wwPDB EM Validation Summary Report ⓘ

Aug 18, 2025 – 03:09 PM JST

PDB ID	:	8YDI / pdb_00008ydi
EMDB ID	:	EMD-39172
Title	:	E.coli transcription translation coupling complex in TTC-P state 1 (subclass 2) containing mRNA with 39-mer spacer, NusG, NusA, fMet-tRNA(iMet), Phe-tRNA(Phe), and viomycin
Authors	:	Zhang, J.; Lu, G.; Wang, C.; Lin, J.
Deposited on	:	2024-02-20
Resolution	:	4.60 Å(reported)

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

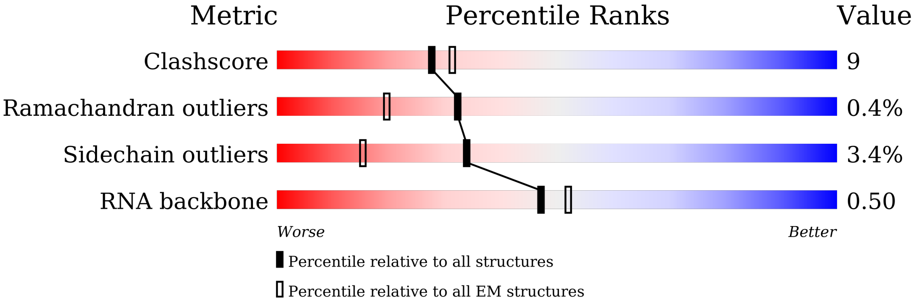
EMDB validation analysis	:	0.0.1.dev126
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

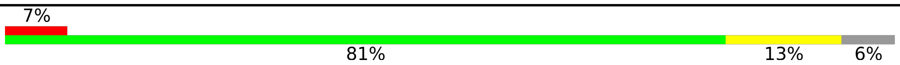
The reported resolution of this entry is 4.60 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	A	70	
2	B	57	
3	C	55	
4	D	46	
5	E	65	
6	F	38	
7	G	241	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
8	H	233	70% 18% • 12%
9	I	206	7% 74% 25%
10	J	167	77% 17% 6%
11	K	135	52% 21% • 26%
12	L	179	• 67% 17% 16%
13	M	130	88% 11% •
14	N	130	66% 30% • •
15	O	103	• 72% 18% 5% 5%
16	P	129	63% 26% • 10%
17	Q	124	• 65% 32% • •
18	R	118	69% 27% •
19	S	101	86% 13% •
20	T	89	84% 15% •
21	U	82	7% 74% 24% •
22	V	84	• 74% 21% 5%
23	W	75	65% 20% • 13%
24	X	92	71% 15% 14%
25	Y	87	• 77% 21% •
26	Z	71	• 58% 32% • 8%
27	b	273	78% 21% •
28	c	209	84% 16%
29	d	201	81% 19%
30	e	179	79% 20% ••
31	f	177	72% 28% •
32	g	149	27% 8% 65%

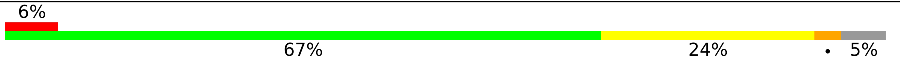
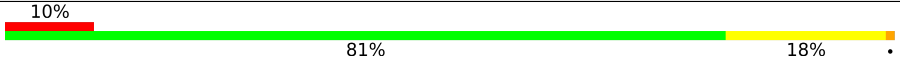
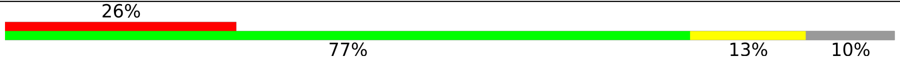
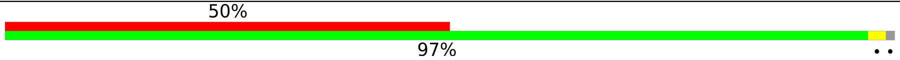
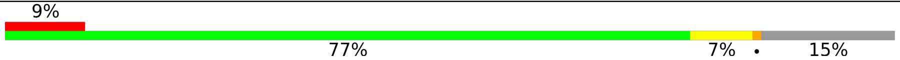
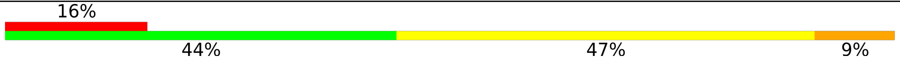
Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
33	i	142	11% 63% 35% ••
34	j	142	82% 18%
35	k	123	82% 17% •
36	l	144	86% 13% •
37	m	136	83% 17%
38	n	127	73% 21% 6%
39	o	117	79% 20% •
40	p	115	• 85% 14% •
41	q	118	83% 15% ••
42	r	103	73% 25% •
43	s	110	85% 15%
44	t	100	76% 17% 7%
45	u	104	72% 26% •
46	v	94	85% 14% •
47	w	85	74% 14% 12%
48	x	78	74% 23% ••
49	y	63	76% 24%
50	z	59	76% 22% •
51	1	2904	43% 51% 6%
52	2	120	76% 20% •
53	3	1542	68% 29% •
54	4	56	5% 27% 34% • 38%
55	8	37	27% 43% • 27%
56	9	37	49% 5% 46%
57	A1	329	29% 77% 15% 9%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
57	A2	329	
58	B1	1407	
59	B2	1342	
60	W0	91	
61	NA	495	
62	NG	181	
63	5	76	
64	6	77	
64	7	77	
65	h	6	

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
65	5OH	h	6	-	-	X	-

2 Entry composition

There are 66 unique types of molecules in this entry. The entry contains 178130 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 50S ribosomal protein L31.

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

- Molecule 2 is a protein called 50S ribosomal protein L32.

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

- Molecule 3 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	C	50	409	263	75	71	0	0

- Molecule 4 is a protein called 50S ribosomal protein L34.

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

- Molecule 5 is a protein called 50S ribosomal protein L35.

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

- Molecule 6 is a protein called 50S ribosomal protein L36.

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

- Molecule 7 is a protein called 30S ribosomal protein S2.

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

- Molecule 8 is a protein called 30S ribosomal protein S3.

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

- Molecule 9 is a protein called 30S ribosomal protein S4.

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

- Molecule 10 is a protein called 30S ribosomal protein S5.

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

- Molecule 11 is a protein called 30S ribosomal protein S6, fully modified isoform.

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

- Molecule 12 is a protein called 30S ribosomal protein S7.

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

- Molecule 13 is a protein called 30S ribosomal protein S8.

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

- Molecule 14 is a protein called 30S ribosomal protein S9.

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

- Molecule 15 is a protein called 30S ribosomal protein S10.

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

- Molecule 16 is a protein called 30S ribosomal protein S11.

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

- Molecule 17 is a protein called 30S ribosomal protein S12.

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

- Molecule 18 is a protein called 30S ribosomal protein S13.

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

- Molecule 19 is a protein called 30S ribosomal protein S14.

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

- Molecule 20 is a protein called 30S ribosomal protein S15.

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

- Molecule 21 is a protein called 30S ribosomal protein S16.

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

- Molecule 22 is a protein called 30S ribosomal protein S17.

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

- Molecule 23 is a protein called 30S ribosomal protein S18.

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

- Molecule 24 is a protein called 30S ribosomal protein S19.

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

- Molecule 25 is a protein called 30S ribosomal protein S20.

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

- Molecule 26 is a protein called 30S ribosomal protein S21.

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

- Molecule 27 is a protein called 50S ribosomal protein L2.

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

- Molecule 28 is a protein called 50S ribosomal protein L3.

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

- Molecule 29 is a protein called 50S ribosomal protein L4.

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

- Molecule 30 is a protein called 50S ribosomal protein L5.

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

- Molecule 31 is a protein called 50S ribosomal protein L6.

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

- Molecule 32 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	g	52	Total	C	N	O	S	0	0
			400	256	73	70	1		

- Molecule 33 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	i	141	Total	C	N	O	S	0	0
			1032	651	179	196	6		

- Molecule 34 is a protein called 50S ribosomal protein L13.

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

- Molecule 35 is a protein called 50S ribosomal protein L14.

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

- Molecule 36 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	l	143	Total 1045	C 649	N 206	O 189	S 1	0	0

- Molecule 37 is a protein called 50S ribosomal protein L16.

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

- Molecule 38 is a protein called 50S ribosomal protein L17.

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

- Molecule 39 is a protein called 50S ribosomal protein L18.

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

- Molecule 40 is a protein called 50S ribosomal protein L19.

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

- Molecule 41 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	q	117	Total 947	C 604	N 192	O 151	0	0

- Molecule 42 is a protein called 50S ribosomal protein L21.

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

- Molecule 43 is a protein called 50S ribosomal protein L22.

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

- Molecule 44 is a protein called 50S ribosomal protein L23.

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

- Molecule 45 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
45	u	102	779	492	146	141	0	0

- Molecule 46 is a protein called 50S ribosomal protein L25.

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

- Molecule 47 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	w	75	575	356	116	102	1	0	0

- Molecule 48 is a protein called 50S ribosomal protein L28.

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

- Molecule 49 is a protein called 50S ribosomal protein L29.

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

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

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

- Molecule 51 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
51	1	2903	62317	27801	11468	20146	2902	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	747	C	U	conflict	GB 1929590828

- Molecule 52 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
52	2	120	2568	1145	471	833	119	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	120	A	U	conflict	GB NR_103249

- Molecule 53 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
53	3	1539	33012	14725	6052	10697	1538	0	0

- Molecule 54 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
54	4	35	729	326	105	263	35	0	0

- Molecule 55 is a DNA chain called templete DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	8	27	Total	C	N	O	P	0	0
			539	257	88	167	27		

- Molecule 56 is a DNA chain called non-templete DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	9	20	Total	C	N	O	P	0	0
			417	195	84	118	20		

- Molecule 57 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
57	A1	301	Total	C	N	O	S	0	0
			2088	1293	380	409	6		
57	A2	288	Total	C	N	O	S	0	0
			2029	1257	366	400	6		

- Molecule 58 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
58	B1	1335	Total	C	N	O	S	0	0
			10353	6509	1842	1955	47		

- Molecule 59 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
59	B2	1340	Total	C	N	O	S	0	0
			10546	6616	1839	2048	43		

- Molecule 60 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
60	W0	82	Total	C	N	O	S	0	0
			650	396	122	131	1		

- Molecule 61 is a protein called Transcription termination/antitermination protein NusA.

Mol	Chain	Residues	Atoms				AltConf	Trace
61	NA	492	Total	C	N	O	0	0
			2432	1448	492	492		

- Molecule 62 is a protein called Transcription termination/antitermination protein NusG.

Mol	Chain	Residues	Atoms				AltConf	Trace
62	NG	154	Total 758	C 450	N 154	O 154	0	0

- Molecule 63 is a RNA chain called tRNA(Phe).

Mol	Chain	Residues	Atoms					AltConf	Trace
63	5	76	Total 1622	C 723	N 290	O 533	P 76	0	0

- Molecule 64 is a RNA chain called tRNA(fMet).

Mol	Chain	Residues	Atoms					AltConf	Trace
64	6	77	Total 1640	C 732	N 297	O 535	P 76	0	0
64	7	77	Total 1640	C 732	N 297	O 535	P 76	0	0

- Molecule 65 is a protein (with D amino acids) called viomycin.

Mol	Chain	Residues	Atoms				AltConf	Trace
65	h	6	Total 48	C 25	N 13	O 10	0	0

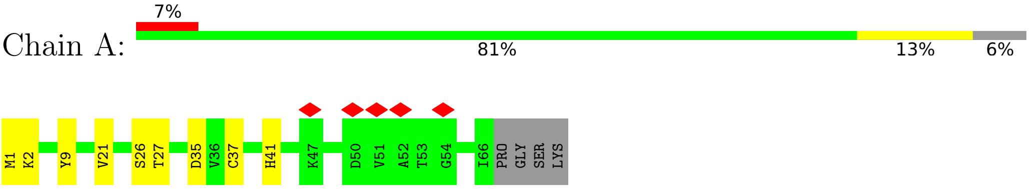
- Molecule 66 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
66	B1	1	Total 1	Mg 1	0

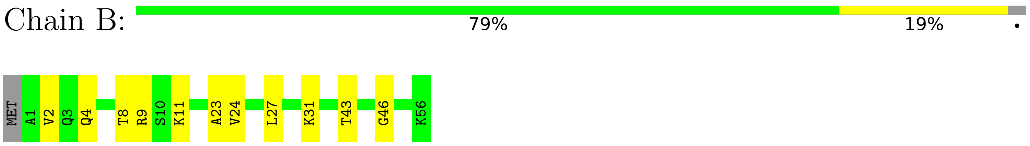
3 Residue-property plots ⓘ

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.

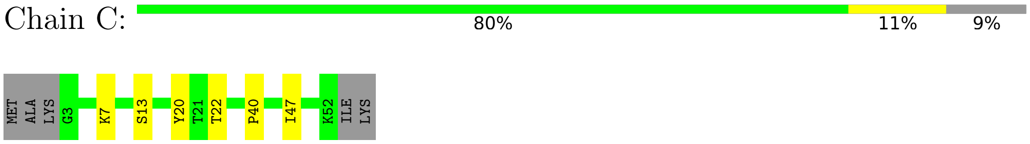
- Molecule 1: 50S ribosomal protein L31



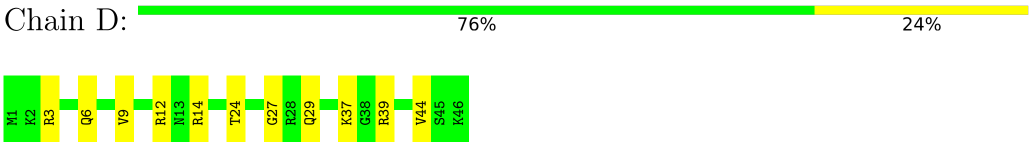
- Molecule 2: 50S ribosomal protein L32



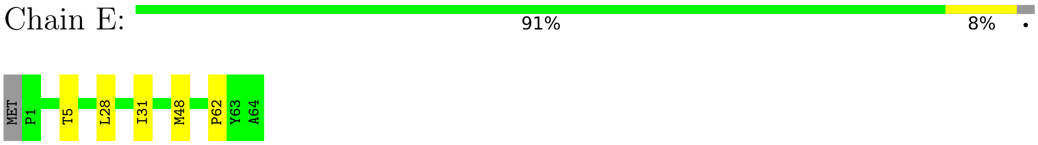
- Molecule 3: 50S ribosomal protein L33



- Molecule 4: 50S ribosomal protein L34

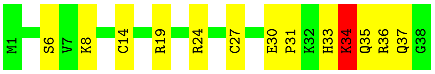


- Molecule 5: 50S ribosomal protein L35



- Molecule 6: 50S ribosomal protein L36

Chain F:

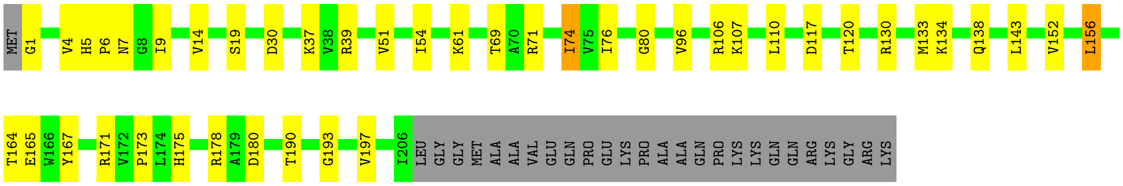


- Molecule 7: 30S ribosomal protein S2

Chain G:

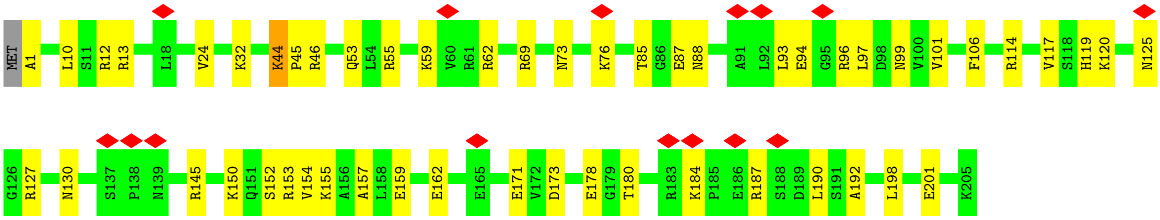
- Molecule 8: 30S ribosomal protein S3

Chain H:



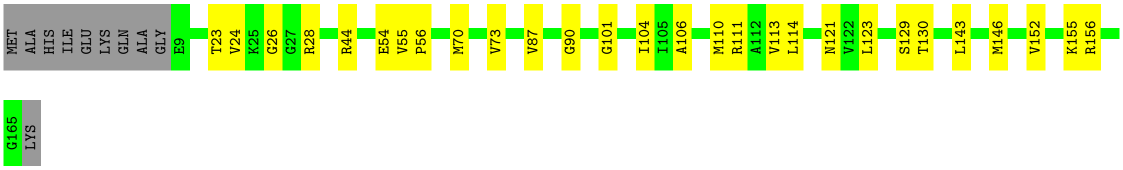
- Molecule 9: 30S ribosomal protein S4

Chain I:



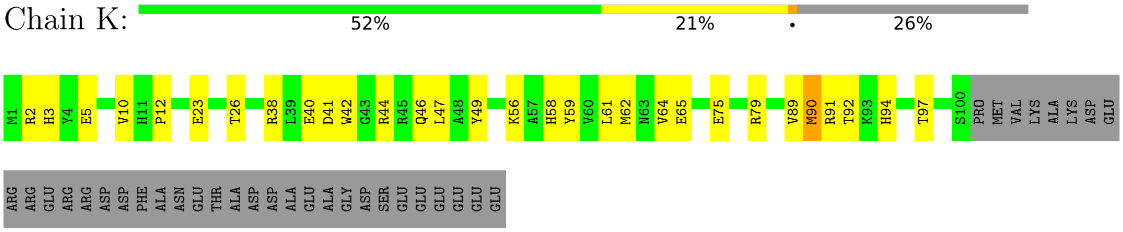
- Molecule 10: 30S ribosomal protein S5

Chain J:



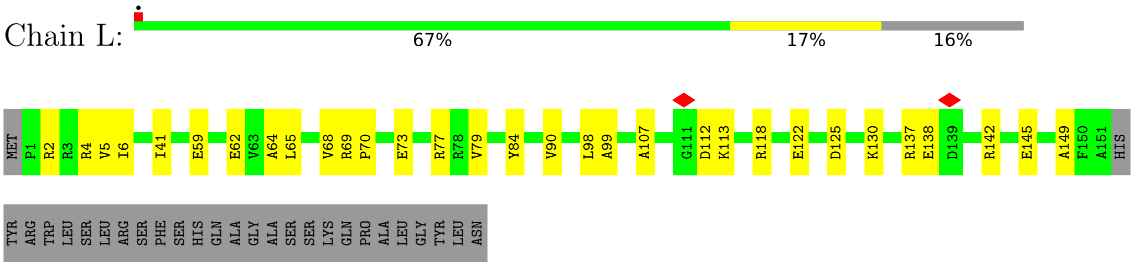
- Molecule 11: 30S ribosomal protein S6, fully modified isoform

Chain K:



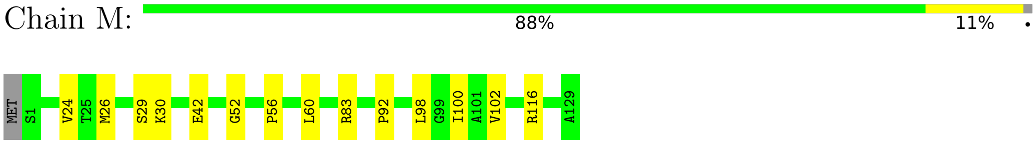
- Molecule 12: 30S ribosomal protein S7

Chain L:



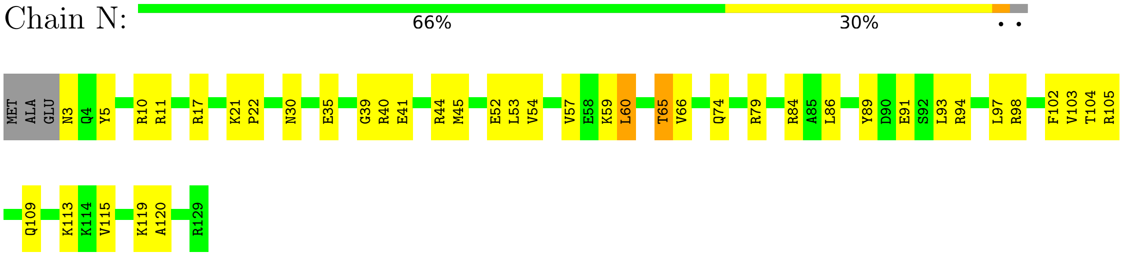
- Molecule 13: 30S ribosomal protein S8

Chain M:



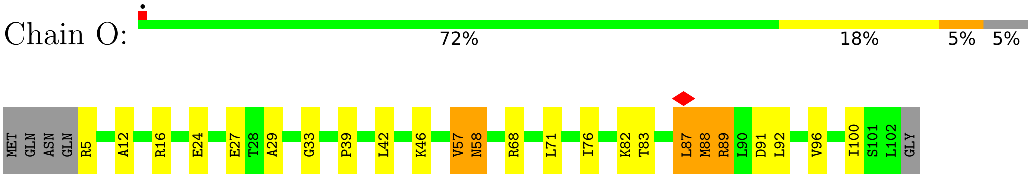
- Molecule 14: 30S ribosomal protein S9

Chain N:



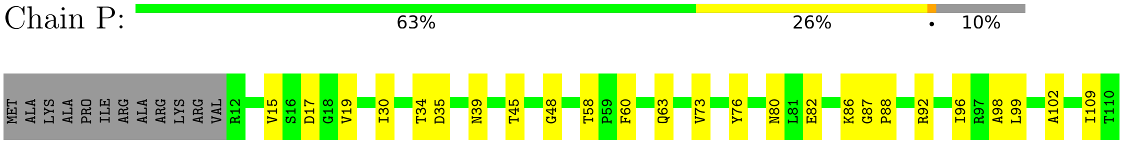
- Molecule 15: 30S ribosomal protein S10

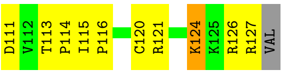
Chain O:



- Molecule 16: 30S ribosomal protein S11

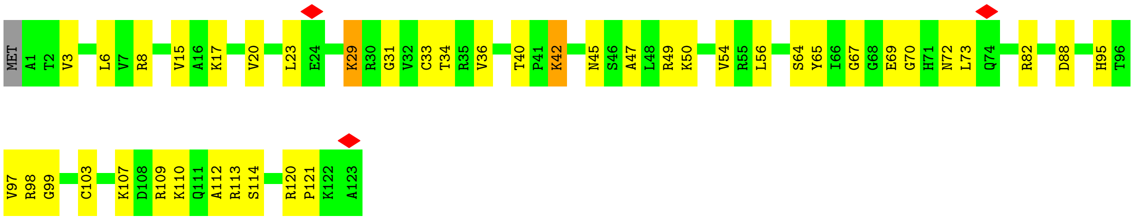
Chain P:





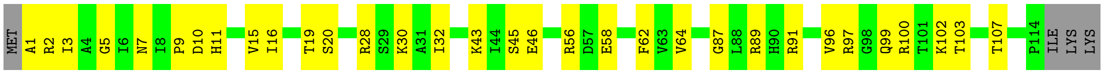
- Molecule 17: 30S ribosomal protein S12

Chain Q:



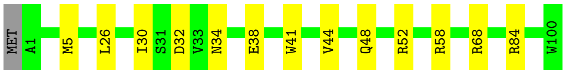
- Molecule 18: 30S ribosomal protein S13

Chain R:



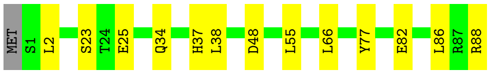
- Molecule 19: 30S ribosomal protein S14

Chain S:



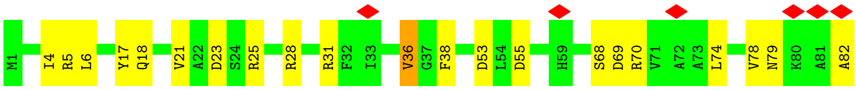
- Molecule 20: 30S ribosomal protein S15

Chain T:



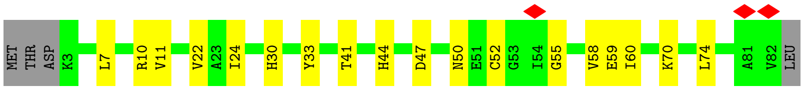
- Molecule 21: 30S ribosomal protein S16

Chain U:

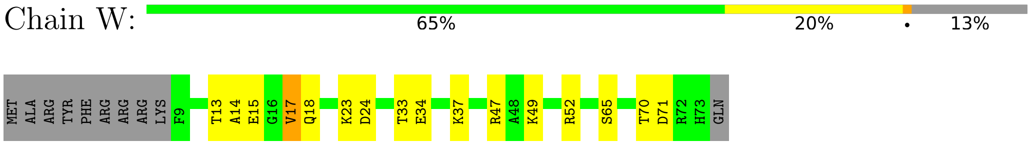


- Molecule 22: 30S ribosomal protein S17

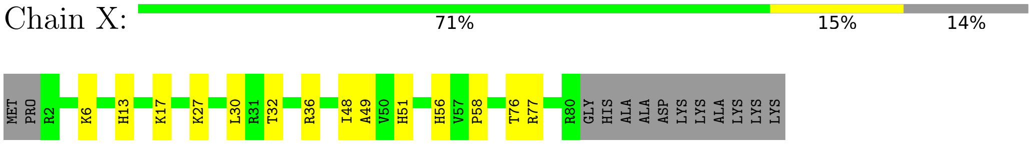
Chain V:



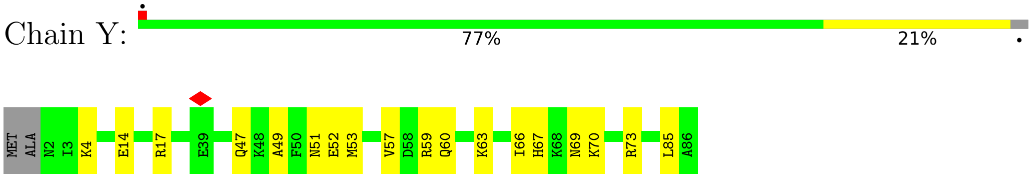
- Molecule 23: 30S ribosomal protein S18



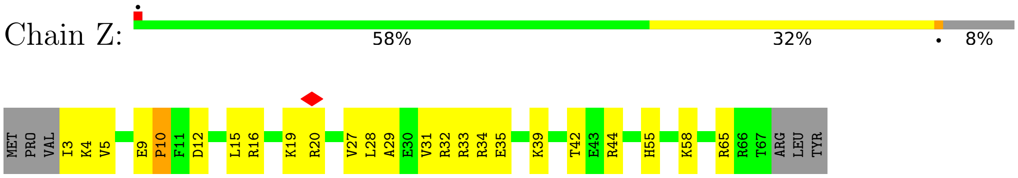
- Molecule 24: 30S ribosomal protein S19



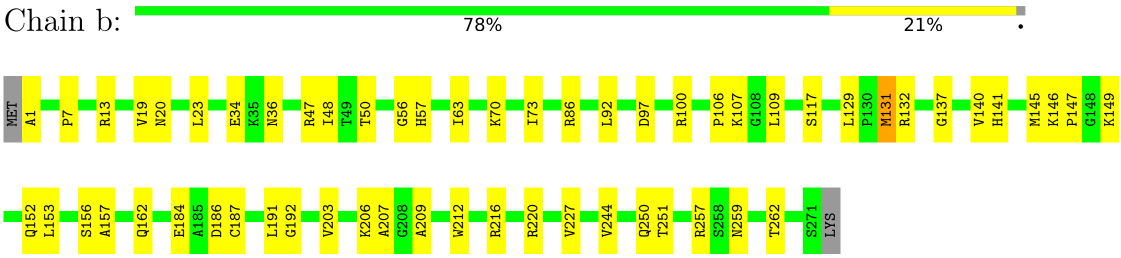
- Molecule 25: 30S ribosomal protein S20



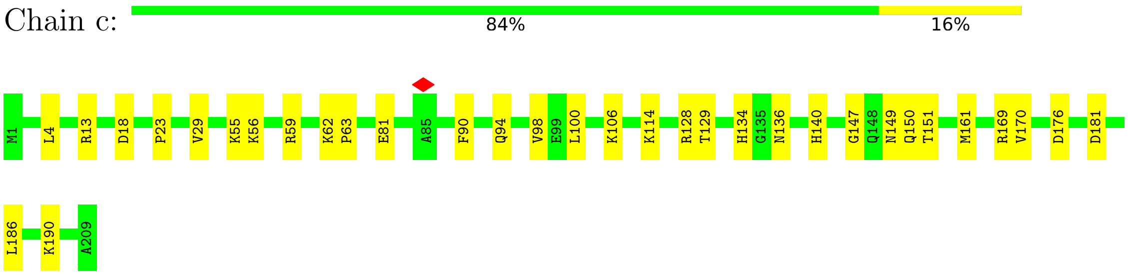
- Molecule 26: 30S ribosomal protein S21



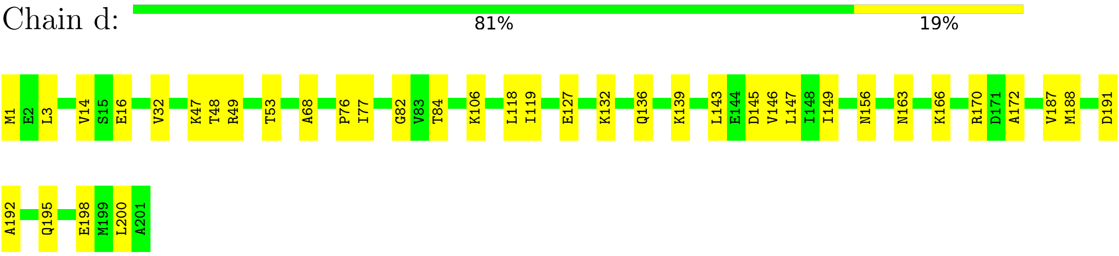
- Molecule 27: 50S ribosomal protein L2



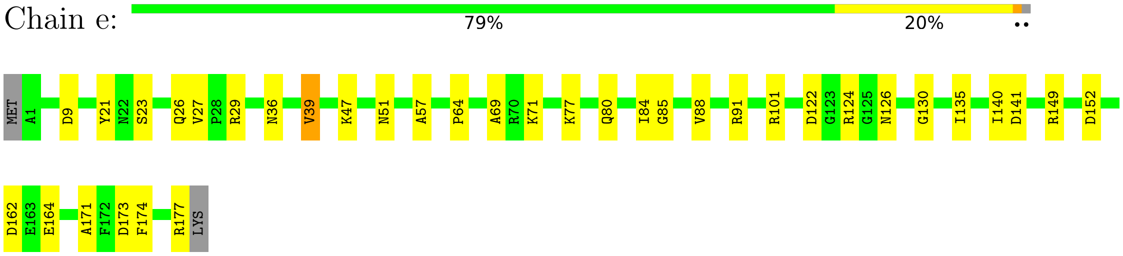
- Molecule 28: 50S ribosomal protein L3



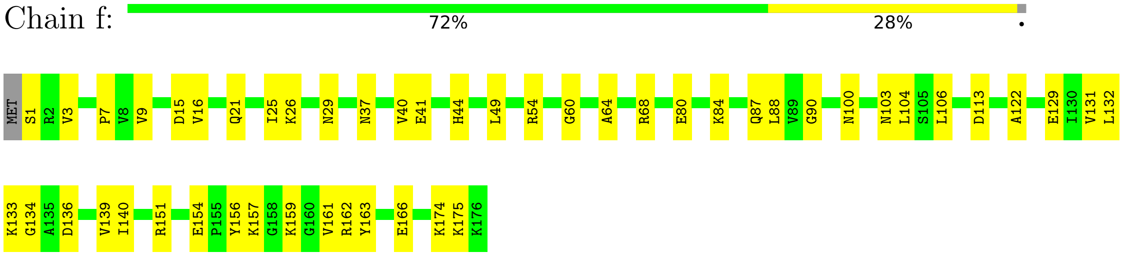
- Molecule 29: 50S ribosomal protein L4



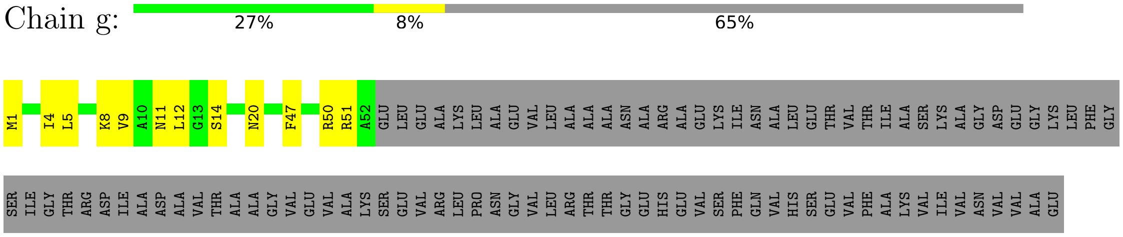
- Molecule 30: 50S ribosomal protein L5



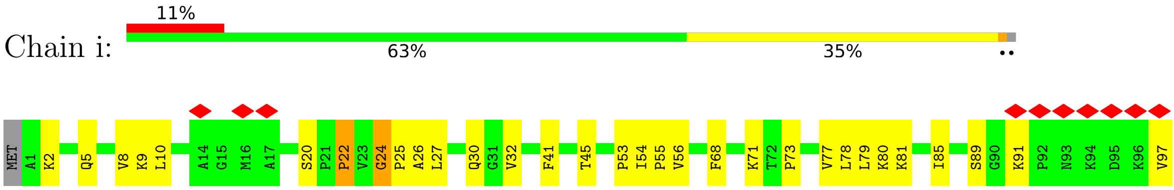
- Molecule 31: 50S ribosomal protein L6



- Molecule 32: 50S ribosomal protein L9

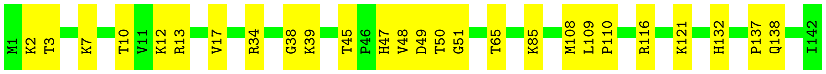


- Molecule 33: 50S ribosomal protein L11



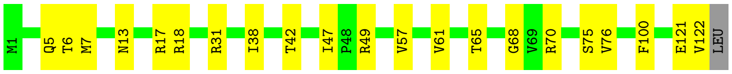
- Molecule 34: 50S ribosomal protein L13

Chain j:



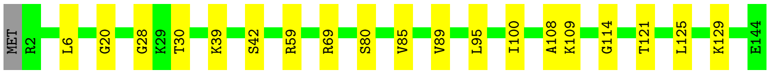
- Molecule 35: 50S ribosomal protein L14

Chain k:



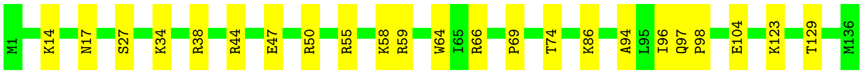
- Molecule 36: 50S ribosomal protein L15

Chain l:



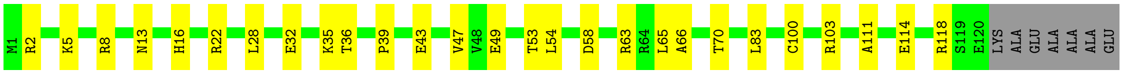
- Molecule 37: 50S ribosomal protein L16

Chain m:



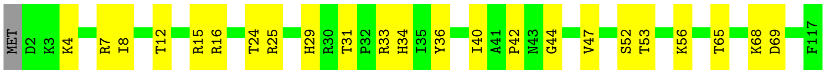
- Molecule 38: 50S ribosomal protein L17

Chain n:



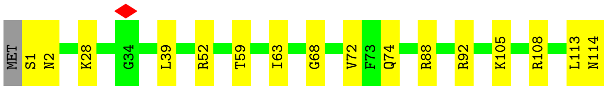
- Molecule 39: 50S ribosomal protein L18

Chain o:



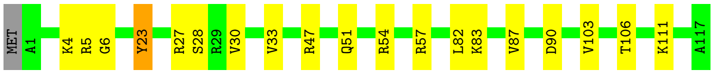
- Molecule 40: 50S ribosomal protein L19

Chain p:



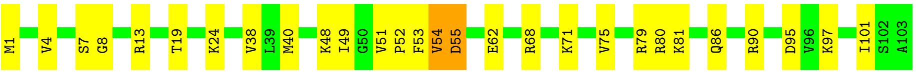
- Molecule 41: 50S ribosomal protein L20

Chain q:



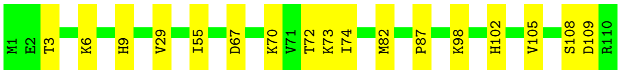
- Molecule 42: 50S ribosomal protein L21

Chain r:



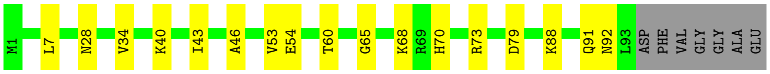
- Molecule 43: 50S ribosomal protein L22

Chain s:



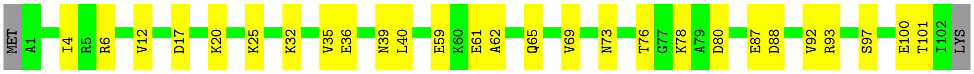
- Molecule 44: 50S ribosomal protein L23

Chain t:



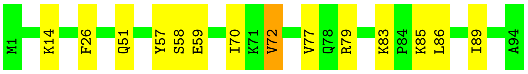
- Molecule 45: 50S ribosomal protein L24

Chain u:



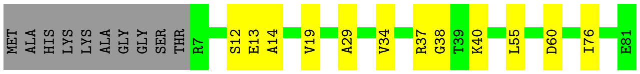
- Molecule 46: 50S ribosomal protein L25

Chain v:



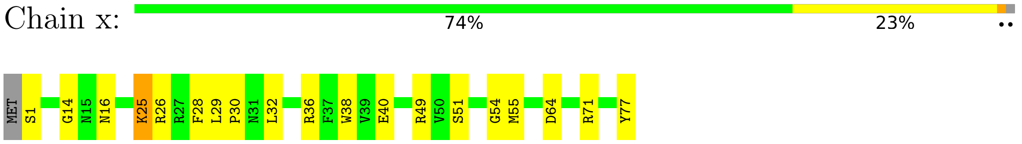
- Molecule 47: 50S ribosomal protein L27

Chain w:



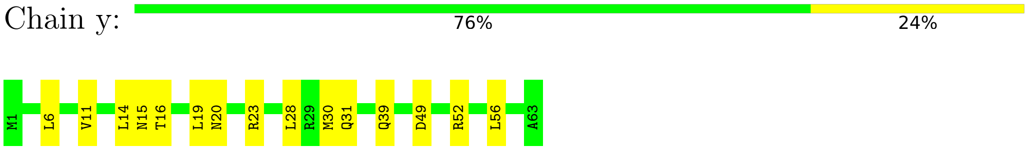
- Molecule 48: 50S ribosomal protein L28

Chain x:



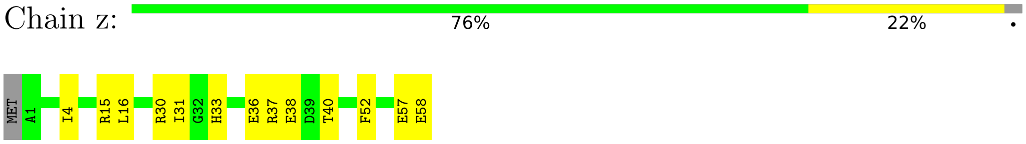
- Molecule 49: 50S ribosomal protein L29

Chain y:



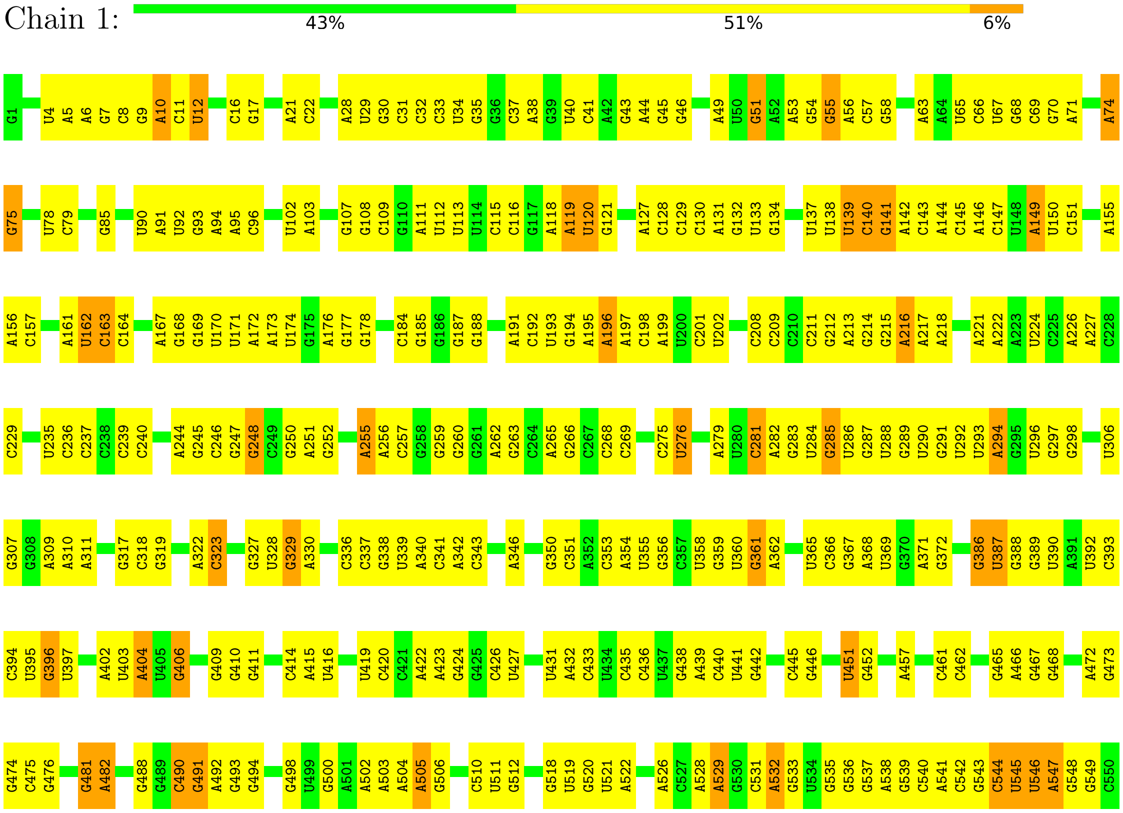
- Molecule 50: 50S ribosomal protein L30

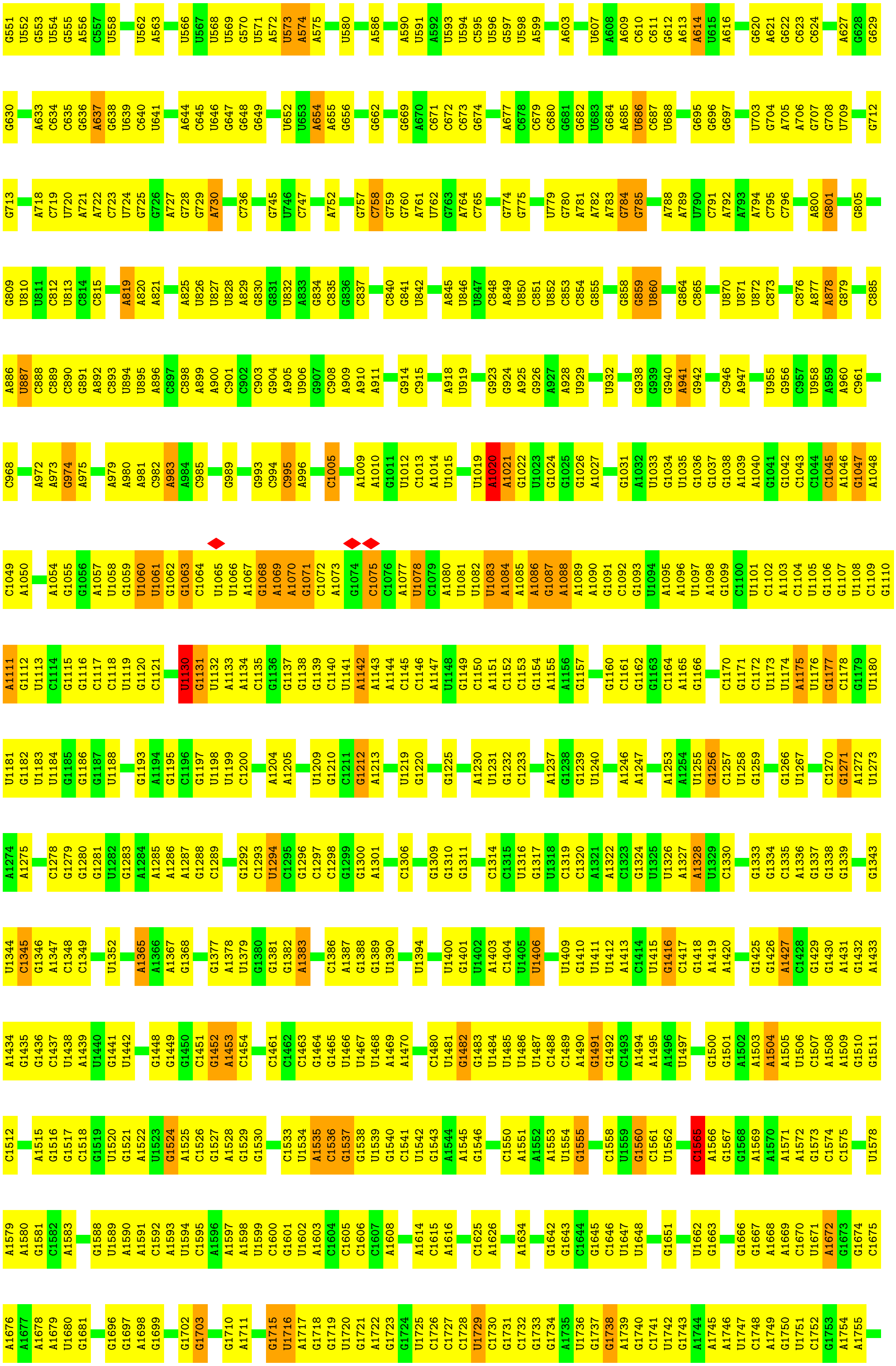
Chain z:

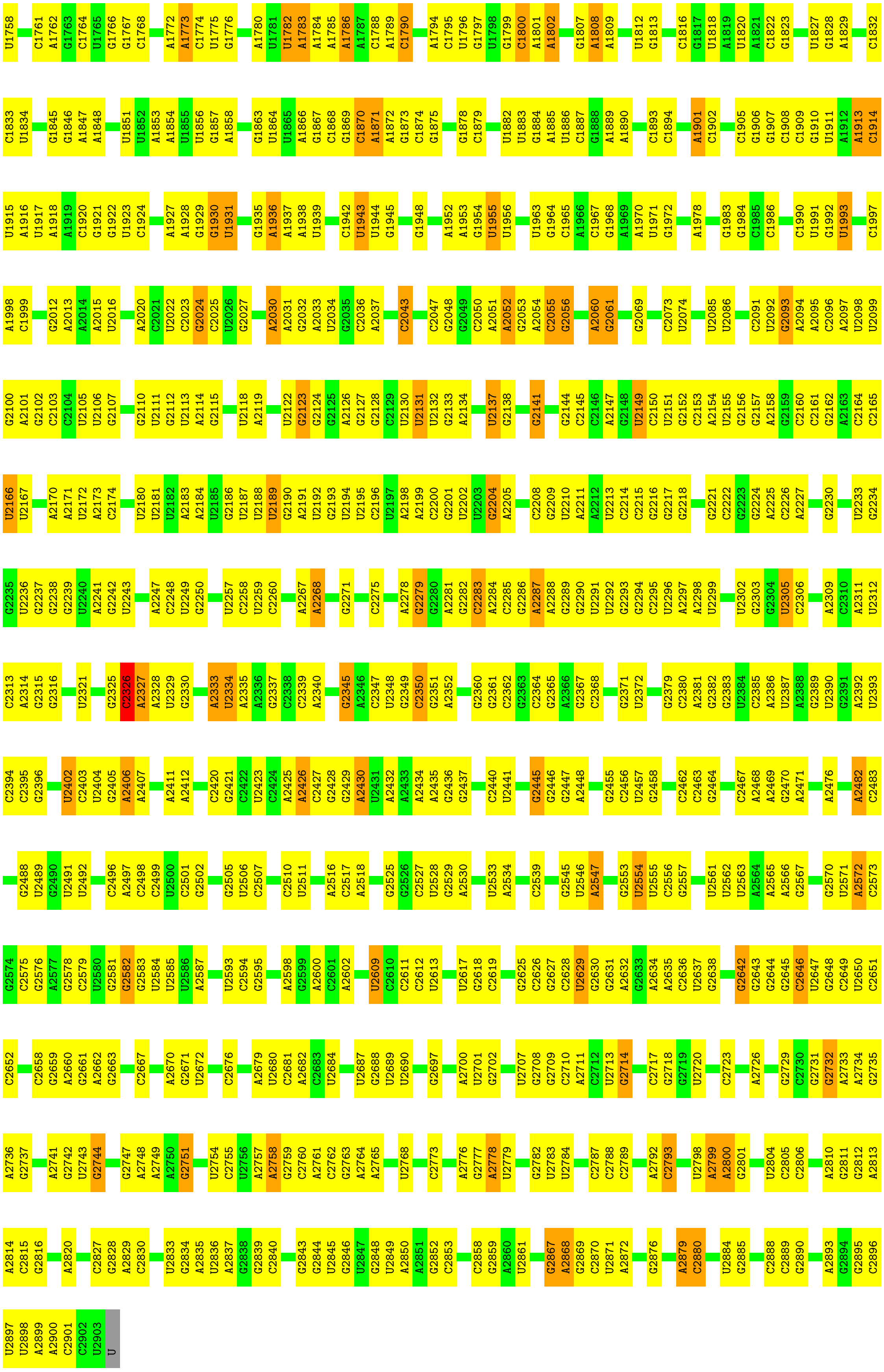


- Molecule 51: 23S rRNA

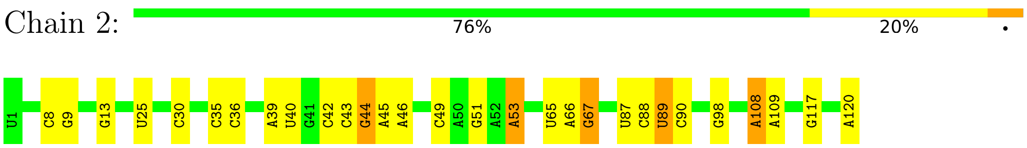
Chain 1:



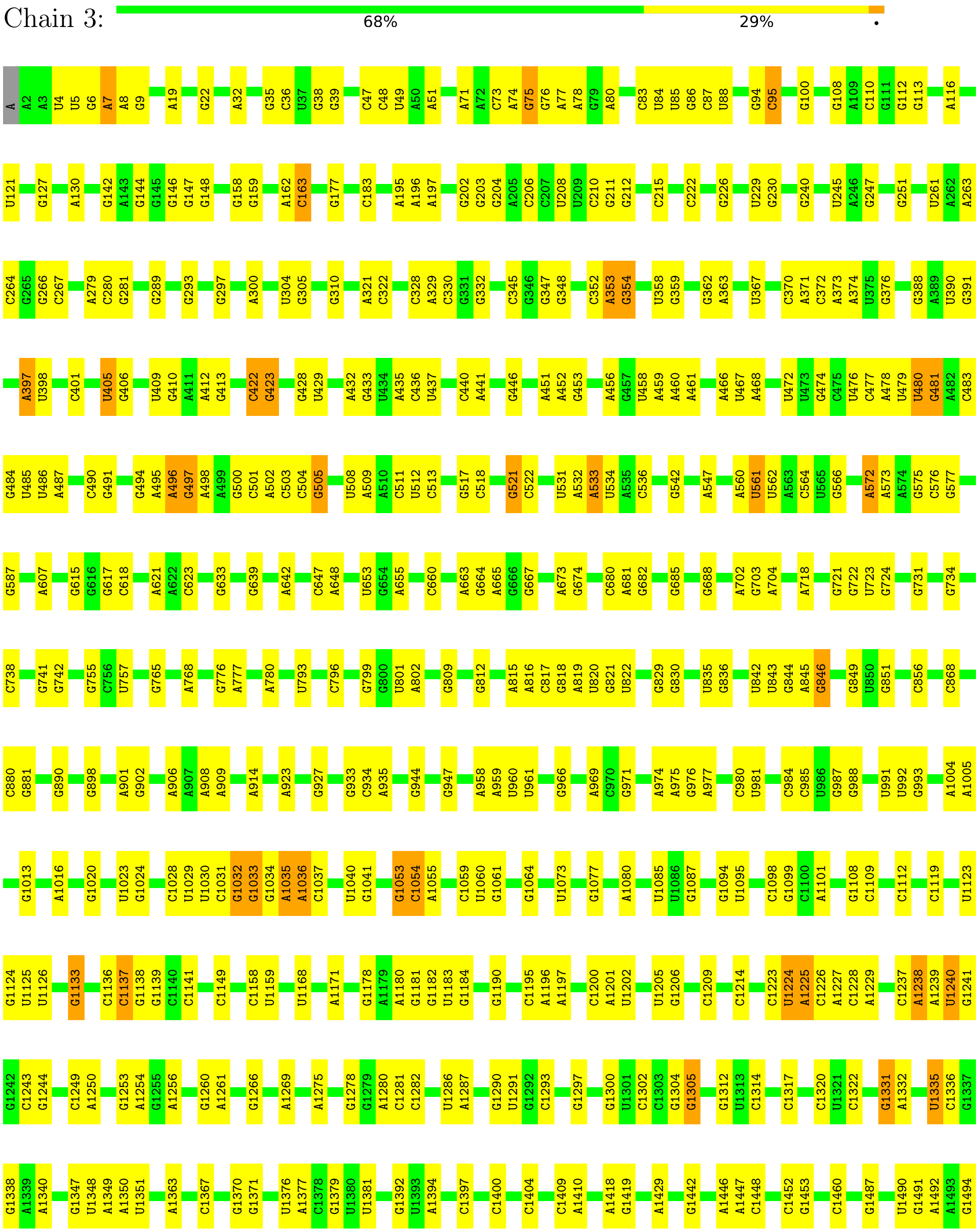

G551 U552 G553 U554 G555 A556 C557 U558 U562 A563 U566 U567 U568 U569 G570 U571 A572 U573 A574 A575 U580 A586 A590 U591 A592 U593 U594 C595 U596 G597 U598 A599 A603 U607 A608 A609 C610 C611 G612 A613 A614 U615 A616 G620 A621 G622 C623 C624 A627 G628 G629
G630 A633 C634 C635 G636 A637 G638 U639 C640 U641 A644 C645 U646 G647 G648 G649 U652 U653 A654 A655 G656 G662 G669 A670 C671 C672 C673 G674 A677 C678 C679 C680 G681 G682 U683 G684 A685 U686 C687 U688 G695 U696 G697 U703 G704 A705 A706 G707 G708 U709 G712
G713 A718 C719 U720 A721 A722 C723 U724 G725 G726 A727 G728 G729 A730 C736 G745 U746 C747 A752 G757 C758 G759 G760 A761 U762 G763 A764 C765 G774 G775 U779 G780 A781 A782 A783 G784 G785 A788 A789 U790 C791 A792 A793 A794 C795 C796 A800 G801 G805
G809 U810 U811 C812 U813 C814 C815 A819 A820 A821 A825 U826 U827 G828 A829 G830 G831 U832 A833 G834 C835 G836 C837 C840 G841 U842 A845 U846 U847 C848 A849 U850 C851 U852 C853 C854 G855 G858 G859 U860 G864 C865 U870 U871 G872 C873 C876 A877 A878 G879 C885
A886 U887 C888 C889 C890 G891 A892 C893 U894 U895 A896 C897 C898 A899 A900 C901 C902 C903 G904 A905 U906 G907 C908 A909 A910 A911 G914 C915 A918 U919 G923 G924 A925 G926 A927 A928 U929 U932 G938 G939 G940 A941 G942 C946 A947 U955 G956 C957 U958 A959 A960 C961
C968 A972 A973 G974 A975 A979 A980 A981 C982 A983 A984 C985 G989 G993 C994 C995 A996 C1005 A1009 A1010 G1011 U1012 C1013 A1014 U1015 U1019 A1020 A1021 G1022 U1023 G1024 G1025 G1026 A1027 G1031 A1032 U1033 G1034 U1035 G1036 G1037 G1038 A1039 A1040 G1041 G1042 C1043 C1044 C1045 A1046 G1047 A1048
C1049 A1050 A1054 G1055 G1056 A1057 U1058 G1059 U1060 U1061 G1062 G1063 C1064 U1065 U1066 A1067 G1068 A1069 A1070 G1071 C1072 A1073 G1074 C1075 C1076 A1077 U1078 C1079 A1080 U1081 U1082 U1083 A1084 A1085 A1086 G1087 A1088 A1089 A1090 G1091 C1092 G1093 U1094 A1095 U1096 U1097 A1098 G1099 C1100 U1101 C1102 A1103 C1104 U1105 G1106 G1107 U1108 C1109 G1110
A1111 G1112 U1113 C1114 G1115 G1116 C1117 C1118 U1119 G1120 C1121 U1130 G1131 U1132 A1133 A1134 C1135 G1136 C1137 G1138 G1139 C1140 U1141 A1142 A1143 A1144 C1145 C1146 A1147 U1148 G1149 C1150 A1151 C1152 C1153 G1154 A1155 A1156 G1157 G1160 C1161 G1162 G1163 C1164 A1165 G1166 C1170 G1171 C1172 U1173 U1174 A1175 U1176 G1177 C1178 G1179 U1180
U1181 G1182 U1183 U1184 G1185 G1186 G1187 U1188 G1193 A1194 G1195 C1196 G1197 U1198 U1199 C1200 A1204 A1205 U1209 G1210 C1211 G1212 A1213 U1219 G1220 G1225 A1230 U1231 G1232 C1233 A1237 G1238 G1239 U1240 A1246 A1247 A1253 A1254 U1255 G1256 C1257 U1258 G1259 G1266 U1267 C1270 G1271 A1272 U1273
A1274 A1275 C1278 G1279 G1280 G1281 U1282 G1283 A1284 A1285 A1286 A1287 G1288 C1289 G1292 C1293 U1294 C1295 G1296 C1297 C1298 G1299 G1300 A1301 C1306 G1309 G1310 G1311 C1314 C1315 U1316 G1317 U1318 C1319 C1320 A1321 A1322 C1323 G1324 U1325 U1326 A1327 A1328 U1329 C1330 G1333 G1334 C1335 A1336 G1337 G1338 G1339 G1343
U1344 C1345 G1346 A1347 C1348 C1349 U1352 A1365 A1366 A1367 G1368 G1377 A1378 U1379 G1380 G1381 C1382 A1383 C1386 A1387 G1388 G1389 U1390 U1394 U1400 G1401 U1402 A1403 C1404 U1405 U1406 U1409 G1410 U1411 U1412 A1413 C1414 U1415 G1416 C1417 G1418 A1419 A1420 G1425 G1426 A1427 C1428 G1429 G1430 A1431 G1432 A1433
A1434 G1435 G1436 C1437 U1438 A1439 U1440 G1441 U1442 G1448 G1449 G1450 C1451 G1452 A1453 C1454 C1461 C1462 C1463 G1464 G1465 U1466 U1467 U1468 A1469 A1470 C1480 U1481 G1482 G1483 U1484 U1485 U1486 U1487 C1488 C1489 A1490 G1491 G1492 C1493 A1494 A1495 A1496 U1497 G1500 G1501 A1502 A1503 A1504 A1505 U1506 C1507 A1508 A1509 G1510 G1511
C1512 A1515 G1516 G1517 C1518 G1519 U1520 G1521 A1522 U1523 G1524 A1525 C1526 G1527 A1528 G1529 G1530 C1533 U1534 A1535 C1536 G1537 G1538 U1539 G1540 C1541 U1542 G1543 A1544 A1545 G1546 C1550 A1551 A1552 A1553 U1554 G1555 C1558 U1559 G1560 C1561 U1562 C1565 A1566 G1567 G1568 A1569 A1570 A1571 A1572 G1573 C1574 C1575 U1578
A1579 A1580 G1581 C1582 A1583 G1588 U1589 A1590 A1591 C1592 A1593 U1594 C1595 A1596 A1597 A1598 U1599 C1600 G1601 U1602 A1603 C1604 C1605 C1606 C1607 A1608 A1614 C1615 A1616 C1625 A1626 A1634 G1642 G1643 C1644 G1645 C1646 U1647 U1648 G1651 U1662 G1663 G1666 G1667 A1668 A1669 C1670 U1671 A1672 G1673 G1674 C1675
A1676 A1677 A1678 A1679 U1680 G1681 G1696 G1697 A1698 G1699 G1702 G1703 G1710 A1711 G1715 U1716 A1717 G1718 G1719 U1720 G1721 A1722 G1723 G1724 U1725 C1726 C1727 C1728 U1729 C1730 G1731 C1732 G1733 G1734 A1735 U1736 G1737 G1738 A1739 G1740 C1741 U1742 G1743 A1744 A1745 A1746 U1747 C1748 A1749 G1750 U1751 C1752 G1753 A1754 A1755

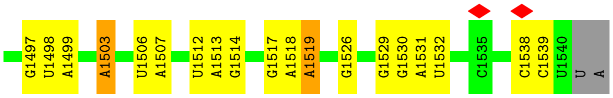

U1758 C1761 A1762 G1763 C1764 U1765 G1766 G1767 C1768 A1772 A1773 C1774 U1775 G1776 A1780 U1781 U1782 A1783 A1784 A1785 A1786 A1787 C1788 A1789 C1790 A1794 C1795 U1796 G1797 U1798 G1799 C1800 A1801 A1802 G1807 A1808 A1809 U1812 G1813 C1816 G1817 U1818 A1819 U1820 A1821 C1822 G1823 U1827 G1828 A1829 C1832
C1833 U1834 G1845 G1846 A1847 A1848 U1851 U1852 A1853 A1854 U1855 U1856 G1857 A1858 G1863 U1864 U1865 A1866 G1867 C1868 G1869 C1870 A1871 A1872 G1873 C1874 G1875 G1878 C1879 U1882 U1883 G1884 A1885 U1886 C1887 G1888 A1889 A1890 C1893 C1894 A1901 C1902 C1905 G1906 G1907 C1908 C1909 G1910 U1911 A1912 A1913 C1914
U1915 A1916 U1917 A1918 A1919 C1920 G1921 G1922 U1923 C1924 A1927 A1928 G1929 G1930 U1931 G1935 A1936 A1937 A1938 U1939 C1942 U1943 U1944 G1945 G1948 A1952 A1953 G1954 U1955 U1956 U1963 G1964 C1965 A1966 C1967 G1968 A1969 A1970 U1971 G1972 A1978 G1983 G1984 C1985 C1986 C1990 U1991 G1992 U1993 C1997
A1998 C1999 G2012 A2013 A2014 A2015 U2016 A2020 C2021 U2022 C2023 G2024 C2025 U2026 G2027 A2030 A2031 G2032 A2033 U2034 G2035 C2036 A2037 C2043 C2047 G2048 G2049 C2050 A2051 A2052 G2053 A2054 C2055 G2056 A2060 G2061 G2069 C2073 U2074 U2085 U2086 C2091 U2092 G2093 A2094 A2095 C2096 A2097 U2098 U2099
G2100 A2101 G2102 C2103 C2104 U2105 U2106 G2107 G2110 U2111 G2112 U2113 A2114 G2115 U2118 A2119 U2122 G2123 G2124 G2125 A2126 G2127 G2128 C2129 U2130 U2131 U2132 G2133 A2134 U2137 G2138 G2141 G2144 C2145 C2146 A2147 G2148 U2149 C2150 U2151 G2152 C2153 A2154 U2155 G2156 G2157 A2158 G2159 C2160 C2161 G2162 A2163 C2164 C2165
U2166 U2167 A2170 A2171 U2172 A2173 C2174 U2180 U2181 U2182 A2183 A2184 U2185 G2186 U2187 U2188 U2189 G2190 A2191 U2192 G2193 U2194 U2195 C2196 U2197 A2198 A2199 C2200 G2201 U2202 U2203 G2204 A2205 C2208 G2209 U2210 A2211 A2212 U2213 C2214 C2215 G2216 G2217 G2218 G2221 C2222 G2223 G2224 A2225 C2226 A2227 G2230 U2233 G2234
G2235 U2236 G2237 G2238 G2239 U2240 A2241 G2242 U2243 A2247 C2248 U2249 G2250 U2257 C2258 U2259 C2260 A2267 A2268 G2271 C2275 A2278 G2279 G2280 A2281 G2282 C2283 A2284 C2285 G2286 A2287 A2288 G2289 G2290 U2291 U2292 G2293 G2294 C2295 U2296 A2297 A2298 U2299 U2302 G2303 G2304 U2305 C2306 A2309 C2310 A2311 U2312
C2313 A2314 G2315 G2316 U2321 G2325 C2326 A2327 A2328 U2329 G2330 A2333 U2334 A2335 A2336 G2337 C2338 C2339 A2340 G2345 A2346 C2347 U2348 G2349 C2350 G2351 A2352 G2360 G2361 C2362 G2363 C2364 G2365 A2366 G2367 C2368 G2371 U2372 G2379 C2380 A2381 G2382 G2383 U2384 C2385 A2386 U2387 A2388 G2389 U2390 G2391 A2392 U2393
C2394 C2395 G2396 U2402 C2403 U2404 G2405 A2406 A2407 A2411 A2412 C2420 G2421 C2422 U2423 C2424 A2425 A2426 C2427 G2428 G2429 A2430 U2431 A2432 A2433 A2434 A2435 G2436 G2437 C2440 U2441 G2445 G2446 G2447 A2448 G2455 C2456 U2457 G2458 C2462 C2463 G2464 C2467 A2468 A2469 G2470 A2471 A2476 A2482 C2483
G2488 U2489 G2490 U2491 U2492 C2496 A2497 C2498 C2499 U2500 C2501 G2502 G2505 U2506 C2507 C2510 U2511 A2516 C2517 A2518 G2525 G2526 C2527 U2528 G2529 A2530 U2533 A2534 C2539 G2545 U2546 A2547 G2553 U2554 U2555 C2556 G2557 U2561 U2562 U2563 A2564 A2565 A2566 G2567 G2570 U2571 A2572 C2573
G2574 C2575 G2576 A2577 G2578 C2579 U2580 G2581 G2582 G2583 U2584 U2585 U2586 A2587 U2593 C2594 G2595 A2598 G2599 A2600 C2601 A2602 U2609 C2610 C2611 C2612 U2613 U2617 G2618 C2619 G2625 C2626 G2627 C2628 U2629 G2630 G2631 A2632 G2633 A2634 A2635 C2636 U2637 G2638 G2642 G2643 G2644 G2645 C2646 U2647 G2648 C2649 U2650 C2651
C2652 C2658 G2659 A2660 G2661 A2662 G2663 C2667 A2670 G2671 U2672 C2676 A2679 U2680 C2681 A2682 C2683 U2684 U2687 G2688 U2689 U2690 G2697 A2700 U2701 G2702 U2707 G2708 G2709 C2710 A2711 C2712 U2713 G2714 C2717 G2718 G2719 U2720 C2723 A2726 G2729 C2730 G2731 G2732 A2733 A2734 G2735
A2736 G2737 A2741 G2742 U2743 G2744 G2747 A2748 A2749 A2750 G2751 U2754 C2755 U2756 A2757 A2758 G2759 C2760 A2761 C2762 G2763 A2764 A2765 U2768 C2773 A2776 G2777 A2778 U2779 G2782 U2783 U2784 C2787 C2788 C2789 A2792 C2793 U2798 A2799 A2800 G2801 U2804 C2805 C2806 A2810 G2811 G2812 A2813
A2814 C2815 G2816 A2820 C2827 G2828 A2829 C2830 U2833 G2834 A2835 U2836 A2837 G2838 G2839 C2840 G2843 G2844 U2845 G2846 U2847 G2848 U2849 A2850 A2851 G2852 C2853 C2858 G2859 A2860 U2861 G2867 A2868 G2869 C2870 U2871 A2872 G2876 A2879 C2880 U2884 G2885 C2888 C2889 G2890 A2893 G2894 G2895 C2896
U2897 U2898 A2899 A2900 C2901 C2902 U2903 U

- Molecule 52: 5S rRNA



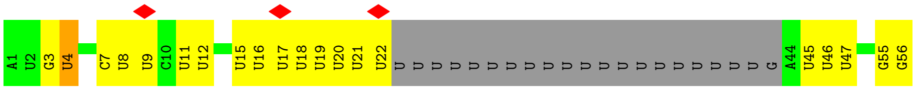
- Molecule 53: 16S rRNA





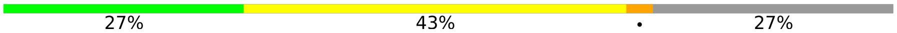
- Molecule 54: mRNA

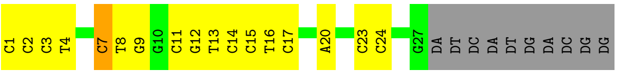
Chain 4:



- Molecule 55: templete DNA strand

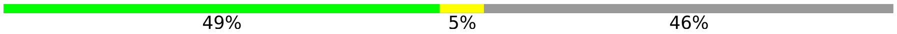
Chain 8:

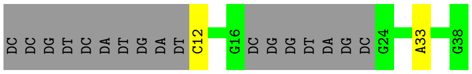




- Molecule 56: non-templete DNA strand

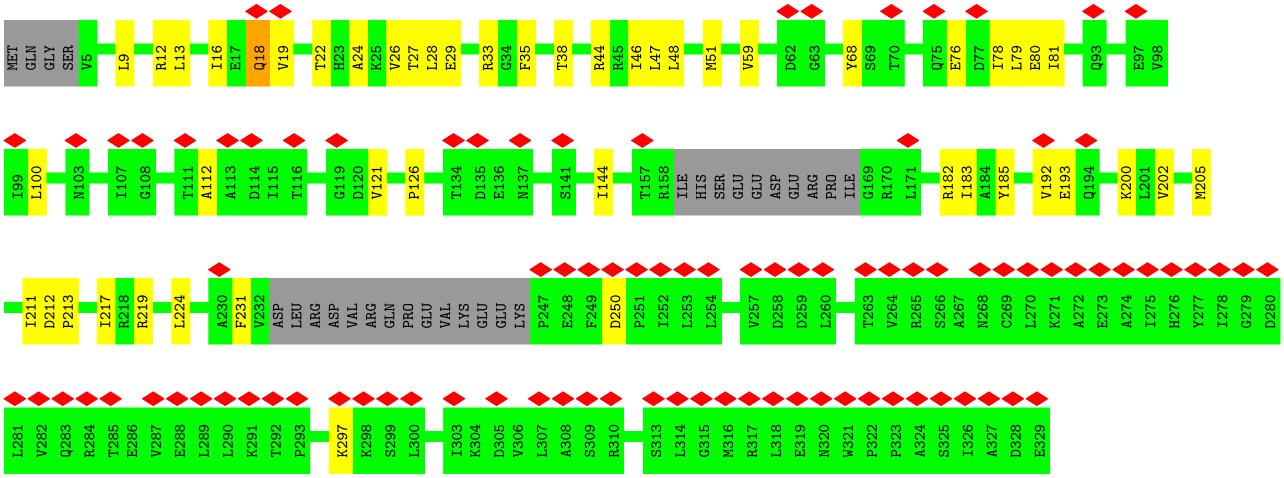
Chain 9:





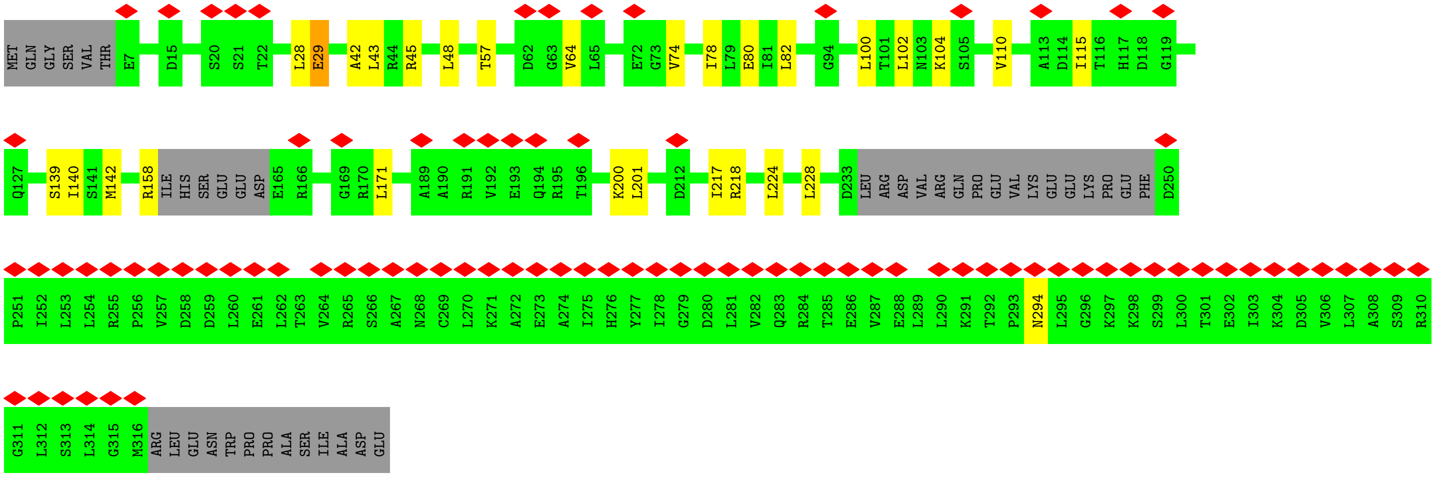
- Molecule 57: DNA-directed RNA polymerase subunit alpha

Chain A1:



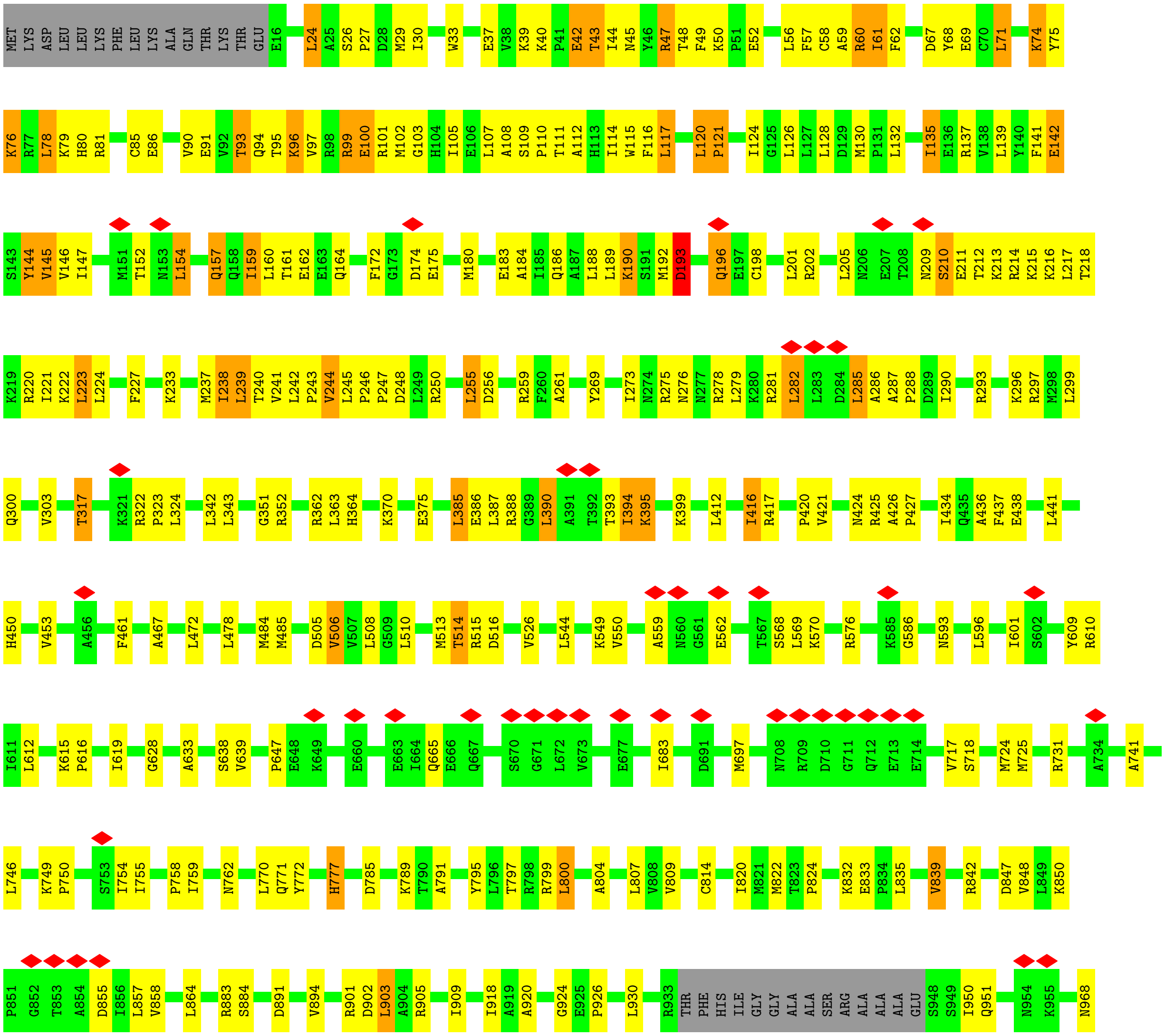
- Molecule 57: DNA-directed RNA polymerase subunit alpha

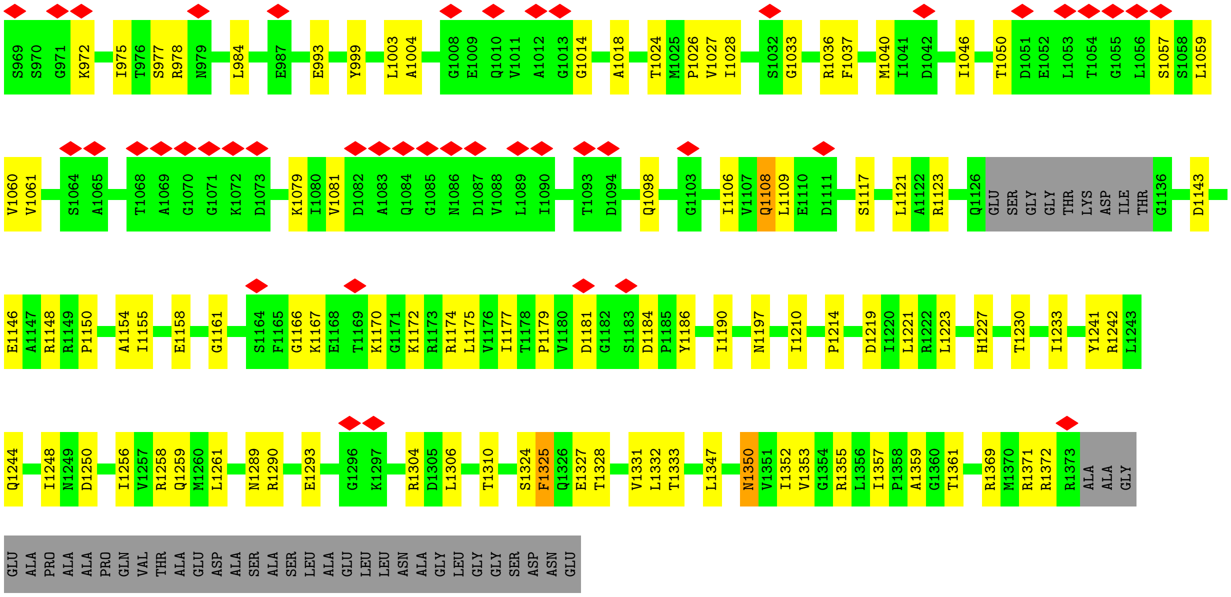
Chain A2:



- Molecule 58: DNA-directed RNA polymerase subunit beta’

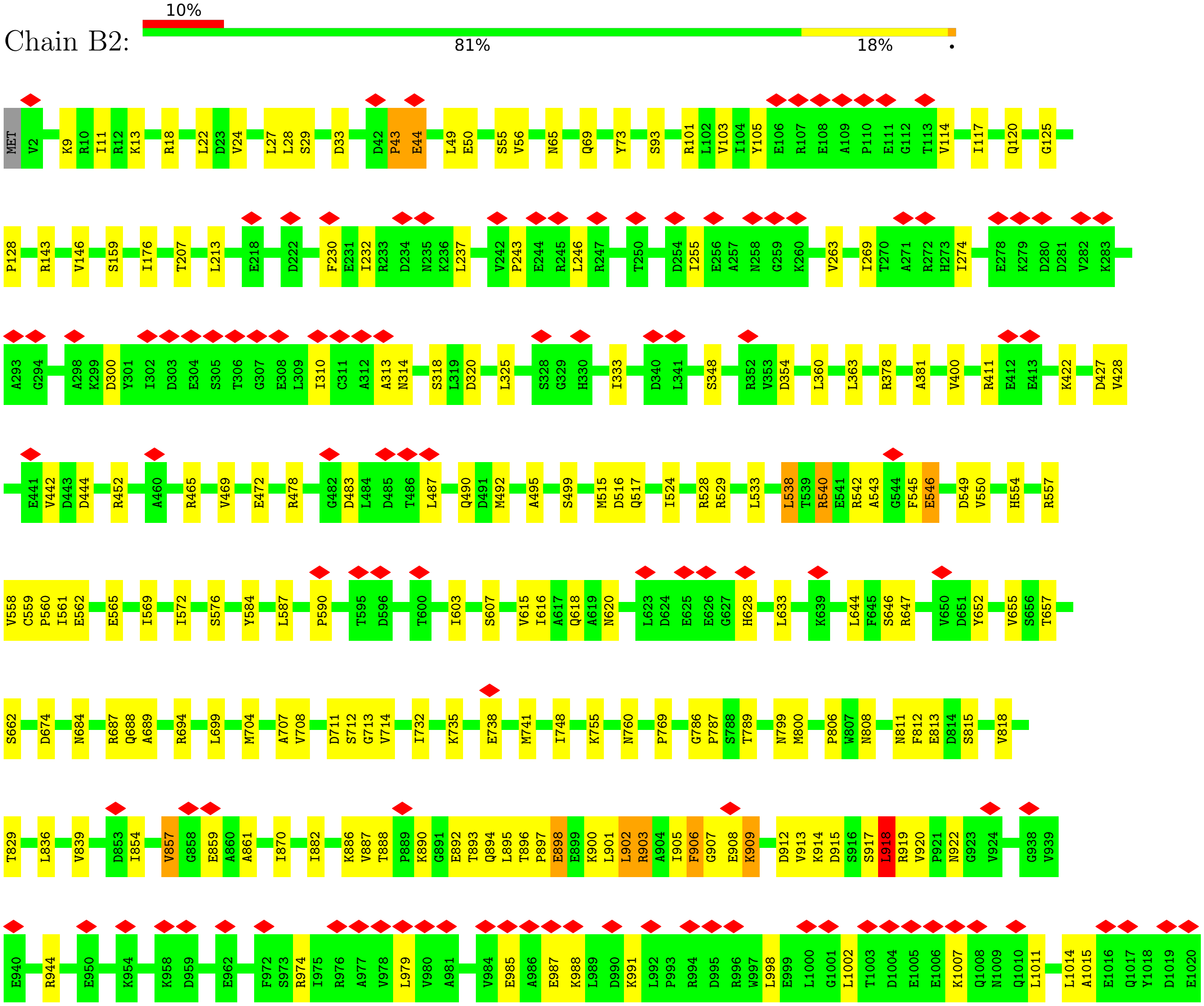
Chain B1:

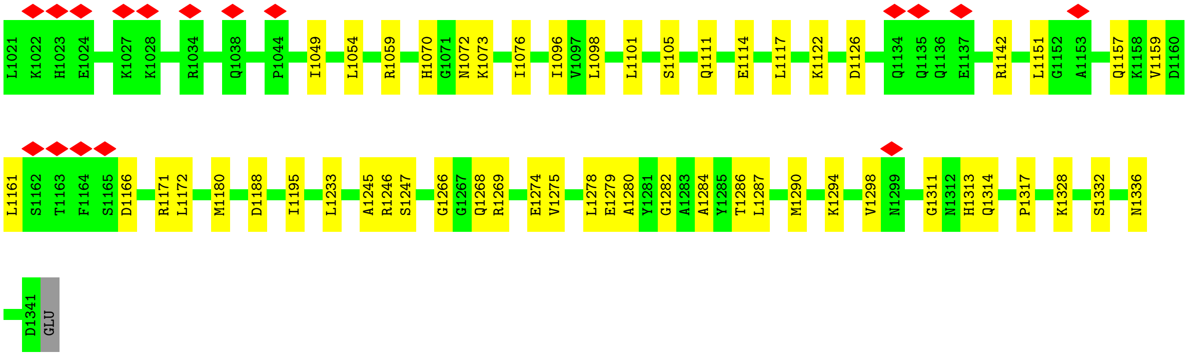




- Molecule 59: DNA-directed RNA polymerase subunit beta

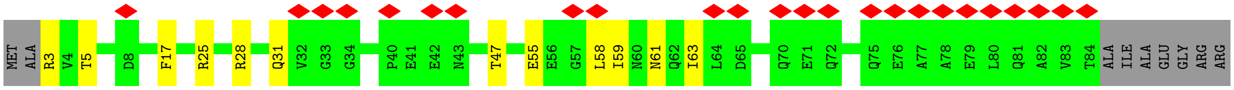
Chain B2:





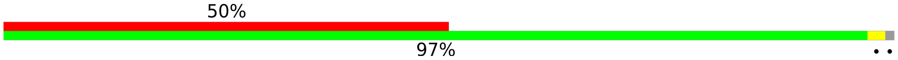
- Molecule 60: DNA-directed RNA polymerase subunit omega

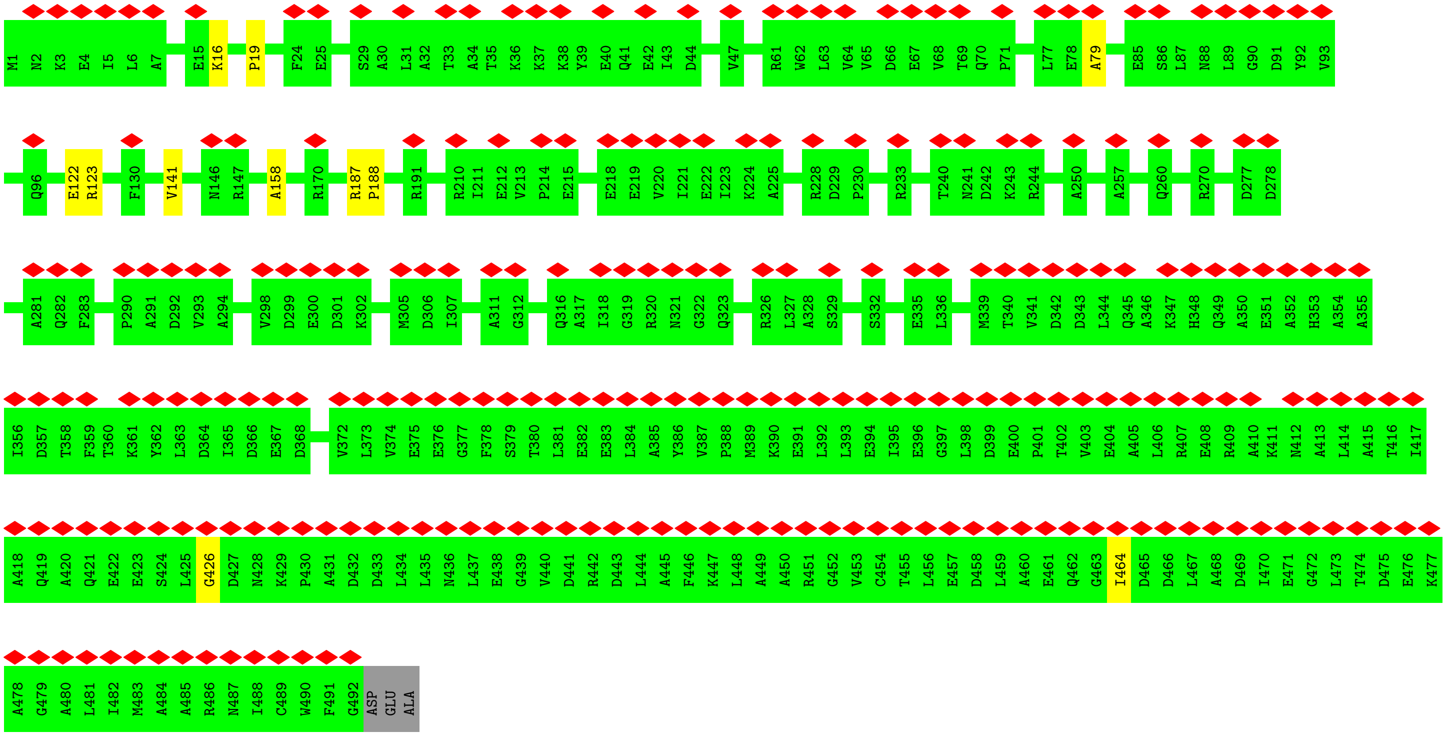
Chain W0:



- Molecule 61: Transcription termination/antitermination protein NusA

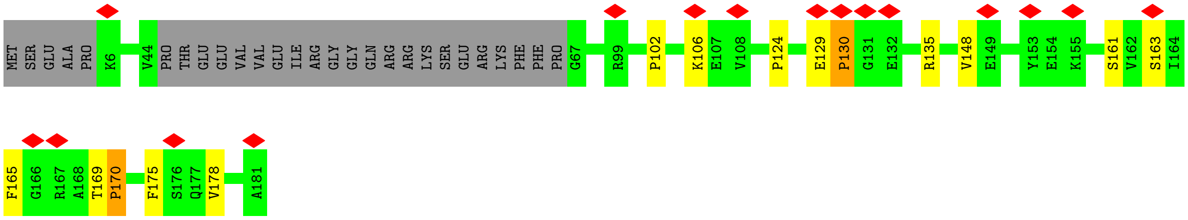
Chain NA:





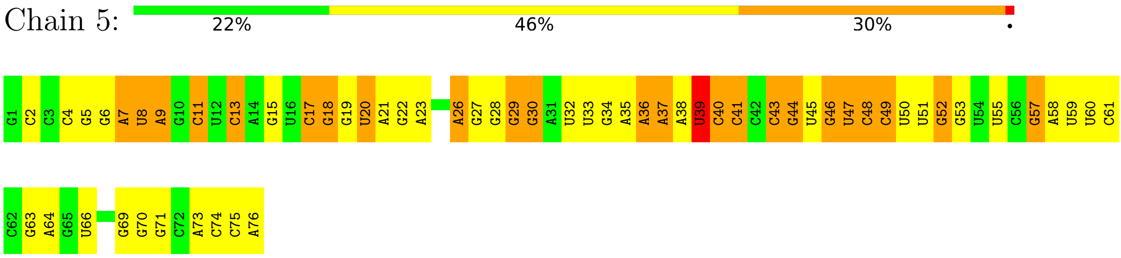
- Molecule 62: Transcription termination/antitermination protein NusG

Chain NG:



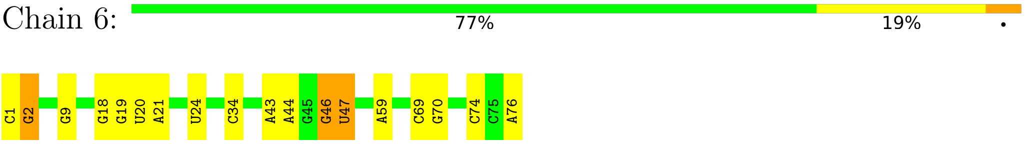
- Molecule 63: tRNA(Phe)

Chain 5:



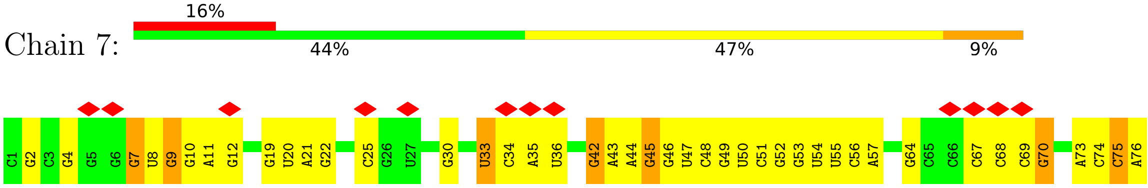
- Molecule 64: tRNA(fMet)

Chain 6:



- Molecule 64: tRNA(fMet)

Chain 7:



- Molecule 65: viomycin

Chain h:

4 Experimental information ⓘ

Property	**Value**	**Source**
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	35000	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose $(e^-/\text{Å}^2)$	47	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.161	Depositor
Minimum map value	-0.071	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.012	Depositor
Map size (Å)	753.60004, 753.60004, 753.60004	wwPDB
Map dimensions	480, 480, 480	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.57, 1.57, 1.57	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: KBE, 5OH, UAL, DPP, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#|Z| > 5$	RMSZ	$\#|Z| > 5$
1	A	0.26	0/531	0.54	0/709
2	B	0.40	0/450	0.60	0/599
3	C	0.28	0/416	0.52	0/554
4	D	0.47	0/380	0.69	0/498
5	E	0.53	0/513	0.60	0/676
6	F	0.57	0/303	0.65	0/397
7	G	0.37	0/1735	0.64	0/2338
8	H	0.34	0/1651	0.55	0/2225
9	I	0.35	0/1665	0.71	0/2227
10	J	0.38	0/1169	0.68	2/1573 (0.1%)
11	K	0.46	0/835	0.77	0/1128
12	L	0.30	0/1195	0.66	3/1602 (0.2%)
13	M	0.35	0/989	0.53	0/1326
14	N	0.41	0/1034	0.77	0/1375
15	O	0.50	0/796	0.78	2/1077 (0.2%)
16	P	0.45	0/885	0.64	1/1195 (0.1%)
17	Q	0.50	0/969	0.86	2/1300 (0.2%)
18	R	0.33	0/892	0.73	2/1193 (0.2%)
19	S	0.33	0/817	0.61	0/1088
20	T	0.49	0/722	0.64	0/964
21	U	0.30	0/659	0.71	2/884 (0.2%)
22	V	0.44	0/657	0.71	0/881
23	W	0.54	0/544	0.74	1/731 (0.1%)
24	X	0.28	0/652	0.55	0/877
25	Y	0.28	0/671	0.52	0/888
26	Z	0.66	0/550	1.01	2/728 (0.3%)
27	b	0.49	0/2121	0.64	0/2852
28	c	0.42	0/1586	0.59	2/2134 (0.1%)
29	d	0.43	0/1571	0.62	0/2113
30	e	0.37	0/1434	0.60	2/1926 (0.1%)
31	f	0.29	0/1343	0.55	0/1816
32	g	0.32	0/405	0.75	0/544

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	i	0.31	0/1046	0.77	3/1410 (0.2%)
34	j	0.41	0/1152	0.55	1/1551 (0.1%)
35	k	0.45	0/947	0.66	0/1268
36	l	0.40	0/1054	0.63	0/1403
37	m	0.56	0/1093	0.74	0/1460
38	n	0.46	0/973	0.72	1/1301 (0.1%)
39	o	0.32	0/902	0.51	0/1209
40	p	0.41	0/929	0.62	0/1242
41	q	0.52	0/960	0.62	1/1278 (0.1%)
42	r	0.43	0/829	0.69	0/1107
43	s	0.43	0/864	0.58	0/1156
44	t	0.33	0/744	0.52	0/994
45	u	0.45	0/787	0.75	0/1051
46	v	0.34	0/766	0.51	0/1025
47	w	0.40	0/582	0.52	0/769
48	x	0.43	0/635	0.63	1/848 (0.1%)
49	y	0.29	0/510	0.63	0/677
50	z	0.41	0/453	0.53	0/605
51	1	0.51	0/69796	0.62	22/108888 (0.0%)
52	2	0.43	0/2872	0.46	0/4479
53	3	0.42	0/36963	0.43	0/57662
54	4	0.52	0/808	0.65	0/1251
55	8	0.56	0/599	0.70	1/919 (0.1%)
56	9	0.49	0/468	0.53	0/719
57	A1	0.55	0/2106	0.81	0/2868
57	A2	0.49	0/2048	0.76	0/2786
58	B1	0.57	6/10510 (0.1%)	0.75	8/14196 (0.1%)
59	B2	0.46	0/10714	0.67	1/14459 (0.0%)
60	W0	0.30	0/652	0.61	0/879
61	NA	0.84	0/2431	1.24	0/3385
62	NG	1.11	0/756	1.07	1/1048 (0.1%)
63	5	0.57	0/1812	0.86	3/2823 (0.1%)
64	6	0.40	0/1832	0.48	0/2855
64	7	0.39	0/1832	0.57	1/2855 (0.0%)
65	h	3.16	2/11 (18.2%)	0.74	0/13
All	All	0.48	8/191576 (0.0%)	0.62	65/282857 (0.0%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
65	h	3	SER	CA-C	-6.70	1.38	1.52
65	h	4	SER	CA-C	-6.18	1.40	1.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
58	B1	1350	ASN	CG-ND2	-5.28	1.22	1.33
58	B1	1108	GLN	CD-OE1	5.17	1.33	1.23
58	B1	424	ASN	CG-ND2	-5.14	1.22	1.33

The worst 5 of 65 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	P	73	VAL	N-CA-C	-9.00	104.56	113.20
41	q	33	VAL	N-CA-C	-8.81	104.72	112.12
12	L	64	ALA	N-CA-C	-7.67	105.09	114.75
51	1	1130	U	C2'-C3'-O3'	7.59	120.88	109.50
64	7	33	U	C2'-C3'-O3'	7.25	120.38	109.50

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	522	0	524	7	0
2	B	444	0	461	9	0
3	C	409	0	440	4	0
4	D	377	0	418	9	0
5	E	504	0	574	2	0
6	F	302	0	343	7	0
7	G	1704	0	1732	35	0
8	H	1624	0	1699	29	0
9	I	1643	0	1710	32	0
10	J	1156	0	1199	18	0
11	K	817	0	808	16	0
12	L	1181	0	1240	19	0
13	M	979	0	1034	9	0
14	N	1022	0	1070	24	0
15	O	786	0	828	14	0
16	P	869	0	878	22	0
17	Q	955	0	1019	32	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	R	883	0	944	18	0
19	S	805	0	847	9	0
20	T	714	0	737	6	0
21	U	649	0	666	16	0
22	V	648	0	691	9	0
23	W	535	0	552	9	0
24	X	637	0	665	9	0
25	Y	665	0	714	11	0
26	Z	544	0	579	11	0
27	b	2082	0	2157	46	0
28	c	1565	0	1616	29	0
29	d	1552	0	1619	28	0
30	e	1410	0	1447	23	0
31	f	1323	0	1374	33	0
32	g	400	0	423	6	0
33	i	1032	0	1088	42	0
34	j	1129	0	1162	22	0
35	k	938	0	1012	16	0
36	l	1045	0	1117	16	0
37	m	1074	0	1157	13	0
38	n	960	0	1000	19	0
39	o	892	0	923	16	0
40	p	917	0	965	16	0
41	q	947	0	1022	10	0
42	r	816	0	839	18	0
43	s	857	0	922	11	0
44	t	738	0	807	9	0
45	u	779	0	834	14	0
46	v	753	0	780	9	0
47	w	575	0	592	8	0
48	x	625	0	655	12	0
49	y	509	0	543	11	0
50	z	449	0	491	9	0
51	1	62317	0	31346	1464	0
52	2	2568	0	1303	15	0
53	3	33012	0	16618	188	0
54	4	729	0	364	6	0
55	8	539	0	305	29	0
56	9	417	0	224	2	0
57	A1	2088	0	1895	25	0
57	A2	2029	0	1864	20	0
58	B1	10353	0	10548	322	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
59	B2	10546	0	10550	169	0
60	W0	650	0	658	10	0
61	NA	2432	0	1171	9	0
62	NG	758	0	334	9	0
63	5	1622	0	821	28	0
64	6	1640	0	837	7	0
64	7	1640	0	837	20	0
65	h	48	0	40	9	0
66	B1	1	0	0	0	0
All	All	178130	0	126632	2826	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 2826 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)
40:p:52:ARG:HH21	51:1:2720:U:H5”	0.95	1.08
51:1:275:C:H2’	51:1:276:U:H4’	1.37	1.07
51:1:1666:G:H2’	51:1:1667:G:H5’	1.41	1.03
51:1:2713:U:H3’	51:1:2714:G:H5’	1.41	1.02
51:1:1672:A:C2	51:1:2582:G:H5’	1.95	1.02

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	A	64/70 (91%)	59 (92%)	5 (8%)	0	100	100
2	B	54/57 (95%)	48 (89%)	4 (7%)	2 (4%)	2	20

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	48/55 (87%)	41 (85%)	7 (15%)	0	100	100
4	D	44/46 (96%)	42 (96%)	2 (4%)	0	100	100
5	E	62/65 (95%)	57 (92%)	5 (8%)	0	100	100
6	F	36/38 (95%)	32 (89%)	3 (8%)	1 (3%)	4	24
7	G	216/241 (90%)	187 (87%)	27 (12%)	2 (1%)	14	51
8	H	204/233 (88%)	194 (95%)	10 (5%)	0	100	100
9	I	203/206 (98%)	172 (85%)	30 (15%)	1 (0%)	25	64
10	J	155/167 (93%)	138 (89%)	17 (11%)	0	100	100
11	K	98/135 (73%)	85 (87%)	13 (13%)	0	100	100
12	L	149/179 (83%)	130 (87%)	19 (13%)	0	100	100
13	M	127/130 (98%)	118 (93%)	9 (7%)	0	100	100
14	N	125/130 (96%)	104 (83%)	21 (17%)	0	100	100
15	O	96/103 (93%)	87 (91%)	8 (8%)	1 (1%)	13	48
16	P	114/129 (88%)	100 (88%)	13 (11%)	1 (1%)	14	51
17	Q	121/124 (98%)	94 (78%)	27 (22%)	0	100	100
18	R	112/118 (95%)	99 (88%)	12 (11%)	1 (1%)	14	51
19	S	98/101 (97%)	83 (85%)	15 (15%)	0	100	100
20	T	86/89 (97%)	75 (87%)	11 (13%)	0	100	100
21	U	80/82 (98%)	69 (86%)	11 (14%)	0	100	100
22	V	78/84 (93%)	69 (88%)	8 (10%)	1 (1%)	10	42
23	W	63/75 (84%)	56 (89%)	5 (8%)	2 (3%)	3	21
24	X	77/92 (84%)	71 (92%)	6 (8%)	0	100	100
25	Y	83/87 (95%)	78 (94%)	5 (6%)	0	100	100
26	Z	63/71 (89%)	44 (70%)	18 (29%)	1 (2%)	8	37
27	b	269/273 (98%)	244 (91%)	25 (9%)	0	100	100
28	c	207/209 (99%)	190 (92%)	17 (8%)	0	100	100
29	d	199/201 (99%)	186 (94%)	13 (6%)	0	100	100
30	e	175/179 (98%)	157 (90%)	18 (10%)	0	100	100
31	f	174/177 (98%)	158 (91%)	16 (9%)	0	100	100
32	g	50/149 (34%)	44 (88%)	5 (10%)	1 (2%)	6	32
33	i	139/142 (98%)	116 (84%)	23 (16%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
34	j	140/142 (99%)	128 (91%)	12 (9%)	0	100	100
35	k	120/123 (98%)	106 (88%)	14 (12%)	0	100	100
36	l	141/144 (98%)	129 (92%)	12 (8%)	0	100	100
37	m	134/136 (98%)	128 (96%)	6 (4%)	0	100	100
38	n	118/127 (93%)	103 (87%)	15 (13%)	0	100	100
39	o	114/117 (97%)	109 (96%)	5 (4%)	0	100	100
40	p	112/115 (97%)	103 (92%)	9 (8%)	0	100	100
41	q	115/118 (98%)	110 (96%)	3 (3%)	2 (2%)	7	36
42	r	101/103 (98%)	90 (89%)	10 (10%)	1 (1%)	13	48
43	s	108/110 (98%)	101 (94%)	7 (6%)	0	100	100
44	t	91/100 (91%)	82 (90%)	9 (10%)	0	100	100
45	u	100/104 (96%)	84 (84%)	15 (15%)	1 (1%)	13	48
46	v	92/94 (98%)	87 (95%)	5 (5%)	0	100	100
47	w	73/85 (86%)	67 (92%)	6 (8%)	0	100	100
48	x	75/78 (96%)	72 (96%)	2 (3%)	1 (1%)	10	42
49	y	61/63 (97%)	55 (90%)	6 (10%)	0	100	100
50	z	56/59 (95%)	52 (93%)	4 (7%)	0	100	100
57	A1	295/329 (90%)	273 (92%)	21 (7%)	1 (0%)	37	72
57	A2	282/329 (86%)	271 (96%)	11 (4%)	0	100	100
58	B1	1329/1407 (94%)	1203 (90%)	122 (9%)	4 (0%)	37	72
59	B2	1338/1342 (100%)	1203 (90%)	131 (10%)	4 (0%)	37	72
60	W0	80/91 (88%)	77 (96%)	3 (4%)	0	100	100
61	NA	490/495 (99%)	469 (96%)	17 (4%)	4 (1%)	16	54
62	NG	150/181 (83%)	129 (86%)	14 (9%)	7 (5%)	2	17
65	h	2/6 (33%)	1 (50%)	1 (50%)	0	100	100
All	All	9586/10235 (94%)	8659 (90%)	888 (9%)	39 (0%)	32	68

5 of 39 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
42	r	54	VAL
48	x	25	LYS
58	B1	121	PRO

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
61	NA	187	ARG
61	NA	188	PRO

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	59/62 (95%)	58 (98%)	1 (2%)	56	72
2	B	47/48 (98%)	47 (100%)	0	100	100
3	C	45/49 (92%)	44 (98%)	1 (2%)	47	65
4	D	38/38 (100%)	37 (97%)	1 (3%)	41	60
5	E	51/52 (98%)	49 (96%)	2 (4%)	27	49
6	F	34/34 (100%)	30 (88%)	4 (12%)	4	17
7	G	180/199 (90%)	174 (97%)	6 (3%)	33	54
8	H	170/190 (90%)	167 (98%)	3 (2%)	54	71
9	I	172/173 (99%)	168 (98%)	4 (2%)	45	64
10	J	119/126 (94%)	117 (98%)	2 (2%)	56	72
11	K	87/116 (75%)	82 (94%)	5 (6%)	17	39
12	L	124/147 (84%)	124 (100%)	0	100	100
13	M	104/105 (99%)	103 (99%)	1 (1%)	73	81
14	N	105/107 (98%)	98 (93%)	7 (7%)	13	34
15	O	86/90 (96%)	78 (91%)	8 (9%)	7	23
16	P	89/99 (90%)	86 (97%)	3 (3%)	32	53
17	Q	103/104 (99%)	98 (95%)	5 (5%)	21	42
18	R	92/96 (96%)	91 (99%)	1 (1%)	70	80
19	S	83/84 (99%)	83 (100%)	0	100	100
20	T	76/77 (99%)	73 (96%)	3 (4%)	27	49
21	U	65/65 (100%)	64 (98%)	1 (2%)	60	75
22	V	74/78 (95%)	72 (97%)	2 (3%)	40	59

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
23	W	56/65 (86%)	52 (93%)	4 (7%)	12	32
24	X	70/79 (89%)	70 (100%)	0	100	100
25	Y	65/66 (98%)	64 (98%)	1 (2%)	60	75
26	Z	55/61 (90%)	47 (86%)	8 (14%)	2	13
27	b	216/218 (99%)	212 (98%)	4 (2%)	52	69
28	c	164/164 (100%)	164 (100%)	0	100	100
29	d	165/165 (100%)	162 (98%)	3 (2%)	54	71
30	e	148/150 (99%)	145 (98%)	3 (2%)	50	68
31	f	137/138 (99%)	135 (98%)	2 (2%)	60	75
32	g	41/114 (36%)	38 (93%)	3 (7%)	11	31
33	i	109/110 (99%)	108 (99%)	1 (1%)	75	83
34	j	116/116 (100%)	116 (100%)	0	100	100
35	k	103/104 (99%)	103 (100%)	0	100	100
36	l	102/103 (99%)	101 (99%)	1 (1%)	73	81
37	m	109/109 (100%)	103 (94%)	6 (6%)	18	40
38	n	100/103 (97%)	99 (99%)	1 (1%)	73	81
39	o	86/87 (99%)	86 (100%)	0	100	100
40	p	99/100 (99%)	99 (100%)	0	100	100
41	q	89/90 (99%)	86 (97%)	3 (3%)	32	53
42	r	84/84 (100%)	82 (98%)	2 (2%)	44	63
43	s	93/93 (100%)	92 (99%)	1 (1%)	70	80
44	t	80/84 (95%)	80 (100%)	0	100	100
45	u	83/85 (98%)	79 (95%)	4 (5%)	21	43
46	v	78/78 (100%)	77 (99%)	1 (1%)	65	77
47	w	57/63 (90%)	57 (100%)	0	100	100
48	x	67/68 (98%)	67 (100%)	0	100	100
49	y	55/55 (100%)	55 (100%)	0	100	100
50	z	48/49 (98%)	46 (96%)	2 (4%)	25	47
57	A1	185/286 (65%)	174 (94%)	11 (6%)	16	38
57	A2	186/286 (65%)	184 (99%)	2 (1%)	70	80
58	B1	1110/1168 (95%)	1018 (92%)	92 (8%)	9	28

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
59	B2	1150/1157 (99%)	1116 (97%)	34 (3%)	36	56
60	W0	70/75 (93%)	69 (99%)	1 (1%)	62	75
65	h	2/2 (100%)	2 (100%)	0	100	100
All	All	7381/7914 (93%)	7131 (97%)	250 (3%)	34	53

5 of 250 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
57	A1	22	THR
59	B2	516	ASP
58	B1	96	LYS
59	B2	483	ASP
59	B2	901	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 125 such sidechains are listed below:

Mol	Chain	Res	Type
29	d	165	HIS
59	B2	314	ASN
36	l	99	ASN
59	B2	69	GLN
59	B2	1080	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
51	1	2902/2904 (99%)	397 (13%)	16 (0%)
52	2	119/120 (99%)	17 (14%)	1 (0%)
53	3	1538/1542 (99%)	254 (16%)	5 (0%)
54	4	33/56 (58%)	16 (48%)	2 (6%)
63	5	75/76 (98%)	43 (57%)	7 (9%)
64	6	76/77 (98%)	10 (13%)	0
64	7	76/77 (98%)	27 (35%)	2 (2%)
All	All	4819/4852 (99%)	764 (15%)	33 (0%)

5 of 764 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
51	1	10	A

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
51	1	12	U
51	1	34	U
51	1	35	G
51	1	46	G

5 of 33 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
63	5	48	C
63	5	57	G
64	7	56	C
51	1	1930	G
51	1	1801	A

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

4 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	$\#\|Z\| > 2$
65	DPP	h	2	65	3,5,6	0.56	0	1,5,7	0.08	0
65	5OH	h	6	65	8,12,13	0.76	0	3,16,18	1.51	1 (33%)
65	KBE	h	1	65	8,8,9	0.60	0	7,8,10	1.20	1 (14%)
65	UAL	h	5	65	7,8,9	2.32	3 (42%)	5,9,11	2.90	2 (40%)

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
65	DPP	h	2	65	-	0/2/4/6	-
65	5OH	h	6	65	-	0/2/18/20	0/1/1/1
65	KBE	h	1	65	-	0/7/7/8	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
65	UAL	h	5	65	-	0/3/7/9	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
65	h	5	UAL	C1-N1	-4.90	1.32	1.40
65	h	5	UAL	C-CA	-2.91	1.40	1.45
65	h	5	UAL	CA-N	2.04	1.40	1.35

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
65	h	5	UAL	CA-CB-N1	-5.27	115.66	125.60
65	h	5	UAL	O-C-CA	-3.22	121.30	125.39
65	h	6	5OH	CR-CB-CA	-2.36	110.06	112.61
65	h	1	KBE	CB-CA-C	-2.06	109.22	112.25

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
65	h	2	DPP	2	0
65	h	6	5OH	6	0
65	h	5	UAL	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

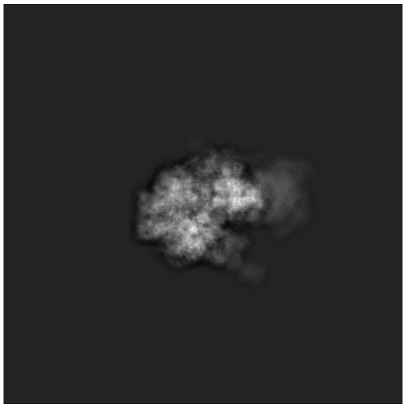
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-39172. These allow visual inspection of the internal detail of the map and identification of artifacts.

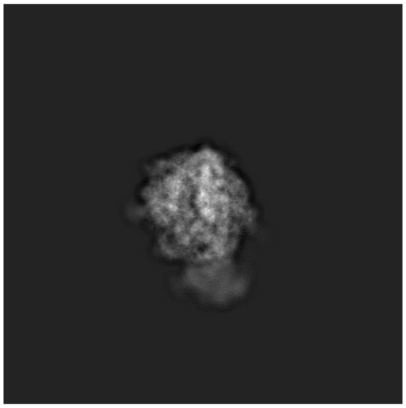
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

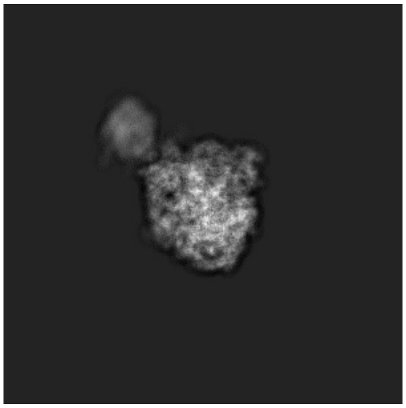
6.1.1 Primary map



X

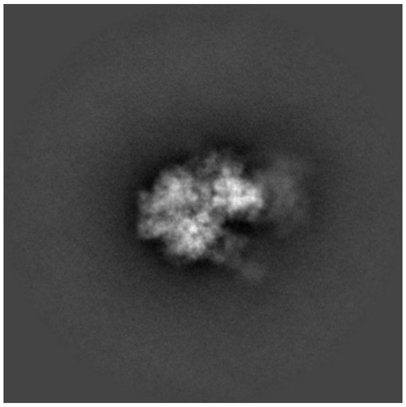


Y

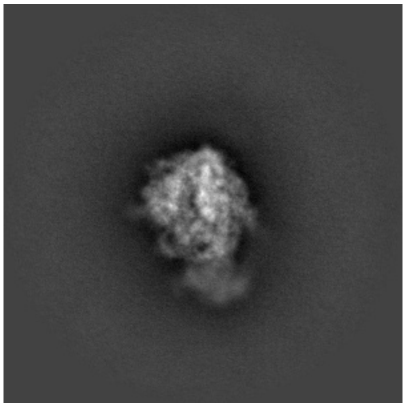


Z

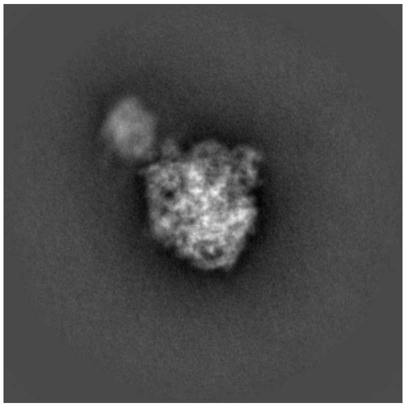
6.1.2 Raw map



X



Y

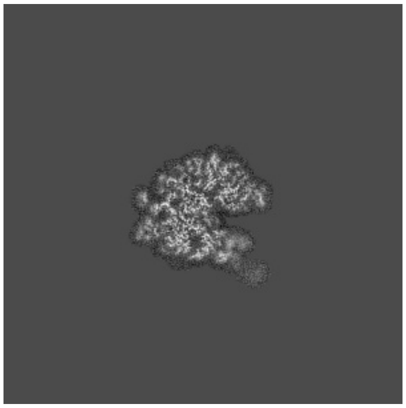


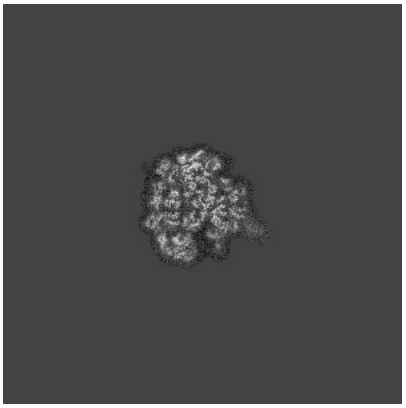
Z

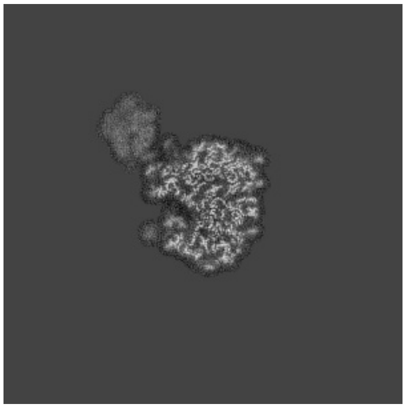
The images above show the map projected in three orthogonal directions.

6.2 Central slices

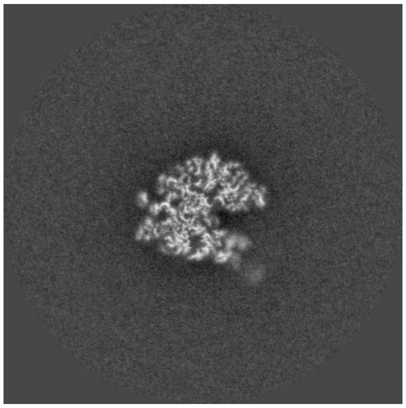
6.2.1 Primary map

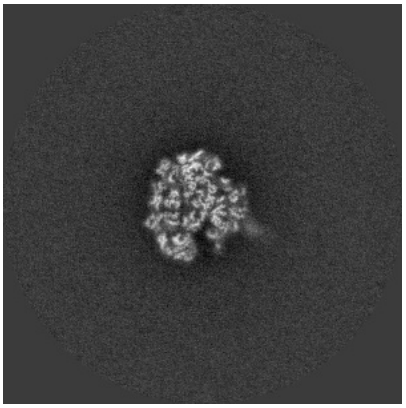

X Index: 240

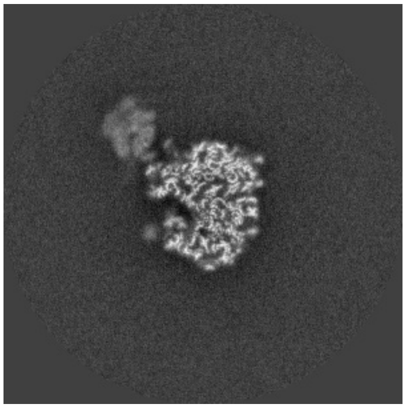

Y Index: 240


Z Index: 240

6.2.2 Raw map


X Index: 240

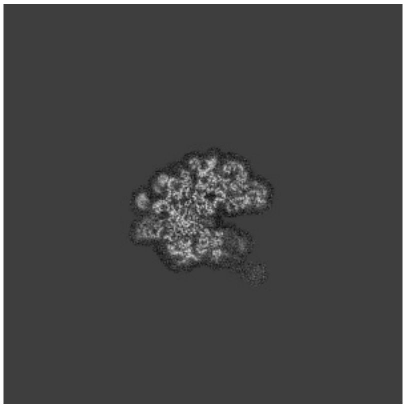

Y Index: 240


Z Index: 240

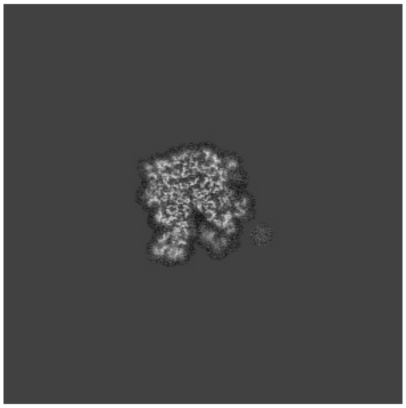
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices ⓘ

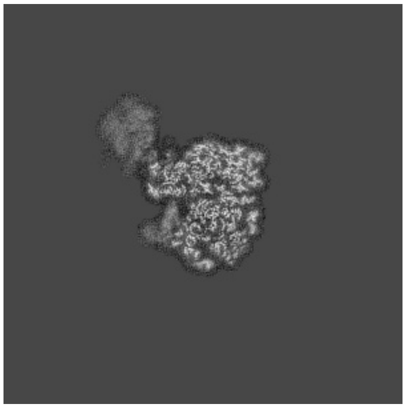
6.3.1 Primary map



X Index: 244

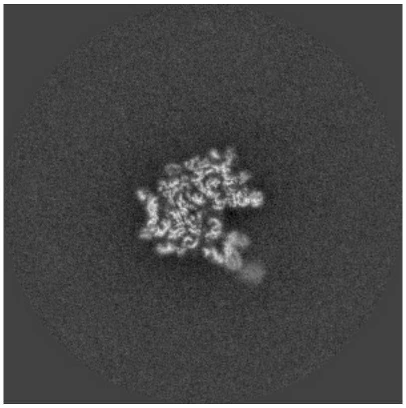


Y Index: 224

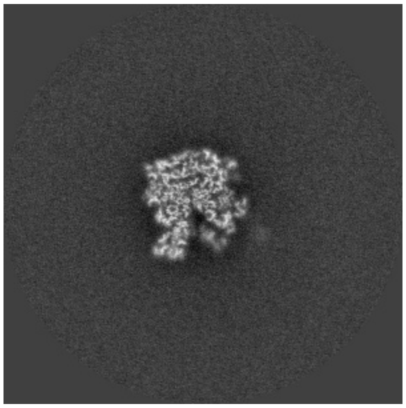


Z Index: 245

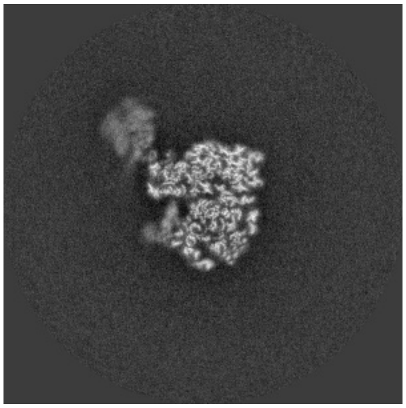
6.3.2 Raw map



X Index: 233



Y Index: 224

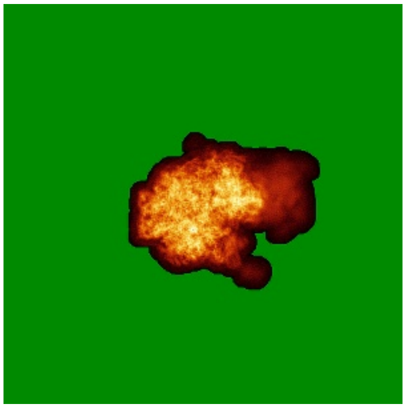


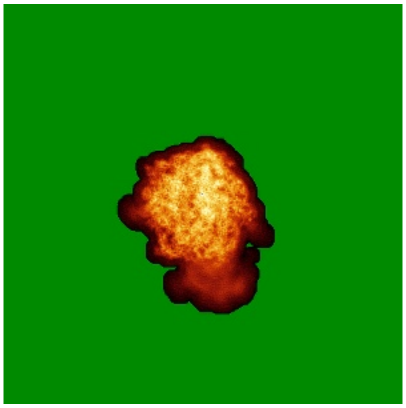
Z Index: 245

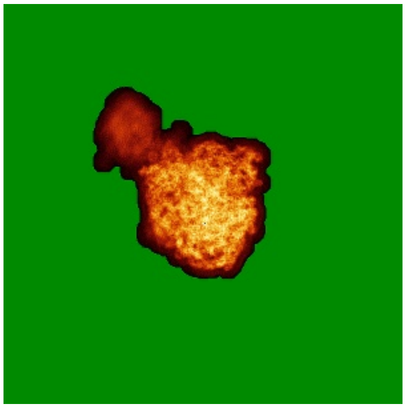
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color)

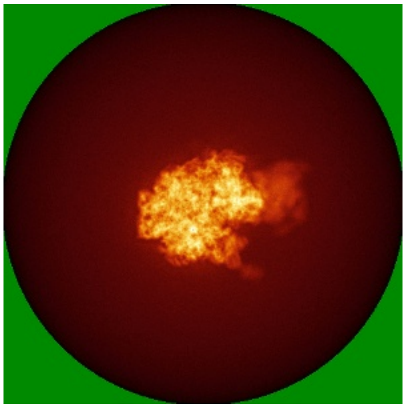
6.4.1 Primary map

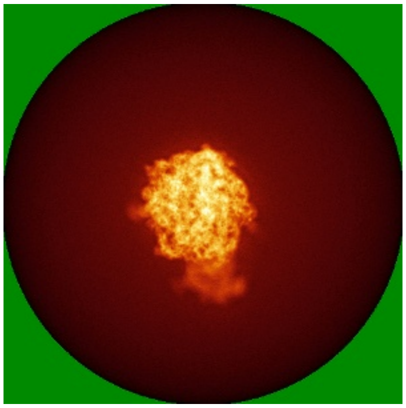

X

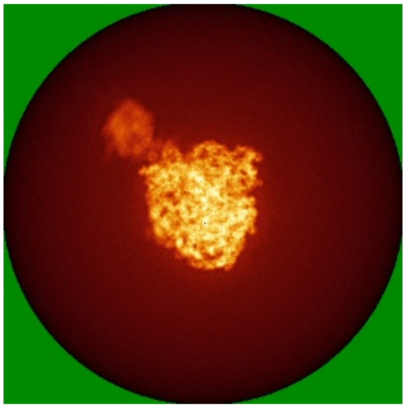

Y


Z

6.4.2 Raw map


X


Y


Z

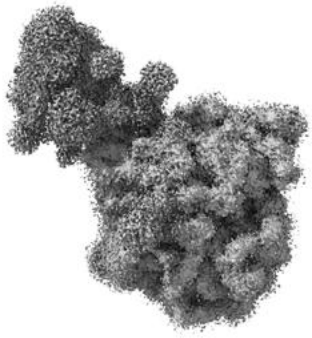
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views

6.5.1 Primary map

X

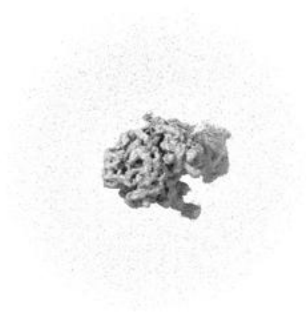
Y



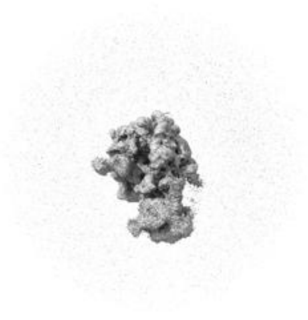
Z

The images above show the 3D surface view of the map at the recommended contour level 0.012. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

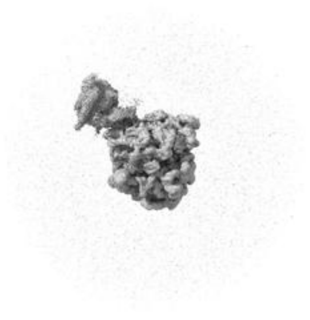
6.5.2 Raw map



X



Y



Z

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.

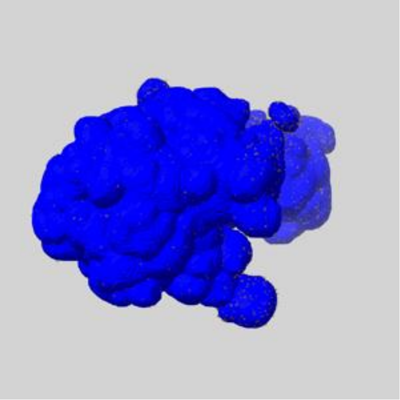
6.6 Mask visualisation ⓘ

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

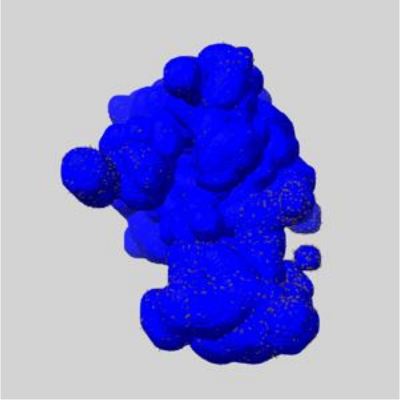
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

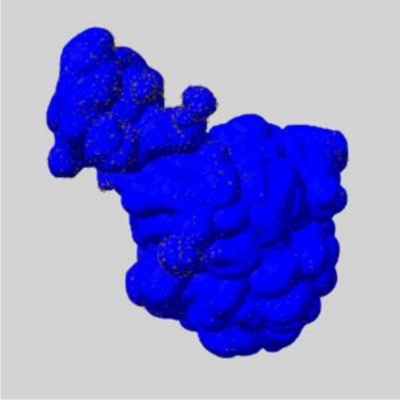
6.6.1 emd_39172_msk_1.map ⓘ



X



Y

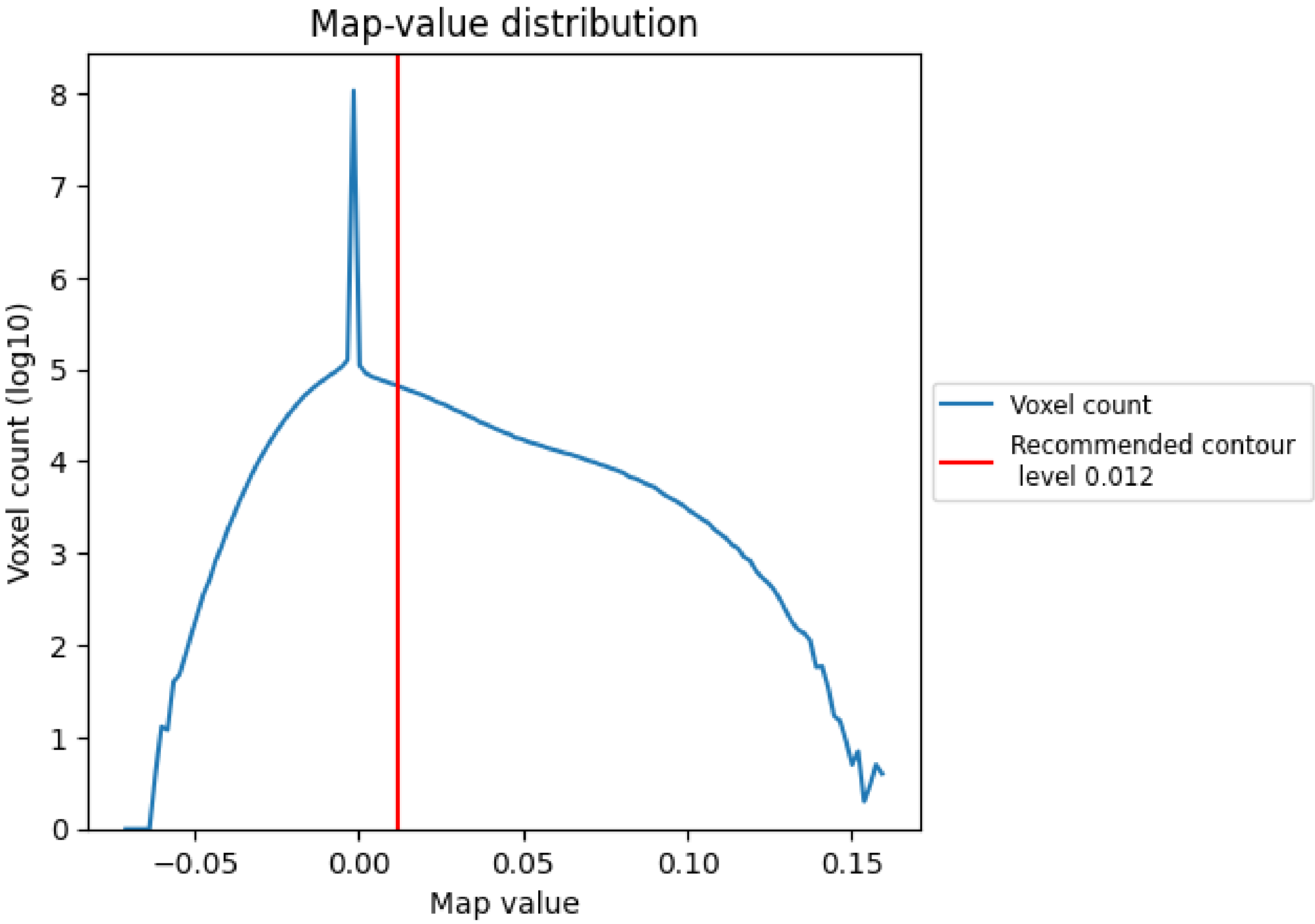


Z

7 Map analysis ⓘ

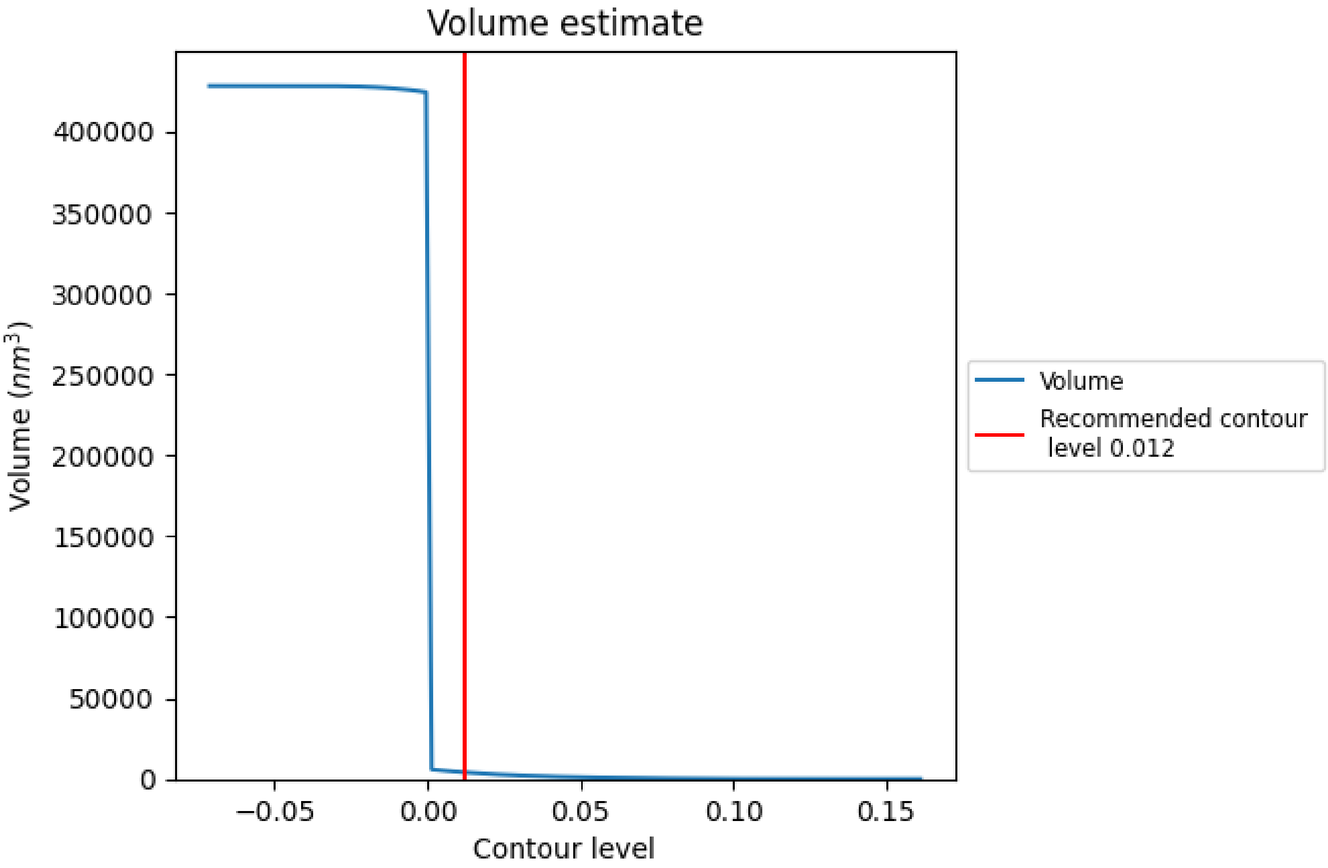
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution ⓘ



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.

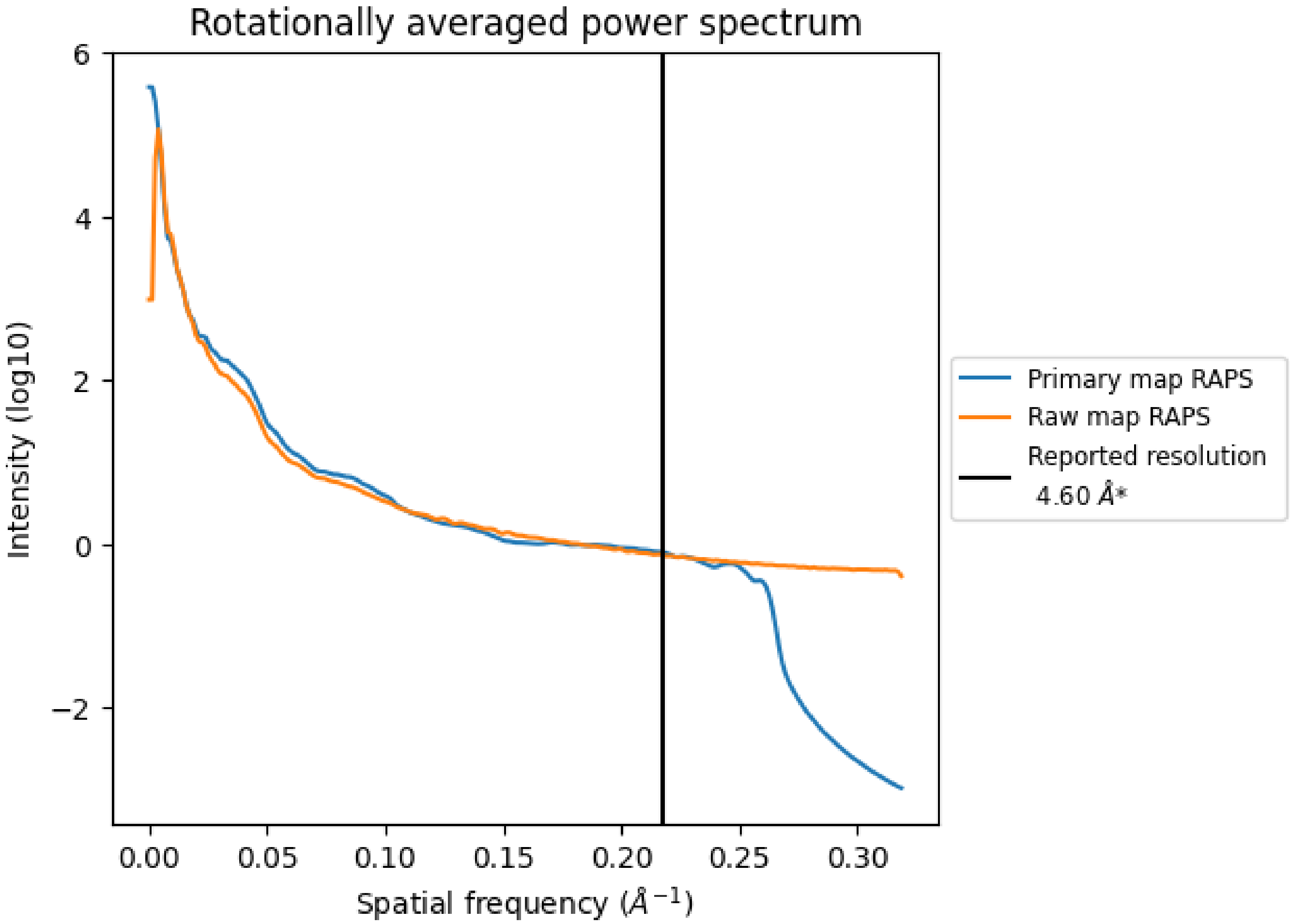
7.2 Volume estimate ⓘ



The volume at the recommended contour level is 4127 nm^3; this corresponds to an approximate mass of 3728 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 ⓘ

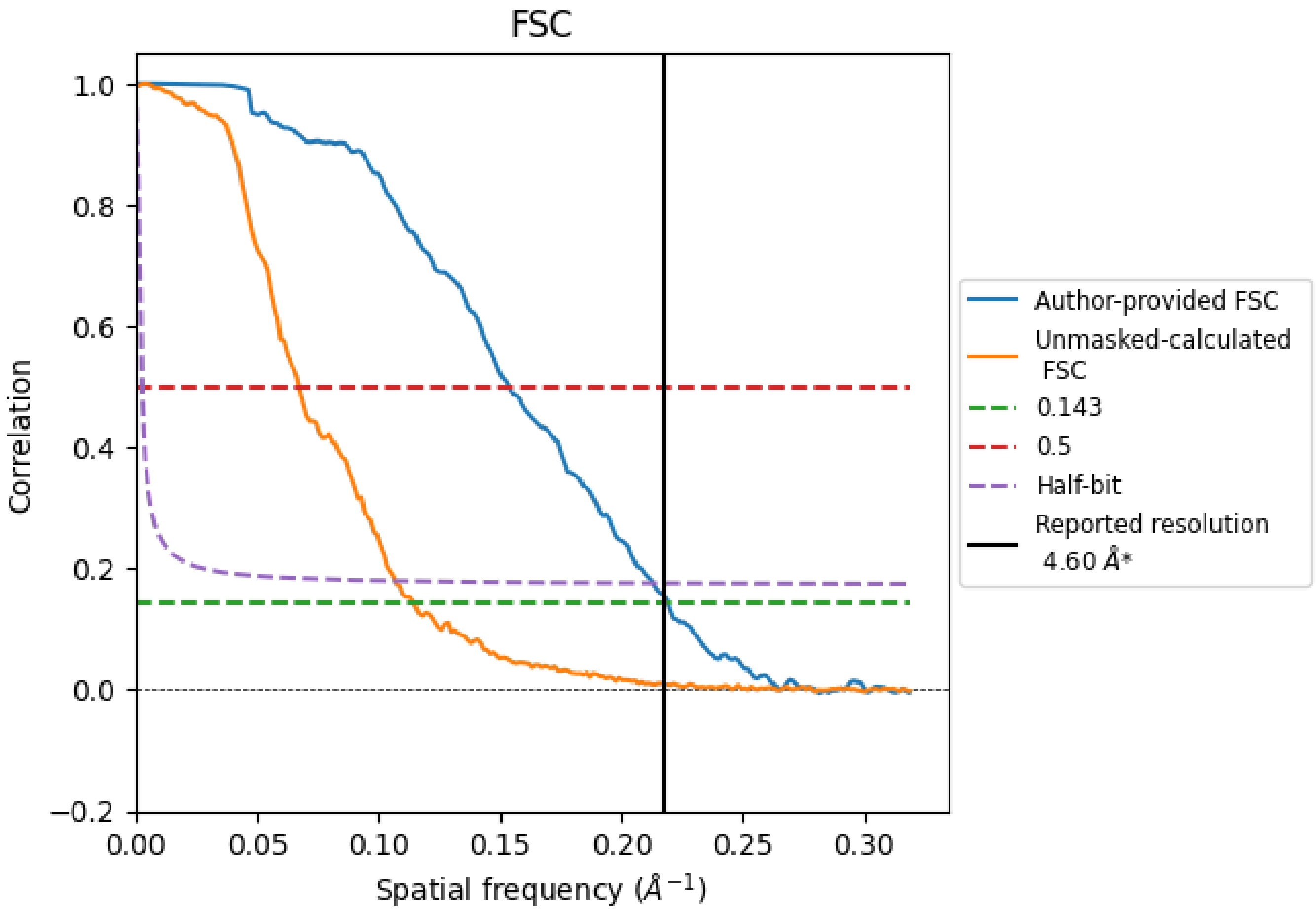


*Reported resolution corresponds to spatial frequency of 0.217 $Å^{-1}$

8 Fourier-Shell correlation ⓘ

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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.217 $Å^{-1}$

8.2 Resolution estimates (i)

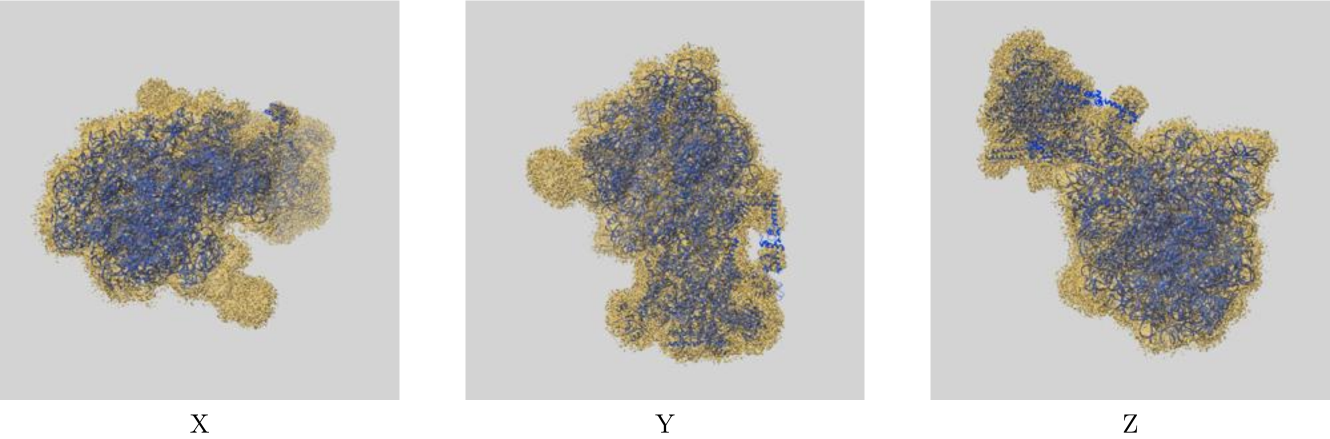
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.60	-	-
Author-provided FSC curve	4.56	6.51	4.69
Unmasked-calculated*	8.73	14.88	9.35

*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 8.73 differs from the reported value 4.6 by more than 10 %

9 Map-model fit ⓘ

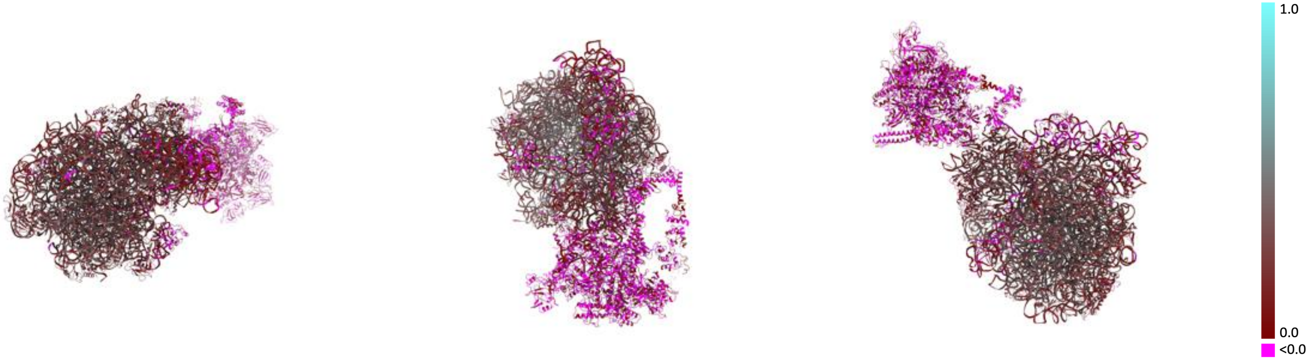
This section contains information regarding the fit between EMDB map EMD-39172 and PDB model 8YDI. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay ⓘ


X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.012 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.

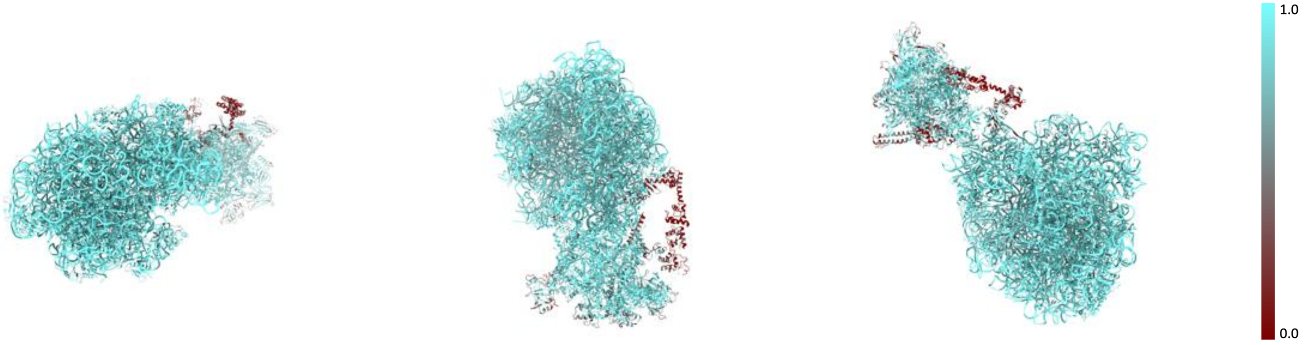
9.2 Q-score mapped to coordinate model ⓘ



X Y Z

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.

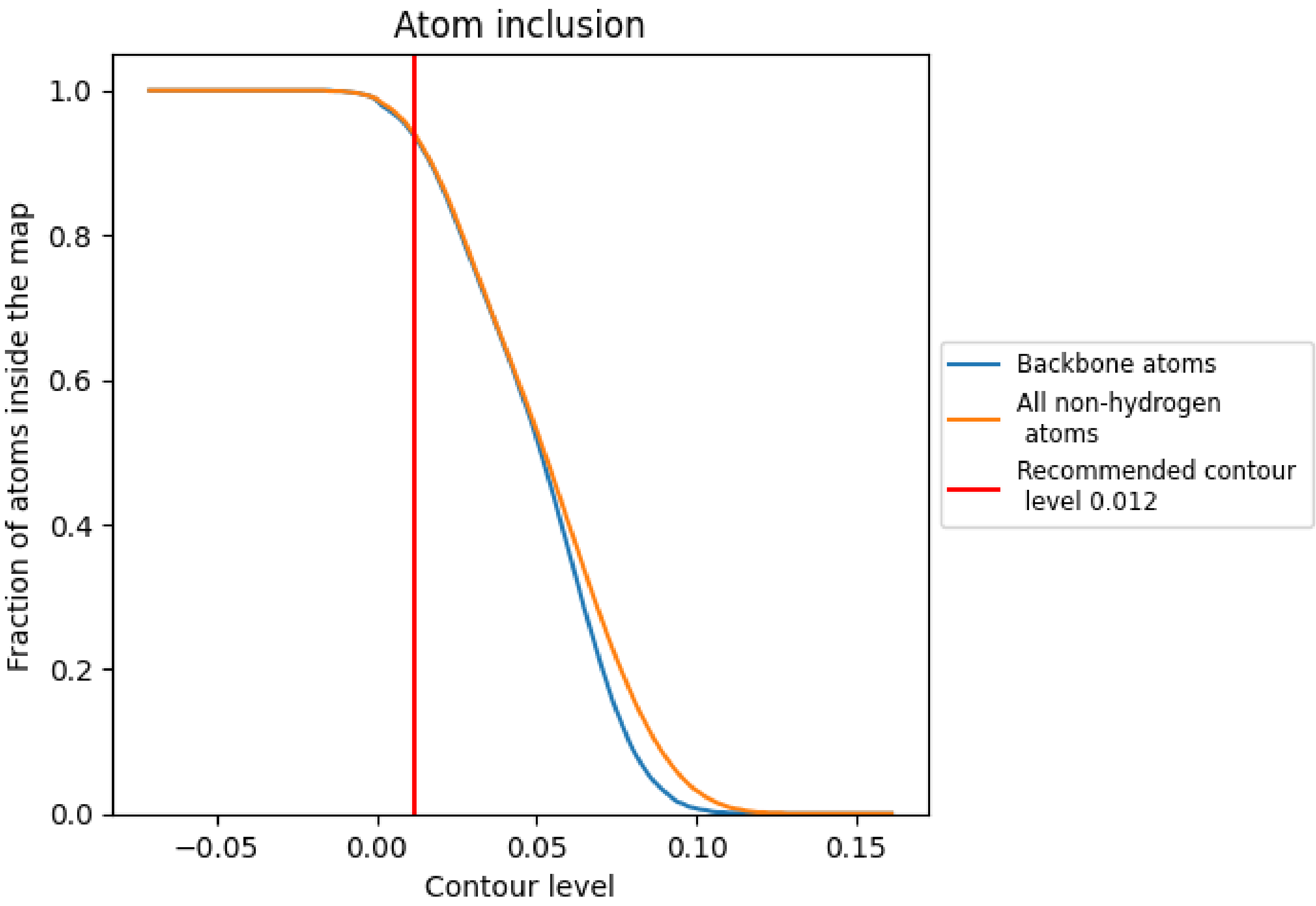
9.3 Atom inclusion mapped to coordinate model ⓘ



X Y Z

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 (0.012).

9.4 Atom inclusion ⓘ



At the recommended contour level, 94% of all backbone atoms, 94% 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 (0.012) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9380	0.2250
1	0.9920	0.3080
2	0.9960	0.2630
3	0.9860	0.2470
4	0.8160	0.0330
5	0.9190	0.0940
6	0.9900	0.3120
7	0.7340	0.0600
8	0.9500	0.0360
9	0.9260	0.0410
A	0.8670	0.1360
A1	0.6580	0.0200
A2	0.6840	0.0220
B	0.9510	0.3070
B1	0.8600	0.0200
B2	0.8110	0.0200
C	0.9600	0.2970
D	0.9410	0.3440
E	0.9610	0.3560
F	0.9450	0.2510
G	0.9340	0.2080
H	0.9230	0.2590
I	0.8250	0.0490
J	0.9410	0.2720
K	0.9380	0.2180
L	0.9240	0.2040
M	0.9490	0.2780
N	0.9570	0.1880
NA	0.4720	-0.0140
NG	0.8710	0.0480
O	0.9130	0.1880
P	0.9520	0.2350
Q	0.8990	0.1910
R	0.9520	0.2130
S	0.9510	0.2190

Continued on next page...

Continued from previous page...

Chain	Atom inclusion	Q-score
T	0.9580	0.2540
U	0.8250	0.0870
V	0.9070	0.1540
W	0.9460	0.2290
W0	0.6370	0.0030
X	0.9570	0.1940
Y	0.9340	0.1700
Z	0.8200	0.1370
b	0.9550	0.3540
c	0.9470	0.2800
d	0.9560	0.2780
e	0.9530	0.2490
f	0.9510	0.1770
g	0.9590	0.2220
h	0.9380	0.2650
i	0.8550	0.0460
j	0.9590	0.2960
k	0.8950	0.2780
l	0.9640	0.3160
m	0.9260	0.3060
n	0.9570	0.2820
o	0.9730	0.2220
p	0.9210	0.2360
q	0.9580	0.3140
r	0.9640	0.3140
s	0.9380	0.3090
t	0.9330	0.1930
u	0.9640	0.2250
v	0.9590	0.2280
w	0.9520	0.3030
x	0.9580	0.3360
y	0.9560	0.1740
z	0.9610	0.3010