



Full wwPDB EM Validation Report ⓘ

Dec 1, 2025 – 10:38 pm GMT

PDB ID : 9H6Y / pdb_00009h6y
EMDB ID : EMD-51903
Title : Late-stage 48S Initiation Complex (LS48S IC) guided by the trans-RNA
Authors : Nguyen, T.T.; Hashem, Y.; Rocha, R.E.O.; Boissier, F.; Qian, S.B.; Jia, L.;
Uematsu, S.; Gu, Y.; Shi, S.
Deposited on : 2024-10-25
Resolution : 2.90 Å(reported)
Based on initial models : 6FYX, 6YAM, 8P09, .

This is a Full wwPDB EM Validation 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:

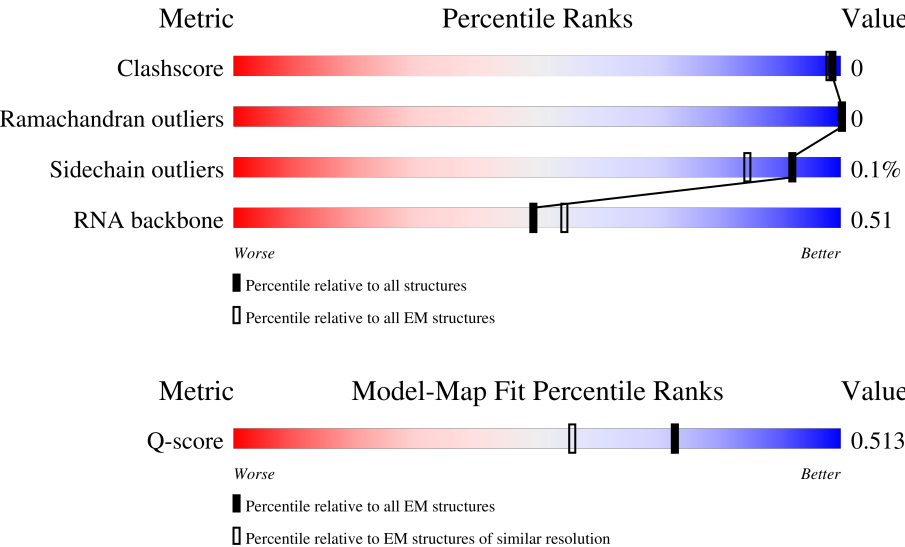
EMDB validation analysis : 0.0.1.dev129
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up 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) : 2.46

1 Overall quality at a glance i

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

The reported resolution of this entry is 2.90 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
RNA backbone	6643	2191	-
Q-score	-	25397	13054 (2.40 - 3.40)

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	1	76	61% 54% 36% 8% ..
2	2	1863	13% 64% 23% 6% 7%
3	3	160	94% ..

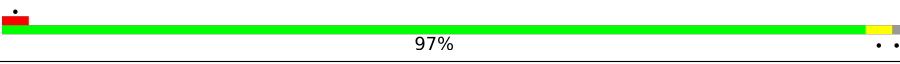
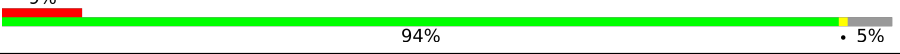
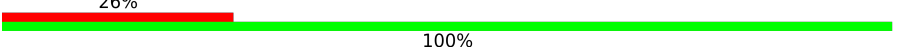
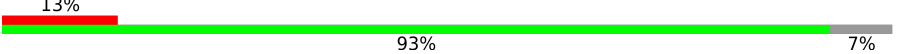
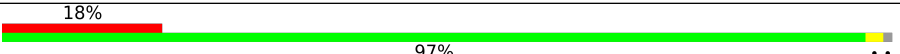
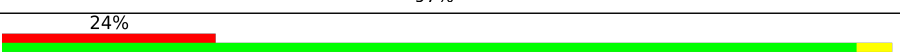
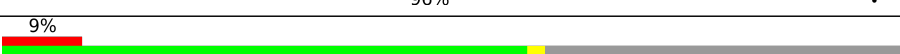
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Mol	Chain	Length	Quality of chain
4	A	284	68% 92% 6%
5	B	485	87% 86% 13%
6	C	295	7% 69% 30%
7	D	264	7% 80% 19%
8	E	270	9% 83% 16%
9	F	243	12% 92% 7%
10	G	263	97% .
11	H	204	88% 8%
12	I	249	24% 94% 5%
13	J	194	69% 96% ..
14	K	208	16% 95% ..
15	L	194	8% 93% ..
16	M	149	9% 64% 34%
17	N	158	19% 97% .
18	O	132	72% 92% 6%
19	P	151	9% 95% ...
20	Q	151	7% 88% 10%
21	R	145	17% 94% ..
22	S	146	92% 5% .
23	T	135	37% 93% 7%
24	U	152	9% 91% 5%
25	V	145	6% 95% ..
26	W	119	24% 85% 13%
27	X	83	10% 98% .
28	Y	130	97% ..

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Mol	Chain	Length	Quality of chain
29	Z	143	
30	a	133	
31	b	115	
32	c	84	
33	d	69	
34	e	56	
35	f	156	
36	g	317	
37	i	133	
38	j	144	
39	k	599	
40	l	25	
41	n	124	
42	o	430	

2 Entry composition

There are 43 unique types of molecules in this entry. The entry contains 90469 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a RNA chain called Initiator methionylated tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	75	Total	C	N	O	P	0	0
			1614	722	299	519	74		

- Molecule 2 is a RNA chain called 18S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	2	1741	Total	C	N	O	P	0	0
			37147	16585	6650	12172	1740		

- Molecule 3 is a RNA chain called Linear mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	3	9	Total	C	N	O	P	0	0
			196	87	37	63	9		

- Molecule 4 is a protein called Eukaryotic translation initiation factor 2 subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	A	266	Total	C	N	O	S	0	0
			2146	1354	376	405	11		

- Molecule 5 is a protein called Eukaryotic translation initiation factor 2 subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	B	422	Total	C	N	O	S	0	0
			3213	2044	561	591	17		

- Molecule 6 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	C	207	Total	C	N	O	S	0	0
			1636	1042	288	298	8		

- Molecule 7 is a protein called Small ribosomal subunit protein eS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	D	215	Total	C	N	O	S	0	0
			1741	1107	309	310	15		

- Molecule 8 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	E	226	Total	C	N	O	S	0	0
			1754	1139	298	310	7		

- Molecule 9 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	F	227	Total	C	N	O	S	0	0
			1764	1124	317	315	8		

- Molecule 10 is a protein called Small ribosomal subunit protein eS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	G	263	Total	C	N	O	S	0	0
			2083	1329	385	359	10		

- Molecule 11 is a protein called Small ribosomal subunit protein uS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	H	187	Total	C	N	O	S	0	0
			1482	928	279	268	7		

- Molecule 12 is a protein called Small ribosomal subunit protein eS6.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	I	237	Total	C	N	O	S	0	0
			1923	1199	387	330	7		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	130	THR	PRO	conflict	UNP G1TM55

- Molecule 13 is a protein called Small ribosomal subunit protein eS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	J	190	Total	C	N	O	S	0	0
			1530	975	281	273	1		

- Molecule 14 is a protein called Small ribosomal subunit protein eS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	K	206	Total	C	N	O	S	0	0
			1679	1054	329	291	5		

- Molecule 15 is a protein called Small ribosomal subunit protein uS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	L	188	Total	C	N	O	S	0	0
			1542	979	309	251	3		

- Molecule 16 is a protein called Small ribosomal subunit protein eS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	M	98	Total	C	N	O	S	0	0
			827	539	148	134	6		

- Molecule 17 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	N	158	Total	C	N	O	S	0	0
			1296	827	241	221	7		

- Molecule 18 is a protein called Small ribosomal subunit protein eS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	O	124	Total	C	N	O	S	0	0
			958	600	170	179	9		

- Molecule 19 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	P	150	Total	C	N	O	S	0	0
			1208	773	229	205	1		

- Molecule 20 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	Q	136	Total	C	N	O	S	0	0
			1016	621	199	190	6		

- Molecule 21 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	R	140	Total	C	N	O	S	0	0
			1154	733	219	195	7		

- Molecule 22 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	S	141	Total	C	N	O	S	0	0
			1124	715	212	194	3		

- Molecule 23 is a protein called Small ribosomal subunit protein eS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	T	126	Total	C	N	O	S	0	0
			1019	639	188	187	5		

- Molecule 24 is a protein called Small ribosomal subunit protein uS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	U	145	Total	C	N	O	S	0	0
			1194	747	243	203	1		

- Molecule 25 is a protein called Small ribosomal subunit protein eS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	V	141	Total	C	N	O	S	0	0
			1112	701	213	195	3		

- Molecule 26 is a protein called Small ribosomal subunit protein uS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	W	104	Total	C	N	O	S	0	0
			822	514	156	148	4		

- Molecule 27 is a protein called Small ribosomal subunit protein eS21.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	X	83	Total	C	N	O	S	0	0
			637	393	117	122	5		

- Molecule 28 is a protein called Small ribosomal subunit protein uS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	Y	129	Total	C	N	O	S	0	0
			1034	659	193	176	6		

- Molecule 29 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Z	142	Total	C	N	O	S	0	0
			1106	698	220	184	4		

- Molecule 30 is a protein called 40S ribosomal protein S24.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	a	126	Total	C	N	O	S	0	0
			1021	645	198	173	5		

- Molecule 31 is a protein called Small ribosomal subunit protein eS26.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	b	99	Total	C	N	O	S	0	0
			789	491	162	130	6		

- Molecule 32 is a protein called Small ribosomal subunit protein eS27.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	c	84	Total	C	N	O	S	0	0
			659	413	122	116	8		

- Molecule 33 is a protein called Small ribosomal subunit protein eS28.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	d	64	Total	C	N	O	S	0	0
			506	308	102	94	2		

- Molecule 34 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	e	53	Total	C	N	O	S	0	0
			445	278	90	72	5		

- Molecule 35 is a protein called Ubiquitin-ribosomal protein eS31 fusion protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	f	71	Total	C	N	O	S	0	0
			581	367	109	98	7		

- Molecule 36 is a protein called Small ribosomal subunit protein RACK1.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	g	313	Total	C	N	O	S	0	0
			2436	1535	424	465	12		

- Molecule 37 is a protein called Ubiquitin-like FUBI-ribosomal protein eS30 fusion protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	i	58	Total	C	N	O	S	0	0
			464	287	102	74	1		

- Molecule 38 is a protein called Eukaryotic translation initiation factor 4C.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	j	112	Total	C	N	O	S	0	0
			903	561	173	165	4		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
j	39	ILE	VAL	conflict	UNP G1SYS4
j	76	ILE	VAL	conflict	UNP G1SYS4

- Molecule 39 is a protein called ATP binding cassette subfamily E member 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	k	595	Total	C	N	O	S	0	0
			4692	2995	802	864	31		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
k	538	ILE	VAL	conflict	UNP G1SG72

- Molecule 40 is a protein called Small ribosomal subunit protein eS32.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	l	25	Total	C	N	O	S	0	0
			240	145	64	28	3		

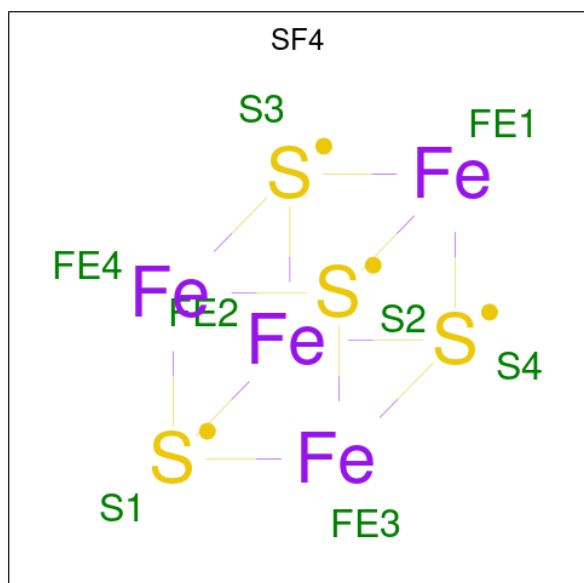
- Molecule 41 is a protein called Small ribosomal subunit protein eS25.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	n	75	Total	C	N	O	S	0	0
			598	382	111	104	1		

- Molecule 42 is a protein called Eukaryotic translation initiation factor 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	o	147	Total	C	N	O	S	0	0
			1162	733	205	213	11		

- Molecule 43 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe₄S₄) (labeled as "Ligand of Interest" by depositor).

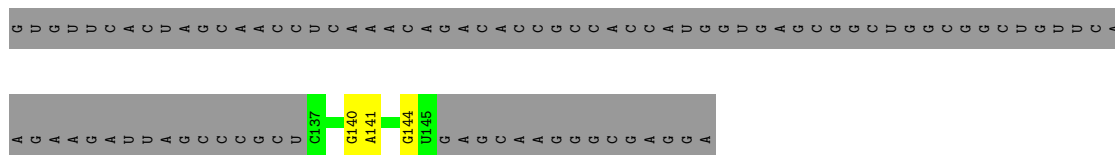


Mol	Chain	Residues	Atoms			AltConf
43	k	1	Total	Fe	S	0
			8	4	4	

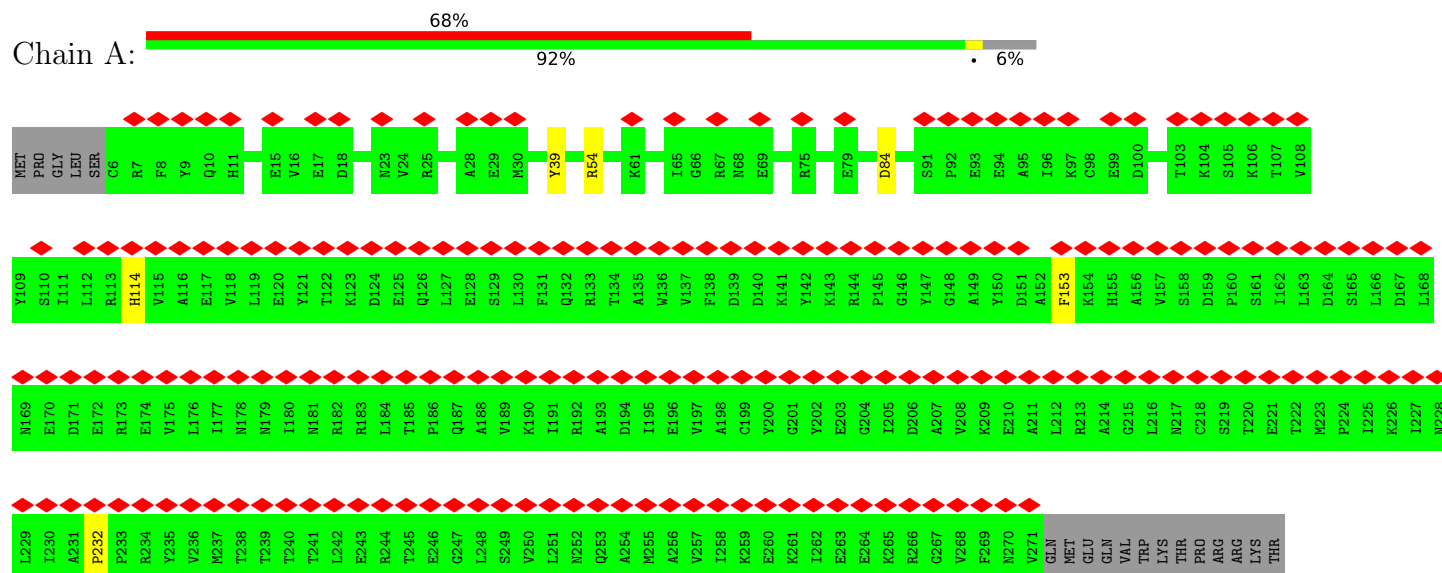
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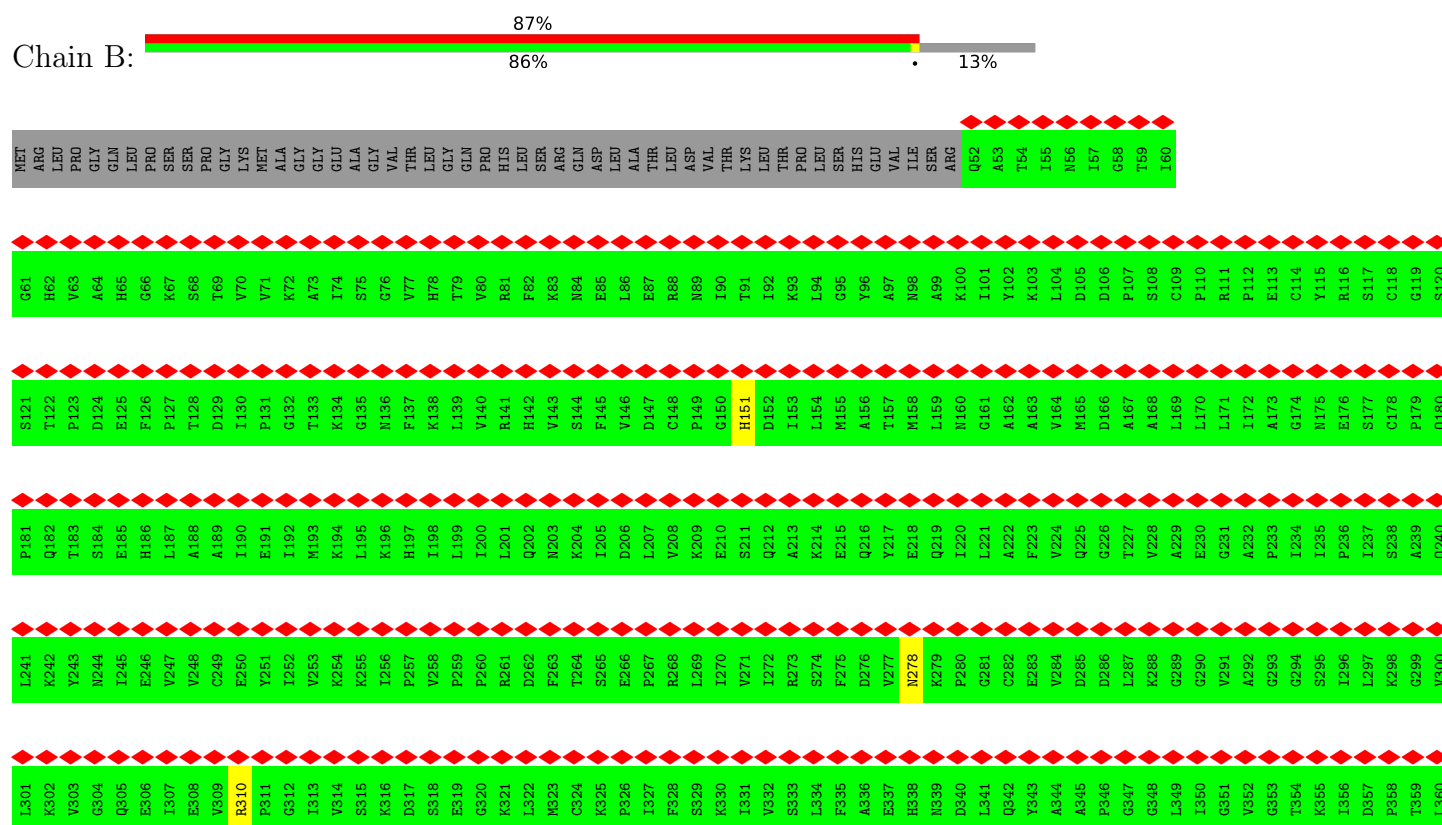
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
43	k	1	8	4	4	0

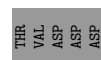


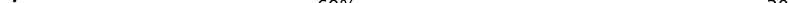
• Molecule 4: Eukaryotic translation initiation factor 2 subunit 1

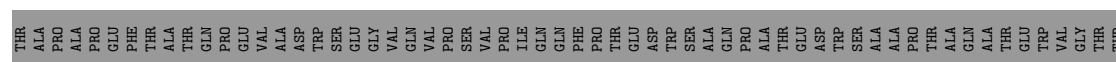
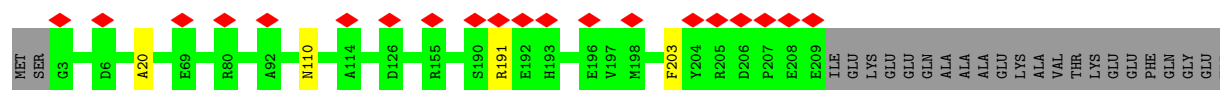


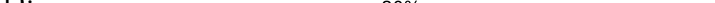
• Molecule 5: Eukaryotic translation initiation factor 2 subunit 3

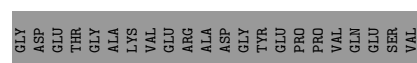




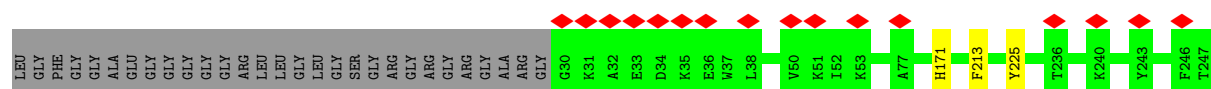
- Chain C:  7% 69% 30%

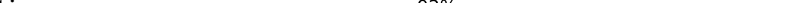


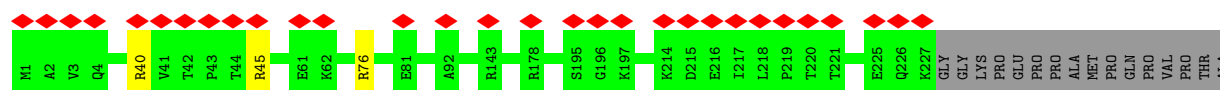
- Chain D:  7% 80% 19%



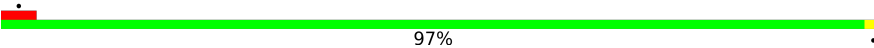
- Chain E:  9% 83% 16%

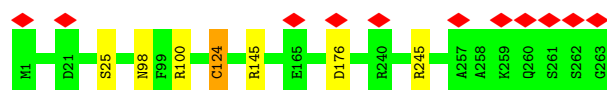


- Chain F:  12% 92% 7%



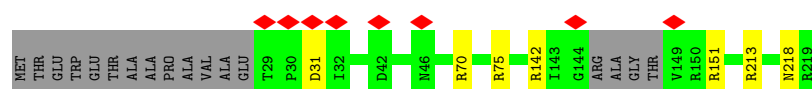
- Molecule 10: Small ribosomal subunit protein eS4

Chain G:  97%

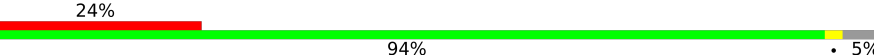


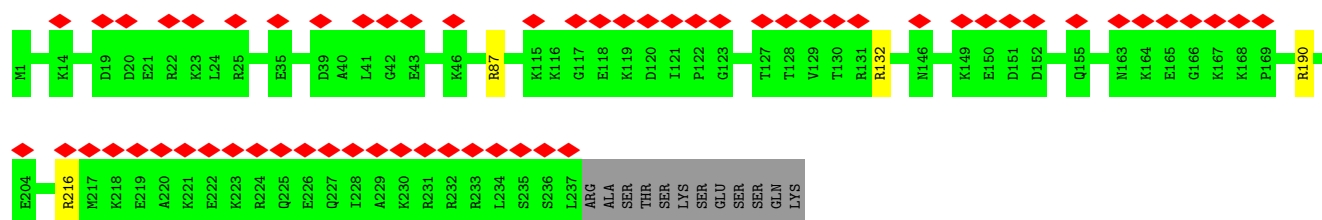
- Molecule 11: Small ribosomal subunit protein uS7

Chain H:  88% 8%

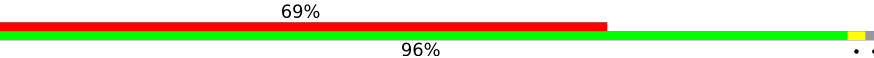


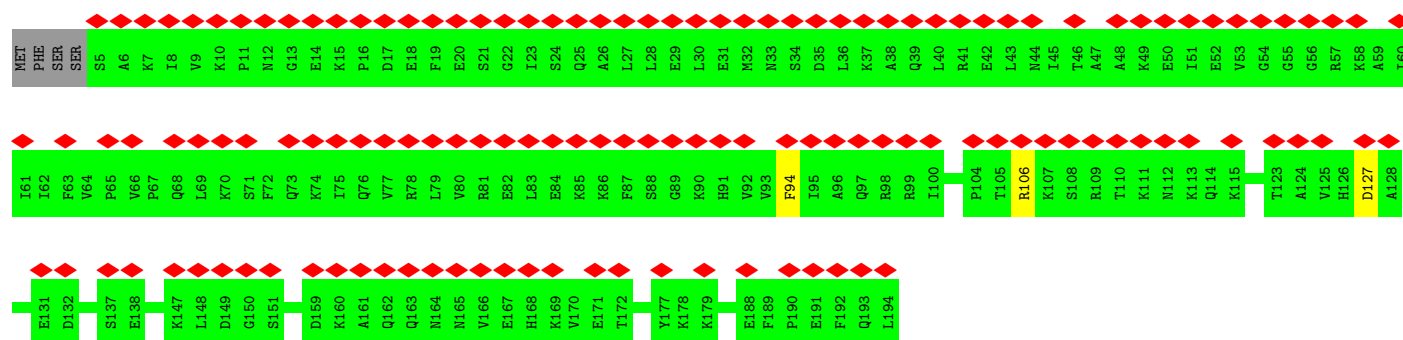
- Molecule 12: Small ribosomal subunit protein eS6

Chain I:  24% 94% 5%

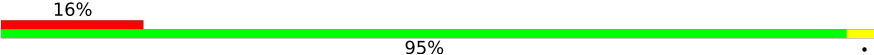


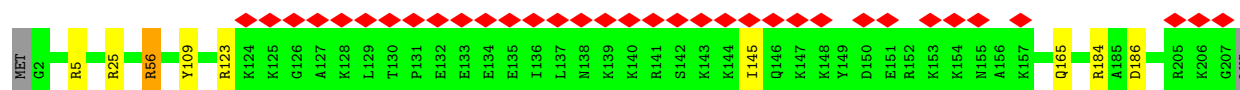
- Molecule 13: Small ribosomal subunit protein eS7

Chain J:  69% 96%



- Molecule 14: Small ribosomal subunit protein eS8

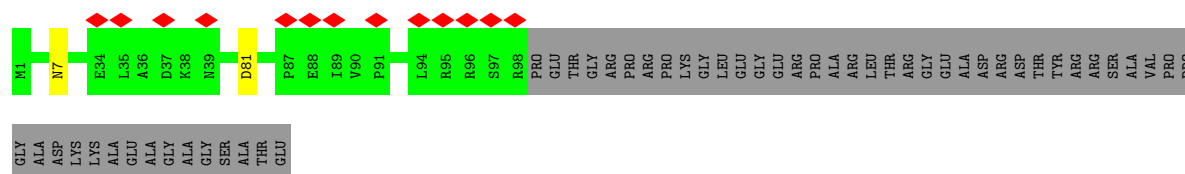
Chain K:  16% 95%



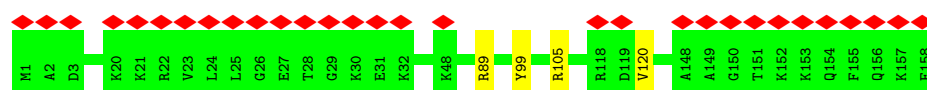
- Molecule 15: Small ribosomal subunit protein uS4



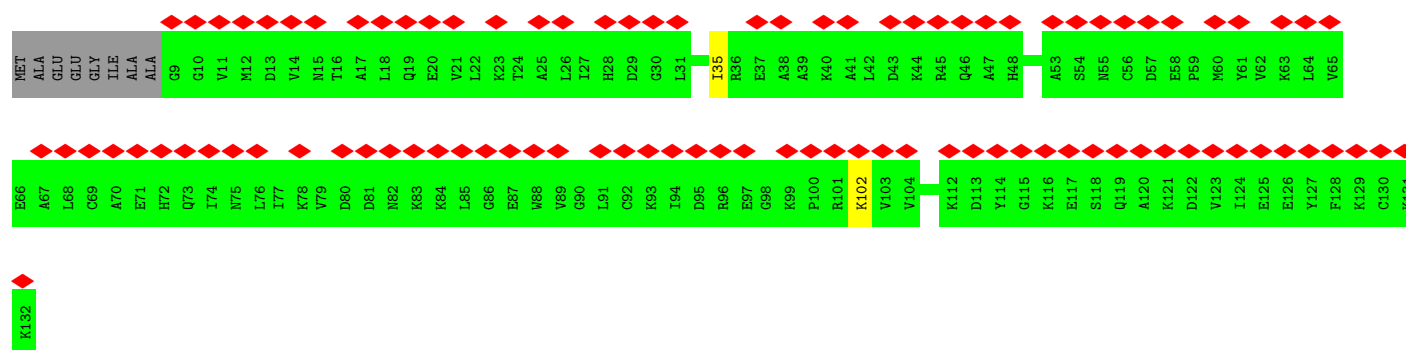
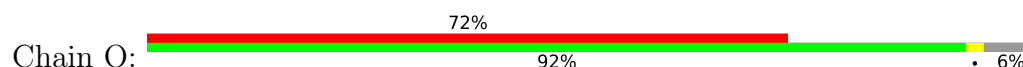
- Molecule 16: Small ribosomal subunit protein eS10



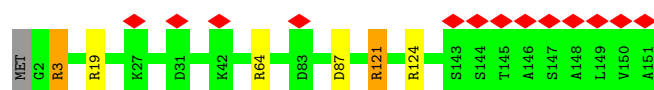
- Molecule 17: Small ribosomal subunit protein uS17



- Molecule 18: Small ribosomal subunit protein eS12

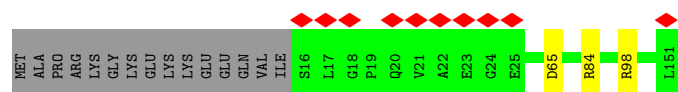


- Molecule 19: Small ribosomal subunit protein uS15

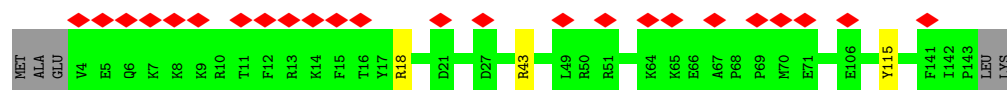


- Molecule 20: Small ribosomal subunit protein uS11

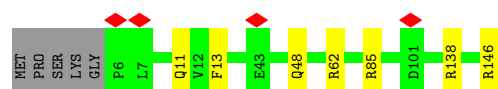




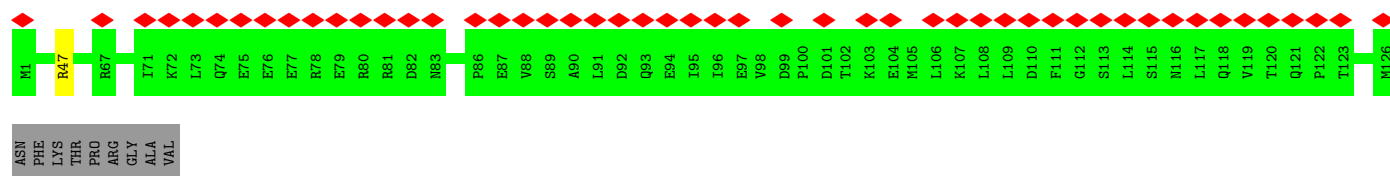
- Molecule 21: Small ribosomal subunit protein uS19



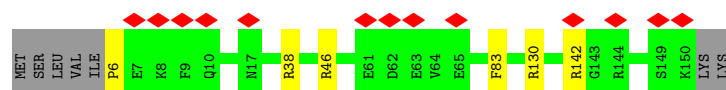
- Molecule 22: Small ribosomal subunit protein uS9



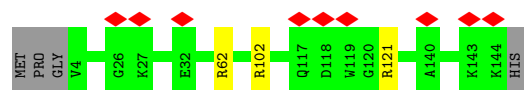
- Molecule 23: Small ribosomal subunit protein eS17



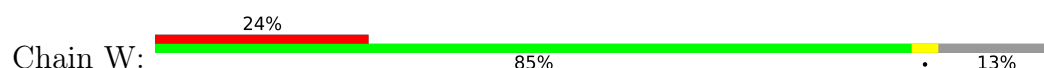
- Molecule 24: Small ribosomal subunit protein uS13

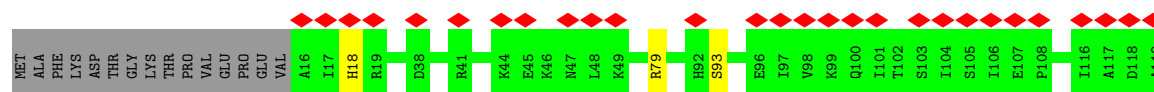


- Molecule 25: Small ribosomal subunit protein eS19

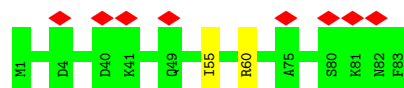


- Molecule 26: Small ribosomal subunit protein uS10

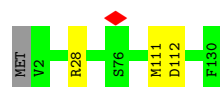




- Molecule 27: Small ribosomal subunit protein eS21



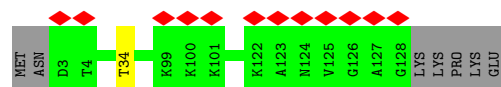
- Molecule 28: Small ribosomal subunit protein uS8



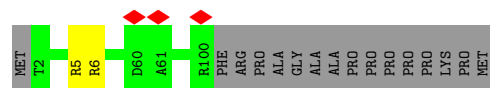
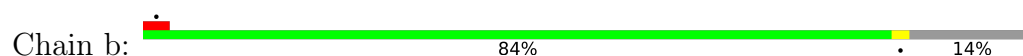
- Molecule 29: Small ribosomal subunit protein uS12



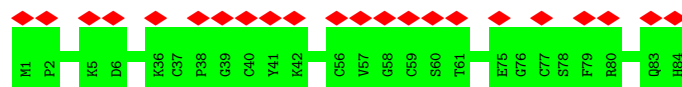
- Molecule 30: 40S ribosomal protein S24



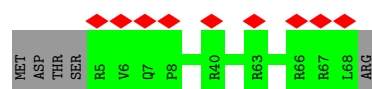
- Molecule 31: Small ribosomal subunit protein eS26



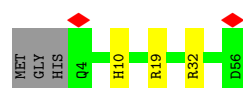
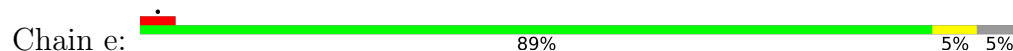
- Molecule 32: Small ribosomal subunit protein eS27



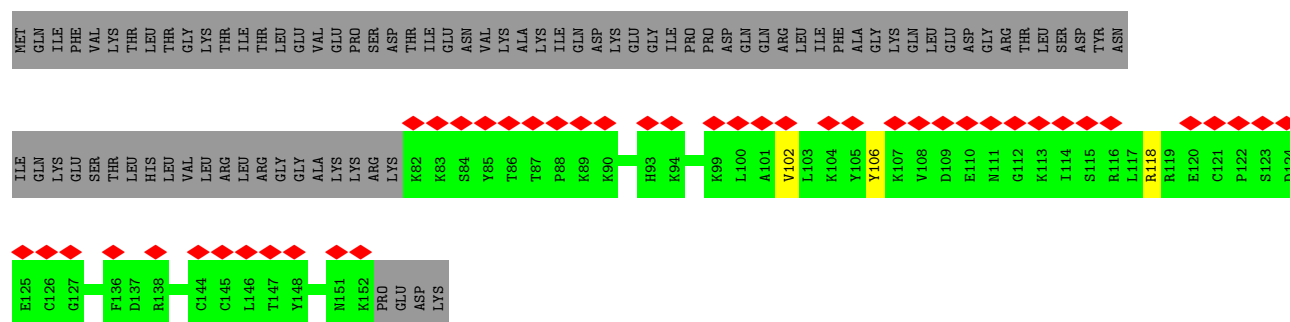
- Molecule 33: Small ribosomal subunit protein eS28



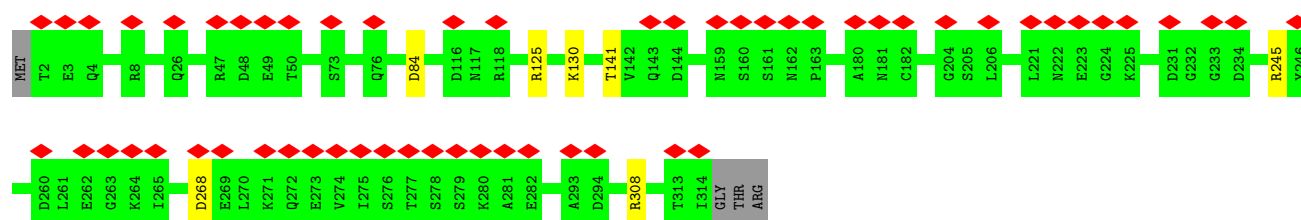
- Molecule 34: Small ribosomal subunit protein uS14



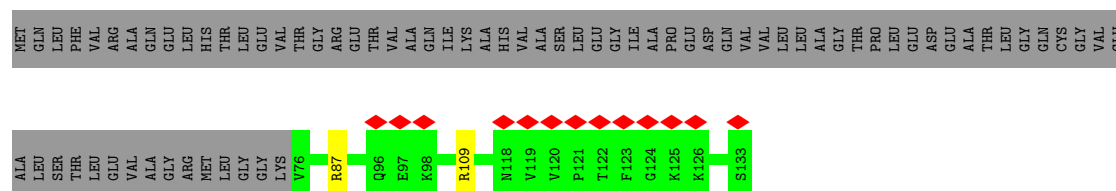
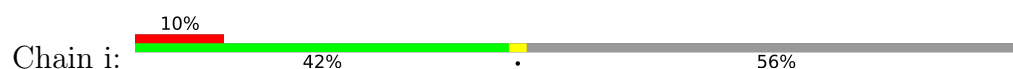
- Molecule 35: Ubiquitin-ribosomal protein eS31 fusion protein



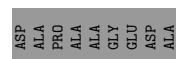
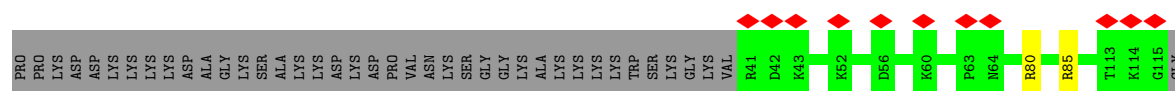
- Molecule 36: Small ribosomal subunit protein RACK1



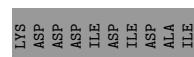
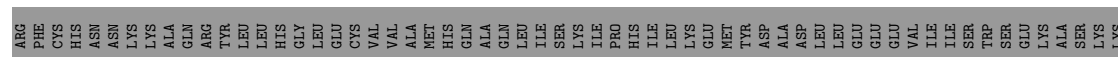
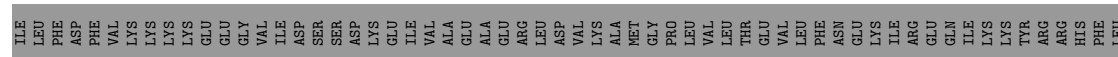
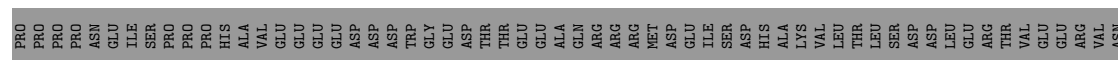
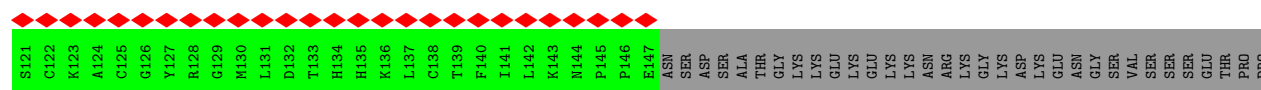
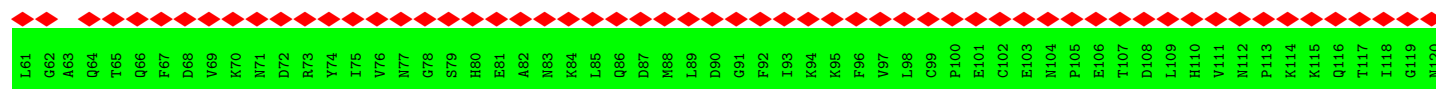
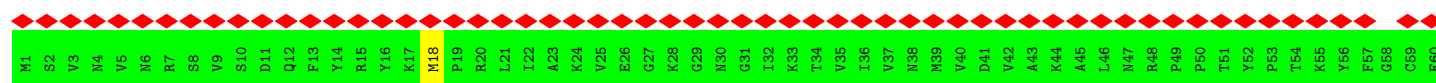
- Molecule 37: Ubiquitin-like FUBI-ribosomal protein eS30 fusion protein



- Molecule 38: Eukaryotic translation initiation factor 4C



Chain o:



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1000	Depositor
Resolution determination method	OTHER	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	59000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	2.111	Depositor
Minimum map value	-1.144	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.052	Depositor
Recommended contour level	0.246	Depositor
Map size ($\text{\AA}$)	465.0, 465.0, 465.0	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.93, 0.93, 0.93	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: T6A, SF4, I2T

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	1	0.84	0/1770	1.16	3/2759 (0.1%)
2	2	0.82	0/41503	1.14	87/64683 (0.1%)
3	3	0.80	0/219	1.09	2/340 (0.6%)
4	A	0.87	0/2177	1.38	5/2935 (0.2%)
5	B	0.90	0/3266	1.41	4/4415 (0.1%)
6	C	0.87	0/1673	1.40	3/2275 (0.1%)
7	D	0.81	0/1769	1.35	2/2367 (0.1%)
8	E	0.83	0/1794	1.38	3/2430 (0.1%)
9	F	0.82	0/1792	1.35	2/2412 (0.1%)
10	G	0.88	0/2125	1.38	5/2856 (0.2%)
11	H	0.84	0/1503	1.40	6/2020 (0.3%)
12	I	0.88	0/1945	1.41	4/2588 (0.2%)
13	J	0.87	0/1553	1.39	3/2079 (0.1%)
14	K	0.90	0/1708	1.43	6/2278 (0.3%)
15	L	0.88	0/1567	1.45	6/2092 (0.3%)
16	M	0.85	0/851	1.34	2/1147 (0.2%)
17	N	0.88	0/1319	1.39	1/1761 (0.1%)
18	O	0.85	0/968	1.38	1/1296 (0.1%)
19	P	0.86	0/1232	1.42	6/1656 (0.4%)
20	Q	0.89	0/1029	1.50	2/1380 (0.1%)
21	R	0.89	0/1177	1.40	2/1571 (0.1%)
22	S	0.87	0/1142	1.40	9/1528 (0.6%)
23	T	0.89	0/1031	1.38	1/1383 (0.1%)
24	U	0.91	0/1212	1.45	6/1621 (0.4%)
25	V	0.85	0/1132	1.43	3/1517 (0.2%)
26	W	0.87	0/832	1.41	3/1117 (0.3%)
27	X	0.84	0/644	1.39	3/860 (0.3%)
28	Y	0.85	0/1051	1.41	3/1406 (0.2%)
29	Z	0.85	0/1124	1.45	3/1500 (0.2%)
30	a	0.86	0/1038	1.36	0/1380
31	b	0.89	0/802	1.50	2/1076 (0.2%)
32	c	0.86	0/673	1.39	0/902

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	d	0.87	0/508	1.43	0/680
34	e	0.90	0/455	1.57	4/603 (0.7%)
35	f	0.90	0/593	1.31	1/786 (0.1%)
36	g	0.87	0/2493	1.36	5/3394 (0.1%)
37	i	0.89	0/469	1.49	2/617 (0.3%)
38	j	0.88	1/913 (0.1%)	1.68	7/1213 (0.6%)
39	k	0.88	0/4779	1.39	11/6452 (0.2%)
40	l	0.98	0/241	1.64	1/305 (0.3%)
41	n	0.83	0/604	1.39	2/810 (0.2%)
42	o	0.89	0/1186	1.33	1/1599 (0.1%)
All	All	0.85	1/95862 (0.0%)	1.28	222/138089 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	1	0	17
2	2	0	334
4	A	0	1
6	C	0	1
7	D	0	1
9	F	0	1
10	G	0	1
11	H	0	1
14	K	0	4
15	L	0	1
17	N	0	2
19	P	0	1
20	Q	0	1
21	R	0	1
28	Y	0	1
29	Z	0	1
35	f	0	2
38	j	0	1
All	All	0	372

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
38	j	8	GLY	N-CA	5.72	1.51	1.45

All (222) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
38	j	7	LYS	O-C-N	-28.90	92.43	122.19
6	C	20	ALA	N-CA-C	9.09	124.00	113.19
38	j	7	LYS	CA-C-N	8.76	132.17	121.83
38	j	7	LYS	C-N-CA	8.76	132.17	121.83
2	2	73	C	C2'-C3'-O3'	8.24	121.86	109.50
2	2	915	A	C2'-C3'-O3'	7.85	121.27	109.50
2	2	67	C	C2'-C3'-O3'	7.80	121.19	109.50
13	J	94	PHE	CA-CB-CG	7.29	121.09	113.80
24	U	6	PRO	CA-N-CD	-7.25	101.84	112.00
2	2	297	C	O4'-C1'-C2'	-7.03	98.78	105.80
14	K	186	ASP	CA-CB-CG	6.99	119.59	112.60
2	2	1547	G	C4'-C3'-O3'	6.95	119.83	109.40
29	Z	41	PHE	CA-CB-CG	6.95	120.75	113.80
2	2	1427	G	C4'-C3'-O3'	6.80	123.20	113.00
2	2	1515	G	C2'-C3'-O3'	-6.71	103.64	113.70
2	2	1845	A	C2'-C3'-O3'	-6.70	103.65	113.70
2	2	71	G	C2'-C3'-O3'	6.64	119.46	109.50
2	2	491	C	N1-C1'-C2'	6.52	121.78	112.00
2	2	1506	G	O4'-C1'-C2'	-6.51	101.08	107.60
2	2	1135	C	O4'-C1'-N1	6.50	118.25	108.50
40	l	18	ARG	NE-CZ-NH2	6.49	125.04	119.20
39	k	486	ASP	CA-CB-CG	6.46	119.06	112.60
10	G	176	ASP	CA-CB-CG	6.46	119.06	112.60
22	S	85	ARG	NE-CZ-NH2	6.45	125.00	119.20
2	2	1507	U	O5'-C5'-C4'	6.42	121.13	111.50
39	k	493	ASP	CA-CB-CG	6.42	119.02	112.60
10	G	124	CYS	N-CA-CB	6.36	121.80	110.80
2	2	72	C	C2'-C3'-O3'	6.36	119.03	109.50
26	W	93	SER	N-CA-C	6.28	113.87	108.22
1	1	8	G	C4'-C3'-O3'	6.24	118.76	109.40
36	g	125	ARG	NE-CZ-NH2	6.20	124.78	119.20
25	V	121	ARG	NE-CZ-NH2	6.18	124.76	119.20
28	Y	111	MET	CA-C-N	6.15	129.49	120.82
28	Y	111	MET	C-N-CA	6.15	129.49	120.82
2	2	1473	U	N1-C1'-C2'	6.11	121.17	112.00
28	Y	112	ASP	CA-CB-CG	6.10	118.70	112.60
2	2	1105	C	N1-C1'-C2'	6.09	121.14	112.00
2	2	849	C	O4'-C1'-N1	6.09	117.63	108.50
34	e	10	HIS	CA-CB-CG	6.06	119.86	113.80
2	2	987	G	O4'-C4'-C3'	6.05	110.05	104.00
3	3	141	A	C5'-C4'-C3'	-6.05	106.93	116.00
12	I	132	ARG	NE-CZ-NH2	6.04	124.64	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
26	W	79	ARG	NE-CZ-NH2	6.03	124.63	119.20
3	3	140	G	C5'-C4'-C3'	-6.03	106.96	116.00
2	2	1673	A	O4'-C1'-N9	6.00	117.50	108.50
22	S	11	GLN	OE1-CD-NE2	-5.98	116.62	122.60
10	G	98	ASN	CA-CB-CG	5.96	118.56	112.60
36	g	84	ASP	CA-CB-CG	5.96	118.56	112.60
2	2	818	U	C3'-C2'-C1'	5.95	107.25	101.30
19	P	19	ARG	NE-CZ-NH2	5.95	124.55	119.20
2	2	1414	C	O4'-C1'-N1	5.93	117.09	108.20
12	I	87	ARG	NE-CZ-NH2	5.92	124.52	119.20
19	P	121	ARG	NE-CZ-NH2	5.91	124.52	119.20
2	2	915	A	P-O3'-C3'	5.86	128.99	120.20
38	j	12	ARG	NE-CZ-NH2	5.86	124.47	119.20
8	E	171	HIS	CB-CG-CD2	-5.85	123.59	131.20
11	H	218	ASN	CA-CB-CG	5.84	118.44	112.60
4	A	232	PRO	N-CA-C	5.84	117.82	110.70
2	2	296	U	C3'-C2'-C1'	5.81	107.11	101.30
2	2	1472	A	C5'-C4'-C3'	-5.78	106.53	115.20
2	2	909	A	O4'-C1'-N9	5.78	116.87	108.20
15	L	24	ARG	NE-CZ-NH2	5.78	124.40	119.20
16	M	81	ASP	CA-CB-CG	5.78	118.38	112.60
2	2	334	U	C5'-C4'-C3'	-5.77	107.34	116.00
15	L	80	ARG	NE-CZ-NH2	5.76	124.38	119.20
8	E	171	HIS	CA-CB-CG	5.76	119.56	113.80
39	k	260	ARG	NE-CZ-NH2	5.76	124.38	119.20
20	Q	65	ASP	CA-CB-CG	5.75	118.34	112.60
10	G	25	SER	N-CA-C	5.73	117.25	108.42
2	2	491	C	O4'-C1'-C2'	-5.72	101.88	107.60
2	2	819	U	O4'-C1'-N1	5.72	117.08	108.50
21	R	18	ARG	NE-CZ-NH2	5.72	124.35	119.20
14	K	56	ARG	NE-CZ-NH2	5.71	124.34	119.20
25	V	102	ARG	NE-CZ-NH2	5.71	124.34	119.20
41	n	80	ARG	NE-CZ-NH2	5.70	124.33	119.20
37	i	109	ARG	NE-CZ-NH2	5.70	124.33	119.20
2	2	1310	U	C2'-C3'-O3'	5.70	122.25	113.70
2	2	321	C	C2'-C3'-O3'	5.67	118.01	109.50
2	2	1414	C	C5'-C4'-C3'	-5.67	106.70	115.20
39	k	567	ARG	NE-CZ-NH2	5.67	124.30	119.20
14	K	123	ARG	NE-CZ-NH2	5.66	124.29	119.20
5	B	310	ARG	NE-CZ-NH2	5.66	124.29	119.20
7	D	162	ARG	NE-CZ-NH2	5.65	124.28	119.20
2	2	1828	A	C4'-C3'-C2'	-5.64	96.96	102.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	O	35	ILE	N-CA-C	5.64	115.84	110.42
38	j	83	ASP	CA-C-N	5.64	131.35	122.21
38	j	83	ASP	C-N-CA	5.64	131.35	122.21
10	G	100	ARG	NE-CZ-NH2	5.63	124.26	119.20
2	2	1472	A	C4'-C3'-O3'	5.62	117.82	109.40
2	2	583	C	C3'-C2'-C1'	5.60	106.90	101.30
22	S	62	ARG	NE-CZ-NH2	5.59	124.23	119.20
22	S	146	ARG	NE-CZ-NH2	5.59	124.23	119.20
2	2	1562	G	O4'-C1'-N9	5.59	116.88	108.50
5	B	151	HIS	CB-CG-CD2	-5.58	123.94	131.20
2	2	818	U	O4'-C4'-C3'	5.57	109.57	104.00
2	2	515	A	C2'-C3'-O3'	5.56	117.85	109.50
2	2	1294	G	O4'-C1'-N9	5.56	116.84	108.50
2	2	1370	C	C4'-C3'-C2'	-5.55	97.05	102.60
16	M	7	ASN	CA-CB-CG	5.55	118.15	112.60
36	g	268	ASP	CA-CB-CG	5.55	118.15	112.60
2	2	739	U	C4'-C3'-O3'	5.54	117.71	109.40
2	2	1619	U	O4'-C1'-N1	5.53	116.79	108.50
38	j	24	ARG	NE-CZ-NH2	5.53	124.17	119.20
2	2	1549	C	C3'-C2'-C1'	5.52	106.82	101.30
22	S	138	ARG	NE-CZ-NH2	5.52	124.17	119.20
6	C	110	ASN	CA-CB-CG	5.51	118.11	112.60
39	k	360	PHE	CA-CB-CG	5.50	119.30	113.80
2	2	324	C	C4'-C3'-C2'	-5.50	97.10	102.60
2	2	341	G	C4'-C3'-C2'	-5.49	97.11	102.60
29	Z	140	ARG	NE-CZ-NH2	5.49	124.14	119.20
2	2	1420	G	C5'-C4'-C3'	-5.49	106.97	115.20
15	L	153	SER	CA-C-N	5.48	127.89	120.38
15	L	153	SER	C-N-CA	5.48	127.89	120.38
41	n	85	ARG	NE-CZ-NH2	5.48	124.13	119.20
4	A	84	ASP	CA-CB-CG	5.47	118.07	112.60
19	P	64	ARG	NE-CZ-NH2	5.47	124.12	119.20
2	2	1670	A	O4'-C1'-N9	5.47	116.70	108.50
6	C	203	PHE	CA-CB-CG	5.47	119.27	113.80
27	X	60	ARG	NE-CZ-NH2	5.46	124.12	119.20
17	N	105	ARG	NE-CZ-NH2	5.46	124.12	119.20
2	2	1360	U	O4'-C1'-N1	5.46	116.69	108.50
2	2	1119	C	C4'-C3'-C2'	-5.45	97.15	102.60
31	b	6	ARG	NE-CZ-NH2	5.45	124.10	119.20
11	H	31	ASP	CA-CB-CG	5.42	118.02	112.60
24	U	130	ARG	NE-CZ-NH2	5.42	124.07	119.20
15	L	127	ARG	NE-CZ-NH2	5.41	124.07	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
36	g	245	ARG	NE-CZ-NH2	5.41	124.07	119.20
2	2	806	A	C5'-C4'-C3'	-5.40	107.90	116.00
37	i	87	ARG	NE-CZ-NH2	5.39	124.05	119.20
2	2	545	A	C4'-C3'-O3'	5.39	121.09	113.00
2	2	301	C	C5'-C4'-C3'	-5.39	107.92	116.00
22	S	13	PHE	CA-C-N	5.38	126.20	121.58
22	S	13	PHE	C-N-CA	5.38	126.20	121.58
4	A	54	ARG	NE-CZ-NH2	5.37	124.03	119.20
2	2	1776	G	C2'-C3'-O3'	-5.37	105.65	113.70
21	R	43	ARG	NE-CZ-NH2	5.37	124.03	119.20
2	2	832	G	O4'-C4'-C3'	5.36	109.36	104.00
11	H	213	ARG	NE-CZ-NH2	5.36	124.02	119.20
39	k	101	ARG	NE-CZ-NH2	5.34	124.01	119.20
2	2	1842	U	O4'-C4'-C3'	5.34	109.34	104.00
2	2	165	G	O4'-C1'-N9	5.33	116.50	108.50
15	L	5	ARG	NE-CZ-NH2	5.33	123.99	119.20
2	2	579	G	O4'-C1'-N9	5.33	116.19	108.20
7	D	208	HIS	CB-CG-CD2	-5.32	124.28	131.20
1	1	10	G	C3'-C2'-C1'	5.32	106.82	101.50
5	B	278	ASN	CA-C-N	5.32	127.60	120.58
5	B	278	ASN	C-N-CA	5.32	127.60	120.58
29	Z	105	PHE	CA-CB-CG	5.32	119.12	113.80
2	2	537	G	C2'-C3'-O3'	-5.31	105.73	113.70
2	2	954	G	O4'-C1'-N9	5.31	116.47	108.50
2	2	792	G	C4'-C3'-O3'	5.31	120.96	113.00
12	I	190	ARG	NE-CZ-NH2	5.30	123.97	119.20
24	U	46	ARG	NE-CZ-NH2	5.30	123.97	119.20
2	2	1659	A	C5'-C4'-C3'	-5.30	107.25	115.20
11	H	70	ARG	NE-CZ-NH2	5.30	123.97	119.20
13	J	127	ASP	CA-CB-CG	5.29	117.89	112.60
2	2	235	C	C2'-C3'-O3'	-5.29	105.76	113.70
2	2	1503	G	O4'-C1'-N9	5.29	116.14	108.20
24	U	142	ARG	NE-CZ-NH2	5.28	123.95	119.20
22	S	146	ARG	NH1-CZ-NH2	-5.24	112.48	119.30
2	2	225	C	C5'-C4'-C3'	-5.22	108.16	116.00
19	P	3	ARG	NE-CZ-NH2	5.22	123.90	119.20
2	2	1255	A	N9-C1'-C2'	5.22	119.83	112.00
22	S	48	GLN	OE1-CD-NE2	-5.22	117.38	122.60
11	H	151	ARG	NE-CZ-NH2	5.21	123.89	119.20
2	2	272	C	O4'-C4'-C3'	5.20	109.20	104.00
39	k	326	ASP	N-CA-C	5.18	117.83	111.82
2	2	550	A	C4'-C3'-C2'	-5.17	97.42	102.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	k	252	ARG	NE-CZ-NH2	5.17	123.86	119.20
14	K	165	GLN	OE1-CD-NE2	-5.17	117.43	122.60
2	2	1419	C	O4'-C1'-C2'	-5.16	100.64	105.80
14	K	25	ARG	NE-CZ-NH2	5.16	123.84	119.20
2	2	1776	G	C4'-C3'-O3'	5.16	120.74	113.00
2	2	1086	C	C4'-C3'-C2'	-5.16	97.44	102.60
36	g	308	ARG	NE-CZ-NH2	5.16	123.84	119.20
2	2	1215	C	C5'-C4'-C3'	-5.15	108.27	116.00
12	I	216	ARG	NE-CZ-NH2	5.15	123.83	119.20
19	P	124	ARG	NE-CZ-NH2	5.15	123.83	119.20
27	X	55	ILE	CA-C-N	5.14	128.00	120.71
27	X	55	ILE	C-N-CA	5.14	128.00	120.71
2	2	1029	G	C2'-C3'-O3'	-5.13	106.00	113.70
2	2	649	G	N9-C1'-C2'	5.13	119.69	112.00
9	F	40	ARG	NE-CZ-NH2	5.13	123.81	119.20
19	P	87	ASP	CA-CB-CG	5.12	117.72	112.60
20	Q	84	ARG	NE-CZ-NH2	5.12	123.81	119.20
35	f	102	VAL	N-CA-C	5.12	115.89	110.72
11	H	142	ARG	NE-CZ-NH2	5.12	123.80	119.20
25	V	62	ARG	NE-CZ-NH2	5.11	123.80	119.20
8	E	213	PHE	CA-CB-CG	5.11	118.91	113.80
39	k	275	ASP	N-CA-C	5.10	116.68	110.41
2	2	445	A	C4'-C3'-C2'	-5.09	97.51	102.60
2	2	834	G	C2'-C3'-O3'	-5.08	106.07	113.70
2	2	75	G	C3'-C2'-C1'	5.08	106.38	101.30
2	2	1350	G	C5'-C4'-C3'	-5.08	108.38	116.00
34	e	19	ARG	NE-CZ-NH2	5.08	123.77	119.20
2	2	322	G	C1'-O4'-C4'	-5.08	104.82	109.90
2	2	1105	C	C1'-O4'-C4'	-5.07	104.83	109.90
4	A	153	PHE	CA-CB-CG	5.07	118.87	113.80
23	T	47	ARG	NE-CZ-NH2	5.07	123.76	119.20
4	A	114	HIS	CB-CG-CD2	-5.06	124.62	131.20
14	K	145	ILE	N-CA-C	5.06	115.72	110.82
42	o	18	MET	N-CA-C	5.06	112.77	108.22
2	2	731	C	O4'-C1'-C2'	-5.05	102.55	107.60
39	k	408	ASN	CA-CB-CG	5.04	117.64	112.60
2	2	1595	G	O4'-C4'-C3'	5.04	109.04	104.00
39	k	531	ARG	NE-CZ-NH2	5.04	123.73	119.20
2	2	848	G	O4'-C1'-N9	5.03	116.05	108.50
2	2	181	A	O4'-C1'-N9	5.03	115.74	108.20
2	2	77	A	C3'-C2'-C1'	5.03	106.33	101.30
13	J	106	ARG	NE-CZ-NH2	5.03	123.72	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	2	545	A	C2'-C3'-O3'	-5.02	106.16	113.70
9	F	76	ARG	NE-CZ-NH2	5.02	123.72	119.20
24	U	38	ARG	CA-C-N	5.02	126.96	120.44
24	U	38	ARG	C-N-CA	5.02	126.96	120.44
2	2	73	C	C4'-C3'-C2'	-5.01	97.59	102.60
2	2	554	A	C4'-C3'-C2'	-5.01	97.59	102.60
2	2	1282	G	O4'-C4'-C3'	5.01	109.01	104.00
1	1	48	C	O4'-C4'-C3'	5.01	109.01	104.00
34	e	32	ARG	CA-C-N	5.01	127.96	120.90
34	e	32	ARG	C-N-CA	5.01	127.96	120.90
26	W	18	HIS	CB-CG-CD2	-5.00	124.69	131.20
31	b	5	ARG	NE-CZ-NH2	5.00	123.70	119.20

There are no chirality outliers.

All (372) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	1	10	G	Sidechain
1	1	13	G	Sidechain
1	1	15	A	Sidechain
1	1	2	A	Sidechain
1	1	21	A	Sidechain
1	1	24	G	Sidechain
1	1	3	G	Sidechain
1	1	31	G	Sidechain
1	1	42	A	Sidechain
1	1	43	G	Sidechain
1	1	44	A	Sidechain
1	1	50	A	Sidechain
1	1	53	G	Sidechain
1	1	57	G	Sidechain
1	1	6	G	Sidechain
1	1	63	A	Sidechain
1	1	7	A	Sidechain
2	2	1	U	Sidechain
2	2	1004	A	Sidechain
2	2	1009	U	Sidechain
2	2	1010	G	Sidechain
2	2	1016	A	Sidechain
2	2	1053	C	Sidechain
2	2	1056	A	Sidechain
2	2	1066	A	Sidechain

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Mol	Chain	Res	Type	Group
2	2	107	A	Sidechain
2	2	1073	A	Sidechain
2	2	1076	A	Sidechain
2	2	1078	A	Sidechain
2	2	1093	G	Sidechain
2	2	1100	G	Sidechain
2	2	1110	U	Sidechain
2	2	1125	G	Sidechain
2	2	1126	G	Sidechain
2	2	1135	C	Sidechain
2	2	1145	A	Sidechain
2	2	1147	G	Sidechain
2	2	1148	U	Sidechain
2	2	1152	U	Sidechain
2	2	1155	G	Sidechain
2	2	1160	G	Sidechain
2	2	1161	G	Sidechain
2	2	1164	G	Sidechain
2	2	1169	A	Sidechain
2	2	1175	G	Sidechain
2	2	1177	A	Sidechain
2	2	1184	A	Sidechain
2	2	1191	A	Sidechain
2	2	1199	G	Sidechain
2	2	1200	A	Sidechain
2	2	1212	C	Sidechain
2	2	1213	A	Sidechain
2	2	1215	C	Sidechain
2	2	1216	A	Sidechain
2	2	1217	G	Sidechain
2	2	1236	A	Sidechain
2	2	1237	A	Sidechain
2	2	1249	A	Sidechain
2	2	1253	G	Sidechain
2	2	1262	C	Sidechain
2	2	1269	C	Sidechain
2	2	1273	C	Sidechain
2	2	1282	G	Sidechain
2	2	1289	A	Sidechain
2	2	1294	G	Sidechain
2	2	1295	A	Sidechain
2	2	1304	U	Sidechain

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Mol	Chain	Res	Type	Group
2	2	1312	C	Sidechain
2	2	1322	U	Sidechain
2	2	1327	C	Sidechain
2	2	1331	G	Sidechain
2	2	1334	G	Sidechain
2	2	1341	G	Sidechain
2	2	1350	G	Sidechain
2	2	1352	G	Sidechain
2	2	1359	C	Sidechain
2	2	1365	A	Sidechain
2	2	1370	C	Sidechain
2	2	1374	A	Sidechain
2	2	1390	G	Sidechain
2	2	1391	C	Sidechain
2	2	1392	A	Sidechain
2	2	1397	A	Sidechain
2	2	140	U	Sidechain
2	2	1403	U	Sidechain
2	2	1404	U	Sidechain
2	2	1407	G	Sidechain
2	2	1414	C	Sidechain
2	2	1417	A	Sidechain
2	2	1418	G	Sidechain
2	2	1422	U	Sidechain
2	2	1423	C	Sidechain
2	2	1427	G	Sidechain
2	2	1434	A	Sidechain
2	2	1439	C	Sidechain
2	2	144	U	Sidechain
2	2	1442	A	Sidechain
2	2	1447	G	Sidechain
2	2	1450	A	Sidechain
2	2	1452	G	Sidechain
2	2	146	G	Sidechain
2	2	1460	C	Sidechain
2	2	1469	G	Sidechain
2	2	147	A	Sidechain
2	2	1470	A	Sidechain
2	2	1477	G	Sidechain
2	2	148	U	Sidechain
2	2	1483	A	Sidechain
2	2	1493	G	Sidechain

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Mol	Chain	Res	Type	Group
2	2	15	U	Sidechain
2	2	1501	U	Sidechain
2	2	1504	A	Sidechain
2	2	1506	G	Sidechain
2	2	1507	U	Sidechain
2	2	1508	C	Sidechain
2	2	151	C	Sidechain
2	2	1513	C	Sidechain
2	2	1523	G	Sidechain
2	2	1524	C	Sidechain
2	2	1530	U	Sidechain
2	2	1536	G	Sidechain
2	2	1540	A	Sidechain
2	2	1547	G	Sidechain
2	2	1548	C	Sidechain
2	2	1549	C	Sidechain
2	2	1550	U	Sidechain
2	2	1551	A	Sidechain
2	2	1558	G	Sidechain
2	2	1561	G	Sidechain
2	2	1564	A	Sidechain
2	2	157	U	Sidechain
2	2	1570	G	Sidechain
2	2	1573	U	Sidechain
2	2	1574	A	Sidechain
2	2	1590	U	Sidechain
2	2	1593	G	Sidechain
2	2	1595	G	Sidechain
2	2	1598	G	Sidechain
2	2	1599	G	Sidechain
2	2	1601	G	Sidechain
2	2	1612	G	Sidechain
2	2	1618	A	Sidechain
2	2	1619	U	Sidechain
2	2	1627	G	Sidechain
2	2	1631	G	Sidechain
2	2	1634	G	Sidechain
2	2	1635	A	Sidechain
2	2	1645	A	Sidechain
2	2	165	G	Sidechain
2	2	1652	G	Sidechain
2	2	1654	U	Sidechain

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Mol	Chain	Res	Type	Group
2	2	1655	C	Sidechain
2	2	1656	A	Sidechain
2	2	1663	U	Sidechain
2	2	1674	A	Sidechain
2	2	1676	U	Sidechain
2	2	1677	C	Sidechain
2	2	1678	C	Sidechain
2	2	1693	C	Sidechain
2	2	1701	G	Sidechain
2	2	171	A	Sidechain
2	2	1712	C	Sidechain
2	2	1723	U	Sidechain
2	2	1730	A	Sidechain
2	2	1733	C	Sidechain
2	2	1738	G	Sidechain
2	2	1739	G	Sidechain
2	2	1744	G	Sidechain
2	2	176	U	Sidechain
2	2	1769	U	Sidechain
2	2	1770	G	Sidechain
2	2	1779	C	Sidechain
2	2	1780	U	Sidechain
2	2	1794	A	Sidechain
2	2	1803	A	Sidechain
2	2	1807	A	Sidechain
2	2	1808	G	Sidechain
2	2	1809	A	Sidechain
2	2	1816	A	Sidechain
2	2	1818	A	Sidechain
2	2	1819	A	Sidechain
2	2	1828	A	Sidechain
2	2	183	G	Sidechain
2	2	1831	G	Sidechain
2	2	184	G	Sidechain
2	2	1842	U	Sidechain
2	2	1843	G	Sidechain
2	2	1845	A	Sidechain
2	2	1850	C	Sidechain
2	2	1851	G	Sidechain
2	2	1853	A	Sidechain
2	2	1854	A	Sidechain
2	2	188	U	Sidechain

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Mol	Chain	Res	Type	Group
2	2	189	G	Sidechain
2	2	190	A	Sidechain
2	2	194	C	Sidechain
2	2	196	U	Sidechain
2	2	199	G	Sidechain
2	2	202	U	Sidechain
2	2	208	G	Sidechain
2	2	222	G	Sidechain
2	2	226	A	Sidechain
2	2	228	A	Sidechain
2	2	237	G	Sidechain
2	2	272	C	Sidechain
2	2	273	G	Sidechain
2	2	275	C	Sidechain
2	2	277	U	Sidechain
2	2	282	G	Sidechain
2	2	284	C	Sidechain
2	2	287	U	Sidechain
2	2	296	U	Sidechain
2	2	299	G	Sidechain
2	2	308	C	Sidechain
2	2	311	C	Sidechain
2	2	318	U	Sidechain
2	2	319	G	Sidechain
2	2	32	U	Sidechain
2	2	320	G	Sidechain
2	2	322	G	Sidechain
2	2	344	U	Sidechain
2	2	357	U	Sidechain
2	2	358	U	Sidechain
2	2	359	C	Sidechain
2	2	360	G	Sidechain
2	2	364	G	Sidechain
2	2	370	G	Sidechain
2	2	375	G	Sidechain
2	2	38	A	Sidechain
2	2	383	U	Sidechain
2	2	387	G	Sidechain
2	2	395	G	Sidechain
2	2	408	A	Sidechain
2	2	415	G	Sidechain
2	2	42	A	Sidechain

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Mol	Chain	Res	Type	Group
2	2	425	A	Sidechain
2	2	427	G	Sidechain
2	2	428	G	Sidechain
2	2	432	C	Sidechain
2	2	434	G	Sidechain
2	2	435	A	Sidechain
2	2	436	G	Sidechain
2	2	440	C	Sidechain
2	2	441	G	Sidechain
2	2	442	G	Sidechain
2	2	443	C	Sidechain
2	2	45	A	Sidechain
2	2	46	A	Sidechain
2	2	464	G	Sidechain
2	2	465	C	Sidechain
2	2	472	G	Sidechain
2	2	483	A	Sidechain
2	2	485	U	Sidechain
2	2	489	G	Sidechain
2	2	49	C	Sidechain
2	2	493	C	Sidechain
2	2	515	A	Sidechain
2	2	516	A	Sidechain
2	2	518	A	Sidechain
2	2	521	A	Sidechain
2	2	523	A	Sidechain
2	2	524	G	Sidechain
2	2	532	U	Sidechain
2	2	542	G	Sidechain
2	2	546	U	Sidechain
2	2	553	G	Sidechain
2	2	557	C	Sidechain
2	2	564	A	Sidechain
2	2	581	U	Sidechain
2	2	585	U	Sidechain
2	2	588	G	Sidechain
2	2	591	G	Sidechain
2	2	594	A	Sidechain
2	2	60	A	Sidechain
2	2	601	G	Sidechain
2	2	603	C	Sidechain
2	2	604	G	Sidechain

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Mol	Chain	Res	Type	Group
2	2	605	C	Sidechain
2	2	606	A	Sidechain
2	2	611	C	Sidechain
2	2	615	G	Sidechain
2	2	629	C	Sidechain
2	2	639	U	Sidechain
2	2	645	A	Sidechain
2	2	649	G	Sidechain
2	2	652	G	Sidechain
2	2	654	A	Sidechain
2	2	658	A	Sidechain
2	2	659	A	Sidechain
2	2	661	A	Sidechain
2	2	670	G	Sidechain
2	2	678	U	Sidechain
2	2	684	A	Sidechain
2	2	71	G	Sidechain
2	2	73	C	Sidechain
2	2	731	C	Sidechain
2	2	735	C	Sidechain
2	2	740	G	Sidechain
2	2	744	C	Sidechain
2	2	745	U	Sidechain
2	2	75	G	Sidechain
2	2	78	C	Sidechain
2	2	785	G	Sidechain
2	2	789	G	Sidechain
2	2	79	A	Sidechain
2	2	790	A	Sidechain
2	2	791	A	Sidechain
2	2	793	C	Sidechain
2	2	795	U	Sidechain
2	2	804	A	Sidechain
2	2	807	A	Sidechain
2	2	820	C	Sidechain
2	2	822	A	Sidechain
2	2	824	G	Sidechain
2	2	829	C	Sidechain
2	2	830	C	Sidechain
2	2	831	C	Sidechain
2	2	832	G	Sidechain
2	2	836	C	Sidechain

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Mol	Chain	Res	Type	Group
2	2	841	G	Sidechain
2	2	845	A	Sidechain
2	2	854	A	Sidechain
2	2	857	A	Sidechain
2	2	858	A	Sidechain
2	2	864	G	Sidechain
2	2	868	A	Sidechain
2	2	870	G	Sidechain
2	2	873	C	Sidechain
2	2	882	A	Sidechain
2	2	888	U	Sidechain
2	2	889	U	Sidechain
2	2	897	G	Sidechain
2	2	899	A	Sidechain
2	2	907	C	Sidechain
2	2	908	C	Sidechain
2	2	914	U	Sidechain
2	2	930	G	Sidechain
2	2	939	U	Sidechain
2	2	950	U	Sidechain
2	2	959	A	Sidechain
2	2	96	C	Sidechain
2	2	961	U	Sidechain
2	2	964	U	Sidechain
2	2	966	G	Sidechain
2	2	967	G	Sidechain
2	2	97	U	Sidechain
2	2	980	C	Sidechain
2	2	982	G	Sidechain
2	2	984	C	Sidechain
2	2	986	A	Sidechain
2	2	99	A	Sidechain
4	A	39	TYR	Sidechain
6	C	191	ARG	Sidechain
7	D	82	ARG	Sidechain
9	F	45	ARG	Sidechain
10	G	245	ARG	Sidechain
11	H	75	ARG	Sidechain
14	K	109	TYR	Sidechain
14	K	184	ARG	Sidechain
14	K	5	ARG	Sidechain
14	K	56	ARG	Sidechain

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Mol	Chain	Res	Type	Group
15	L	69	ARG	Sidechain
17	N	89	ARG	Sidechain
17	N	99	TYR	Sidechain
19	P	121	ARG	Sidechain
20	Q	98	ARG	Sidechain
21	R	115	TYR	Sidechain
28	Y	28	ARG	Sidechain
29	Z	17	ARG	Sidechain
35	f	106	TYR	Sidechain
35	f	118	ARG	Sidechain
38	j	7	LYS	Mainchain

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	1	1614	0	822	3	0
2	2	37147	0	18750	9	0
3	3	196	0	98	0	0
4	A	2146	0	2191	0	0
5	B	3213	0	3354	0	0
6	C	1636	0	1641	0	0
7	D	1741	0	1815	0	0
8	E	1754	0	1834	0	0
9	F	1764	0	1863	0	0
10	G	2083	0	2189	0	0
11	H	1482	0	1534	0	0
12	I	1923	0	2089	0	0
13	J	1530	0	1627	0	0
14	K	1679	0	1762	0	0
15	L	1542	0	1659	1	0
16	M	827	0	854	0	0
17	N	1296	0	1374	0	0
18	O	958	0	993	1	0
19	P	1208	0	1294	0	0
20	Q	1016	0	1039	0	0
21	R	1154	0	1213	0	0
22	S	1124	0	1193	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
23	T	1019	0	1075	0	0
24	U	1194	0	1253	0	0
25	V	1112	0	1149	0	0
26	W	822	0	887	0	0
27	X	637	0	637	0	0
28	Y	1034	0	1080	0	0
29	Z	1106	0	1179	0	0
30	a	1021	0	1085	0	0
31	b	789	0	841	0	0
32	c	659	0	683	0	0
33	d	506	0	536	0	0
34	e	445	0	442	0	0
35	f	581	0	599	0	0
36	g	2436	0	2393	1	0
37	i	464	0	511	0	0
38	j	903	0	928	0	0
39	k	4692	0	4819	2	0
40	l	240	0	289	0	0
41	n	598	0	656	0	0
42	o	1162	0	1171	0	0
43	k	16	0	0	0	0
All	All	90469	0	73401	16	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 0.

All (16) 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)
2:2:1244:I2T:C6	2:2:1244:I2T:OP2	2.48	0.62
2:2:1244:I2T:C32	2:2:1244:I2T:O2	2.47	0.59
1:1:23:C:H2'	1:1:24:G:C8	2.46	0.51
2:2:1078:A:H5'	2:2:1837:G:H4'	1.96	0.48
1:1:22:G:H2'	1:1:23:C:C6	2.51	0.46
2:2:1098:G:H1	2:2:1126:G:N2	2.14	0.45
1:1:13:G:N2	1:1:24:G:H1	2.15	0.45
2:2:1243:C:H4'	2:2:1244:I2T:O5'	2.18	0.44
2:2:498:A:OP2	15:L:1:MET:HE1	2.18	0.43
18:O:102:LYS:HE2	18:O:102:LYS:HA	2.01	0.42
2:2:1243:C:H4'	2:2:1244:I2T:C5'	2.51	0.41
39:k:347:MET:SD	39:k:349:LYS:HE2	2.61	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
36:g:130:LYS:HE2	36:g:141:THR:HG22	2.03	0.41
39:k:124:ALA:HB1	39:k:168:ILE:HD11	2.03	0.40
2:2:552:U:H2'	2:2:553:G:C8	2.56	0.40
2:2:868:A:H2'	2:2:869:G:C8	2.56	0.40

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	
4	A	264/284 (93%)	251 (95%)	13 (5%)	0	100	100
5	B	420/485 (87%)	397 (94%)	23 (6%)	0	100	100
6	C	205/295 (70%)	197 (96%)	8 (4%)	0	100	100
7	D	213/264 (81%)	207 (97%)	6 (3%)	0	100	100
8	E	224/270 (83%)	215 (96%)	9 (4%)	0	100	100
9	F	225/243 (93%)	217 (96%)	8 (4%)	0	100	100
10	G	261/263 (99%)	255 (98%)	6 (2%)	0	100	100
11	H	183/204 (90%)	176 (96%)	7 (4%)	0	100	100
12	I	235/249 (94%)	223 (95%)	12 (5%)	0	100	100
13	J	188/194 (97%)	181 (96%)	7 (4%)	0	100	100
14	K	204/208 (98%)	196 (96%)	8 (4%)	0	100	100
15	L	186/194 (96%)	183 (98%)	3 (2%)	0	100	100
16	M	96/149 (64%)	89 (93%)	7 (7%)	0	100	100
17	N	156/158 (99%)	146 (94%)	10 (6%)	0	100	100
18	O	122/132 (92%)	114 (93%)	8 (7%)	0	100	100
19	P	148/151 (98%)	145 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
20	Q	134/151 (89%)	130 (97%)	4 (3%)	0	100	100
21	R	138/145 (95%)	131 (95%)	7 (5%)	0	100	100
22	S	139/146 (95%)	135 (97%)	4 (3%)	0	100	100
23	T	124/135 (92%)	120 (97%)	4 (3%)	0	100	100
24	U	143/152 (94%)	138 (96%)	5 (4%)	0	100	100
25	V	139/145 (96%)	136 (98%)	3 (2%)	0	100	100
26	W	102/119 (86%)	96 (94%)	6 (6%)	0	100	100
27	X	81/83 (98%)	78 (96%)	3 (4%)	0	100	100
28	Y	127/130 (98%)	124 (98%)	3 (2%)	0	100	100
29	Z	140/143 (98%)	135 (96%)	5 (4%)	0	100	100
30	a	124/133 (93%)	116 (94%)	8 (6%)	0	100	100
31	b	97/115 (84%)	94 (97%)	3 (3%)	0	100	100
32	c	82/84 (98%)	79 (96%)	3 (4%)	0	100	100
33	d	62/69 (90%)	62 (100%)	0	0	100	100
34	e	51/56 (91%)	49 (96%)	2 (4%)	0	100	100
35	f	69/156 (44%)	63 (91%)	6 (9%)	0	100	100
36	g	311/317 (98%)	295 (95%)	16 (5%)	0	100	100
37	i	56/133 (42%)	54 (96%)	2 (4%)	0	100	100
38	j	110/144 (76%)	101 (92%)	9 (8%)	0	100	100
39	k	593/599 (99%)	552 (93%)	41 (7%)	0	100	100
40	l	23/25 (92%)	23 (100%)	0	0	100	100
41	n	73/124 (59%)	70 (96%)	3 (4%)	0	100	100
42	o	145/430 (34%)	139 (96%)	6 (4%)	0	100	100
All	All	6393/7477 (86%)	6112 (96%)	281 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	
4	A	238/255 (93%)	238 (100%)	0	100	100
5	B	354/407 (87%)	354 (100%)	0	100	100
6	C	173/244 (71%)	173 (100%)	0	100	100
7	D	196/231 (85%)	196 (100%)	0	100	100
8	E	190/214 (89%)	189 (100%)	1 (0%)	86	96
9	F	190/202 (94%)	190 (100%)	0	100	100
10	G	225/225 (100%)	223 (99%)	2 (1%)	75	92
11	H	159/170 (94%)	159 (100%)	0	100	100
12	I	207/218 (95%)	207 (100%)	0	100	100
13	J	170/174 (98%)	170 (100%)	0	100	100
14	K	177/179 (99%)	177 (100%)	0	100	100
15	L	162/168 (96%)	162 (100%)	0	100	100
16	M	89/125 (71%)	89 (100%)	0	100	100
17	N	142/142 (100%)	141 (99%)	1 (1%)	81	94
18	O	104/108 (96%)	104 (100%)	0	100	100
19	P	130/131 (99%)	129 (99%)	1 (1%)	79	93
20	Q	106/119 (89%)	106 (100%)	0	100	100
21	R	126/130 (97%)	126 (100%)	0	100	100
22	S	117/121 (97%)	117 (100%)	0	100	100
23	T	114/121 (94%)	114 (100%)	0	100	100
24	U	125/132 (95%)	124 (99%)	1 (1%)	79	93
25	V	113/116 (97%)	113 (100%)	0	100	100
26	W	94/107 (88%)	94 (100%)	0	100	100
27	X	67/67 (100%)	67 (100%)	0	100	100
28	Y	112/113 (99%)	112 (100%)	0	100	100
29	Z	114/115 (99%)	114 (100%)	0	100	100
30	a	108/115 (94%)	107 (99%)	1 (1%)	75	92
31	b	87/99 (88%)	87 (100%)	0	100	100
32	c	76/76 (100%)	76 (100%)	0	100	100
33	d	57/62 (92%)	57 (100%)	0	100	100
34	e	47/49 (96%)	47 (100%)	0	100	100
35	f	64/140 (46%)	64 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
36	g	272/275 (99%)	272 (100%)	0	100	100
37	i	48/106 (45%)	48 (100%)	0	100	100
38	j	94/123 (76%)	94 (100%)	0	100	100
39	k	523/526 (99%)	522 (100%)	1 (0%)	92	98
40	l	24/24 (100%)	24 (100%)	0	100	100
41	n	66/102 (65%)	66 (100%)	0	100	100
42	o	131/388 (34%)	131 (100%)	0	100	100
All	All	5591/6419 (87%)	5583 (100%)	8 (0%)	92	98

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
8	E	225	TYR
10	G	124	CYS
10	G	145	ARG
17	N	120	VAL
19	P	3	ARG
24	U	83	PHE
30	a	34	THR
39	k	322	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (49) such sidechains are listed below:

Mol	Chain	Res	Type
4	A	23	ASN
6	C	24	HIS
6	C	29	ASN
6	C	111	GLN
6	C	113	GLN
7	D	101	HIS
7	D	124	HIS
7	D	149	GLN
9	F	57	ASN
9	F	74	GLN
9	F	174	HIS
10	G	67	GLN
11	H	46	ASN
11	H	129	ASN

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Mol	Chain	Res	Type
12	I	197	GLN
13	J	44	ASN
13	J	76	GLN
13	J	193	GLN
14	K	181	GLN
15	L	75	ASN
15	L	113	GLN
17	N	112	HIS
18	O	15	ASN
18	O	82	ASN
19	P	49	GLN
20	Q	94	HIS
21	R	53	GLN
22	S	80	GLN
23	T	62	GLN
24	U	101	ASN
24	U	120	HIS
28	Y	15	ASN
29	Z	73	GLN
29	Z	97	ASN
31	b	25	ASN
32	c	84	HIS
33	d	45	ASN
34	e	37	ASN
36	g	15	ASN
36	g	159	ASN
36	g	181	ASN
36	g	311	GLN
39	k	171	GLN
39	k	202	GLN
39	k	203	GLN
39	k	453	ASN
42	o	66	GLN
42	o	77	ASN
42	o	120	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	1	74/76 (97%)	16 (21%)	3 (4%)
2	2	1735/1863 (93%)	245 (14%)	67 (3%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	3	8/160 (5%)	1 (12%)	0
All	All	1817/2099 (86%)	262 (14%)	70 (3%)

All (262) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	1	8	G
1	1	9	U
1	1	10	G
1	1	12	C
1	1	15	A
1	1	16	G
1	1	17	C
1	1	18	G
1	1	19	G
1	1	20	A
1	1	21	A
1	1	45	G
1	1	48	C
1	1	73	A
1	1	75	C
1	1	76	A
2	2	4	C
2	2	26	U
2	2	33	G
2	2	37	C
2	2	41	G
2	2	46	A
2	2	56	G
2	2	67	C
2	2	68	A
2	2	72	C
2	2	73	C
2	2	74	G
2	2	75	G
2	2	76	U
2	2	77	A
2	2	78	C
2	2	79	A
2	2	80	G
2	2	99	A
2	2	113	G

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Mol	Chain	Res	Type
2	2	115	U
2	2	126	G
2	2	127	C
2	2	143	U
2	2	147	A
2	2	148	U
2	2	161	U
2	2	181	A
2	2	182	C
2	2	183	G
2	2	185	C
2	2	191	C
2	2	196	U
2	2	197	U
2	2	202	U
2	2	223	A
2	2	224	U
2	2	225	C
2	2	226	A
2	2	227	A
2	2	277	U
2	2	278	U
2	2	296	U
2	2	297	C
2	2	299	G
2	2	300	G
2	2	303	G
2	2	304	A
2	2	310	G
2	2	315	C
2	2	316	C
2	2	317	G
2	2	321	C
2	2	322	G
2	2	337	G
2	2	346	C
2	2	347	C
2	2	352	C
2	2	354	A
2	2	358	U
2	2	359	C
2	2	375	G

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Mol	Chain	Res	Type
2	2	376	C
2	2	399	C
2	2	438	A
2	2	439	A
2	2	440	C
2	2	442	G
2	2	455	A
2	2	462	C
2	2	464	G
2	2	477	U
2	2	482	C
2	2	506	A
2	2	507	C
2	2	515	A
2	2	516	A
2	2	538	C
2	2	542	G
2	2	543	U
2	2	546	U
2	2	554	A
2	2	579	G
2	2	583	C
2	2	584	A
2	2	596	G
2	2	597	U
2	2	598	C
2	2	604	G
2	2	610	G
2	2	611	C
2	2	633	A
2	2	658	A
2	2	659	A
2	2	661	A
2	2	662	A
2	2	663	G
2	2	679	U
2	2	680	G
2	2	729	C
2	2	730	C
2	2	731	C
2	2	732	C
2	2	736	C

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Mol	Chain	Res	Type
2	2	738	U
2	2	739	U
2	2	740	G
2	2	741	C
2	2	743	U
2	2	744	C
2	2	748	G
2	2	749	C
2	2	750	G
2	2	789	G
2	2	793	C
2	2	794	G
2	2	795	U
2	2	807	A
2	2	817	G
2	2	818	U
2	2	833	A
2	2	834	G
2	2	837	G
2	2	843	A
2	2	866	A
2	2	870	G
2	2	872	C
2	2	873	C
2	2	874	G
2	2	883	U
2	2	886	U
2	2	907	C
2	2	908	C
2	2	909	A
2	2	912	A
2	2	913	U
2	2	915	A
2	2	916	A
2	2	918	A
2	2	929	G
2	2	939	U
2	2	951	A
2	2	965	U
2	2	966	G
2	2	967	G
2	2	986	A

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Mol	Chain	Res	Type
2	2	987	G
2	2	988	A
2	2	1012	U
2	2	1013	U
2	2	1019	A
2	2	1057	U
2	2	1058	A
2	2	1081	C
2	2	1111	U
2	2	1112	C
2	2	1113	C
2	2	1145	A
2	2	1150	U
2	2	1191	A
2	2	1211	C
2	2	1212	C
2	2	1220	G
2	2	1238	U
2	2	1244	I2T
2	2	1247	A
2	2	1252	G
2	2	1253	G
2	2	1255	A
2	2	1256	A
2	2	1270	G
2	2	1271	G
2	2	1281	G
2	2	1296	U
2	2	1298	G
2	2	1310	U
2	2	1311	U
2	2	1360	U
2	2	1367	U
2	2	1368	U
2	2	1374	A
2	2	1392	A
2	2	1393	U
2	2	1399	C
2	2	1400	U
2	2	1408	C
2	2	1414	C
2	2	1415	C

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Mol	Chain	Res	Type
2	2	1417	A
2	2	1420	G
2	2	1428	U
2	2	1433	C
2	2	1434	A
2	2	1450	A
2	2	1459	U
2	2	1473	U
2	2	1474	U
2	2	1485	A
2	2	1486	G
2	2	1493	G
2	2	1494	A
2	2	1506	G
2	2	1507	U
2	2	1515	G
2	2	1516	C
2	2	1517	A
2	2	1528	A
2	2	1546	U
2	2	1547	G
2	2	1548	C
2	2	1549	C
2	2	1550	U
2	2	1551	A
2	2	1553	C
2	2	1574	A
2	2	1575	A
2	2	1583	A
2	2	1596	A
2	2	1598	G
2	2	1599	G
2	2	1616	U
2	2	1618	A
2	2	1632	A
2	2	1633	G
2	2	1634	G
2	2	1643	G
2	2	1649	G
2	2	1660	G
2	2	1675	G
2	2	1717	G

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Mol	Chain	Res	Type
2	2	1777	C
2	2	1778	G
2	2	1779	C
2	2	1820	G
2	2	1829	A
2	2	1831	G
2	2	1832	U
2	2	1843	G
2	2	1846	C
2	2	1855	G
2	2	1856	G
2	2	1857	A
2	2	1858	U
2	2	1859	C
2	2	1863	A
3	3	144	G

All (70) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	1	8	G
1	1	20	A
1	1	72	U
2	2	67	C
2	2	71	G
2	2	73	C
2	2	75	G
2	2	76	U
2	2	77	A
2	2	147	A
2	2	181	A
2	2	189	G
2	2	223	A
2	2	225	C
2	2	272	C
2	2	297	C
2	2	303	G
2	2	320	G
2	2	321	C
2	2	322	G
2	2	346	C
2	2	358	U

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Mol	Chain	Res	Type
2	2	359	C
2	2	438	A
2	2	506	A
2	2	583	C
2	2	596	G
2	2	610	G
2	2	660	A
2	2	679	U
2	2	732	C
2	2	739	U
2	2	743	U
2	2	793	C
2	2	817	G
2	2	818	U
2	2	865	A
2	2	872	C
2	2	908	C
2	2	912	A
2	2	915	A
2	2	965	U
2	2	1012	U
2	2	1057	U
2	2	1112	C
2	2	1211	C
2	2	1249	A
2	2	1255	A
2	2	1270	G
2	2	1310	U
2	2	1392	A
2	2	1415	C
2	2	1419	C
2	2	1427	G
2	2	1433	C
2	2	1473	U
2	2	1489	C
2	2	1493	G
2	2	1504	A
2	2	1547	G
2	2	1548	C
2	2	1549	C
2	2	1598	G
2	2	1617	U

Continued on next page...

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Mol	Chain	Res	Type
2	2	1633	G
2	2	1674	A
2	2	1778	G
2	2	1831	G
2	2	1855	G
2	2	1857	A

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

2 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	$\# Z > 2$
1	T6A	1	37	1	27,34,35	1.29	3 (11%)	29,49,52	1.69	6 (20%)
2	I2T	2	1244	2	24,29,30	2.77	3 (12%)	29,42,45	1.28	3 (10%)

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
1	T6A	1	37	1	-	5/19/41/42	0/3/3/3
2	I2T	2	1244	2	-	3/16/34/35	0/2/2/2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	2	1244	I2T	CN1-N1	-9.48	1.27	1.46
2	2	1244	I2T	O2'-C2'	-7.90	1.24	1.43
1	1	37	T6A	ODA-C13	4.78	1.36	1.22
2	2	1244	I2T	C33-N34	-4.04	1.27	1.48
1	1	37	T6A	ODB-C13	-2.23	1.23	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	1	37	T6A	C8-N7	-2.17	1.30	1.34

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	37	T6A	N6-C10-N11	4.56	120.14	113.76
2	2	1244	I2T	O3'-C3'-C4'	-3.60	100.64	111.05
1	1	37	T6A	O10-C10-N6	-3.48	117.74	123.62
1	1	37	T6A	C2-N1-C6	3.19	119.33	116.59
2	2	1244	I2T	C3'-C2'-C1'	2.74	104.83	101.64
2	2	1244	I2T	O3'-C3'-C2'	2.62	120.29	111.82
1	1	37	T6A	C14-C12-C13	2.54	114.52	110.19
1	1	37	T6A	C15-C14-C12	2.53	117.39	112.29
1	1	37	T6A	ODB-C13-C12	2.44	122.82	114.21

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	2	1244	I2T	C32-C31-N3-C2
2	2	1244	I2T	C32-C31-N3-C4
1	1	37	T6A	N11-C12-C14-C15
1	1	37	T6A	N11-C12-C13-ODA
1	1	37	T6A	N11-C12-C13-ODB
1	1	37	T6A	N11-C12-C14-O14
1	1	37	T6A	C13-C12-C14-C15
2	2	1244	I2T	C4'-C5'-O5'-P

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	2	1244	I2T	4	0

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

2 ligands 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	$\# Z > 2$
43	SF4	k	701	39	0,12,12	-	-	-		
43	SF4	k	702	39	0,12,12	-	-	-		

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
43	SF4	k	701	39	-	-	0/6/5/5
43	SF4	k	702	39	-	-	0/6/5/5

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

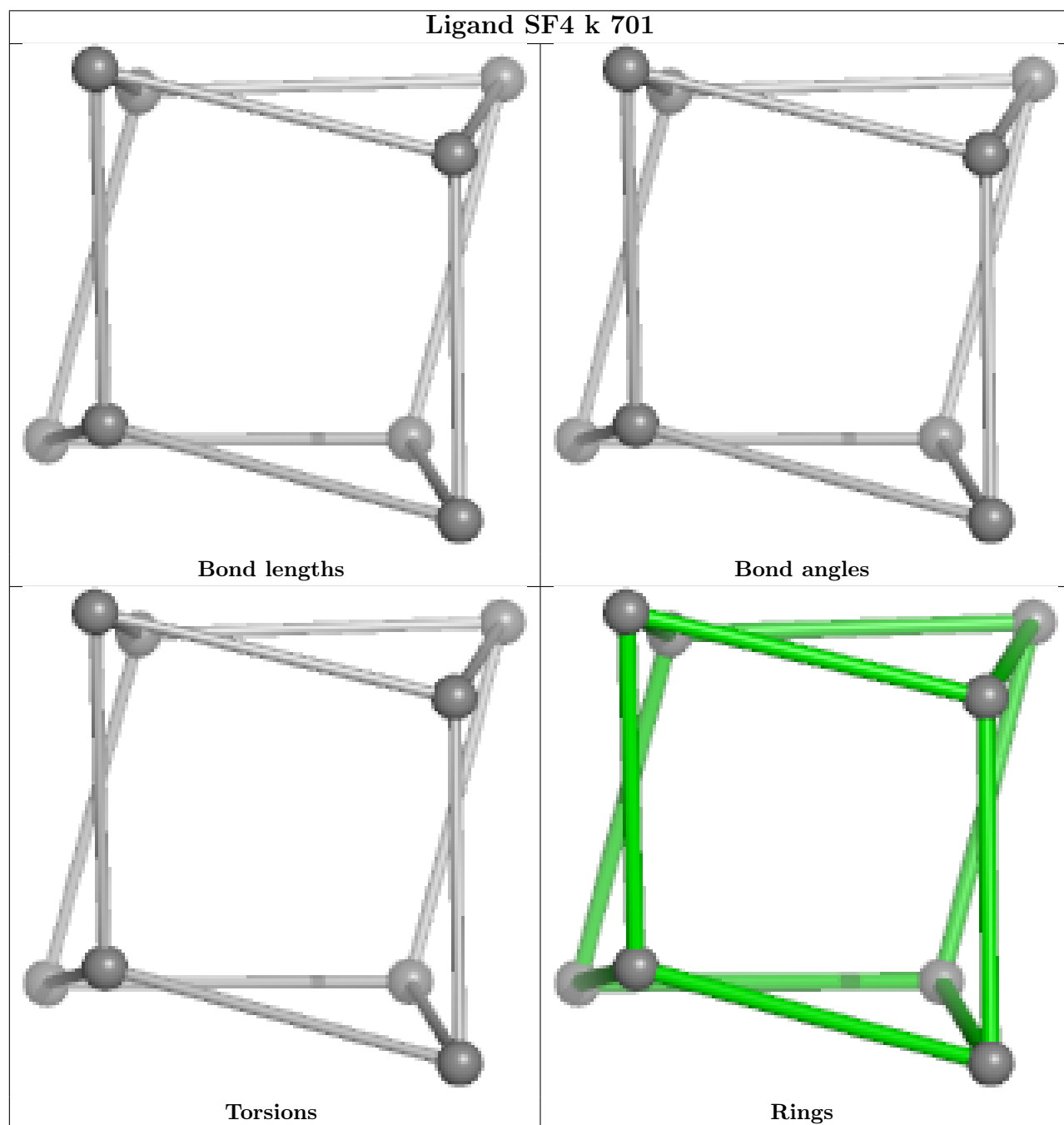
There are no torsion outliers.

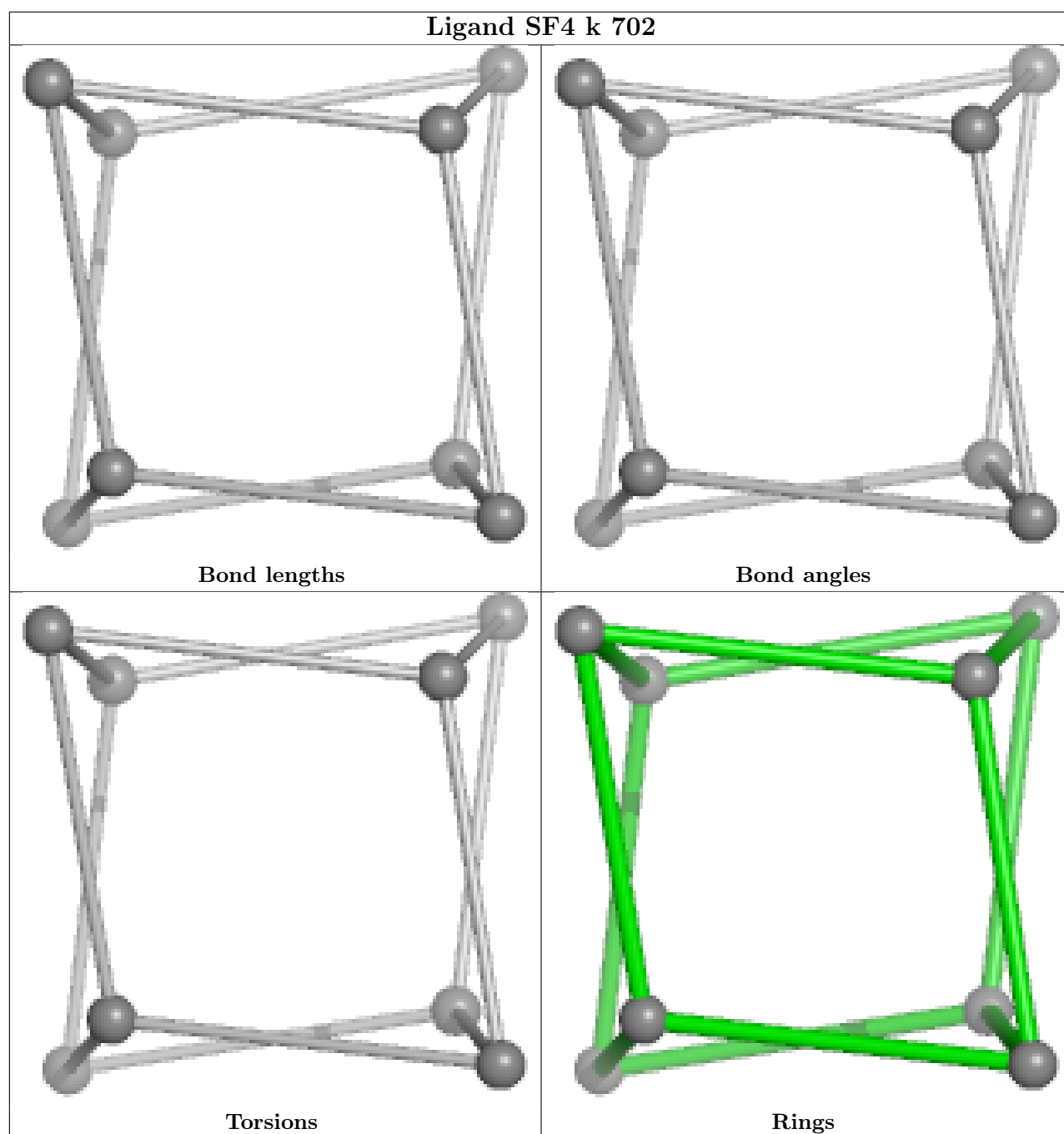
There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

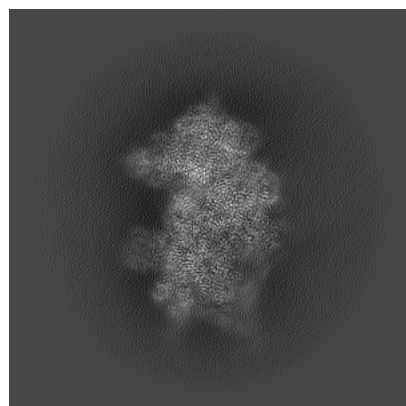
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-51903. These allow visual inspection of the internal detail of the map and identification of artifacts.

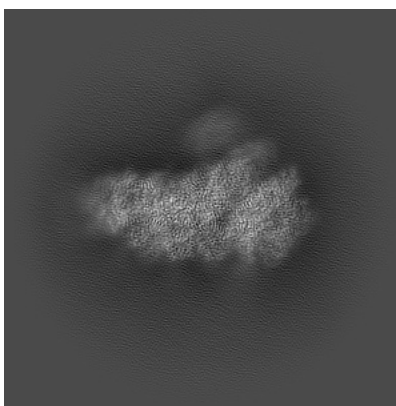
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

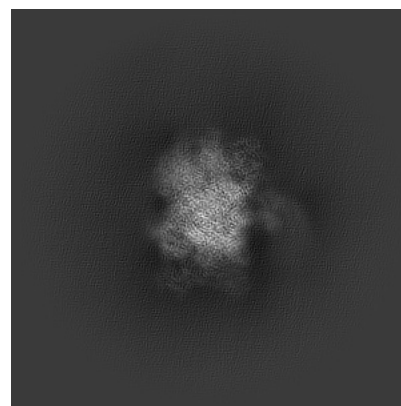
6.1.1 Primary map



X

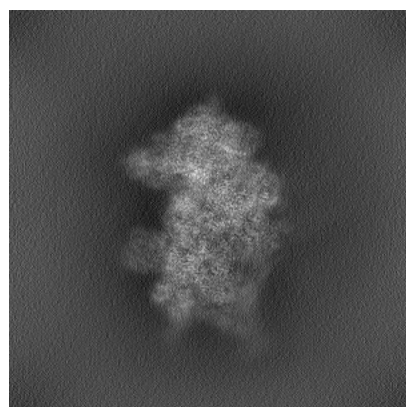


Y

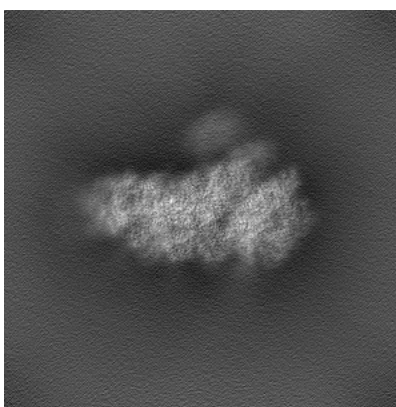


Z

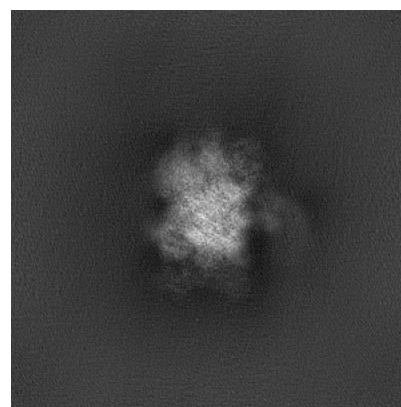
6.1.2 Raw map



X



Y

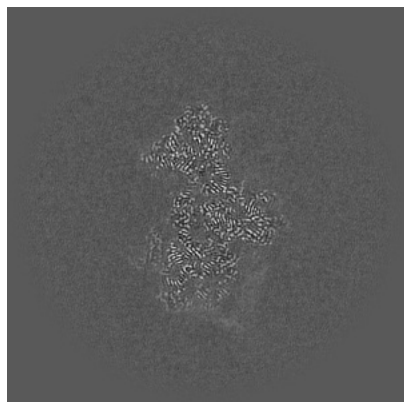


Z

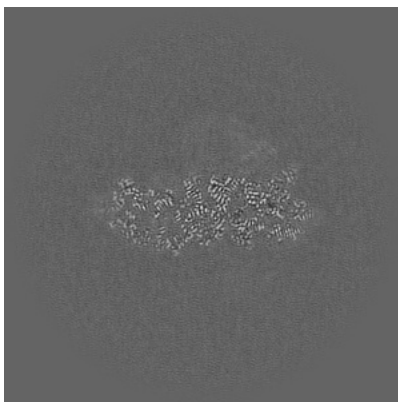
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

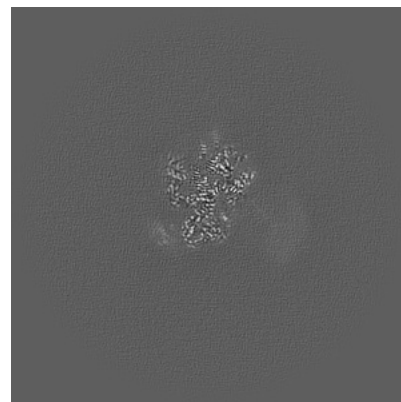
6.2.1 Primary map



X Index: 250

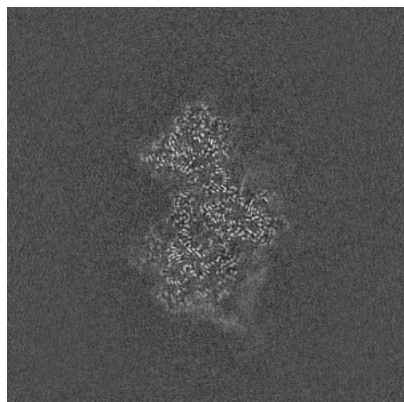


Y Index: 250

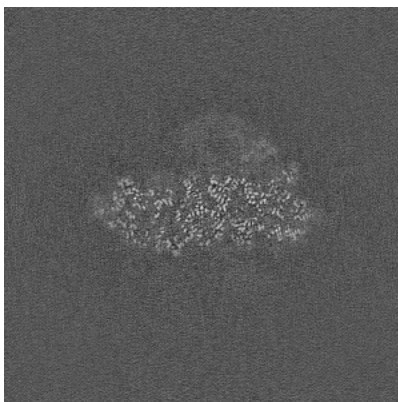


Z Index: 250

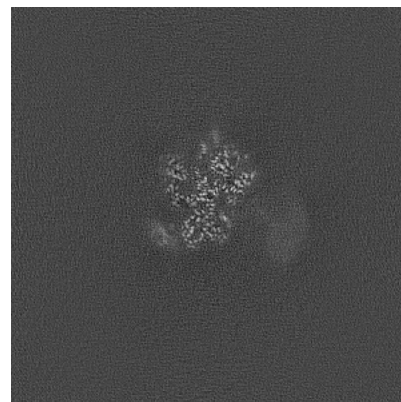
6.2.2 Raw map



X Index: 250



Y Index: 250

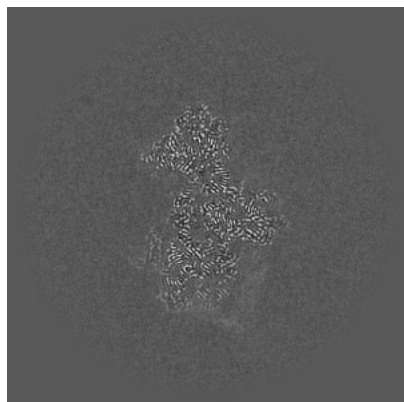


Z Index: 250

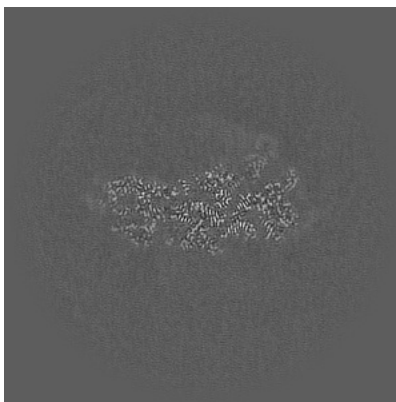
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

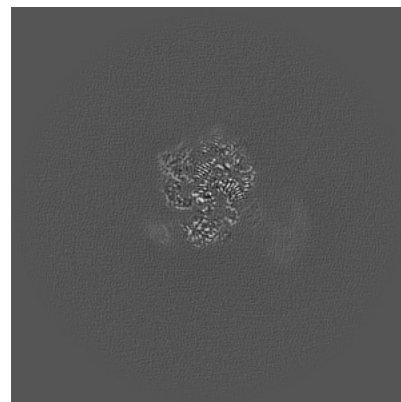
6.3.1 Primary map



X Index: 250

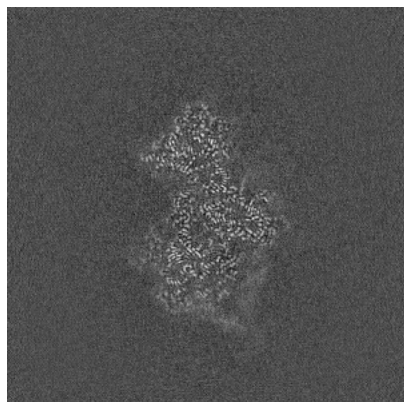


Y Index: 262

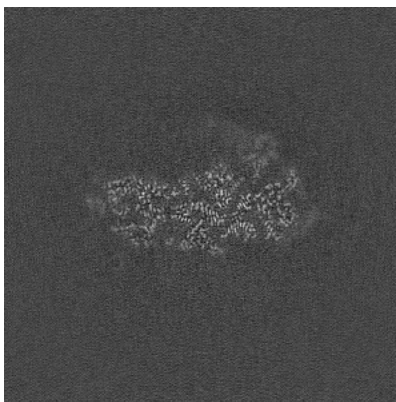


Z Index: 255

6.3.2 Raw map



X Index: 250



Y Index: 262

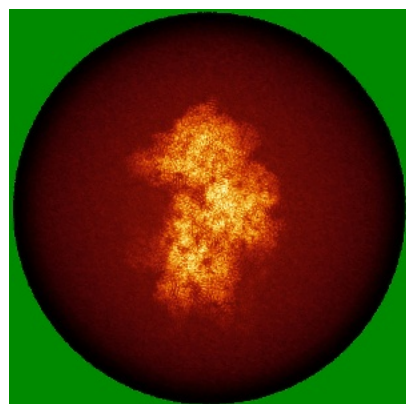


Z Index: 255

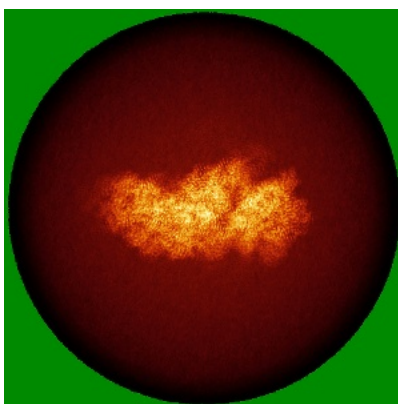
The images above show the largest variance slices of the map in three orthogonal directions.

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

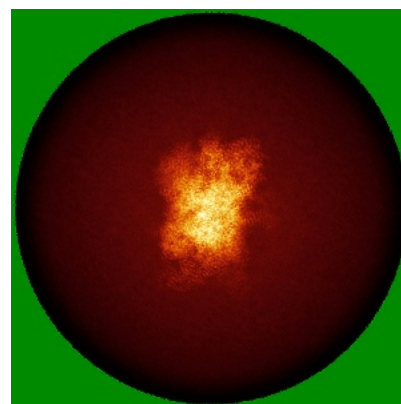
6.4.1 Primary map



X

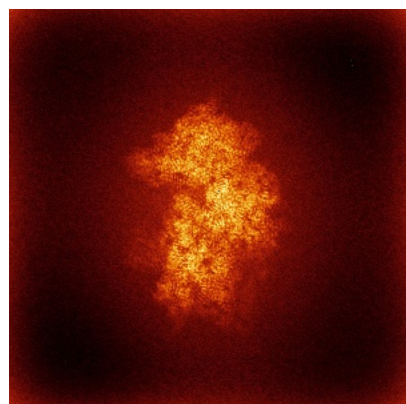


Y

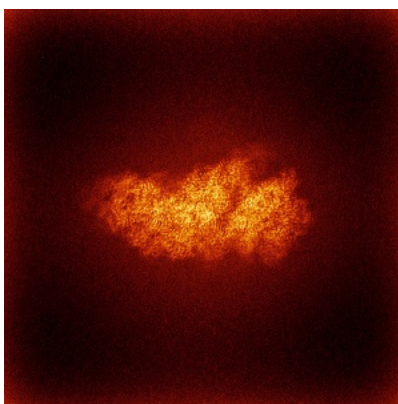


Z

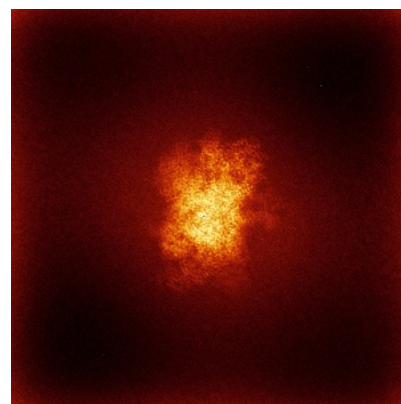
6.4.2 Raw map



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



X



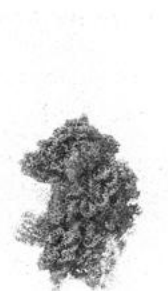
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.246. 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.

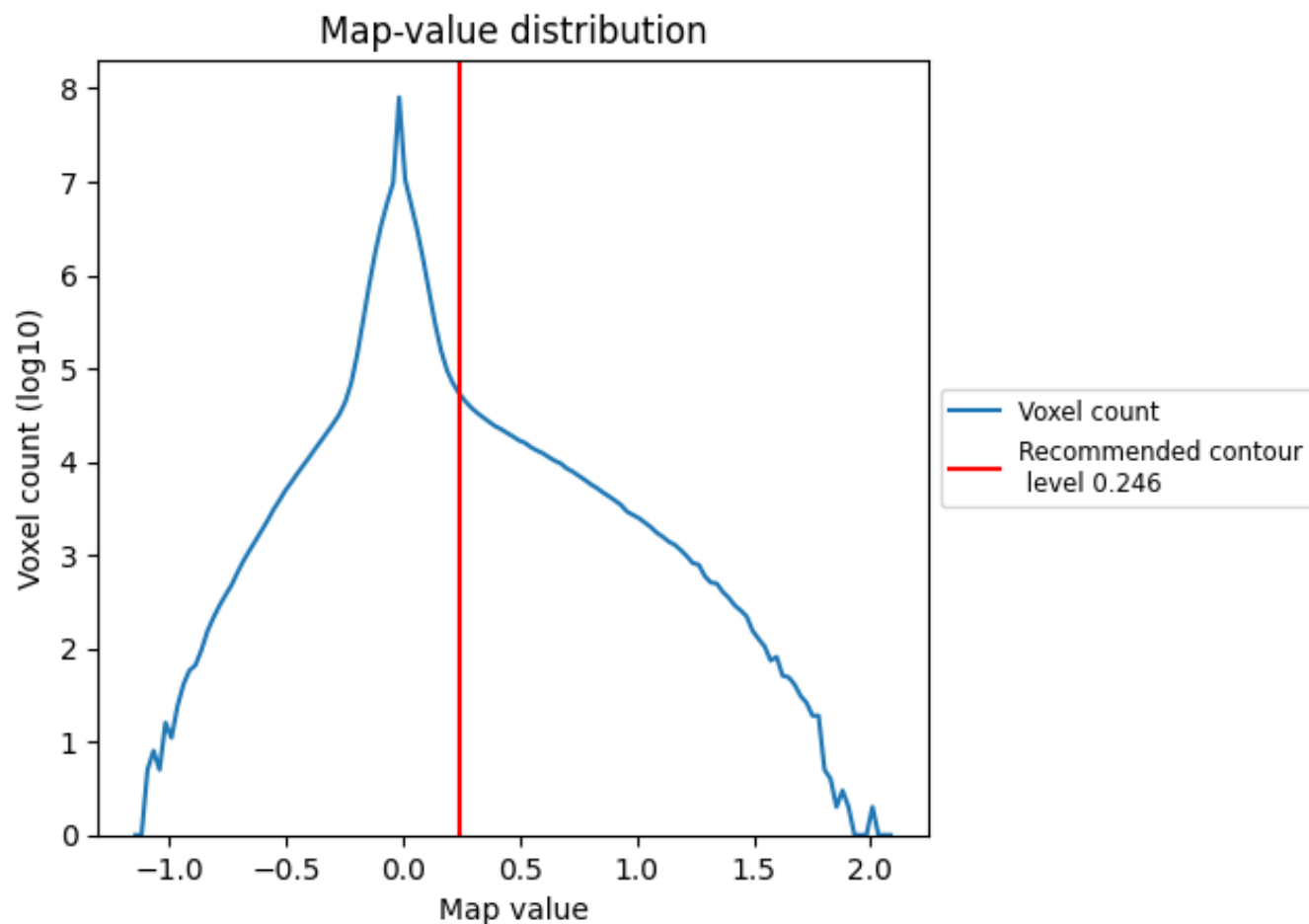
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

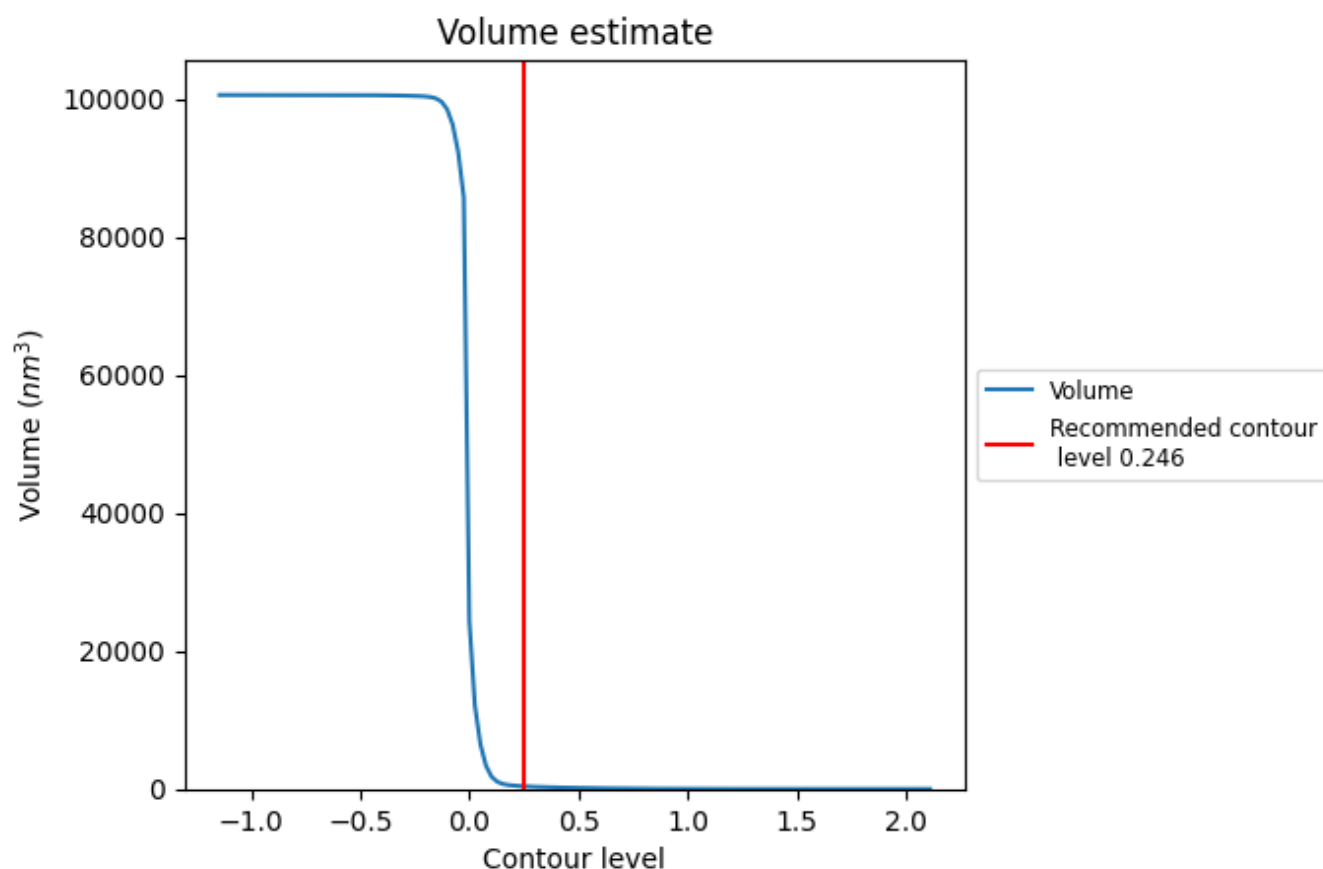
This section contains the results of statistical analysis of the map.

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.

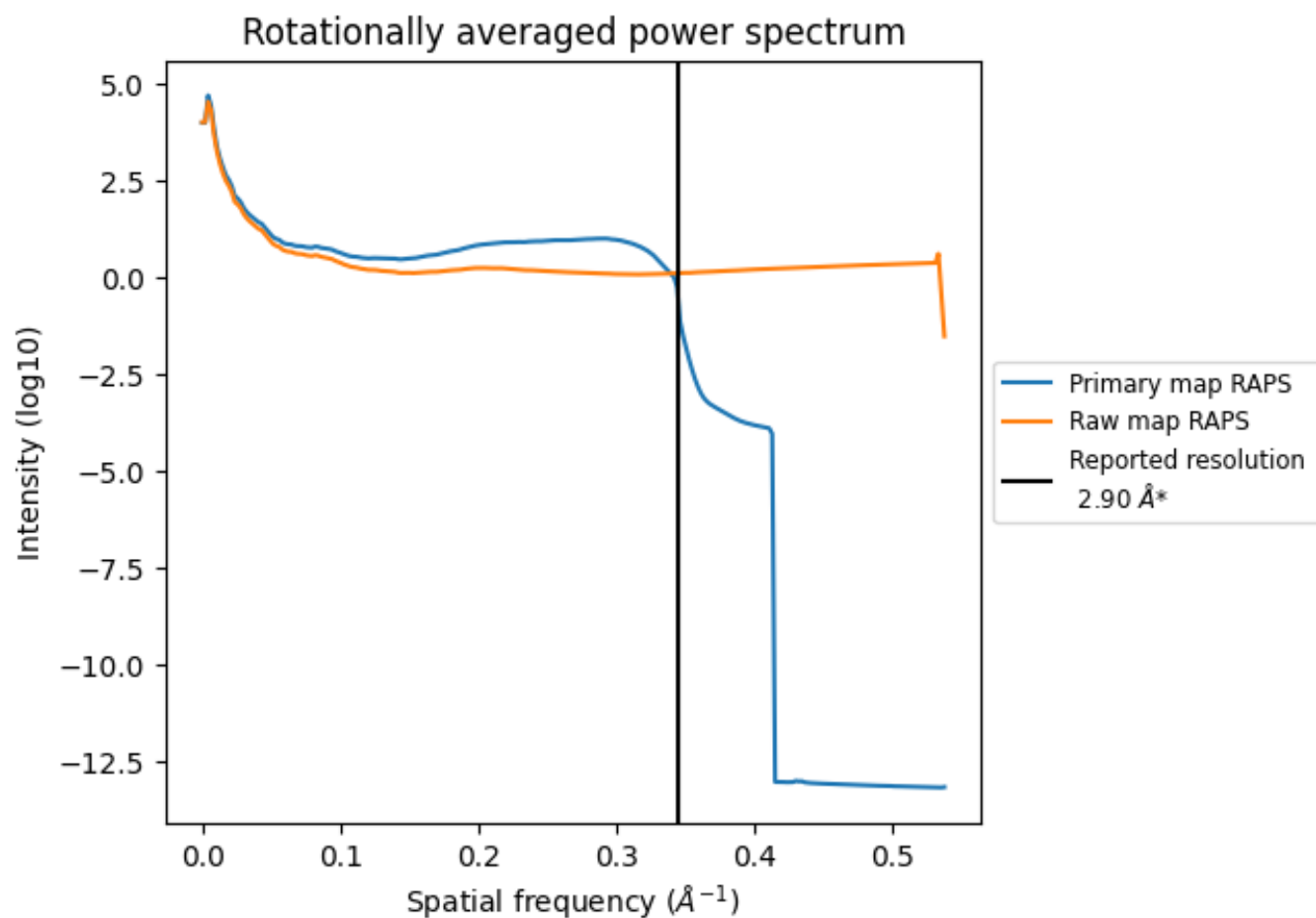
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 391 nm^3 ; this corresponds to an approximate mass of 353 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 ⓘ

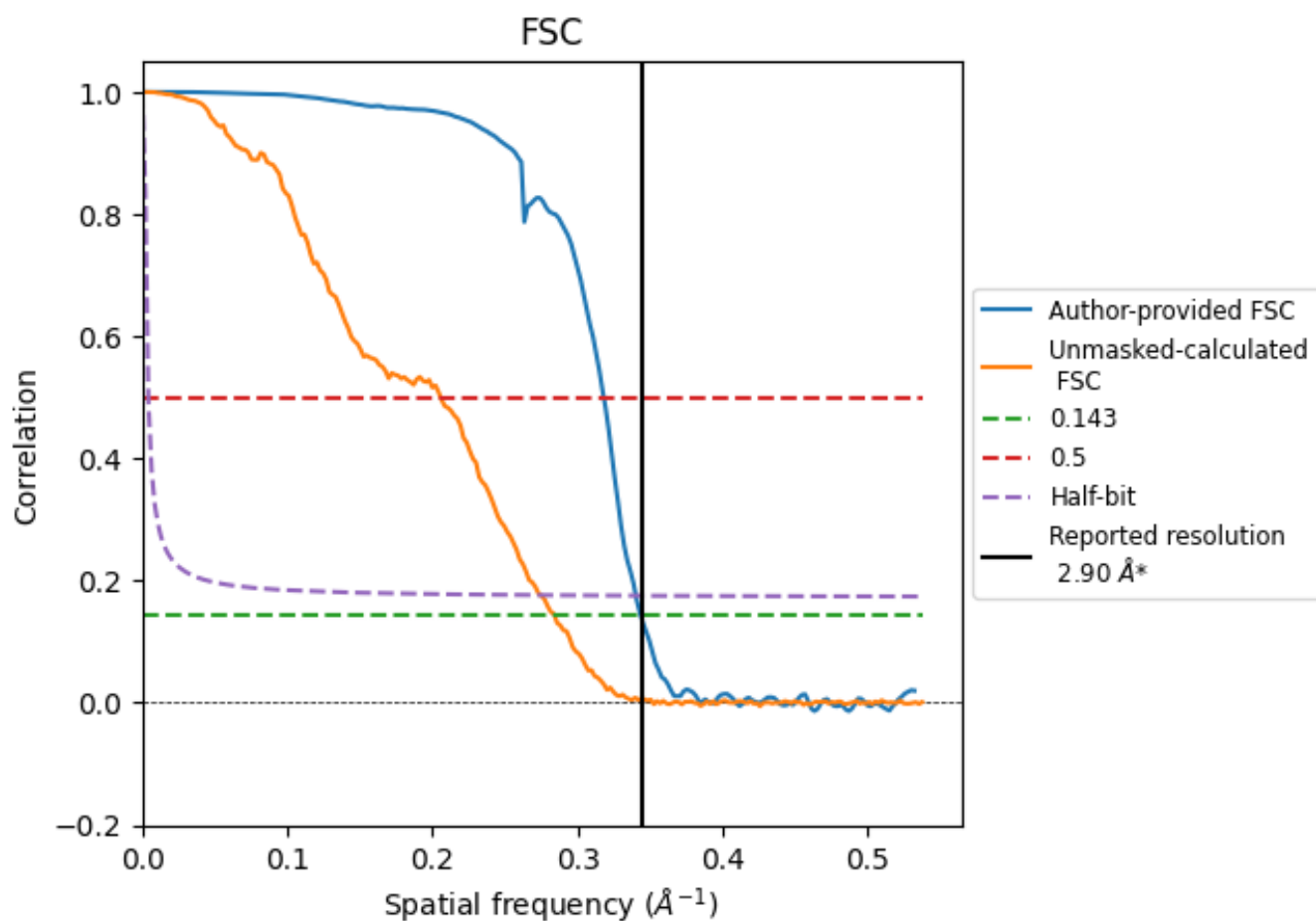


*Reported resolution corresponds to spatial frequency of 0.345 Å⁻¹

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 0.345 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

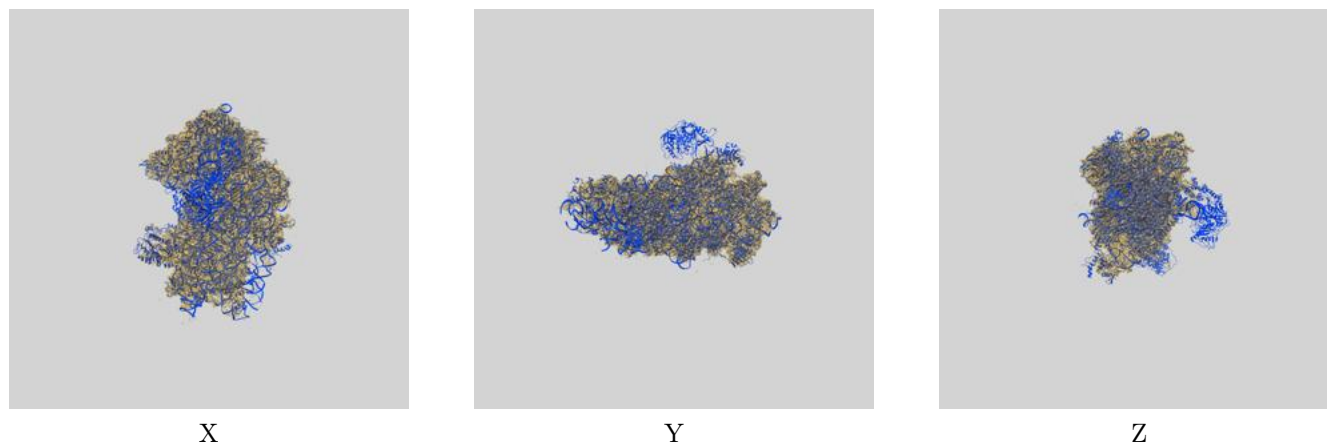
Resolution estimate (Å)	Estimation criterion (FSC cut-off)			
	0.143	0.5	Half-bit	Other
Reported by author	-	-	-	2.90
Author-provided FSC curve	2.91	3.14	2.94	-
Unmasked-calculated*	3.52	4.86	3.64	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

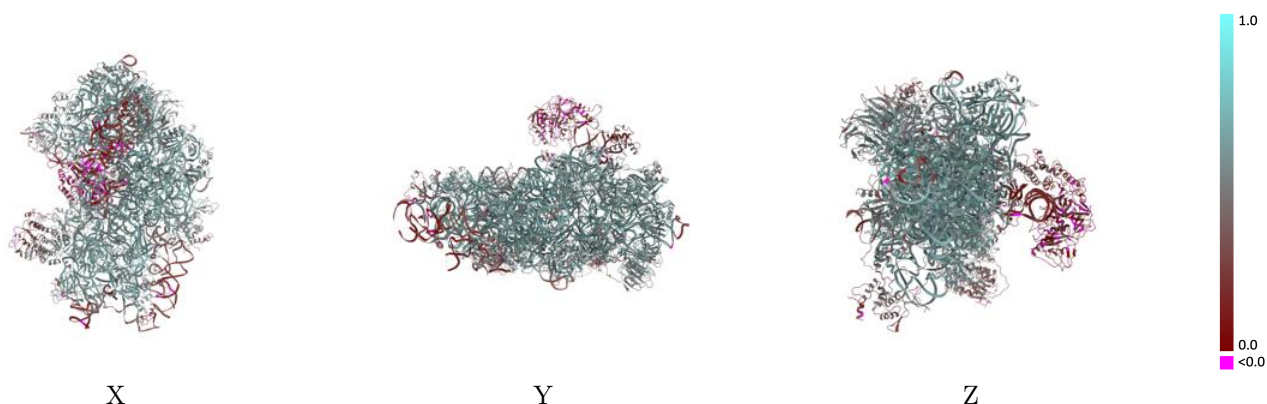
This section contains information regarding the fit between EMDB map EMD-51903 and PDB model 9H6Y. Per-residue inclusion information can be found in [section 3](#) on [page 13](#).

9.1 Map-model overlay [i](#)



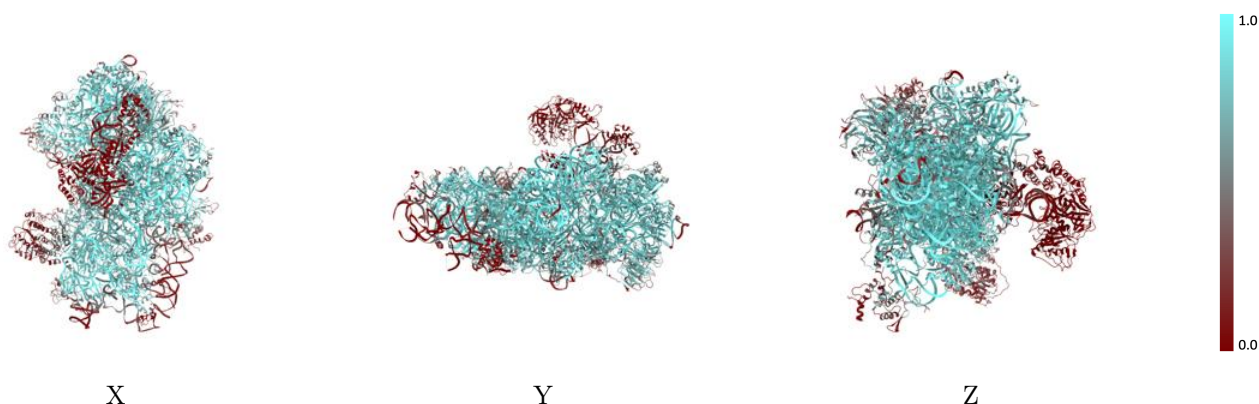
The images above show the 3D surface view of the map at the recommended contour level 0.246 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



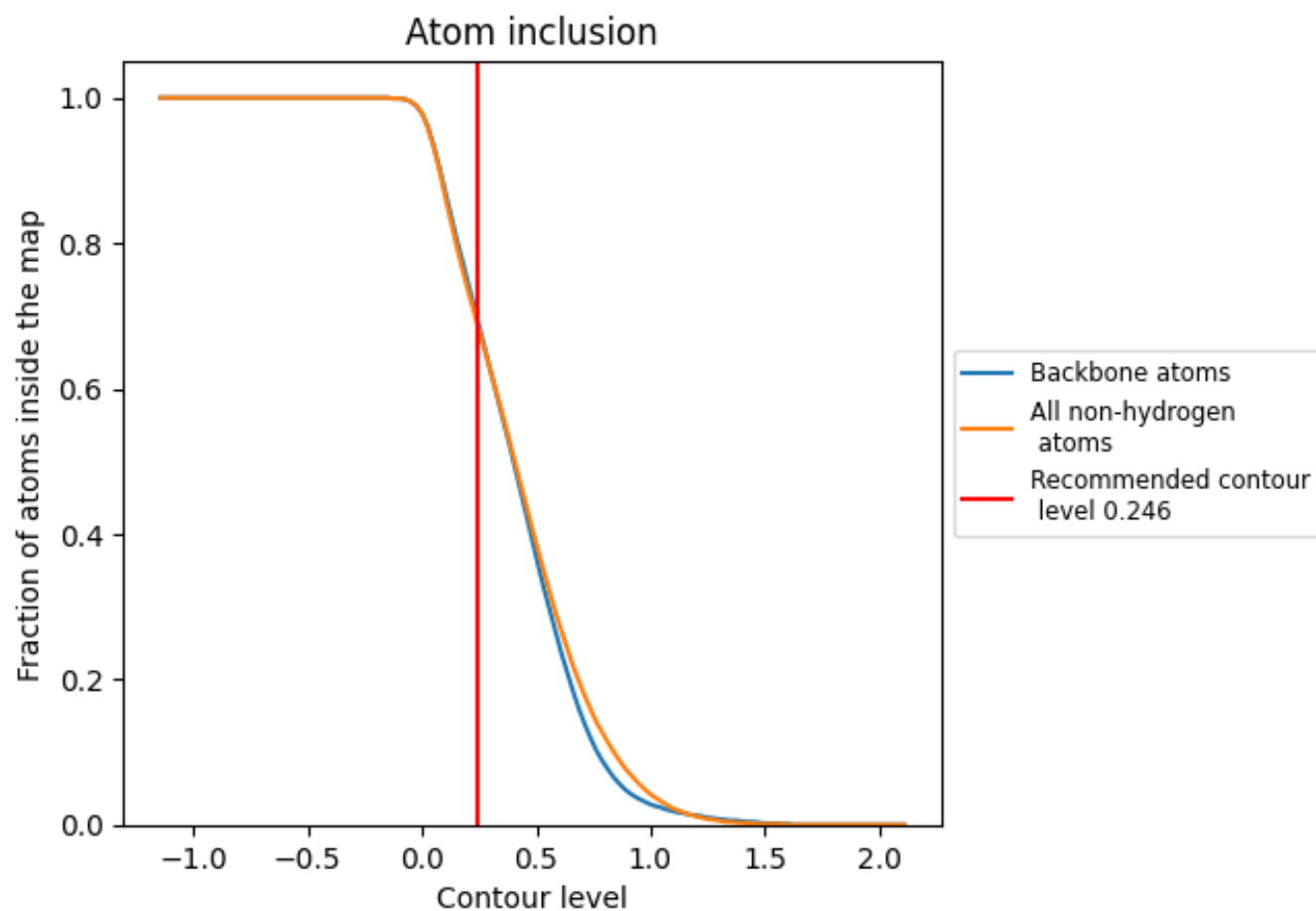
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.246).

9.4 Atom inclusion [i](#)



At the recommended contour level, 69% of all backbone atoms, 68% 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 (0.246) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6840	 0.5130
1	 0.3860	 0.3150
2	 0.8240	 0.5610
3	 0.9130	 0.6050
A	 0.2200	 0.3260
B	 0.0000	 0.1520
C	 0.7640	 0.5500
D	 0.7820	 0.5600
E	 0.7870	 0.5700
F	 0.7110	 0.5420
G	 0.8100	 0.5810
H	 0.8030	 0.5710
I	 0.6080	 0.5020
J	 0.2630	 0.3940
K	 0.7100	 0.5240
L	 0.7940	 0.5630
M	 0.7430	 0.5180
N	 0.7300	 0.5390
O	 0.2510	 0.3250
P	 0.7870	 0.5740
Q	 0.8120	 0.5680
R	 0.6750	 0.5130
S	 0.8620	 0.5950
T	 0.5480	 0.4730
U	 0.7500	 0.5390
V	 0.8080	 0.5670
W	 0.6300	 0.5220
X	 0.7130	 0.5390
Y	 0.8760	 0.6020
Z	 0.8550	 0.5880
a	 0.7710	 0.5550
b	 0.8300	 0.5860
c	 0.6290	 0.5070
d	 0.7040	 0.5480
e	 0.8690	 0.5820



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Chain	Atom inclusion	Q-score
f	 0.3480	 0.3680
g	 0.6500	 0.5100
i	 0.6260	 0.4890
j	 0.6530	 0.5070
k	 0.3060	 0.4080
l	 0.6440	 0.5220
n	 0.6650	 0.5170
o	 0.0360	 0.3020