W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB EM Validation Summary Report (i)

Mar 2, 2024 – 12:10 PM EST

PDB ID	:	5TZS
EMDB ID	:	EMD-8473
Title	:	Architecture of the yeast small subunit processsome
Authors	:	Chaker-Margot, M.; Barandun, J.; Hunziker, M.; Klinge, S.
Deposited on	:	2016-11-22
Resolution	:	5.10 Å(reported)

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 5.10 Å.

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

Metric	Percentile Ranks	Value
Ramachandran outliers		2.3%
RNA backbone		0.46

Worse *Better*

■ Percentile relative to all structures
▯ Percentile relative to all EM structures
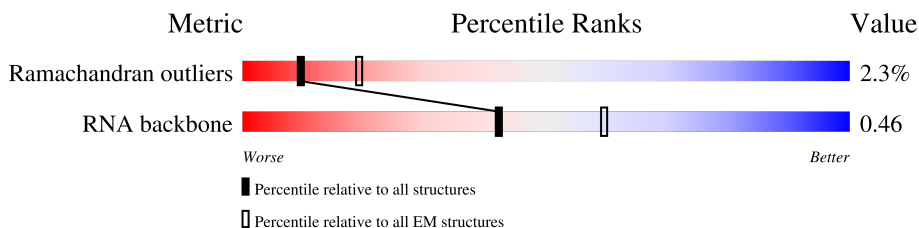
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
RNA backbone	4643	859

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	0	364	21% / 99% ·
2	1	1800	12% / 14% 12% · 71%
3	2	126	12% / 48% 49% ·
4	3	236	79% / 86% 6% 8%
5	5	261	48% / 86% 7% 8%
6	6	225	9% / 81% 8% 10%
7	7	190	95% / 88% 9% ·
8	8	200	63% / 84% · 14%
9	9	197	21% / 86% 8% · 6%

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Mol	Chain	Length	Quality of chain
10	A	39	100%
11	B	108	45% / 100%
12	C	143	80% / 20%
13	D	156	72% / 94% / 6%
14	E	130	81% / 97%
15	F	135	21% / 64% / 33%
16	G	67	9% / 91% / 7%
17	H	544	44% / 99%
18	I	176	22% / 94% / 6%
19	J	107	7% / 98%
19	K	107	16% / 95%
20	M	258	8% / 99%
21	N	545	20% / 99%
22	O	638	8% / 98%
23	P	306	7% / 100%
24	Q	710	19% / 99%
25	R	717	78% / 100%
26	S	250	14% / 98%
27	T	781	5% / 96%
28	U	284	13% / 100%
29	V	263	72% / 100%
30	W	104	9% / 90% / 10%
31	X	640	72% / 100%
32	Y	641	93% / 100%
33	Z	151	5% / 99%

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Mol	Chain	Length	Quality of chain
34	a	312	15% / 98%
35	b	341	22% / 100%
36	c	221	7% / 99%
37	d	216	24% / 99%
38	e	126	7% / 97%
38	f	126	8% / 90% / 10%
39	g	573	11% / 63% / 36%
40	h	367	10% / 97%
41	i	511	10% / 92% / 7%
42	j	252	21% / 84% / 16%
42	k	252	15% / 86% / 13%
43	l	124	6% / 100%
44	m	156	14% / 99%
45	n	160	14% / 100%
46	o	175	71% / 99%
47	p	924	87% / 96%
48	q	372	9% / 100%
49	r	145	6% / 56% / 43%
50	s	290	21% / 97%
50	t	290	89% / 7%
50	u	290	9% / 94% / 6%
51	v	580	15% / 97%
52	y	507	15% / 93% / 7%
53	z	76	32% / 100%

2 Entry composition (i)

There are 53 unique types of molecules in this entry. The entry contains 98451 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 5' external transcribed spacer.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	364	Total 4476	C 1871	N 43	O 2198	P 364	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	515	Total 10978	C 4908	N 1957	O 3598	P 515	0	0

- Molecule 3 is a RNA chain called U3 snoRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	2	126	Total 2468	C 1095	N 388	O 859	P 126	0	0

- Molecule 4 is a protein called 40S ribosomal protein S6-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	3	216	Total 1063	C 631	N 216	O 216	0	0

- Molecule 5 is a protein called 40S ribosomal protein S4-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	5	241	Total 1185	C 703	N 241	O 241	0	0

- Molecule 6 is a protein called 40S ribosomal protein S5.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	6	202	Total 1000	C 596	N 202	O 202	0	0

- Molecule 7 is a protein called 40S ribosomal protein S7-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	7	186	Total 923	C 551	N 186	O 186	0	0

- Molecule 8 is a protein called 40S ribosomal protein S8-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	8	173	Total 849	C 503	N 173	O 173	0	0

- Molecule 9 is a protein called 40S ribosomal protein S9-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	9	185	Total 915	C 545	N 185	O 185	0	0

- Molecule 10 is a DNA chain called 5' domain-associated.

Mol	Chain	Residues	Atoms				AltConf	Trace
10	A	39	Total 468	C 195	O 234	P 39	0	0

- Molecule 11 is a DNA chain called 3' domain-associated.

Mol	Chain	Residues	Atoms				AltConf	Trace
11	B	108	Total 1296	C 540	O 648	P 108	0	0

- Molecule 12 is a protein called 40S ribosomal protein S16-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
12	C	115	Total 566	C 336	N 115	O 115	0	0

- Molecule 13 is a protein called 40S ribosomal protein S11-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
13	D	146	Total 721	C 429	N 146	O 146	0	0

- Molecule 14 is a protein called 40S ribosomal protein S22-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	E	127	Total 624	C 370	N 127	O 127	0	0

- Molecule 15 is a protein called 40S ribosomal protein S24-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
15	F	90	Total 444	C 264	N 90	O 90	0	0

- Molecule 16 is a protein called 40S ribosomal protein S28-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	G	62	Total 306	C 182	N 62	O 62	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	17	ALA	GLY	conflict	UNP Q3E7X9

- Molecule 17 is a protein called Utp4.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	H	544	Total 2680	C 1592	N 544	O 544	0	0

- Molecule 18 is a protein called UtpA_CTD1.

Mol	Chain	Residues	Atoms				AltConf	Trace
18	I	176	Total 880	C 528	N 176	O 176	0	0

- Molecule 19 is a protein called UtpA_CTD2.

Mol	Chain	Residues	Atoms				AltConf	Trace
19	J	107	Total 535	C 321	N 107	O 107	0	0
19	K	105	Total 525	C 315	N 105	O 105	0	0

- Molecule 20 is a protein called Beta-propeller 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
20	M	258	1275	759	258	258	0	0

- Molecule 21 is a protein called Utp17.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
21	N	545	2678	1588	545	545	0	0

- Molecule 22 is a protein called Utp1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
22	O	638	3153	1877	638	638	0	0

- Molecule 23 is a protein called Utp6.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
23	P	306	1530	918	306	306	0	0

- Molecule 24 is a protein called Utp12.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
24	Q	710	3503	2083	710	710	0	0

- Molecule 25 is a protein called Utp13.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
25	R	717	3539	2105	717	717	0	0

- Molecule 26 is a protein called Utp18.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
26	S	250	1228	728	250	250	0	0

- Molecule 27 is a protein called U3 small nucleolar RNA-associated protein 21,Utp21.

Mol	Chain	Residues	Atoms				AltConf	Trace
27	T	749	Total 3691	C 2193	N 749	O 749	0	0

- Molecule 28 is a protein called Beta-propeller 5.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	U	284	Total 1398	C 830	N 284	O 284	0	0

- Molecule 29 is a protein called Enp2.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	V	263	Total 1298	C 772	N 263	O 263	0	0

- Molecule 30 is a protein called UtpA_CTD4.

Mol	Chain	Residues	Atoms				AltConf	Trace
30	W	104	Total 520	C 312	N 104	O 104	0	0

- Molecule 31 is a protein called Kre33.

Mol	Chain	Residues	Atoms				AltConf	Trace
31	X	640	Total 3155	C 1875	N 640	O 640	0	0

- Molecule 32 is a protein called Kre33.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	Y	641	Total 3160	C 1878	N 641	O 641	0	0

- Molecule 33 is a protein called Imp3.

Mol	Chain	Residues	Atoms				AltConf	Trace
33	Z	151	Total 748	C 446	N 151	O 151	0	0

- Molecule 34 is a protein called Nop56.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	a	312	Total 1544	C 920	N 312	O 312	0	0

- Molecule 35 is a protein called Nop58.

Mol	Chain	Residues	Atoms				AltConf	Trace
35	b	341	Total 1687	C 1005	N 341	O 341	0	0

- Molecule 36 is a protein called Nop1.

Mol	Chain	Residues	Atoms				AltConf	Trace
36	c	221	Total 1088	C 646	N 221	O 221	0	0

- Molecule 37 is a protein called Nop1.

Mol	Chain	Residues	Atoms				AltConf	Trace
37	d	216	Total 1064	C 632	N 216	O 216	0	0

- Molecule 38 is a protein called 13 kDa ribonucleoprotein-associated protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
38	e	122	Total 606	C 362	N 122	O 122	0	0
38	f	114	Total 566	C 338	N 114	O 114	0	0

- Molecule 39 is a protein called Ribosomal RNA-processing protein 9.

Mol	Chain	Residues	Atoms				AltConf	Trace
39	g	365	Total 1799	C 1069	N 365	O 365	0	0

- Molecule 40 is a protein called RNA 3'-terminal phosphate cyclase-like protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
40	h	355	Total 1742	C 1032	N 355	O 355	0	0

- Molecule 41 is a protein called Bms1,Ribosome biogenesis protein BMS1,Bms1,Ribosome

biogenesis protein BMS1.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	i	475	Total 2347	C 1398	N 475	O 474	0	0

- Molecule 42 is a protein called Ribosomal RNA small subunit methyltransferase NEP1.

Mol	Chain	Residues	Atoms				AltConf	Trace
42	j	211	Total 1047	C 625	N 211	O 211	0	0
42	k	218	Total 1081	C 645	N 218	O 218	0	0

- Molecule 43 is a protein called Utp24.

Mol	Chain	Residues	Atoms				AltConf	Trace
43	l	124	Total 613	C 365	N 124	O 124	0	0

- Molecule 44 is a protein called Imp4.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	m	156	Total 775	C 463	N 156	O 156	0	0

- Molecule 45 is a protein called Utp30.

Mol	Chain	Residues	Atoms				AltConf	Trace
45	n	160	Total 791	C 471	N 160	O 160	0	0

- Molecule 46 is a protein called Unassigned KH domain.

Mol	Chain	Residues	Atoms				AltConf	Trace
46	o	173	Total 858	C 512	N 173	O 173	0	0

- Molecule 47 is a protein called Utp20.

Mol	Chain	Residues	Atoms				AltConf	Trace
47	p	924	Total 4620	C 2772	N 924	O 924	0	0

- Molecule 48 is a protein called Repeat protein 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	q	372	Total 1860	C 1116	N 372	O 372	0	0

- Molecule 49 is a protein called 40S ribosomal protein S23-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
49	r	82	Total 402	C 238	N 82	O 82	0	0

- Molecule 50 is a protein called Beta-propeller 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
50	s	290	Total 1429	C 849	N 290	O 290	0	0
50	t	269	Total 1076	C 538	N 269	O 269	0	0
50	u	274	Total 1346	C 798	N 274	O 274	0	0

- Molecule 51 is a protein called Repeat protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
51	v	577	Total 2885	C 1731	N 577	O 577	0	0

- Molecule 52 is a protein called Unassigned protein helices.

Mol	Chain	Residues	Atoms				AltConf	Trace
52	y	507	Total 2535	C 1521	N 507	O 507	0	0

- Molecule 53 is a DNA chain called Unassigned RNA helices.

Mol	Chain	Residues	Atoms				AltConf	Trace
53	z	76	Total 912	C 380	O 456	P 76	0	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: 5' external transcribed spacer

Chain 0:

21%

99%

• Molecule 2: 18S ribosomal RNA

Chain 1:

12%

14%   12%   71%

• Molecule 3: U3 snoRNA

Chain 2:

• Molecule 4: 40S ribosomal protein S6-A

Chain 3:

• Molecule 5: 40S ribosomal protein S4-A

Chain 5:

I154 K155 V156 N157 D158 T159 V160 K161 I162 D163 L164 A165 K168 I169 T170 D171 F175 D176 A177 G178 K179 L180 V181 Y182 V183 T184 G185 G186 R187 N188 L189 G190 R191 T194 I195 V196 H197 K198 E199 ARG HIS ASP GLY GLY PHE D206 L207 V208 D212 S213 T217 F218 V219 T220 R221

L222 N223 F226 G229 G232 K233 P234 P239 K242 G243 I244 LYS LEU S247 I248 A249 E250 R254 A257 Q258 Q259 GLY LEU

• Molecule 6: 40S ribosomal protein S5

Chain 6:

9%

81% 8% 10%

MET SER ASP THR GLU ALA PRO VAL GLU VAL GLN GLU ASP PHE GLU VAL VAL GLU GLU PHE THR PRO VAL V24 P28 I29 Q35 A36 Q37 T38 E39 F43 N44 K54 D55 L58 V70 A71 M99 N100 G101 G105 T125 P129 D145 T146 V149 G150

G151 G152 G153 A154 A155 A159 N169 R180 F184 R185 A191 T207 A210 R225

• Molecule 7: 40S ribosomal protein S7-A

Chain 7:

95%

88% 9%

MET S2 A3 P4 Q5 A6 K7 I8 L9 S10 Q11 A12 P13 T14 E15 L16 E17 L18 Q19 V20 A21 Q22 A23 F24 V25 E26 L27 E28 N29 S30 S31 P32 E33 L34 K35 A36 E37 L38 R39 P40 L41 Q42 F43 K44 S45 I46 R47 E48 I49 D50 V51 A52 G53 G54 K55 K56 A57 L58 A59 I60

F61 V62 P63 V64 P65 S66 L67 A68 G69 F70 H71 K72 V73 Q74 T75 K76 L77 T78 R79 E80 L81 E82 K83 K84 F85 Q86 D87 R88 H89 V90 I91 P92 L93 A94 E95 R96 R97 I98 L99 P100 K101 P102 S103 R104 T105 S106 R107 Q108 V109 Q110 K111 R112 P113 R114 S115 R116 T117 L118 T119 A120

V121 H122 D123 K124 I125 L126 E127 D128 L129 V130 F131 P132 T133 E134 I135 V136 G137 K138 R139 V140 R141 Y142 L143 V144 G145 G146 N147 K148 I149 Q150 K151 V152 L153 L154 D155 S156 K157 D158 V159 Q160 Q161 I162 D163 Y164 K165 L166 E167 S168 F169 Q170 A171 V172 Y173 N174 K175 L176 T177 G178 K179 Q180

I181 V182 F183 E184 I185 P186 S187 GLU THR HIS

• Molecule 8: 40S ribosomal protein S8-A

Chain 8:

63%

84% 14%

MET G2 I3 S4 R5 D6 S7 K10 R11 S12 A13 T14 G15 A16 K17 R18 A19 Q20 F21 R22 K23 K24 R25 K26 F27 E28 L29 G30 R31 Q32 P33 A34 N35 T36 K37 I38 G39 A40 K41 R42 I43 H44 S45 V46 G50 G51 N52 K53 K54 Y55 R56 A57 L58 R59 I60 E61 T62 G63

N64 F65 S66 W67 A68 S69 E70 G71 K75 T76 R77 I78 A79 G80 V81 P85 S86 N87 N88 E89 L90 V91 R92 T95 L96 T97 K98 A99 A100 I101 V102 Q103 I104 D105 A106 T107 P108 F109 R110 Q111 W112 A115 H116 Y117 G118 Q119 T120 L121 G122 K123 LYS LYS ASN VAL LYS GLU

GLU GLU THR VAL ALA LYS SER LYS ASN ALA GLU ARG LYS TRP ALA ALA ARG ALA ALA SER A150 K151 I152 E153 S154 S155 V156 E157 S158 Q159 F160 S161 A162 G163 R164 L165 Y166 A167 C168 I169 S170 S171 R172 S176 G177 R178 C179 D180 G181 Y182 I183 L184 E185 G186 E187 Y192 L193 R194

R195 L196 T197 A198 K199 K200

• Molecule 9: 40S ribosomal protein S9-A

Chain 9:

21%
86%
8% • 6%

MET P2 R3 A4 P5 R6 T7 Y8 S9 K10 T11 Y12 S13 R17 S46 A55 D58 L59 R62 D63 E64 K65 D66 P67 F71 E72 G84 E88 D89 K90 A98 D103 F104 L105 E106 Q110 K115 L118 A119 K120 S121 A125 R126 I134

G137 I143 M147 V148 R149 L150 D151 S162 G165 R168 P169 A181 E182 A183 S184 G185 E186 ALA ALA ASP GLU ALA ASP GLU ASP ALA ASP GLU GLU

• Molecule 10: 5' domain-associated

Chain A:

100%

There are no outlier residues recorded for this chain.

• Molecule 11: 3' domain-associated

Chain B:

45%
100%

N1111 N1114 N1115 N1116 N1117 N1118 N1119 N1120 N1131 N1132 N1133 N1134 N1135 N1136 N1137 N1138 N1139 N1140 N1141 N1142 N1143 N1146 N1151 N1152 N1153 N1154 N1155 N1156 N1157 N1158 N1159 N1160 N1161 N1162 N1163 N1170 N1171 N1172 N1173 N1176 N1179 N1492 N1505 N1647 N1648 N1649 N1650 N1741 N1742 N1743 N1744 N1755

• Molecule 12: 40S ribosomal protein S16-A

Chain C:

80% • 20%

MET SER ALA VAL P5 S6 E40 G72 A119 ASP SER ARG ARG PRO GLU PRO LYS LYS PHE GLY GLY LYS GLY ALA ARG SER ARG PHE GLN LYS SER TYR ARG

• Molecule 13: 40S ribosomal protein S11-A

Chain D:

72%
94% 6%

MET S2 T3 E4 L5 T6 V7 Q8 S9 A12 F13 Q14 K15 Q16 P17 H18 I19 F20 N21 N22 P23 K24 V25 K26 T27 S28 K29 R30 T31 K32 R33 W34 Y35 K36 N37 A38 G39 L40 G41 F42 K43 T44 P45 K46 T47 E50 G51 S52 Y53 I54 D55 K56 K57 C58 P59 F60 T61 G62

L63 V64 S65 I66 R67 G68 K69 I70 L71 T72 G73 T74 V75 V76 S77 T78 K79 I84 V85 I86 R87 R88 A89 Y90 L91 H92 Y93 I94 P95 K96 Y97 N98 R99 Y100 E101 K102 R103 H104 K105 N106 V107 P108 V111 S112 R116 V117 Q118 V119 G120 D121 I122 V123 T124 C128 R129 P130

• Molecule 14: 40S ribosomal protein S22-A
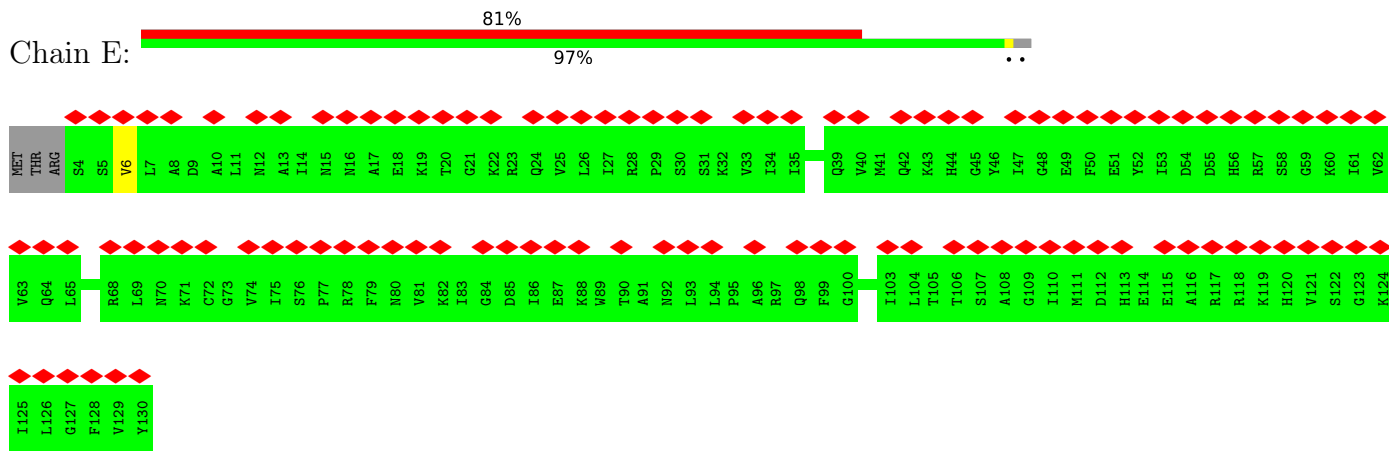
• Molecule 15: 40S ribosomal protein S24-A
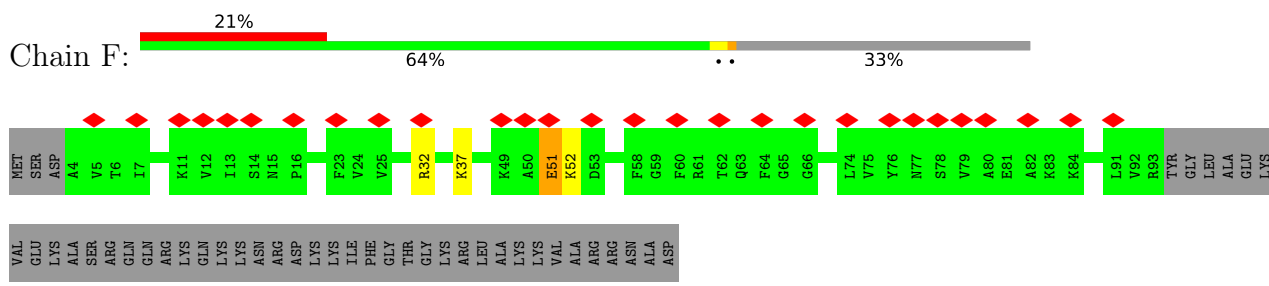
• Molecule 16: 40S ribosomal protein S28-A

• Molecule 17: Utp4

X501 X502 X503 X504 X505 X506 X507 X508 X509 X510 X511 X512 X513 X514 X515 X516 X517 X518 X519 X520 X521 X522 X523 X527 X528 X529 X530 X531 X532 X533 X536 X539 X540 X541 X542 X543 X544 X545 X546 X547 X548 X549 X550 X551 X552 X553 X554 X555 X556 X560 X561 X562 X563 X568

X569 X570 X571 X572 X573 X574 X575 X576 X577 X578 X579 X580 X581 X582 X583 X584 X585 X586 X587 X588 X589 X590 X591 X595 X596 X597 X598 X599 X600 X604 X605 X606 X613 X614 X615 X616 X617 X618 X619 X620 X621 X622 X623 X624 X625 X626 X627 X628 X629 X630 X631 X632 X633 X634 X635 X636 X637

X638 X639 X644 X645 X646 X647 X648 X651 X656

• Molecule 18: UtpA_CTD1

22%

Chain I:
94% 6%

X1101 X1102 X1103 X1106 X1107 X1108 X1109 X1110 X1111 X1116 X1117 X1118 X1119 X1120 X1121 X1125 X1130 X1131 X1140 X1150 X1151 X1155 X1156 X1160 X1161 X1162 X1179 X1180 X1188 X1189 X1208 X1238 X1239 X1240 X1241 X1242 X1243 X1244 X1245 X1249 X1260 X1261 X1262 X1263 X1264 X1268 X1282 X1283

X1292 X1293 X1296 X1301 X1302 X1314 X1318 X1319 X1320

• Molecule 19: UtpA_CTD2

7%

Chain J:
98% .

X994 X1002 X1003 X1012 X1013 X1014 X1028 X1029 X1030 X1031 X1063 X1118

• Molecule 19: UtpA_CTD2

16%

Chain K:
95% . .

X1001 X1002 X1003 X1004 X1008 X1009 X1010 X1011 X1014 X1015 X1016 X1017 X1041 X1042 X1056 X1062 X1085 X1092 X1093 X1102 X1110 X1119 X1122 UNK UNK

• Molecule 20: Beta-propeller 2

8%

Chain M:
99% .

X38 X43 X54 X74 X75 X76 X77 X89 X93 X94 X109 X171 X177 X191 X224 X225 X261 X266 X275 X287 X300 X305 X306 X316 X345 X346

• Molecule 21: Utp17

20%

Chain N:
99% .

• Molecule 22: Utp1

Chain O:

• Molecule 23: Utp6

Chain P:

• Molecule 24: Utp12

Chain Q:

X475 X480 X490 X495 X503 X504 X505 X520 X521 X522 X523 X530 X531 X532 X533 X534 X540 X541 X563 X573 X588 X589 X590 X591 X805 X812 X817 X818 X819 X820 X821 X822 X823 X824 X851 X898 X902 X941

• Molecule 25: Utp13

Chain R:

78%

100%

X3 X4 X5 X6 X7 X8 X9 X13 X14 X15 X16 X17 X18 X19 X20 X21 X22 X23 X24 X25 X26 X27 X28 X29 X30 X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45 X46 X47 X48 X49 X50 X51 X52 X53 X54 X55 X56 X57 X58 X59 X60 X61 X62 X63 X64 X65

X66 X67 X68 X69 X70 X71 X72 X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83 X84 X85 X86 X87 X88 X89 X90 X91 X92 X93 X94 X95 X96 X97 X98 X99 X100 X101 X102 X105 X106 X107 X108 X109 X110 X111 X112 X113 X114 X115 X116 X117 X118 X119 X120 X121 X122 X127 X128 X129 X130 X131

X132 X133 X134 X135 X136 X137 X138 X139 X140 X141 X142 X143 X144 X145 X146 X147 X148 X149 X150 X151 X152 X153 X154 X155 X156 X157 X158 X159 X160 X161 X162 X163 X164 X165 X166 X167 X168 X169 X170 X171 X172 X173 X174 X175 X176 X177 X181 X182 X183 X184 X185 X186 X187 X188 X189 X190 X191 X192 X194 X195

X196 X197 X198 X199 X202 X203 X204 X205 X206 X210 X211 X213 X214 X215 X216 X217 X218 X223 X224 X225 X226 X227 X228 X229 X230 X231 X235 X239 X240 X243 X244 X245 X246 X247 X248 X251 X252 X253 X254 X255 X256 X257 X258 X259 X260 X261 X262 X263 X264 X265 X266 X267 X268 X269 X270 X271 X272 X273

X274 X275 X276 X277 X278 X279 X280 X283 X284 X285 X286 X287 X288 X289 X290 X291 X292 X293 X294 X295 X296 X297 X298 X299 X300 X301 X303 X304 X305 X306 X307 X308 X309 X310 X311 X312 X315 X316 X317 X318 X319 X325 X326 X327 X328 X329 X330 X331 X332 X333 X334 X335 X336 X337 X338 X339 X340 X341 X342

X343 X344 X345 X346 X347 X348 X349 X350 X351 X352 X353 X354 X355 X356 X357 X358 X359 X360 X361 X362 X363 X364 X365 X366 X367 X368 X369 X370 X371 X372 X373 X374 X375 X376 X377 X378 X379 X380 X381 X382 X383 X384 X385 X386 X387 X388 X389 X390 X391 X392 X393 X394 X395 X396 X397 X398 X399 X400 X401 X402

X403 X404 X405 X406 X407 X408 X409 X410 X411 X412 X413 X414 X415 X416 X417 X418 X419 X420 X421 X422 X423 X424 X425 X426 X427 X428 X429 X430 X431 X432 X433 X434 X435 X436 X437 X438 X439 X440 X441 X442 X443 X444 X445 X446 X447 X448 X449 X450 X451 X452 X453 X454 X455 X456 X457 X458 X459 X460 X461 X462
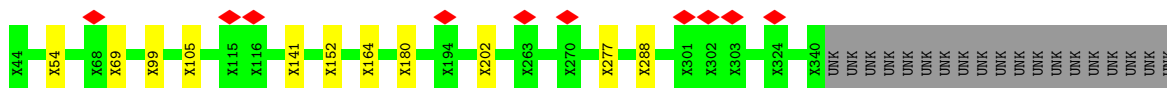
X463 X464 X465 X466 X467 X468 X469 X470 X471 X472 X473 X474 X475 X476 X477 X478 X479 X480 X481 X482 X483 X484 X485 X486 X487 X488 X489 X490 X491 X492 X493 X494 X495 X496 X497 X498 X499 X500 X501 X502 X503 X504 X505 X506 X507 X508 X509 X510 X511 X512 X513 X514 X515 X516 X517 X518 X519 X520 X521 X522

X523 X524 X525 X526 X527 X528 X529 X530 X531 X532 X533 X534 X535 X536 X537 X538 X539 X540 X541 X542 X543 X544 X545 X546 X547 X548 X549 X550 X551 X552 X553 X554 X555 X556 X557 X558 X559 X560 X561 X562 X563 X564 X565 X566 X567 X568 X569 X570 X571 X572 X573 X574 X575 X576 X577 X578 X579 X580 X581 X582

X583 X584 X585 X586 X587 X588 X589 X590 X591 X592 X593 X594 X595 X596 X597 X598 X599 X600 X601 X602 X603 X604 X605 X606 X607 X608 X609 X610 X611 X653 X656 X657 X658 X680 X757 X763 X764 X778 X805 X827 X838 X855 X889

• Molecule 26: Utp18

Chain S:

14%

98%

X266 X267 X268 X273 X274 X275 X278 X284 X285 X286 X287 X293 X296 X299 X328 X333 X339 X342 X343 X358 X387 X388 X389 X396 X397 X398 X406 X407 X408 X430 X443 X456 X467 X471 X481 X482 X487 X553 X585

X586 X587 X588 X594 X599 X609 X617

• Molecule 27: U3 small nucleolar RNA-associated protein 21,Utp21

Chain T:

5%

96%

S21 T43 Y94 A116 L128 P145 G165 D207 G238 Q248 S249 S255 G260 S261 G271 I309 S318 E321 P326 SER LEU SER GLN GLY SER GLY ASP VAL VAL VAL Q338 G348 S361 Q391 ARG LEU HIS LYS LYS GLN ASP

GLY GLY ARG VAL GLY GLY SER THR ILE LYS S409 A416 D444 G478 S479 G482 G521 G524 L540 A572 Q659 PHE LYS THR VAL S664 F673 X951 X956 X965 X966 X970 X1006 X1013 X1014 X1024 X1041 X1042 X1046

• Molecule 28: Beta-propeller 5

Chain U:

13%

100%

X1005 X1011 X1012 X1015 X1018 X1019 X1029 X1037 X1042 X1046 X1066 X1080 X1100 X1110 X1111 X1128 X1137 X1140 X1170 X1183 X1184 X1201 X1215 X1216 X1217 X1218 X1249 X1254 X1259 X1265 X1266 X1267 X1273 X1274 X1296 X1297

X1300 X1301 X1302 X1314 X1315 X1316 X1324

• Molecule 29: Enp2

Chain V:

72%

100%

X1005 X1008 X1009 X1010 X1011 X1012 X1013 X1016 X1017 X1019 X1020 X1021 X1022 X1023 X1024 X1025 X1026 X1027 X1028 X1031 X1032 X1033 X1034 X1035 X1036 X1037 X1038 X1039 X1040 X1041 X1042 X1043 X1044 X1045 X1054 X1055 X1056 X1057 X1058 X1059 X1060 X1061 X1062 X1063 X1065 X1066 X1067 X1068 X1069 X1070 X1071 X1072 X1073 X1074 X1075 X1076 X1077

X1078 X1079 X1080 X1081 X1082 X1083 X1084 X1085 X1086 X1087 X1088 X1091 X1092 X1093 X1094 X1095 X1096 X1097 X1098 X1099 X1100 X1101 X1102 X1103 X1104 X1105 X1106 X1107 X1108 X1109 X1110 X1111 X1112 X1113 X1117 X1118 X1119 X1120 X1121 X1122 X1125 X1129 X1132 X1133 X1134 X1135 X1136 X1137 X1141 X1142 X1143 X1144 X1148 X1149

X1150 X1151 X1152 X1153 X1154 X1157 X1158 X1165 X1166 X1167 X1168 X1169 X1170 X1171 X1172 X1173 X1174 X1175 X1176 X1179 X1182 X1183 X1184 X1185 X1186 X1189 X1190 X1198 X1199 X1200 X1201 X1202 X1207 X1208 X1211 X1212 X1213 X1214 X1215 X1216 X1220 X1221 X1222 X1227 X1228 X1229 X1230 X1231 X1232 X1234 X1235 X1236 X1237

X1238 X1239 X1240 X1241 X1242 X1243 X1244 X1245 X1246 X1247 X1251 X1252 X1253 X1254 X1255 X1256 X1257 X1258 X1259 X1260 X1261 X1262 X1263 X1264 X1265 X1269 X1270 X1271 X1272 X1273 X1274 X1275 X1297 X1298 X1299 X1300 X1301 X1302 X1303 X1310 X1313 X1314 X1315 X1316 X1317 X1318 X1319 X1320 X1321 X1322 X1323 X1324 X1325

• Molecule 30: UtpA_CTD4

Chain W:

9%

90%

10%

X1101 X1112 X1113 X1114 X1137 X1138 X1139 X1140 X1141 X1142 X1143 X1145 X1157 X1158 X1159 X1160 X1191 X1198 X1212 X1223

• Molecule 31: Kre33

Chain X:

72%

100%

X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X15 X16 X17 X21 X26 X27 X28 X29 X30 X31 X32 X35 X36 X40 X41 X44 X45 X46 X53 X54 X66 X67 X68 X69 X70 X71 X72 X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83 X84 X85 X88

X89 X90 X93 X94 X95 X98 X99 X100 X101 X105 X106 X107 X108 X109 X112 X113 X114 X115 X116 X117 X118 X119 X120 X121 X122 X123 X124 X125 X126 X127 X128 X129 X130 X131 X132 X133 X134 X137 X138 X141 X142 X143 X144 X145 X146 X147 X148 X149 X150 X153 X154 X155 X156

X157 X158 X159 X160 X163 X164 X165 X166 X167 X168 X169 X170 X171 X172 X173 X174 X175 X176 X177 X178 X179 X180 X181 X182 X183 X184 X185 X186 X187 X188 X189 X190 X191 X192 X193 X194 X195 X196 X197 X198 X199 X200 X201 X202 X203 X204 X205 X206 X207 X208 X209 X210 X211 X212 X213 X214 X215 X216 X217

X218 X219 X220 X221 X222 X223 X224 X225 X226 X227 X228 X229 X230 X231 X232 X233 X236 X237 X238 X239 X240 X241 X242 X243 X244 X245 X246 X247 X248 X249 X250 X256 X257 X258 X259 X260 X263 X264 X265 X266 X267 X268 X269 X270 X273 X274 X275 X276 X277 X278 X279 X280 X281 X282 X283 X284 X285

X286 X287 X288 X289 X290 X291 X292 X293 X294 X295 X296 X297 X298 X299 X300 X301 X302 X305 X306 X307 X308 X309 X310 X311 X312 X313 X314 X315 X316 X317 X318 X319 X320 X321 X322 X327 X332 X336 X337 X338 X339 X340 X341 X342 X343 X344 X345 X346 X347 X348 X349 X350 X351 X352 X353 X354

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X499 X500 X506 X510 X511 X512 X513 X514 X517 X518 X519 X520 X521 X522 X523 X524 X525 X526 X527 X528 X529 X532 X533 X534 X535 X536 X537 X538 X541 X542 X545 X548 X549 X550 X551 X552 X553 X554 X555 X561 X562 X563 X566 X574 X575 X576 X577 X581 X582

X583 X584 X585 X586 X587 X588 X589 X590 X591 X592 X593 X594 X595 X596 X597 X598 X599 X600 X601 X602 X603 X604 X605 X606 X607 X608 X609 X610 X611 X612 X613 X614 X615 X616 X617 X618 X619 X620 X621 X622 X623 X624 X625 X626 X627 X628 X629 X630 X631 X632 X633 X634 X635 X636 X637 X638 X639 X640 X641 X642

X643 X644 X645 X646 X647 X648 X651 X652 X653 X654 X655 X656 X657 X658 X659 X660 X661 X662 X663 X664 X665 X666 X667

• Molecule 32: Kre33

Chain Y:

93%

100%

X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17 X18 X19 X20 X21 X22 X23 X24 X25 X26 X27 X28 X29 X30 X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45 X46 X47 X48 X49 X50 X51 X52 X53 X54 X66 X67 X68 X69 X70 X71 X72

X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83 X84 X85 X86 X87 X88 X89 X90 X91 X92 X93 X94 X95 X96 X97 X98 X99 X100 X101 X102 X103 X104 X105 X106 X107 X108 X109 X110 X111 X112 X113 X114 X115 X116 X117 X118 X119 X120 X121 X122 X123 X124 X125 X126 X127 X128 X129 X130 X131 X132

X133 X134 X135 X136 X137 X138 X139 X140 X141 X142 X143 X144 X145 X146 X147 X148 X149 X150 X151 X152 X153 X154 X155 X156 X157 X158 X159 X160 X161 X162 X163 X164 X165 X166 X167 X168 X169 X170 X171 X172 X173 X174 X175 X176 X177 X178 X179 X180 X181 X182 X183 X184 X185 X186 X187 X188 X189 X190 X191 X192

X193 X194 X195 X196 X197 X198 X199 X200 X201 X202 X203 X204 X205 X206 X207 X208 X209 X210 X211 X212 X213 X214 X215 X216 X217 X218 X219 X220 X221 X222 X223 X224 X225 X226 X227 X228 X229 X230 X231 X232 X233 X234 X235 X236 X237 X238 X239 X240 X241 X242 X243 X244 X245 X246 X247 X248 X249 X250 X257 X258

X259 X260 X261 X262 X263 X264 X265 X266 X267 X268 X269 X270 X271 X272 X273 X274 X275 X276 X277 X278 X279 X280 X281 X282 X283 X284 X285 X286 X287 X288 X289 X290 X291 X292 X293 X294 X295 X296 X297 X298 X299 X300 X301 X302 X303 X304 X305 X306 X307 X308 X309 X310 X311 X312 X313 X314 X315 X316 X317 X318

X319 X320 X321 X322 X323 X324 X325 X326 X327 X328 X329 X330 X331 X332 X333 X334 X335 X336 X337 X338 X339 X340 X341 X342 X343 X344 X345 X346 X347 X348 X349 X350 X351 X352 X353 X354 X355 X356 X357 X358 X359 X360 X361 X362 X363 X364 X365 X366 X367 X368 X369 X370 X371 X372 X373 X374 X375 X376 X377 X378

X379 X380 X381 X382 X383 X384 X385 X386 X387 X388 X389 X390 X391 X392 X393 X394 X395 X396 X397 X398 X399 X400 X401 X402 X403 X404 X405 X406 X407 X408 X409 X410 X411 X412 X413 X414 X415 X416 X417 X418 X419 X420 X421 X422 X423 X424 X425 X426 X427 X428 X429 X430 X431 X432 X433 X434 X438 X439 X440

X441 X442 X443 X444 X445 X446 X447 X448 X449 X450 X451 X452 X453 X454 X457 X458 X459 X460 X461 X462 X463 X464 X465 X466 X467 X468 X469 X470 X471 X472 X473 X476 X477 X478 X479 X480 X481 X482 X483 X484 X485 X486 X487 X488 X489 X490 X491 X492 X493 X494 X495 X496 X497 X498 X499 X500 X501 X502

X503 X504 X505 X506 X507 X508 X509 X510 X511 X514 X515 X516 X517 X518 X519 X520 X521 X522 X523 X524 X525 X526 X527 X530 X531 X532 X533 X534 X535 X538 X539 X540 X541 X542 X543 X544 X545 X546 X547 X548 X549 X550 X551 X552 X553 X554 X555 X556 X557 X558 X559 X562 X563 X564 X565 X566

X567 X573 X574 X575 X576 X577 X578 X579 X580 X581 X582 X583 X584 X587 X588 X589 X590 X591 X592 X593 X594 X595 X596 X597 X600 X601 X602 X603 X604 X605 X606 X607 X608 X609 X610 X611 X612 X613 X614 X615 X616 X617 X624 X625 X626 X627 X628 X629 X630 X631 X632 X633 X634 X635 X636 X637 X638 X639

X643 X644 X645 X646 X647 X648 X649 X650 X651 X652 X653 X654 X655 X656 X657 X658 X659 X660 X661 X662 X663 X664 X665 X666 X667 X668 X669 X670

• Molecule 33: Imp3

Chain Z:

5%

99%

X23 X26 X33 X72 X79 X90 X91 X95 X137 X173

• Molecule 34: Nop56

Chain a:

15%

98%

• Molecule 35: Nop58

• Molecule 36: Nop1

• Molecule 37: Nop1

• Molecule 38: 13 kDa ribonucleoprotein-associated protein

• Molecule 38: 13 kDa ribonucleoprotein-associated protein

Chain f:

8%

90%

10%

MET SER ALA PRO ASN PRO LYS ALA PHE PRO LEU ALA D13 A27 K35 E50 A56 D57 C58 E62 I63 K74 A90 I126

• Molecule 39: Ribosomal RNA-processing protein 9

Chain g:

11%

63%

36%

MET SER ASP VAL THR GLN GLN LYS LYS ARG LYS ARG SER LYS GLY GLU VAL ASN PRO SER LYS PRO THR VAL ASP GLU GLU ILE THR ASP PRO SER SER ASN GLU ASP GLU GLU GLN LEU GLU VAL SER ASP GLU ASP ALA LEU GLU GLU GLU PHE GLU GLY GLU GLU ASN PRO ALA

ASP LYS ARG ARG LEU ALA LYS GLN TYR LEU GLU ASN LEU LYS SER GLU ALA ASN ASP ILE LEU THR ASP ASN ARG ASN ALA GLU GLU LYS ASP LEU ASN ASN LEU GLU LYS GLU ARG THR ILE ASP GLU TYR ASN PHE ASP ALA GLY ASP LEU ASP LYS ASP ILE ILE ALA SER ARG

LEU LYS GLU ASP VAL ALA GLU GLN GLN G130 R134 L140 R151 V152 G153 E154 C159 F163 Q164 P165 VAL LEU ASN LYS TYR THR PHE GLU GLU SER SER ASN GLY ASP LYS ASN LYS GLY R184 S191 K192 D193 I201 R207 A214 K215 G216 G217 A218 P222

THR SER LYS HIS GLU TYR GLU N230 D237 E238 T241 V242 A243 D247 T253 G254 S269 G281 R289 S298 C299 A300 S308 Y319 G320 D323 A330 T338 G361 G362 D363 E364 P365 Q366 R370 M373 K374 E375 ASN ALA LYS GLU GLY GLU

ASP GLY GLU VAL LYS TYR PRO ASP GLU SER GLU ALA PRO LEU F396 D409 T415 N421 A428 T435 G441 I442 L443 PRO GLU PRO SER PHE ASN ASP ILE SER GLY GLU THR ASP GLU GLU LEU ARG LYS ARG GLN LEU GLN GLY LYS LYS L469 T476 S495

G512 G516 A517 K518 K523 S529 GLY LYS HIS GLY LYS GLU K536 L540 A541 S542 I543 A544 A554 N555 V556 A566 D569 Q570 THR GLY PHE

• Molecule 40: RNA 3'-terminal phosphate cyclase-like protein

Chain h:

10%

97%

MET SER SER SER ALA PRO K7 Q12 G13 G39 D40 L41 N42 I67 S68 Y69 S115 K119 S124 A128 A150 G164 A175 S189 G193 Y196 S197 K217 C221 S249 A258 D263 A264 G265 E281 K305 G309 R310 L311

Q317 R327 F338 V342 D343 E344 A345 E348 D349 M350 T360 N361 THR SER LYS ILE ALA

• Molecule 41: Bms1,Ribosome biogenesis protein BMS1,Bms1,Ribosome biogenesis protein BMS1

Chain i:

10%

92%

7%

X68 X73 X94 X107 X110 X117 X122 X123 X130 X131 X132 X136 X176 X177 X178 X202 X235 X236 X246 X250 X261 X262 X263 X264 X270 X277 X284 X292 X300 X301 D556 N557 I558 G569 GLU ASP ASP ASP SER

LYS ASP GLU SER ASP ILE GLU GLU ASP VAL ASP ASP ASP PHE PHE ARG LYS LYS ASP ASP GLY THR VAL THR LYS GLU GLY ASN LYS ASP HIS ALA V606 D607 D616 T617 F618 V628 X705 X706 X784 X800 X801 X802 X803 X804 X805 X806 X807 X808 X809 X812 X817

X851 X892 X917 X920 X935 X943 X971 X1015

• Molecule 42: Ribosomal RNA small subunit methyltransferase NEP1

Chain j: 21%   84%   16%

MET VAL GLU ASP SER ARG VAL ARG ASP ALA LEU LYS GLY GLY ASP GLN LYS ALA LEU PRO ALA SER LEU VAL PRO GLN ALA P28 P29 V30 L31 T32 S33 K34 D35 T38 K39 V43 V44 L45 A48 S49 L50 E51 T52 H53 K54 I55 SER SER ASN GLY PRO GLY ASP LYS

Y65 V66 L67 Q74 L77 LYS LYS MET GLY ARG D83 I84 S85 E86 A107 V124 V128 F137 M141 L144 L145 L148 S152 V153 N154 S155 E156 E157 K164 D183 E200 A208 M209 A210 R211 G212 K213 D214 N215 F216 Y220 V221 D222 E223

G226 A234 I251 L252

• Molecule 42: Ribosomal RNA small subunit methyltransferase NEP1

Chain k: 15%   86%   13%

MET VAL GLU ASP SER ARG VAL ARG ASP ALA LEU LYS GLY GLY ASP GLN LYS ALA LEU PRO ALA SER LEU VAL PRO GLN ALA P28 T52 H53 K54 I55 SER SER ASN GLY PRO GLY GLY D63 K64 Y65 V66 L67 D71 Q74 L77 K78 K79 M80 G81 R82 D83 I84 S85

T92 P131 R136 S149 V153 N154 S155 E156 L180 D197 D198 A208 M209 A210 R211 G212 K213 D214 A217 E223 I251 L252

• Molecule 43: Utp24

Chain l: 6%   100%

X56 X79 X91 X97 X157 X174 X177 X181 X182 X183

• Molecule 44: Imp4

Chain m: 14%   99%

X28 X48 X57 X74 X75 X81 X82 X83 X84 X85 X86 X92 X97 X120 X146 X147 X148 X149 X153 X154 X162 X165 X166 X167 X210 X230 X236 X237 X238 X239

• Molecule 45: Utp30

Chain n:

14%

100%

X5 X6 X34 X73 X92 X93 X94 X95 X119 X120 X121 X122 X123 X124 X125 X126 X137 X141 X149 X150 X151 X154 X155 X156 X157 X172 X180 X196 X211

• Molecule 46: Unassigned KH domain

Chain o:

71%

99%

X38 X39 X40 X41 X42 X43 X44 X45 X46 X47 X50 X51 X52 X53 X54 X55 X56 X57 X58 X59 X60 X61 X62 X63 X64 X65 X66 X67 X68 X69 X70 X71 X72 X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83 X84 X85 X86 X87 X88 X89 X90 X91 X92 X93 X94 X95 X96 X97 X98

X99 X100 X105 X106 X107 X108 X109 X110 X111 X112 X113 X114 X115 X116 X117 X118 X119 X120 X121 X122 X123 X124 X125 X128 X129 X130 X131 X132 X133 X134 X135 X138 X139 X140 X141 X142 X143 X144 X145 X146 X147 X148 X149 X150 X151 X152 X155 X156 X159 X160 X161 X162 X163 X164 X165

X166 X167 X168 X169 X170 X171 X172 X173 X174 X175 X176 X180 X184 X185 X186 X187 X188 X189 X190 X191 X192 X194 X197 X198 X199 X200 X201 X202 X206 X207 X208 X209 X210 X211 X212 UNK UNK

• Molecule 47: Utp20

Chain p:

87%

96%

X22 X23 X24 X25 X26 X27 X28 X29 X30 X31 X32 X33 X56 X57 X58 X59 X60 X61 X62 X63 X64 X65 X66 X67 X68 X69 X70 X71 X72 X73 X74 X81 X82 X83 X84 X85 X86 X87 X88 X89 X90 X91 X92 X93 X94 X106 X107 X108 X109 X110 X111 X112 X113 X114 X115 X116 X119 X120 X121

X139 X140 X141 X142 X143 X144 X145 X146 X147 X148 X149 X150 X151 X152 X153 X154 X155 X161 X162 X163 X164 X165 X166 X167 X168 X169 X170 X171 X172 X173 X174 X175 X176 X177 X178 X179 X188 X189 X190 X191 X192 X193 X194 X195 X196 X197 X198 X199 X206 X207 X208 X209 X210 X211 X212 X213 X214 X215 X216

X217 X218 X219 X220 X221 X222 X223 X224 X231 X232 X233 X234 X235 X236 X237 X238 X239 X240 X241 X242 X243 X244 X256 X257 X260 X261 X262 X263 X264 X265 X266 X267 X268 X269 X270 X271 X272 X288 X289 X290 X291 X292 X293 X294 X295 X296 X297 X298 X299 X300 X301 X302 X303 X304 X305 X311 X312 X313 X314

X315 X316 X317 X318 X319 X320 X323 X324 X325 X326 X327 X328 X336 X337 X338 X339 X340 X341 X346 X347 X348 X349 X363 X364 X365 X366 X367 X368 X369 X370 X371 X372 X373 X376 X377 X378 X391 X392 X393 X394 X395 X396 X397 X398 X399 X405 X406 X407 X408 X409 X410 X420 X421 X422

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X592 X593 X594 X595 X596 X597 X598 X599 X602 X603 X604 X605 X606 X607 X631 X632 X633 X634 X635 X636 X637 X638 X639 X640 X641 X642 X643 X644 X645 X646 X647 X648 X650 X651 X652 X653 X654 X655 X656 X657 X658 X659 X660 X661 X662 X663 X664 X665 X666 X672 X673 X674 X675 X678 X679 X682

• Molecule 48: Repeat protein 2

Chain q:

• Molecule 49: 40S ribosomal protein S23-A

Chain r:

K82 N99 D100 E101 L104 A105 GLY PHE GLY ARG LYS GLY LYS ALA LYS GLY D116 G119 P143 ARG SER

• Molecule 50: Beta-propeller 1

Chain s:

21%

97%

X20 X350 X354 X355 X359 X367 X371 X384 X387 X410 X411 X412 X413 X414 X419 X420 X421 X422 X423 X424 X425 X426 X435 X436 X437 X438 X439 X440 X443 X444 X452 X457 X458 X462 X466 X475 X493 X520 X528 X529 X530

X536 X537 X544 X563 X564 X565 X566 X572 X573 X574 X575 X576 X577 X578 X579 X580 X581 X582 X583 X584 X589 X590 X595 X619 X625 X628 X629 X634 X635 X638 X639 X640 X643 X647 X648 X649 X653 X654 X655 X656 X657 X658 X659

• Molecule 50: Beta-propeller 1

Chain t:

89%

7%

X44 X54 X68 X69 X99 X105 X115 X116 X141 X152 X164 X180 X194 X202 X263 X270 X277 X288 X301 X302 X303 X324 X340 UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK UNK

UNK UNK

• Molecule 50: Beta-propeller 1

Chain u:

9%

94%

6%

X16 X79 X88 X89 X99 X100 X101 X108 X112 X117 X118 X146 X165 X188 X192 X214 X215 X216 X217 X218 X219 X220 X243 X244 X250 X274 X277 X278 X279 X280 X281 X289 X300 UNK UNK UNK UNK UNK UNK UNK UNK

UNK UNK UNK UNK UNK

• Molecule 51: Repeat protein 1

Chain v:

15%

97%

X1 X12 X22 X23 X24 X32 X33 X34 X58 X59 X60 X64 X65 X68 X69 X70 X71 X81 X84 X97 X105 X106 X120 X135 X136 X157 X164 X180 X208 X211 X243 X252 X253 X262 X263 X264 X265 X266 X267 X268 X272

X276 X282 X283 X284 X290 X291 X292 X293 X297 X302 X303 X304 X305 X306 X307 X314 X315 X316 X324 X352 X353 X354 X355 X362 X366 X400 X401 X402 X429 X430 X504 X505 X565 X570 X579 X587 X596 X597 X598 X599 X600 X608 X613

X620 X623 X649 X650 X651 X661 X662 X663 X689 X702 X717 X725 X726 X727 X728 X729 X732 X755 X759 X760 X761 X774 X775 X776 X783 X784 X807 X808 X809 X810 UNK UNK UNK

• Molecule 52: Unassigned protein helices

Chain y:

15%

93%   7%
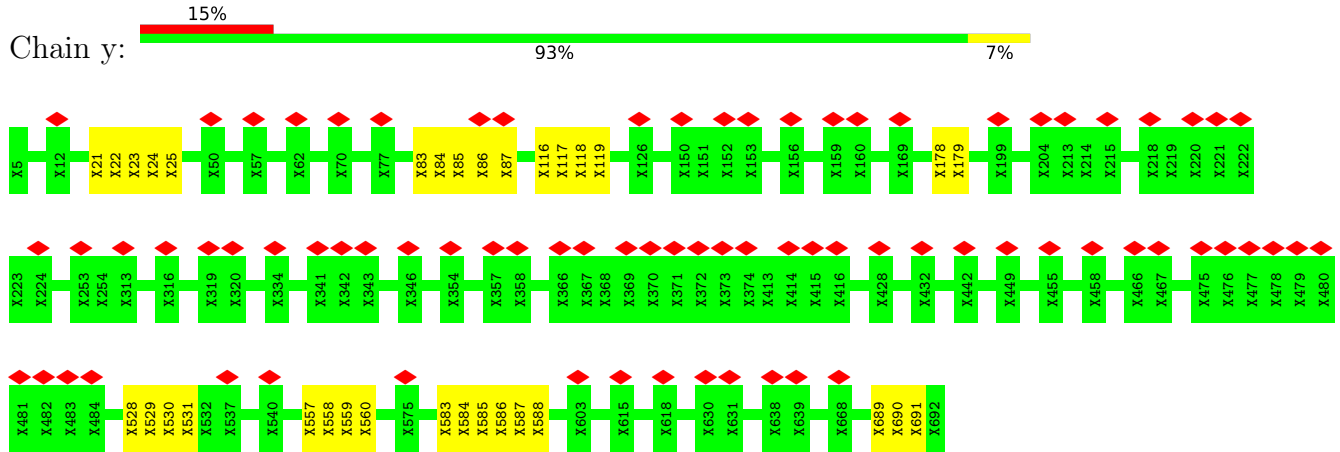
• Molecule 53: Unassigned RNA helices

Chain z:

32%

100%
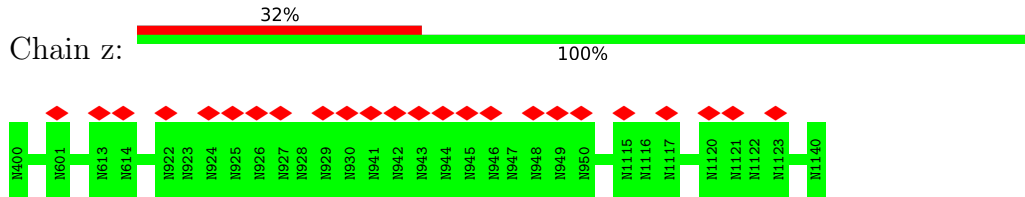
4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	33813	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	1.56	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	22500	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.086	Depositor
Minimum map value	-0.043	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.018	Depositor
Map size (Å)	503.50003, 503.50003, 503.50003	wwPDB
Map dimensions	380, 380, 380	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.325, 1.325, 1.325	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0	1.11	0/268	1.42	5/417 (1.2%)
2	1	1.25	39/12260 (0.3%)	1.71	368/19055 (1.9%)
3	2	1.66	26/2443 (1.1%)	1.69	73/3787 (1.9%)
4	3	0.57	0/1061	0.81	1/1472 (0.1%)
5	5	0.63	0/1182	0.92	0/1638
6	6	0.70	2/998 (0.2%)	1.22	7/1388 (0.5%)
7	7	0.51	0/922	0.85	0/1285
8	8	0.65	0/847	0.93	0/1173
9	9	0.56	0/914	0.82	0/1272
12	C	0.50	0/565	0.77	0/784
13	D	0.30	0/720	0.62	0/1001
14	E	0.34	0/623	0.63	0/864
15	F	0.38	0/443	0.73	0/615
16	G	0.46	0/305	0.80	0/423
27	T	0.51	0/3055	0.69	0/4243
38	e	0.25	0/605	0.56	0/843
38	f	0.26	0/565	0.57	0/787
39	g	0.41	0/1793	0.64	2/2485 (0.1%)
40	h	0.40	0/1741	0.59	0/2416
41	i	0.32	0/265	0.50	0/367
42	j	0.36	0/1044	0.62	0/1452
42	k	0.39	0/1079	0.57	0/1502
49	r	0.37	0/399	0.58	0/549
All	All	0.95	67/34097 (0.2%)	1.28	456/49818 (0.9%)

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
3	2	0	1
6	6	0	3

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Mol	Chain	#Chirality outliers	#Planarity outliers
9	9	0	3
12	C	0	1
15	F	0	2
16	G	0	1
17	H	0	4
18	I	0	11
19	J	0	2
19	K	0	3
20	M	0	3
21	N	0	4
22	O	0	12
24	Q	0	4
26	S	0	4
27	T	0	2
28	U	0	1
30	W	0	10
31	X	0	2
33	Z	0	2
34	a	0	6
35	b	0	1
36	c	0	3
37	d	0	3
39	g	0	2
41	i	0	5
44	m	0	2
47	p	0	38
50	s	0	9
50	t	0	11
50	u	0	1
51	v	0	13
52	y	0	33
All	All	0	202

The worst 5 of 67 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	2	308	U	O3'-P	-63.84	0.84	1.61
2	1	1615	C	O3'-P	-41.94	1.10	1.61
6	6	145	ASP	C-N	-12.45	1.05	1.34
2	1	337	G	C2-N2	10.63	1.45	1.34
3	2	118	A	C1'-N9	-10.57	1.32	1.46

The worst 5 of 456 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	1	1615	C	OP2-P-O3'	-30.61	37.85	105.20
6	6	145	ASP	O-C-N	-22.20	87.17	122.70
3	2	118	A	O4'-C1'-N9	-21.15	91.28	108.20
2	1	1615	C	OP1-P-O3'	17.13	142.90	105.20
2	1	1615	C	O3'-P-O5'	-16.35	72.93	104.00

There are no chirality outliers.

5 of 202 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	2	118	A	Sidechain
6	6	145	ASP	Mainchain
6	6	44	ASN	Peptide
6	6	99	MET	Peptide
9	9	88	GLU	Peptide

5.2 Too-close contacts ⓘ

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

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	3	212/236 (90%)	180 (85%)	20 (9%)	12 (6%)	1	20
5	5	235/261 (90%)	199 (85%)	19 (8%)	17 (7%)	1	16
6	6	198/225 (88%)	148 (75%)	36 (18%)	14 (7%)	1	16
7	7	184/190 (97%)	143 (78%)	23 (12%)	18 (10%)	0	10
8	8	169/200 (84%)	150 (89%)	14 (8%)	5 (3%)	4	31
9	9	183/197 (93%)	152 (83%)	17 (9%)	14 (8%)	1	14

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
12	C	113/143 (79%)	107 (95%)	6 (5%)	0	100	100
13	D	144/156 (92%)	125 (87%)	19 (13%)	0	100	100
14	E	125/130 (96%)	113 (90%)	11 (9%)	1 (1%)	19	60
15	F	88/135 (65%)	72 (82%)	13 (15%)	3 (3%)	3	29
16	G	60/67 (90%)	53 (88%)	7 (12%)	0	100	100
27	T	613/781 (78%)	565 (92%)	48 (8%)	0	100	100
38	e	120/126 (95%)	118 (98%)	2 (2%)	0	100	100
38	f	112/126 (89%)	110 (98%)	2 (2%)	0	100	100
39	g	353/573 (62%)	337 (96%)	15 (4%)	1 (0%)	41	76
40	h	353/367 (96%)	340 (96%)	13 (4%)	0	100	100
41	i	50/511 (10%)	48 (96%)	2 (4%)	0	100	100
42	j	205/252 (81%)	190 (93%)	15 (7%)	0	100	100
42	k	214/252 (85%)	201 (94%)	11 (5%)	2 (1%)	17	56
49	r	76/145 (52%)	66 (87%)	9 (12%)	1 (1%)	12	48
All	All	3807/5073 (75%)	3417 (90%)	302 (8%)	88 (2%)	9	36

5 of 88 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	3	153	VAL
4	3	173	PRO
4	3	174	LYS
5	5	24	SER
5	5	95	THR

5.3.2 Protein sidechains ⓘ

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	0	10/364 (2%)	1 (10%)	0
2	1	496/1800 (27%)	119 (23%)	22 (4%)
3	2	95/126 (75%)	20 (21%)	3 (3%)
All	All	601/2290 (26%)	140 (23%)	25 (4%)

5 of 140 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	0	287	G
2	1	57	G
2	1	60	U
2	1	67	A
2	1	68	A

5 of 25 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	1	512	A
2	1	1572	G
3	2	318	U
2	1	1535	U
2	1	1573	A

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

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

5.5　Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6　Ligand geometry ⓘ

There are no ligands in this entry.

5.7　Other polymers ⓘ

There are no such residues in this entry.

5.8　Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
47	p	58

Continued on next page...

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Mol	Chain	Number of breaks
1	0	45
51	v	31
22	O	27
48	q	23
25	R	20
52	y	18
24	Q	18
41	i	16
17	H	16
23	P	15
26	S	13
21	N	11
18	I	11
29	V	11
20	M	11
45	n	10
11	B	9
3	2	8
2	1	8
53	z	7
34	a	7
44	m	7
31	X	7
32	Y	7
50	t	6
35	b	6
30	W	6
50	s	6
19	K	5
10	A	5
19	J	5
28	U	5
50	u	4
27	T	3
43	l	3
6	6	3
46	o	2
37	d	2
36	c	1

The worst 5 of 476 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	y	204:UNK	C	213:UNK	N	135.82
1	y	180:UNK	C	185:UNK	N	133.64
1	y	618:UNK	C	625:UNK	N	128.71
1	z	950:N	O3'	1110:N	P	127.24
1	y	144:UNK	C	150:UNK	N	117.41

6   Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-8473. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1   Orthogonal projections ⓘ

6.1.1   Primary map

| X | Y | Z |
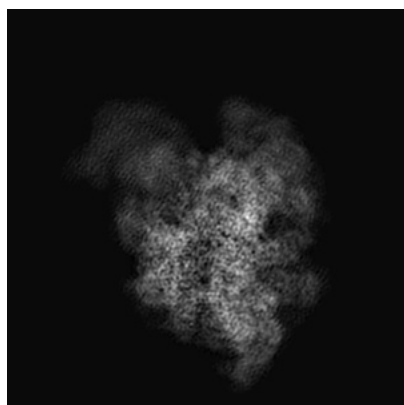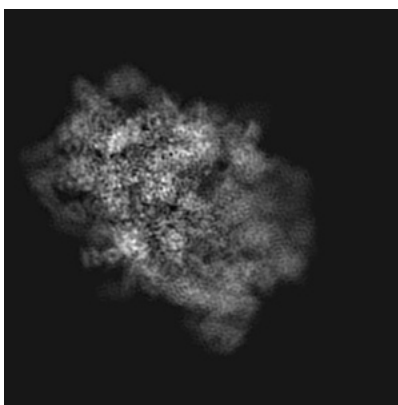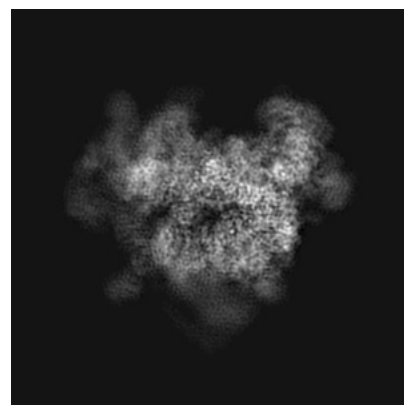
The images above show the map projected in three orthogonal directions.

6.2   Central slices ⓘ
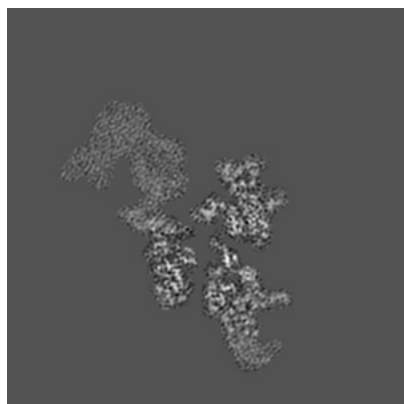
6.2.1   Primary map
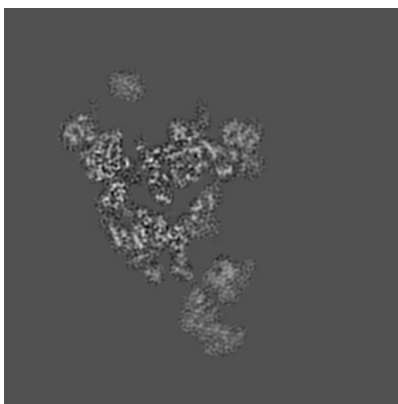
| X Index: 190 | Y Index: 190 | Z Index: 190 |
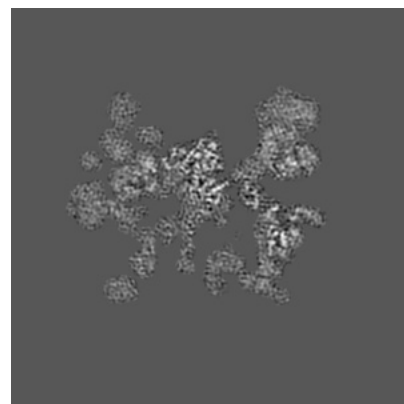
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices ⓘ
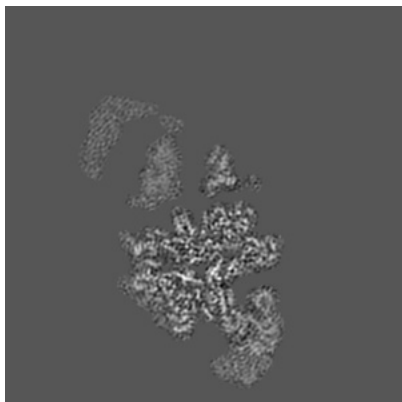
6.3.1 Primary map
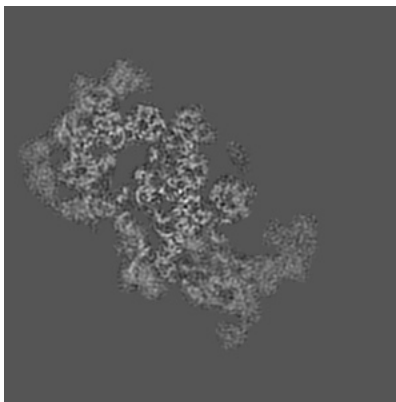
X Index: 217	Y Index: 219	Z Index: 151
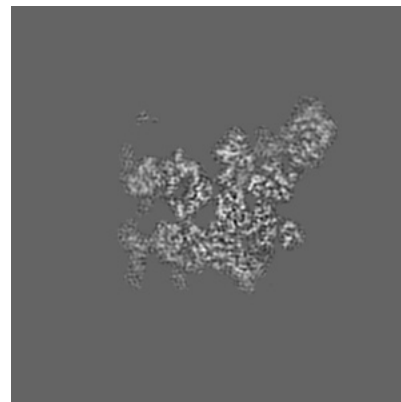
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

6.4.1 Primary map

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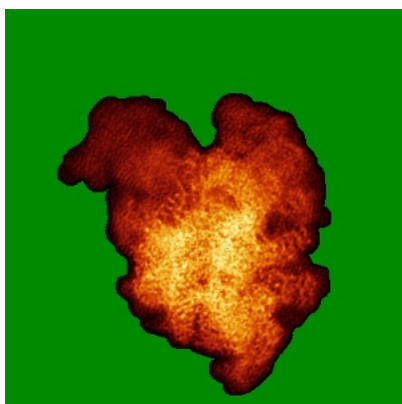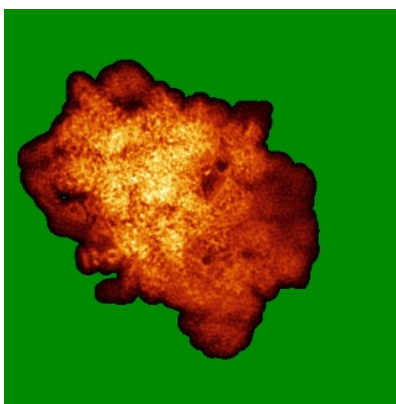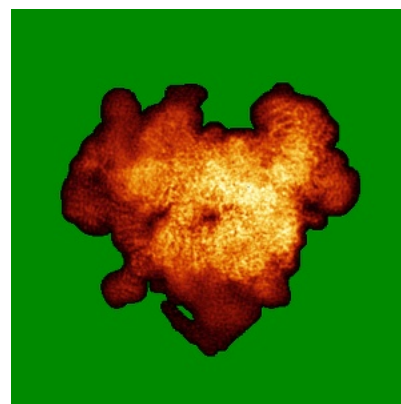
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

| X | Y | Z |
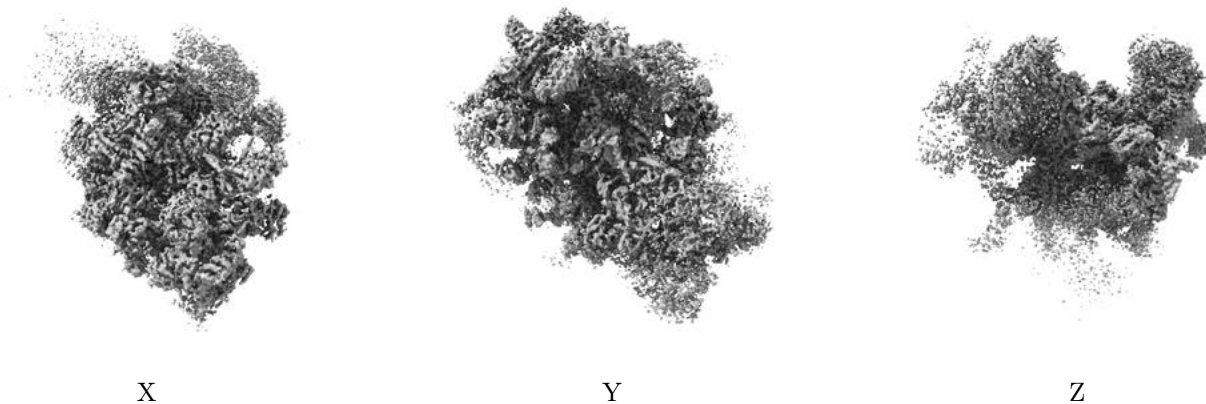
The images above show the 3D surface view of the map at the recommended contour level 0.018. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.6 Mask visualisation ⓘ

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)
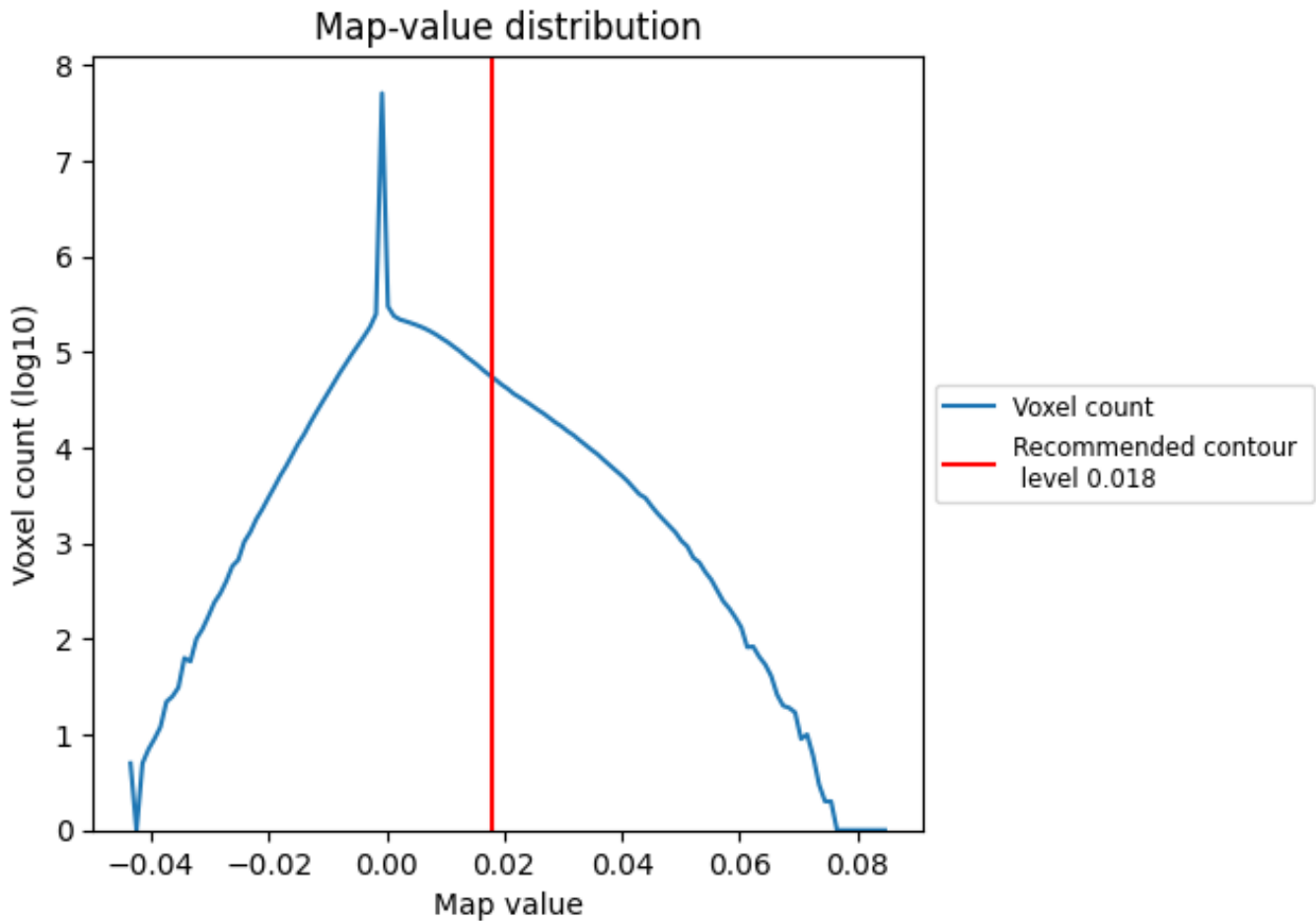
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate (i)
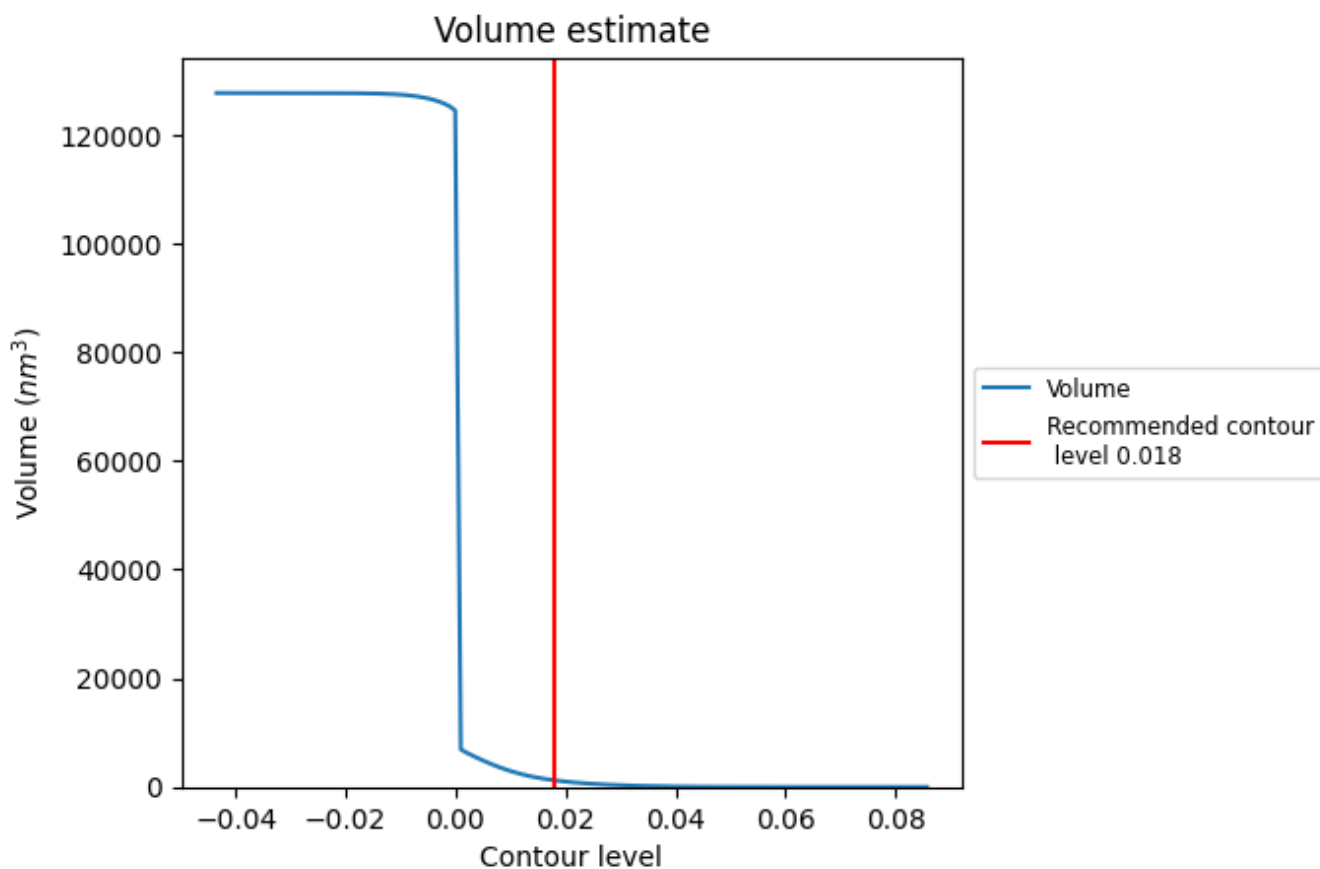
The volume at the recommended contour level is 1219 nm³; this corresponds to an approximate mass of 1101 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3　Rotationally averaged power spectrum (i)
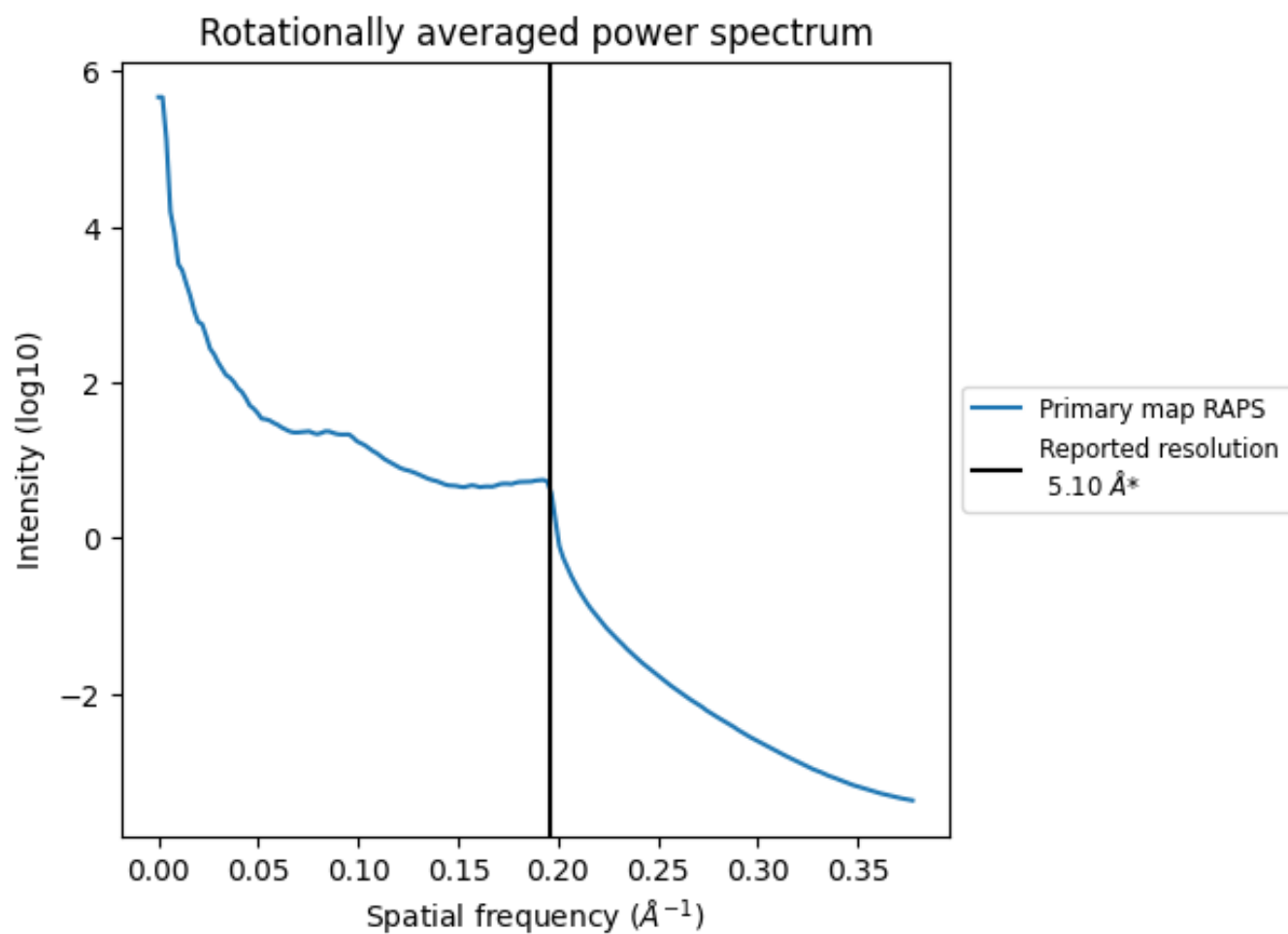
*Reported resolution corresponds to spatial frequency of 0.196 Å^{-1}

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 ⓘ
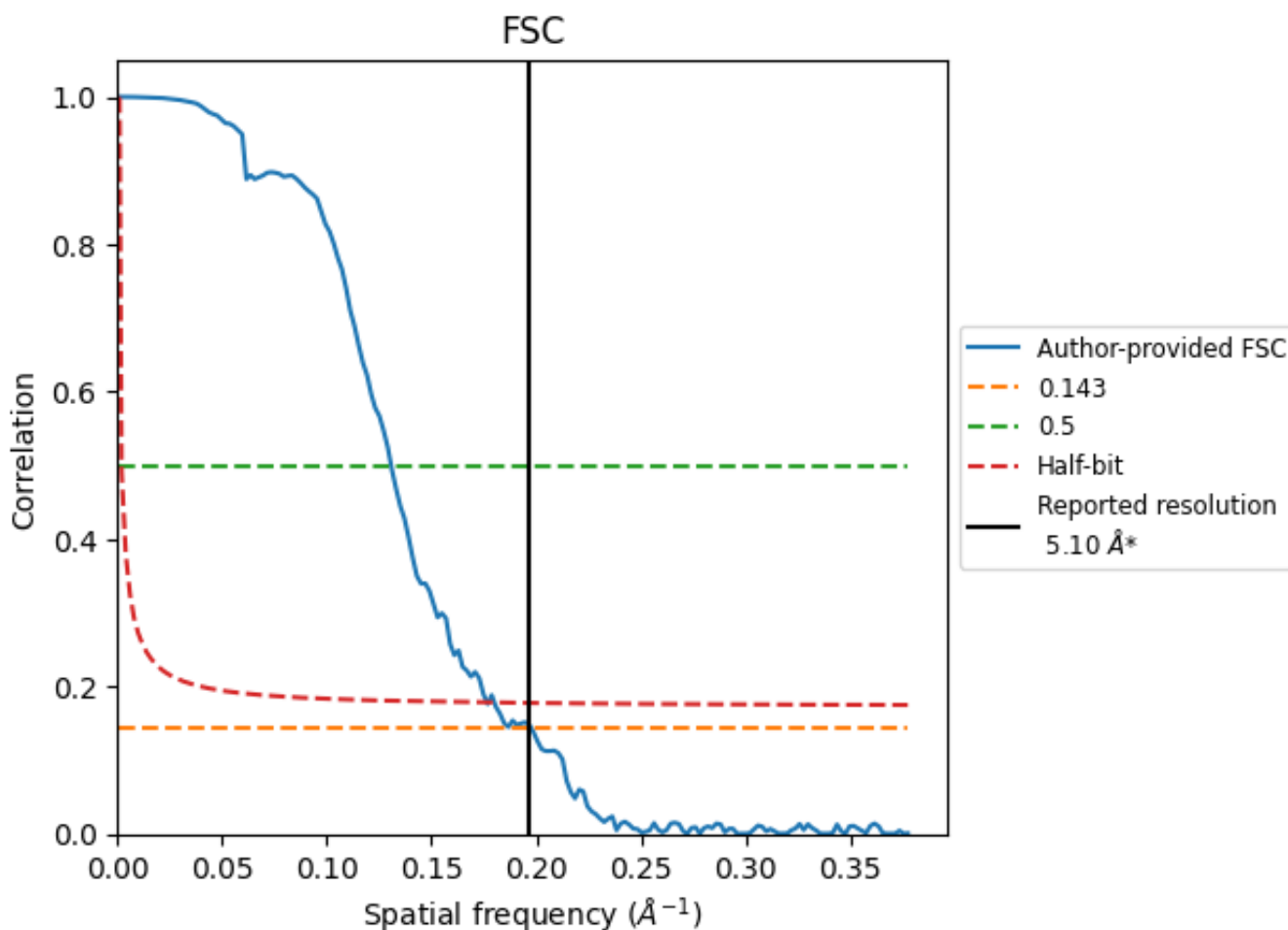
*Reported resolution corresponds to spatial frequency of 0.196 Å^{-1}

8.2　Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	5.10	-	-
Author-provided FSC curve	5.06	7.66	5.67
Unmasked-calculated*	-	-	-

*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-8473 and PDB model 5TZS. Per-residue inclusion information can be found in section 3 on page 13.

9.1   Map-model overlay (i)

X   Y   Z
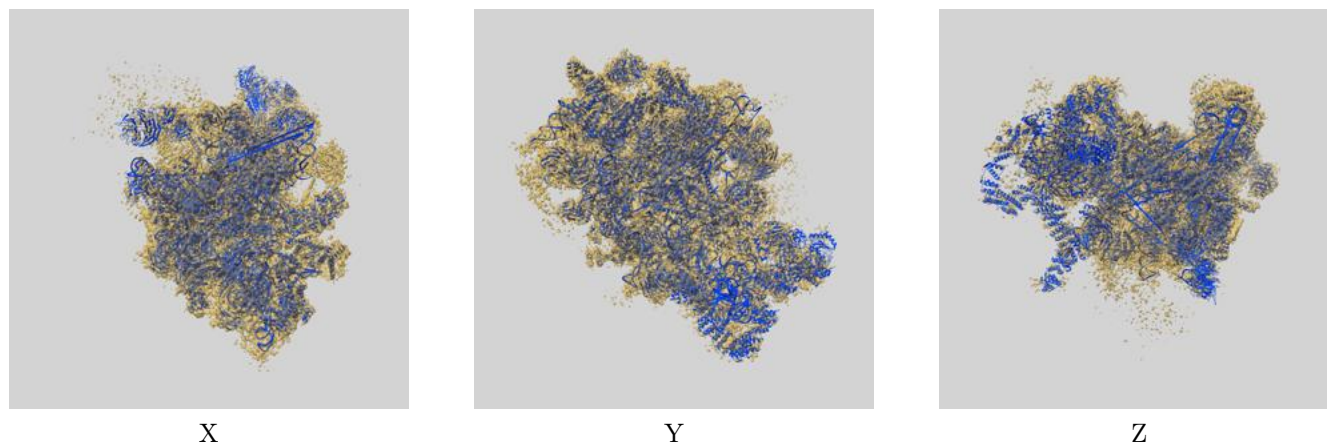
The images above show the 3D surface view of the map at the recommended contour level 0.018 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model ⓘ

X   Y   Z
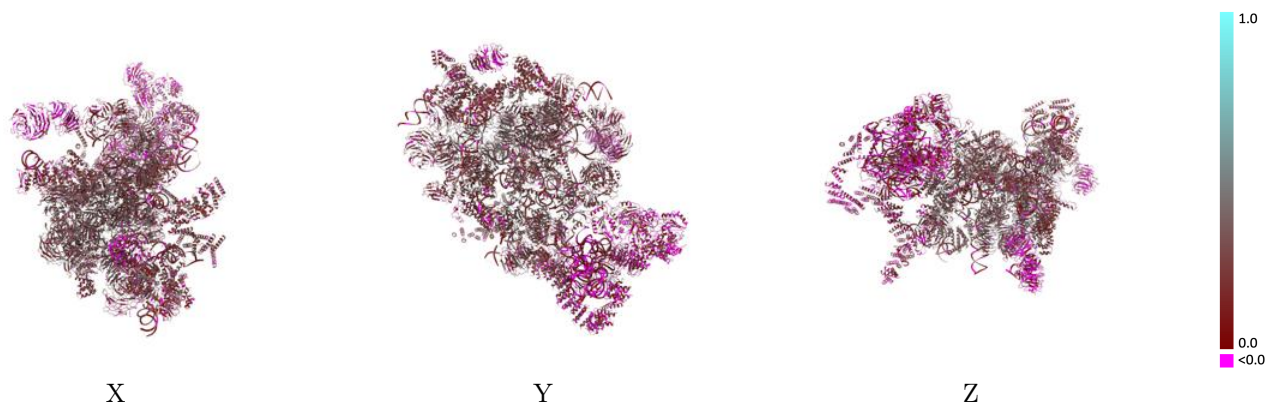
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
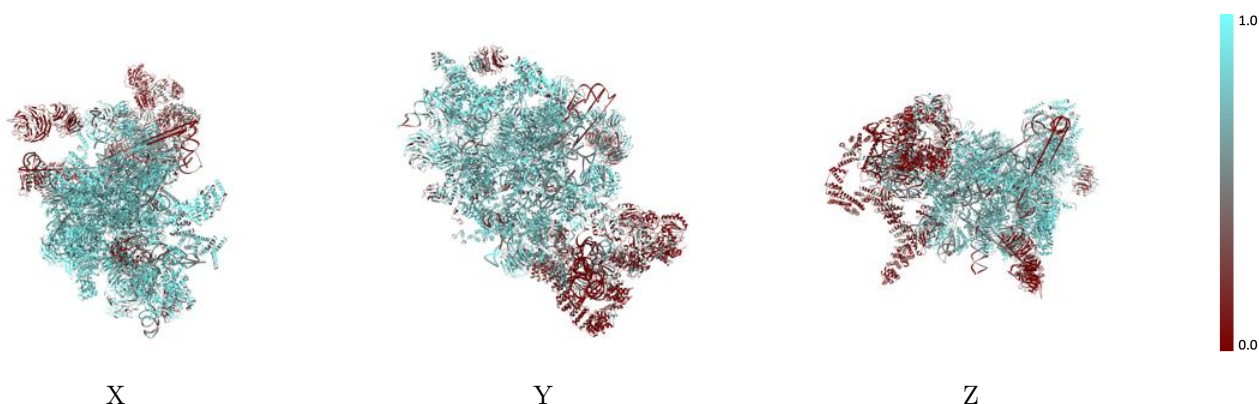
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.018).

9.4   Atom inclusion (i)
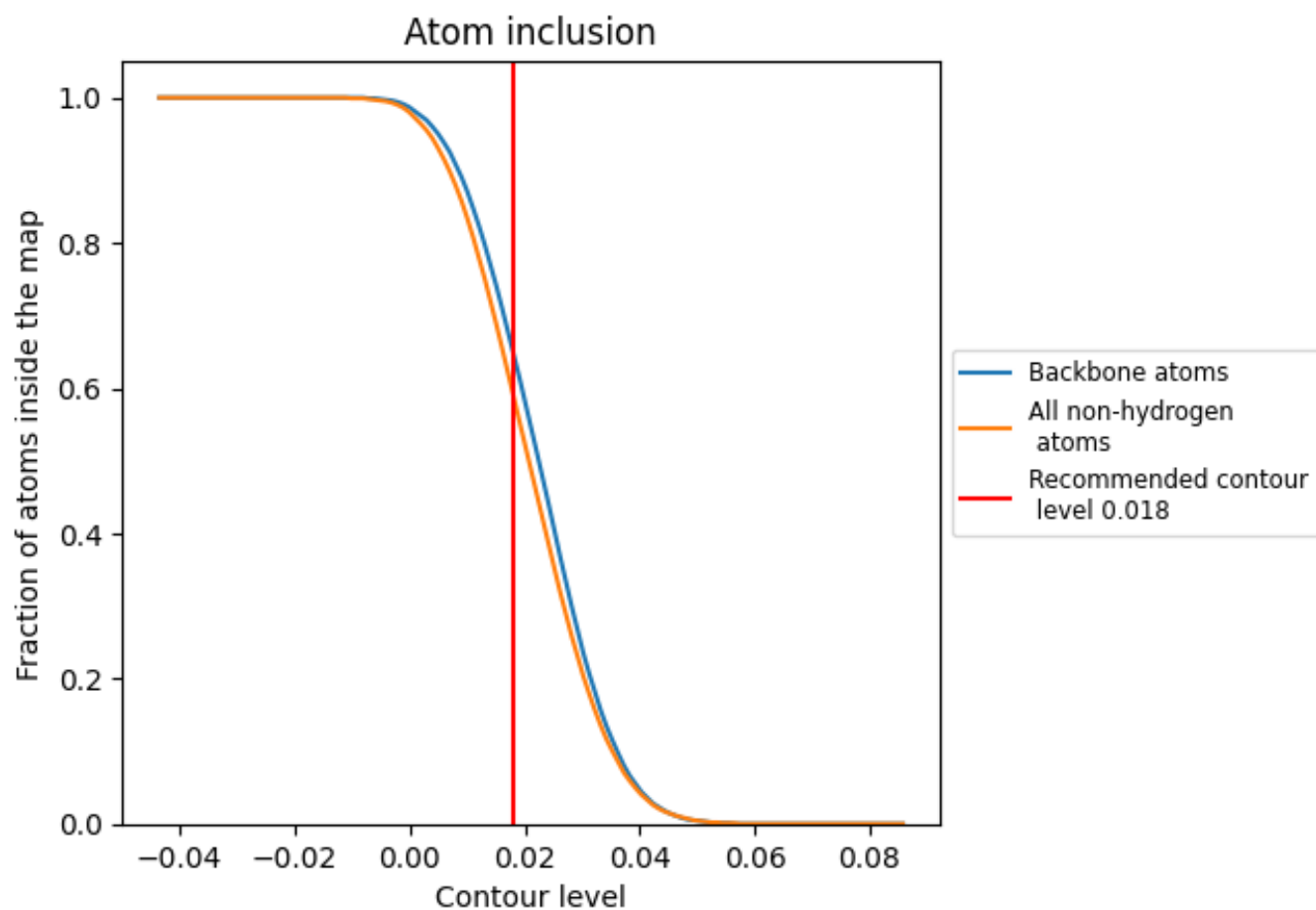
At the recommended contour level, 65% of all backbone atoms, 59% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.018) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5910	0.2220
0	0.6070	0.2240
1	0.4540	0.1320
2	0.7480	0.2460
3	0.1550	0.0920
5	0.4780	0.2120
6	0.7840	0.3030
7	0.0630	0.1230
8	0.2990	0.1450
9	0.6980	0.2580
A	0.7050	0.2770
B	0.4340	0.1860
C	0.8680	0.3440
D	0.2520	0.0990
E	0.2210	0.2220
F	0.6010	0.2400
G	0.8170	0.3800
H	0.5250	0.1500
I	0.7210	0.2200
J	0.8110	0.2700
K	0.7600	0.2390
M	0.8220	0.3410
N	0.7080	0.2560
O	0.8240	0.3370
P	0.8320	0.2500
Q	0.7260	0.2480
R	0.2290	0.0620
S	0.7890	0.3220
T	0.8460	0.3420
U	0.7640	0.2990
V	0.2930	0.1150
W	0.8270	0.2800
X	0.2850	0.1060
Y	0.0920	0.0530
Z	0.8280	0.3300

1.0

0.0
<0.0

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Chain	Atom inclusion	Q-score
a	0.7590	0.2500
b	0.7180	0.2690
c	0.8280	0.3400
d	0.6760	0.3030
e	0.7920	0.3070
f	0.7830	0.2920
g	0.7400	0.2740
h	0.7830	0.3100
i	0.7840	0.3150
j	0.6710	0.2490
k	0.7150	0.2920
l	0.8550	0.3440
m	0.7830	0.3260
n	0.7660	0.2590
o	0.3090	0.1520
p	0.1710	0.1420
q	0.8020	0.2450
r	0.8010	0.3590
s	0.7180	0.2400
t	0.9130	0.3770
u	0.8100	0.3320
v	0.7580	0.2380
y	0.7500	0.2570
z	0.4700	0.2040