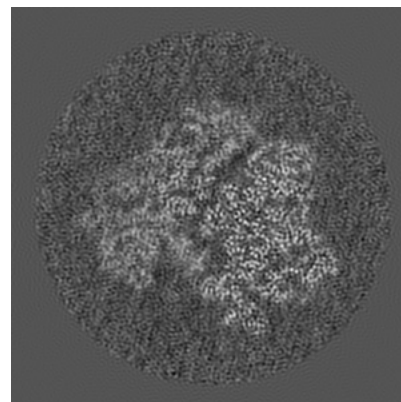
6.3.1 Primary map



X Index: 306

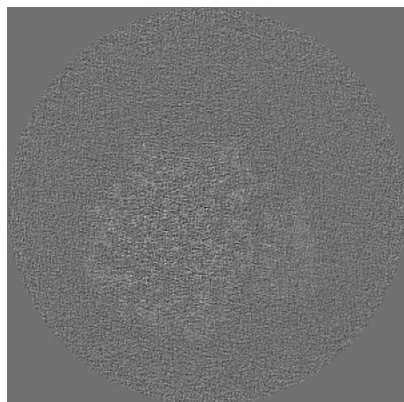


Y Index: 250

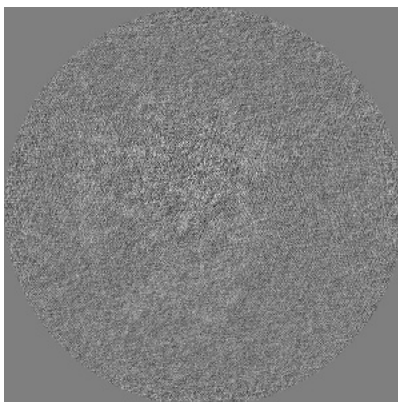


Z Index: 239

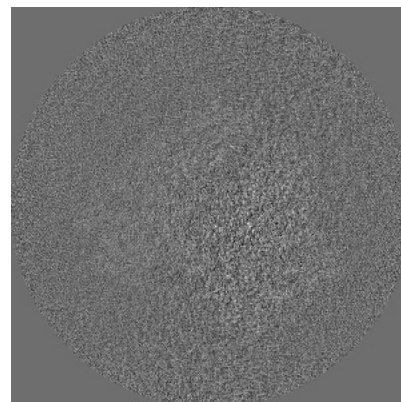
6.3.2 Raw map



X Index: 284



Y Index: 224

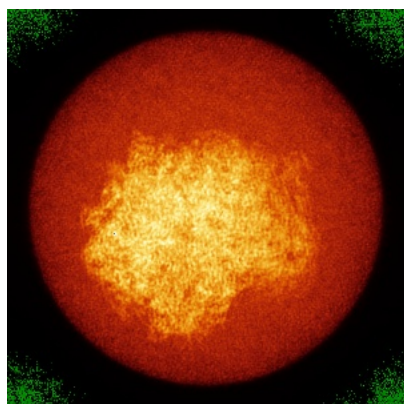


Z Index: 242

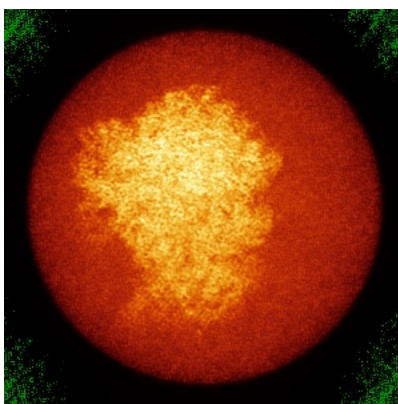
The images above show the largest variance slices of the map in three orthogonal directions.

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

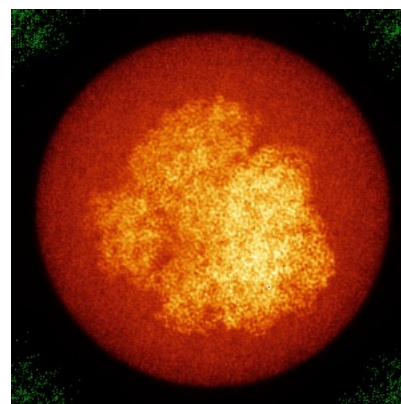
6.4.1 Primary map



X

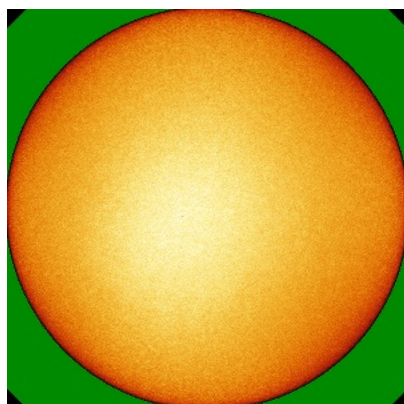


Y

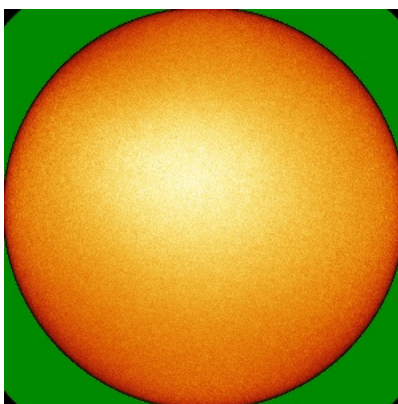


Z

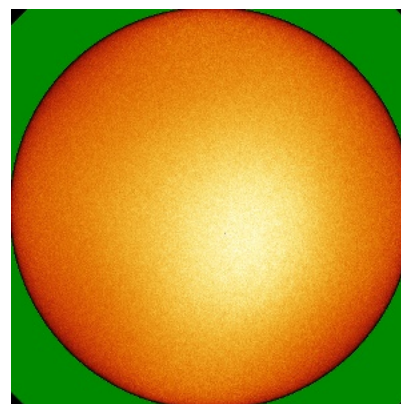
6.4.2 Raw map



X



Y

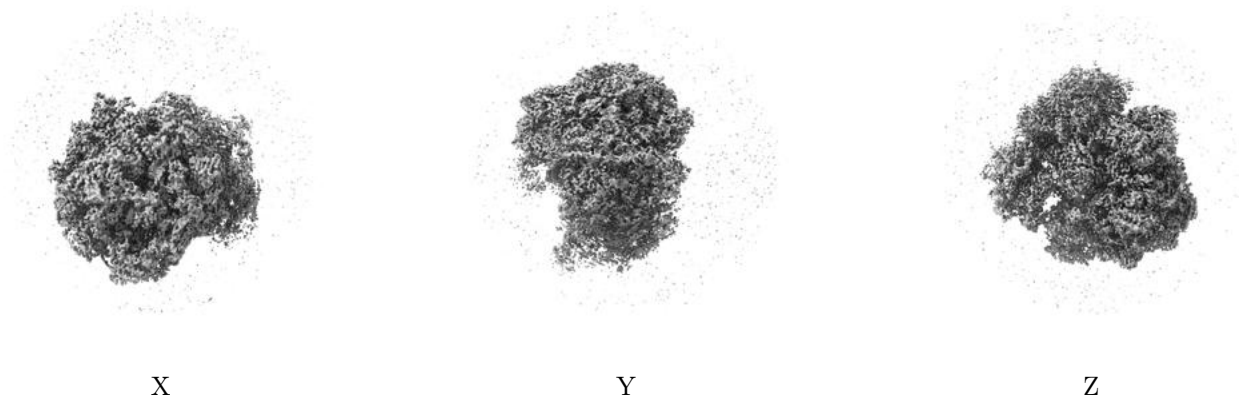


Z

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.

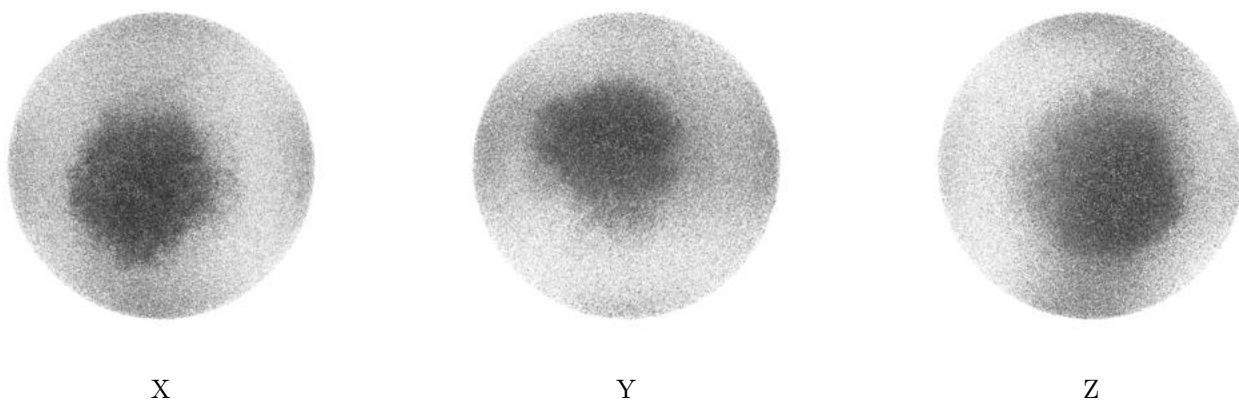
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 4.0. 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.

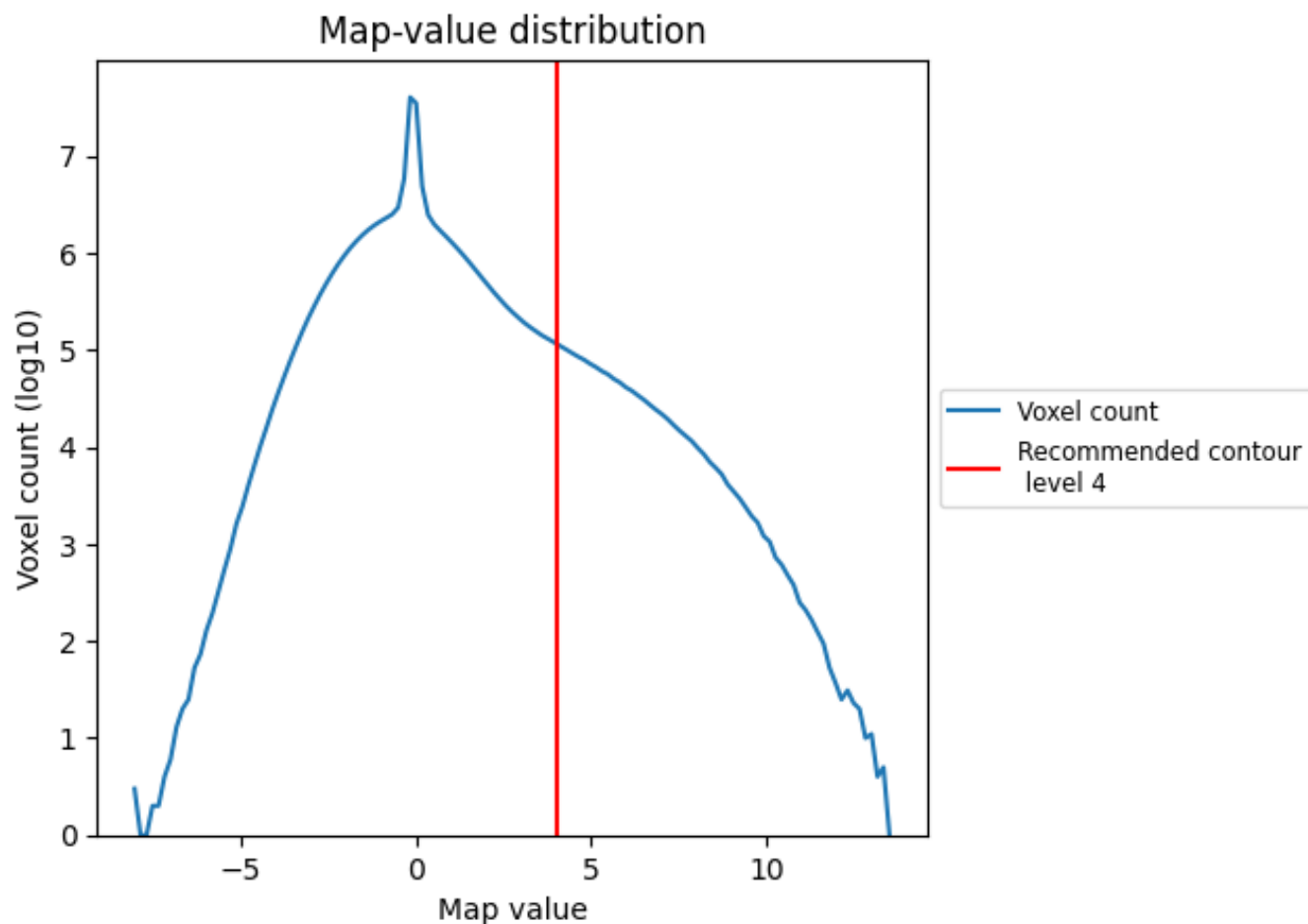
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

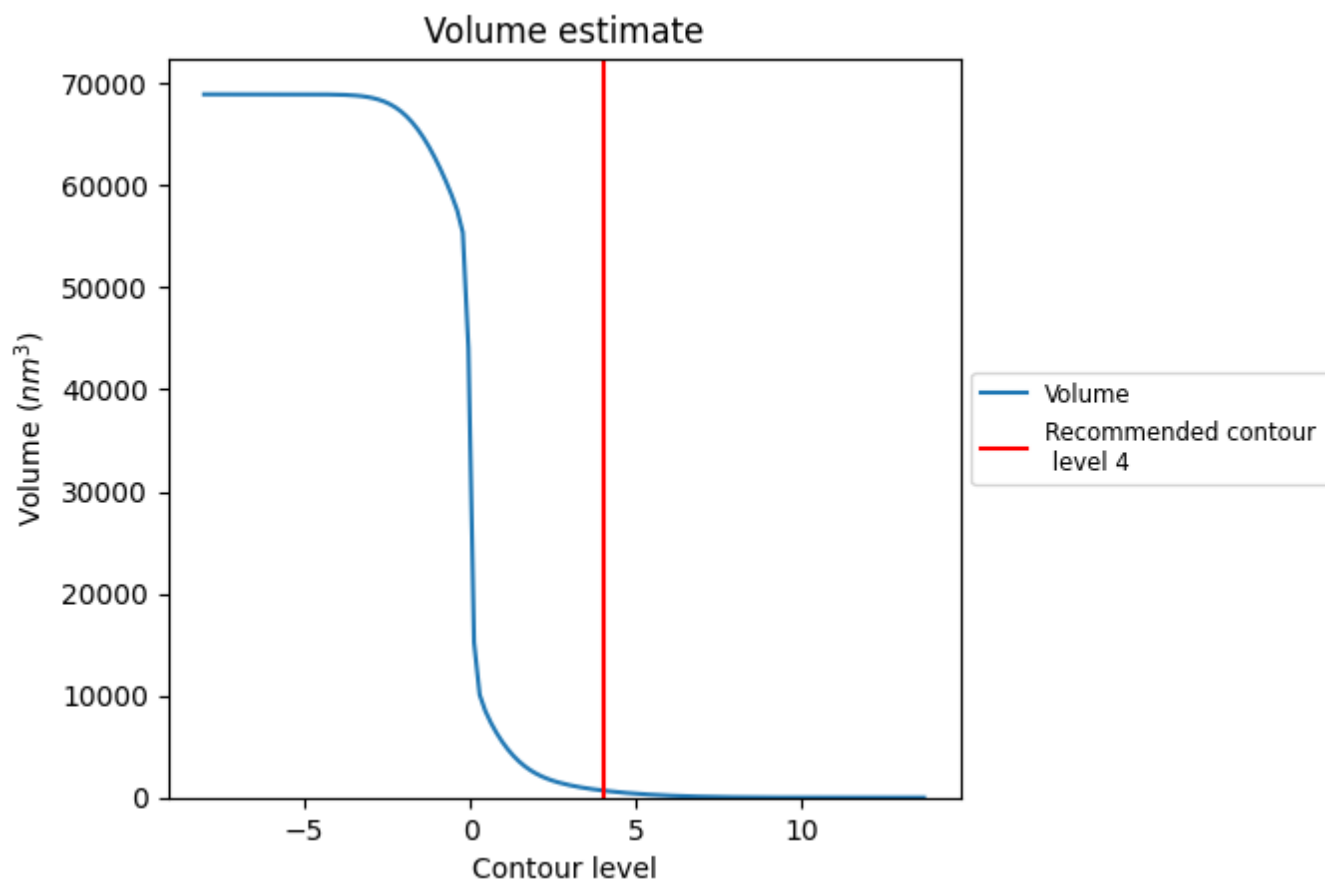
This section contains the results of statistical analysis of the map.

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.

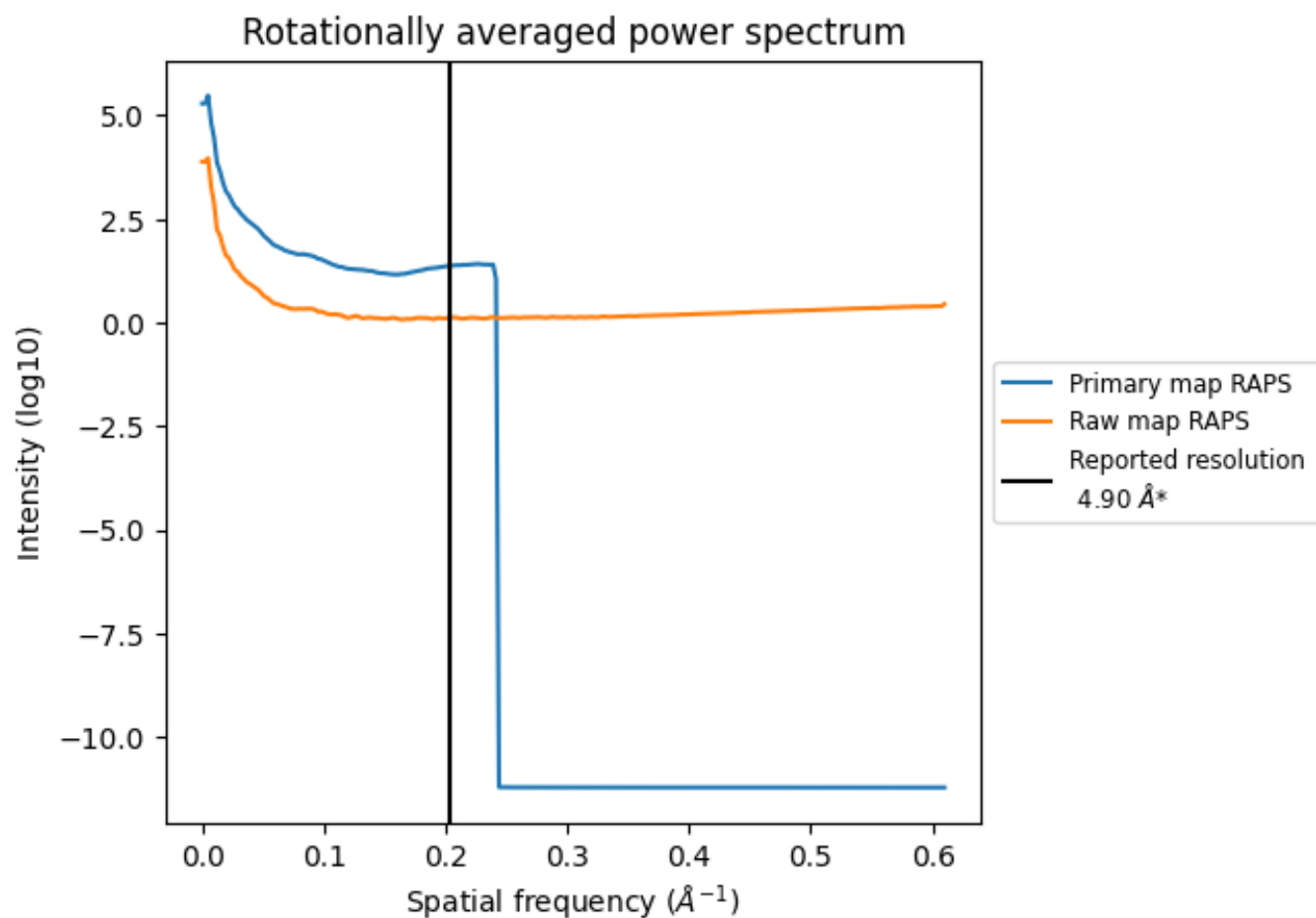
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 692 nm³; this corresponds to an approximate mass of 625 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 ⓘ

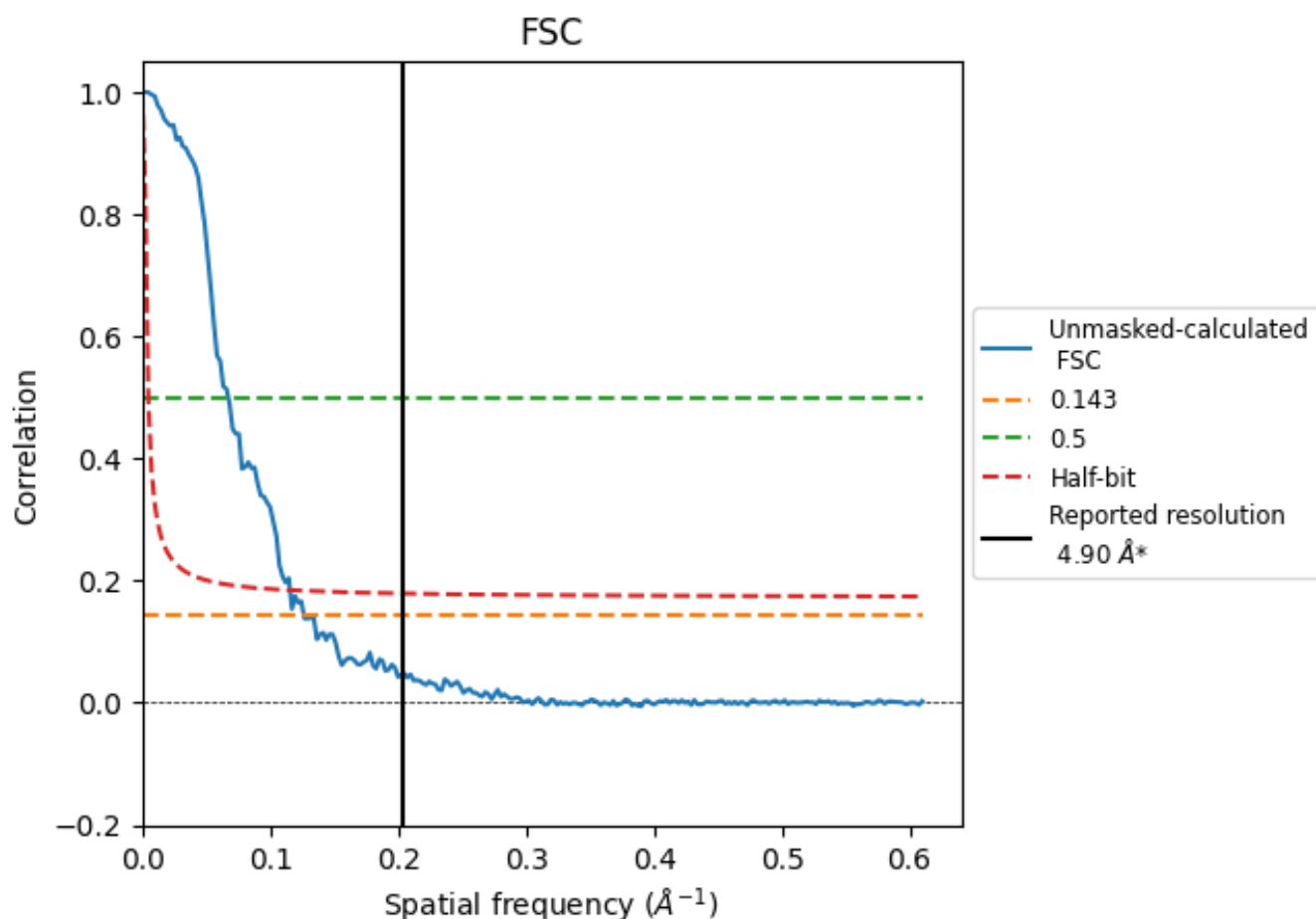


*Reported resolution corresponds to spatial frequency of 0.204 $\text{\AA}^{-1}$

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.204 Å⁻¹

8.2 Resolution estimates [i](#)

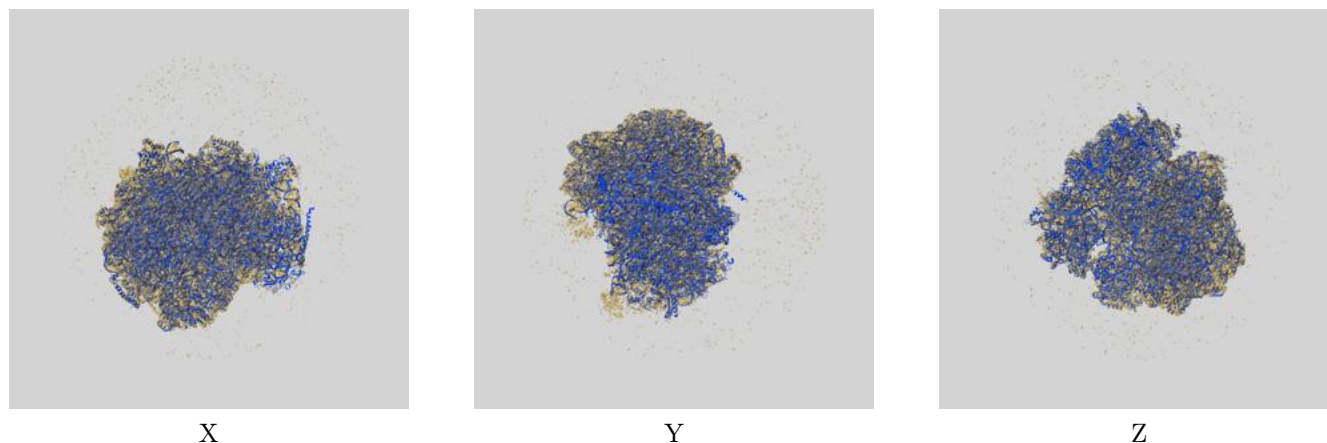
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.91	14.88	8.65

*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 7.91 differs from the reported value 4.9 by more than 10 %

9 Map-model fit [i](#)

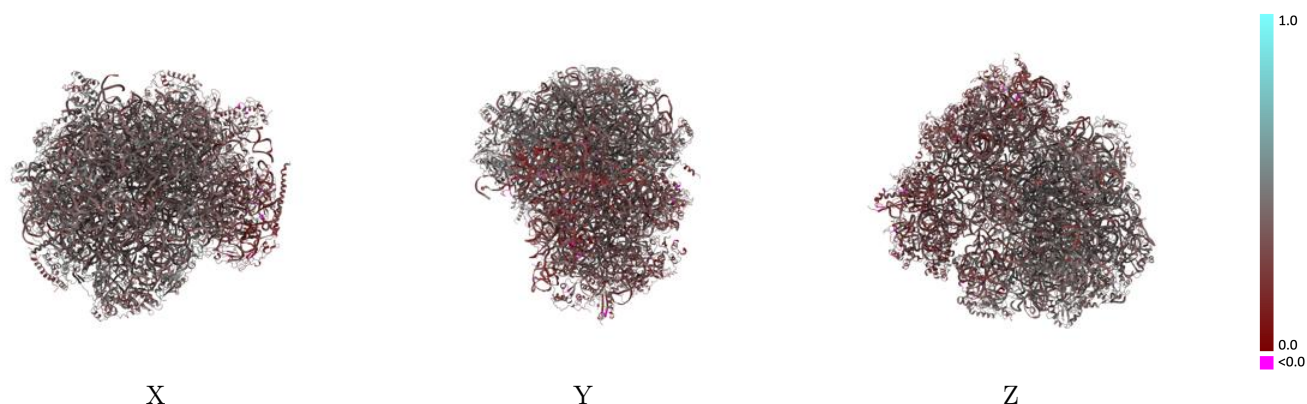
This section contains information regarding the fit between EMDB map EMD-16228 and PDB model 8BTD. Per-residue inclusion information can be found in section [3](#) on page [18](#).

9.1 Map-model overlay [i](#)



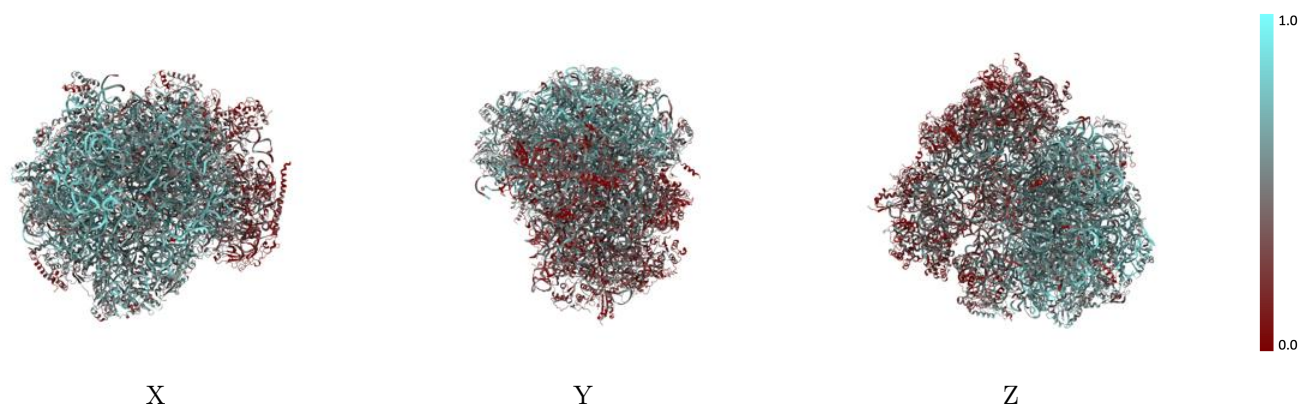
The images above show the 3D surface view of the map at the recommended contour level 4.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



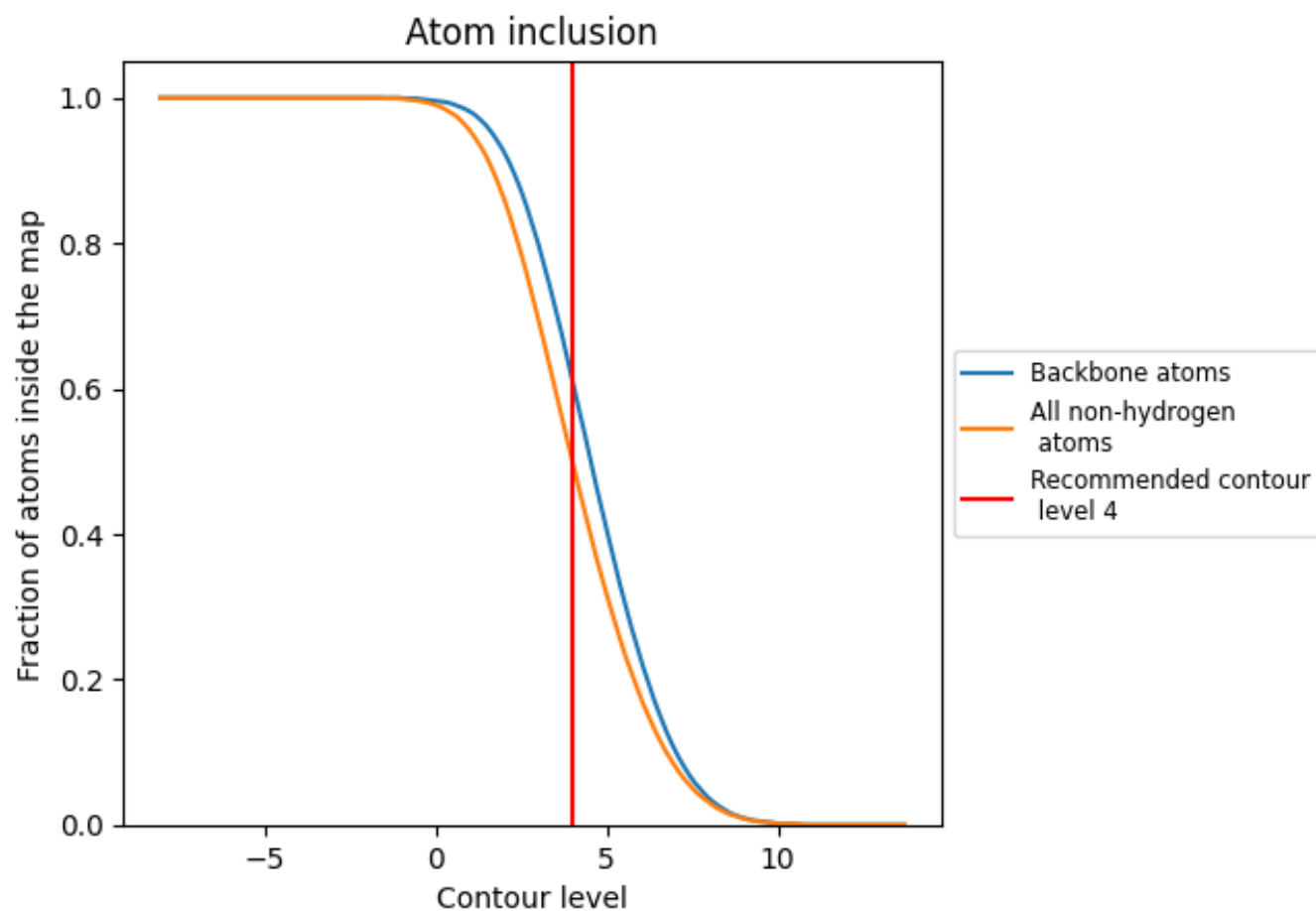
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4).

9.4 Atom inclusion [i](#)



At the recommended contour level, 61% of all backbone atoms, 50% 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 (4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4980	0.3660
LA	0.4830	0.4370
LB	0.5250	0.4300
LC	0.5340	0.4260
LD	0.6830	0.3760
LE	0.7080	0.3780
LF	0.4580	0.4010
LG	0.4960	0.4190
LH	0.4510	0.4110
LI	0.4740	0.4090
LJ	0.5070	0.4290
LK	0.4230	0.4240
LL	0.4420	0.4070
LM	0.5320	0.4260
LN	0.5080	0.4120
LO	0.5360	0.4380
LP	0.5210	0.4090
LQ	0.5040	0.4300
LR	0.5080	0.4260
LS	0.4230	0.3910
LT	0.5240	0.4270
LU	0.4870	0.4280
LV	0.3960	0.3800
LW	0.5060	0.4230
LX	0.4930	0.4130
LY	0.5470	0.4390
LZ	0.5820	0.4300
La	0.3980	0.3880
Lb	0.5610	0.4360
Lc	0.4930	0.4090
Ld	0.4850	0.4150
Le	0.5420	0.4330
Lf	0.5000	0.4270
Lg	0.5450	0.4460
Lh	0.4440	0.4220



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Chain	Atom inclusion	Q-score
Li	 0.5070	 0.4080
Lj	 0.4450	 0.4160
Lk	 0.5780	 0.4510
Ll	 0.4010	 0.3810
Ln	 0.1070	 0.3090
Lo	 0.3400	 0.4030
Lp	 0.5150	 0.4480
Lq	 0.5150	 0.4120
Ls	 0.5050	 0.3990
Lt	 0.6680	 0.3820
SA	 0.2590	 0.3360
SB	 0.3080	 0.3600
SC	 0.2300	 0.3100
SD	 0.3280	 0.3650
SE	 0.2170	 0.2960
SF	 0.2320	 0.3270
SG	 0.1210	 0.2870
SH	 0.1900	 0.3310
SI	 0.2000	 0.3350
SJ	 0.3270	 0.3610
SK	 0.2340	 0.3010
SL	 0.2250	 0.2630
SM	 0.1970	 0.3300
SO	 0.2890	 0.3890
SP	 0.2940	 0.3470
SQ	 0.3890	 0.3870
SR	 0.2090	 0.3480
ST	 0.2050	 0.3120
SU	 0.2040	 0.3100
SV	 0.2670	 0.3600
SW	 0.2550	 0.3070
SX	 0.1840	 0.2540
SY	 0.2210	 0.3430
Sb	 0.1830	 0.2960
Sc	 0.2130	 0.3180
Sd	 0.3320	 0.3870
Se	 0.2160	 0.3640
Sg	 0.2020	 0.3380
Sh	 0.2860	 0.3270
Sj	 0.1820	 0.3340
St	 0.4870	 0.3070
u	 0.4300	 0.3030

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Chain	Atom inclusion	Q-score
v	 0.0970	 0.1980
y	 0.2850	 0.3110