



## wwPDB EM Validation Summary Report ⓘ

Aug 10, 2023 – 07:44 pm BST

PDB ID : 8BGH  
EMDB ID : EMD-16031  
Title : Elongating E. coli 70S ribosome containing acylated tRNA(iMet) in the P-site and AAA mRNA codon in the A-site after uncompleted di-peptide formation  
Authors : Koziej, L.; Glatt, S.  
Deposited on : 2022-10-27  
Resolution : 2.88 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

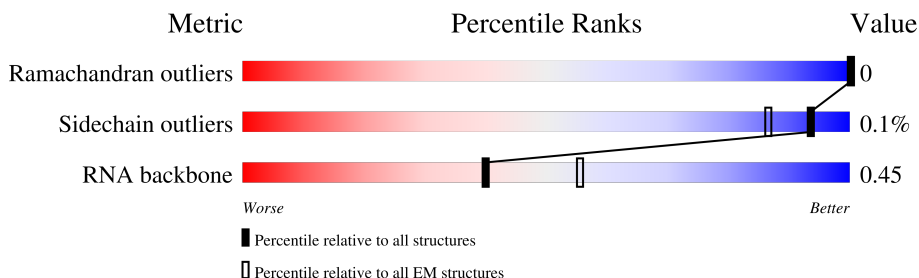
EMDB validation analysis : 0.0.1.dev50  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

# 1 Overall quality at a glance i

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

The reported resolution of this entry is 2.88 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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

Mol	Chain	Length	Quality of chain
1	A	273	99%
2	B	209	100%
3	C	201	100%
4	D	179	99%
5	E	177	98%
6	F	149	42%
7	G	142	100%
8	H	123	100%

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Mol	Chain	Length	Quality of chain
9	I	144	100%
10	J	136	100%
11	K	127	93% 7%
12	L	117	99%
13	M	115	99%
14	N	118	99%
15	O	103	100%
16	P	110	100%
17	Q	100	93% 7%
18	R	104	98%
19	S	94	100%
20	T	85	88% 12%
21	U	78	99%
22	V	63	95% 5%
23	W	59	97%
24	X	70	86% 14% 6%
25	a	57	96%
26	b	55	93% 7%
27	c	46	100%
28	d	65	97%
29	e	38	100%
30	f	241	93% 7% 11%
31	g	233	88% 12%
32	h	206	100%
33	i	167	93% 7%

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Mol	Chain	Length	Quality of chain
34	j	131	81% 19%
35	k	179	84% 16%
36	l	130	98% ..
37	m	130	96% ..
38	n	103	96% .
39	o	129	91% 9%
40	p	124	99% .
41	q	118	97% .
42	r	101	99% .
43	s	89	99% .
44	t	82	100%
45	u	84	95% 5%
46	v	75	88% 12%
47	w	92	85% 14%
48	x	87	99% .
49	y	71	99% .
50	0	2904	80% 15% 5%
51	1	120	90% 10%
52	2	1542	82% 18%
53	3	30	73%
54	4	77	83% 17%

## 2 Entry composition [i](#)

There are 55 unique types of molecules in this entry. The entry contains 236174 atoms, of which 95177 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
1	A	271	4237	1288	2155	423	364	7	0	0

- Molecule 2 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
2	B	208	3170	976	1611	287	292	4	0	0

- Molecule 3 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
3	C	201	3171	974	1619	283	290	5	0	0

- Molecule 4 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
4	D	177	2855	899	1445	249	256	6	0	0

- Molecule 5 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
5	E	173	2628	814	1333	237	242	2	0	0

- Molecule 6 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
6	F	149	2259	699	1148	197	214	1	0	0

- Molecule 7 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
7	G	142	2291	714	1162	212	199	4	0	0

- Molecule 8 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
8	H	123	1970	593	1023	181	167	6	0	0

- Molecule 9 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
9	I	144	2182	654	1129	207	190	2	0	0

- Molecule 10 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
10	J	136	2231	686	1157	205	177	6	0	0

- Molecule 11 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
11	K	118	1934	585	989	194	161	5	0	0

- Molecule 12 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
12	L	116	1816	552	924	178	162	0	0

- Molecule 13 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
13	M	114	1880	574	963	179	163	1	0	0

- Molecule 14 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
14	N	117	1967	604	1020	192	151	0	0

- Molecule 15 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
15	O	103	1655	516	839	153	145	2	0	0

- Molecule 16 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
16	P	110	1779	532	922	166	156	3	0	0

- Molecule 17 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
17	Q	93	1545	466	807	139	131	2	0	0

- Molecule 18 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
18	R	102	1611	492	832	146	141	0	0

- Molecule 19 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
19	S	94	1533	479	780	137	134	3	0	0

- Molecule 20 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
20	T	75	1166	355	594	116	100	1	0	0

- Molecule 21 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
21	U	77	1278	388	653	129	106	2	0	0

- Molecule 22 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
22	V	60	1015	303	524	96	91	1	0	0

- Molecule 23 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
23	W	57	922	276	483	86	75	2	0	0

- Molecule 24 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
24	X	60	963	299	483	90	85	6	0	0

- Molecule 25 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
25	a	55	880	263	446	92	78	1	0	0

- Molecule 26 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
26	b	51	869	269	452	76	72	0	0

- Molecule 27 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
27	c	46	795	228	418	90	57	2	0	0

- Molecule 28 is a protein called 50S ribosomal protein L35.



Mol	Chain	Residues	Atoms					AltConf	Trace	
28	d	64	Total	C	H	N	O	S	0	0
			1076	323	572	105	74	2		

- Molecule 29 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace	
29	e	38	Total	C	H	N	O	S	0	0
			645	185	343	65	48	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace	
30	f	224	Total	C	H	N	O	S	0	0
			3534	1109	1781	315	321	8		

- Molecule 31 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
31	g	206	Total	C	H	N	O	S	0	0
			3321	1028	1697	305	288	3		

- Molecule 32 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
32	h	205	Total	C	H	N	O	S	0	0
			3351	1026	1708	315	298	4		

- Molecule 33 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
33	i	155	Total	C	H	N	O	S	0	0
			2330	711	1186	216	211	6		

- Molecule 34 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace	
34	j	106	Total	C	H	N	O	S	0	0
			1726	545	864	156	154	7		

- Molecule 35 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
35	k	151	2419	735	1238	227	215	4	0	0

- Molecule 36 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
36	l	129	2011	616	1032	173	184	6	0	0

- Molecule 37 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
37	m	127	2093	634	1071	206	179	3	0	0

- Molecule 38 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
38	n	99	1632	498	837	152	144	1	0	0

- Molecule 39 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
39	o	117	1765	540	888	174	160	3	0	0

- Molecule 40 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
40	p	123	1972	590	1017	196	165	4	0	0

- Molecule 41 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
41	q	114	1825	546	942	178	156	3	0	0

- Molecule 42 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
42	r	100	1650	499	845	164	139	3	0	0

- Molecule 43 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
43	s	88	1449	439	735	144	130	1	0	0

- Molecule 44 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
44	t	82	1315	406	666	128	114	1	0	0

- Molecule 45 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
45	u	80	1340	411	692	121	113	3	0	0

- Molecule 46 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
46	v	66	1110	345	566	102	96	1	0	0

- Molecule 47 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
47	w	79	1303	408	666	120	107	2	0	0

- Molecule 48 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
48	x	86	1390	414	720	138	115	3	0	0

- Molecule 49 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
49	y	70	Total	C	H	N	O	S	0	0
			1219	366	629	125	98	1		

- Molecule 50 is a RNA chain called 23S rRNA RRLG-RRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
50	0	2758	Total	C	H	N	O	P	0	0
			88993	26417	29774	10911	19134	2757		

- Molecule 51 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
51	1	120	Total	C	H	N	O	P	0	0
			3868	1144	1302	468	835	119		

- Molecule 52 is a RNA chain called 16S rRNA RRSB-RRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
52	2	1534	Total	C	H	N	O	P	0	0
			49478	14681	16564	6041	10659	1533		

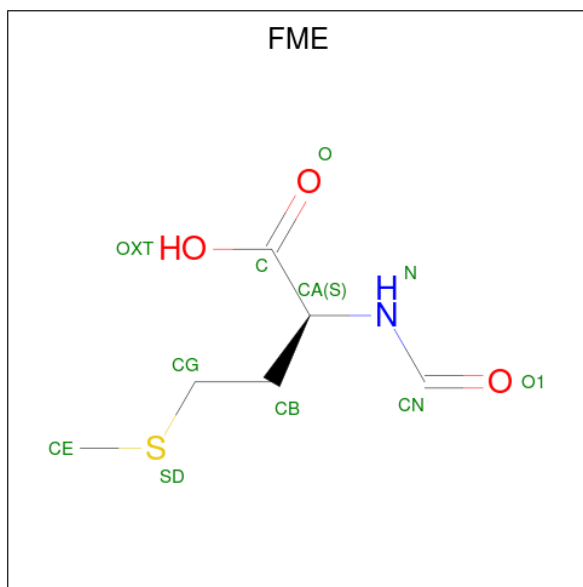
- Molecule 53 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
53	3	8	Total	C	H	N	O	P	0	0
			259	78	86	34	53	8		

- Molecule 54 is a RNA chain called Acylated P-site tRNA(fMet).

Mol	Chain	Residues	Atoms					AltConf	Trace	
54	4	77	Total	C	H	N	O	P	0	0
			2478	732	835	297	537	77		

- Molecule 55 is N-FORMYLMETHIONINE (three-letter code: FME) (formula: C<sub>6</sub>H<sub>11</sub>NO<sub>3</sub>S) (labeled as "Ligand of Interest" by depositor).



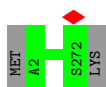
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		S
55	4	1	20	6	10	1	2	1	0

### 3 Residue-property plots

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

- Molecule 1: 50S ribosomal protein L2

Chain A:  99%



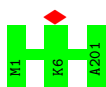
- Molecule 2: 50S ribosomal protein L3

Chain B:  100%



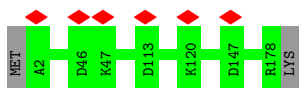
- Molecule 3: 50S ribosomal protein L4

Chain C:  100%



- Molecule 4: 50S ribosomal protein L5

Chain D:  99%

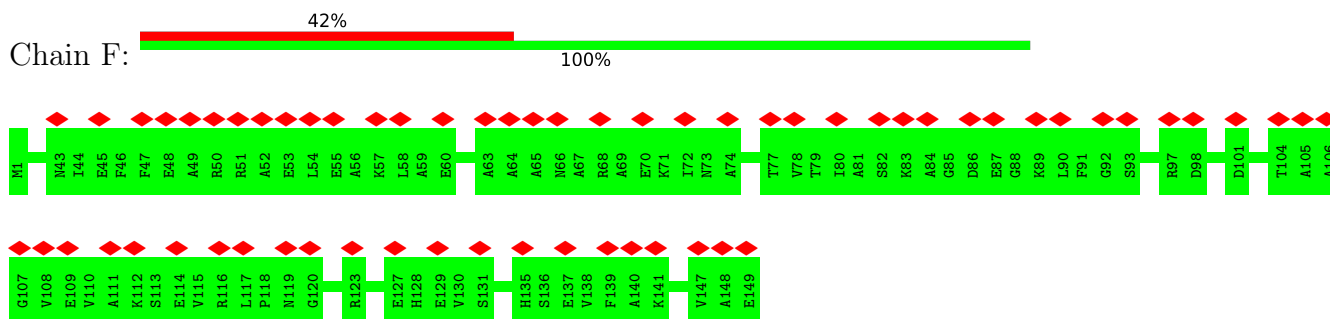


- Molecule 5: 50S ribosomal protein L6

Chain E:  98%



- Molecule 6: 50S ribosomal protein L9



- Molecule 7: 50S ribosomal protein L13



There are no outlier residues recorded for this chain.

- Molecule 8: 50S ribosomal protein L14



There are no outlier residues recorded for this chain.

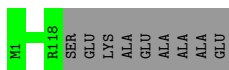
- Molecule 9: 50S ribosomal protein L15



- Molecule 10: 50S ribosomal protein L16



- Molecule 11: 50S ribosomal protein L17



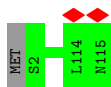
- Molecule 12: 50S ribosomal protein L18





- Molecule 13: 50S ribosomal protein L19

Chain M: 99%



- Molecule 14: 50S ribosomal protein L20

Chain N: 99%



- Molecule 15: 50S ribosomal protein L21

Chain O: 100%



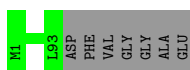
- Molecule 16: 50S ribosomal protein L22

Chain P: 100%



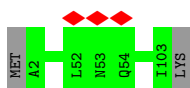
- Molecule 17: 50S ribosomal protein L23

Chain Q: 93% 7%



- Molecule 18: 50S ribosomal protein L24

Chain R: 98%

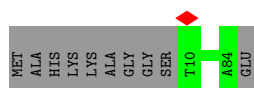
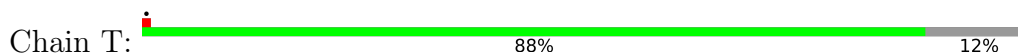


- Molecule 19: 50S ribosomal protein L25





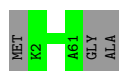
- Molecule 20: 50S ribosomal protein L27



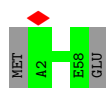
- Molecule 21: 50S ribosomal protein L28



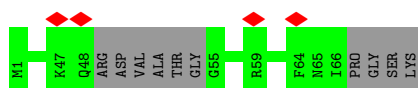
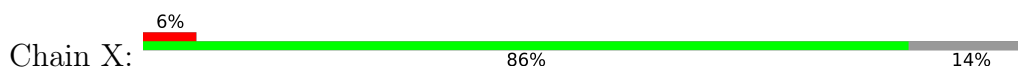
- Molecule 22: 50S ribosomal protein L29



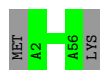
- Molecule 23: 50S ribosomal protein L30



- Molecule 24: 50S ribosomal protein L31

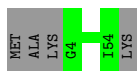


- Molecule 25: 50S ribosomal protein L32



- Molecule 26: 50S ribosomal protein L33

Chain b:  93% 7%



- Molecule 27: 50S ribosomal protein L34

Chain c:  100%



- Molecule 28: 50S ribosomal protein L35

Chain d:  97%

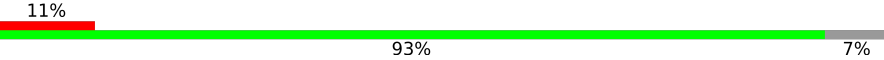


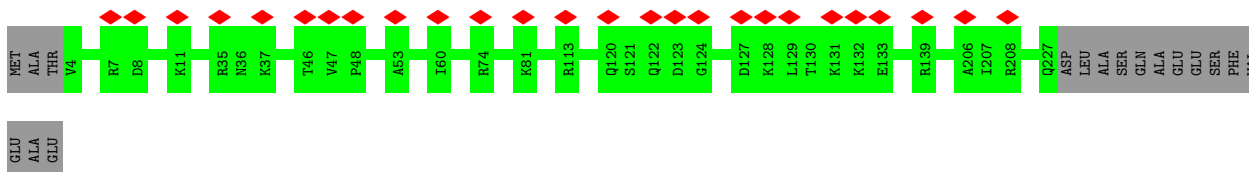
- Molecule 29: 50S ribosomal protein L36

Chain e:  100%


There are no outlier residues recorded for this chain.

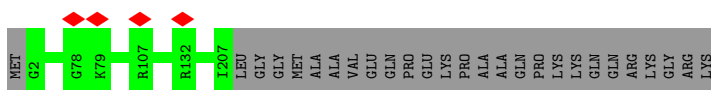
- Molecule 30: 30S ribosomal protein S2

Chain f:  11% 93% 7%



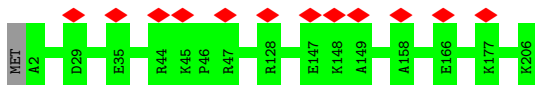
- Molecule 31: 30S ribosomal protein S3

Chain g:  6% 88% 12%



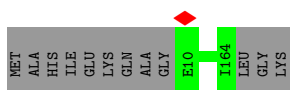
- Molecule 32: 30S ribosomal protein S4

Chain h:  6% 100%




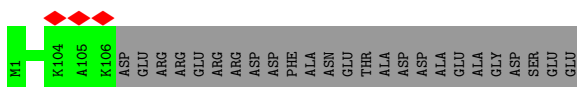
- Molecule 33: 30S ribosomal protein S5

Chain i:  93% 7%




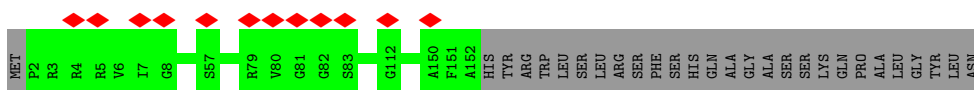
- Molecule 34: 30S ribosomal protein S6

Chain j:  81% 19%



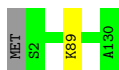
- Molecule 35: 30S ribosomal protein S7

Chain k:  7% 84% 16%



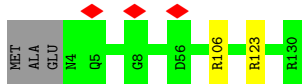
- Molecule 36: 30S ribosomal protein S8

Chain l:  98% ..



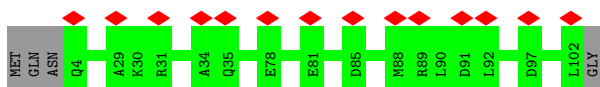
- Molecule 37: 30S ribosomal protein S9

Chain m:  96% ..

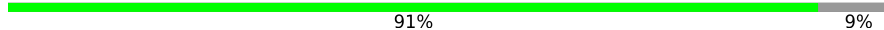


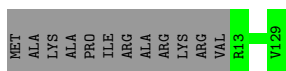
- Molecule 38: 30S ribosomal protein S10

Chain n:  14% 96% .



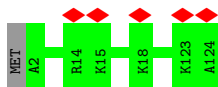
- Molecule 39: 30S ribosomal protein S11

Chain o:  91% 9%



- Molecule 40: 30S ribosomal protein S12

Chain p: 99%



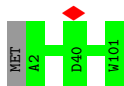
- Molecule 41: 30S ribosomal protein S13

Chain q: 97%



- Molecule 42: 30S ribosomal protein S14

Chain r: 99%



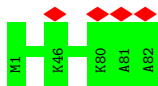
- Molecule 43: 30S ribosomal protein S15

Chain s: 99%



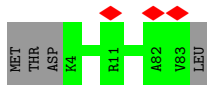
- Molecule 44: 30S ribosomal protein S16

Chain t: 5% 100%

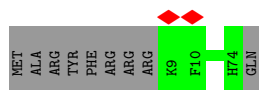
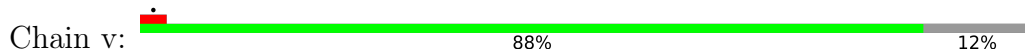


- Molecule 45: 30S ribosomal protein S17

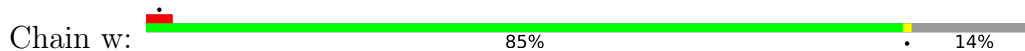
Chain u: 95% 5%



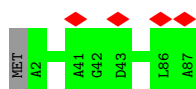
- Molecule 46: 30S ribosomal protein S18



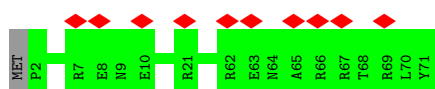
- Molecule 47: 30S ribosomal protein S19



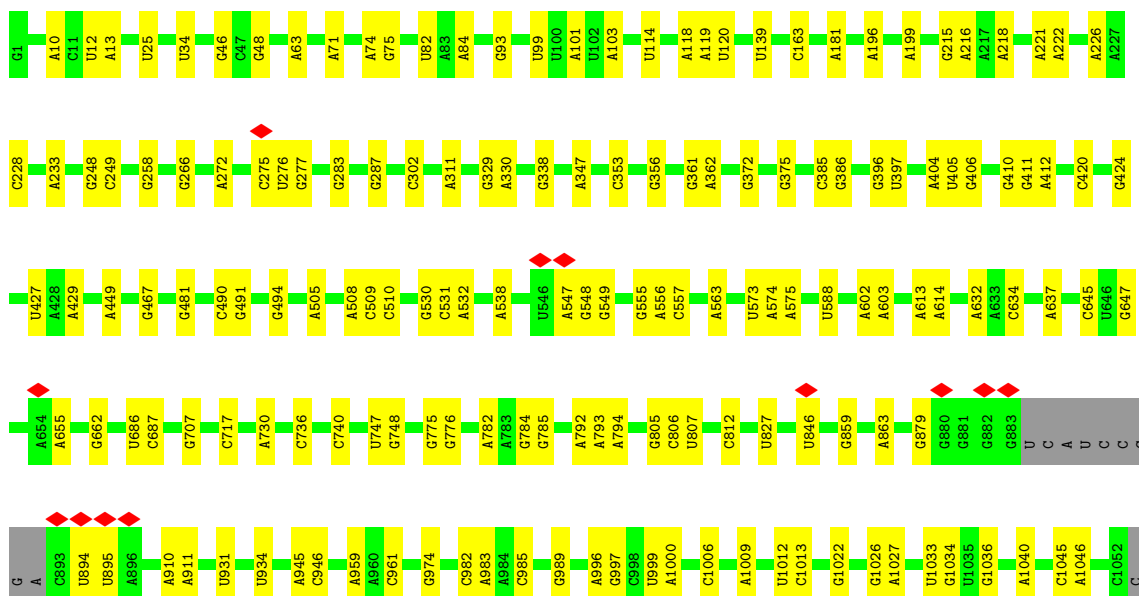
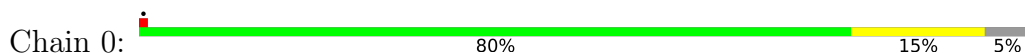
- Molecule 48: 30S ribosomal protein S20

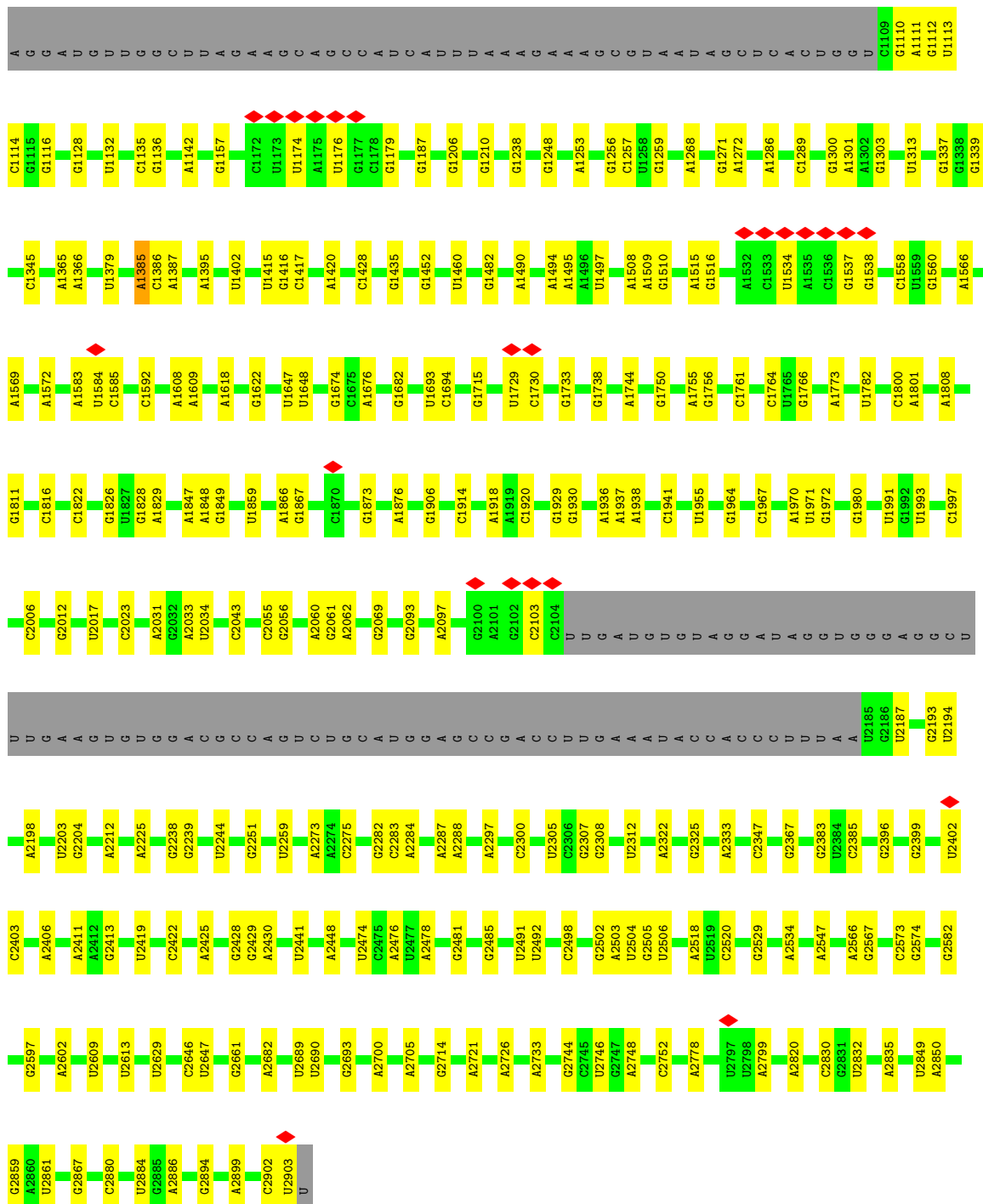


- Molecule 49: 30S ribosomal protein S21

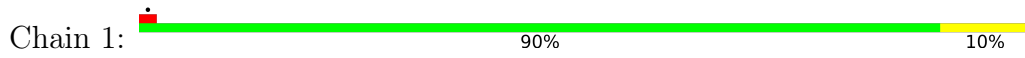


- Molecule 50: 23S rRNA RRLG-RRNA



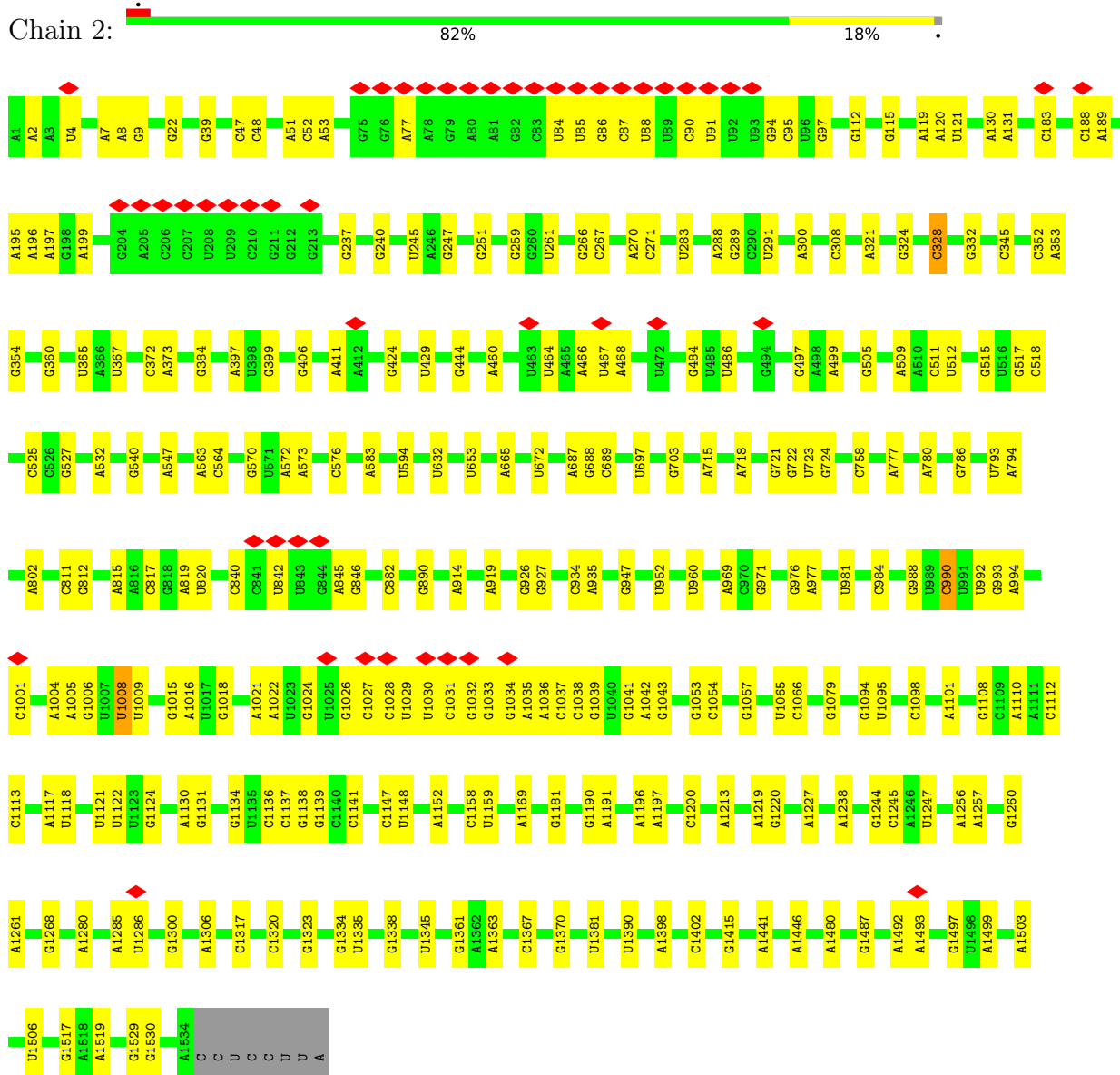


• Molecule 51: 5S rRNA



• Molecule 52: 16S rRNA RRSB-RRNA

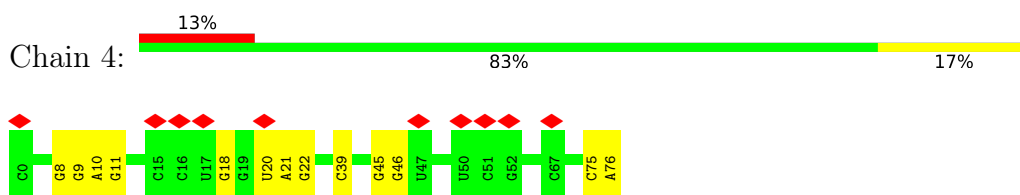
U1 G21 G24 C35 C36 C42 C43 C44 G56 A59 G67 U89 C90 A108 A109 U120



• Molecule 53: mRNA



• Molecule 54: Acylated P-site tRNA(fMet)



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	17151	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 ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	900	Depositor
Maximum defocus (nm)	2100	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	2.365	Depositor
Minimum map value	-0.033	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.049	Depositor
Recommended contour level	0.104	Depositor
Map size (Å)	440.32, 440.32, 440.32	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86, 0.86, 0.86	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: FME

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	0.36	0/2121	0.60	0/2852
2	B	0.33	0/1580	0.55	0/2127
3	C	0.33	0/1571	0.54	0/2113
4	D	0.30	0/1434	0.54	0/1926
5	E	0.30	0/1315	0.53	0/1783
6	F	0.26	0/1122	0.50	0/1515
7	G	0.37	0/1152	0.55	0/1551
8	H	0.33	0/956	0.59	0/1279
9	I	0.33	0/1062	0.61	0/1413
10	J	0.33	0/1093	0.60	0/1460
11	K	0.34	0/958	0.63	0/1281
12	L	0.32	0/902	0.57	0/1209
13	M	0.34	0/929	0.58	0/1242
14	N	0.39	0/960	0.59	0/1278
15	O	0.34	0/829	0.56	0/1107
16	P	0.31	0/864	0.57	0/1156
17	Q	0.31	0/744	0.55	0/994
18	R	0.31	0/787	0.51	0/1051
19	S	0.33	0/766	0.54	0/1025
20	T	0.33	0/579	0.57	0/767
21	U	0.32	0/635	0.62	0/848
22	V	0.31	0/492	0.54	0/655
23	W	0.32	0/443	0.56	0/593
24	X	0.29	0/488	0.52	0/649
25	a	0.33	0/440	0.61	0/588
26	b	0.32	0/424	0.53	0/565
27	c	0.33	0/380	0.71	0/498
28	d	0.30	0/513	0.59	0/676
29	e	0.33	0/303	0.60	0/397
30	f	0.29	0/1784	0.50	0/2403
31	g	0.33	0/1651	0.56	0/2225
32	h	0.30	0/1665	0.54	0/2227

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	i	0.36	0/1157	0.55	0/1557
34	j	0.31	0/881	0.54	0/1189
35	k	0.29	0/1195	0.54	0/1602
36	l	0.34	0/989	0.54	0/1326
37	m	0.31	0/1034	0.61	0/1375
38	n	0.29	0/805	0.59	0/1089
39	o	0.31	0/893	0.57	0/1205
40	p	0.31	0/969	0.61	0/1300
41	q	0.29	0/892	0.58	0/1193
42	r	0.31	0/817	0.59	0/1088
43	s	0.32	0/722	0.56	0/964
44	t	0.31	0/659	0.59	0/884
45	u	0.29	0/657	0.56	0/881
46	v	0.36	0/553	0.59	0/742
47	w	0.31	0/652	0.54	0/877
48	x	0.29	0/676	0.51	0/895
49	y	0.29	0/598	0.60	0/792
50	0	0.64	0/66326	0.87	11/103471 (0.0%)
51	1	0.58	0/2869	0.83	0/4474
52	2	0.59	0/36856	0.86	10/57497 (0.0%)
53	3	0.42	0/194	0.77	0/300
54	4	0.40	0/1835	0.77	0/2859
All	All	0.55	0/153171	0.80	21/229013 (0.0%)

There are no bond length outliers.

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
52	2	990	C	C2-N1-C1'	8.18	127.80	118.80
50	0	12	U	C2-N1-C1'	6.39	125.36	117.70
52	2	328	C	C2-N1-C1'	6.33	125.76	118.80
50	0	1313	U	C2-N1-C1'	5.87	124.74	117.70
52	2	990	C	C6-N1-C1'	-5.84	113.80	120.80

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

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

## 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	
1	A	269/273 (98%)	251 (93%)	18 (7%)	0	100	100
2	B	206/209 (99%)	196 (95%)	10 (5%)	0	100	100
3	C	199/201 (99%)	192 (96%)	7 (4%)	0	100	100
4	D	175/179 (98%)	157 (90%)	18 (10%)	0	100	100
5	E	171/177 (97%)	161 (94%)	10 (6%)	0	100	100
6	F	147/149 (99%)	133 (90%)	14 (10%)	0	100	100
7	G	140/142 (99%)	137 (98%)	3 (2%)	0	100	100
8	H	121/123 (98%)	116 (96%)	5 (4%)	0	100	100
9	I	142/144 (99%)	133 (94%)	9 (6%)	0	100	100
10	J	134/136 (98%)	122 (91%)	12 (9%)	0	100	100
11	K	116/127 (91%)	106 (91%)	10 (9%)	0	100	100
12	L	114/117 (97%)	107 (94%)	7 (6%)	0	100	100
13	M	112/115 (97%)	105 (94%)	7 (6%)	0	100	100
14	N	115/118 (98%)	112 (97%)	3 (3%)	0	100	100
15	O	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
16	P	108/110 (98%)	104 (96%)	4 (4%)	0	100	100
17	Q	91/100 (91%)	84 (92%)	7 (8%)	0	100	100
18	R	100/104 (96%)	92 (92%)	8 (8%)	0	100	100
19	S	92/94 (98%)	91 (99%)	1 (1%)	0	100	100
20	T	73/85 (86%)	70 (96%)	3 (4%)	0	100	100
21	U	75/78 (96%)	74 (99%)	1 (1%)	0	100	100
22	V	58/63 (92%)	58 (100%)	0	0	100	100
23	W	55/59 (93%)	54 (98%)	1 (2%)	0	100	100
24	X	56/70 (80%)	51 (91%)	5 (9%)	0	100	100
25	a	53/57 (93%)	50 (94%)	3 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
26	b	49/55 (89%)	45 (92%)	4 (8%)	0	100	100
27	c	44/46 (96%)	43 (98%)	1 (2%)	0	100	100
28	d	62/65 (95%)	55 (89%)	7 (11%)	0	100	100
29	e	36/38 (95%)	36 (100%)	0	0	100	100
30	f	222/241 (92%)	197 (89%)	25 (11%)	0	100	100
31	g	204/233 (88%)	193 (95%)	11 (5%)	0	100	100
32	h	203/206 (98%)	194 (96%)	9 (4%)	0	100	100
33	i	153/167 (92%)	144 (94%)	9 (6%)	0	100	100
34	j	104/131 (79%)	101 (97%)	3 (3%)	0	100	100
35	k	149/179 (83%)	139 (93%)	10 (7%)	0	100	100
36	l	127/130 (98%)	123 (97%)	4 (3%)	0	100	100
37	m	125/130 (96%)	113 (90%)	12 (10%)	0	100	100
38	n	97/103 (94%)	90 (93%)	7 (7%)	0	100	100
39	o	115/129 (89%)	102 (89%)	13 (11%)	0	100	100
40	p	121/124 (98%)	111 (92%)	10 (8%)	0	100	100
41	q	112/118 (95%)	102 (91%)	10 (9%)	0	100	100
42	r	98/101 (97%)	93 (95%)	5 (5%)	0	100	100
43	s	86/89 (97%)	84 (98%)	2 (2%)	0	100	100
44	t	80/82 (98%)	71 (89%)	9 (11%)	0	100	100
45	u	78/84 (93%)	73 (94%)	5 (6%)	0	100	100
46	v	64/75 (85%)	58 (91%)	6 (9%)	0	100	100
47	w	77/92 (84%)	71 (92%)	6 (8%)	0	100	100
48	x	84/87 (97%)	83 (99%)	1 (1%)	0	100	100
49	y	68/71 (96%)	67 (98%)	1 (2%)	0	100	100
All	All	5581/5909 (94%)	5243 (94%)	338 (6%)	0	100	100

There are no Ramachandran outliers to report.

### 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	
1	A	216/218 (99%)	216 (100%)	0	100	100
2	B	164/164 (100%)	164 (100%)	0	100	100
3	C	165/165 (100%)	165 (100%)	0	100	100
4	D	148/150 (99%)	148 (100%)	0	100	100
5	E	134/138 (97%)	134 (100%)	0	100	100
6	F	114/114 (100%)	114 (100%)	0	100	100
7	G	116/116 (100%)	116 (100%)	0	100	100
8	H	104/104 (100%)	104 (100%)	0	100	100
9	I	103/103 (100%)	103 (100%)	0	100	100
10	J	109/109 (100%)	109 (100%)	0	100	100
11	K	98/103 (95%)	98 (100%)	0	100	100
12	L	86/87 (99%)	86 (100%)	0	100	100
13	M	99/100 (99%)	99 (100%)	0	100	100
14	N	89/90 (99%)	89 (100%)	0	100	100
15	O	84/84 (100%)	84 (100%)	0	100	100
16	P	93/93 (100%)	93 (100%)	0	100	100
17	Q	80/84 (95%)	80 (100%)	0	100	100
18	R	83/85 (98%)	83 (100%)	0	100	100
19	S	78/78 (100%)	78 (100%)	0	100	100
20	T	57/63 (90%)	57 (100%)	0	100	100
21	U	67/68 (98%)	67 (100%)	0	100	100
22	V	54/55 (98%)	54 (100%)	0	100	100
23	W	47/49 (96%)	47 (100%)	0	100	100
24	X	55/62 (89%)	55 (100%)	0	100	100
25	a	46/48 (96%)	46 (100%)	0	100	100
26	b	46/49 (94%)	46 (100%)	0	100	100
27	c	38/38 (100%)	38 (100%)	0	100	100
28	d	51/52 (98%)	50 (98%)	1 (2%)	55	81
29	e	34/34 (100%)	34 (100%)	0	100	100
30	f	186/199 (94%)	186 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
31	g	170/190 (90%)	170 (100%)	0	100	100
32	h	172/173 (99%)	172 (100%)	0	100	100
33	i	118/126 (94%)	118 (100%)	0	100	100
34	j	92/112 (82%)	92 (100%)	0	100	100
35	k	124/147 (84%)	124 (100%)	0	100	100
36	l	104/105 (99%)	103 (99%)	1 (1%)	76	91
37	m	105/107 (98%)	103 (98%)	2 (2%)	57	82
38	n	87/90 (97%)	87 (100%)	0	100	100
39	o	90/99 (91%)	90 (100%)	0	100	100
40	p	103/104 (99%)	103 (100%)	0	100	100
41	q	92/96 (96%)	92 (100%)	0	100	100
42	r	83/84 (99%)	83 (100%)	0	100	100
43	s	76/77 (99%)	76 (100%)	0	100	100
44	t	65/65 (100%)	65 (100%)	0	100	100
45	u	74/78 (95%)	74 (100%)	0	100	100
46	v	57/65 (88%)	57 (100%)	0	100	100
47	w	70/79 (89%)	69 (99%)	1 (1%)	67	87
48	x	65/66 (98%)	65 (100%)	0	100	100
49	y	60/61 (98%)	60 (100%)	0	100	100
All	All	4651/4826 (96%)	4646 (100%)	5 (0%)	93	98

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

Mol	Chain	Res	Type
28	d	31	HIS
36	l	89	LYS
37	m	106	ARG
37	m	123	ARG
47	w	81	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
50	0	2754/2904 (94%)	415 (15%)	8 (0%)
51	1	119/120 (99%)	12 (10%)	0
52	2	1533/1542 (99%)	258 (16%)	20 (1%)
53	3	7/30 (23%)	2 (28%)	1 (14%)
54	4	76/77 (98%)	11 (14%)	4 (5%)
All	All	4489/4673 (96%)	698 (15%)	33 (0%)

5 of 698 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
50	0	10	A
50	0	13	A
50	0	25	U
50	0	34	U
50	0	46	G

5 of 33 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
53	3	19	A
54	4	10	A
54	4	45	G
52	2	723	U
52	2	466	A

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

1 ligand is 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
55	FME	4	101	54	8,9,10	0.91	0	7,9,11	1.09	1 (14%)

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
55	FME	4	101	54	-	4/7/9/11	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
55	4	101	FME	O-C-CA	-2.25	118.89	124.78

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
55	4	101	FME	O1-CN-N-CA
55	4	101	FME	O-C-CA-CB
55	4	101	FME	N-CA-CB-CG
55	4	101	FME	C-CA-CB-CG

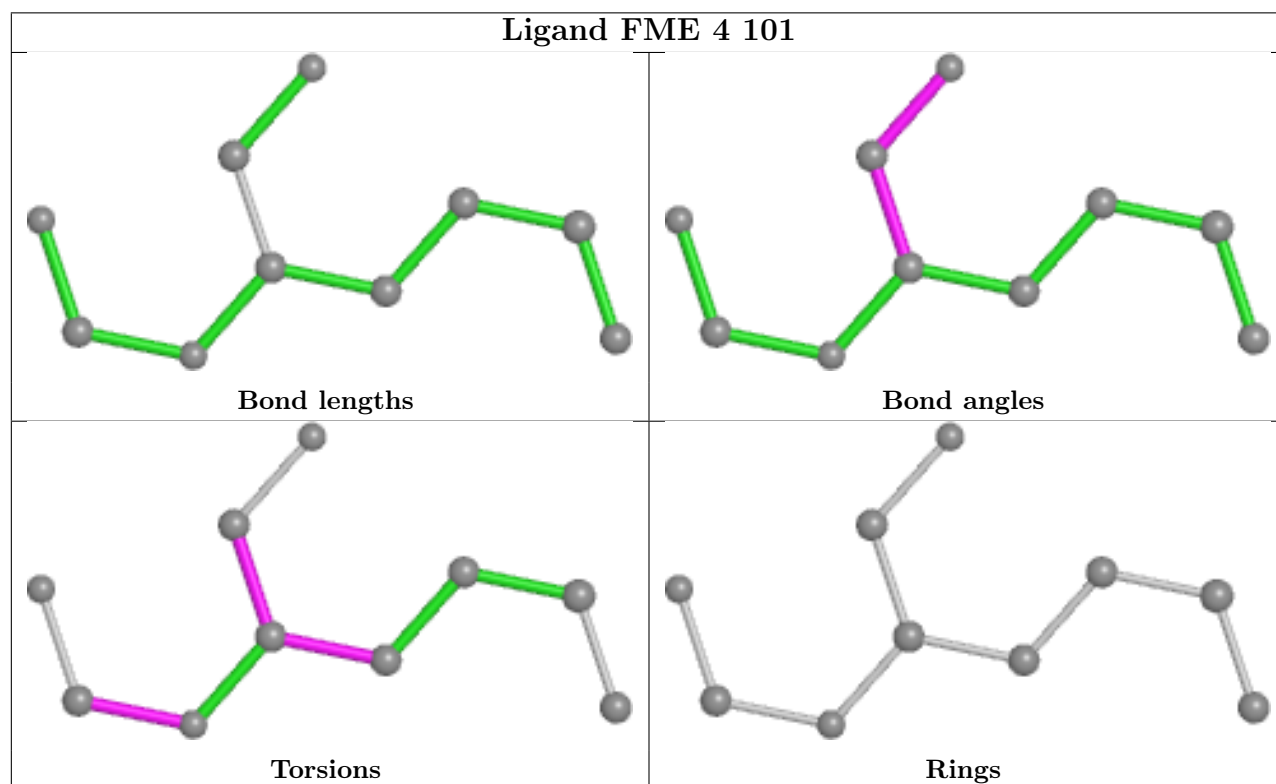
There are no ring outliers.

No monomer is involved in short contacts.

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



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



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

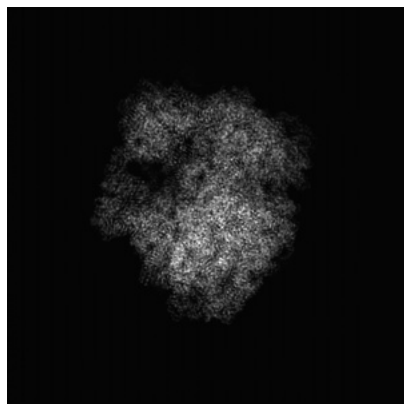
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16031. These allow visual inspection of the internal detail of the map and identification of artifacts.

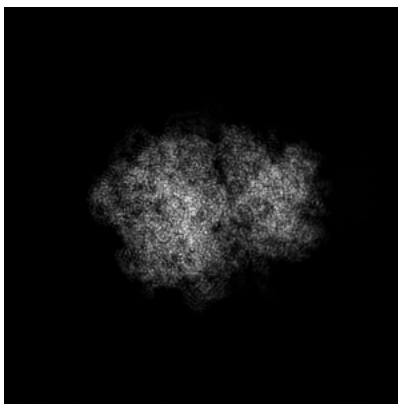
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

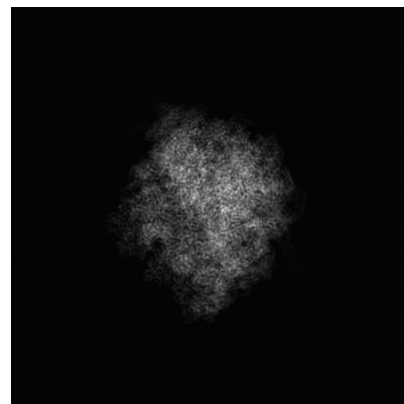
#### 6.1.1 Primary map



X

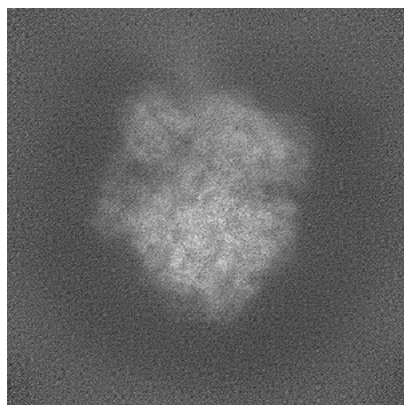


Y

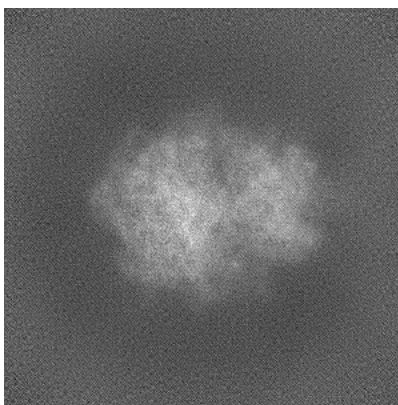


Z

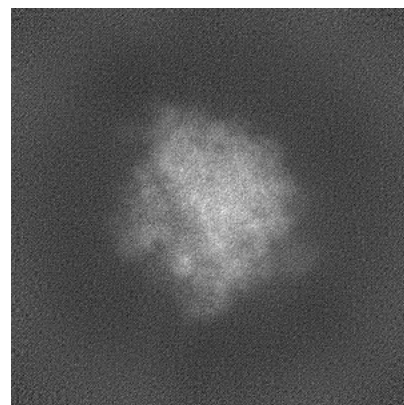
#### 6.1.2 Raw map



X



Y



Z

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

## 6.2 Central slices [i](#)

### 6.2.1 Primary map



X Index: 256

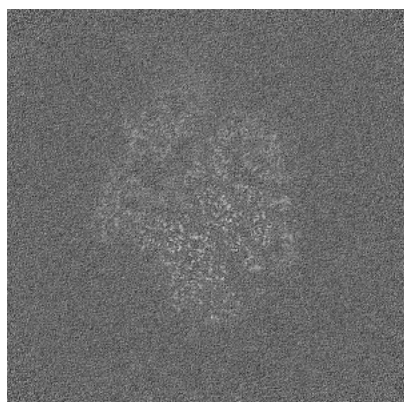


Y Index: 256

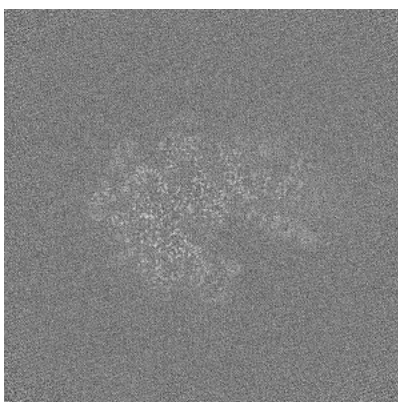


Z Index: 256

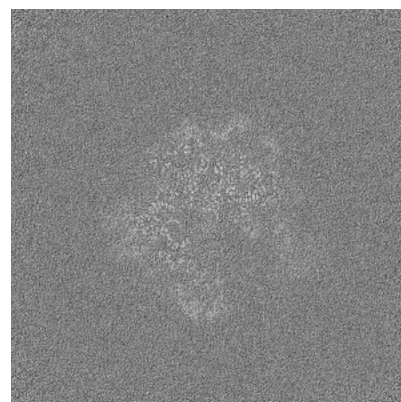
### 6.2.2 Raw map



X Index: 256



Y Index: 256



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: 270

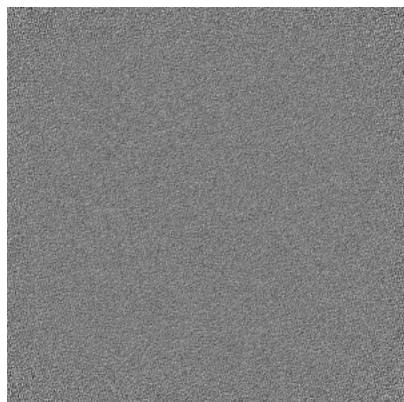


Y Index: 277

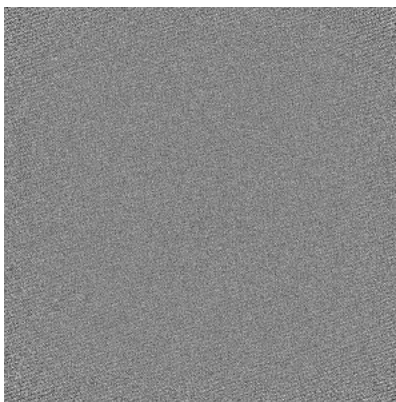


Z Index: 235

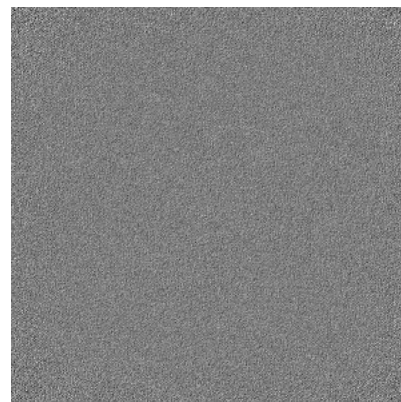
### 6.3.2 Raw map



X Index: 0



Y Index: 0

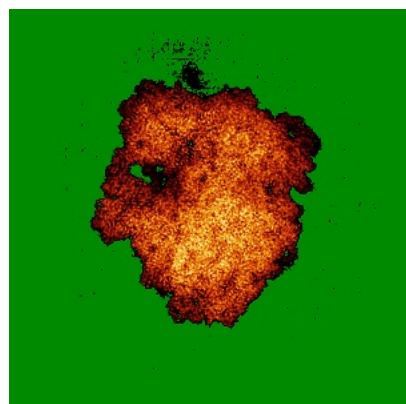


Z Index: 0

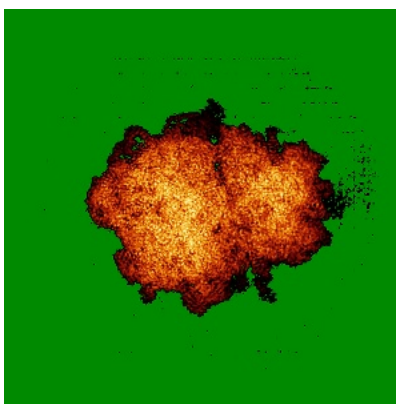
The images above show the largest variance slices of the map in three orthogonal directions.

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

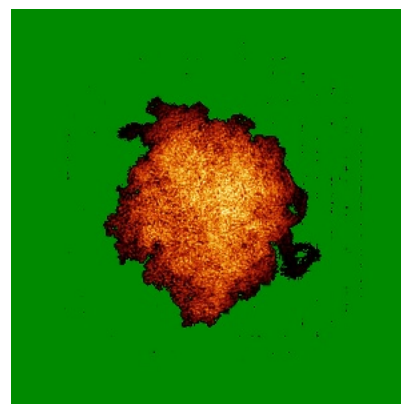
### 6.4.1 Primary map



X

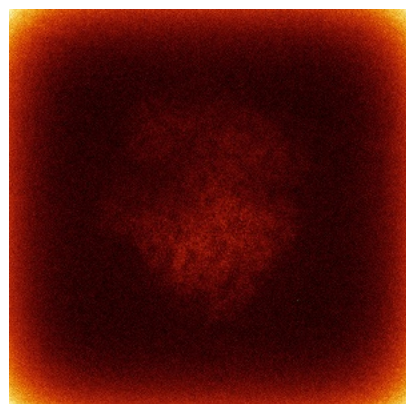


Y

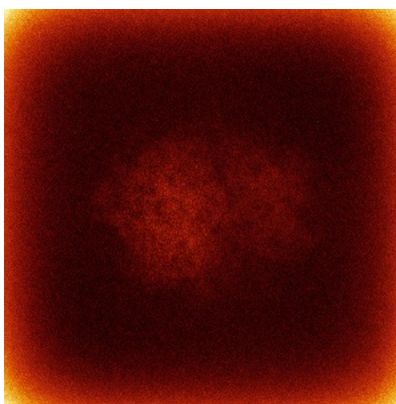


Z

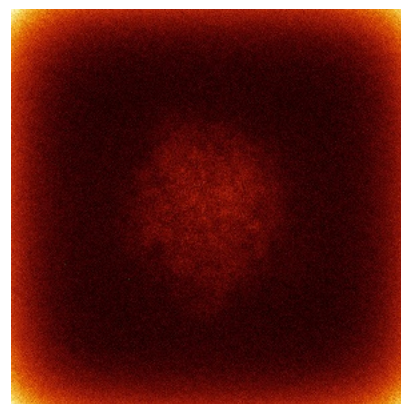
### 6.4.2 Raw map



X



Y



Z

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

## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



X



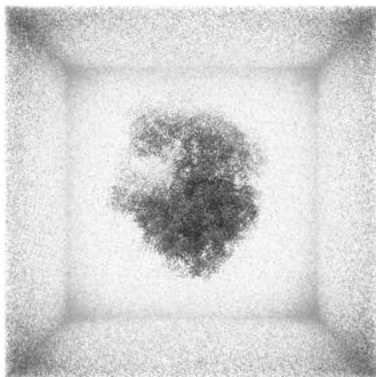
Y



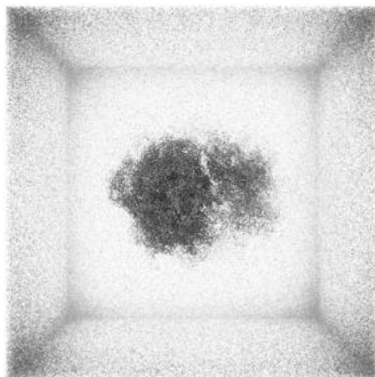
Z

The images above show the 3D surface view of the map at the recommended contour level 0.104. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

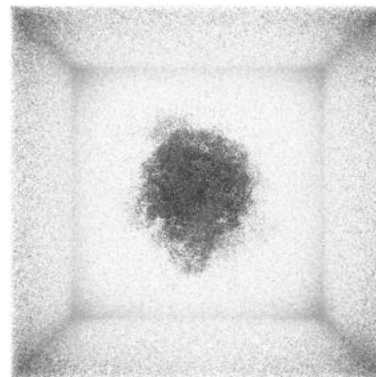
### 6.5.2 Raw map



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.

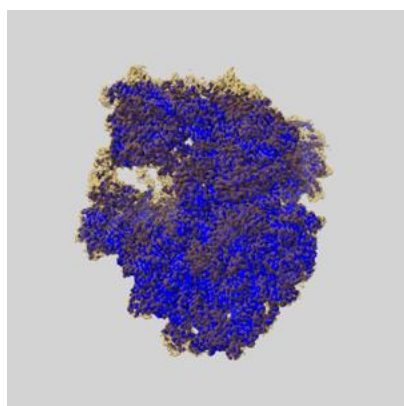
## 6.6 Mask visualisation [i](#)

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

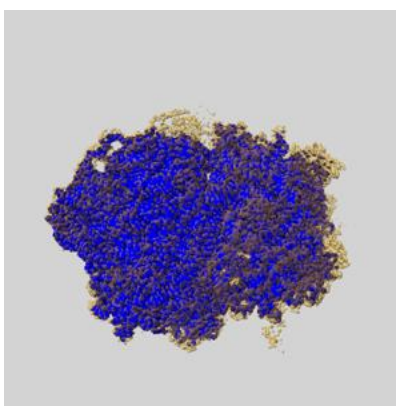
A mask typically either:

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

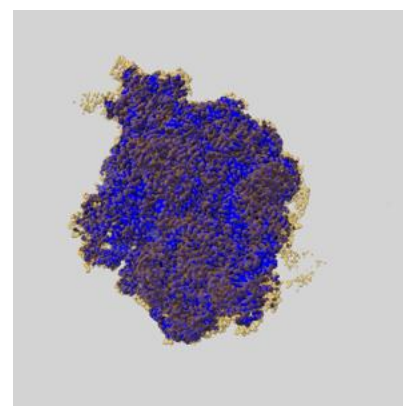
### 6.6.1 emd\_16031\_msk\_1.map [i](#)



X



Y

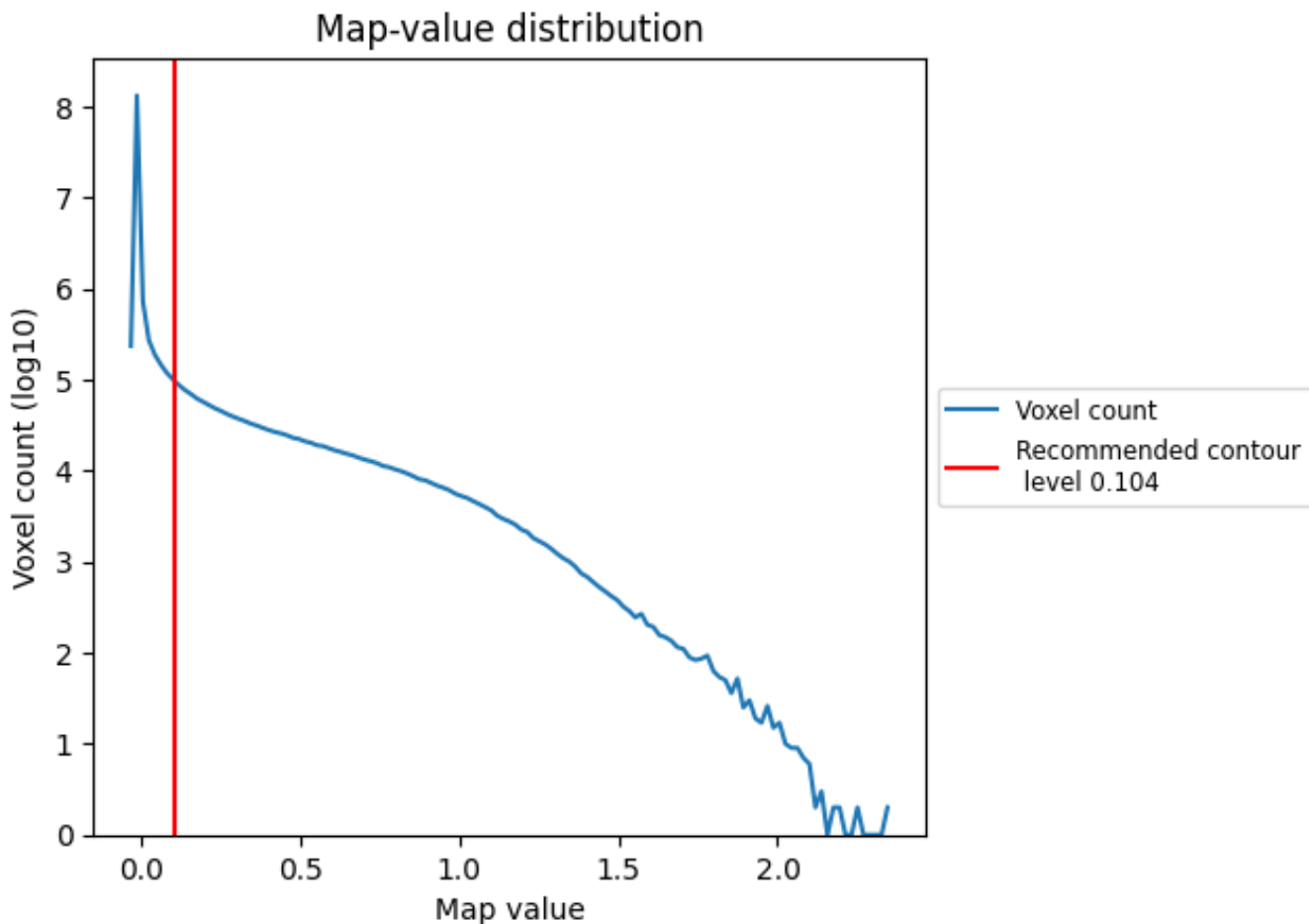


Z

## 7 Map analysis [i](#)

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

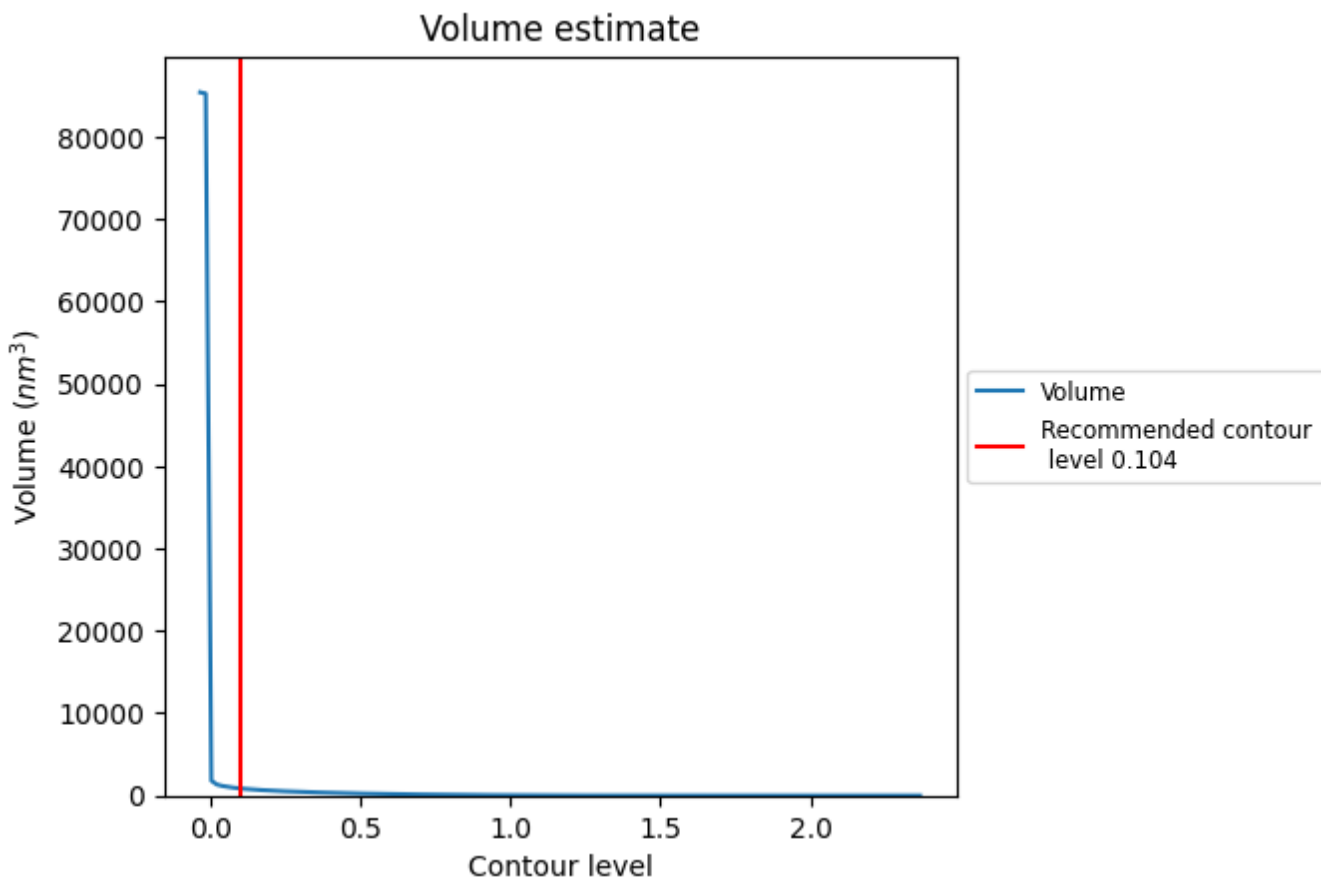
### 7.1 Map-value distribution [i](#)



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.



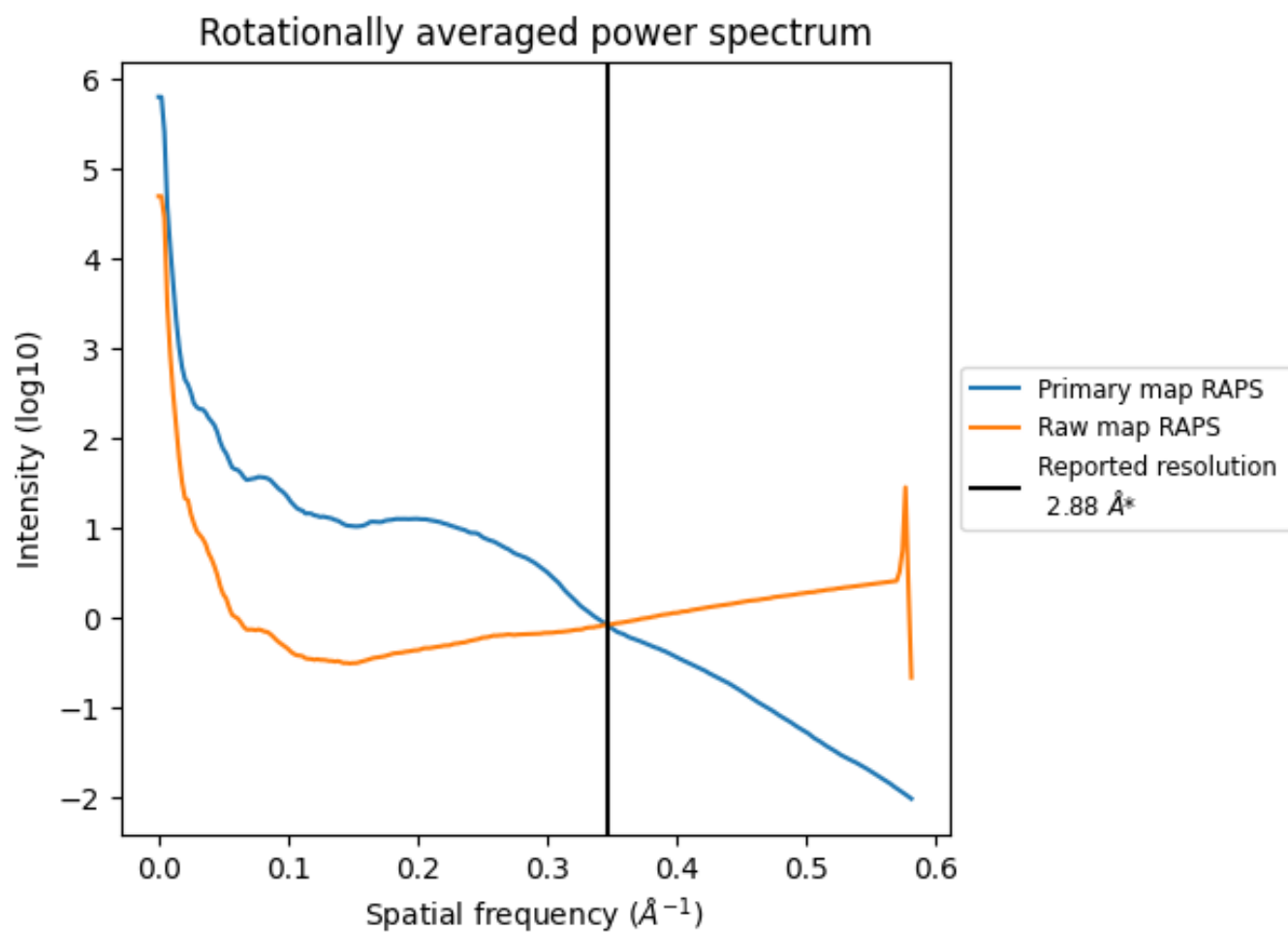
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 855  $\text{nm}^3$ ; this corresponds to an approximate mass of 772 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

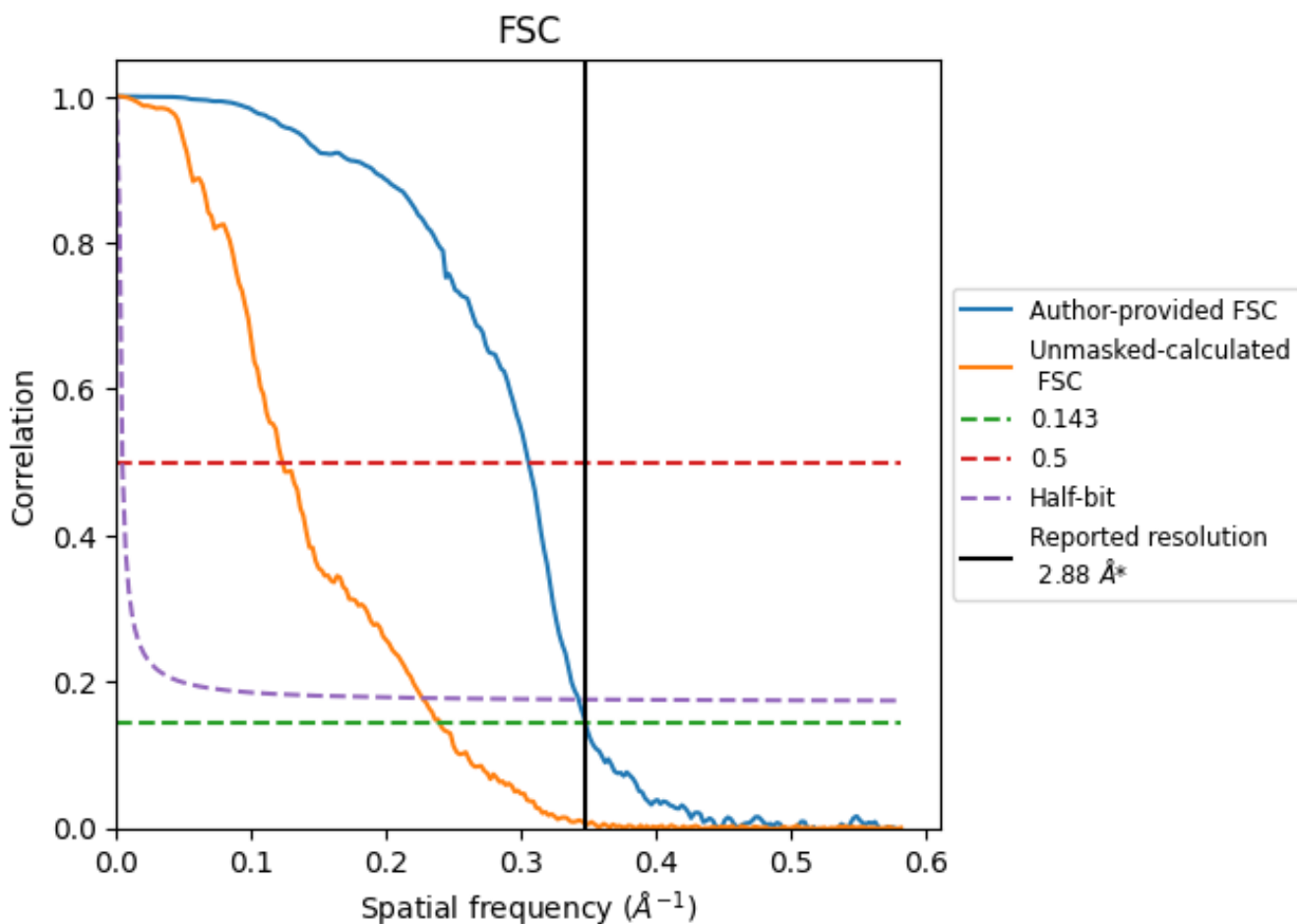


\*Reported resolution corresponds to spatial frequency of 0.347 Å<sup>-1</sup>

## 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 0.347 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

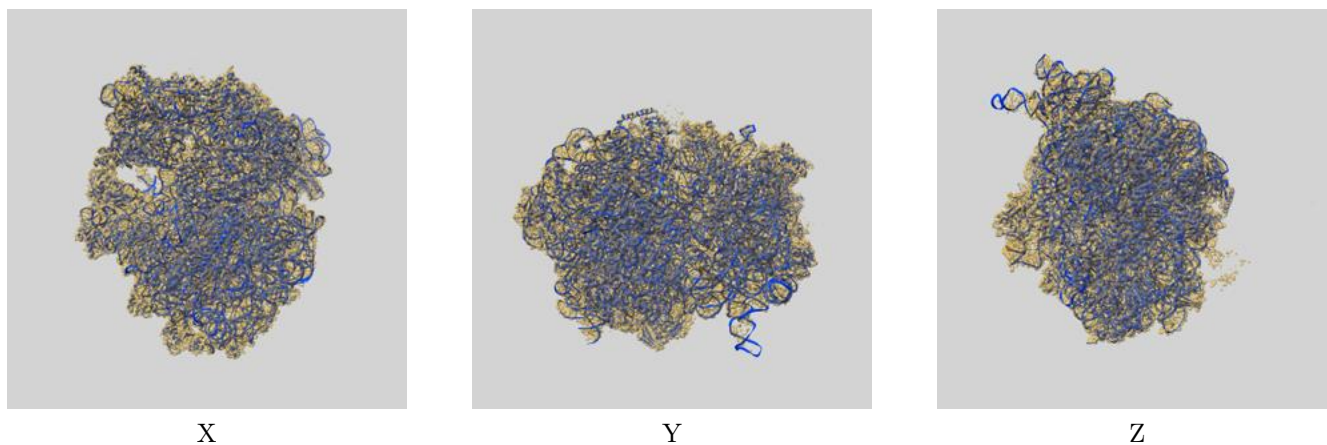
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.88	-	-
Author-provided FSC curve	2.88	3.28	2.92
Unmasked-calculated*	4.17	8.13	4.41

\*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 4.17 differs from the reported value 2.88 by more than 10 %

## 9 Map-model fit [i](#)

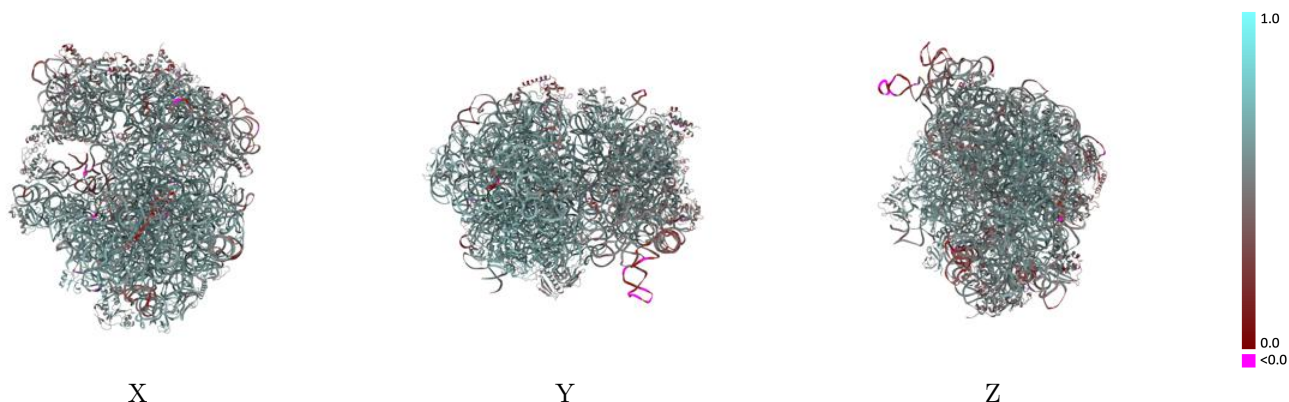
This section contains information regarding the fit between EMDB map EMD-16031 and PDB model 8BGH. Per-residue inclusion information can be found in section [3](#) on page [14](#).

### 9.1 Map-model overlay [i](#)



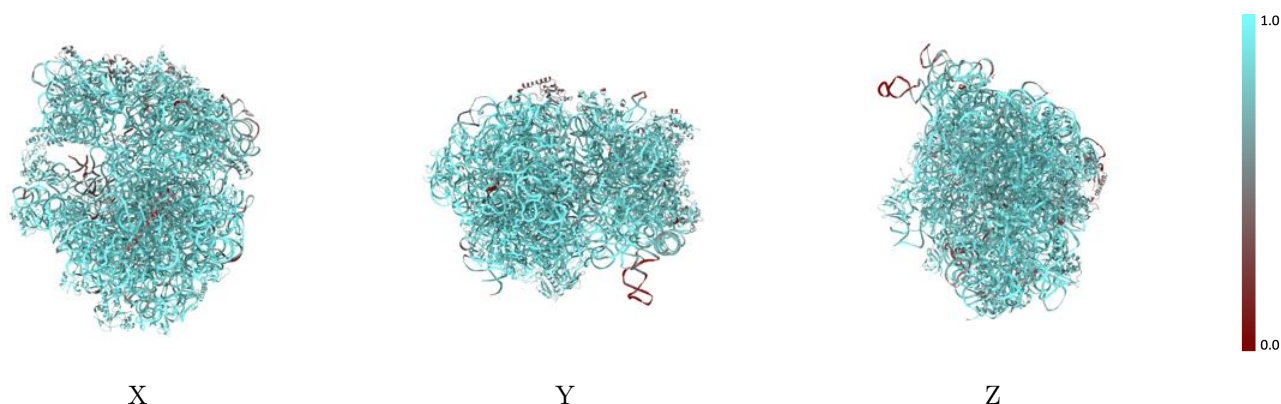
The images above show the 3D surface view of the map at the recommended contour level 0.104 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



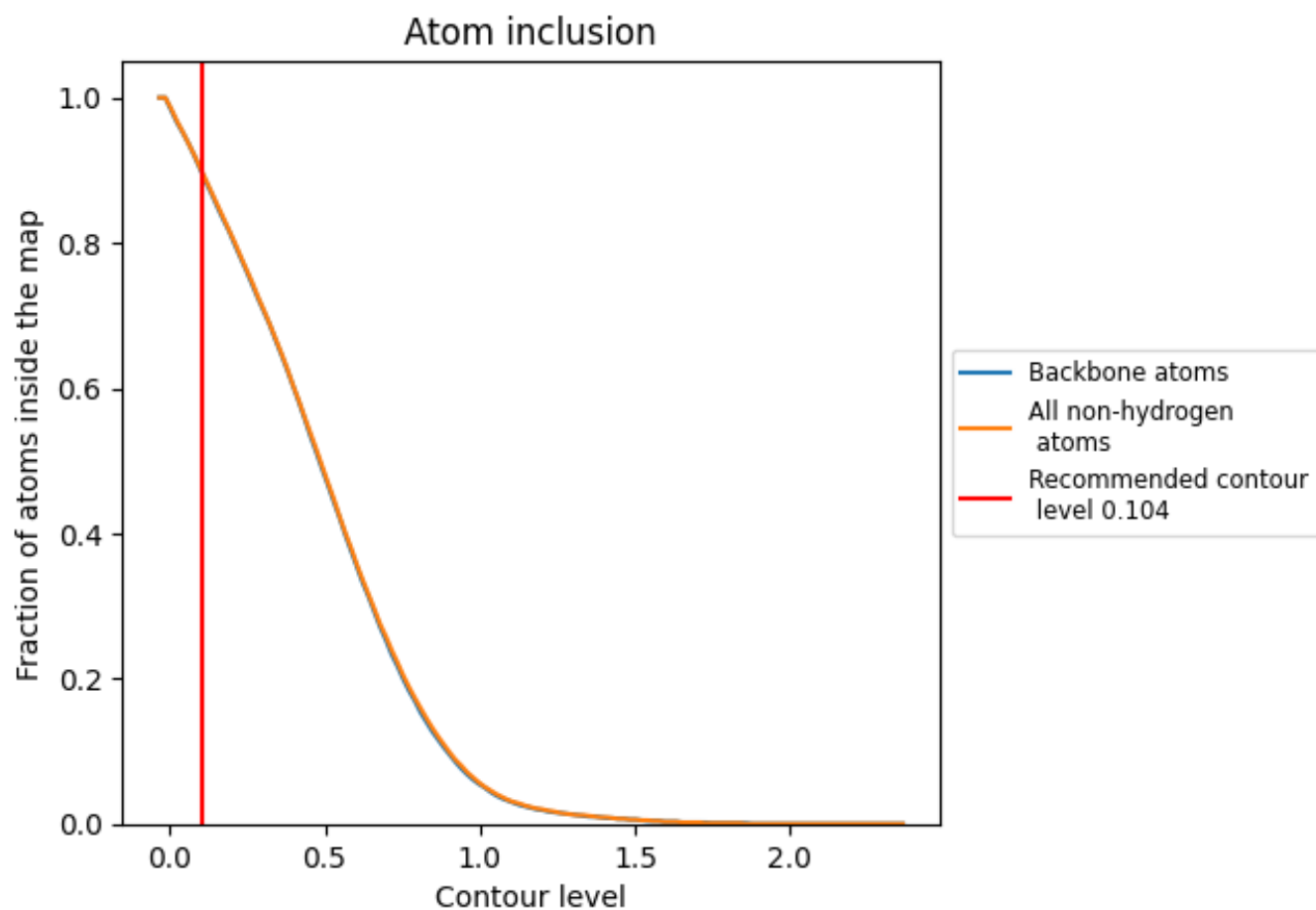
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.104).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 90% 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 (0.104) and Q-score for the entire model and for each chain.









































Chain	Atom inclusion	Q-score
All	 0.8980	 0.5600
0	 0.9480	 0.5970
1	 0.9240	 0.5570
2	 0.8910	 0.5290
3	 0.6300	 0.4260
4	 0.6950	 0.4240
A	 0.9360	 0.6230
B	 0.9220	 0.6110
C	 0.8890	 0.5790
D	 0.8000	 0.4710
E	 0.8210	 0.5030
F	 0.5000	 0.3330
G	 0.9430	 0.6190
H	 0.9180	 0.6070
I	 0.9070	 0.6110
J	 0.9060	 0.5860
K	 0.9520	 0.6310
L	 0.8740	 0.5430
M	 0.9050	 0.5930
N	 0.9330	 0.6250
O	 0.8960	 0.5900
P	 0.9050	 0.5980
Q	 0.8920	 0.5880
R	 0.8720	 0.5750
S	 0.8440	 0.5570
T	 0.9350	 0.6180
U	 0.9170	 0.6100
V	 0.8560	 0.5430
W	 0.8950	 0.5910
X	 0.7010	 0.4240
a	 0.9210	 0.6180
b	 0.8090	 0.5540
c	 0.9270	 0.6360
d	 0.9330	 0.6330
e	 0.9310	 0.6090



*Continued on next page...*



*Continued from previous page...*

Chain	Atom inclusion	Q-score
f	 0.7260	 0.4310
g	 0.8550	 0.5320
h	 0.7590	 0.4700
i	 0.8970	 0.5710
j	 0.8100	 0.5010
k	 0.7480	 0.4540
l	 0.8800	 0.5600
m	 0.8270	 0.4920
n	 0.7400	 0.4400
o	 0.8710	 0.5410
p	 0.8070	 0.5080
q	 0.8310	 0.5120
r	 0.8640	 0.5310
s	 0.8640	 0.5440
t	 0.8130	 0.4940
u	 0.7800	 0.4900
v	 0.8510	 0.5330
w	 0.8080	 0.4680
x	 0.7850	 0.4760
y	 0.6800	 0.4300