WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Jun 24, 2025 – 07:54 pm BST

|		
PDB ID	:	9QEH / pdb_00009qeh
EMDB ID	:	EMD-53067
Title	:	Cryo-EM structure of the A2085-methylated 50S ribosome of a MLSb resistant S. aureus strain "MNY196" in complex with solithromycin
Authors	:	Rivalta, A.; Yonath, A.
Deposited on	:	2025-03-10
Resolution	:	2.08 Å(reported)

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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 2.08 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
Clashscore		4
Ramachandran outliers		0
Sidechain outliers		2.3%
RNA backbone		0.60

Worse   *Better*

▌ Percentile relative to all structures

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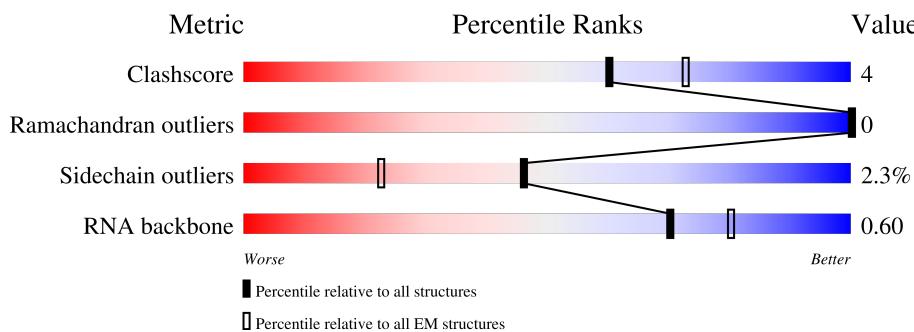
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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

Mol	Chain	Length	Quality of chain
1	1	52	69% 21% • 8%
2	2	45	89% 9% •
3	3	66	98% •
4	4	37	84% 16%
5	L	122	89% 10% •
6	A	2923	63% 25% • 11%
7	B	115	55% 38% 5% •
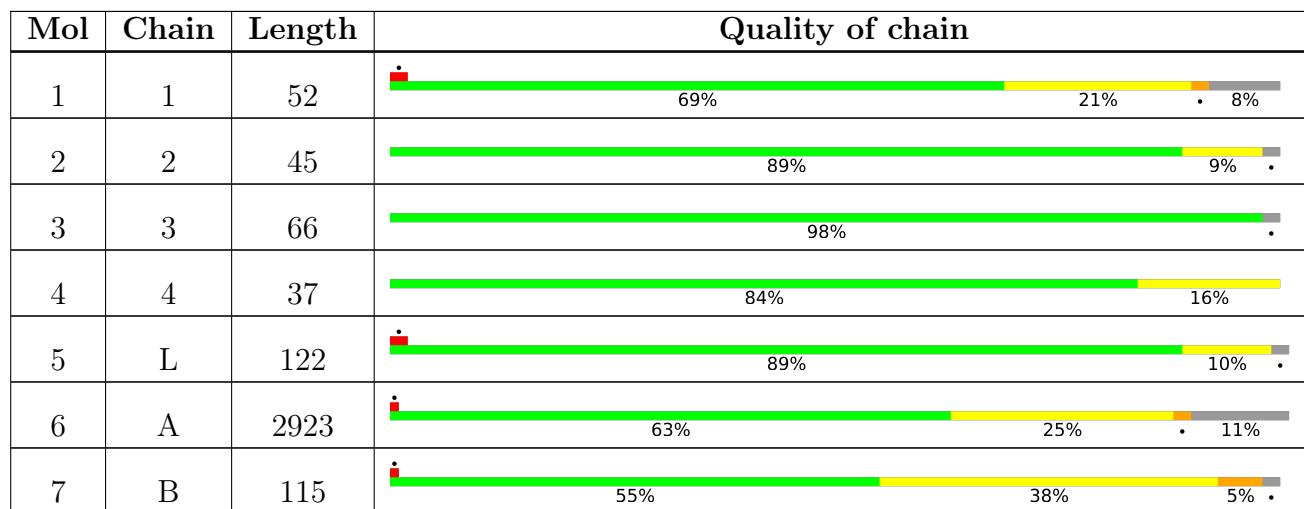
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Mol	Chain	Length	Quality of chain
8	C	277	94% 5%
9	D	220	89% 8%
10	E	207	88% 11%
11	F	179	32% 80% 10% 9%
12	G	178	10% 81% 13%
13	H	145	94% 6%
14	I	122	82% 18%
15	J	146	90% 10%
16	K	144	83% 12% 5%
17	M	119	6% 82% 15%
18	N	116	84% 12%
19	O	118	92% 7%
20	P	102	97%
21	Q	117	88% 7% 5%
22	R	91	93%
23	S	105	77% 12% 10%
24	T	217	40% 57%
25	U	94	82% 17%
26	V	62	5% 71% 11% 18%
27	W	73	79% 8% 12%
28	X	59	90% 8%
29	Z	57	68% 9% 23%
30	8	71	31% 14% 14% 68%
31	11	13	62% 38% 38% 23%

2 Entity composition ⓘ

There are 36 unique types of molecules in this entry. The entry contains 82317 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Large ribosomal subunit protein bL33A.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	48	Total 359	C 221	N 68	O 66	S 4	0	0

- Molecule 2 is a protein called Large ribosomal subunit protein bL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	2	44	Total 368	C 225	N 89	O 53	S 1	0	0

- Molecule 3 is a protein called Large ribosomal subunit protein bL35.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	3	65	Total 518	C 321	N 112	O 83	S 2	0	0

- Molecule 4 is a protein called Large ribosomal subunit protein bL36.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	4	37	Total 292	C 183	N 59	O 45	S 5	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
5	L	120	Total 908	C 563	N 182	O 162	S 1	0	0

- Molecule 6 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	A	2616	Total 56161	C 25076	N 10304	O 18163	P 2618	2	0

- Molecule 7 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	B	113	Total 2408	C 1076	N 431	O 788	P 113	0	0

- Molecule 8 is a protein called Large ribosomal subunit protein uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	C	274	Total 2043	C 1274	N 405	O 359	S 5	0	0

- Molecule 9 is a protein called Large ribosomal subunit protein uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	D	215	Total 1559	C 982	N 294	O 278	S 5	0	0

- Molecule 10 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	E	206	Total 1517	C 957	N 284	O 274	S 2	0	0

- Molecule 11 is a protein called Large ribosomal subunit protein uL5.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	F	162	Total 937	C 582	N 179	O 174	S 2	0	0

- Molecule 12 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	G	175	Total 1165	C 724	N 230	O 208	S 3	0	0

- Molecule 13 is a protein called Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	H	145	Total 1088	C 686	N 203	O 196	S 3	0	0

- Molecule 14 is a protein called Large ribosomal subunit protein uL14.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	I	122	Total 908	C 566	N 173	O 165	S 4	0	0

- Molecule 15 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms				AltConf	Trace
15	J	146	Total 1024	C 637	N 209	O 178	0	0

- Molecule 16 is a protein called Large ribosomal subunit protein uL16.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	K	137	Total 1040	C 668	N 197	O 172	S 3	0	0

- Molecule 17 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	M	119	Total 813	C 507	N 163	O 143	0	0

- Molecule 18 is a protein called Large ribosomal subunit protein bL19.

Mol	Chain	Residues	Atoms				AltConf	Trace
18	N	112	Total 860	C 544	N 172	O 144	0	0

- Molecule 19 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	O	117	Total 910	C 576	N 184	O 146	S 4	0	0

- Molecule 20 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	P	102	Total 757	C 484	N 138	O 134	S 1	0	0

- Molecule 21 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Q	111	Total 802	C 506	N 157	O 137	S 2	0	0

- Molecule 22 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	R	89	Total 650	C 416	N 116	O 114	S 4	0	0

- Molecule 23 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	S	94	Total 664	C 421	N 124	O 118	S 1	0	0

- Molecule 24 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms				AltConf	Trace
24	T	94	Total 624	C 401	N 113	O 110	0	0

- Molecule 25 is a protein called Large ribosomal subunit protein bL27.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	U	78	Total 566	C 352	N 114	O 100	0	0

- Molecule 26 is a protein called Large ribosomal subunit protein bL28.

Mol	Chain	Residues	Atoms				AltConf	Trace
26	V	51	Total 370	C 229	N 80	O 61	0	0

- Molecule 27 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms				AltConf	Trace
27	W	64	Total 480	C 299	N 97	O 84	0	0

- Molecule 28 is a protein called Large ribosomal subunit protein uL30.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	X	58	Total 434	C 271	N 84	O 79	0	0

- Molecule 29 is a protein called Large ribosomal subunit protein bL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Z	44	Total 344	C 212	N 73	O 55	S 4	0	0

- Molecule 30 is a RNA chain called P_site tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	8	23	Total 497	C 221	N 94	O 159	P 23	0	0

- Molecule 31 is a RNA chain called E_site tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	11	13	Total 280	C 124	N 53	O 90	P 13	0	0

- Molecule 32 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
32	1	1	Total 1	Zn 1	0
32	4	1	Total 1	Zn 1	0
32	Z	1	Total 1	Zn 1	0

- Molecule 33 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
33	L	1	Total 1	Mg 1	0
33	A	227	Total 227	Mg 227	0
33	D	1	Total 1	Mg 1	0
33	J	1	Total 1	Mg 1	0

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Mol	Chain	Residues	Atoms		AltConf
33	U	1	Total	Mg	0
			1	1	

- Molecule 34 is (3aS,4R,7S,9R,10R,11R,13R,15R,15aR)-1-{4-[4-(3-aminophenyl)-1H-1,2,3-tri azol-1-yl]butyl}-4-ethyl-7-fluoro-11-methoxy-3a ,7,9,11,13,15-hexamethyl-2,6,8,14-tetraox otetradecahydro-2H-oxacyclotetradecino[4,3-d][1,3]oxazol-10-yl 3,4,6-trideoxy-3-(dimethyl amino)-beta-D-xylo-hexopyranoside (CCD ID: EM1) (formula: $C_{43}H_{65}FN_6O_{10}$) (labeled as "Ligand of Interest" by depositor).

EM1
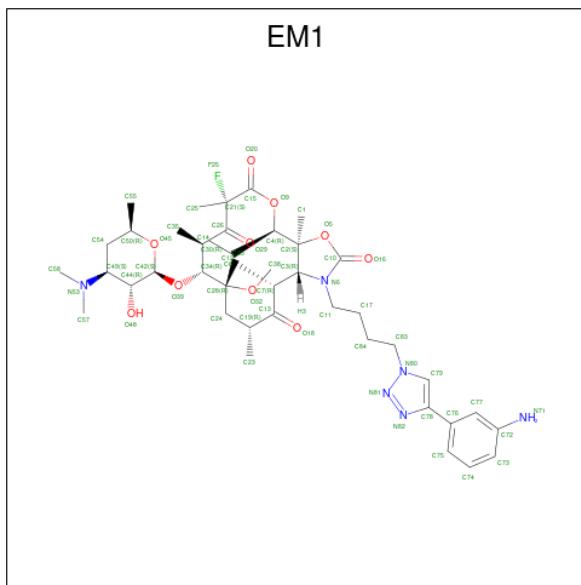
Mol	Chain	Residues	Atoms					AltConf
			Total	C	F	N	O	
34	A	1	60	43	1	6	10	0

- Molecule 35 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
35	A	11	Total	K	0
			11	11	
35	C	1	Total	K	0
			1	1	

- Molecule 36 is water.

Mol	Chain	Residues	Atoms		AltConf
36	3	1	Total	O	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
36	A	626	Total 626	O 626	0
36	C	21	Total 21	O 21	0
36	D	3	Total 3	O 3	0
36	E	1	Total 1	O 1	0
36	H	1	Total 1	O 1	0
36	J	6	Total 6	O 6	0
36	N	2	Total 2	O 2	0
36	O	2	Total 2	O 2	0
36	R	1	Total 1	O 1	0
36	X	1	Total 1	O 1	0

3 Residue-property plots ⓘ

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

• Molecule 1: Large ribosomal subunit protein bL33A
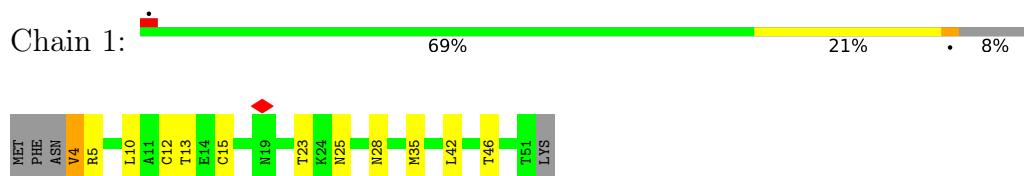
Chain 1:

• Molecule 2: Large ribosomal subunit protein bL34
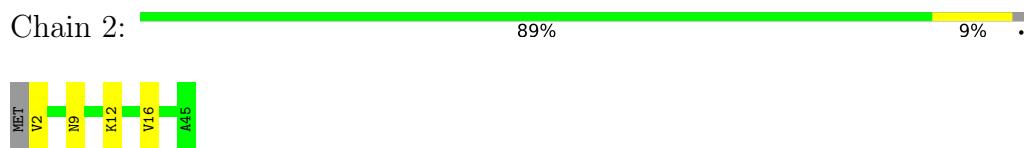
Chain 2:

• Molecule 3: Large ribosomal subunit protein bL35

Chain 3:

• Molecule 4: Large ribosomal subunit protein bL36
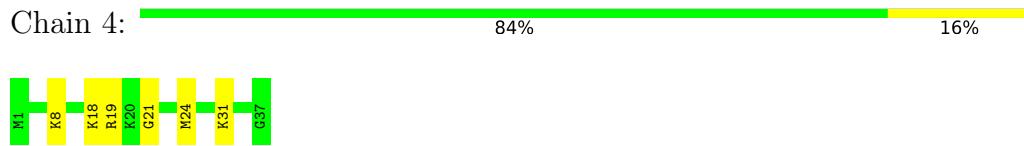
Chain 4:

• Molecule 5: Large ribosomal subunit protein bL17
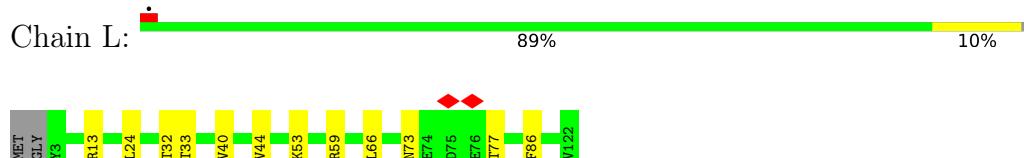
Chain L:

• Molecule 6: 23S rRNA
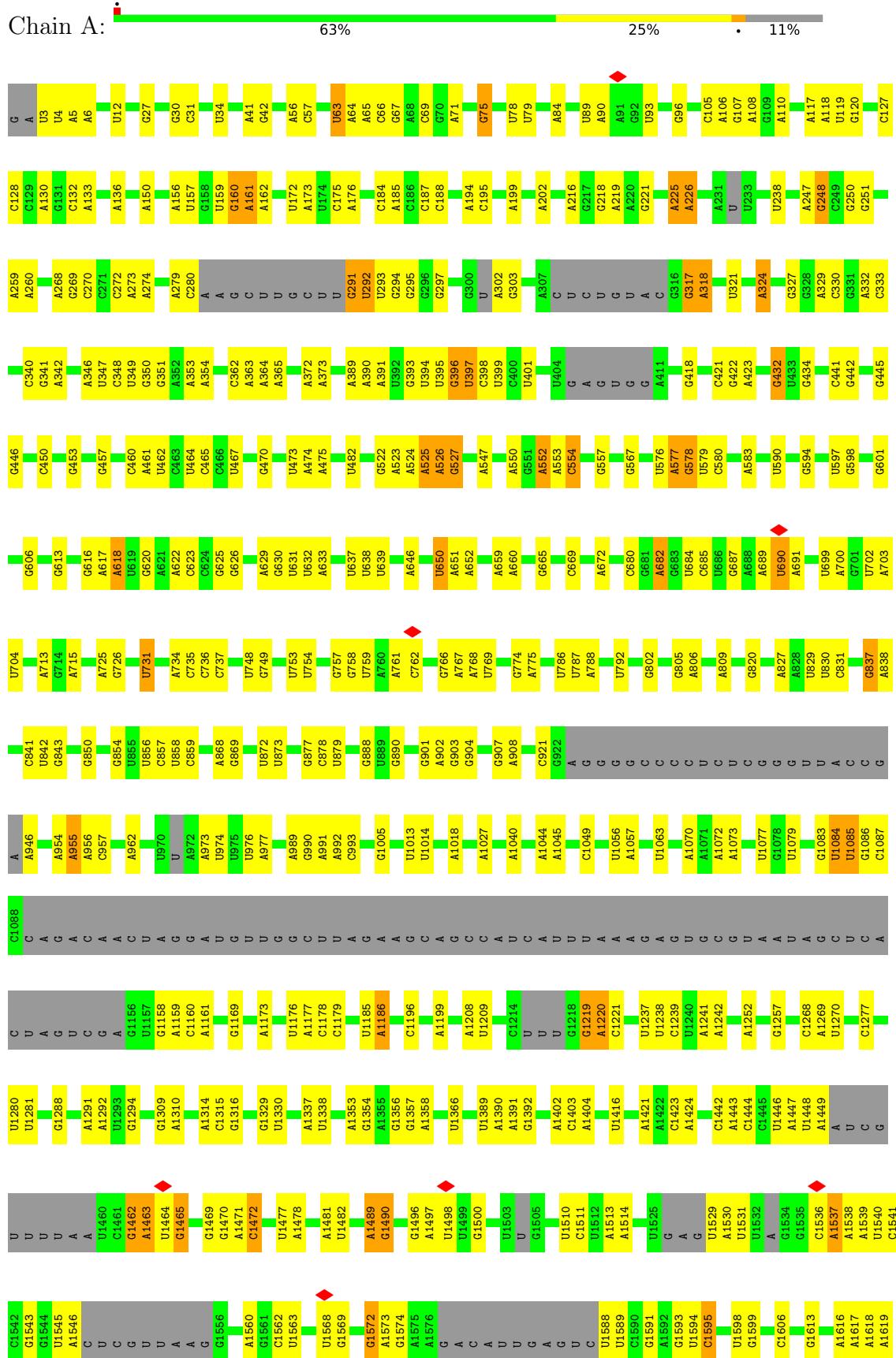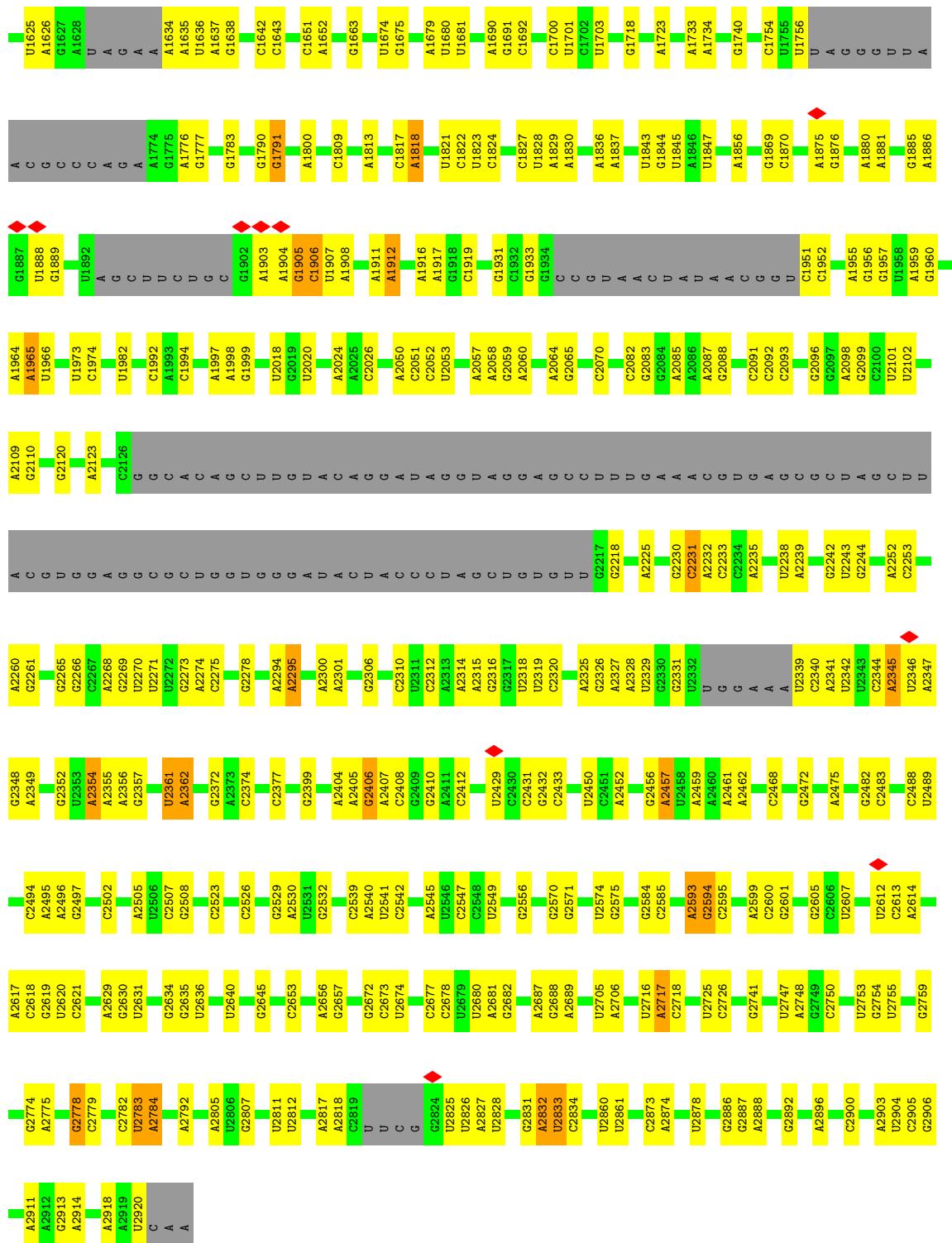
Chain A:

• Molecule 7: 5S rRNA

Chain B:

A104 C105 G106 U107 U108 G109 C110 C111 A112 G113 G114 C
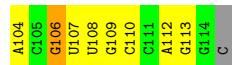
• Molecule 8: Large ribosomal subunit protein uL2

Chain C: 94% 5% •

MET A2 E23 F67 V95 G99 E100 K101 I105 Q133 K150 L173 I174 S186 K207 V271 K275 LYS LYS

• Molecule 9: Large ribosomal subunit protein uL3

Chain D: 89% 8% •

MET T2 K3 G4 K38 G52 K85 V96 S137 R138 G139 F147 M156 A157 S158 D159 A160 V163 F164 E191 N192 K193 N200 I211 K216 LYS GLY ASN LYS

• Molecule 10: Large ribosomal subunit protein uL4

Chain E: 88% 11%

MET A2 N3 Y4 D5 K13 I17 E18 L19 A22 S58 T77 P81 V89 P102 R111 S115 Q119 L123 L153 L181 I186 L192 E196 K200 K201 V202 L206 G207

• Molecule 11: Large ribosomal subunit protein uL5

32%

Chain F: 80% 10% 9%

MET N2 R3 L4 K5 E6 K7 F8 N9 T10 E11 V12 T13 E14 K18 N21 S24 V25 M26 P29 K30 I31 M38 D42 A43 V44 GLN ASN SER K48 D51 N52 A53 V54 E58 G62 A70 K71 K72 SER ILE ALA THR PHE ARG LEU R80 M83 P84

I85 L103 I104 S107 L108 P109 R110 V111 R112 D113 PHE GLN G116 V117 S118 K119 K120 T129 L130 G131 V132 K133 E134 Q135 L136 I137 F138 P139 E140 I141 D142 Y143 ASP LYS V146 S147 K148 V149 R150 D153 I154 V155 T158 T159 A160 N161 E164 R167 E168 L169 L170 F173

G174 M175 P176 F177 ARG LYS

• Molecule 12: Large ribosomal subunit protein uL6

10%

Chain G: 81% 13% • •

MET S2 R3 V4 G5 P12 S13 D14 V15 T16 K30 R35 T36 K44 Q45 E46 E47 N48 T49 I50 E51 V52 R62 T63 N64 T68 R69 N74 K85 V86 L87 A96 Q97 M98 L103 I104 V107 E118 F123 S124 V125 E126 K127

N128 T129 V130 I136 L144 I162 R163 Y164 E167 Y168 V169 K175 T176 GLY LYS
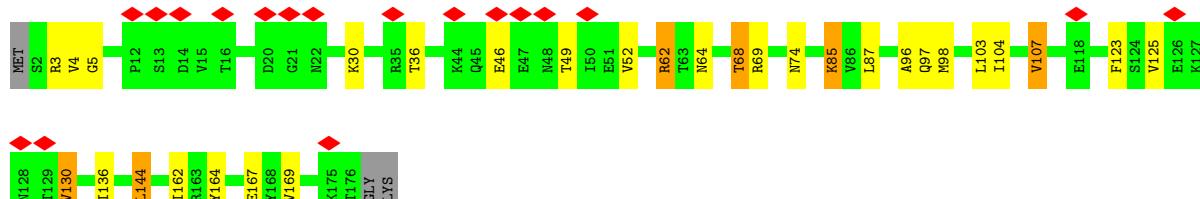
• Molecule 13: Large ribosomal subunit protein uL13

Chain H:

94% 6%

M1 L26 K42 T51 F65 P82 T113 Y126 H133 G145
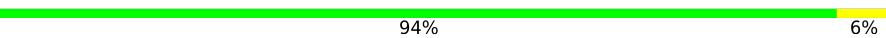
• Molecule 14: Large ribosomal subunit protein uL14

Chain I:

82% 18%

M1 R17 K23 V24 G29 R30 K31 T32 A33 N34 I35 T42 V43 K44 T47 V52 K66 I77 D90 K91 R94 A103 R107 F111 M112 K113 L117 L122

• Molecule 15: Large ribosomal subunit protein uL15

Chain J:

90% 10%

M1 K2 L3 H4 R13 R21 N27 S31 V77 E86 T89 L96 V97 V101 I111 N114 I146

• Molecule 16: Large ribosomal subunit protein uL16

Chain K:

83% 12% 5%

M1 L2 L3 K8 T38 T39 I42 T43 R51 T55 V64 R82 I94 A95 V96 E112 L118 K128 F131 L137 GLY GLY GLU THR ASN GLU SER

• Molecule 17: Large ribosomal subunit protein uL18

Chain M:

6%

82% 15% •

M1 K4 I5 D6 K7 N8 K9 V10 R11 L12 K13 R17 V18 R19 T20 N21 L22 P29 R35 I44 A54 Q55 A56 S61 A64 T65 T66 A67 T68 I80 A85 D86 I92 Y99 A112 L117 E118 F119

• Molecule 18: Large ribosomal subunit protein bL19

Chain N:

•

84% 12% •

MET THR ASN H4 I7 L19 H31 E36 G37 T38 R39 E40 R41 R74 E84 K85 I86 E87 V88 R91 L105 R106 I115 ARG

• Molecule 19: Large ribosomal subunit protein bL20

Chain O:

92% 7% •

MET P2 K15 R51 Y76 S77 M80 M94 S101 A105 K118

• Molecule 20: Large ribosomal subunit protein bL21

Chain P: 97%

M1 I4 I20 F40 A102

• Molecule 21: Large ribosomal subunit protein uL22

Chain Q: 88%   7%   5%

M1 T9 I10 R11 V46 I47 E48 K49 V50 L51 M52 R88 S94 K111 GLU ALA LYS GLU ALA
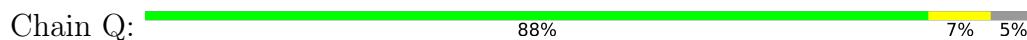
• Molecule 22: Large ribosomal subunit protein uL23

Chain R: 93%

MET E2 A3 I6 F46 I87 F90 ASN

• Molecule 23: Large ribosomal subunit protein uL24

Chain S: 77%   12%   10%

MET H2 K5 K15 T26 L27 P28 K42 Q45 K46 P47 THR GLN LEU ASN PRO GLU GLY G55 I56 L57 E58 G88 K89 K90 V91 K95 K102 SER ASN ASN
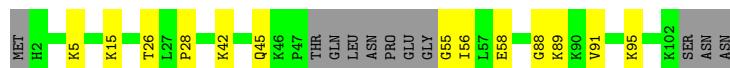
• Molecule 24: 50S ribosomal protein L25

Chain T: 40%   •   57%

MET A2 I8 R15 V39 I52 E62 G66 V74 N95 MET SER GLU GLU ARG THR VAL GLU VAL PRO VAL GLN LEU VAL GLY GLU ALA VAL GLY ALA LYS GLU GLY GLY VAL VAL GLU GLU GLN PRO LEU PHE ASN LEU GLU VAL THR ALA THR PRO ASP ASN ILE

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

GLN THR GLU GLU PRO GLU VAL VAL GLY GLU SER LYS GLU ASP GLU GLU LYS THR GLU GLU

• Molecule 25: Large ribosomal subunit protein bL27

Chain U: 82%   •   17%

MET LEU LYS LEU ASN LEU GLN PHE PHE ALA SER LYS LYS GLY VAL S16 K52 A93 GLU

• Molecule 26: Large ribosomal subunit protein bL28

Chain V:

5%

71%   11%   18%

MET GLY LYS GLN CYS PHE VAL THR GLY ARG LYS A12 L39 P44 S50 A51 L54 K55 S56 G57 K58 V59 V62
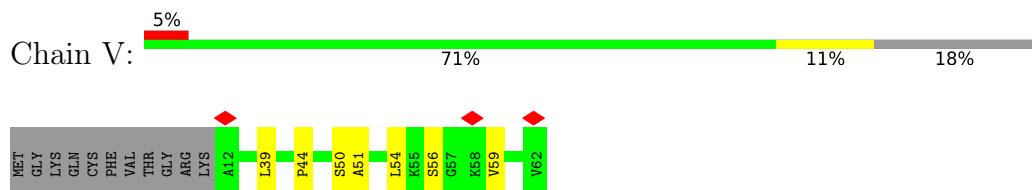
• Molecule 27: Large ribosomal subunit protein uL29

Chain W:

79%   8%   12%

MET VAL LYS GLN MET K6 T14 T15 S16 E17 L41 E42 E43 K52 S69 LYS ALA ASN GLN
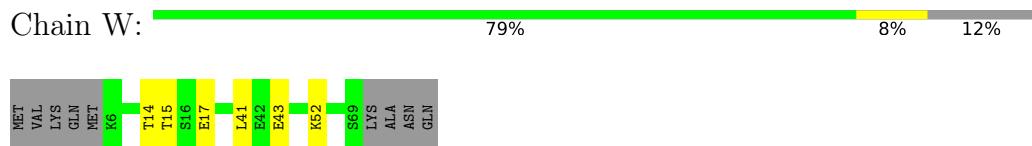
• Molecule 28: Large ribosomal subunit protein uL30

Chain X:

90%   8%

MET A2 V12 T18 Q19 R20 K29 K49 K59
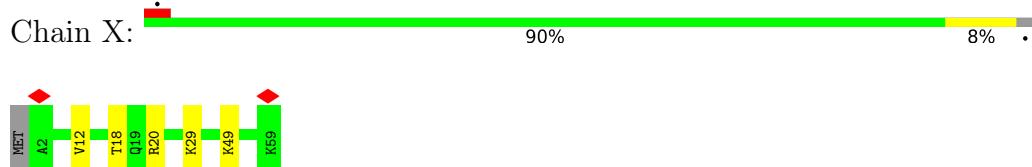
• Molecule 29: Large ribosomal subunit protein bL32

Chain Z:

68%   9%   23%

MET A2 M27 C33 GLY E35 Y36 C43 K44 N45 C46 GLY SER TYR ASN GLY GLU VAL ALA ALA LYS

• Molecule 30: P_site tRNA

Chain 8:

31%

14%   14%   68%

C G C G G G A U8 G9 G10 A11 G12 C13 A14 G15 G A G23 C24 U25 C26 G27 U28 C29 G G G C U C A U A G G C G43 A44 A45 G46 G47 C G G U G G U U C A A A U C C G C C

U C C C G C A A C75 C76 A77

• Molecule 31: E_site tRNA

Chain 11:

62%

38%   38%   23%

G1 G2 C3 C4 G5 G69 G70 C71 C72 A73 C74 C75 A76
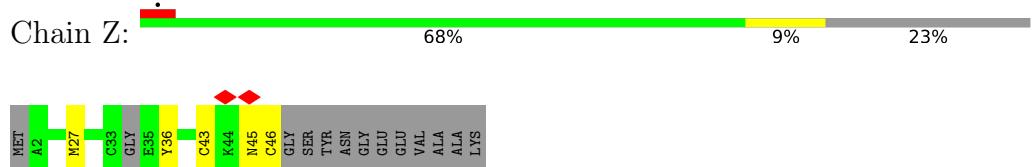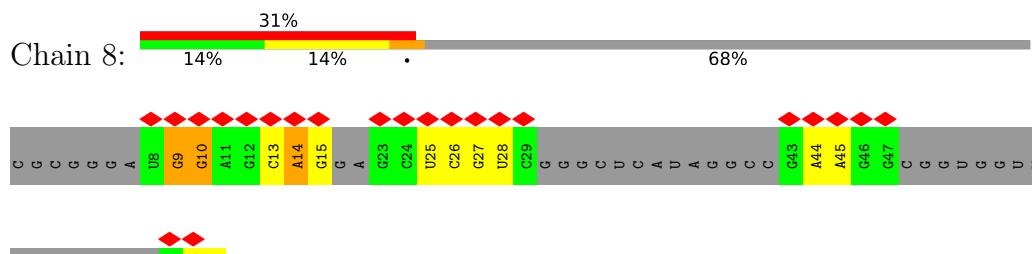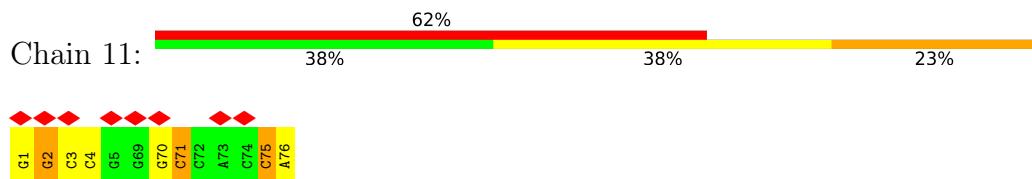
4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	263087	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.298	Depositor
Minimum map value	-0.108	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.02	Depositor
Map size (Å)	362.56, 362.56, 362.56	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.824, 0.824, 0.824	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: K, 2MG, MA6, EM1, 5MU, H2U, ZN, MG, G7M, OMG, PSU, 2MA

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	0.16	0/364	0.32	0/495
2	2	0.20	0/372	0.34	0/487
3	3	0.18	0/523	0.35	0/689
4	4	0.22	0/295	0.33	0/389
5	L	0.17	0/912	0.34	0/1223
6	A	0.23	0/62614	0.36	0/97606
7	B	0.17	0/2692	0.33	0/4193
8	C	0.18	0/2078	0.32	0/2799
9	D	0.18	0/1583	0.38	0/2131
10	E	0.16	0/1540	0.30	0/2087
11	F	0.13	0/945	0.32	0/1293
12	G	0.13	0/1179	0.27	0/1603
13	H	0.17	0/1110	0.35	0/1502
14	I	0.18	0/915	0.34	0/1230
15	J	0.18	0/1038	0.33	0/1395
16	K	0.19	0/1064	0.36	0/1438
17	M	0.14	0/822	0.28	0/1117
18	N	0.16	0/872	0.31	0/1172
19	O	0.21	0/922	0.35	0/1227
20	P	0.17	0/767	0.27	0/1032
21	Q	0.19	0/810	0.40	0/1097
22	R	0.17	0/657	0.30	0/886
23	S	0.17	0/671	0.30	0/904
24	T	0.13	0/631	0.30	0/863
25	U	0.16	0/572	0.33	0/764
26	V	0.16	0/375	0.33	0/506
27	W	0.14	0/481	0.29	0/645
28	X	0.18	0/436	0.35	0/589
29	Z	0.19	0/349	0.38	0/464
30	8	0.13	0/553	0.26	0/854
31	11	0.15	0/311	0.27	0/479
All	All	0.22	0/88453	0.35	0/133159

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	1	359	0	328	9	0
2	2	368	0	409	4	0
3	3	518	0	566	0	0
4	4	292	0	328	4	0
5	L	908	0	948	7	0
6	A	56161	0	28241	390	0
7	B	2408	0	1218	22	0
8	C	2043	0	2117	8	0
9	D	1559	0	1573	11	0
10	E	1517	0	1544	13	0
11	F	937	0	619	12	0
12	G	1165	0	1024	14	0
13	H	1088	0	1066	6	0
14	I	908	0	964	14	0
15	J	1024	0	1014	9	0
16	K	1040	0	1055	9	0
17	M	813	0	746	16	0
18	N	860	0	889	9	0
19	O	910	0	956	6	0
20	P	757	0	769	4	0
21	Q	802	0	839	3	0
22	R	650	0	650	2	0
23	S	664	0	658	7	0
24	T	624	0	569	2	0
25	U	566	0	555	1	0
26	V	370	0	360	3	0
27	W	480	0	491	4	0
28	X	434	0	468	4	0
29	Z	344	0	350	4	0
30	8	497	0	254	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
31	11	280	0	145	7	0
32	1	1	0	0	0	0
32	4	1	0	0	0	0
32	Z	1	0	0	0	0
33	A	227	0	0	0	0
33	D	1	0	0	0	0
33	J	1	0	0	0	0
33	L	1	0	0	0	0
33	U	1	0	0	0	0
34	A	60	0	65	0	0
35	A	11	0	0	0	0
35	C	1	0	0	0	0
36	3	1	0	0	0	0
36	A	626	0	0	1	0
36	C	21	0	0	0	0
36	D	3	0	0	0	0
36	E	1	0	0	0	0
36	H	1	0	0	0	0
36	J	6	0	0	0	0
36	N	2	0	0	0	0
36	O	2	0	0	0	0
36	R	1	0	0	0	0
36	X	1	0	0	0	0
All	All	82317	0	51778	563	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 4.

The worst 5 of 563 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)
6:A:1219:G:HO2'	6:A:1220:A:H8	1.31	0.79
13:H:126:TYR:HH	13:H:133:HIS:HE2	1.28	0.79
29:Z:43:CYS:HB3	29:Z:46:CYS:SG	2.23	0.78
1:1:5:ARG:HB3	1:1:25:ASN:HA	1.69	0.75
6:A:788:A:O2'	6:A:1703:U:OP1	2.05	0.75

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	1	46/52 (88%)	43 (94%)	3 (6%)	0	100	100
2	2	42/45 (93%)	42 (100%)	0	0	100	100
3	3	63/66 (96%)	62 (98%)	1 (2%)	0	100	100
4	4	35/37 (95%)	35 (100%)	0	0	100	100
5	L	118/122 (97%)	114 (97%)	4 (3%)	0	100	100
8	C	272/277 (98%)	270 (99%)	2 (1%)	0	100	100
9	D	213/220 (97%)	204 (96%)	9 (4%)	0	100	100
10	E	204/207 (99%)	201 (98%)	3 (2%)	0	100	100
11	F	152/179 (85%)	142 (93%)	10 (7%)	0	100	100
12	G	173/178 (97%)	165 (95%)	8 (5%)	0	100	100
13	H	143/145 (99%)	141 (99%)	2 (1%)	0	100	100
14	I	120/122 (98%)	119 (99%)	1 (1%)	0	100	100
15	J	144/146 (99%)	139 (96%)	5 (4%)	0	100	100
16	K	135/144 (94%)	131 (97%)	4 (3%)	0	100	100
17	M	117/119 (98%)	113 (97%)	4 (3%)	0	100	100
18	N	110/116 (95%)	109 (99%)	1 (1%)	0	100	100
19	O	115/118 (98%)	115 (100%)	0	0	100	100
20	P	100/102 (98%)	99 (99%)	1 (1%)	0	100	100
21	Q	109/117 (93%)	106 (97%)	3 (3%)	0	100	100
22	R	87/91 (96%)	87 (100%)	0	0	100	100
23	S	90/105 (86%)	88 (98%)	2 (2%)	0	100	100
24	T	92/217 (42%)	85 (92%)	7 (8%)	0	100	100
25	U	76/94 (81%)	74 (97%)	2 (3%)	0	100	100
26	V	49/62 (79%)	48 (98%)	1 (2%)	0	100	100
27	W	62/73 (85%)	59 (95%)	3 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
28	X	56/59 (95%)	54 (96%)	2 (4%)	0	100	100
29	Z	40/57 (70%)	36 (90%)	4 (10%)	0	100	100
All	All	2963/3270 (91%)	2881 (97%)	82 (3%)	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	
1	1	36/50 (72%)	34 (94%)	2 (6%)	17	15
2	2	38/40 (95%)	38 (100%)	0	100	100
3	3	53/57 (93%)	53 (100%)	0	100	100
4	4	34/35 (97%)	34 (100%)	0	100	100
5	L	88/102 (86%)	87 (99%)	1 (1%)	70	76
8	C	209/224 (93%)	208 (100%)	1 (0%)	86	90
9	D	154/177 (87%)	151 (98%)	3 (2%)	52	57
10	E	153/169 (90%)	150 (98%)	3 (2%)	50	55
11	F	39/158 (25%)	39 (100%)	0	100	100
12	G	89/155 (57%)	75 (84%)	14 (16%)	2	1
13	H	108/123 (88%)	108 (100%)	0	100	100
14	I	97/100 (97%)	96 (99%)	1 (1%)	73	78
15	J	91/112 (81%)	90 (99%)	1 (1%)	70	76
16	K	100/119 (84%)	96 (96%)	4 (4%)	27	27
17	M	61/95 (64%)	58 (95%)	3 (5%)	21	19
18	N	86/102 (84%)	85 (99%)	1 (1%)	67	73
19	O	86/98 (88%)	84 (98%)	2 (2%)	45	49
20	P	74/86 (86%)	74 (100%)	0	100	100
21	Q	76/94 (81%)	74 (97%)	2 (3%)	41	44

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
22	R	62/82 (76%)	61 (98%)	1 (2%)	58	64
23	S	62/90 (69%)	60 (97%)	2 (3%)	34	36
24	T	51/190 (27%)	48 (94%)	3 (6%)	16	13
25	U	50/75 (67%)	50 (100%)	0	100	100
26	V	32/52 (62%)	30 (94%)	2 (6%)	15	12
27	W	45/66 (68%)	44 (98%)	1 (2%)	47	51
28	X	48/53 (91%)	48 (100%)	0	100	100
29	Z	37/50 (74%)	37 (100%)	0	100	100
All	All	2059/2754 (75%)	2012 (98%)	47 (2%)	46	49

5 of 47 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
16	K	42	ILE
19	O	101	SER
16	K	96	VAL
17	M	80	ILE
21	Q	11	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
13	H	81	HIS
16	K	35	GLN
27	W	40	GLN
23	S	69	GLN
25	U	86	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
30	8	19/71 (26%)	5 (26%)	0
31	11	11/13 (84%)	4 (36%)	0
6	A	2590/2923 (88%)	295 (11%)	10 (0%)
7	B	112/115 (97%)	22 (19%)	2 (1%)
All	All	2732/3122 (87%)	326 (11%)	12 (0%)

5 of 326 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
6	A	34	U
6	A	63	U
6	A	71	A
6	A	75	G
6	A	84	A

5 of 12 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
6	A	2344	C
6	A	2457	A
7	B	55	A
6	A	2783	U
6	A	809	A

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

11 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	$\#|Z| > 2$
6	G7M	A	2601	6,33	20,26,27	0.58	0	17,39,42	0.33	0
6	PSU	A	2607	6	18,21,22	0.63	1 (5%)	22,30,33	0.71	1 (4%)
6	5MU	A	1966	6,35	19,22,23	0.32	0	28,32,35	0.40	0
6	PSU	A	2632	6	18,21,22	0.49	0	22,30,33	0.63	0
6	PSU	A	2484	6	18,21,22	0.53	0	22,30,33	0.59	0
6	2MG	A	2472	6	18,26,27	1.09	3 (16%)	16,38,41	0.62	0
6	2MA	A	2530	6,33,35	19,25,26	1.06	2 (10%)	21,37,40	3.03	4 (19%)
6	MA6	A	2085	6	18,26,27	0.75	0	19,38,41	0.71	0
6	OMG	A	2278	6,30	18,26,27	0.95	2 (11%)	19,38,41	0.57	0
6	5MU	A	792	6	19,22,23	0.31	0	28,32,35	0.33	0
6	H2U	A	2476	6	18,21,22	0.35	0	21,30,33	0.43	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	G7M	A	2601	6,33	-	0/3/25/26	0/3/3/3
6	PSU	A	2607	6	-	0/7/25/26	0/2/2/2
6	5MU	A	1966	6,35	-	0/7/25/26	0/2/2/2
6	PSU	A	2632	6	-	0/7/25/26	0/2/2/2
6	PSU	A	2484	6	-	0/7/25/26	0/2/2/2
6	2MG	A	2472	6	-	1/5/27/28	0/3/3/3
6	2MA	A	2530	6,33,35	-	1/3/25/26	0/3/3/3
6	MA6	A	2085	6	-	0/7/29/30	0/3/3/3
6	OMG	A	2278	6,30	-	1/5/27/28	0/3/3/3
6	5MU	A	792	6	-	0/7/25/26	0/2/2/2
6	H2U	A	2476	6	-	0/7/38/39	0/2/2/2

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	2472	2MG	C5-C6	-2.88	1.41	1.47
6	A	2530	2MA	C6-N6	-2.36	1.25	1.34
6	A	2472	2MG	C8-N7	-2.29	1.31	1.35
6	A	2278	OMG	C5-C6	-2.21	1.42	1.47
6	A	2607	PSU	O4'-C1'	-2.15	1.40	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	2530	2MA	C5-C6-N1	-12.18	113.01	121.01
6	A	2530	2MA	C2-N1-C6	3.89	124.15	118.08
6	A	2530	2MA	C2-N3-C4	-3.72	112.50	115.52
6	A	2530	2MA	N6-C6-N1	2.61	124.15	117.07
6	A	2607	PSU	O4'-C1'-C2'	2.45	108.60	105.14

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	2278	OMG	C1'-C2'-O2'-CM2
6	A	2472	2MG	C3'-C4'-C5'-O5'
6	A	2530	2MA	O4'-C4'-C5'-O5'

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	2601	G7M	2	0
6	A	1966	5MU	1	0
6	A	2085	MA6	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 247 ligands modelled in this entry, 246 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
34	EM1	A	3001	-	58,64,64	0.51	0	71,97,97	0.45	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
34	EM1	A	3001	-	-	1/71/112/112	0/4/5/5

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
34	A	3001	EM1	C84-C83-N80-N81

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 then 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.

Ligand EM1 A 3001

Bond lengths   Bond angles

Torsions   Rings
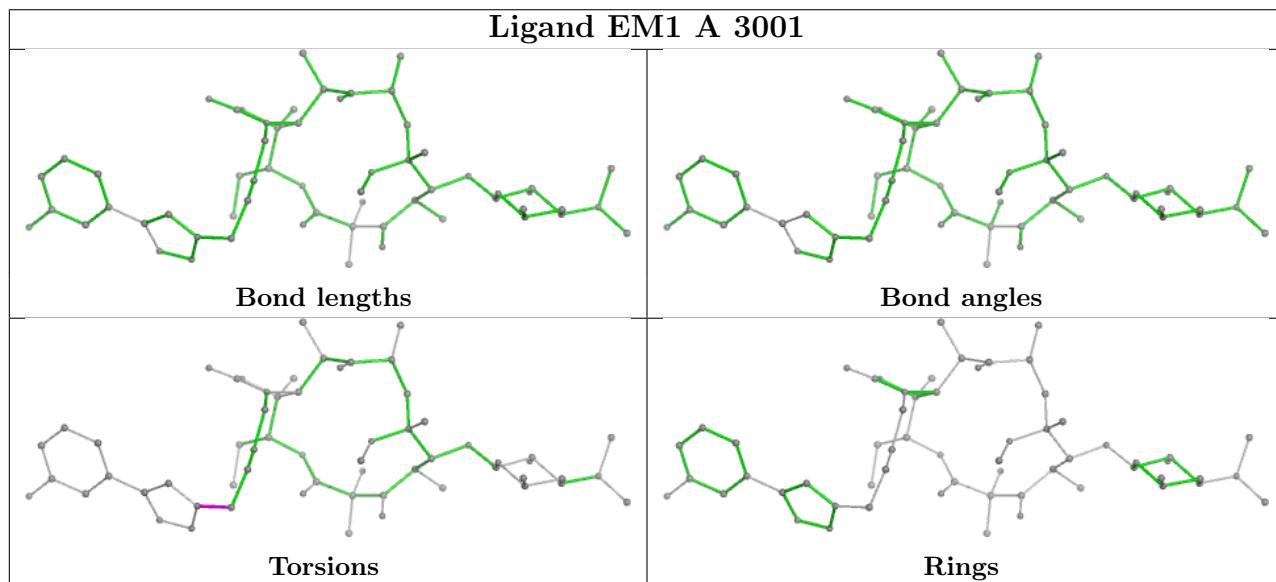
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
31	11	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	11	5:G	O3'	69:G	P	13.84

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-53067. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections ⓘ
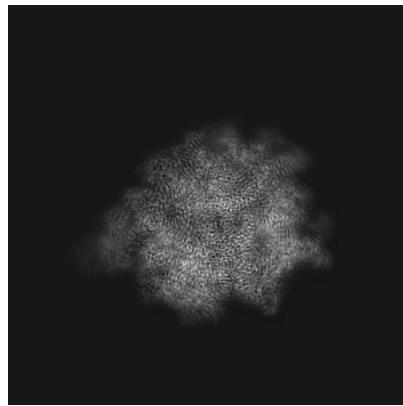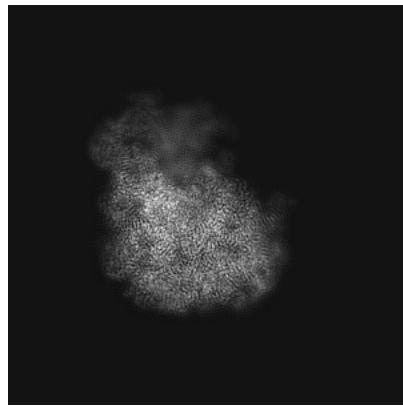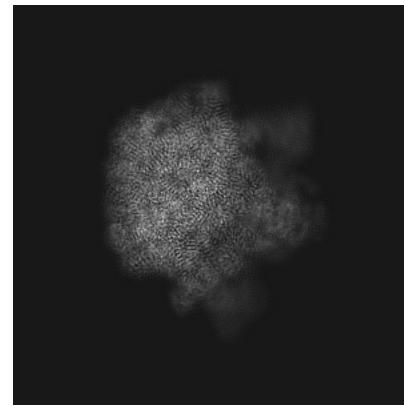
6.1.1 Primary map

| X | Y | Z |

6.1.2 Raw map

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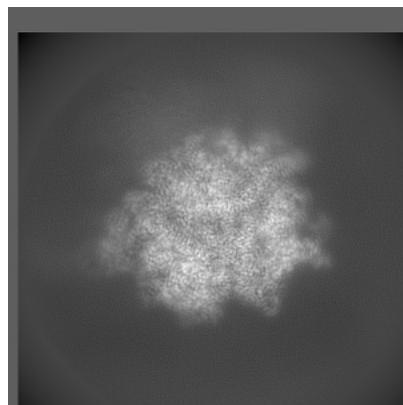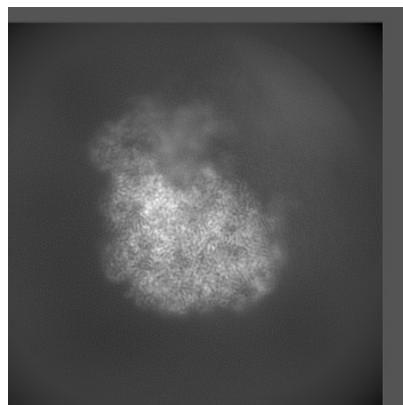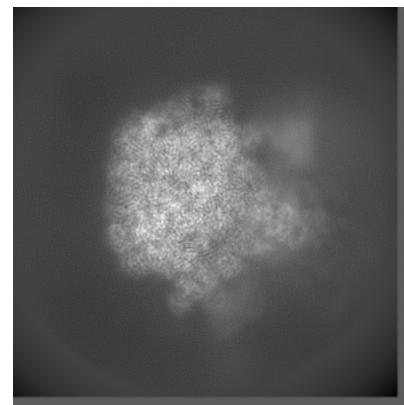
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
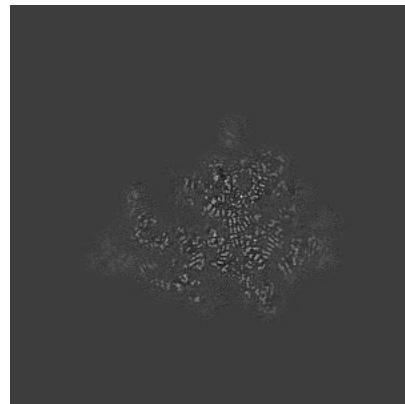
6.2.1 Primary map
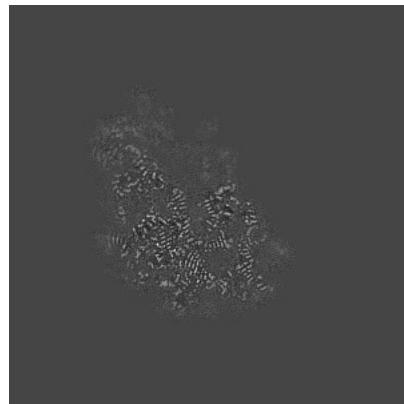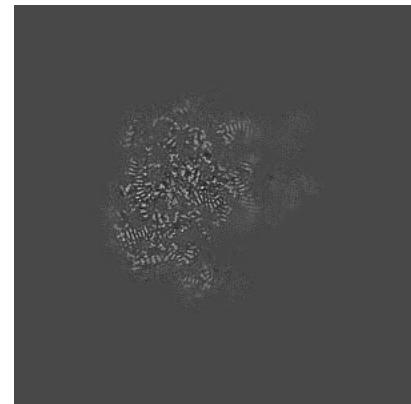
| X Index: 220 | Y Index: 220 | Z Index: 220 |

6.2.2 Raw map
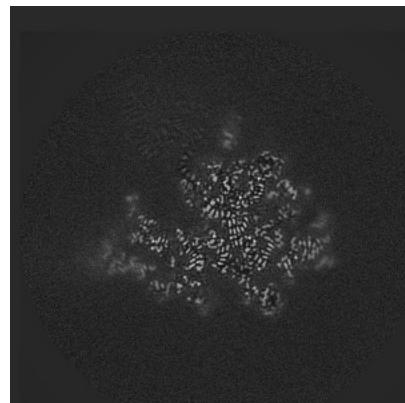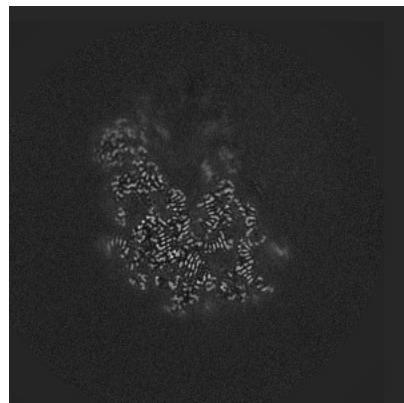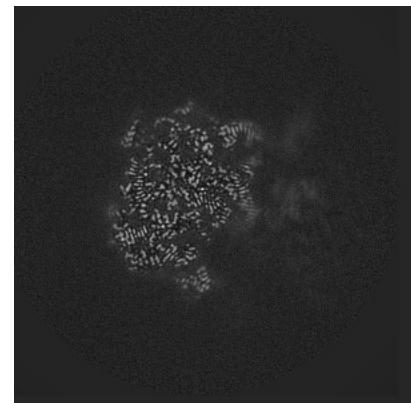
| X Index: 220 | Y Index: 220 | Z Index: 220 |

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

6.3 Largest variance slices (i)

6.3.1 Primary map
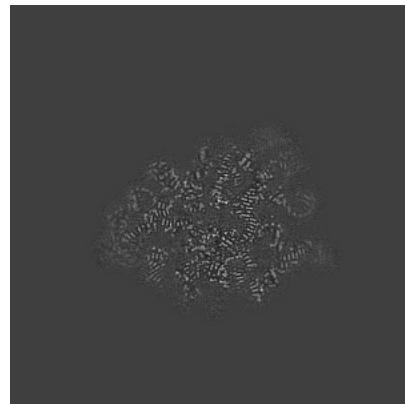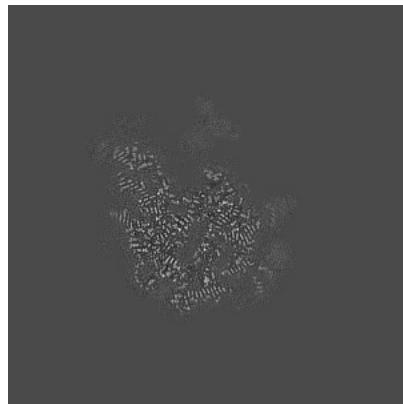
X Index: 192	Y Index: 237	Z Index: 177
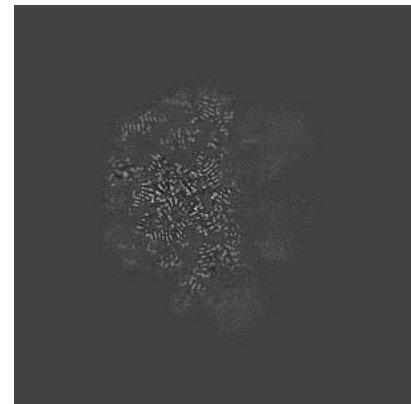
6.3.2 Raw map
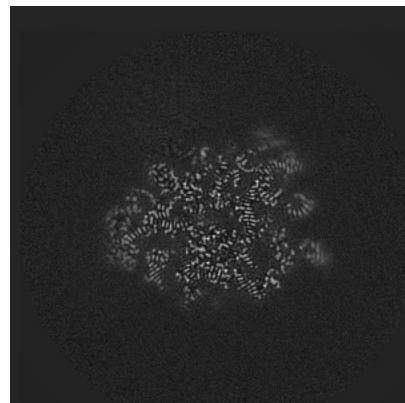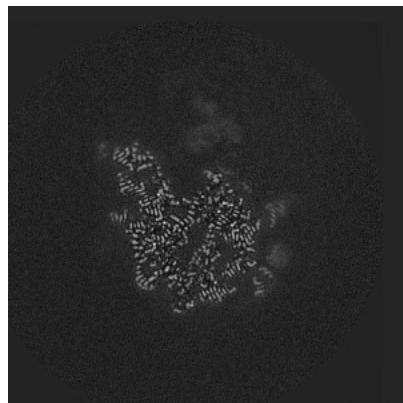
X Index: 191	Y Index: 236	Z Index: 164
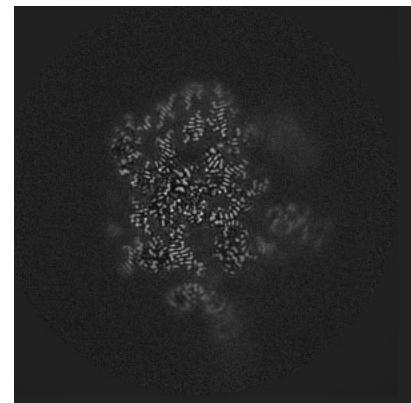
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map
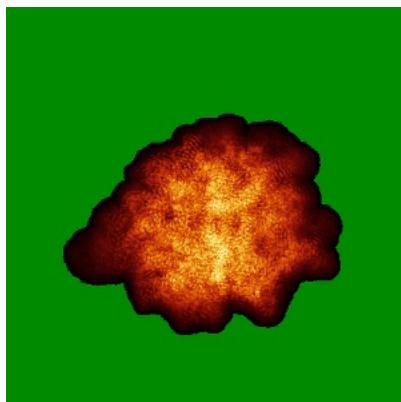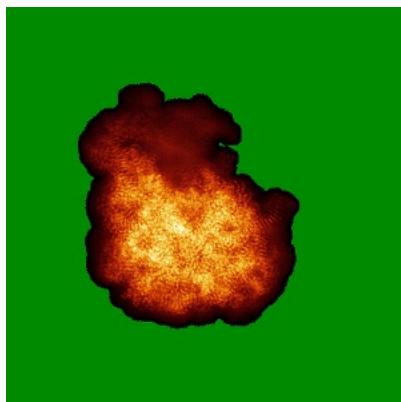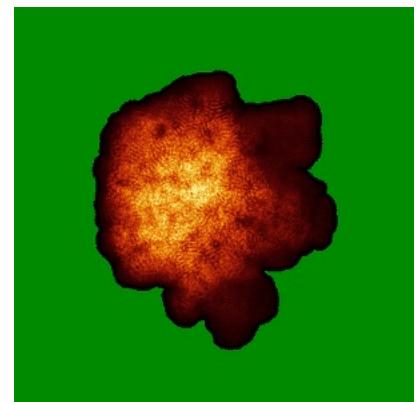
X	Y	Z

6.4.2 Raw map

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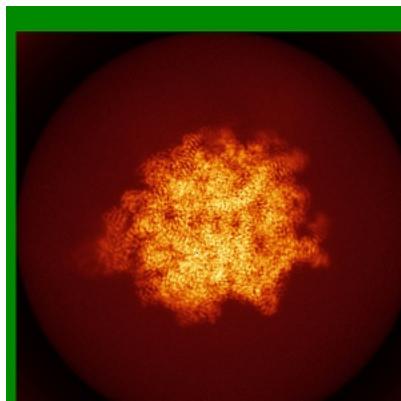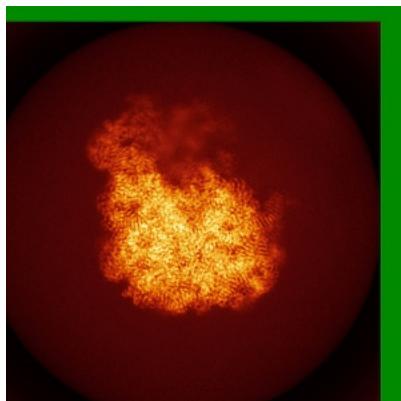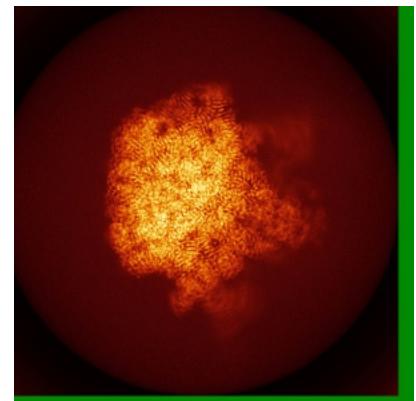
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

| X | Y | Z |
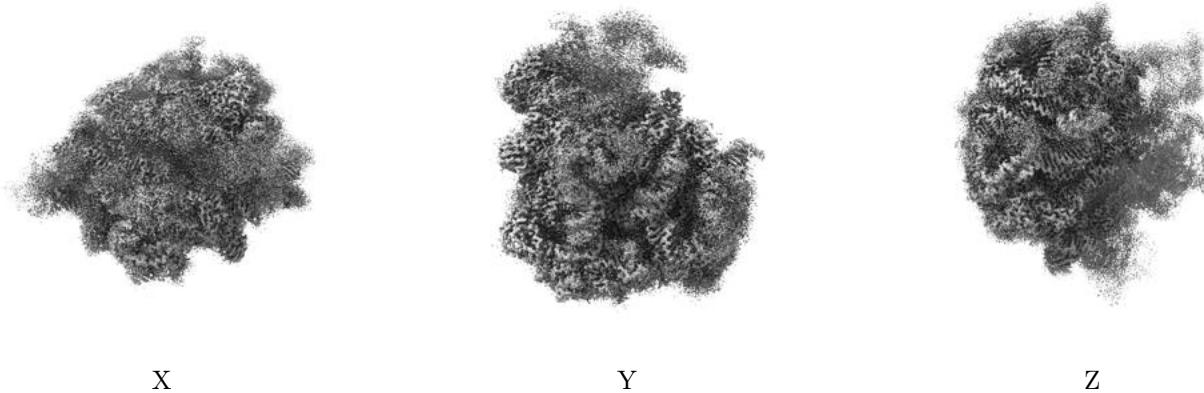
The images above show the 3D surface view of the map at the recommended contour level 0.02. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

| X | Y | Z |
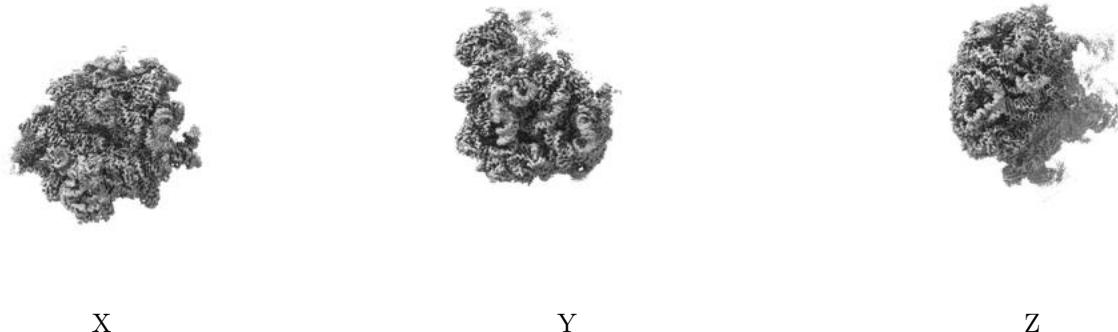
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation ⓘ

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

7 Map analysis ⓘ

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

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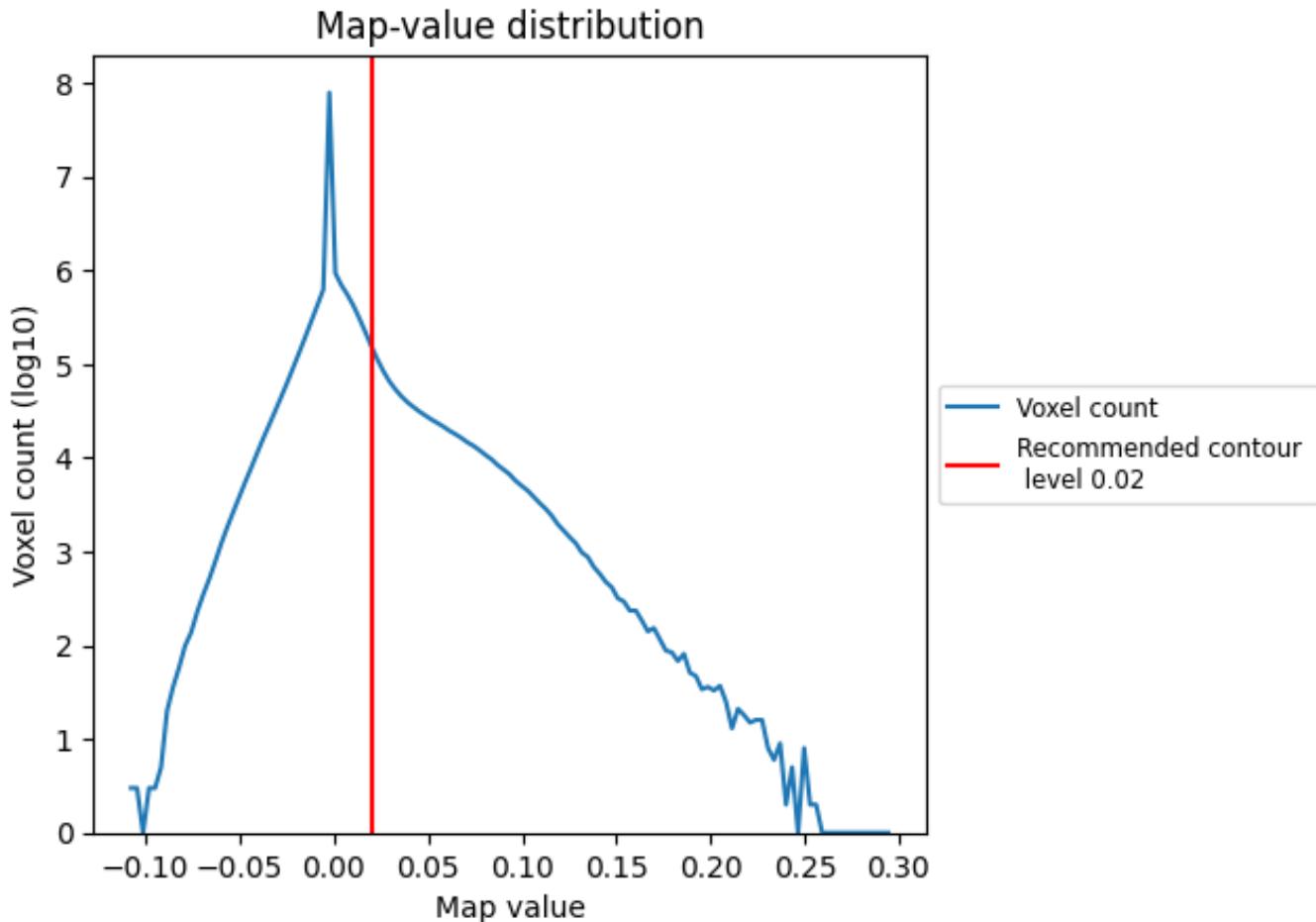
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2   Volume estimate ⓘ
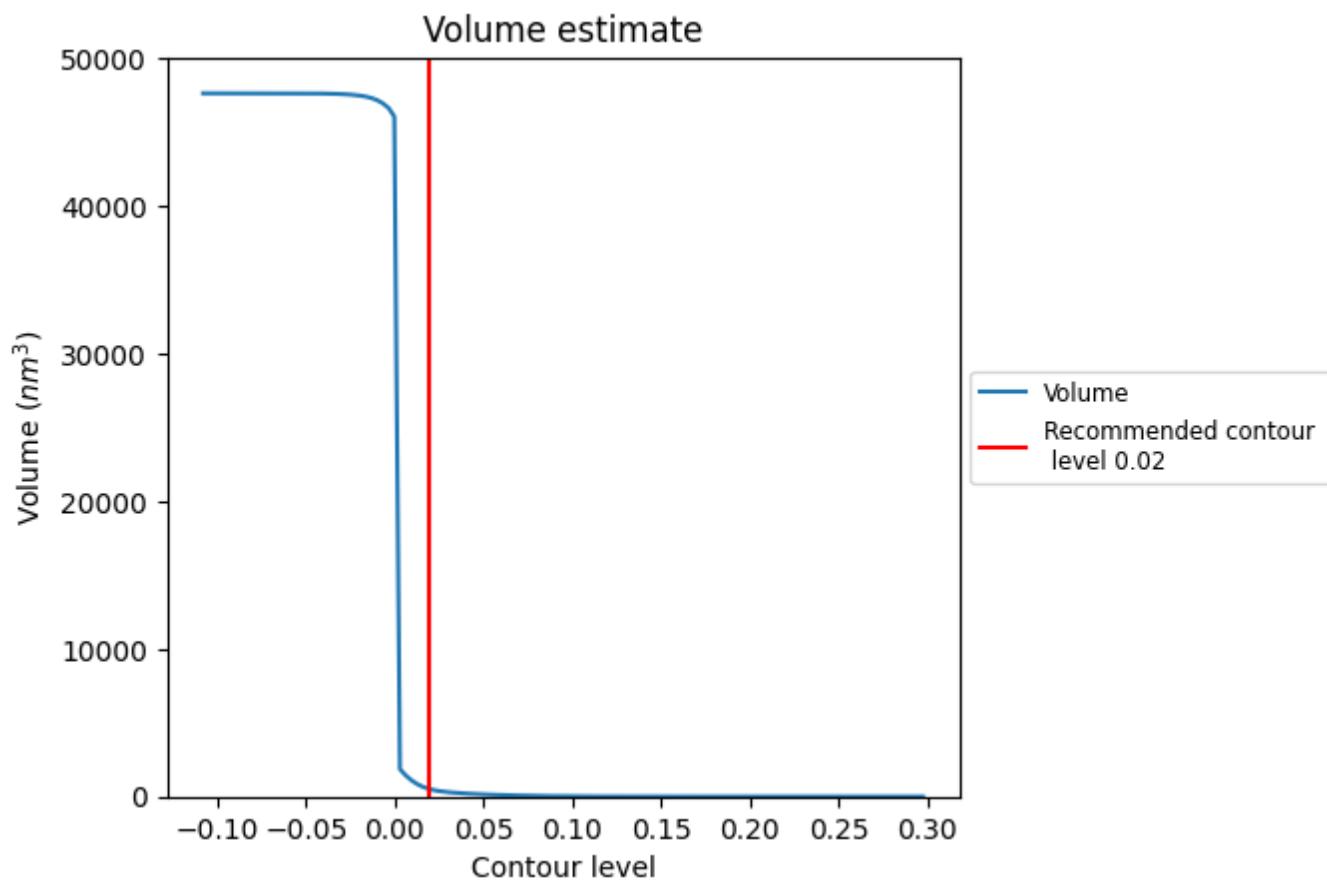
The volume at the recommended contour level is 503 nm^3; this corresponds to an approximate mass of 455 kDa.

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)
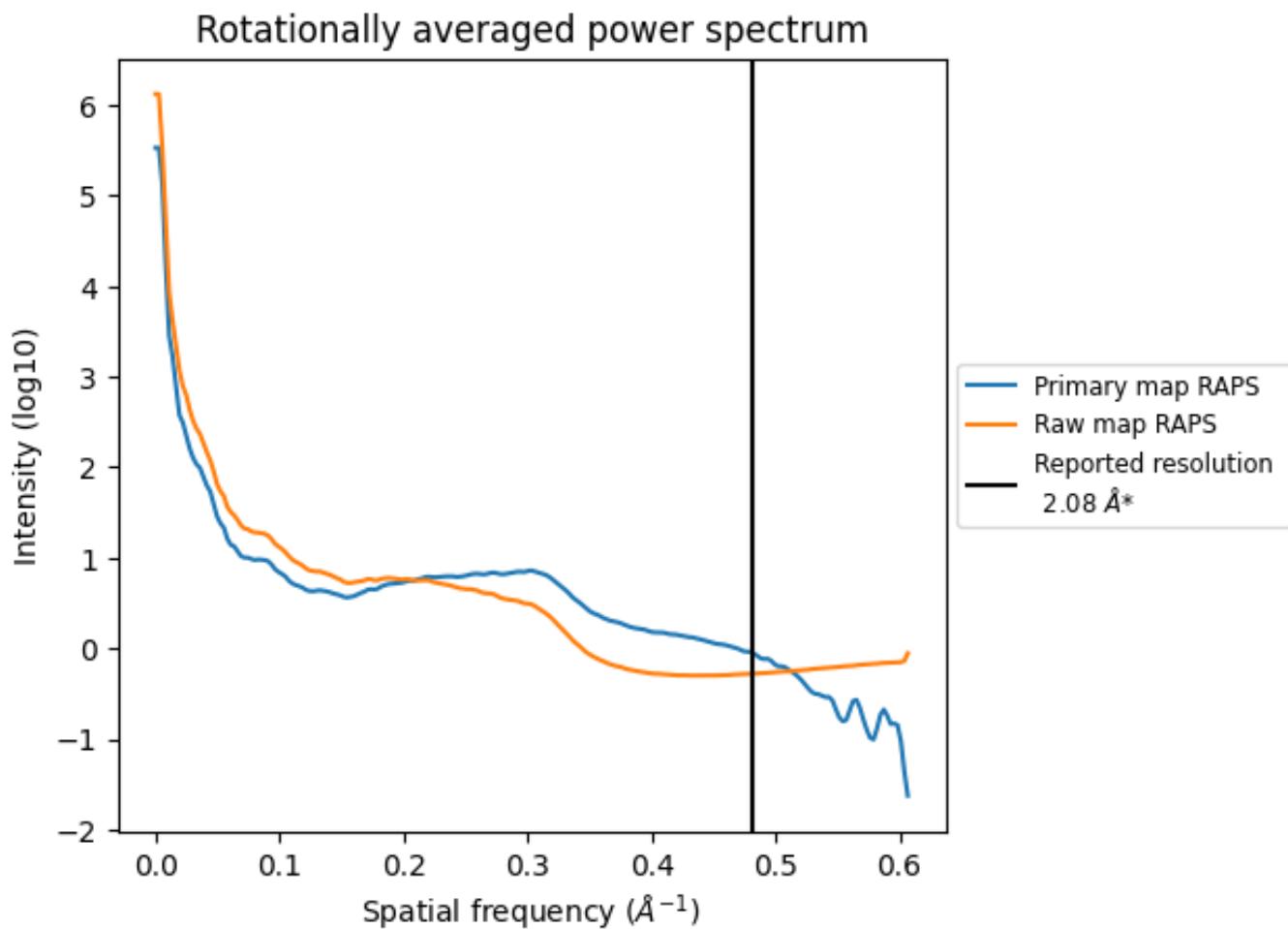
*Reported resolution corresponds to spatial frequency of 0.481 Å^{-1}

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 ⓘ
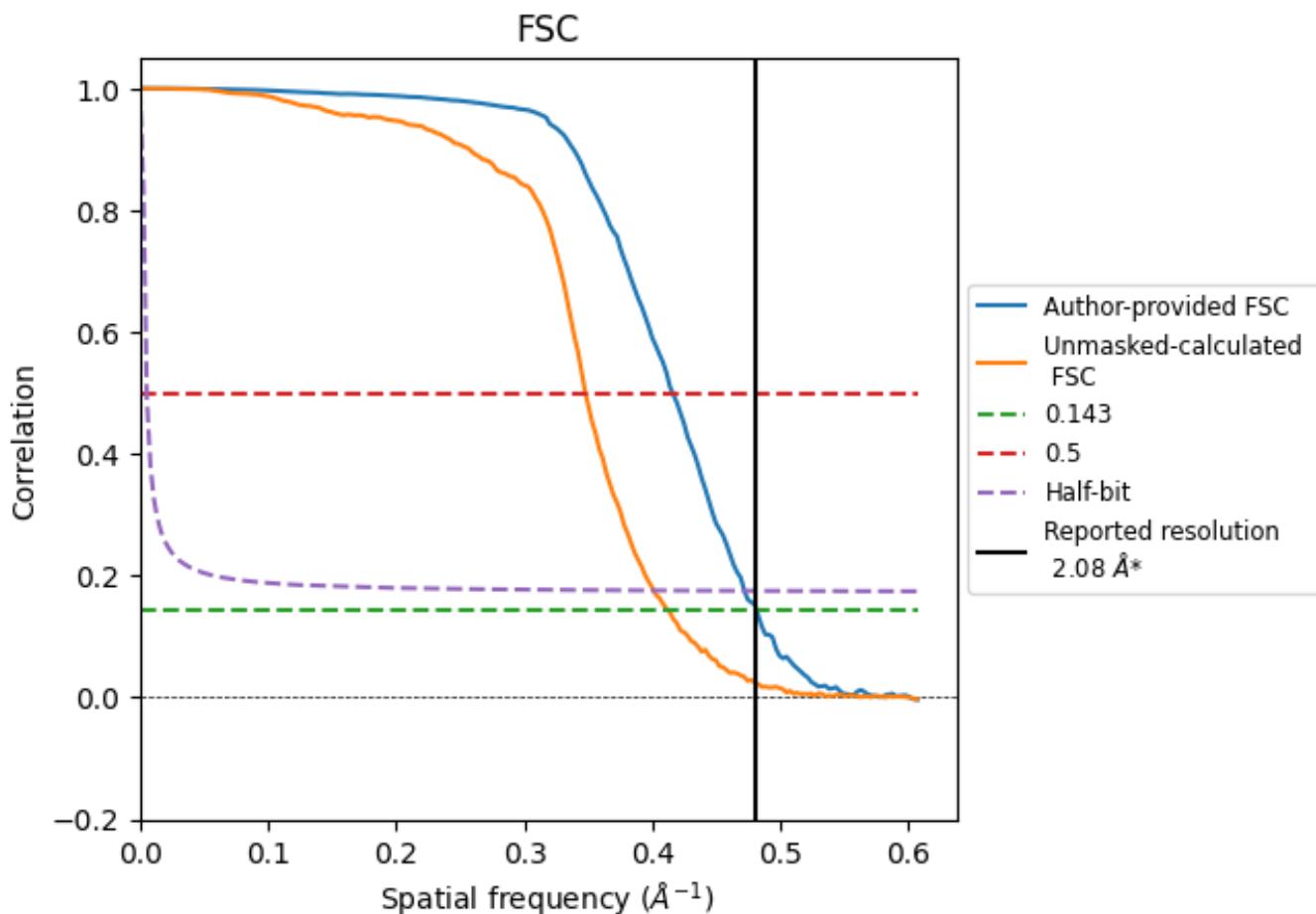
*Reported resolution corresponds to spatial frequency of 0.481 Å^{-1}

8.2   Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.08	-	-
Author-provided FSC curve	2.08	2.41	2.12
Unmasked-calculated*	2.43	2.88	2.49

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.43 differs from the reported value 2.08 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-53067 and PDB model 9QEH. Per-residue inclusion information can be found in section 3 on page 11.

9.1 Map-model overlay ⓘ

X

Y

Z
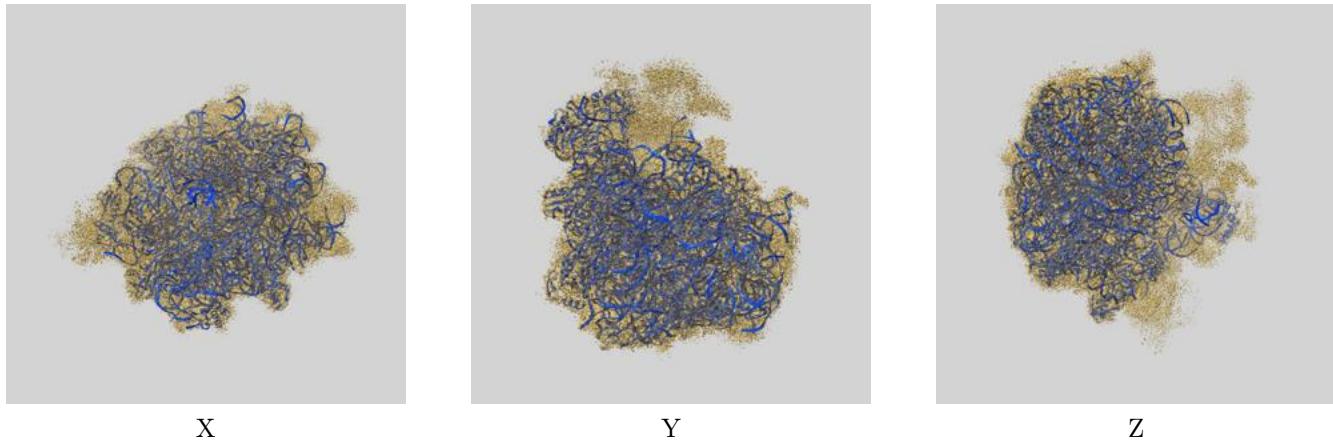
The images above show the 3D surface view of the map at the recommended contour level 0.02 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model   (i)
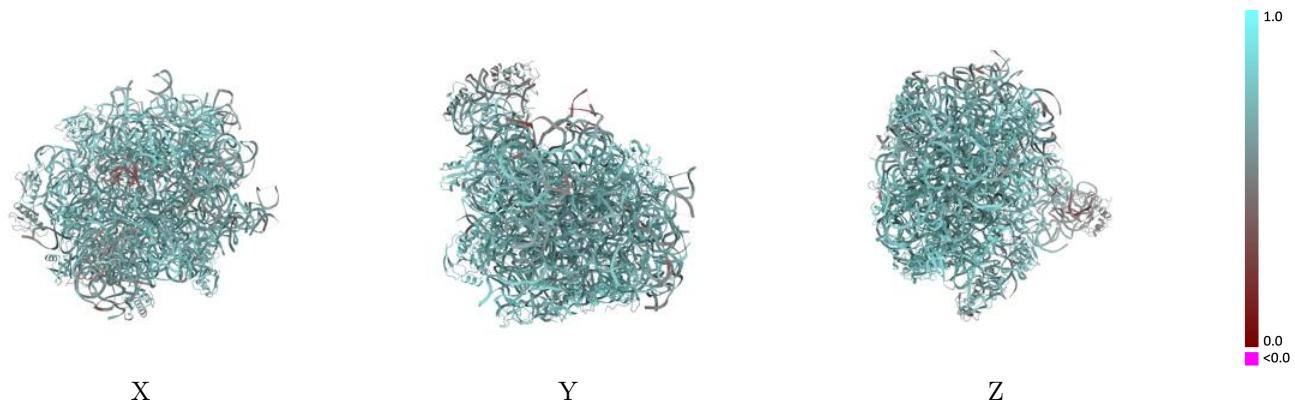
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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)
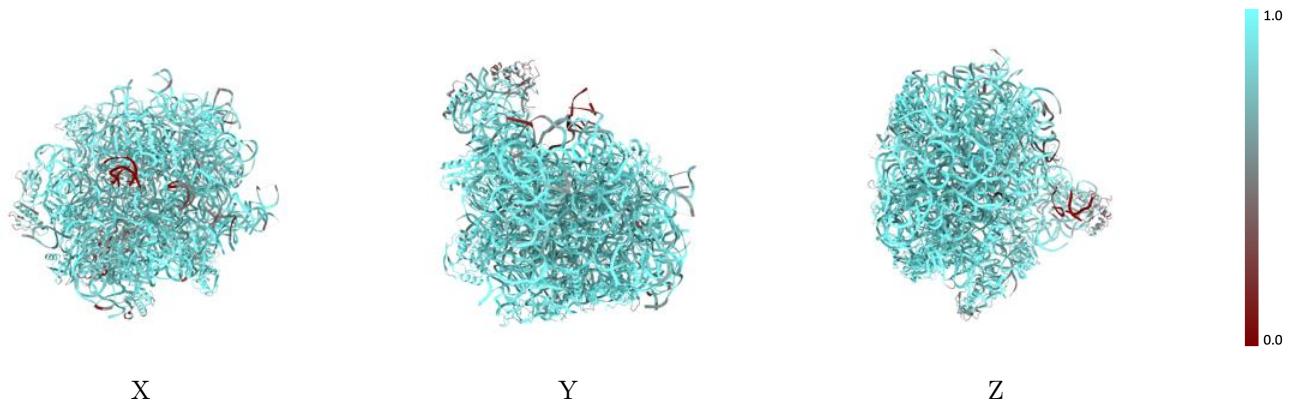
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.02).

9.4　Atom inclusion ⓘ
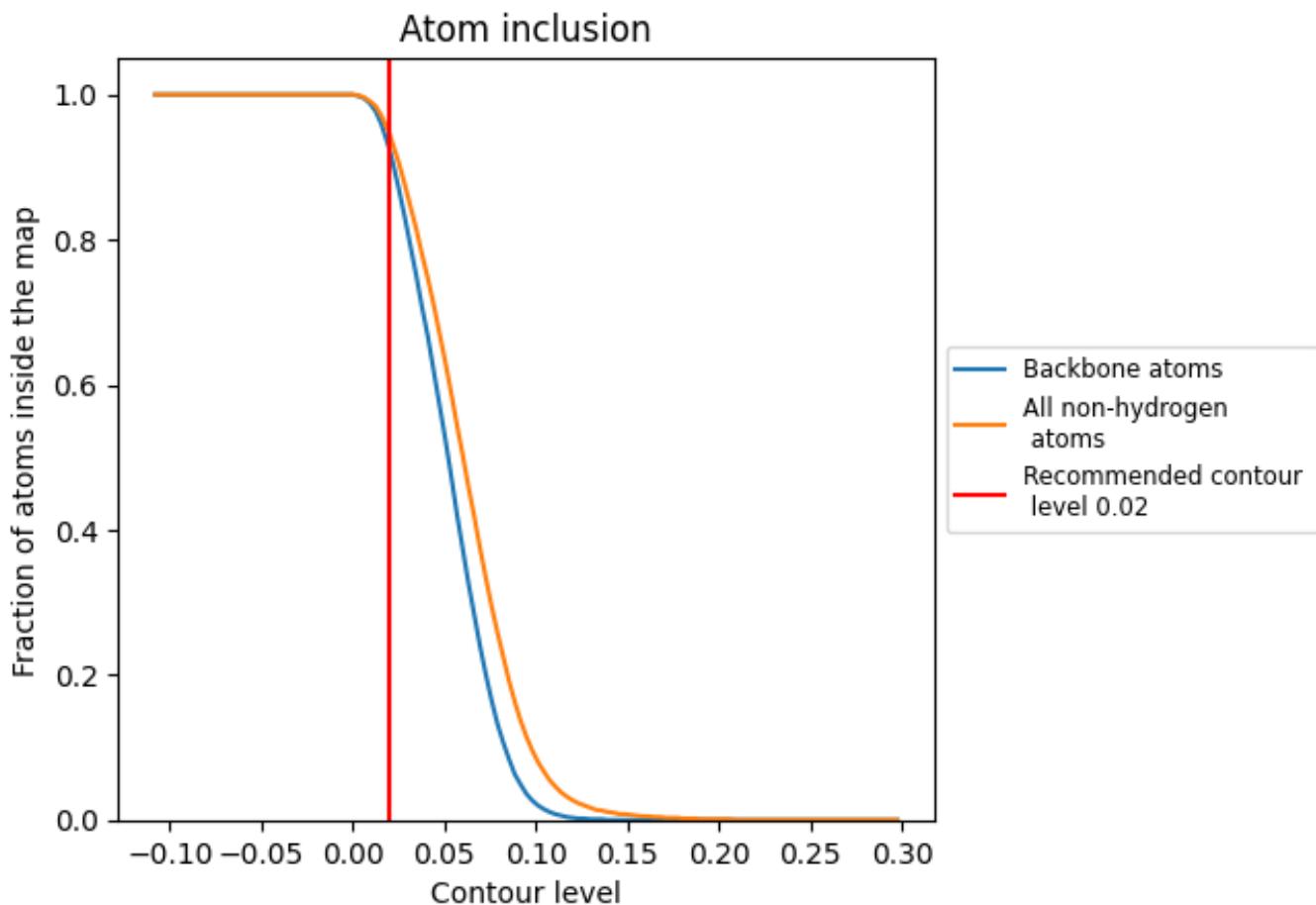
At the recommended contour level, 93% of all backbone atoms, 95% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9470	0.7230
1	0.8690	0.6740
11	0.4390	0.5190
2	0.9940	0.7960
3	0.9980	0.7910
4	0.9790	0.7610
8	0.0660	0.3650
A	0.9640	0.7270
B	0.8890	0.6240
C	0.9820	0.7760
D	0.9920	0.7750
E	0.9550	0.7590
F	0.5520	0.5050
G	0.7620	0.6150
H	0.9880	0.7730
I	0.9730	0.7610
J	0.9780	0.7510
K	0.9770	0.7580
L	0.9750	0.7700
M	0.8530	0.6410
N	0.9580	0.7430
O	0.9950	0.7880
P	0.9710	0.7600
Q	0.9860	0.7870
R	0.9780	0.7420
S	0.9120	0.6940
T	0.9150	0.6870
U	0.9890	0.7720
V	0.9020	0.7000
W	0.9420	0.7110
X	0.9580	0.7620
Z	0.9370	0.7380
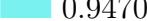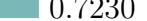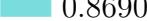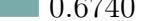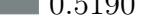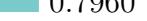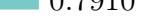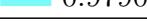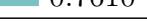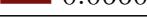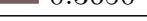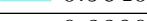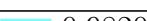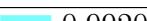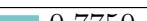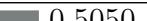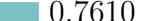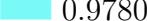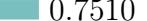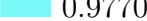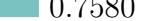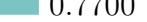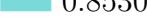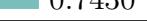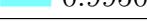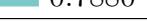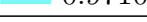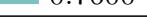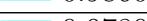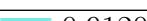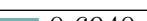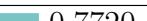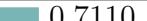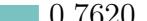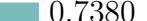
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