



## Full wwPDB EM Validation Report ⓘ

Apr 14, 2022 – 05:02 am BST

PDB ID : 7P7U  
EMDB ID : EMD-13245  
Title : E. faecalis 70S ribosome with P-tRNA, state IV  
Authors : Crowe-McAuliffe, C.; Wilson, D.N.  
Deposited on : 2021-07-20  
Resolution : 3.10 Å(reported)

This is a Full wwPDB EM Validation 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.

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

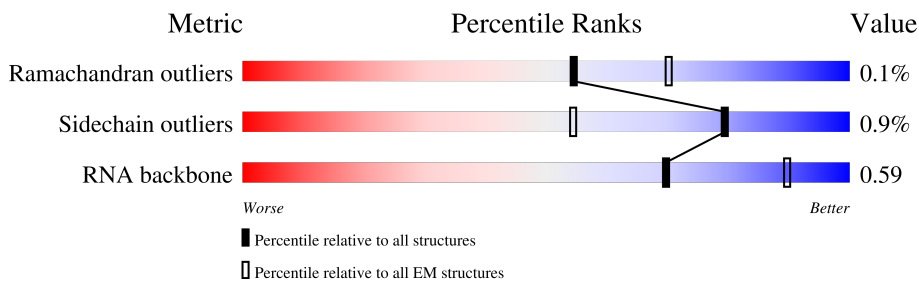
EMDB validation analysis : 0.0.0.dev97  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.27

# 1 Overall quality at a glance

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

The reported resolution of this entry is 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.





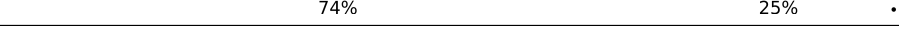
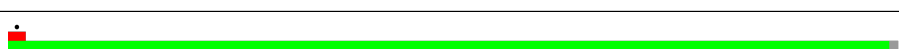
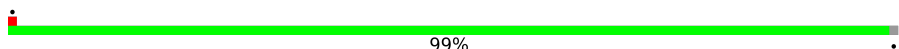
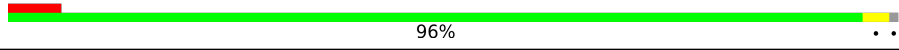
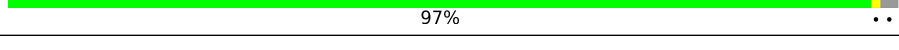
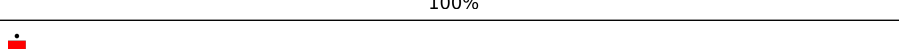

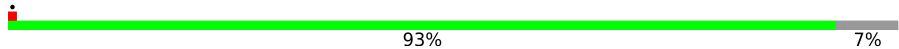
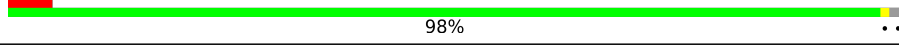
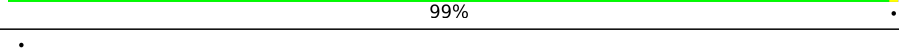
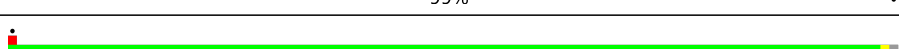
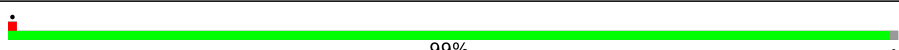
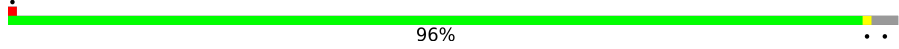
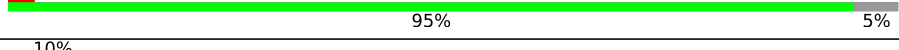
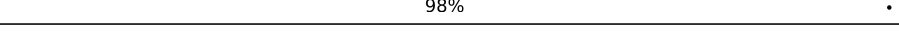







Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	1	62	
2	2	59	
3	3	89	
4	4	59	
5	5	49	
6	6	44	
7	7	66	
8	8	38	

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Mol	Chain	Length	Quality of chain
9	A	2912	 82% 14%
10	B	116	 78% 21%
11	D	77	 13% 74% 25%
12	G	276	 99%
13	H	209	 99%
14	I	207	 99%
15	J	179	 6% 96%
16	K	178	 19% 97%
17	M	147	 100%
18	N	122	 100%
19	O	146	 99%
20	P	144	 93% 7%
21	Q	127	 5% 98%
22	R	118	 99%
23	S	115	 99%
24	T	119	 98%
25	U	102	 99%
26	V	115	 96%
27	W	96	 95% 5%
28	X	103	 10% 98%
29	Y	95	 78% 22%
30	Z	62	 13% 98%
31	a	1558	 83% 14%
32	b	19	 47% 47% 21%
33	c	261	15% 83% 15%

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Mol	Chain	Length	Quality of chain
34	d	218	 5% 94% 6%
35	e	203	 5% 97% ..
36	f	166	 1% 98% .
37	g	100	 6% 96% .
38	h	156	 15% 96% ..
39	i	132	 1% 99% .
40	j	130	 9% 96% ..
41	k	102	 15% 93% . 6%
42	l	129	 6% 89% . 10%
43	m	137	 1% 98% .
44	n	121	 9% 92% . 6%
45	o	61	 97% ..
46	p	89	 1% 96% .
47	q	91	 1% 96% .
48	r	88	 1% 91% 9%
49	s	79	 6% 80% 20%
50	t	92	 9% 89% 11%
51	u	83	 6% 98% .

## 2 Entry composition

There are 56 unique types of molecules in this entry. The entry contains 139826 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	1	59	491	307	91	92	1	0	0

- Molecule 2 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	2	57	428	266	80	81	1	0	0

- Molecule 3 is a protein called 50S ribosomal protein L31 type B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	3	80	647	409	110	126	2	0	0

- Molecule 4 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	4	53	406	248	84	69	5	0	0

- Molecule 5 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	5	48	410	247	84	75	4	0	0

- Molecule 6 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	6	44	374	227	91	54	2	0	0

- Molecule 7 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	7	64	522	320	122	78	2	0	0

- Molecule 8 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	8	38	305	188	66	45	6	0	0

- Molecule 9 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
9	A	2824	60606	27054	11141	19587	2824	0	0

- Molecule 10 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
10	B	114	2439	1088	439	798	114	0	0

- Molecule 11 is a RNA chain called tRNA-fMet.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
11	D	77	1644	733	298	536	77	0	0

- Molecule 12 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	G	274	2106	1305	414	380	7	0	0

- Molecule 13 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	H	206	1572	990	291	287	4	0	0

- Molecule 14 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	I	205	Total	C	N	O	S	0	0
			1572	984	289	297	2		

- Molecule 15 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	J	177	Total	C	N	O	S	0	0
			1392	887	239	260	6		

- Molecule 16 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	K	174	Total	C	N	O	S	0	0
			1335	838	242	251	4		

- Molecule 17 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	M	147	Total	C	N	O	S	0	0
			1146	726	207	209	4		

- Molecule 18 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	N	122	Total	C	N	O	S	0	0
			923	574	176	171	2		

- Molecule 19 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	O	146	Total	C	N	O	S	0	0
			1096	677	212	206	1		

- Molecule 20 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	P	134	Total	C	N	O	S	0	0
			1070	683	209	173	5		

- Molecule 21 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Q	125	Total	C	N	O	S	0	0
			997	615	192	187	3		

- Molecule 22 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	R	118	Total	C	N	O	S	0	0
			908	561	176	169	2		

- Molecule 23 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms				AltConf	Trace
23	S	114	Total	C	N	O	0	0
			925	582	185	158		

- Molecule 24 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	T	118	Total	C	N	O	S	0	0
			950	602	184	160	4		

- Molecule 25 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	U	101	Total	C	N	O	S	0	0
			779	497	138	142	2		

- Molecule 26 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	V	111	Total	C	N	O	S	0	0
			841	527	154	158	2		

- Molecule 27 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	W	91	Total	C	N	O	S	0	0
			736	469	129	134	4		

- Molecule 28 is a protein called 50S ribosomal protein L24.



Mol	Chain	Residues	Atoms					AltConf	Trace
28	X	101	Total	C	N	O	S	0	0
			763	486	135	140	2		

- Molecule 29 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	Y	74	Total	C	N	O	0	0
			559	344	107	108		

- Molecule 30 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Z	61	Total	C	N	O	S	0	0
			480	299	97	82	2		

- Molecule 31 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	a	1521	Total	C	N	O	P	0	0
			32595	14542	5954	10578	1521		

- Molecule 32 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	b	13	Total	C	N	O	P	0	0
			285	127	57	88	13		

- Molecule 33 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	c	222	Total	C	N	O	S	0	0
			1773	1126	312	326	9		

- Molecule 34 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	d	205	Total	C	N	O	S	0	0
			1618	1018	304	293	3		

- Molecule 35 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	e	200	Total	C	N	O	S	0	0
			1611	1010	301	296	4		

- Molecule 36 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	f	163	Total	C	N	O	S	0	0
			1204	759	222	221	2		

- Molecule 37 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	g	96	Total	C	N	O	S	0	0
			786	496	135	152	3		

- Molecule 38 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	h	153	Total	C	N	O	S	0	0
			1218	759	232	221	6		

- Molecule 39 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	i	131	Total	C	N	O	S	0	0
			1041	662	184	193	2		

- Molecule 40 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	j	127	Total	C	N	O	S	0	0
			980	610	195	174	1		

- Molecule 41 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	k	96	Total	C	N	O	S	0	0
			773	487	142	142	2		

- Molecule 42 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	l	116	Total	C	N	O	S	0	0
			854	527	163	160	4		

- Molecule 43 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	m	134	Total	C	N	O	S	0	0
			1051	652	211	186	2		

- Molecule 44 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	n	114	Total	C	N	O	S	0	0
			902	552	183	166	1		

- Molecule 45 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	o	60	Total	C	N	O	S	0	0
			492	310	100	77	5		

- Molecule 46 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	p	85	Total	C	N	O	S	0	0
			716	440	146	129	1		

- Molecule 47 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	q	87	Total	C	N	O	S	0	0
			692	437	128	125	2		

- Molecule 48 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	r	80	Total	C	N	O	S	0	0
			660	414	124	119	3		

- Molecule 49 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	s	63	Total	C	N	O	S	0	0
			511	328	95	87	1		

- Molecule 50 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	t	82	Total	C	N	O	S	0	0
			663	426	122	113	2		

- Molecule 51 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	u	81	Total	C	N	O	S	0	0
			608	371	118	117	2		

- Molecule 52 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
52	4	1	Total	Zn	0
			1	1	
52	5	1	Total	Zn	0
			1	1	
52	8	1	Total	Zn	0
			1	1	
52	o	1	Total	Zn	0
			1	1	

- Molecule 53 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
53	7	2	Total	K	0
			2	2	
53	A	103	Total	K	0
			103	103	
53	B	3	Total	K	0
			3	3	
53	G	3	Total	K	0
			3	3	
53	P	1	Total	K	0
			1	1	
53	a	38	Total	K	0
			38	38	

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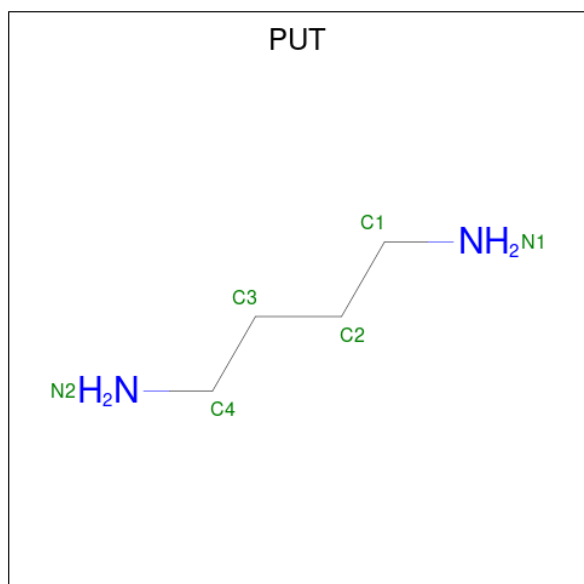
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Mol	Chain	Residues	Atoms	AltConf
53	g	1	Total K 1 1	0
53	o	1	Total K 1 1	0

- Molecule 54 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

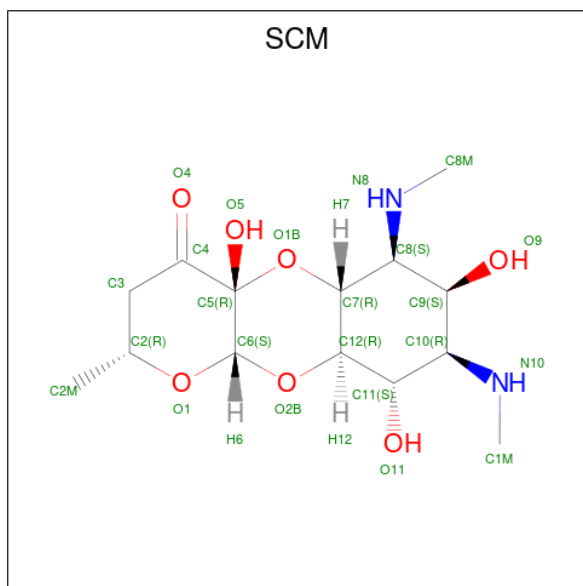
Mol	Chain	Residues	Atoms	AltConf
54	A	138	Total Mg 138 138	0
54	B	1	Total Mg 1 1	0
54	G	1	Total Mg 1 1	0
54	Q	1	Total Mg 1 1	0
54	a	44	Total Mg 44 44	0
54	n	1	Total Mg 1 1	0

- Molecule 55 is 1,4-DIAMINOBUTANE (three-letter code: PUT) (formula: C<sub>4</sub>H<sub>12</sub>N<sub>2</sub>).



Mol	Chain	Residues	Atoms	AltConf
55	a	1	Total C N 6 4 2	0

- Molecule 56 is SPECTINOMYCIN (three-letter code: SCM) (formula:  $C_{14}H_{24}N_2O_7$ ).



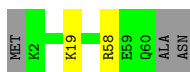
Mol	Chain	Residues	Atoms			AltConf	
			Total	C	N		O
56	a	1	23	14	2	7	0

### 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.

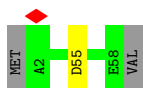
- Molecule 1: 50S ribosomal protein L29

Chain 1:  92% • 5%

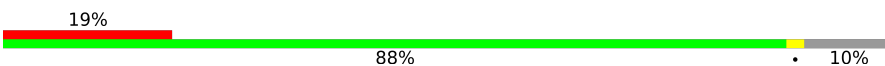


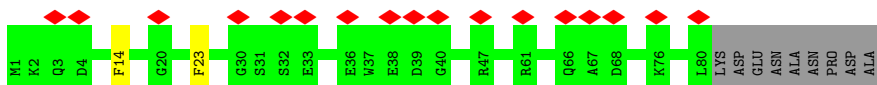
- Molecule 2: 50S ribosomal protein L30

Chain 2:  95% • •




- Molecule 3: 50S ribosomal protein L31 type B

Chain 3:  19% 88% • 10%



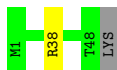
- Molecule 4: 50S ribosomal protein L32

Chain 4:  90% 10%



- Molecule 5: 50S ribosomal protein L33

Chain 5:  96% • •



- Molecule 6: 50S ribosomal protein L34



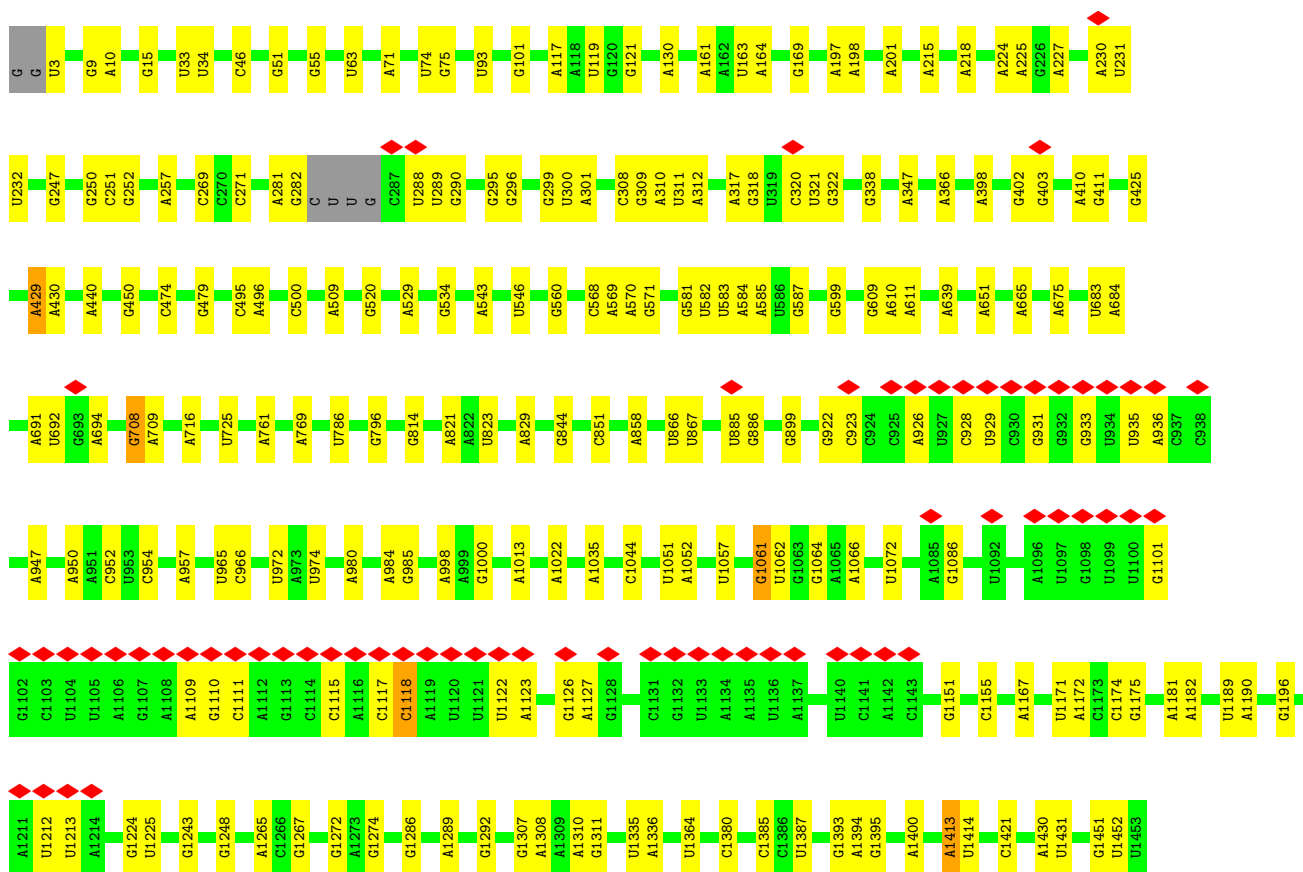
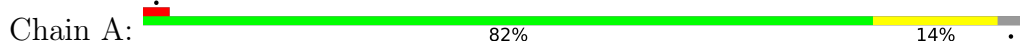
- Molecule 7: 50S ribosomal protein L35



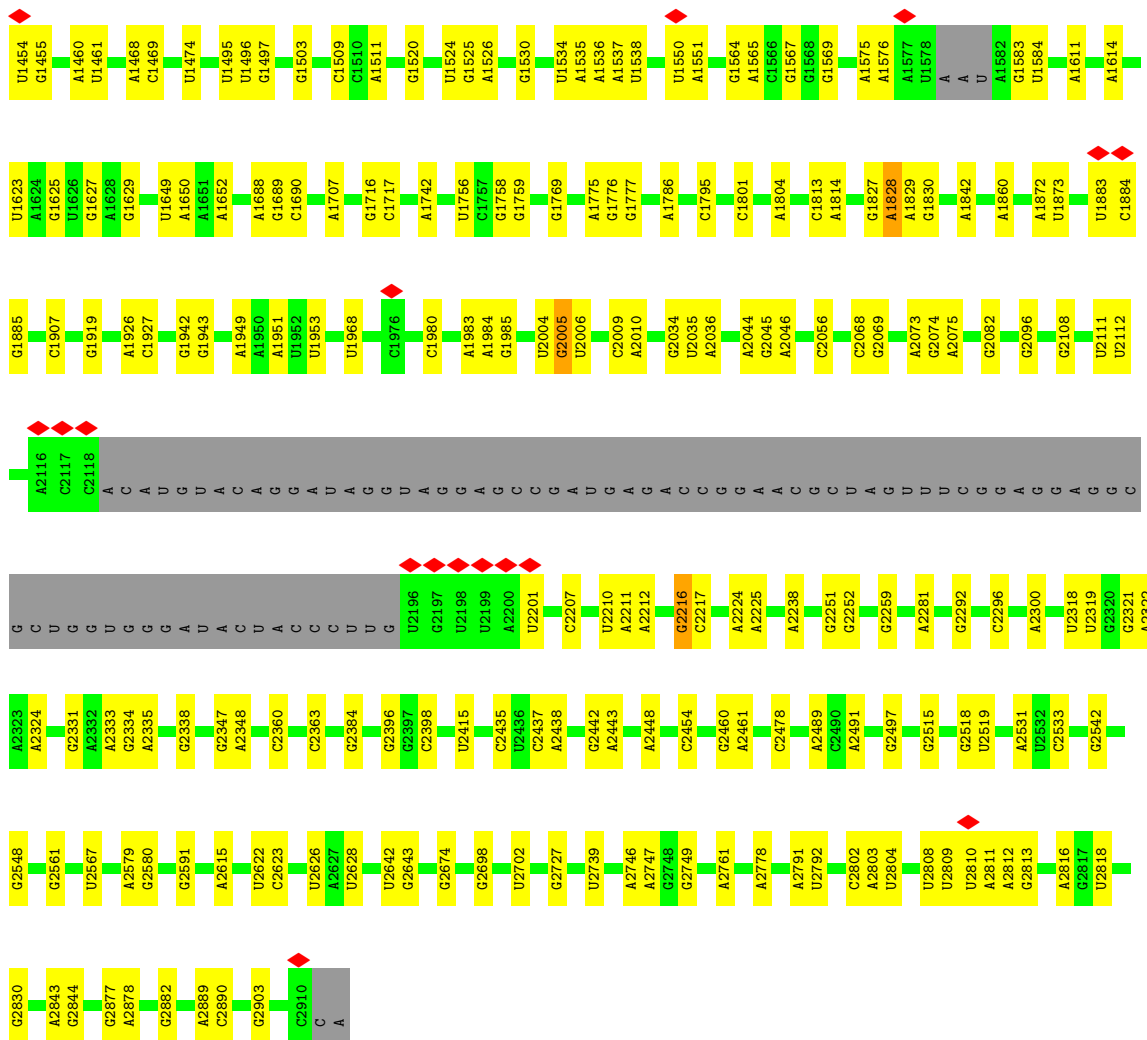
- Molecule 8: 50S ribosomal protein L36



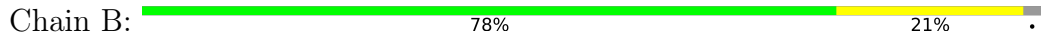
- Molecule 9: 23S rRNA



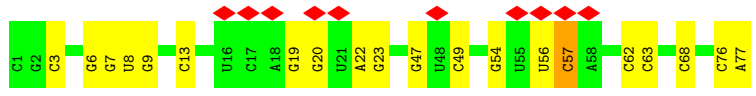
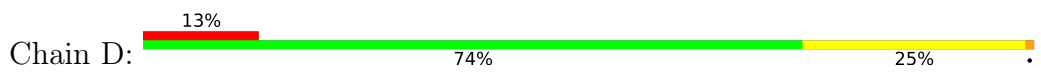




• Molecule 10: 5S rRNA

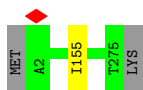


• Molecule 11: tRNA-fMet

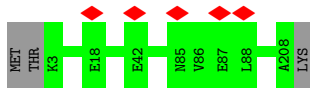


• Molecule 12: 50S ribosomal protein L2

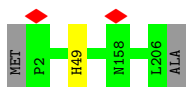




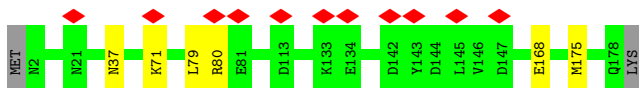
- Molecule 13: 50S ribosomal protein L3



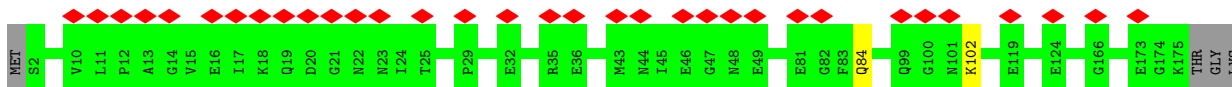
- Molecule 14: 50S ribosomal protein L4



- Molecule 15: 50S ribosomal protein L5



- Molecule 16: 50S ribosomal protein L6

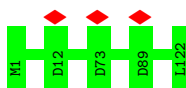


- Molecule 17: 50S ribosomal protein L13



There are no outlier residues recorded for this chain.

- Molecule 18: 50S ribosomal protein L14

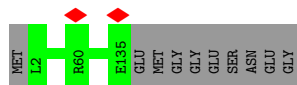


- Molecule 19: 50S ribosomal protein L15

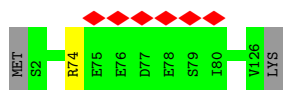




- Molecule 20: 50S ribosomal protein L16



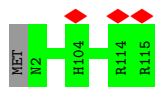
- Molecule 21: 50S ribosomal protein L17



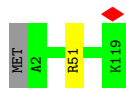
- Molecule 22: 50S ribosomal protein L18



- Molecule 23: 50S ribosomal protein L19



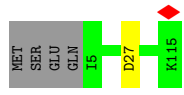
- Molecule 24: 50S ribosomal protein L20



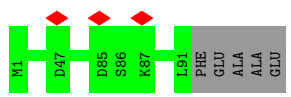
- Molecule 25: 50S ribosomal protein L21



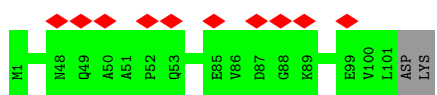
- Molecule 26: 50S ribosomal protein L22



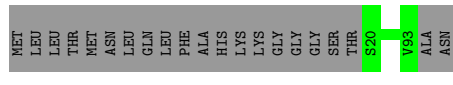
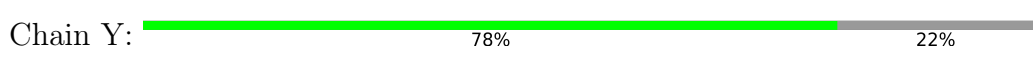
- Molecule 27: 50S ribosomal protein L23



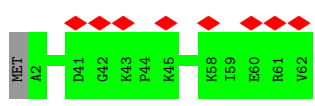
- Molecule 28: 50S ribosomal protein L24



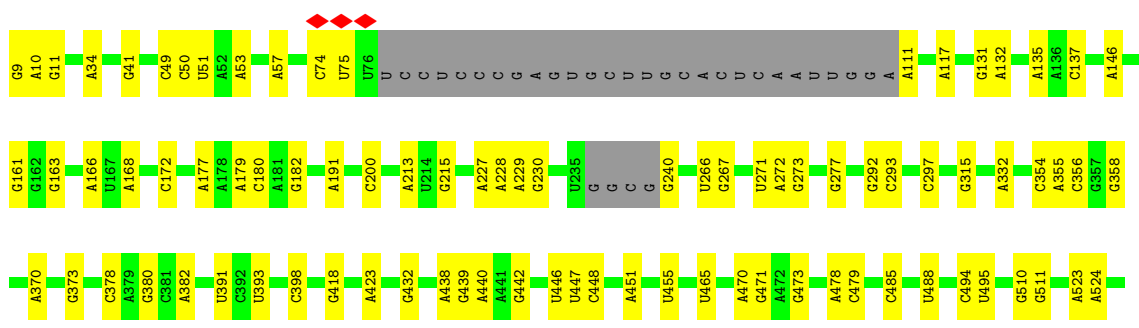
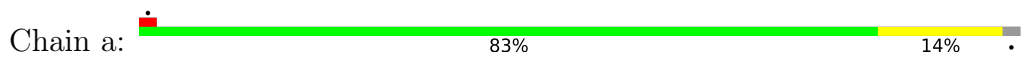
- Molecule 29: 50S ribosomal protein L27



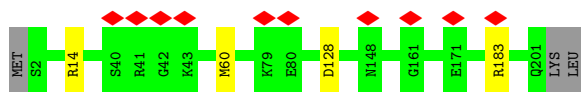
- Molecule 30: 50S ribosomal protein L28



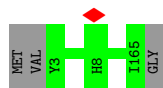
- Molecule 31: 16S rRNA



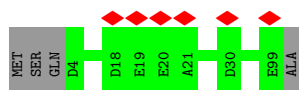




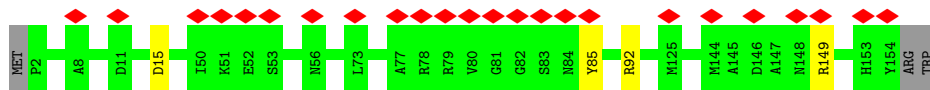
- Molecule 36: 30S ribosomal protein S5



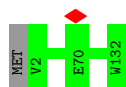
- Molecule 37: 30S ribosomal protein S6



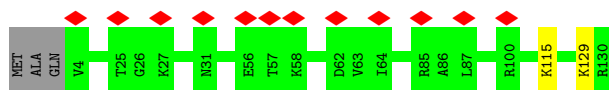
- Molecule 38: 30S ribosomal protein S7



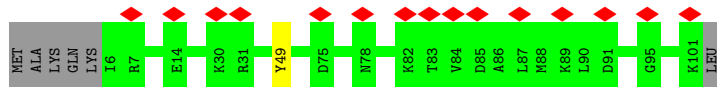
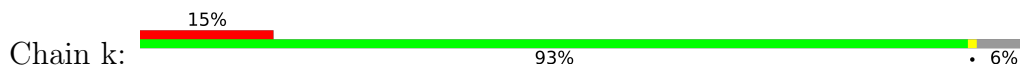
- Molecule 39: 30S ribosomal protein S8



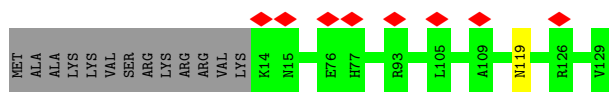
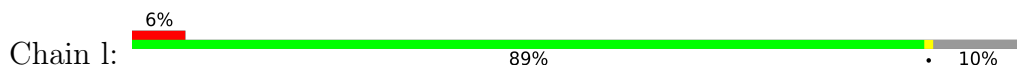
- Molecule 40: 30S ribosomal protein S9



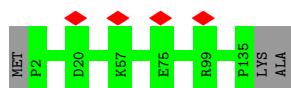
- Molecule 41: 30S ribosomal protein S10



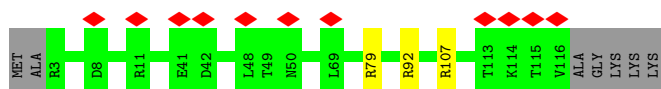
- Molecule 42: 30S ribosomal protein S11



• Molecule 43: 30S ribosomal protein S12



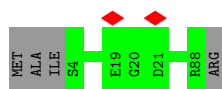
• Molecule 44: 30S ribosomal protein S13



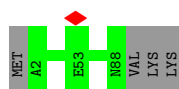
• Molecule 45: 30S ribosomal protein S14 type Z



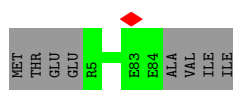
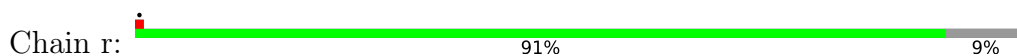
• Molecule 46: 30S ribosomal protein S15



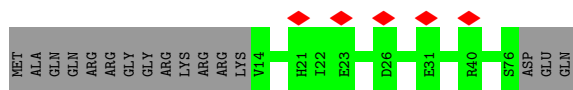
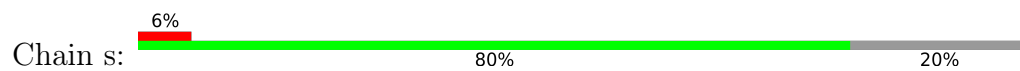
• Molecule 47: 30S ribosomal protein S16



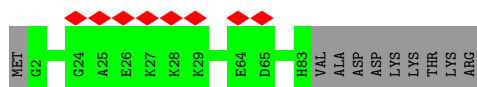
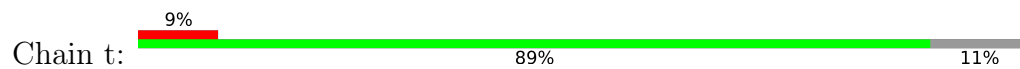
• Molecule 48: 30S ribosomal protein S17



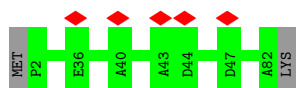
- Molecule 49: 30S ribosomal protein S18



- Molecule 50: 30S ribosomal protein S19



- Molecule 51: 30S ribosomal protein S20





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	18512	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	30.255	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	165000	Depositor
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.052	Depositor
Minimum map value	-0.010	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.015	Depositor
Map size (Å)	344.4, 344.4, 344.4	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.82, 0.82, 0.82	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: K, SCM, MG, ZN, PUT

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	1	0.24	0/492	0.50	0/654
2	2	0.25	0/430	0.49	0/579
3	3	0.30	0/664	0.50	0/896
4	4	0.28	0/413	0.53	0/549
5	5	0.28	0/414	0.56	0/552
6	6	0.28	0/377	0.65	0/491
7	7	0.27	0/528	0.62	0/689
8	8	0.30	0/310	0.55	0/409
9	A	0.45	0/67888	0.76	17/105890 (0.0%)
10	B	0.35	0/2728	0.73	1/4252 (0.0%)
11	D	0.32	0/1837	0.79	2/2862 (0.1%)
12	G	0.29	0/2141	0.54	0/2881
13	H	0.29	0/1594	0.53	0/2140
14	I	0.29	0/1595	0.50	0/2157
15	J	0.27	0/1411	0.50	0/1897
16	K	0.27	0/1355	0.51	0/1825
17	M	0.29	0/1167	0.49	0/1576
18	N	0.29	0/930	0.57	0/1247
19	O	0.29	0/1106	0.53	0/1474
20	P	0.29	0/1093	0.53	0/1457
21	Q	0.27	0/1006	0.57	0/1349
22	R	0.28	0/917	0.55	0/1226
23	S	0.28	0/939	0.59	0/1262
24	T	0.30	0/963	0.49	0/1280
25	U	0.32	0/791	0.48	0/1061
26	V	0.28	0/850	0.51	0/1145
27	W	0.29	0/743	0.51	0/993
28	X	0.28	0/772	0.45	0/1035
29	Y	0.30	0/565	0.54	0/755
30	Z	0.27	0/486	0.54	0/648
31	a	0.40	0/36487	0.76	8/56905 (0.0%)
32	b	0.24	0/319	0.81	2/494 (0.4%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	c	0.32	0/1803	0.49	0/2430
34	d	0.28	0/1643	0.53	0/2208
35	e	0.28	0/1641	0.51	0/2206
36	f	0.28	0/1217	0.52	0/1641
37	g	0.28	0/798	0.50	0/1075
38	h	0.26	0/1238	0.51	0/1668
39	i	0.28	0/1054	0.52	0/1417
40	j	0.27	0/993	0.54	0/1331
41	k	0.27	0/785	0.52	0/1059
42	l	0.26	0/869	0.52	0/1174
43	m	0.28	0/1068	0.57	0/1435
44	n	0.26	0/908	0.58	0/1219
45	o	0.29	0/504	0.52	0/669
46	p	0.27	0/726	0.52	0/969
47	q	0.27	0/704	0.51	0/945
48	r	0.28	0/668	0.52	0/891
49	s	0.27	0/518	0.52	0/694
50	t	0.28	0/680	0.50	0/911
51	u	0.25	0/611	0.46	0/818
All	All	0.39	0/151739	0.71	30/227390 (0.0%)

There are no bond length outliers.

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
31	a	111	A	OP1-P-OP2	-7.16	108.87	119.60
9	A	1828	A	OP1-P-OP2	-7.05	109.03	119.60
31	a	240	G	OP1-P-OP2	-7.04	109.05	119.60
9	A	1801	C	OP1-P-OP2	-6.81	109.39	119.60
31	a	1390	C	OP1-P-OP2	-6.81	109.39	119.60
32	b	1	G	OP1-P-OP2	-6.80	109.40	119.60
10	B	2	G	OP1-P-OP2	-6.79	109.42	119.60
9	A	1413	A	OP1-P-OP2	-6.77	109.45	119.60
31	a	9	G	OP1-P-OP2	-6.73	109.50	119.60
9	A	429	A	OP1-P-OP2	-6.68	109.58	119.60
32	b	13	A	OP1-P-OP2	-6.67	109.60	119.60
9	A	980	A	OP1-P-OP2	-6.64	109.64	119.60
9	A	3	U	OP1-P-OP2	-6.62	109.67	119.60
9	A	1061	G	OP1-P-OP2	-6.56	109.76	119.60
9	A	121	G	OP1-P-OP2	-6.47	109.89	119.60
31	a	1060	G	OP1-P-OP2	-6.46	109.92	119.60
9	A	708	G	OP1-P-OP2	-6.44	109.94	119.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	A	2005	G	OP1-P-OP2	-6.43	109.95	119.60
31	a	845	A	OP1-P-OP2	-6.43	109.96	119.60
31	a	1548	G	OP1-P-OP2	-6.42	109.97	119.60
9	A	500	C	OP1-P-OP2	-6.36	110.06	119.60
9	A	2216	G	OP1-P-OP2	-6.36	110.06	119.60
9	A	2384	G	OP1-P-OP2	-6.17	110.34	119.60
9	A	197	A	OP1-P-OP2	-5.81	110.89	119.60
31	a	131	G	OP1-P-OP2	-5.77	110.95	119.60
9	A	2802	C	O4'-C1'-N1	5.52	112.62	108.20
11	D	57	C	C2-N1-C1'	5.26	124.59	118.80
9	A	1827	G	OP1-P-O3'	5.18	116.61	105.20
11	D	57	C	C6-N1-C2	-5.12	118.25	120.30
9	A	1118	C	C2-N1-C1'	5.11	124.42	118.80

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	1	57/62 (92%)	56 (98%)	1 (2%)	0	100	100
2	2	55/59 (93%)	54 (98%)	1 (2%)	0	100	100
3	3	78/89 (88%)	73 (94%)	5 (6%)	0	100	100
4	4	51/59 (86%)	49 (96%)	2 (4%)	0	100	100
5	5	46/49 (94%)	45 (98%)	1 (2%)	0	100	100
6	6	42/44 (96%)	42 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	7	62/66 (94%)	62 (100%)	0	0	100	100
8	8	36/38 (95%)	35 (97%)	1 (3%)	0	100	100
12	G	272/276 (99%)	265 (97%)	6 (2%)	1 (0%)	34	69
13	H	204/209 (98%)	195 (96%)	9 (4%)	0	100	100
14	I	203/207 (98%)	201 (99%)	2 (1%)	0	100	100
15	J	175/179 (98%)	167 (95%)	8 (5%)	0	100	100
16	K	172/178 (97%)	165 (96%)	7 (4%)	0	100	100
17	M	145/147 (99%)	144 (99%)	1 (1%)	0	100	100
18	N	120/122 (98%)	116 (97%)	4 (3%)	0	100	100
19	O	144/146 (99%)	140 (97%)	3 (2%)	1 (1%)	22	57
20	P	132/144 (92%)	131 (99%)	1 (1%)	0	100	100
21	Q	123/127 (97%)	120 (98%)	3 (2%)	0	100	100
22	R	116/118 (98%)	113 (97%)	3 (3%)	0	100	100
23	S	112/115 (97%)	110 (98%)	2 (2%)	0	100	100
24	T	116/119 (98%)	114 (98%)	2 (2%)	0	100	100
25	U	99/102 (97%)	97 (98%)	2 (2%)	0	100	100
26	V	109/115 (95%)	107 (98%)	2 (2%)	0	100	100
27	W	89/96 (93%)	88 (99%)	1 (1%)	0	100	100
28	X	99/103 (96%)	96 (97%)	3 (3%)	0	100	100
29	Y	72/95 (76%)	68 (94%)	4 (6%)	0	100	100
30	Z	59/62 (95%)	59 (100%)	0	0	100	100
33	c	220/261 (84%)	209 (95%)	10 (4%)	1 (0%)	29	64
34	d	203/218 (93%)	197 (97%)	6 (3%)	0	100	100
35	e	198/203 (98%)	193 (98%)	5 (2%)	0	100	100
36	f	161/166 (97%)	159 (99%)	2 (1%)	0	100	100
37	g	94/100 (94%)	92 (98%)	2 (2%)	0	100	100
38	h	151/156 (97%)	148 (98%)	3 (2%)	0	100	100
39	i	129/132 (98%)	126 (98%)	3 (2%)	0	100	100
40	j	125/130 (96%)	119 (95%)	6 (5%)	0	100	100
41	k	94/102 (92%)	93 (99%)	1 (1%)	0	100	100
42	l	114/129 (88%)	110 (96%)	3 (3%)	1 (1%)	17	52

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
43	m	132/137 (96%)	125 (95%)	7 (5%)	0	100	100
44	n	112/121 (93%)	110 (98%)	2 (2%)	0	100	100
45	o	58/61 (95%)	58 (100%)	0	0	100	100
46	p	83/89 (93%)	82 (99%)	1 (1%)	0	100	100
47	q	85/91 (93%)	83 (98%)	2 (2%)	0	100	100
48	r	78/88 (89%)	75 (96%)	3 (4%)	0	100	100
49	s	61/79 (77%)	59 (97%)	2 (3%)	0	100	100
50	t	80/92 (87%)	80 (100%)	0	0	100	100
51	u	79/83 (95%)	77 (98%)	2 (2%)	0	100	100
All	All	5245/5564 (94%)	5107 (97%)	134 (3%)	4 (0%)	54	83

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
33	c	131	LYS
42	l	119	ASN
19	O	29	LYS
12	G	155	ILE

### 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	1	54/56 (96%)	52 (96%)	2 (4%)	34	66
2	2	48/50 (96%)	47 (98%)	1 (2%)	53	79
3	3	72/79 (91%)	70 (97%)	2 (3%)	43	73
4	4	43/48 (90%)	43 (100%)	0	100	100
5	5	48/49 (98%)	47 (98%)	1 (2%)	53	79
6	6	39/39 (100%)	39 (100%)	0	100	100
7	7	51/53 (96%)	50 (98%)	1 (2%)	55	80

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
8	8	35/35 (100%)	35 (100%)	0	100	100
12	G	224/226 (99%)	224 (100%)	0	100	100
13	H	169/172 (98%)	169 (100%)	0	100	100
14	I	172/173 (99%)	171 (99%)	1 (1%)	86	94
15	J	154/156 (99%)	148 (96%)	6 (4%)	32	65
16	K	145/148 (98%)	143 (99%)	2 (1%)	67	86
17	M	124/124 (100%)	124 (100%)	0	100	100
18	N	98/98 (100%)	98 (100%)	0	100	100
19	O	112/112 (100%)	111 (99%)	1 (1%)	78	91
20	P	107/114 (94%)	107 (100%)	0	100	100
21	Q	107/109 (98%)	106 (99%)	1 (1%)	78	91
22	R	92/92 (100%)	91 (99%)	1 (1%)	73	89
23	S	97/98 (99%)	97 (100%)	0	100	100
24	T	94/95 (99%)	93 (99%)	1 (1%)	73	89
25	U	83/83 (100%)	83 (100%)	0	100	100
26	V	94/98 (96%)	93 (99%)	1 (1%)	73	89
27	W	82/85 (96%)	82 (100%)	0	100	100
28	X	85/87 (98%)	85 (100%)	0	100	100
29	Y	59/75 (79%)	59 (100%)	0	100	100
30	Z	54/55 (98%)	54 (100%)	0	100	100
33	c	187/220 (85%)	182 (97%)	5 (3%)	44	74
34	d	163/174 (94%)	162 (99%)	1 (1%)	86	94
35	e	174/177 (98%)	170 (98%)	4 (2%)	50	77
36	f	126/128 (98%)	126 (100%)	0	100	100
37	g	85/88 (97%)	85 (100%)	0	100	100
38	h	130/133 (98%)	126 (97%)	4 (3%)	40	70
39	i	112/113 (99%)	112 (100%)	0	100	100
40	j	100/102 (98%)	98 (98%)	2 (2%)	55	80
41	k	87/92 (95%)	86 (99%)	1 (1%)	73	89
42	l	90/101 (89%)	90 (100%)	0	100	100
43	m	117/119 (98%)	117 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
44	n	98/102 (96%)	95 (97%)	3 (3%)	40	70
45	o	51/52 (98%)	50 (98%)	1 (2%)	55	80
46	p	76/79 (96%)	76 (100%)	0	100	100
47	q	77/81 (95%)	77 (100%)	0	100	100
48	r	74/81 (91%)	74 (100%)	0	100	100
49	s	54/67 (81%)	54 (100%)	0	100	100
50	t	70/79 (89%)	70 (100%)	0	100	100
51	u	62/64 (97%)	62 (100%)	0	100	100
All	All	4475/4661 (96%)	4433 (99%)	42 (1%)	79	91

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	1	19	LYS
1	1	58	ARG
2	2	55	ASP
3	3	14	PHE
3	3	23	PHE
5	5	38	ARG
7	7	31	HIS
14	I	49	HIS
15	J	37	ASN
15	J	71	LYS
15	J	79	LEU
15	J	80	ARG
15	J	168	GLU
15	J	175	MET
16	K	84	GLN
16	K	102	LYS
19	O	1	MET
21	Q	74	ARG
22	R	4	LYS
24	T	51	ARG
26	V	27	ASP
33	c	23	TRP
33	c	74	LYS
33	c	113	ARG
33	c	129	LEU
33	c	221	PHE

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Mol	Chain	Res	Type
34	d	87	ARG
35	e	14	ARG
35	e	60	MET
35	e	128	ASP
35	e	183	ARG
38	h	15	ASP
38	h	85	TYR
38	h	92	ARG
38	h	149	ARG
40	j	115	LYS
40	j	129	LYS
41	k	49	TYR
44	n	79	ARG
44	n	92	ARG
44	n	107	ARG
45	o	38	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
14	I	141	GLN
14	I	145	ASN
36	f	70	ASN
49	s	21	HIS

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
10	B	113/116 (97%)	23 (20%)	0
11	D	76/77 (98%)	20 (26%)	0
31	a	1518/1558 (97%)	219 (14%)	0
32	b	11/19 (57%)	2 (18%)	0
9	A	2820/2912 (96%)	405 (14%)	30 (1%)
All	All	4538/4682 (96%)	669 (14%)	30 (0%)

All (669) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
9	A	10	A
9	A	15	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	34	U
9	A	46	C
9	A	51	G
9	A	55	G
9	A	63	U
9	A	71	A
9	A	74	U
9	A	75	G
9	A	93	U
9	A	101	G
9	A	117	A
9	A	119	U
9	A	130	A
9	A	161	A
9	A	163	U
9	A	164	A
9	A	169	G
9	A	198	A
9	A	201	A
9	A	215	A
9	A	218	A
9	A	224	A
9	A	225	A
9	A	230	A
9	A	231	U
9	A	232	U
9	A	247	G
9	A	250	G
9	A	251	C
9	A	252	G
9	A	257	A
9	A	269	C
9	A	271	C
9	A	281	A
9	A	282	G
9	A	289	U
9	A	290	G
9	A	295	G
9	A	296	G
9	A	299	G
9	A	300	U
9	A	301	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	308	C
9	A	309	G
9	A	310	A
9	A	311	U
9	A	312	A
9	A	317	A
9	A	318	G
9	A	320	C
9	A	321	U
9	A	322	G
9	A	338	G
9	A	347	A
9	A	366	A
9	A	398	A
9	A	402	G
9	A	403	G
9	A	410	A
9	A	411	G
9	A	425	G
9	A	430	A
9	A	440	A
9	A	450	G
9	A	474	C
9	A	479	G
9	A	495	C
9	A	496	A
9	A	509	A
9	A	520	G
9	A	529	A
9	A	534	G
9	A	543	A
9	A	546	U
9	A	560	G
9	A	568	C
9	A	569	A
9	A	570	A
9	A	571	G
9	A	581	G
9	A	582	U
9	A	583	U
9	A	584	A
9	A	585	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	587	G
9	A	599	G
9	A	609	G
9	A	610	A
9	A	611	A
9	A	639	A
9	A	651	A
9	A	665	A
9	A	675	A
9	A	683	U
9	A	684	A
9	A	691	A
9	A	692	U
9	A	694	A
9	A	708	G
9	A	709	A
9	A	716	A
9	A	725	U
9	A	761	A
9	A	769	A
9	A	786	U
9	A	796	G
9	A	814	G
9	A	821	A
9	A	823	U
9	A	829	A
9	A	844	G
9	A	851	C
9	A	858	A
9	A	866	U
9	A	867	U
9	A	885	U
9	A	886	G
9	A	899	G
9	A	922	G
9	A	923	C
9	A	926	A
9	A	928	C
9	A	929	U
9	A	931	G
9	A	933	G
9	A	935	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	936	A
9	A	947	A
9	A	950	A
9	A	952	C
9	A	954	C
9	A	957	A
9	A	965	U
9	A	966	C
9	A	972	U
9	A	974	U
9	A	984	A
9	A	985	G
9	A	998	A
9	A	1000	G
9	A	1013	A
9	A	1022	A
9	A	1035	A
9	A	1044	C
9	A	1051	U
9	A	1052	A
9	A	1061	G
9	A	1062	U
9	A	1064	G
9	A	1066	A
9	A	1072	U
9	A	1086	G
9	A	1101	G
9	A	1109	A
9	A	1110	G
9	A	1111	C
9	A	1115	C
9	A	1118	C
9	A	1122	U
9	A	1123	A
9	A	1126	G
9	A	1127	A
9	A	1151	G
9	A	1155	C
9	A	1167	A
9	A	1171	U
9	A	1172	A
9	A	1174	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	1175	G
9	A	1181	A
9	A	1182	A
9	A	1190	A
9	A	1196	G
9	A	1212	U
9	A	1213	U
9	A	1225	U
9	A	1243	G
9	A	1248	G
9	A	1265	A
9	A	1267	G
9	A	1272	G
9	A	1274	G
9	A	1286	G
9	A	1289	A
9	A	1292	G
9	A	1307	G
9	A	1308	A
9	A	1310	A
9	A	1311	G
9	A	1335	U
9	A	1336	A
9	A	1364	U
9	A	1380	C
9	A	1385	C
9	A	1387	U
9	A	1394	A
9	A	1395	G
9	A	1400	A
9	A	1414	U
9	A	1421	C
9	A	1430	A
9	A	1431	U
9	A	1451	G
9	A	1452	U
9	A	1454	U
9	A	1455	G
9	A	1460	A
9	A	1461	U
9	A	1468	A
9	A	1469	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	1474	U
9	A	1495	U
9	A	1496	U
9	A	1497	G
9	A	1503	G
9	A	1509	C
9	A	1511	A
9	A	1520	G
9	A	1524	U
9	A	1526	A
9	A	1530	G
9	A	1534	U
9	A	1535	A
9	A	1536	A
9	A	1537	A
9	A	1538	U
9	A	1550	U
9	A	1551	A
9	A	1564	G
9	A	1565	A
9	A	1567	G
9	A	1569	G
9	A	1575	A
9	A	1576	A
9	A	1583	G
9	A	1584	U
9	A	1611	A
9	A	1614	A
9	A	1623	U
9	A	1625	G
9	A	1627	G
9	A	1629	G
9	A	1649	U
9	A	1650	A
9	A	1652	A
9	A	1688	A
9	A	1689	G
9	A	1690	C
9	A	1707	A
9	A	1716	G
9	A	1717	C
9	A	1742	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	1756	U
9	A	1758	G
9	A	1759	G
9	A	1769	G
9	A	1775	A
9	A	1776	G
9	A	1777	G
9	A	1786	A
9	A	1795	C
9	A	1804	A
9	A	1813	C
9	A	1814	A
9	A	1828	A
9	A	1829	A
9	A	1830	G
9	A	1842	A
9	A	1860	A
9	A	1872	A
9	A	1873	U
9	A	1883	U
9	A	1884	C
9	A	1885	G
9	A	1907	C
9	A	1919	G
9	A	1926	A
9	A	1927	C
9	A	1942	G
9	A	1943	G
9	A	1949	A
9	A	1951	A
9	A	1953	U
9	A	1968	U
9	A	1980	C
9	A	1983	A
9	A	1984	A
9	A	1985	G
9	A	2004	U
9	A	2006	U
9	A	2009	C
9	A	2010	A
9	A	2034	G
9	A	2035	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	2036	A
9	A	2044	A
9	A	2045	G
9	A	2046	A
9	A	2056	C
9	A	2068	C
9	A	2069	G
9	A	2073	A
9	A	2074	G
9	A	2075	A
9	A	2082	G
9	A	2096	G
9	A	2108	G
9	A	2112	U
9	A	2201	U
9	A	2207	C
9	A	2211	A
9	A	2212	A
9	A	2216	G
9	A	2217	C
9	A	2224	A
9	A	2225	A
9	A	2238	A
9	A	2251	G
9	A	2252	G
9	A	2259	G
9	A	2281	A
9	A	2292	G
9	A	2296	C
9	A	2300	A
9	A	2318	U
9	A	2319	U
9	A	2321	G
9	A	2322	A
9	A	2324	A
9	A	2331	G
9	A	2333	A
9	A	2334	G
9	A	2335	A
9	A	2338	G
9	A	2347	G
9	A	2348	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	2360	C
9	A	2363	C
9	A	2396	G
9	A	2398	C
9	A	2415	U
9	A	2435	C
9	A	2437	C
9	A	2438	A
9	A	2442	G
9	A	2443	A
9	A	2448	A
9	A	2454	C
9	A	2460	G
9	A	2461	A
9	A	2478	C
9	A	2489	A
9	A	2491	A
9	A	2497	G
9	A	2515	G
9	A	2518	G
9	A	2519	U
9	A	2531	A
9	A	2533	C
9	A	2542	G
9	A	2548	G
9	A	2561	G
9	A	2567	U
9	A	2579	A
9	A	2580	G
9	A	2591	G
9	A	2615	A
9	A	2622	U
9	A	2623	C
9	A	2626	U
9	A	2628	U
9	A	2642	U
9	A	2643	G
9	A	2674	G
9	A	2698	G
9	A	2702	U
9	A	2727	G
9	A	2739	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	2746	A
9	A	2747	A
9	A	2749	G
9	A	2761	A
9	A	2778	A
9	A	2791	A
9	A	2792	U
9	A	2803	A
9	A	2804	U
9	A	2809	U
9	A	2810	U
9	A	2811	A
9	A	2812	A
9	A	2813	G
9	A	2816	A
9	A	2818	U
9	A	2830	G
9	A	2843	A
9	A	2844	G
9	A	2877	G
9	A	2878	A
9	A	2882	G
9	A	2889	A
9	A	2890	C
9	A	2903	G
10	B	7	G
10	B	10	G
10	B	13	A
10	B	23	A
10	B	28	C
10	B	33	U
10	B	35	C
10	B	39	G
10	B	40	C
10	B	43	A
10	B	51	A
10	B	54	U
10	B	55	A
10	B	64	A
10	B	65	G
10	B	87	U
10	B	88	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	B	97	A
10	B	101	U
10	B	107	G
10	B	108	U
10	B	110	G
10	B	115	G
11	D	3	C
11	D	6	G
11	D	7	G
11	D	8	U
11	D	9	G
11	D	13	C
11	D	19	G
11	D	20	G
11	D	22	A
11	D	23	G
11	D	47	G
11	D	49	C
11	D	54	G
11	D	56	U
11	D	57	C
11	D	62	C
11	D	63	C
11	D	68	C
11	D	76	C
11	D	77	A
31	a	10	A
31	a	11	G
31	a	34	A
31	a	41	G
31	a	49	C
31	a	50	C
31	a	51	U
31	a	53	A
31	a	57	A
31	a	74	C
31	a	75	U
31	a	117	A
31	a	132	A
31	a	135	A
31	a	137	C
31	a	146	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	161	G
31	a	163	G
31	a	166	A
31	a	168	A
31	a	172	C
31	a	177	A
31	a	179	A
31	a	180	C
31	a	182	G
31	a	191	A
31	a	200	C
31	a	213	A
31	a	215	G
31	a	227	A
31	a	228	A
31	a	229	A
31	a	230	G
31	a	266	U
31	a	267	G
31	a	271	U
31	a	272	A
31	a	273	G
31	a	277	G
31	a	292	G
31	a	293	C
31	a	297	C
31	a	315	G
31	a	332	A
31	a	354	C
31	a	355	A
31	a	356	C
31	a	358	G
31	a	370	A
31	a	373	G
31	a	378	C
31	a	380	G
31	a	382	A
31	a	391	U
31	a	393	U
31	a	398	C
31	a	418	G
31	a	423	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	432	G
31	a	438	A
31	a	439	G
31	a	440	A
31	a	442	G
31	a	446	U
31	a	447	U
31	a	448	C
31	a	451	A
31	a	455	U
31	a	465	U
31	a	470	A
31	a	471	G
31	a	473	G
31	a	478	A
31	a	479	C
31	a	485	C
31	a	488	U
31	a	494	C
31	a	495	U
31	a	510	G
31	a	511	G
31	a	523	A
31	a	524	A
31	a	537	C
31	a	540	C
31	a	544	C
31	a	553	G
31	a	556	G
31	a	557	U
31	a	573	A
31	a	585	A
31	a	590	U
31	a	598	A
31	a	599	A
31	a	602	C
31	a	603	G
31	a	607	G
31	a	644	C
31	a	659	U
31	a	675	G
31	a	679	U

*Continued on next page...*

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	691	A
31	a	713	A
31	a	714	G
31	a	736	G
31	a	749	U
31	a	750	G
31	a	757	G
31	a	775	A
31	a	787	G
31	a	803	A
31	a	819	U
31	a	820	A
31	a	841	A
31	a	843	C
31	a	846	U
31	a	855	A
31	a	862	G
31	a	866	G
31	a	870	C
31	a	873	C
31	a	882	G
31	a	899	A
31	a	941	A
31	a	953	G
31	a	954	G
31	a	961	C
31	a	962	A
31	a	972	G
31	a	987	U
31	a	995	A
31	a	996	A
31	a	998	G
31	a	1002	A
31	a	1003	G
31	a	1004	A
31	a	1019	U
31	a	1020	G
31	a	1028	U
31	a	1030	G
31	a	1031	A
31	a	1033	C
31	a	1036	U

*Continued on next page...*

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	1045	A
31	a	1050	U
31	a	1051	U
31	a	1052	U
31	a	1055	C
31	a	1058	C
31	a	1059	G
31	a	1060	G
31	a	1063	A
31	a	1064	C
31	a	1065	A
31	a	1067	A
31	a	1073	A
31	a	1081	C
31	a	1082	A
31	a	1092	U
31	a	1121	G
31	a	1122	U
31	a	1128	A
31	a	1159	C
31	a	1161	U
31	a	1163	U
31	a	1165	G
31	a	1166	U
31	a	1172	A
31	a	1183	A
31	a	1185	U
31	a	1194	C
31	a	1210	G
31	a	1222	A
31	a	1223	A
31	a	1226	C
31	a	1239	A
31	a	1251	A
31	a	1253	A
31	a	1262	A
31	a	1264	A
31	a	1283	C
31	a	1286	U
31	a	1296	G
31	a	1306	A
31	a	1307	U

*Continued on next page...*



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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	1326	G
31	a	1328	U
31	a	1331	G
31	a	1341	U
31	a	1344	A
31	a	1348	C
31	a	1372	A
31	a	1379	G
31	a	1390	C
31	a	1391	G
31	a	1420	A
31	a	1423	C
31	a	1424	A
31	a	1445	G
31	a	1448	U
31	a	1449	G
31	a	1455	C
31	a	1466	U
31	a	1468	A
31	a	1472	A
31	a	1478	U
31	a	1479	U
31	a	1480	U
31	a	1481	G
31	a	1517	U
31	a	1519	A
31	a	1521	G
31	a	1524	G
31	a	1530	A
31	a	1533	U
31	a	1544	G
31	a	1556	G
31	a	1557	G
31	a	1558	A
31	a	1564	U
32	b	6	U
32	b	16	A

All (30) RNA pucker outliers are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	A	9	G

*Continued on next page...*

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Mol	Chain	Res	Type
9	A	33	U
9	A	227	A
9	A	251	C
9	A	288	U
9	A	295	G
9	A	429	A
9	A	1057	U
9	A	1061	G
9	A	1117	C
9	A	1189	U
9	A	1224	G
9	A	1393	G
9	A	1413	A
9	A	1451	G
9	A	1525	G
9	A	1536	A
9	A	1583	G
9	A	1828	A
9	A	1829	A
9	A	1926	A
9	A	2005	G
9	A	2111	U
9	A	2210	U
9	A	2216	G
9	A	2318	U
9	A	2518	G
9	A	2808	U
9	A	2810	U
9	A	2877	G

#### 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](#)

Of 344 ligands modelled in this entry, 342 are monoatomic - leaving 2 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$
55	PUT	a	1610	-	5,5,5	0.12	0	4,4,4	0.18	0
56	SCM	a	1660	-	23,25,25	1.32	3 (13%)	26,39,39	1.42	3 (11%)

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	PUT	a	1610	-	-	0/3/3/3	-
56	SCM	a	1660	-	-	0/4/57/57	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
56	a	1660	SCM	C10-N10	-2.33	1.43	1.47
56	a	1660	SCM	C8-N8	-2.08	1.44	1.47
56	a	1660	SCM	C3-C4	-2.07	1.47	1.50

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
56	a	1660	SCM	C8M-N8-C8	-3.87	108.75	114.38
56	a	1660	SCM	C1M-N10-C10	-3.81	108.84	114.38
56	a	1660	SCM	C2M-C2-C3	-2.51	108.33	113.22

There are no chirality outliers.

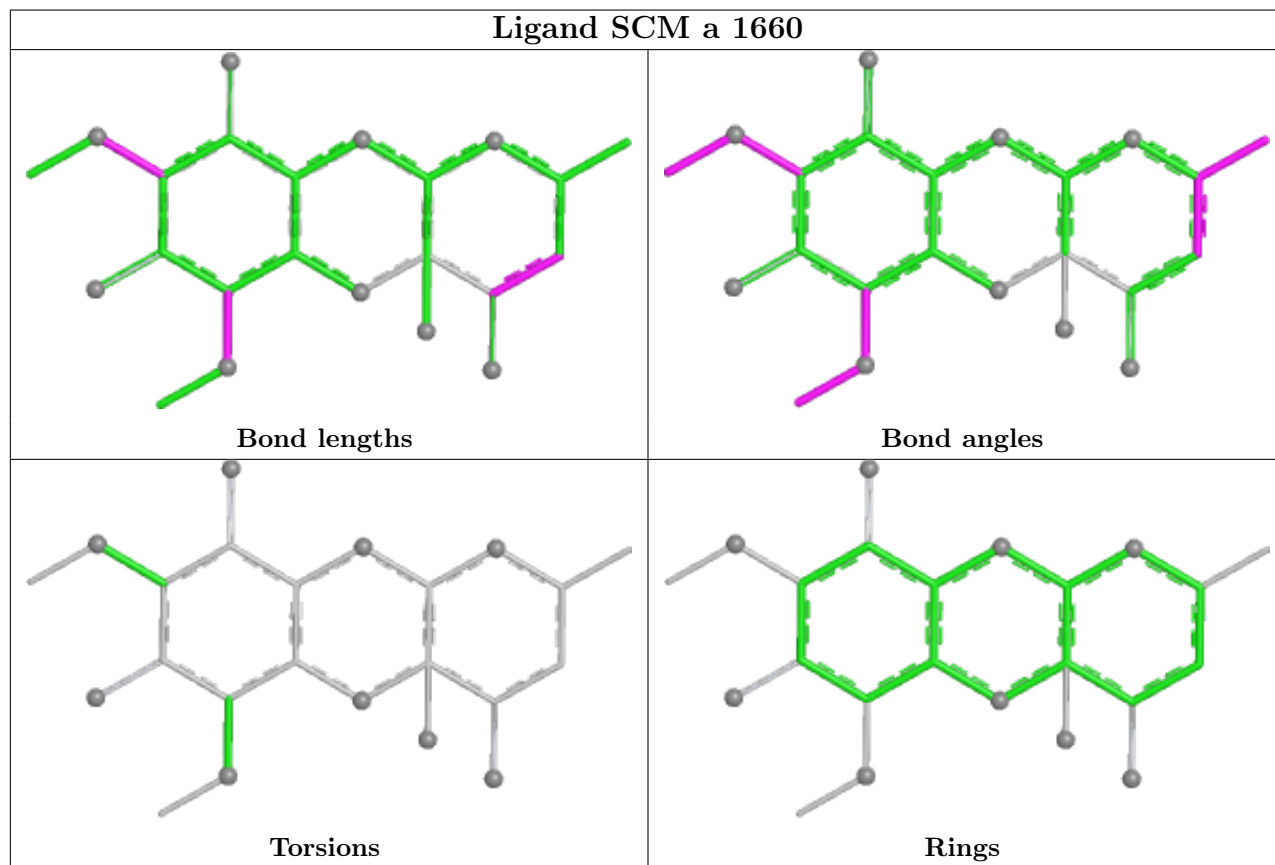
There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

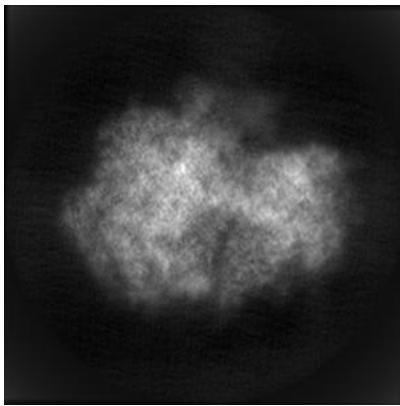
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13245. These allow visual inspection of the internal detail of the map and identification of artifacts.

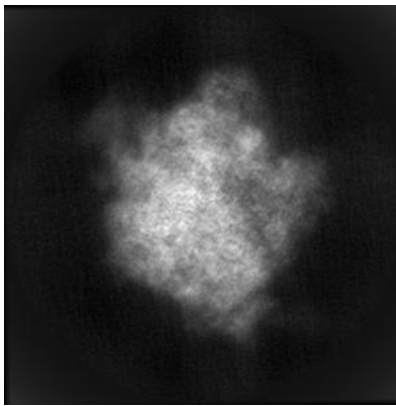
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

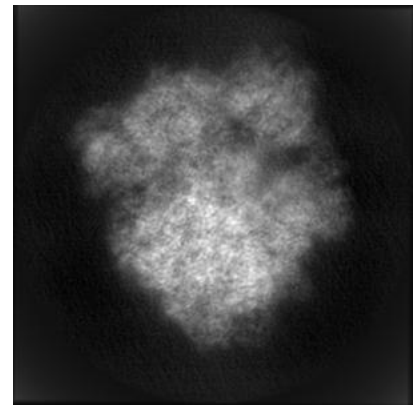
#### 6.1.1 Primary map



X

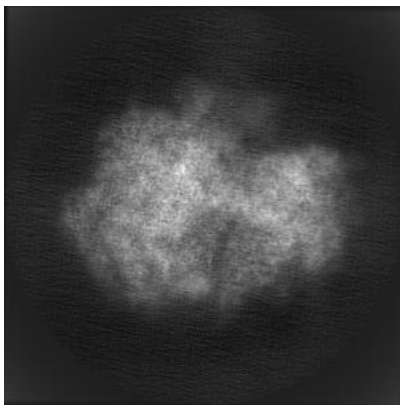


Y

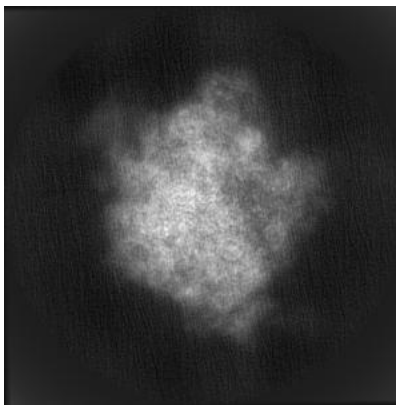


Z

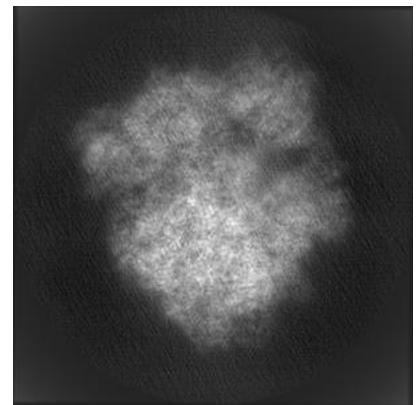
#### 6.1.2 Raw map



X



Y

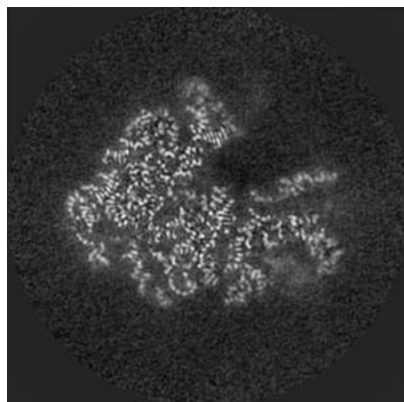


Z

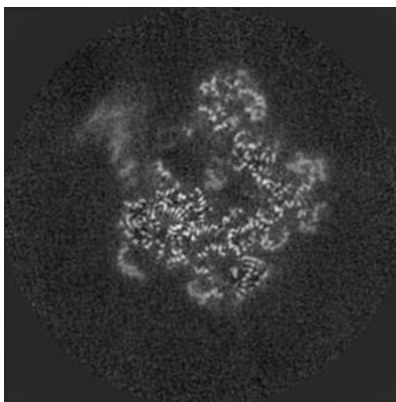
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

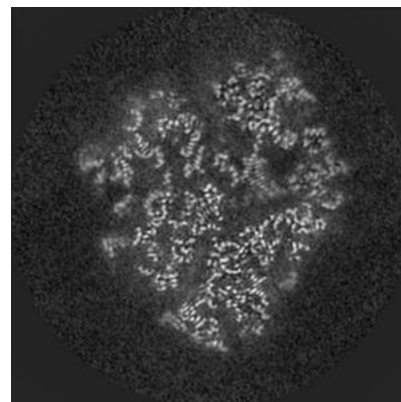
### 6.2.1 Primary map



X Index: 210

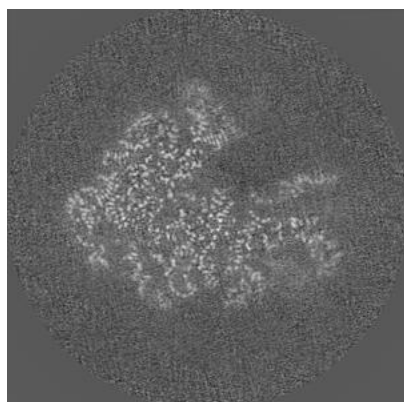


Y Index: 210

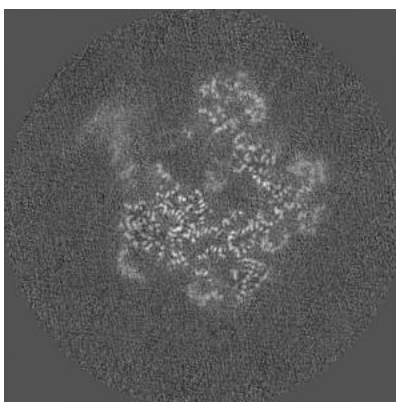


Z Index: 210

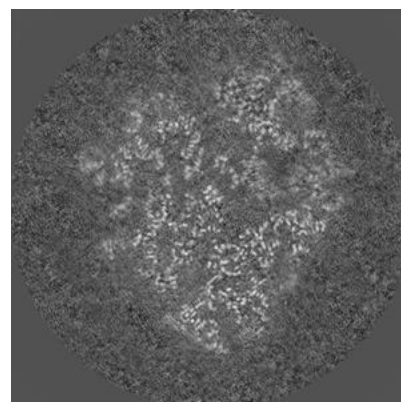
### 6.2.2 Raw map



X Index: 210



Y Index: 210



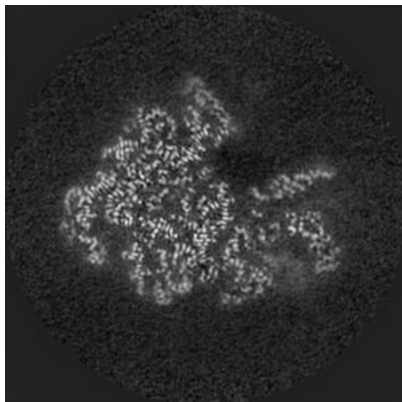
Z Index: 210

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

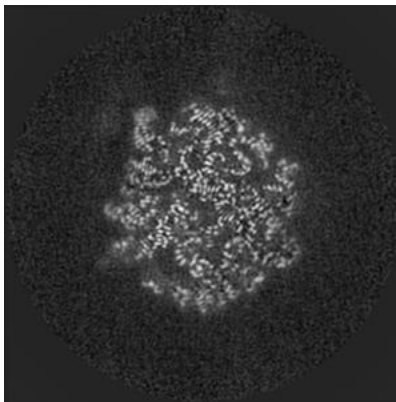


## 6.3 Largest variance slices [i](#)

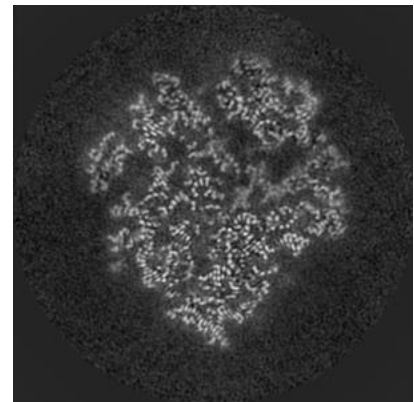
### 6.3.1 Primary map



X Index: 207

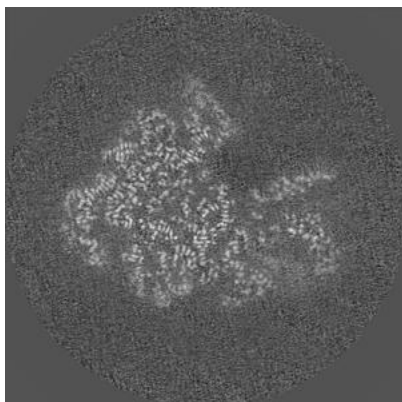


Y Index: 170

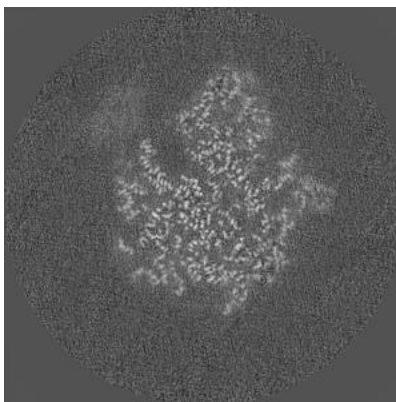


Z Index: 218

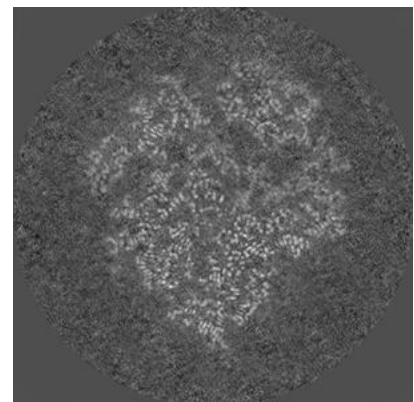
### 6.3.2 Raw map



X Index: 207



Y Index: 191



Z Index: 217

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

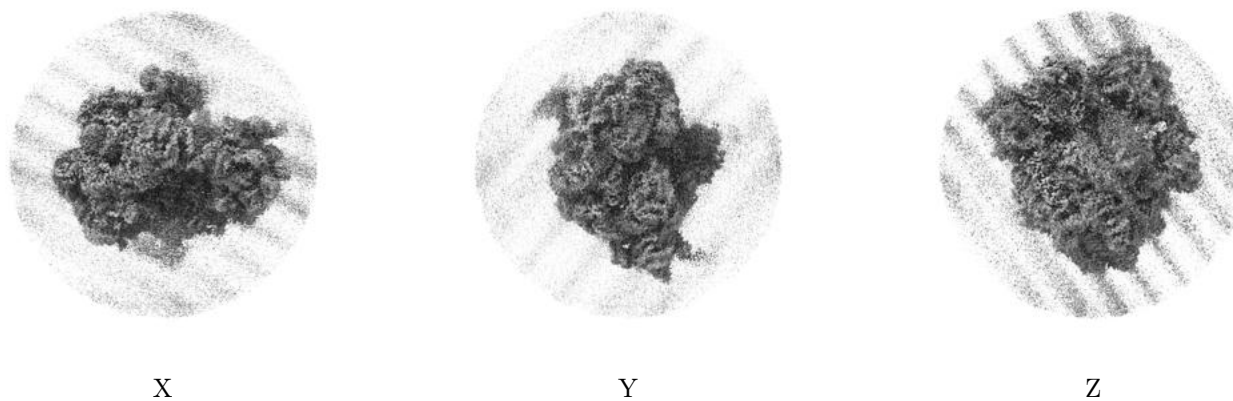
## 6.4 Orthogonal surface views [i](#)

### 6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.015. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 Raw map



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.



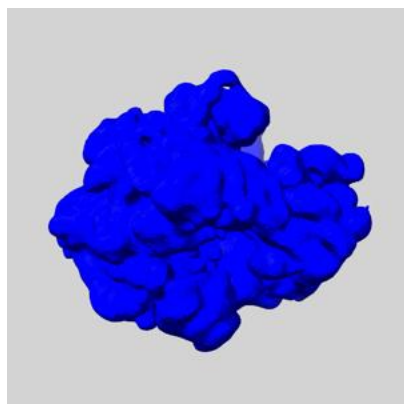
## 6.5 Mask visualisation [i](#)

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

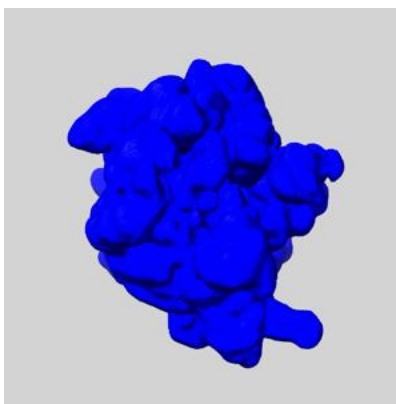
A mask typically either:

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

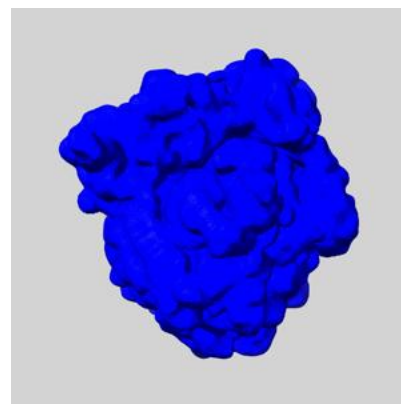
### 6.5.1 emd\_13245\_msk\_1.map [i](#)



X



Y

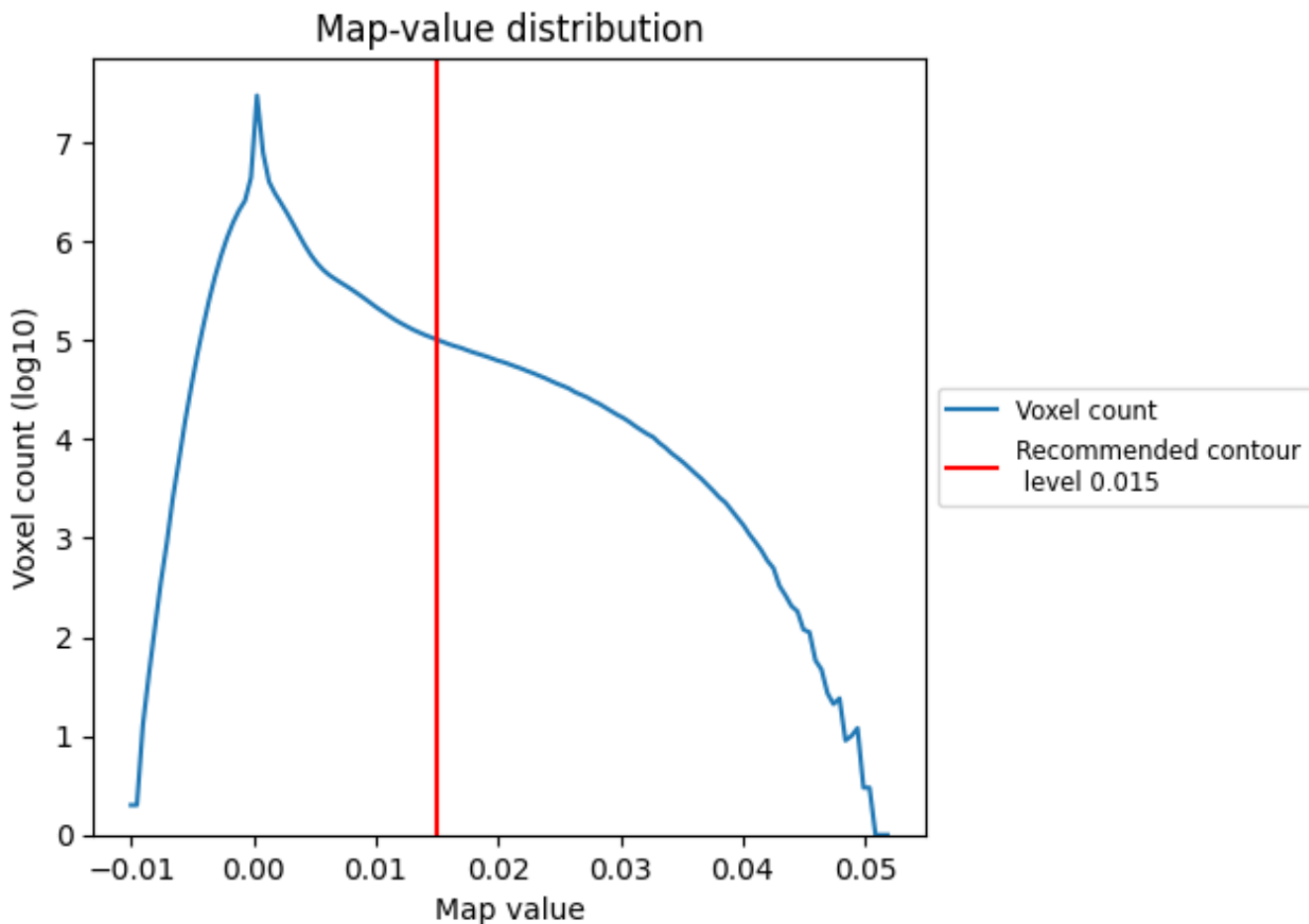


Z

## 7 Map analysis [i](#)

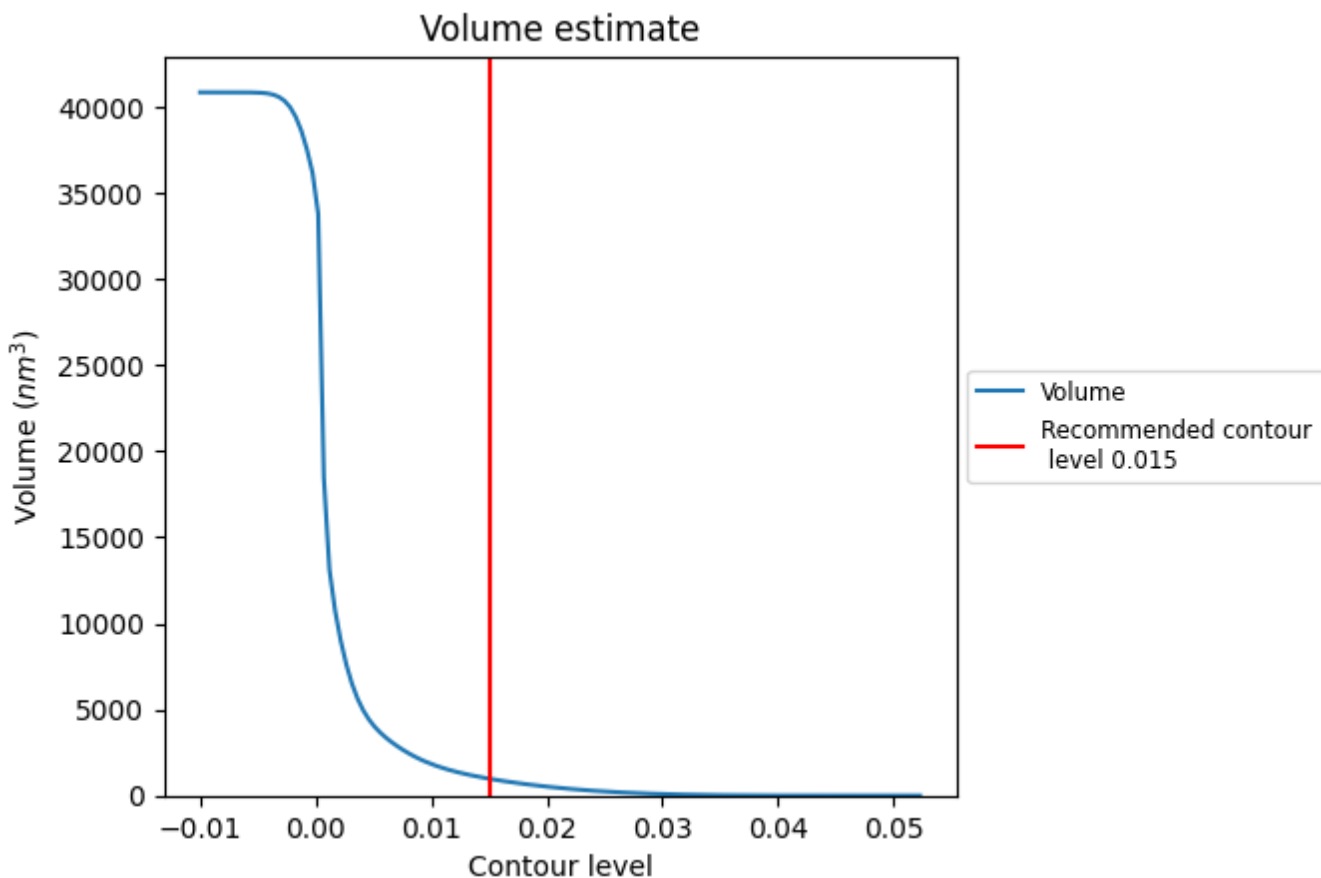
This section contains the results of statistical analysis of the map.

### 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.

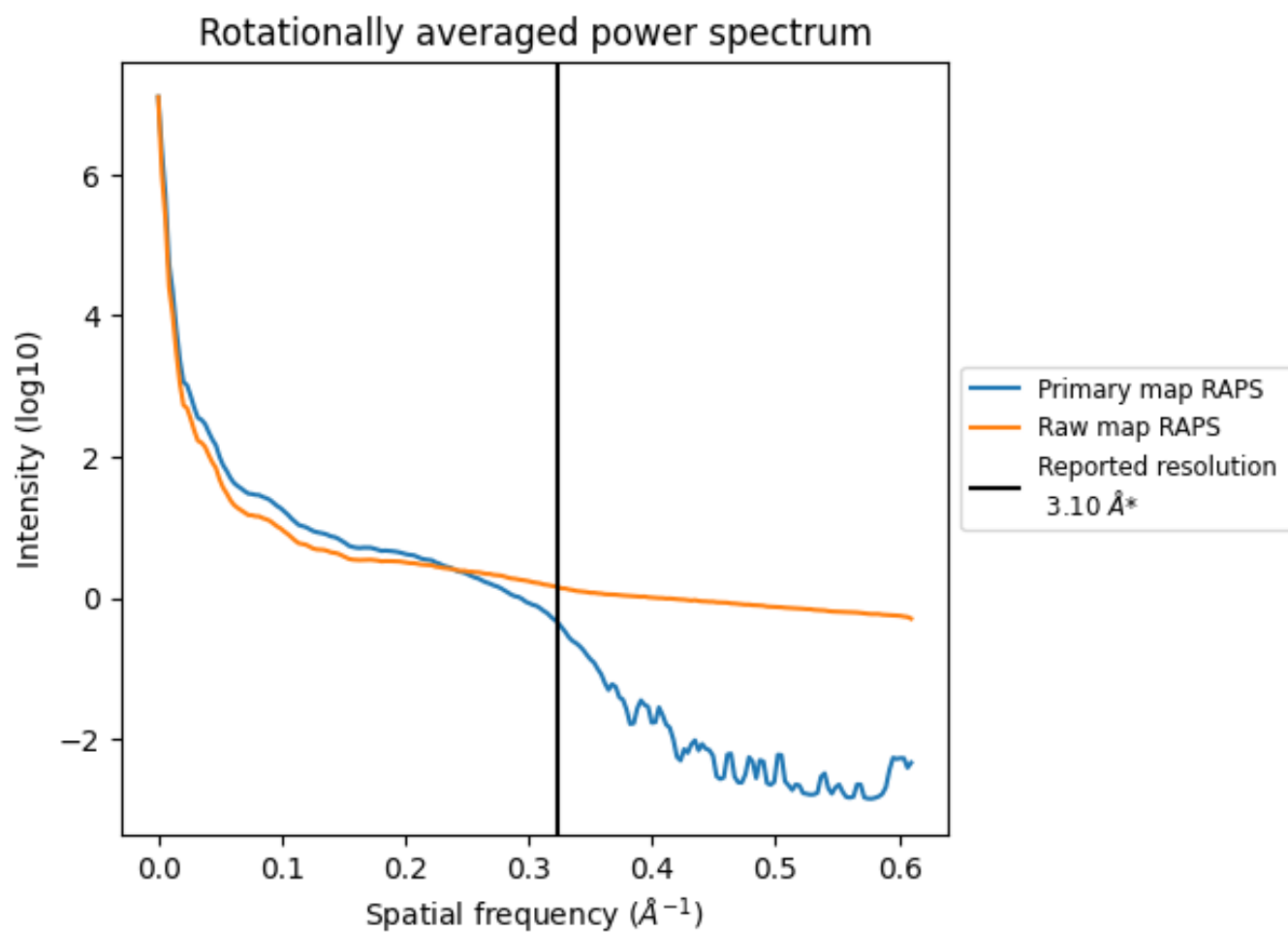
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 980  $\text{nm}^3$ ; this corresponds to an approximate mass of 885 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](#)

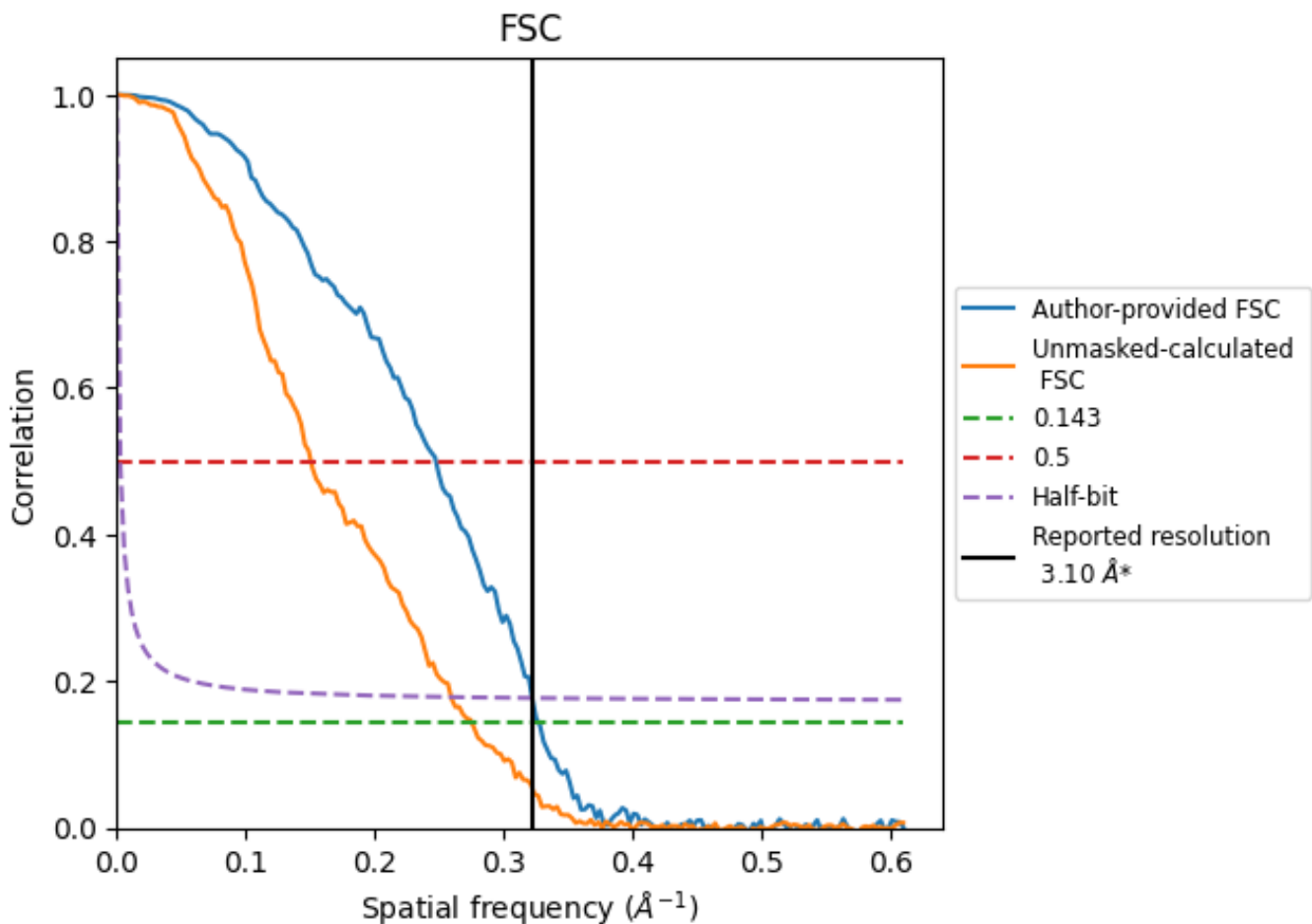


\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 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 0.323 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

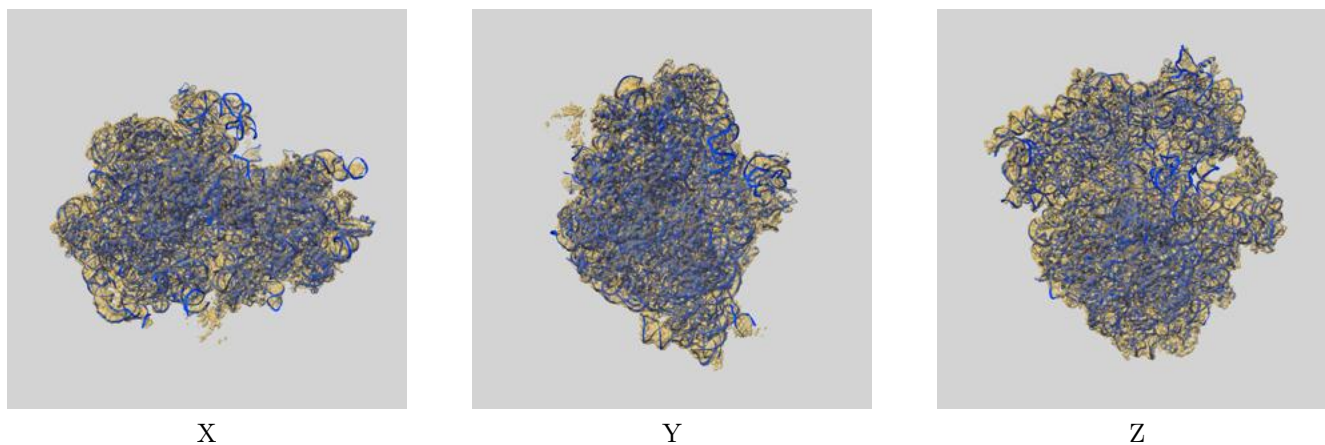
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.06	4.04	3.10
Unmasked-calculated*	3.63	6.64	3.86

\*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 3.63 differs from the reported value 3.1 by more than 10 %

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

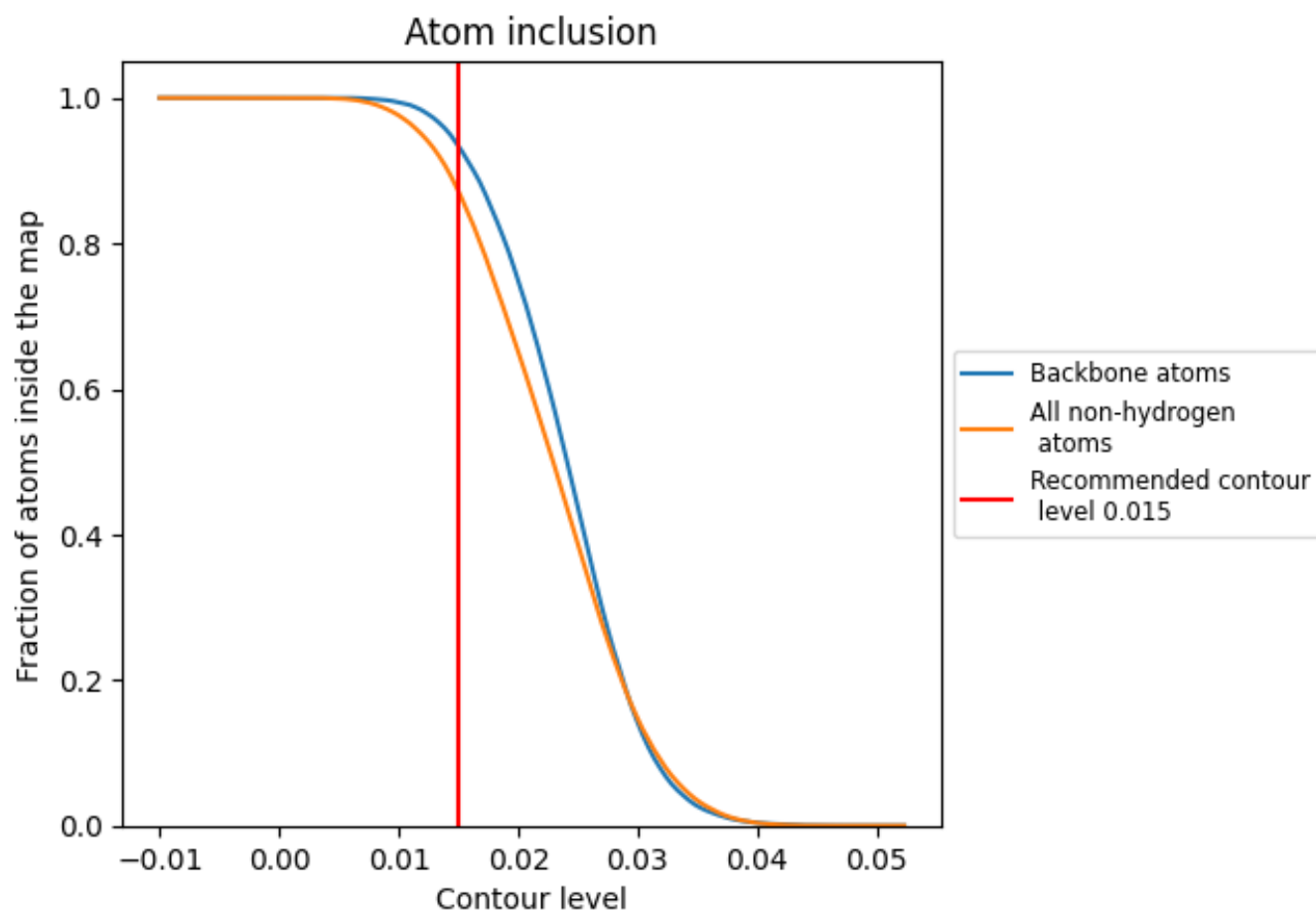
This section contains information regarding the fit between EMDB map EMD-13245 and PDB model 7P7U. Per-residue inclusion information can be found in section 3 on page 15.

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



The images above show the 3D surface view of the map at the recommended contour level 0.015 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 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 87% of all non-hydrogen atoms, are inside the map.