wwPDB EM Validation Summary Report (i)

Sep 16, 2026 – 11:13 PM EDT

PDB ID	:	8FZI / pdb_00008fzi
EMDB ID	:	EMD-29631
Title	:	Cryo-EM structure of an E. coli rotated ribosome bound with RF3-GDPCP and p/E-tRNAPhe (Composite state II-B)
Authors	:	Rybak, M.Y.; Li, L.; Lin, J.; Gagnon, M.G.
Deposited on	:	2023-01-28
Resolution	:	3.10 Å(reported)
Based on initial model	:	7K00

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

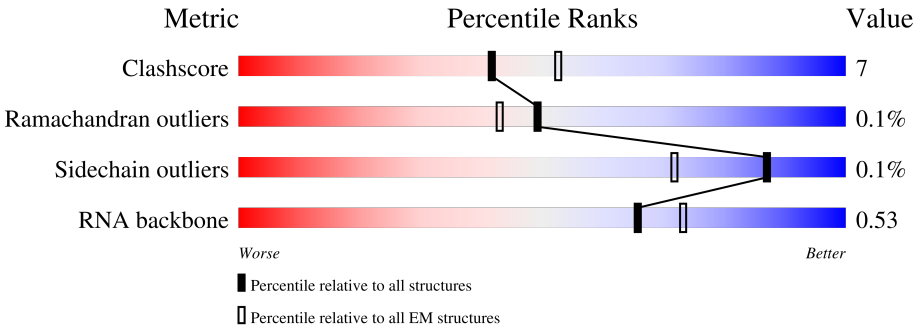
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

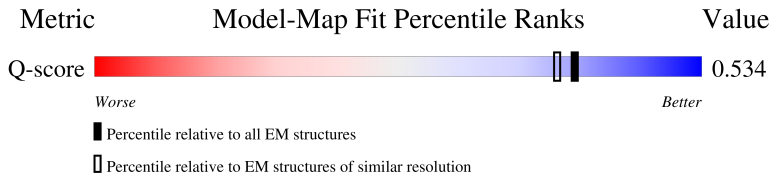
1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.10 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	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	14724 (2.60 - 3.60)

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

Mol	Chain	Length	Quality of chain
1	a	1542	63% 32%
2	b	241	15% 73% 20% 7%
3	c	233	21% 71% 18% 12%

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Mol	Chain	Length	Quality of chain
4	d	206	75% 24%
5	e	167	73% 20% 7%
6	f	131	51% 27% 21%
7	g	156	60% 67% 31%
8	h	130	82% 18%
9	i	130	9% 65% 32%
10	j	103	22% 61% 33% 5%
11	k	129	65% 26% 9%
12	l	124	83% 14%
13	m	118	42% 69% 28%
14	n	101	21% 75% 24%
15	o	89	88% 11%
16	p	82	85% 13%
17	q	84	69% 25% 6%
18	r	75	61% 9% 28%
19	s	92	35% 64% 26% 10%
20	t	87	84% 15%
21	u	71	11% 62% 15% 23%
22	x	76	5% 39% 42% 16%
23	z	21	5% 24% 10% 5% 62%
24	v	529	60% 37%
25	A	2904	72% 24%
26	B	120	65% 28% 7%
27	C	273	86% 13%
28	D	209	86% 14%

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Mol	Chain	Length	Quality of chain
29	E	201	85% 15%
30	F	179	8% 70% 29%
31	G	177	77% 22%
32	I	165	77% 49% 30% 21%
33	J	142	94% 54% 45%
34	L	142	91% 9%
35	M	123	89% 11%
36	N	144	81% 19%
37	O	136	79% 21%
38	P	127	86% 7% 7%
39	Q	117	80% 19%
40	R	115	85% 14%
41	S	118	91% 8%
42	T	103	92% 8%
43	U	110	89% 11%
44	V	100	85% 8% 7%
45	W	104	85% 13%
46	X	94	76% 24%
47	Y	85	81% 8% 11%
48	Z	78	92% 6%
49	1	63	79% 17%
50	2	59	83% 15%
51	3	70	39% 49% 20% 31%
52	4	57	91% 5%
53	5	55	82% 11% 7%

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Mol	Chain	Length	Quality of chain
54	6	46	96%
55	7	65	89% 9%
56	8	38	63% 37%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
58	GCP	v	601	-	-	X	-

2 Entry composition (i)

There are 60 unique types of molecules in this entry. The entry contains 149604 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 16S Ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	a	1528	32803	14637	6019	10619	1528	0	0

- Molecule 2 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	b	224	1754	1110	315	321	8	0	0

- Molecule 3 is a protein called 30S ribosomal protein S3.

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

- Molecule 4 is a protein called 30S ribosomal protein S4.

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

- Molecule 5 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	e	156	1152	717	217	212	6	0	0

- Molecule 6 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	f	103	839	530	151	151	7	0	0

- Molecule 7 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	g	152	1191	741	230	216	4	0	0

- Molecule 8 is a protein called 30S ribosomal protein S8.

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

- Molecule 9 is a protein called 30S ribosomal protein S9.

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

- Molecule 10 is a protein called 30S ribosomal protein S10.

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

- Molecule 11 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	k	117	877	540	173	161	3	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
k	119	IAS	ASN	conflict	UNP A0A0H3PWX2

- Molecule 12 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	l	121	942	582	193	162	5	0	0

- Molecule 13 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	m	115	891	552	179	157	3	0	0

- Molecule 14 is a protein called 30S ribosomal protein S14.

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

- Molecule 15 is a protein called 30S ribosomal protein S15.

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

- Molecule 16 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	p	81	643	403	127	112	1	0	0

- Molecule 17 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	q	79	641	406	120	112	3	0	0

- Molecule 18 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
18	r	54	446	283	85	78	0	0

- Molecule 19 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	s	83	663	424	126	111	2	0	0

- Molecule 20 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	t	86	670	414	138	115	3	0	0

- Molecule 21 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	u	55	460	287	95	77	1	0	0

- Molecule 22 is a RNA chain called p/E phenylalanyl-tRNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	N	O	P	S		
22	x	74	1588	713	285	515	73	2	0	0

- Molecule 23 is a RNA chain called F-UAA mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
23	z	8	168	76	29	55	8	0	0

- Molecule 24 is a protein called Peptide chain release factor RF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	v	525	4099	2595	709	773	22	0	0

- Molecule 25 is a RNA chain called 23S Ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
25	A	2899	62252	27778	11456	20119	2899	0	0

- Molecule 26 is a RNA chain called 5S Ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
26	B	120	2572	1145	470	837	120	0	0

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	D	209	1566	980	288	294	4	0	0

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

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

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

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

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

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

- Molecule 32 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	I	131	988	625	175	183	5	0	0

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

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

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	M	123	946	593	181	166	6	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	N	144	1052	653	207	190	2	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	O	136	1075	686	205	177	7	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	82	MS6	MET	conflict	UNP E6BI61

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	P	118	945	585	194	161	5	0	0

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

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

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

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

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

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

- Molecule 42 is a protein called Ribosomal protein L21.

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	Y	76	582	360	117	104	1	0	0

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	1	61	495	305	97	92	1	0	0

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

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

- Molecule 51 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	3	48	373	232	66	69	6	0	0

- Molecule 52 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	4	55	434	263	92	78	1	0	0

- Molecule 53 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
53	5	51	417	269	76	72	0	0

- Molecule 54 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	6	46	377	228	90	57	2	0	0

- Molecule 55 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
55	7	64	504	323	105	74	2	0	0

- Molecule 56 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
56	8	38	302	185	65	48	4	0	0

- Molecule 57 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
57	a	125	125	125	0
57	n	1	1	1	0
57	p	1	1	1	0
57	x	1	1	1	0
57	z	1	1	1	0
57	A	572	572	572	0
57	B	15	15	15	0
57	C	3	3	3	0
57	D	4	4	4	0
57	E	1	1	1	0
57	N	1	1	1	0
57	P	2	2	2	0

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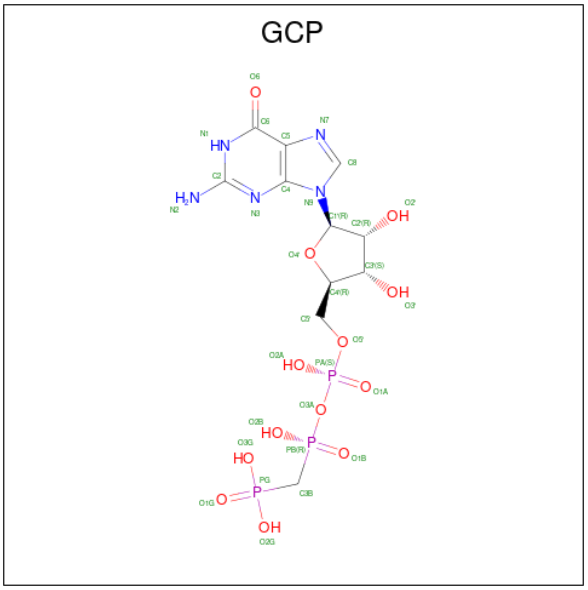
Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
57	S	1	1	1	0
57	T	3	3	3	0
57	V	2	2	2	0
57	Y	1	1	1	0
57	4	1	1	1	0
57	6	1	1	1	0
57	7	1	1	1	0

- Molecule 58 is PHOSPHOMETHYLPHOSPHONIC ACID GUANYLATE ESTER (CCD ID: GCP) (formula: $C_{11}H_{18}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
58	v	1	32	11	5	13	3	0

- Molecule 59 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
59	3	1	1	1	0

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Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
59	8	1	1	1	0

- Molecule 60 is water.

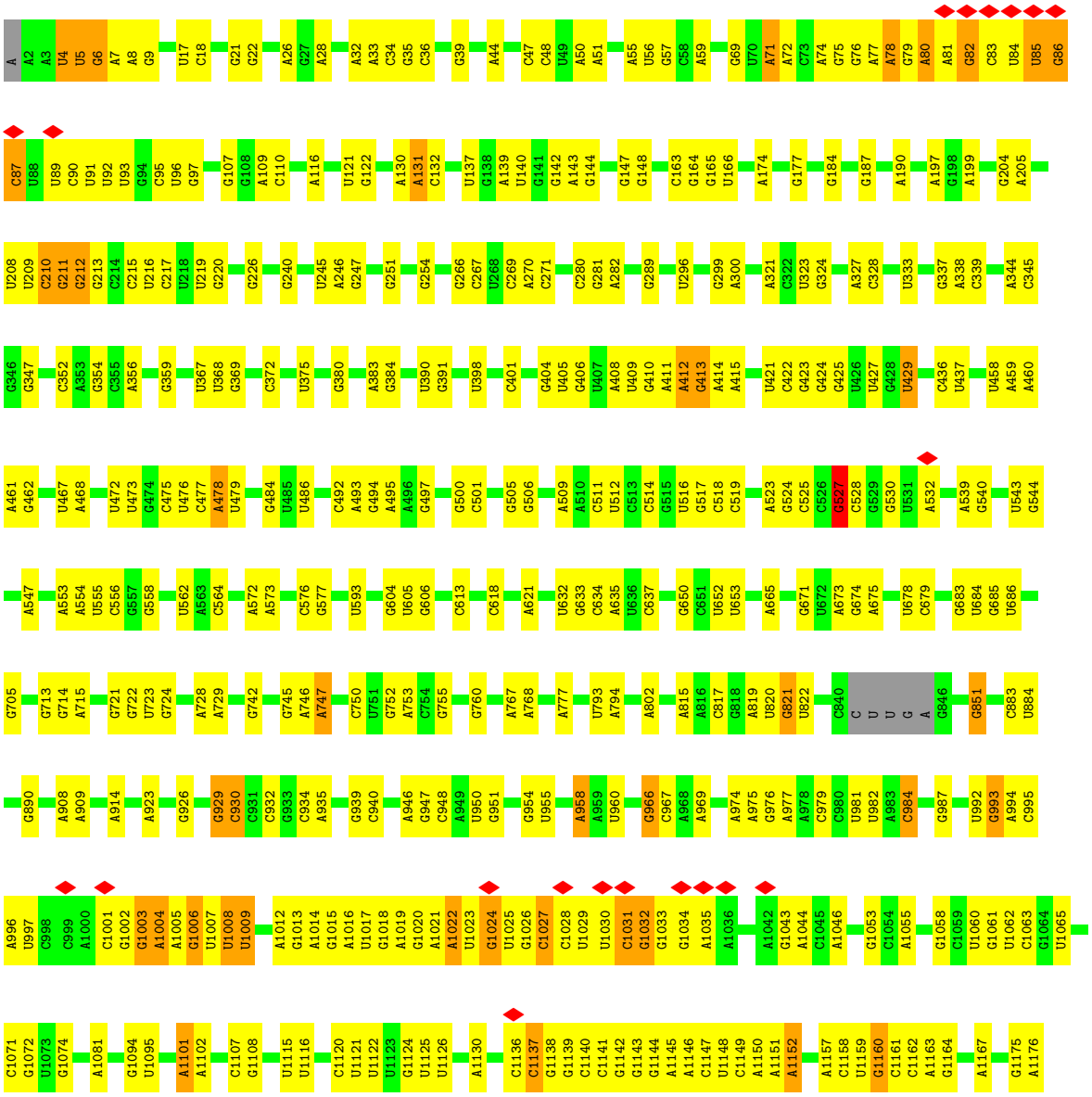
Mol	Chain	Residues	Atoms		AltConf
			Total	O	
60	a	29	29	29	0
60	n	1	1	1	0
60	x	1	1	1	0
60	z	1	1	1	0
60	A	202	202	202	0
60	B	7	7	7	0
60	C	1	1	1	0
60	D	3	3	3	0
60	N	1	1	1	0
60	P	1	1	1	0
60	S	2	2	2	0
60	6	1	1	1	0
60	7	1	1	1	0
60	8	1	1	1	0

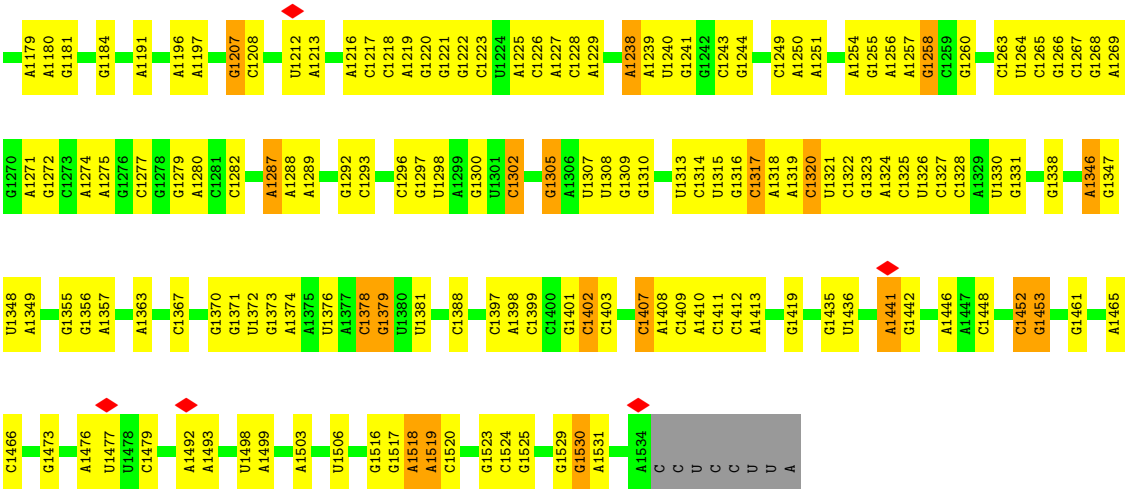
3 Residue-property plots (i)

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: 16S Ribosomal RNA

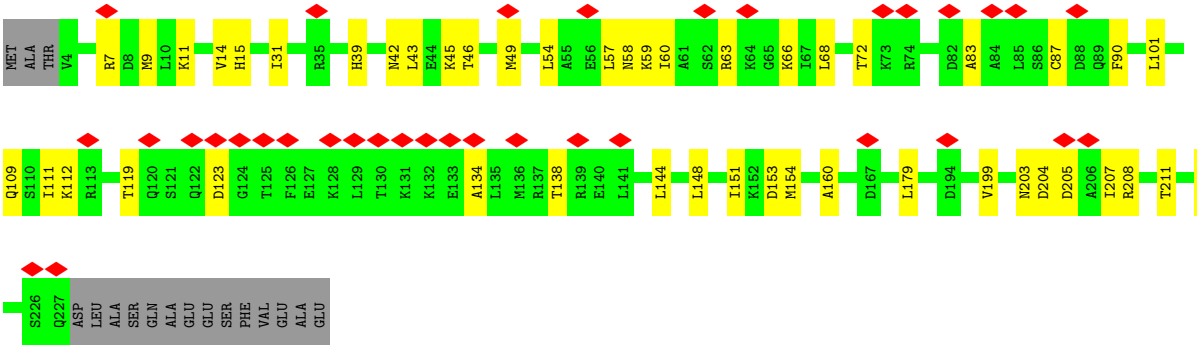
Chain a:





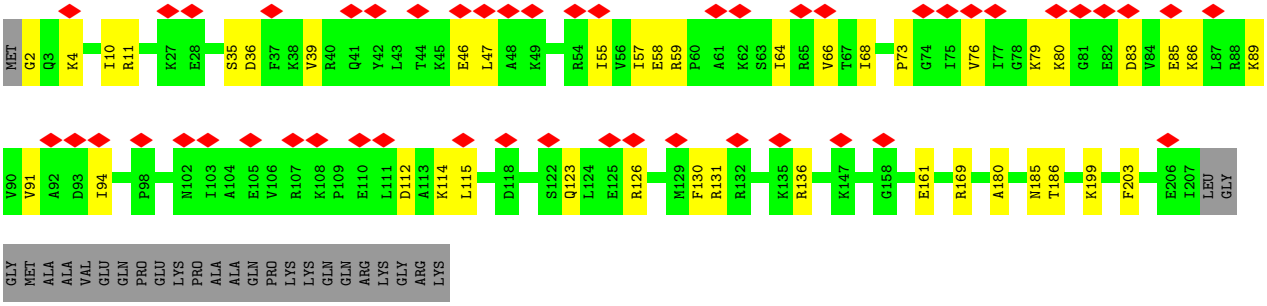
- Molecule 2: 30S ribosomal protein S2

Chain b:



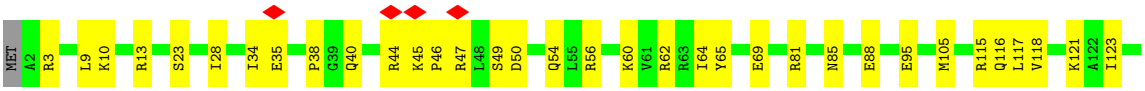
- Molecule 3: 30S ribosomal protein S3

Chain c:



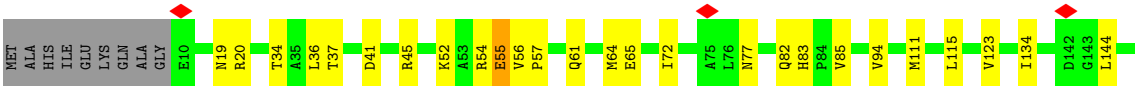
- Molecule 4: 30S ribosomal protein S4

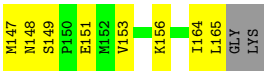
Chain d:



• Molecule 5: 30S ribosomal protein S5

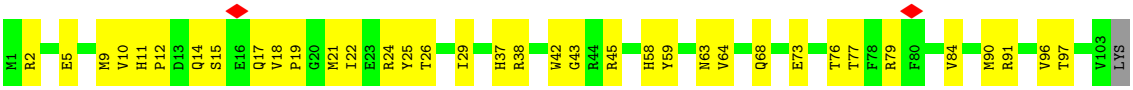
Chain e:





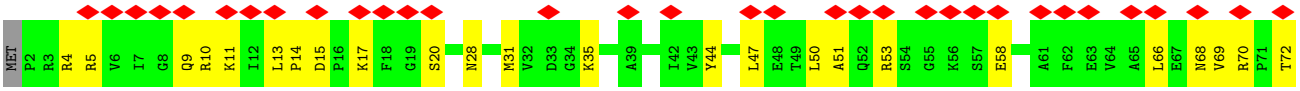
• Molecule 6: 30S ribosomal protein S6

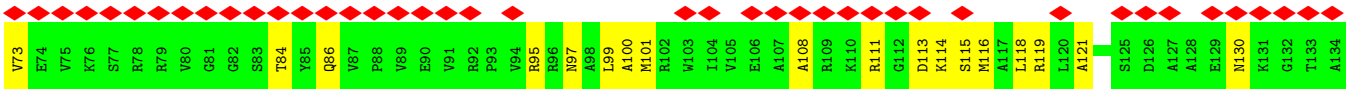
Chain f:

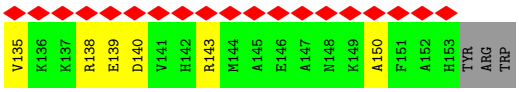


• Molecule 7: 30S ribosomal protein S7

Chain g:

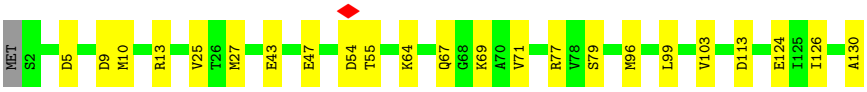






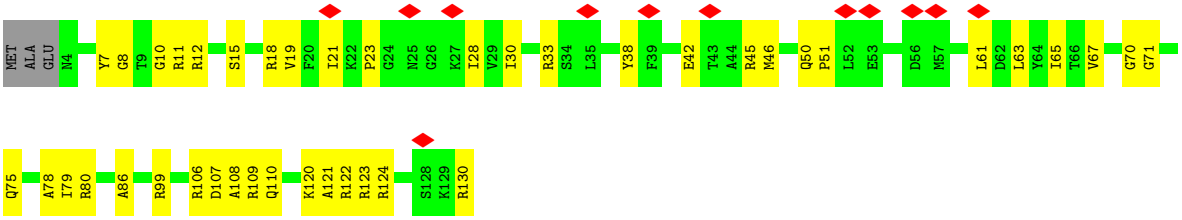
• Molecule 8: 30S ribosomal protein S8

Chain h:



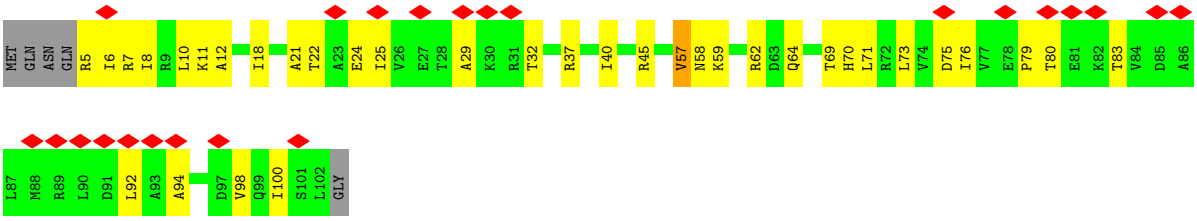
• Molecule 9: 30S ribosomal protein S9

Chain i:



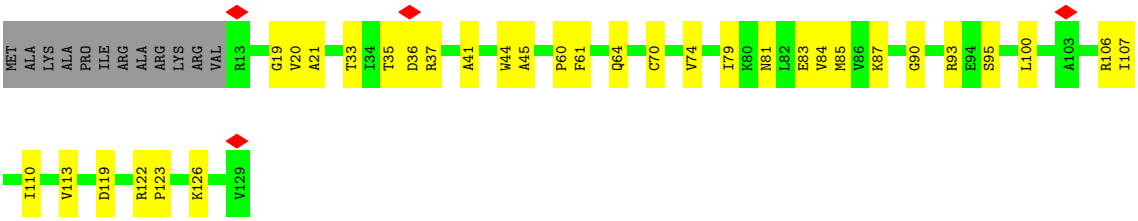
• Molecule 10: 30S ribosomal protein S10

Chain j:



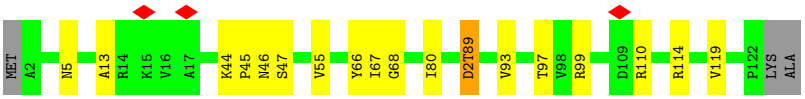
• Molecule 11: 30S ribosomal protein S11

Chain k:



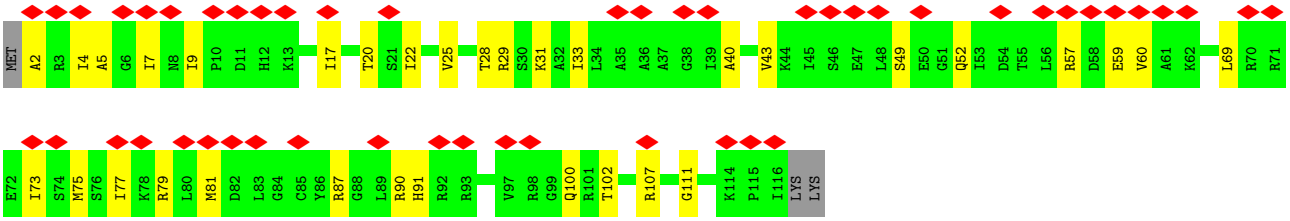
• Molecule 12: 30S ribosomal protein S12

Chain l:



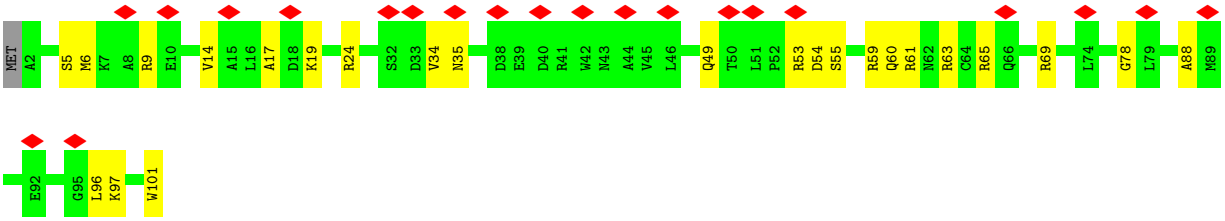
• Molecule 13: 30S ribosomal protein S13

Chain m:



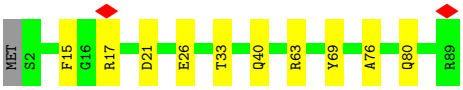
• Molecule 14: 30S ribosomal protein S14

Chain n:



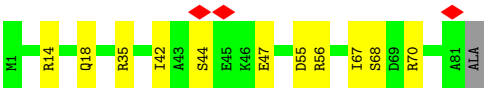
- Molecule 15: 30S ribosomal protein S15

Chain o:



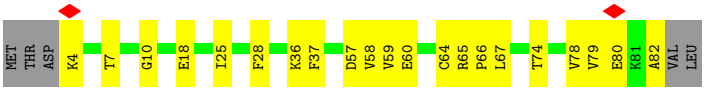
- Molecule 16: 30S ribosomal protein S16

Chain p:



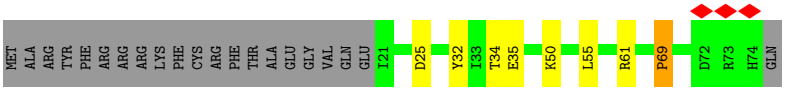
- Molecule 17: 30S ribosomal protein S17

Chain q:



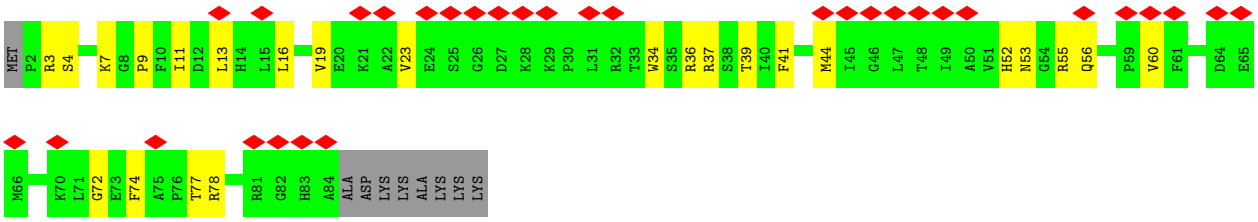
- Molecule 18: 30S ribosomal protein S18

Chain r:



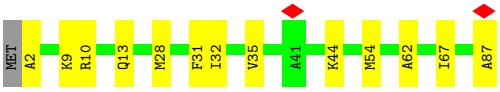
- Molecule 19: 30S ribosomal protein S19

Chain s:



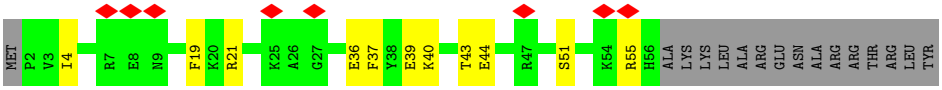
- Molecule 20: 30S ribosomal protein S20

Chain t:



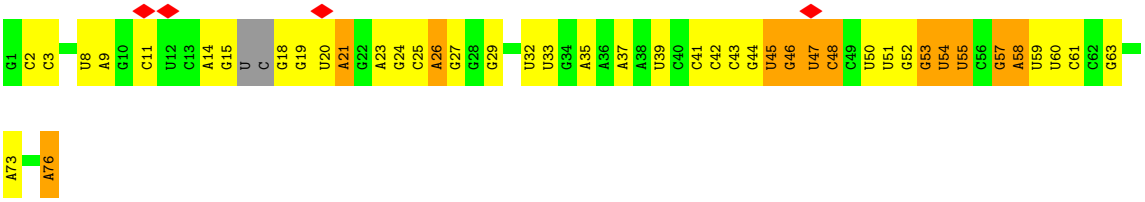
- Molecule 21: 30S ribosomal protein S21

Chain u:



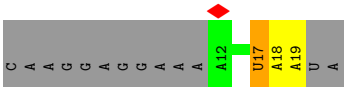
- Molecule 22: p/E phenylalanyl-tRNA

Chain x:



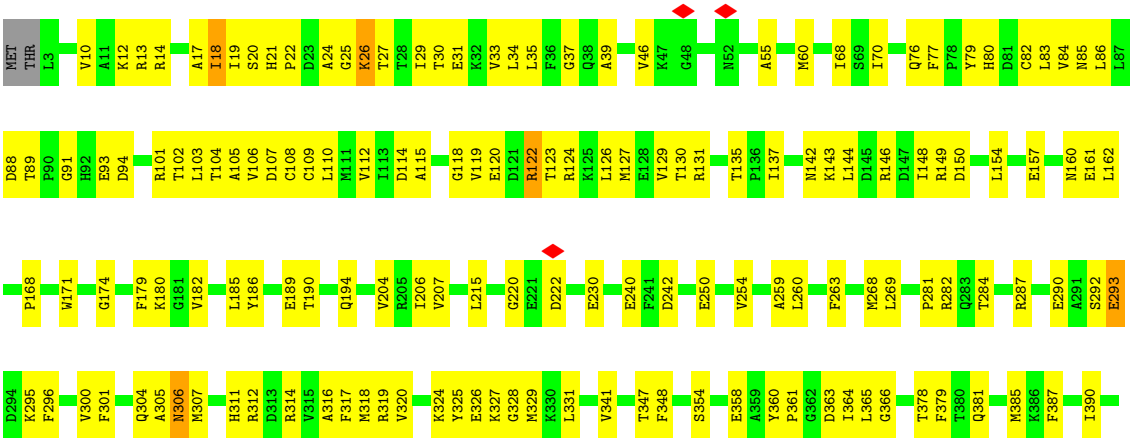
- Molecule 23: F-UAA mRNA

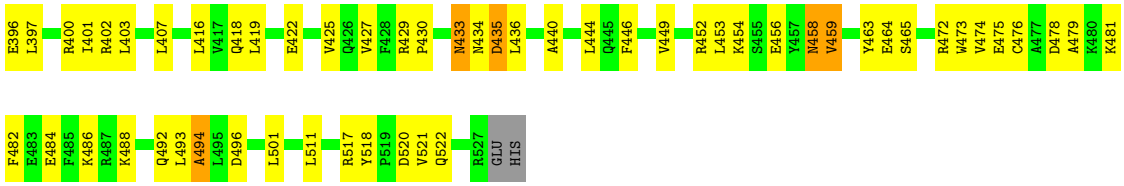
Chain z:



- Molecule 24: Peptide chain release factor RF3

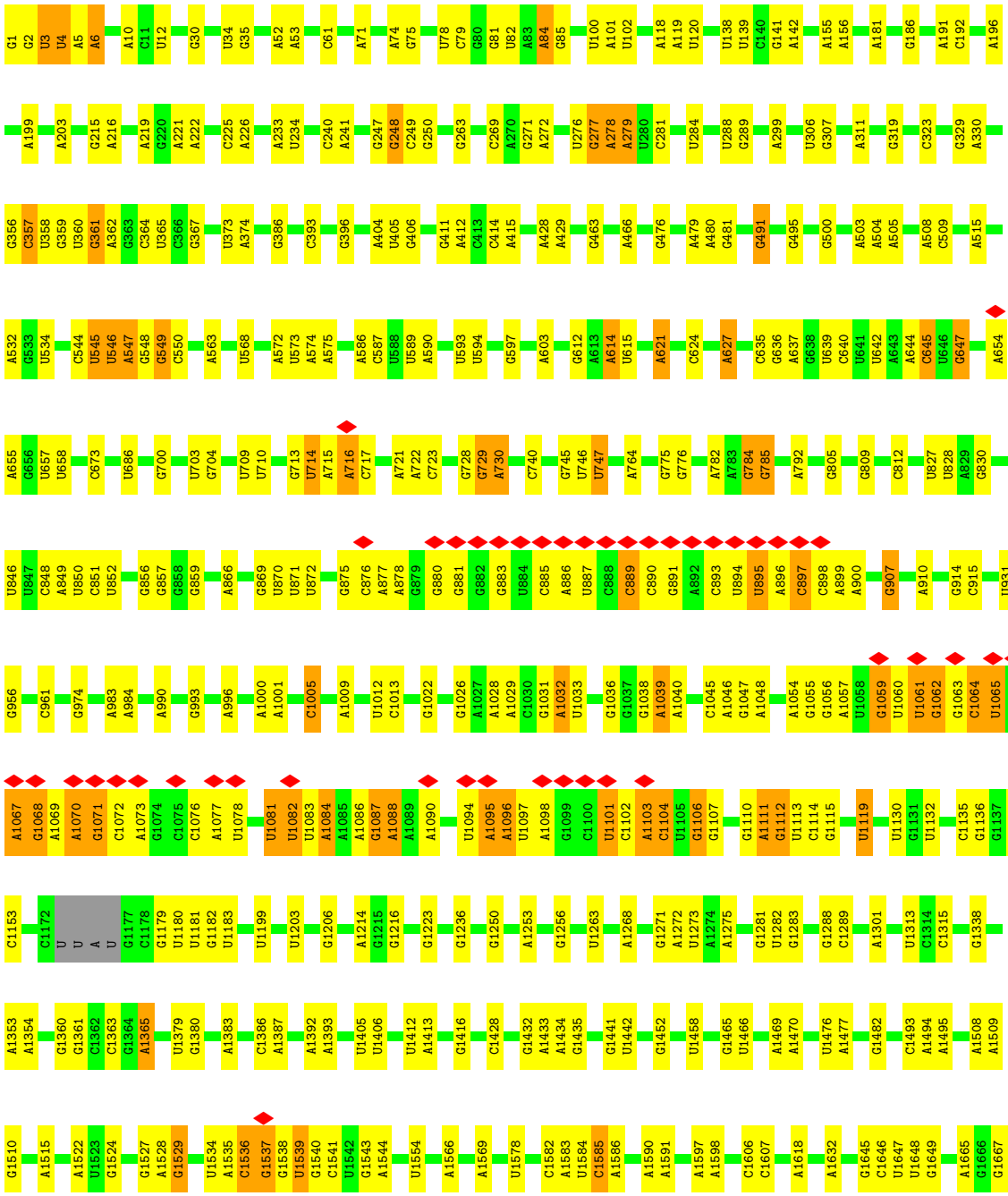
Chain v:

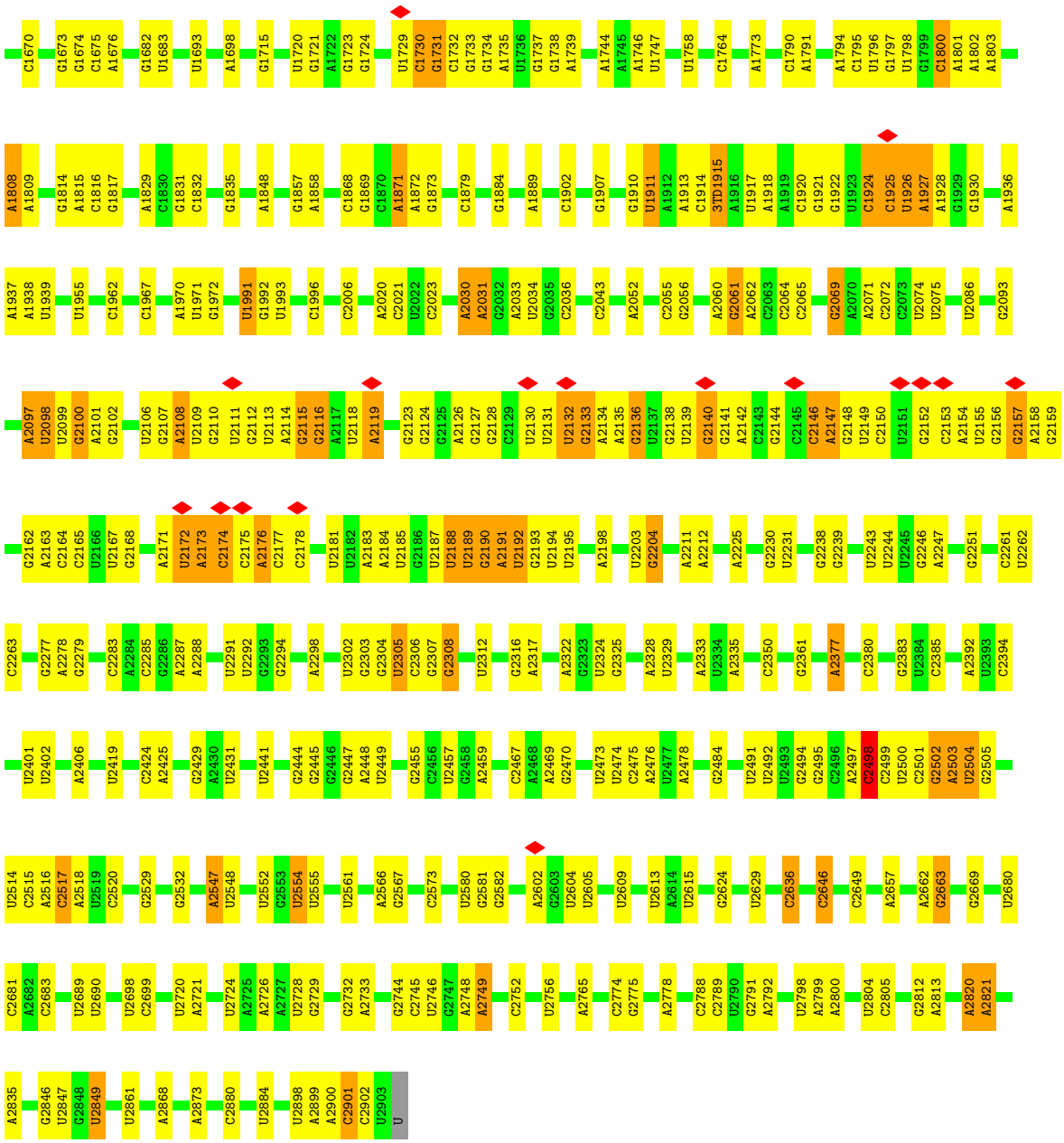




• Molecule 25: 23S Ribosomal RNA

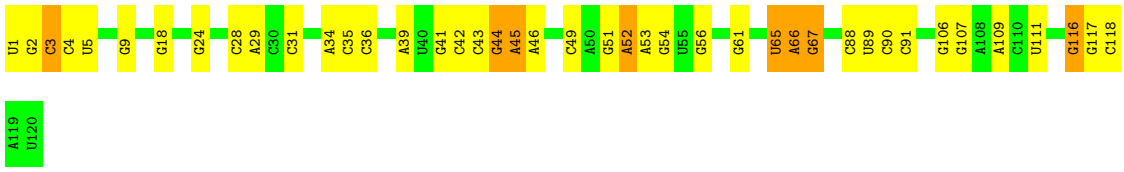
Chain A:





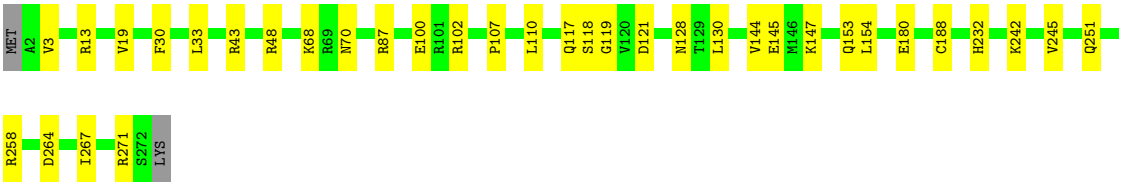
- Molecule 26: 5S Ribosomal RNA

Chain B:



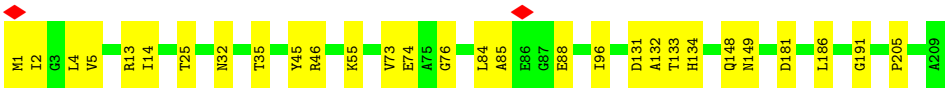
- Molecule 27: 50S ribosomal protein L2

Chain C:



• Molecule 28: 50S ribosomal protein L3

Chain D:

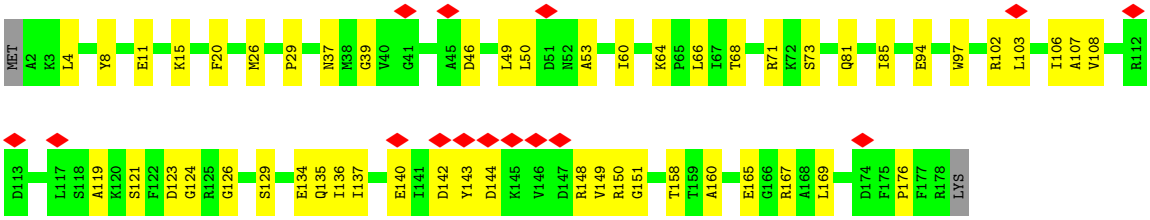


• Molecule 29: 50S ribosomal protein L4

Chain E:

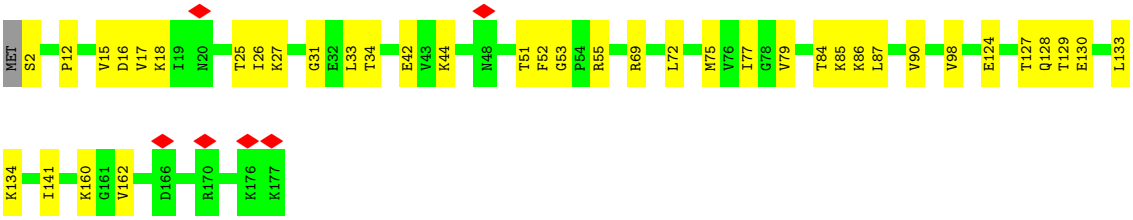
• Molecule 30: 50S ribosomal protein L5

Chain F:



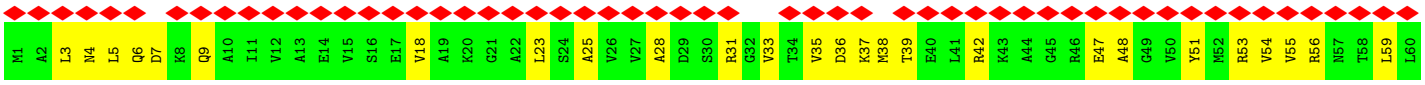
• Molecule 31: 50S ribosomal protein L6

Chain G:



• Molecule 32: 50S ribosomal protein L10

Chain I:



R61 R62 A63 V64 E65 G66 T67 P68 F69 E70 C71 L72 K73 D74 A75 F76 V77 G78 P79 T80 L81 I82 A83 Y84 S85 M86 E87 H88 P89 G90 A91 A92 A93 R94 L95 F96 K97 E98 F99 A100 K101 A102 N103 A104 K105 F106 E107 V108 K109 A110 A111 A112 F113 E114 G115 E116 L117 I118 P119 A120

S121 Q122 I123 D124 R125 L126 A127 T128 L129 P130 T131 TYR GLU GLU ALA ILE ALA ARG LEU MET ALA THR MET LYS GLU ALA SER ALA GLY LYS LEU VAL ARG THR LEU ALA ALA VAL ARG ASP ALA LYS GLU ALA ALA

- Molecule 33: 50S ribosomal protein L11

Chain J: 94% 54% 45%

MET A2 K3 K4 V5 Q6 A7 Y8 V9 K10 L11 Q12 V13 A14 A15 G16 M17 A18 N19 P20 S21 P22 P23 V24 G25 P26 A27 L28 G29 Q30 Q31 G32 V33 N34 I35 M36 E37 F38 C39 K40 A41 F42 N43 A44 K45 T46 D47 S48 I49 E50 K51 G52 L53 P54 I55 P56 V57 V58 I59 T60

V61 Y62 A63 D64 R65 S66 F67 T68 F69 V70 T71 K72 T73 P74 P75 A76 A77 V78 L79 L80 K81 K82 A83 A84 G85 I86 K87 S88 G89 S90 G91 K92 P93 N94 K95 D96 K97 V98 G99 K100 I101 S102 R103 A104 Q105 L106 Q107 E108 I109 A110 Q111 T112 K113 A114 A115 D116 M117 T118 G119 A120

D121 I122 E123 A124 M125 T126 R127 S128 I129 E130 G131 T132 A133 R134 S135 M136 G137 L138 V139 V140 E141 D142

- Molecule 34: 50S ribosomal protein L13

Chain L: 91% 9%

M1 K2 T3 V11 K12 R13 T30 D49 T50 G51 T65 K68 R96 P97 E98 M108 K121 D141 I142

- Molecule 35: 50S ribosomal protein L14

Chain M: 89% 11%

M1 K23 I47 P48 R49 V63 R64 T65 K66 K67 R70 R71 V76 R105 E106 L107 R108 S109 E110 M113 L123

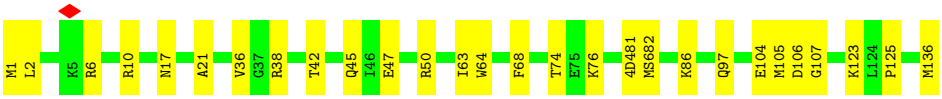
- Molecule 36: 50S ribosomal protein L15

Chain N: 81% 19%

M1 R2 L3 M4 E10 G11 R18 L19 G20 G28 E51 M55 P56 E76 V77 R78 D81 L82 V90 N99 I100 K109 A113 R123 G124 L125 R126 R132 I142 E143 E144

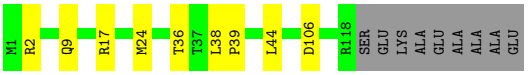
- Molecule 37: 50S ribosomal protein L16

Chain O: 79% 21%



• Molecule 38: 50S ribosomal protein L17

Chain P:



• Molecule 39: 50S ribosomal protein L18

Chain Q:

• Molecule 40: 50S ribosomal protein L19

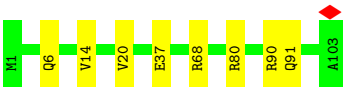
Chain R:

• Molecule 41: 50S ribosomal protein L20

Chain S:

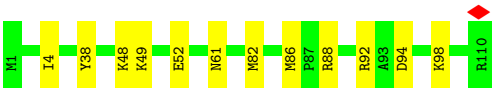
• Molecule 42: Ribosomal protein L21

Chain T:



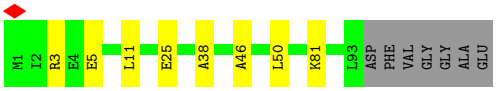
• Molecule 43: 50S ribosomal protein L22

Chain U:



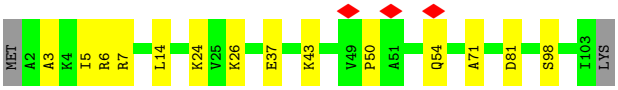
• Molecule 44: 50S ribosomal protein L23

Chain V: 85% 8% 7%



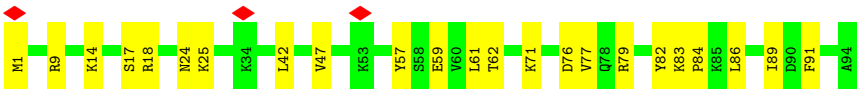
• Molecule 45: 50S ribosomal protein L24

Chain W: 85% 13%



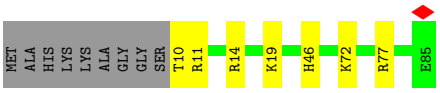
• Molecule 46: 50S ribosomal protein L25

Chain X: 76% 24%



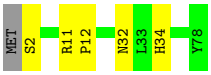
• Molecule 47: 50S ribosomal protein L27

Chain Y: 81% 8% 11%



• Molecule 48: 50S ribosomal protein L28

Chain Z: 92% 6%

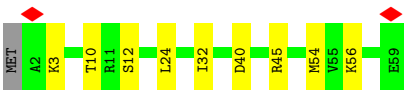


• Molecule 49: 50S ribosomal protein L29

Chain 1: 79% 17%

• Molecule 50: 50S ribosomal protein L30

Chain 2: 83% 15%

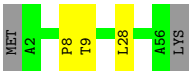


- Molecule 51: 50S ribosomal protein L31

Chain 3:

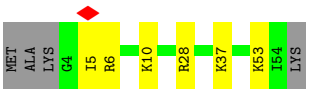
- Molecule 52: 50S ribosomal protein L32

Chain 4:



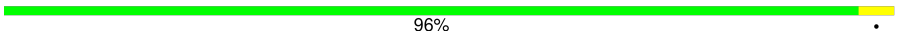
- Molecule 53: 50S ribosomal protein L33

Chain 5:



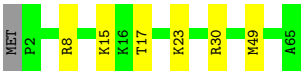
- Molecule 54: 50S ribosomal protein L34

Chain 6:



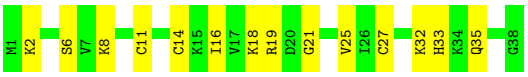
- Molecule 55: 50S ribosomal protein L35

Chain 7:



- Molecule 56: 50S ribosomal protein L36

Chain 8:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	56202	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 ($e^-/Å^2$)	40.44	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	96000	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	42.411	Depositor
Minimum map value	-25.024	Depositor
Average map value	0.001	Depositor
Map value standard deviation	1.033	Depositor
Recommended contour level	3	Depositor
Map size (Å)	435.2, 435.2, 435.2	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.85, 0.85, 0.85	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: MA6, 3TD, IAS, PSU, 2MG, OMC, OMU, MG, 2MA, 1MG, H2U, GCP, 6MZ, D2T, MIA, G7M, MEQ, 5MU, MS6, 4SU, 4OC, UR3, 5MC, OMG, 4D4, ZN

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\|>5$	RMSZ	$\#\|Z\|>5$
1	a	0.23	0/36450	0.30	0/56856
2	b	0.17	0/1785	0.39	0/2404
3	c	0.16	0/1651	0.35	0/2225
4	d	0.22	0/1665	0.36	0/2227
5	e	0.22	0/1165	0.37	0/1568
6	f	0.19	0/858	0.44	0/1160
7	g	0.15	0/1206	0.38	0/1617
8	h	0.23	0/989	0.35	0/1326
9	i	0.15	0/1034	0.33	0/1375
10	j	0.17	0/796	0.42	0/1077
11	k	0.21	0/884	0.36	0/1191
12	l	0.24	0/945	0.39	0/1268
13	m	0.14	0/900	0.32	0/1204
14	n	0.12	0/817	0.26	0/1088
15	o	0.25	0/722	0.39	0/964
16	p	0.22	0/653	0.38	0/877
17	q	0.23	0/650	0.41	0/871
18	r	0.36	0/453	0.67	2/609 (0.3%)
19	s	0.13	0/680	0.31	0/915
20	t	0.22	0/676	0.38	0/895
21	u	0.15	0/467	0.27	0/620
22	x	0.25	0/1602	0.31	0/2493
23	z	0.17	0/187	0.29	0/288
24	v	0.55	0/4176	0.69	2/5649 (0.0%)
25	A	0.31	0/69147	0.33	0/107869
26	B	0.23	0/2876	0.32	0/4483
27	C	0.30	0/2121	0.36	0/2852
28	D	0.30	0/1576	0.40	0/2119
29	E	0.26	0/1571	0.32	0/2113
30	F	0.17	0/1434	0.36	0/1926
31	G	0.20	0/1343	0.34	0/1816

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
32	I	0.15	0/1001	0.40	0/1350
33	J	0.13	0/1046	0.40	0/1410
34	L	0.29	0/1152	0.33	0/1551
35	M	0.29	0/955	0.36	0/1279
36	N	0.28	0/1061	0.36	0/1412
37	O	0.20	0/1073	0.31	0/1433
38	P	0.32	0/958	0.38	0/1281
39	Q	0.21	0/902	0.35	0/1209
40	R	0.28	0/929	0.34	0/1242
41	S	0.33	0/960	0.31	0/1278
42	T	0.28	0/829	0.37	0/1107
43	U	0.29	0/864	0.33	0/1156
44	V	0.26	0/744	0.34	0/994
45	W	0.25	0/787	0.46	0/1051
46	X	0.21	0/766	0.34	0/1025
47	Y	0.29	0/589	0.43	0/779
48	Z	0.29	0/635	0.34	0/848
49	1	0.23	0/496	0.32	0/660
50	2	0.28	0/453	0.31	0/605
51	3	0.10	0/380	0.28	0/508
52	4	0.31	0/440	0.33	0/588
53	5	0.23	0/424	0.34	0/565
54	6	0.32	0/380	0.30	0/498
55	7	0.28	0/513	0.40	0/676
56	8	0.26	0/303	0.39	0/397
All	All	0.28	0/160119	0.35	4/238847 (0.0%)

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
5	e	0	1
37	O	0	1
55	7	0	1
All	All	0	3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
18	r	69	PRO	CA-N-CD	-10.82	96.85	112.00
24	v	433	ASN	N-CA-C	7.12	119.41	108.30
18	r	69	PRO	N-CD-CG	-6.93	92.80	103.20
24	v	458	ASN	CB-CA-C	-5.02	110.81	116.63

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
55	7	30	ARG	Peptide
37	O	82	MS6	Peptide
5	e	55	GLU	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	a	32803	0	16528	333	0
2	b	1754	0	1782	36	0
3	c	1624	0	1696	30	0
4	d	1643	0	1707	38	0
5	e	1152	0	1196	25	0
6	f	839	0	833	32	0
7	g	1191	0	1245	40	0
8	h	979	0	1031	15	0
9	i	1022	0	1070	34	0
10	j	786	0	828	26	0
11	k	877	0	884	21	0
12	l	942	0	999	14	0
13	m	891	0	952	24	0
14	n	805	0	844	23	0
15	o	714	0	734	7	0
16	p	643	0	661	8	0
17	q	641	0	682	14	0
18	r	446	0	472	6	0
19	s	663	0	688	21	0
20	t	670	0	719	8	0
21	u	460	0	486	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
22	x	1588	0	819	37	0
23	z	168	0	86	1	0
24	v	4099	0	4059	190	0
25	A	62252	0	31325	424	0
26	B	2572	0	1301	30	0
27	C	2082	0	2154	23	0
28	D	1566	0	1618	20	0
29	E	1552	0	1618	20	0
30	F	1410	0	1444	47	0
31	G	1323	0	1371	25	0
32	I	988	0	1025	38	0
33	J	1032	0	1085	50	0
34	L	1129	0	1162	11	0
35	M	946	0	1023	11	0
36	N	1052	0	1127	21	0
37	O	1075	0	1145	21	0
38	P	945	0	988	6	0
39	Q	892	0	923	14	0
40	R	917	0	962	11	0
41	S	947	0	1019	8	0
42	T	816	0	839	7	0
43	U	857	0	922	10	0
44	V	738	0	807	5	0
45	W	779	0	831	10	0
46	X	753	0	780	15	0
47	Y	582	0	599	5	0
48	Z	625	0	652	3	0
49	1	495	0	526	7	0
50	2	449	0	488	5	0
51	3	373	0	370	14	0
52	4	434	0	445	3	0
53	5	417	0	451	4	0
54	6	377	0	418	2	0
55	7	504	0	572	3	0
56	8	302	0	340	10	0
57	4	1	0	0	0	0
57	6	1	0	0	0	0
57	7	1	0	0	0	0
57	A	572	0	0	0	0
57	B	15	0	0	0	0
57	C	3	0	0	0	0
57	D	4	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
57	E	1	0	0	0	0
57	N	1	0	0	0	0
57	P	2	0	0	0	0
57	S	1	0	0	0	0
57	T	3	0	0	0	0
57	V	2	0	0	0	0
57	Y	1	0	0	0	0
57	a	125	0	0	0	0
57	n	1	0	0	0	0
57	p	1	0	0	0	0
57	x	1	0	0	0	0
57	z	1	0	0	0	0
58	v	32	0	14	9	0
59	3	1	0	0	0	0
59	8	1	0	0	0	0
60	6	1	0	0	0	0
60	7	1	0	0	0	0
60	8	1	0	0	0	0
60	A	202	0	0	2	0
60	B	7	0	0	0	0
60	C	1	0	0	0	0
60	D	3	0	0	0	0
60	N	1	0	0	0	0
60	P	1	0	0	0	0
60	S	2	0	0	0	0
60	a	29	0	0	0	0
60	n	1	0	0	0	0
60	x	1	0	0	0	0
60	z	1	0	0	0	0
All	All	149604	0	101345	1671	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 7.

The worst 5 of 1671 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)
24:v:25:GLY:HA2	58:v:601:GCP:O1A	1.47	1.12
25:A:2114:A:H62	25:A:2119:A:N6	1.47	1.10
24:v:20:SER:HB3	24:v:26:LYS:HD3	1.31	1.08
24:v:21:HIS:ND1	24:v:22:PRO:HD2	1.73	1.02

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
25:A:2114:A:N6	25:A:2119:A:H61	1.56	1.02

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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	
2	b	222/241 (92%)	203 (91%)	19 (9%)	0	100	100
3	c	204/233 (88%)	193 (95%)	11 (5%)	0	100	100
4	d	203/206 (98%)	194 (96%)	9 (4%)	0	100	100
5	e	154/167 (92%)	147 (96%)	7 (4%)	0	100	100
6	f	101/131 (77%)	95 (94%)	6 (6%)	0	100	100
7	g	150/156 (96%)	142 (95%)	8 (5%)	0	100	100
8	h	127/130 (98%)	122 (96%)	5 (4%)	0	100	100
9	i	125/130 (96%)	120 (96%)	5 (4%)	0	100	100
10	j	96/103 (93%)	89 (93%)	6 (6%)	1 (1%)	12	41
11	k	113/129 (88%)	108 (96%)	5 (4%)	0	100	100
12	l	118/124 (95%)	110 (93%)	8 (7%)	0	100	100
13	m	113/118 (96%)	102 (90%)	11 (10%)	0	100	100
14	n	98/101 (97%)	96 (98%)	2 (2%)	0	100	100
15	o	86/89 (97%)	82 (95%)	4 (5%)	0	100	100
16	p	79/82 (96%)	74 (94%)	5 (6%)	0	100	100
17	q	77/84 (92%)	74 (96%)	3 (4%)	0	100	100
18	r	52/75 (69%)	50 (96%)	2 (4%)	0	100	100
19	s	81/92 (88%)	77 (95%)	4 (5%)	0	100	100
20	t	84/87 (97%)	82 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
21	u	53/71 (75%)	51 (96%)	2 (4%)	0	100	100
24	v	523/529 (99%)	414 (79%)	104 (20%)	5 (1%)	12	41
27	C	269/273 (98%)	255 (95%)	14 (5%)	0	100	100
28	D	206/209 (99%)	196 (95%)	9 (4%)	1 (0%)	24	57
29	E	199/201 (99%)	196 (98%)	3 (2%)	0	100	100
30	F	175/179 (98%)	160 (91%)	15 (9%)	0	100	100
31	G	174/177 (98%)	167 (96%)	7 (4%)	0	100	100
32	I	129/165 (78%)	104 (81%)	25 (19%)	0	100	100
33	J	139/142 (98%)	123 (88%)	15 (11%)	1 (1%)	18	49
34	L	140/142 (99%)	136 (97%)	4 (3%)	0	100	100
35	M	121/123 (98%)	115 (95%)	6 (5%)	0	100	100
36	N	142/144 (99%)	138 (97%)	4 (3%)	0	100	100
37	O	132/136 (97%)	127 (96%)	5 (4%)	0	100	100
38	P	116/127 (91%)	113 (97%)	3 (3%)	0	100	100
39	Q	114/117 (97%)	108 (95%)	6 (5%)	0	100	100
40	R	112/115 (97%)	109 (97%)	3 (3%)	0	100	100
41	S	115/118 (98%)	113 (98%)	2 (2%)	0	100	100
42	T	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
43	U	108/110 (98%)	105 (97%)	3 (3%)	0	100	100
44	V	91/100 (91%)	86 (94%)	5 (6%)	0	100	100
45	W	100/104 (96%)	93 (93%)	7 (7%)	0	100	100
46	X	92/94 (98%)	88 (96%)	4 (4%)	0	100	100
47	Y	74/85 (87%)	71 (96%)	3 (4%)	0	100	100
48	Z	75/78 (96%)	71 (95%)	4 (5%)	0	100	100
49	1	59/63 (94%)	57 (97%)	2 (3%)	0	100	100
50	2	56/59 (95%)	54 (96%)	2 (4%)	0	100	100
51	3	46/70 (66%)	44 (96%)	2 (4%)	0	100	100
52	4	53/57 (93%)	51 (96%)	2 (4%)	0	100	100
53	5	49/55 (89%)	46 (94%)	3 (6%)	0	100	100
54	6	44/46 (96%)	42 (96%)	2 (4%)	0	100	100
55	7	62/65 (95%)	57 (92%)	5 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
56	8	36/38 (95%)	36 (100%)	0	0	100	100
All	All	6188/6573 (94%)	5785 (94%)	395 (6%)	8 (0%)	49	78

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
24	v	18	ILE
24	v	293	GLU
24	v	459	VAL
10	j	57	VAL
28	D	149	ASN

5.3.2 Protein sidechains (i)

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	
2	b	186/199 (94%)	186 (100%)	0	100	100
3	c	170/190 (90%)	170 (100%)	0	100	100
4	d	172/173 (99%)	172 (100%)	0	100	100
5	e	119/126 (94%)	119 (100%)	0	100	100
6	f	90/112 (80%)	90 (100%)	0	100	100
7	g	125/129 (97%)	125 (100%)	0	100	100
8	h	104/105 (99%)	104 (100%)	0	100	100
9	i	105/107 (98%)	105 (100%)	0	100	100
10	j	86/90 (96%)	86 (100%)	0	100	100
11	k	89/98 (91%)	89 (100%)	0	100	100
12	l	101/103 (98%)	101 (100%)	0	100	100
13	m	93/96 (97%)	93 (100%)	0	100	100
14	n	83/84 (99%)	83 (100%)	0	100	100
15	o	76/77 (99%)	76 (100%)	0	100	100
16	p	65/65 (100%)	65 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
17	q	73/78 (94%)	73 (100%)	0	100	100
18	r	47/65 (72%)	47 (100%)	0	100	100
19	s	72/79 (91%)	72 (100%)	0	100	100
20	t	65/66 (98%)	65 (100%)	0	100	100
21	u	48/61 (79%)	48 (100%)	0	100	100
24	v	437/453 (96%)	432 (99%)	5 (1%)	65	78
27	C	216/218 (99%)	216 (100%)	0	100	100
28	D	163/163 (100%)	163 (100%)	0	100	100
29	E	165/165 (100%)	165 (100%)	0	100	100
30	F	148/150 (99%)	148 (100%)	0	100	100
31	G	137/138 (99%)	137 (100%)	0	100	100
32	I	100/123 (81%)	100 (100%)	0	100	100
33	J	109/110 (99%)	109 (100%)	0	100	100
34	L	116/116 (100%)	116 (100%)	0	100	100
35	M	104/104 (100%)	104 (100%)	0	100	100
36	N	103/103 (100%)	103 (100%)	0	100	100
37	O	107/107 (100%)	107 (100%)	0	100	100
38	P	98/103 (95%)	98 (100%)	0	100	100
39	Q	86/87 (99%)	86 (100%)	0	100	100
40	R	99/100 (99%)	99 (100%)	0	100	100
41	S	89/90 (99%)	89 (100%)	0	100	100
42	T	84/84 (100%)	84 (100%)	0	100	100
43	U	93/93 (100%)	93 (100%)	0	100	100
44	V	80/84 (95%)	80 (100%)	0	100	100
45	W	83/85 (98%)	83 (100%)	0	100	100
46	X	78/78 (100%)	78 (100%)	0	100	100
47	Y	58/63 (92%)	58 (100%)	0	100	100
48	Z	67/68 (98%)	67 (100%)	0	100	100
49	1	54/55 (98%)	54 (100%)	0	100	100
50	2	48/49 (98%)	48 (100%)	0	100	100
51	3	44/62 (71%)	44 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
52	4	46/48 (96%)	46 (100%)	0	100	100
53	5	46/49 (94%)	46 (100%)	0	100	100
54	6	38/38 (100%)	38 (100%)	0	100	100
55	7	51/52 (98%)	51 (100%)	0	100	100
56	8	34/34 (100%)	34 (100%)	0	100	100
All	All	5150/5375 (96%)	5145 (100%)	5 (0%)	87	90

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
24	v	26	LYS
24	v	122	ARG
24	v	189	GLU
24	v	435	ASP
24	v	436	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 100 such sidechains are listed below:

Mol	Chain	Res	Type
27	C	239	ASN
32	I	88	HIS
55	7	28	ASN
28	D	49	GLN
29	E	97	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	a	1526/1542 (98%)	212 (13%)	0
22	x	72/76 (94%)	18 (25%)	0
23	z	7/21 (33%)	2 (28%)	0
25	A	2897/2904 (99%)	388 (13%)	14 (0%)
26	B	119/120 (99%)	18 (15%)	2 (1%)
All	All	4621/4663 (99%)	638 (13%)	16 (0%)

5 of 638 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	a	4	U
1	a	5	U
1	a	6	G
1	a	9	G
1	a	32	A

5 of 16 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
26	B	3	C
25	A	2799	A
25	A	1730	C
25	A	2473	U
25	A	1583	A

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

47 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	$\#\|Z\| > 2$
25	OMG	A	2251	25	23,26,27	1.21	3 (13%)	32,38,41	1.99	5 (15%)
25	H2U	A	2449	25	18,21,22	1.05	2 (11%)	19,30,33	1.06	3 (15%)
22	MIA	x	37	22	28,31,32	2.32	7 (25%)	38,44,47	2.77	14 (36%)
25	PSU	A	1911	25	18,21,22	1.41	3 (16%)	21,30,33	2.12	4 (19%)
22	PSU	x	39	22	18,21,22	1.34	2 (11%)	21,30,33	2.15	4 (19%)
1	MA6	a	1519	1	23,26,27	1.48	5 (21%)	33,38,41	2.43	15 (45%)
25	6MZ	A	2030	25	22,25,26	1.44	5 (22%)	29,36,39	2.28	9 (31%)
25	OMC	A	2498	25,57	19,22,23	0.83	0	25,31,34	1.17	2 (8%)
37	4D4	O	81	37	9,11,12	2.69	3 (33%)	7,13,15	0.97	1 (14%)
25	5MC	A	1962	25,57	19,22,23	1.31	3 (15%)	26,32,35	1.05	2 (7%)
1	5MC	a	1407	1	19,22,23	1.49	3 (15%)	26,32,35	1.12	3 (11%)
25	PSU	A	2604	25	18,21,22	1.47	4 (22%)	21,30,33	2.11	4 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	2MG	a	966	1	23,26,27	1.28	4 (17%)	33,38,41	2.22	8 (24%)
1	2MG	a	1516	1	23,26,27	1.25	3 (13%)	33,38,41	2.24	7 (21%)
25	PSU	A	2457	25	18,21,22	1.40	4 (22%)	21,30,33	2.06	4 (19%)
25	PSU	A	2580	25	18,21,22	1.41	5 (27%)	21,30,33	2.09	4 (19%)
1	PSU	a	516	1,57	18,21,22	1.38	3 (16%)	21,30,33	2.10	4 (19%)
1	4OC	a	1402	1	20,23,24	0.76	0	25,32,35	0.92	1 (4%)
25	PSU	A	2605	25	18,21,22	1.46	4 (22%)	21,30,33	2.13	4 (19%)
25	2MA	A	2503	25	22,25,26	1.48	5 (22%)	32,37,40	2.26	9 (28%)
25	2MG	A	1835	25	23,26,27	1.26	3 (13%)	33,38,41	2.15	7 (21%)
1	2MG	a	1207	1	23,26,27	1.26	4 (17%)	33,38,41	2.18	7 (21%)
25	OMU	A	2552	25	19,22,23	1.34	4 (21%)	25,31,34	1.95	6 (24%)
22	PSU	x	55	22	18,21,22	1.38	2 (11%)	21,30,33	2.03	4 (19%)
28	MEQ	D	150	28	8,9,10	0.48	0	5,10,12	0.35	0
25	6MZ	A	1618	25	22,25,26	1.41	4 (18%)	29,36,39	2.28	9 (31%)
25	G7M	A	2069	25	23,26,27	1.57	4 (17%)	34,39,42	1.73	5 (14%)
25	2MG	A	2445	25	23,26,27	1.27	4 (17%)	33,38,41	2.18	10 (30%)
1	5MC	a	967	1	19,22,23	1.48	3 (15%)	26,32,35	1.14	3 (11%)
1	G7M	a	527	1	23,26,27	1.57	3 (13%)	34,39,42	1.75	5 (14%)
1	UR3	a	1498	1	19,22,23	0.94	1 (5%)	26,32,35	1.75	4 (15%)
22	5MU	x	54	22	19,22,23	1.44	6 (31%)	27,32,35	1.84	5 (18%)
12	D2T	l	89	12	8,9,10	2.82	1 (12%)	6,11,13	2.58	2 (33%)
25	PSU	A	746	25,57	18,21,22	1.45	4 (22%)	21,30,33	2.10	3 (14%)
37	MS6	O	82	37	5,7,8	0.57	0	2,7,9	1.29	0
25	PSU	A	2504	25,57	18,21,22	1.40	4 (22%)	21,30,33	1.95	3 (14%)
25	5MU	A	747	25	19,22,23	1.40	4 (21%)	27,32,35	2.18	7 (25%)
22	PSU	x	32	22	18,21,22	1.42	3 (16%)	21,30,33	2.08	4 (19%)
11	IAS	k	119	11	6,7,8	0.97	0	3,8,10	1.45	1 (33%)
25	PSU	A	955	25	18,21,22	1.43	4 (22%)	21,30,33	2.20	4 (19%)
22	4SU	x	8	22	18,21,22	1.85	4 (22%)	25,30,33	2.49	5 (20%)
25	3TD	A	1915	25	19,22,23	4.23	7 (36%)	23,32,35	1.78	3 (13%)
25	5MU	A	1939	25	19,22,23	1.37	4 (21%)	27,32,35	2.29	6 (22%)
25	1MG	A	745	25	23,26,27	1.15	2 (8%)	33,39,42	1.80	5 (15%)
1	MA6	a	1518	1	23,26,27	1.46	4 (17%)	33,38,41	2.46	13 (39%)
25	PSU	A	1917	25	18,21,22	1.44	4 (22%)	21,30,33	2.00	4 (19%)
22	G7M	x	46	22	23,26,27	2.35	5 (21%)	34,39,42	3.09	10 (29%)

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
25	OMG	A	2251	25	-	0/9/27/28	0/3/3/3
25	H2U	A	2449	25	-	0/7/38/39	0/2/2/2
22	MIA	x	37	22	-	4/15/33/34	0/3/3/3
25	PSU	A	1911	25	-	0/7/25/26	0/2/2/2
22	PSU	x	39	22	-	1/7/25/26	0/2/2/2
1	MA6	a	1519	1	-	4/11/29/30	0/3/3/3
25	6MZ	A	2030	25	-	1/9/27/28	0/3/3/3
25	OMC	A	2498	25,57	-	3/9/27/28	0/2/2/2
37	4D4	O	81	37	-	6/11/12/14	-
25	5MC	A	1962	25,57	-	0/7/25/26	0/2/2/2
1	5MC	a	1407	1	-	0/7/25/26	0/2/2/2
25	PSU	A	2604	25	-	0/7/25/26	0/2/2/2
1	2MG	a	966	1	-	2/9/27/28	0/3/3/3
1	2MG	a	1516	1	-	0/9/27/28	0/3/3/3
25	PSU	A	2457	25	-	0/7/25/26	0/2/2/2
25	PSU	A	2580	25	-	0/7/25/26	0/2/2/2
1	PSU	a	516	1,57	-	0/7/25/26	0/2/2/2
1	4OC	a	1402	1	-	3/9/29/30	0/2/2/2
25	PSU	A	2605	25	-	0/7/25/26	0/2/2/2
25	2MA	A	2503	25	-	1/7/25/26	0/3/3/3
25	2MG	A	1835	25	-	2/9/27/28	0/3/3/3
1	2MG	a	1207	1	-	0/9/27/28	0/3/3/3
25	OMU	A	2552	25	-	1/9/27/28	0/2/2/2
22	PSU	x	55	22	-	0/7/25/26	0/2/2/2
28	MEQ	D	150	28	-	2/8/9/11	-
25	6MZ	A	1618	25	-	0/9/27/28	0/3/3/3
25	G7M	A	2069	25	-	0/7/25/26	0/3/3/3
25	2MG	A	2445	25	-	1/9/27/28	0/3/3/3
1	5MC	a	967	1	-	0/7/25/26	0/2/2/2
1	G7M	a	527	1	-	1/7/25/26	0/3/3/3
1	UR3	a	1498	1	-	0/7/25/26	0/2/2/2
22	5MU	x	54	22	-	0/7/25/26	0/2/2/2
12	D2T	l	89	12	-	1/7/12/14	-
25	PSU	A	746	25,57	-	3/7/25/26	0/2/2/2
37	MS6	O	82	37	-	0/4/6/8	-
25	PSU	A	2504	25,57	-	0/7/25/26	0/2/2/2
25	5MU	A	747	25	-	0/7/25/26	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
22	PSU	x	32	22	-	0/7/25/26	0/2/2/2
11	IAS	k	119	11	-	1/7/7/8	-
25	PSU	A	955	25	-	0/7/25/26	0/2/2/2
22	4SU	x	8	22	-	0/7/25/26	0/2/2/2
25	3TD	A	1915	25	-	0/7/25/26	0/2/2/2
25	5MU	A	1939	25	-	0/7/25/26	0/2/2/2
25	1MG	A	745	25	-	0/7/25/26	0/3/3/3
1	MA6	a	1518	1	-	2/11/29/30	0/3/3/3
25	PSU	A	1917	25	-	2/7/25/26	0/2/2/2
22	G7M	x	46	22	-	3/7/25/26	0/3/3/3

The worst 5 of 156 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	A	1915	3TD	C6-C5	12.58	1.49	1.35
25	A	1915	3TD	C2-N1	9.75	1.49	1.37
12	l	89	D2T	CB-CA	-7.44	1.52	1.54
22	x	46	G7M	C8-N7	7.40	1.45	1.33
22	x	37	MIA	C2-S10	-7.24	1.69	1.75

The worst 5 of 242 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
22	x	37	MIA	C12-C13-C14	-8.79	111.23	127.01
22	x	46	G7M	CN7-N7-C8	-8.50	111.91	124.79
25	A	2503	2MA	C5-C4-N3	-7.87	118.89	127.18
22	x	8	4SU	C4-N3-C2	-7.83	119.81	127.31
22	x	37	MIA	C5-C4-N3	-7.69	119.08	127.18

There are no chirality outliers.

5 of 44 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	a	966	2MG	N3-C2-N2-CM2
1	a	1518	MA6	C5-C6-N6-C9
1	a	1519	MA6	C5-C6-N6-C9
22	x	37	MIA	N6-C12-C13-C14
22	x	37	MIA	C12-C13-C14-C15

There are no ring outliers.

16 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
25	A	1911	PSU	1	0
1	a	1519	MA6	1	0
25	A	2030	6MZ	3	0
25	A	2498	OMC	2	0
1	a	1407	5MC	1	0
1	a	1402	4OC	2	0
25	A	2503	2MA	1	0
1	a	1207	2MG	2	0
22	x	55	PSU	2	0
1	a	527	G7M	1	0
22	x	54	5MU	1	0
12	l	89	D2T	1	0
25	A	2504	PSU	1	0
25	A	1915	3TD	1	0
1	a	1518	MA6	1	0
22	x	46	G7M	3	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 740 ligands modelled in this entry, 739 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	$\#\|Z\| > 2$
58	GCP	v	601	-	32,34,34	0.77	1 (3%)	49,54,54	0.56	1 (2%)

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
58	GCP	v	601	-	-	1/19/38/38	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
58	v	601	GCP	PB-O2B	-2.29	1.50	1.56

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
58	v	601	GCP	O1G-PG-C3B	-2.11	106.77	111.37

There are no chirality outliers.

All (1) torsion outliers are listed below:

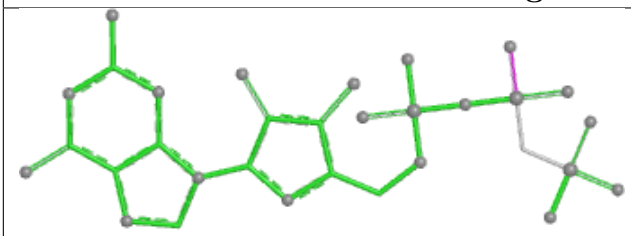
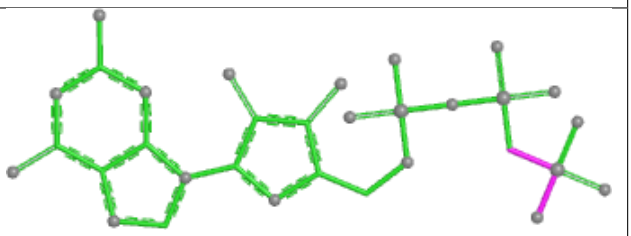
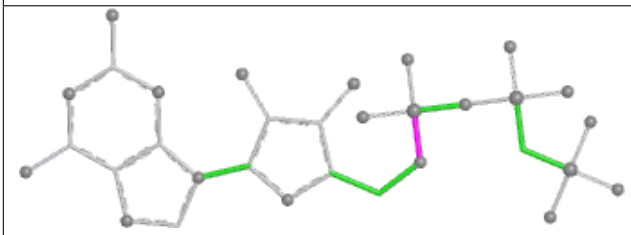
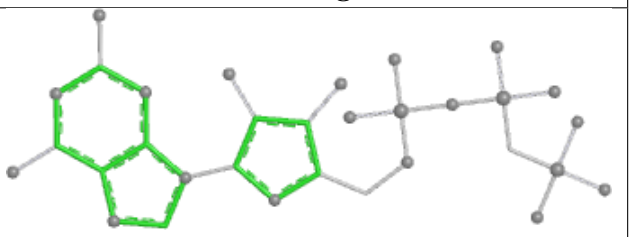
Mol	Chain	Res	Type	Atoms
58	v	601	GCP	C5'-O5'-PA-O1A

There are no ring outliers.

1 monomer is involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
58	v	601	GCP	9	0

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 GCP v 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

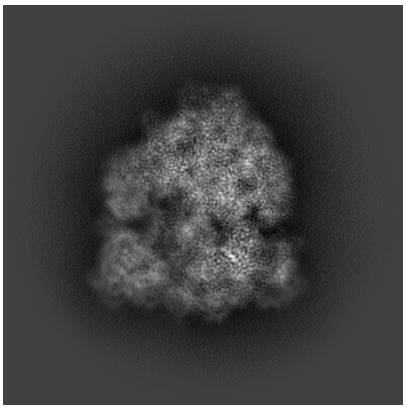
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-29631. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections (i)

6.1.1 Primary map



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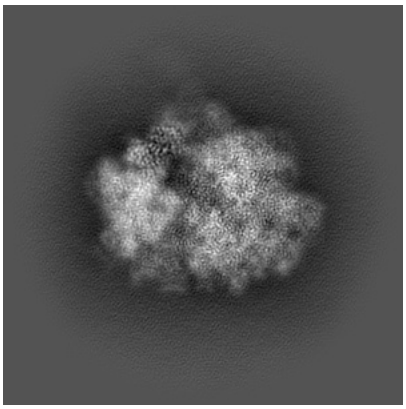

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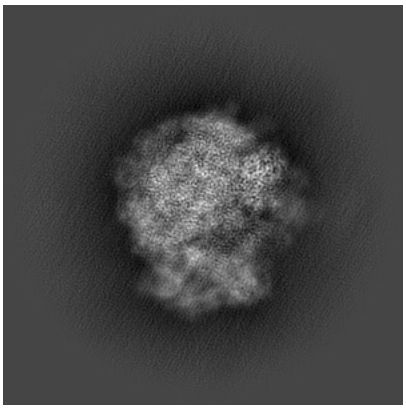
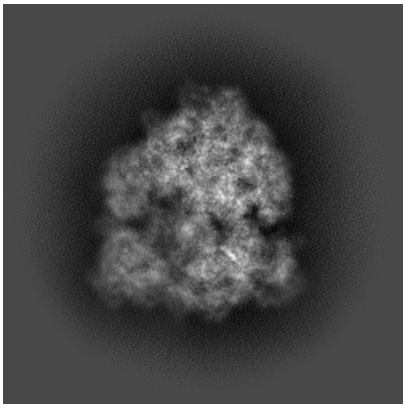


Z

6.1.2 Raw map



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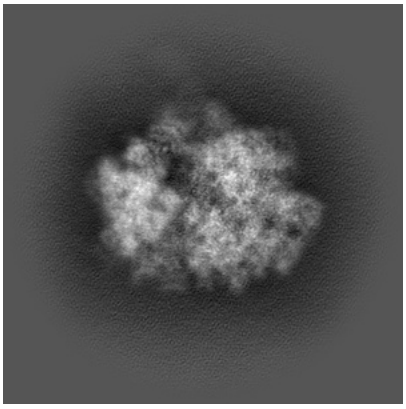
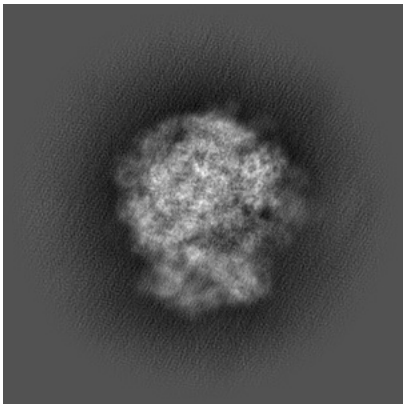


Y

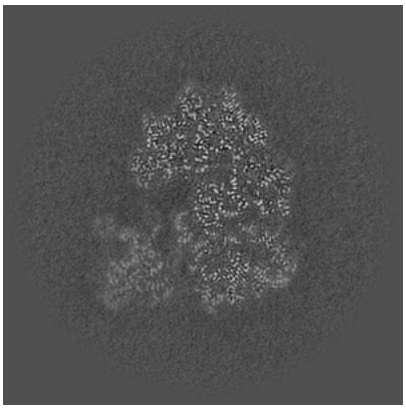


Z

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

6.2 Central slices (i)

6.2.1 Primary map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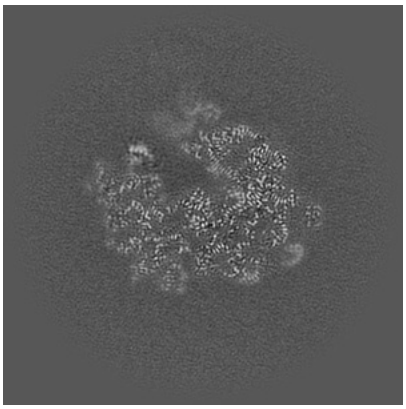
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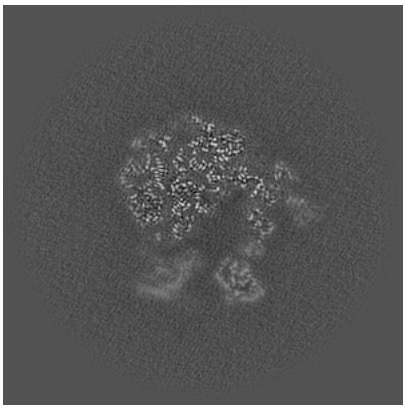
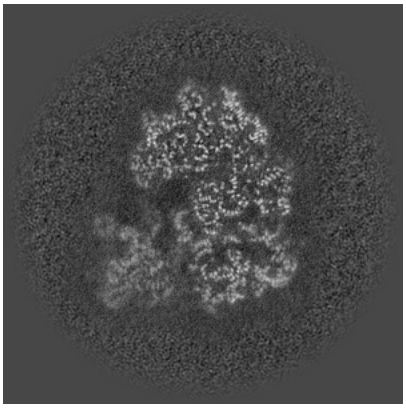

Z Index: 256

6.2.2 Raw map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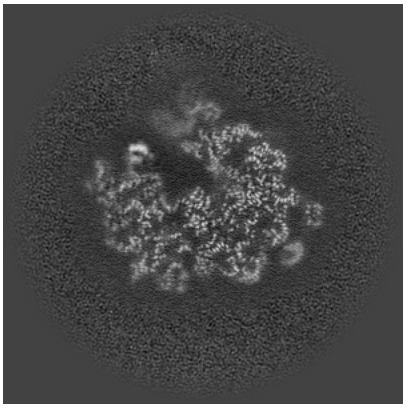
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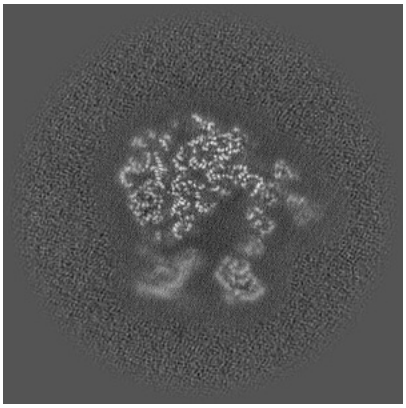
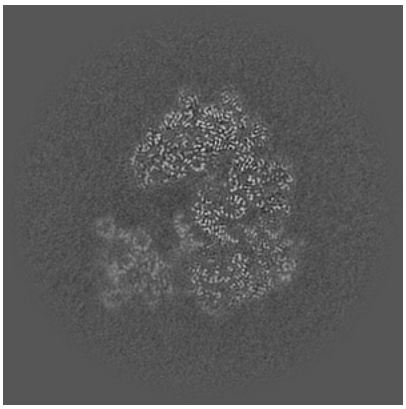
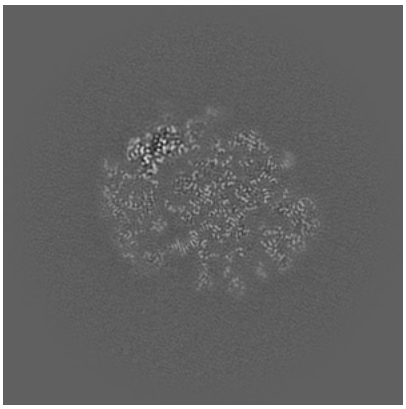

Z Index: 256

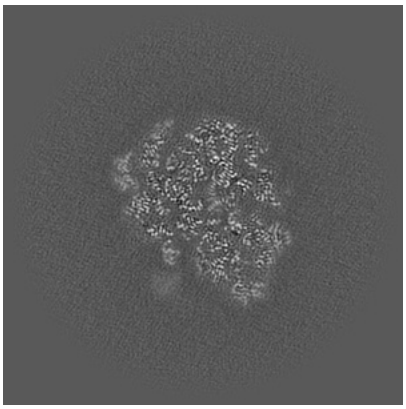
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

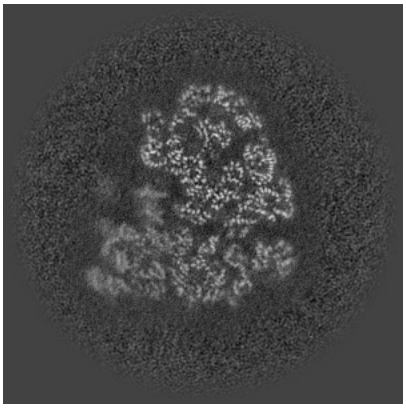
6.3.1 Primary map

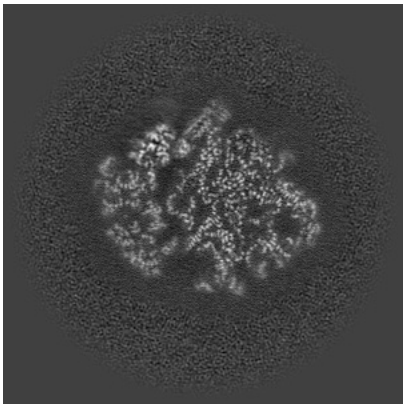

X Index: 260

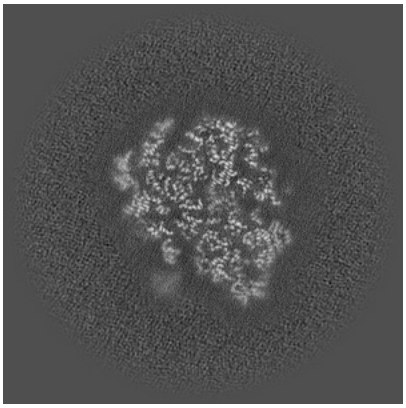

Y Index: 299


Z Index: 296

6.3.2 Raw map


X Index: 243

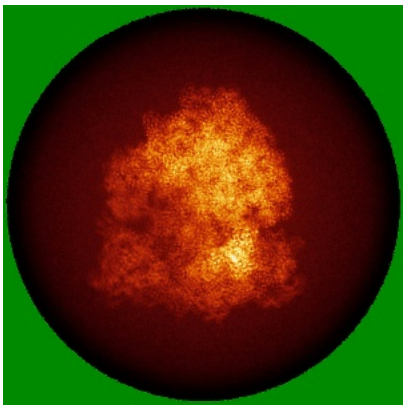

Y Index: 291

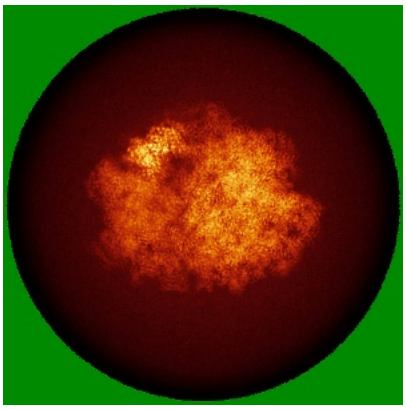

Z Index: 296

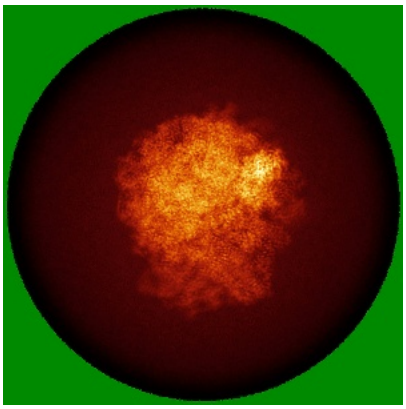
The images above show the largest variance slices of the map in three orthogonal directions.

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

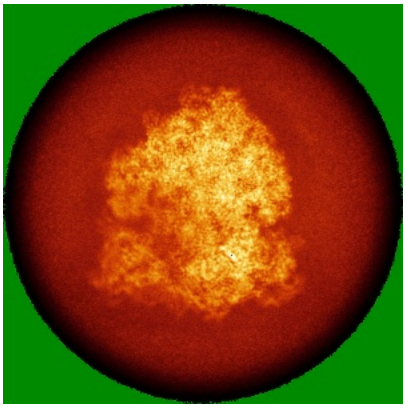
6.4.1 Primary map

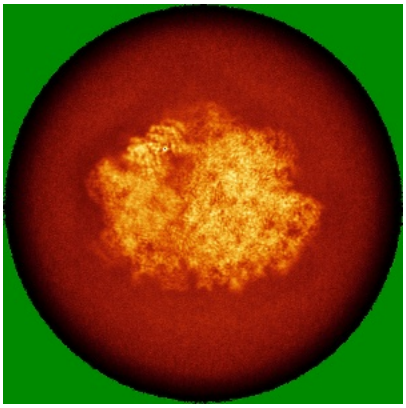

X

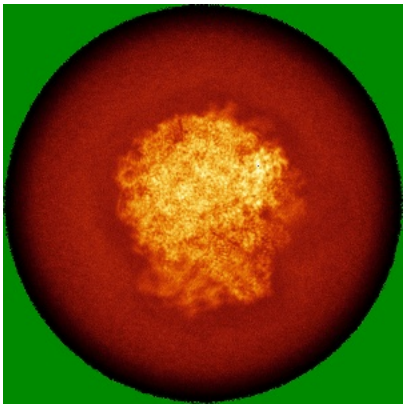

Y


Z

6.4.2 Raw map


X


Y


Z

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

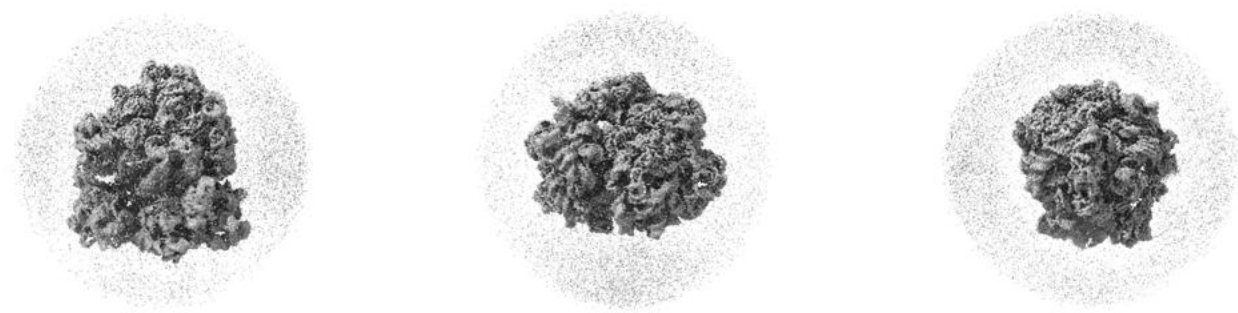
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 3.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

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

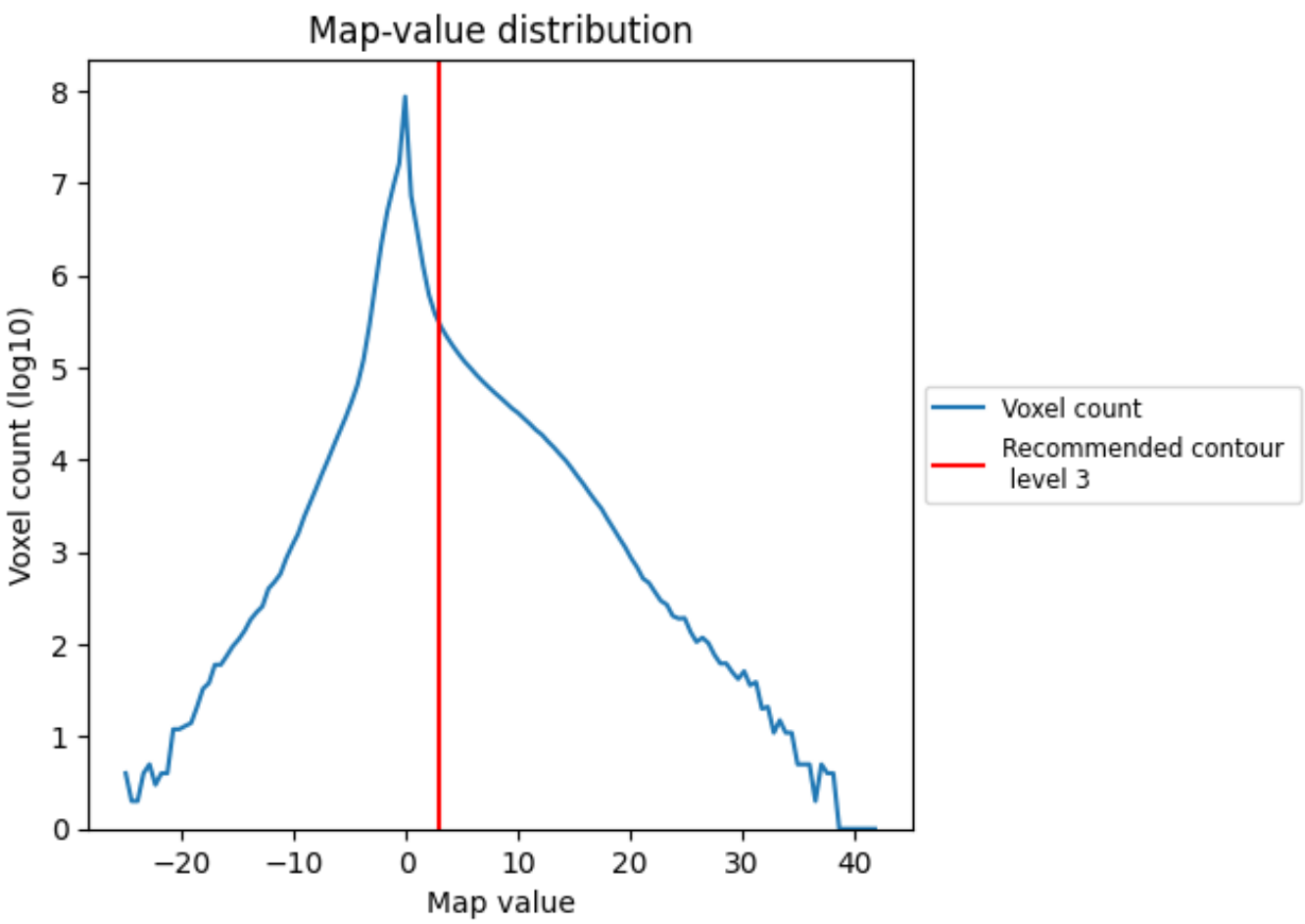
6.6 Mask visualisation (i)

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

7 Map analysis (i)

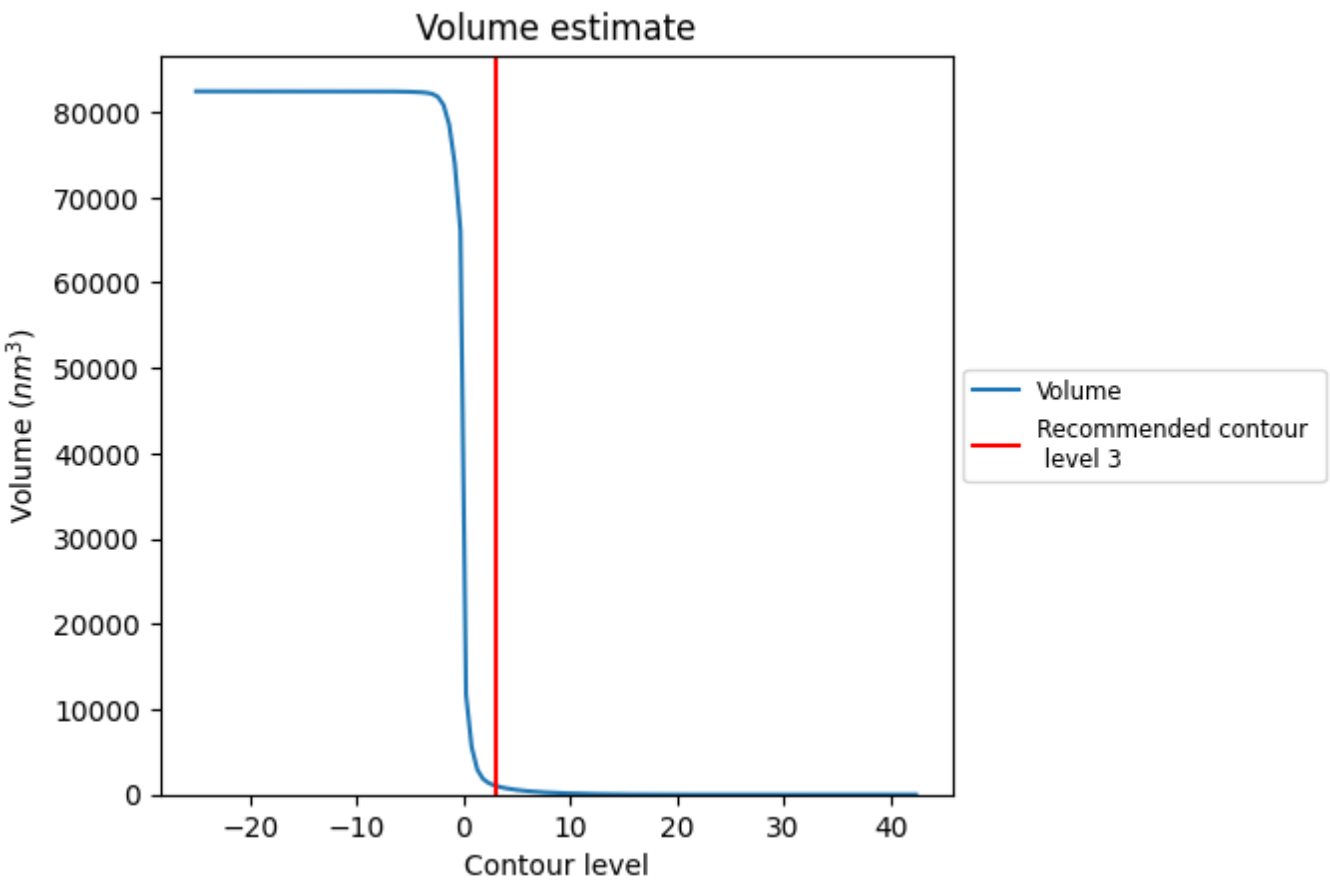
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



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

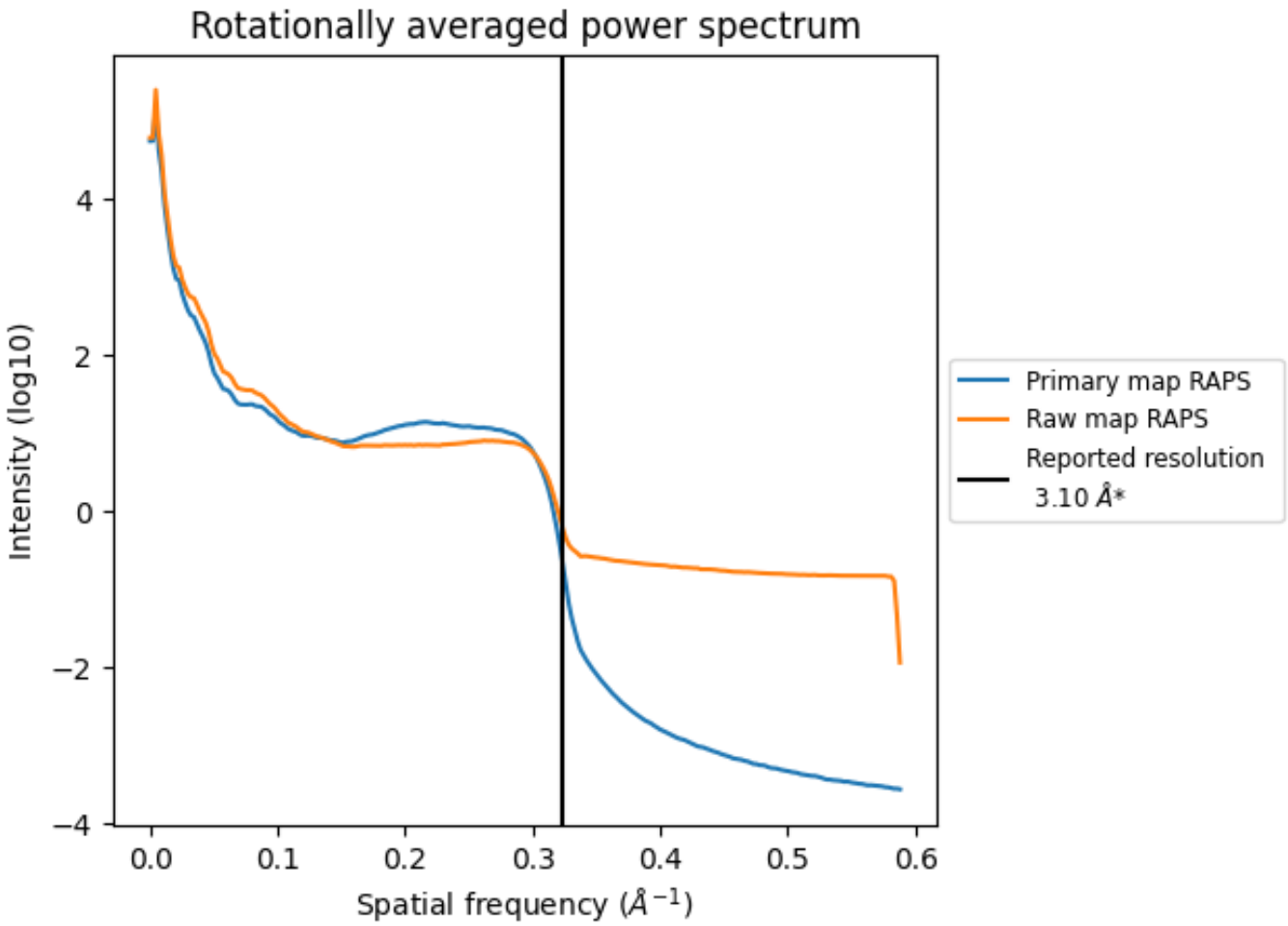
7.2 Volume estimate (i)



The volume at the recommended contour level is 1050 nm^3; this corresponds to an approximate mass of 949 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)

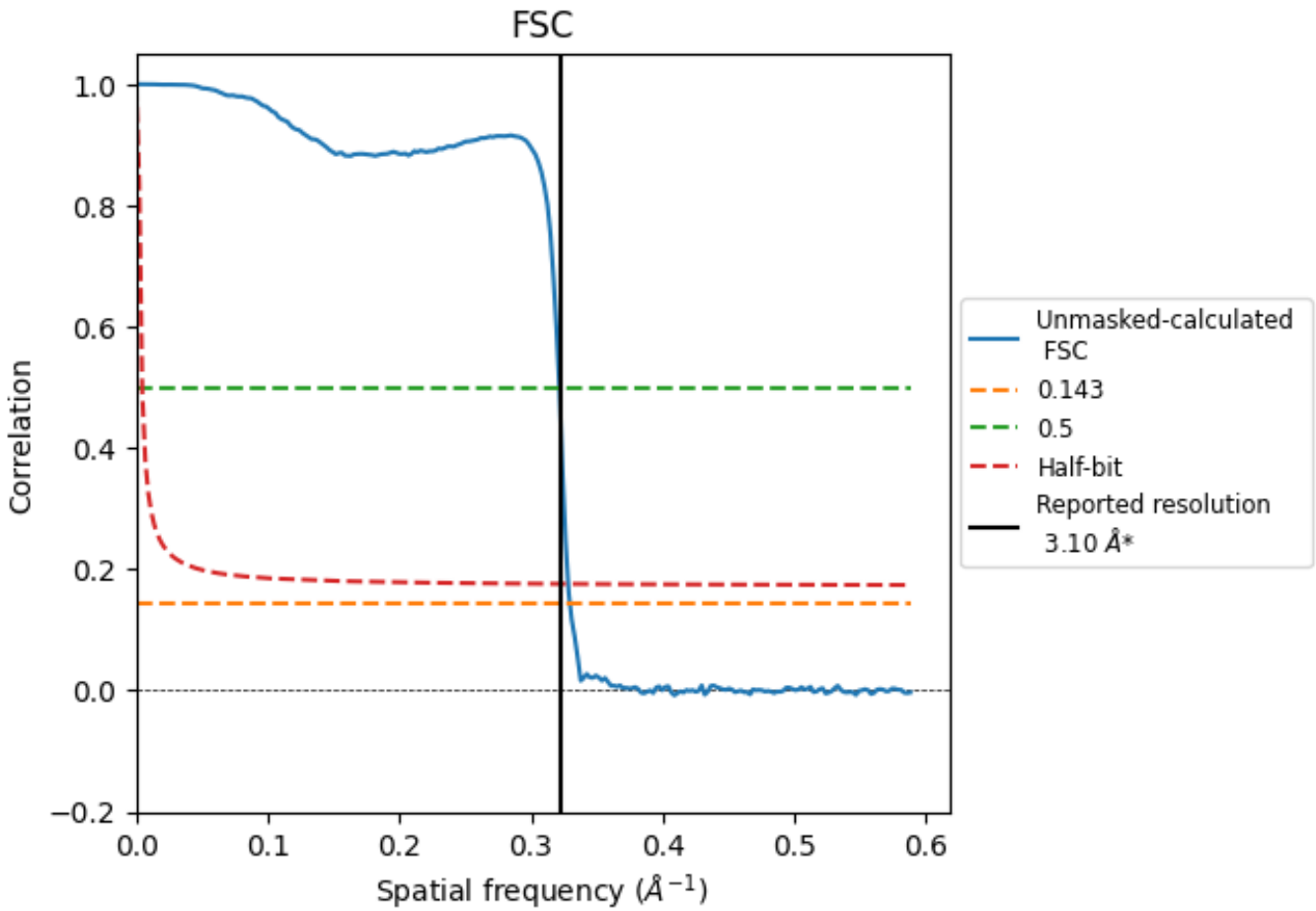


*Reported resolution corresponds to spatial frequency of 0.323 Å^{-1}

8 Fourier-Shell correlation (i)

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

8.1 FSC (i)



*Reported resolution corresponds to spatial frequency of 0.323 Å^{-1}

8.2 Resolution estimates (i)

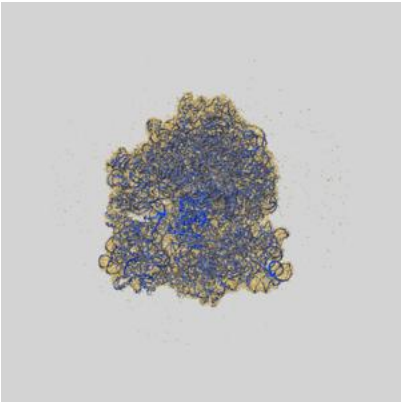
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.03	3.11	3.05

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

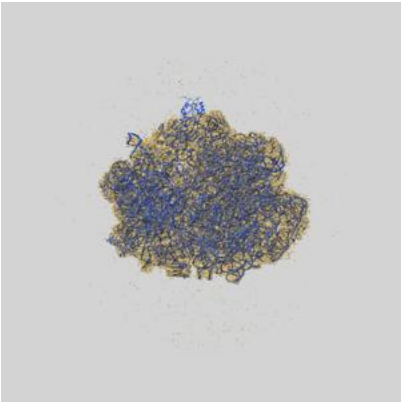
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-29631 and PDB model 8FZI. Per-residue inclusion information can be found in section 3 on page 17.

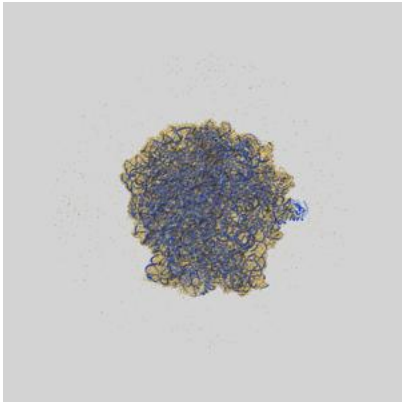
9.1 Map-model overlay (i)



X



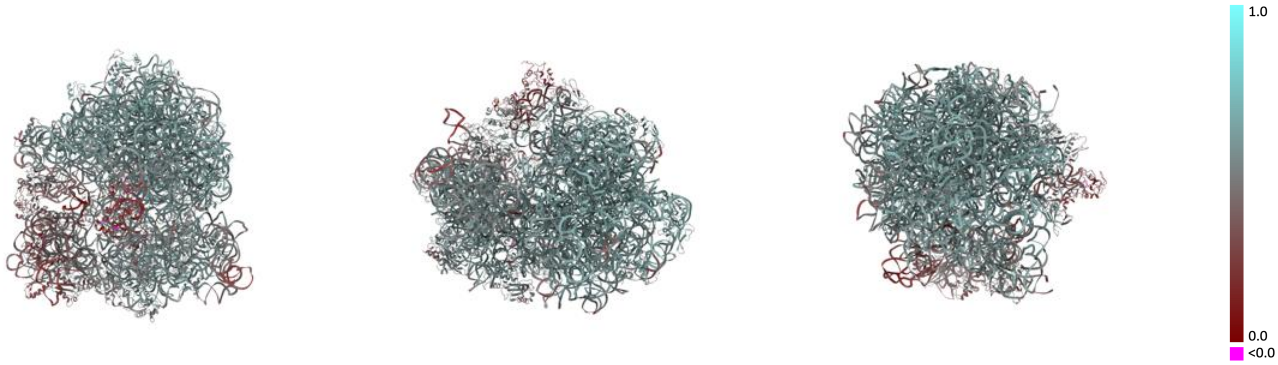
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 3.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

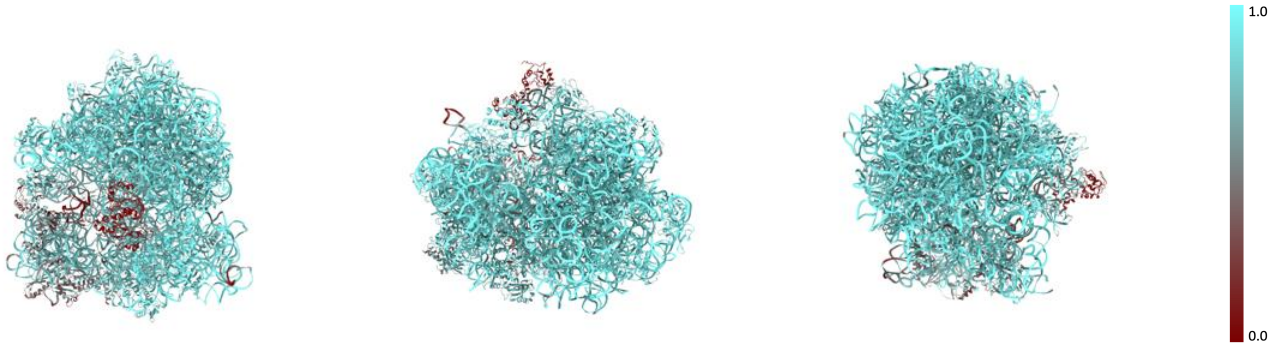
9.2 Q-score mapped to coordinate model (i)



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.

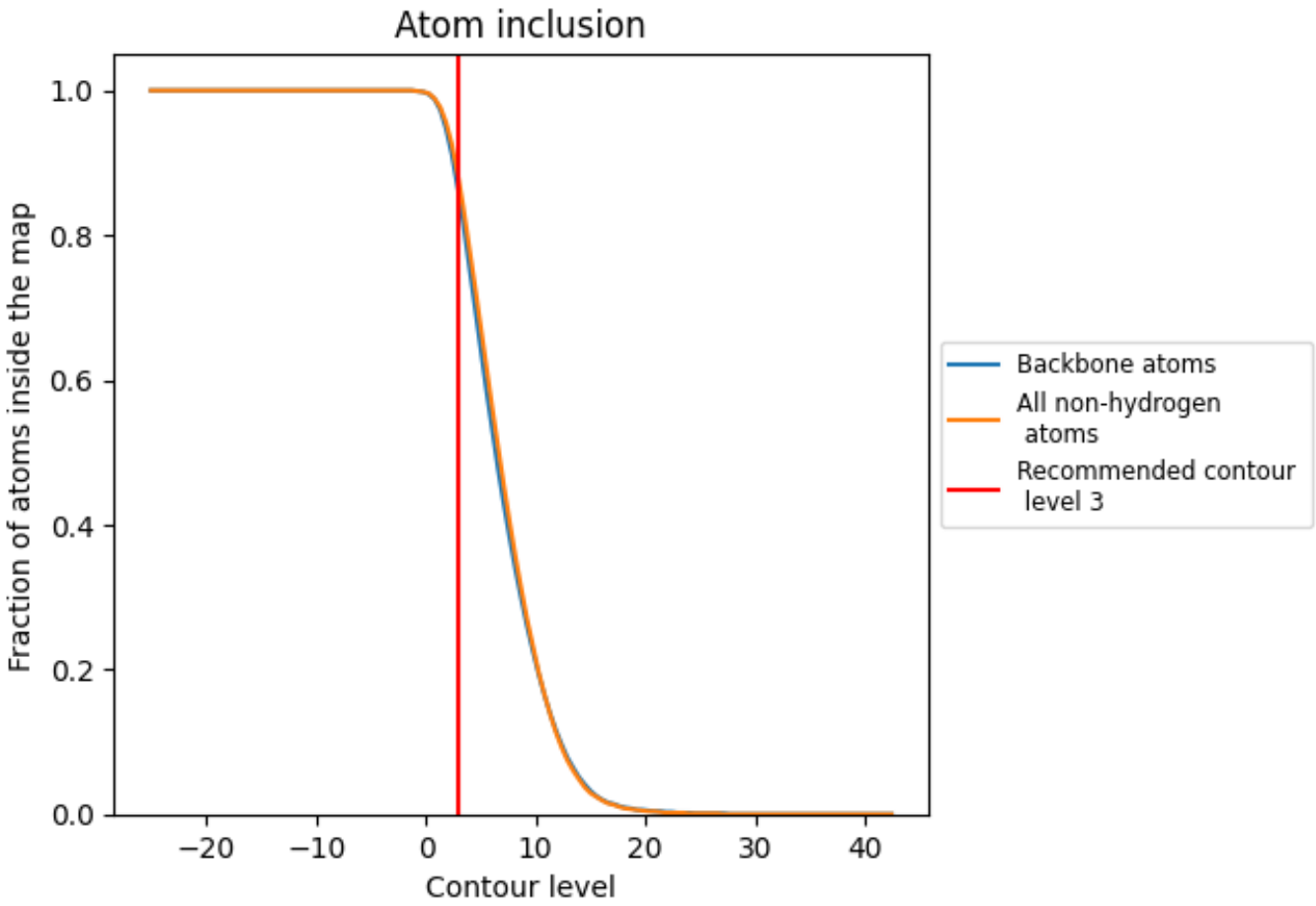
9.3 Atom inclusion mapped to coordinate model (i)



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 (3).

9.4 Atom inclusion (i)



At the recommended contour level, 86% of all backbone atoms, 88% 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 (3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8770	0.5340
1	0.8700	0.5780
2	0.8970	0.5900
3	0.4290	0.3540
4	0.9280	0.6090
5	0.8580	0.5760
6	0.9490	0.6190
7	0.9330	0.6120
8	0.8740	0.5720
A	0.9360	0.5630
B	0.9300	0.5230
C	0.9340	0.6080
D	0.9190	0.5980
E	0.8880	0.5820
F	0.7250	0.4430
G	0.8250	0.5100
I	0.0530	0.2250
J	0.0990	0.2380
L	0.9240	0.6010
M	0.9010	0.5990
N	0.9210	0.5920
O	0.8390	0.5670
P	0.9480	0.6070
Q	0.8670	0.5390
R	0.8710	0.5840
S	0.9530	0.6120
T	0.9140	0.5930
U	0.9170	0.5950
V	0.8920	0.5810
W	0.8720	0.5630
X	0.8370	0.5570
Y	0.8990	0.5960
Z	0.9220	0.5930
a	0.9080	0.5090
b	0.6360	0.4590

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Chain	Atom inclusion	Q-score
c	0.5640	0.4450
d	0.8220	0.5240
e	0.8510	0.5520
f	0.7840	0.4920
g	0.3570	0.3450
h	0.8640	0.5560
i	0.6990	0.4380
j	0.5930	0.4050
k	0.8230	0.5290
l	0.8470	0.5650
m	0.4920	0.3830
n	0.5920	0.4030
o	0.8300	0.5430
p	0.8590	0.5620
q	0.8670	0.5520
r	0.8010	0.5360
s	0.4740	0.3330
t	0.8430	0.5280
u	0.5850	0.4930
v	0.9560	0.5050
x	0.7330	0.3880
z	0.6570	0.5030