WORLDWIDE PDB
PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

May 12, 2022 – 01:17 pm BST

PDB ID	:	7QH7
EMDB ID	:	EMD-13967
Title	:	Cryo-EM structure of the human mtLSU assembly intermediate upon MRM2 depletion - class 4
Authors	:	Rebelo-Guiomar, P.; Pellegrino, S.; Dent, K.C.; Warren, A.J.; Minczuk, M.
Deposited on	:	2021-12-10
Resolution	:	2.89 Å(reported)
Based on initial model	:	5OOL

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

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

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.89 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
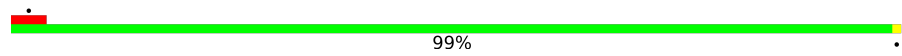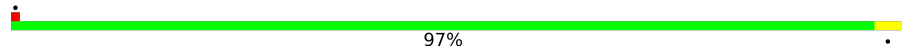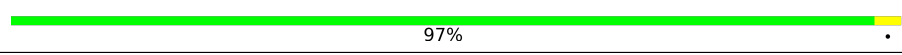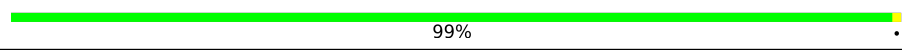
Metric	Percentile Ranks	Value
Ramachandran outliers		0.1%
Sidechain outliers		3.5%
RNA backbone		0.46

Worse   *Better*

▮ Percentile relative to all structures

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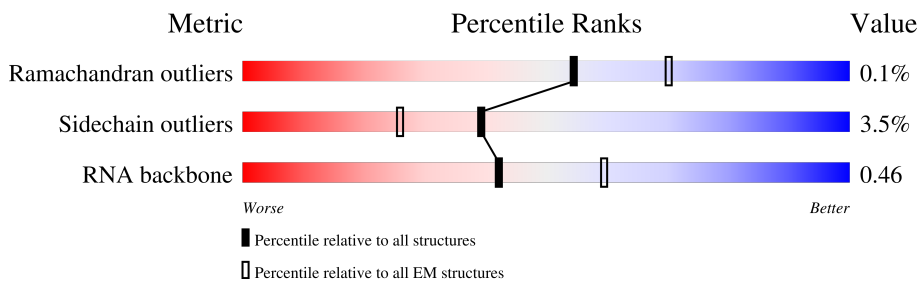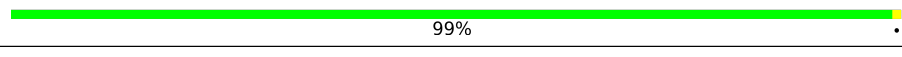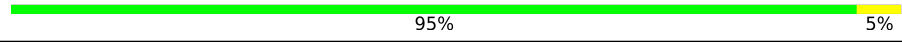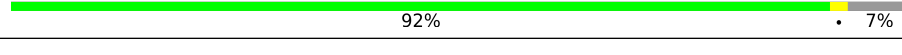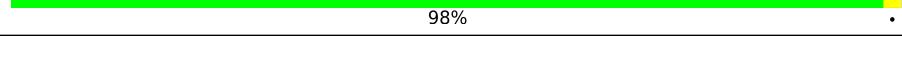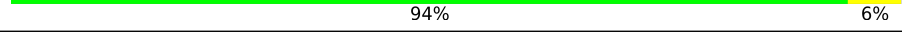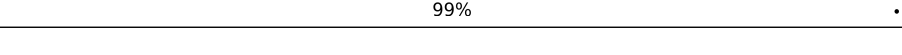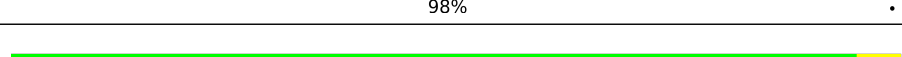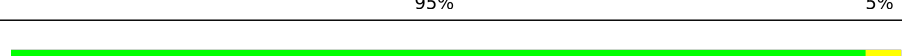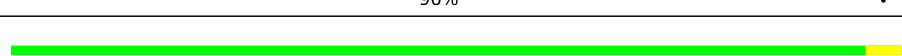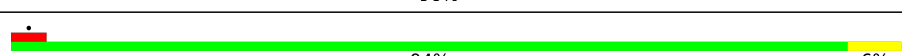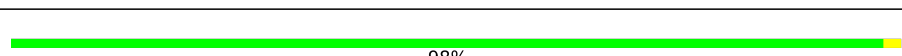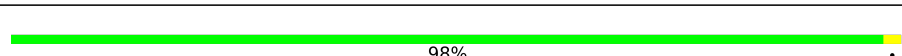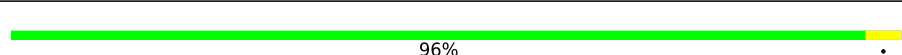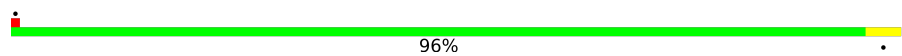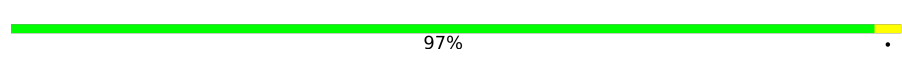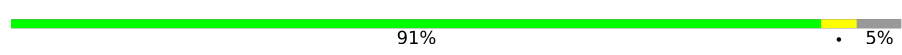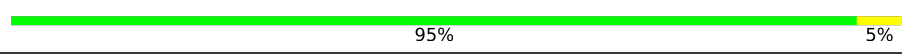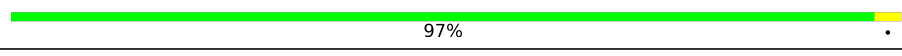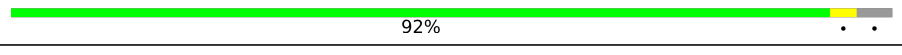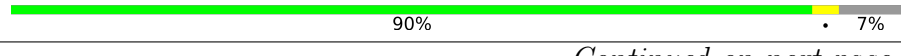
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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

Mol	Chain	Length	Quality of chain
1	D	215	94% 6%
2	E	304	97% •
3	F	250	97% •
4	H	95	96% •
5	I	30	97% •
6	K	177	95% 5%
7	L	115	97% ••
8	M	287	97% •
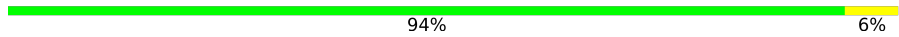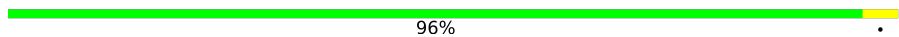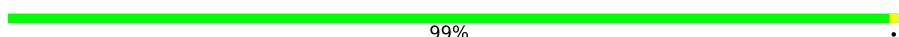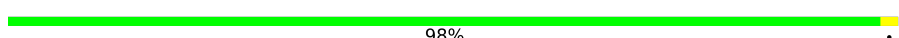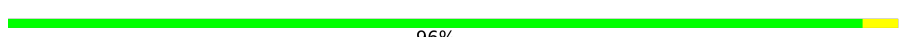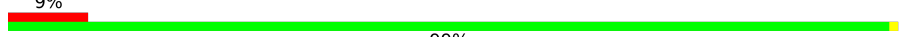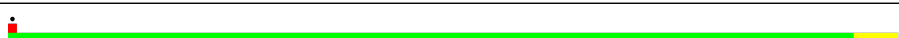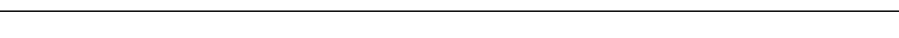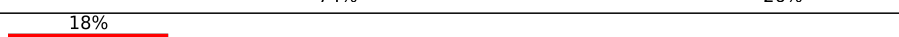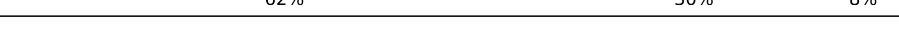
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Mol	Chain	Length	Quality of chain
9	N	201	99%
10	O	152	97%
11	P	141	97%
12	Q	217	99%
13	R	139	99%
14	S	156	95% · 5%
15	T	166	92% · 7%
16	U	125	98%
17	V	48	94% 6%
18	W	100	99%
19	X	243	98%
20	Y	175	95% 5%
21	Z	115	96%
22	0	108	96%
23	1	49	94% 6%
24	2	45	98%
25	3	95	98%
26	5	392	96%
27	6	292	96%
28	7	287	97%
29	9	123	91% · 5%
30	a	80	95% 5%
31	b	148	97%
32	c	287	92% · ·
33	d	169	90% · 7%

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Mol	Chain	Length	Quality of chain
34	f	17	94% · 6%
35	g	129	96% ·
36	h	105	90% · 7% ·
37	i	97	99% ·
38	j	86	98% ·
39	o	81	96% ·
40	p	125	9% · 99% ·
41	q	101	99% ·
42	r	140	89% · 8%
43	s	390	· 91% · 5%
44	u	111	· 95% 5%
45	v	69	9% · 99% ·
46	w	79	70% · 100%
47	A	1256	74% 26%
48	B	61	18% · 62% 30% 8%
49	4	37	95% 5%

2 Entry composition ⓘ

There are 52 unique types of molecules in this entry. The entry contains 85397 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 39S ribosomal protein L2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	D	215	Total 1671	C 1034	N 337	O 292	S 8	0	0

- Molecule 2 is a protein called 39S ribosomal protein L3, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	304	Total 2396	C 1539	N 416	O 430	S 11	0	0

- Molecule 3 is a protein called 39S ribosomal protein L4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	F	250	Total 2013	C 1294	N 365	O 348	S 6	0	0

- Molecule 4 is a protein called 39S ribosomal protein L9, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	H	95	Total 784	C 498	N 152	O 134	0	0

- Molecule 5 is a protein called 39S ribosomal protein L10, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	30	Total 247	C 160	N 47	O 37	S 3	0	0

- Molecule 6 is a protein called 39S ribosomal protein L13, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	K	177	Total 1451	C 934	N 259	O 251	S 7	0	0

- Molecule 7 is a protein called 39S ribosomal protein L14, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	L	115	Total 889	C 559	N 171	O 154	S 5	0	0

- Molecule 8 is a protein called 39S ribosomal protein L15, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	M	287	Total 2305	C 1472	N 425	O 402	S 6	0	0

- Molecule 9 is a protein called 39S ribosomal protein L16, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	N	201	Total 1621	C 1033	N 302	O 276	S 10	0	0

- Molecule 10 is a protein called 39S ribosomal protein L17, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	O	152	Total 1245	C 784	N 239	O 215	S 7	0	0

- Molecule 11 is a protein called 39S ribosomal protein L18, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	P	141	Total 1148	C 719	N 221	O 203	S 5	0	0

- Molecule 12 is a protein called 39S ribosomal protein L19, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	Q	217	Total 1805	C 1159	N 317	O 320	S 9	0	0

- Molecule 13 is a protein called 39S ribosomal protein L20, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	R	139	Total 1143	C 726	N 228	O 185	S 4	0	0

- Molecule 14 is a protein called 39S ribosomal protein L21, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	S	156	Total	C	N	O	S	0	0
			1251	806	222	219	4		

- Molecule 15 is a protein called 39S ribosomal protein L22, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	T	155	Total	C	N	O	S	0	0
			1274	815	232	220	7		

- Molecule 16 is a protein called 39S ribosomal protein L23, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	U	125	Total	C	N	O	S	0	0
			1030	660	197	171	2		

- Molecule 17 is a protein called 39S ribosomal protein L24, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	V	48	Total	C	N	O	S	0	0
			402	259	63	77	3		

- Molecule 18 is a protein called 39S ribosomal protein L27, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	W	100	Total	C	N	O	S	0	0
			801	518	150	130	3		

- Molecule 19 is a protein called 39S ribosomal protein L28, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	X	243	Total	C	N	O	S	0	0
			2035	1317	351	362	5		

- Molecule 20 is a protein called 39S ribosomal protein L47, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	Y	175	Total	C	N	O	S	0	0
			1506	961	290	251	4		

- Molecule 21 is a protein called 39S ribosomal protein L30, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Z	115	Total 937	C 598	N 175	O 161	S 3	0	0

- Molecule 22 is a protein called 39S ribosomal protein L32, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	0	108	Total 880	C 545	N 172	O 157	S 6	0	0

- Molecule 23 is a protein called 39S ribosomal protein L33, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	1	49	Total 408	C 263	N 77	O 66	S 2	0	0

- Molecule 24 is a protein called 39S ribosomal protein L34, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	2	45	Total 367	C 227	N 81	O 58	S 1	0	0

- Molecule 25 is a protein called 39S ribosomal protein L35, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	3	95	Total 831	C 539	N 162	O 127	S 3	0	0

- Molecule 26 is a protein called 39S ribosomal protein L37, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	5	392	Total 3199	C 2067	N 558	O 563	S 11	0	0

- Molecule 27 is a protein called 39S ribosomal protein L38, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	6	292	Total 2460	C 1586	N 432	O 434	S 8	0	0

- Molecule 28 is a protein called 39S ribosomal protein L39, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	7	287	Total 2334	C 1495	N 397	O 425	S 17	0	0

- Molecule 29 is a protein called 39S ribosomal protein L41, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	9	117	Total 947	C 614	N 163	O 168	S 2	0	0

- Molecule 30 is a protein called 39S ribosomal protein L42, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	a	80	Total 672	C 425	N 124	O 118	S 5	0	0

- Molecule 31 is a protein called 39S ribosomal protein L43, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	b	148	Total 1178	C 733	N 229	O 213	S 3	0	0

- Molecule 32 is a protein called 39S ribosomal protein L44, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	c	275	Total 2214	C 1413	N 382	O 410	S 9	0	0

- Molecule 33 is a protein called 39S ribosomal protein L45, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	d	157	Total 1308	C 843	N 228	O 229	S 8	0	0

- Molecule 34 is a protein called 39S ribosomal protein L48, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	f	17	Total 142	C 95	N 26	O 21	0	0

- Molecule 35 is a protein called 39S ribosomal protein L49, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	g	129	Total	C	N	O	S	0	0
			1067	690	185	190	2		

- Molecule 36 is a protein called 39S ribosomal protein L50, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	h	101	Total	C	N	O	S	0	0
			829	525	147	155	2		

- Molecule 37 is a protein called 39S ribosomal protein L51, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	i	97	Total	C	N	O	S	0	0
			827	532	165	126	4		

- Molecule 38 is a protein called 39S ribosomal protein L52, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	j	86	Total	C	N	O	S	0	0
			689	426	134	127	2		

- Molecule 39 is a protein called Ribosomal protein 63, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	o	81	Total	C	N	O	S	0	0
			687	432	138	114	3		

- Molecule 40 is a protein called Peptidyl-tRNA hydrolase ICT1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	p	125	Total	C	N	O	S	0	0
			1045	653	199	189	4		

- Molecule 41 is a protein called Growth arrest and DNA damage-inducible proteins-interacting protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	q	101	Total	C	N	O	S	0	0
			841	527	162	149	3		

- Molecule 42 is a protein called 39S ribosomal protein S18a, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	r	129	Total 1068	C 679	N 209	O 172	S 8	0	0

- Molecule 43 is a protein called 39S ribosomal protein S30, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	s	370	Total 3036	C 1946	N 542	O 534	S 14	0	0

- Molecule 44 is a protein called Mitochondrial assembly of ribosomal large subunit protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	u	111	Total 927	C 595	N 155	O 167	S 10	0	0

- Molecule 45 is a protein called MIEF1 upstream open reading frame protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
45	v	69	Total 588	C 372	N 116	O 100	0	0

- Molecule 46 is a protein called Acyl carrier protein, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	w	79	Total 638	C 410	N 95	O 128	S 5	0	0

- Molecule 47 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	A	1256	Total 26670	C 11966	N 4809	O 8639	P 1256	0	0

- Molecule 48 is a RNA chain called mitochondrial tRNAVal.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	B	56	Total 1191	C 534	N 214	O 387	P 56	0	0

- Molecule 49 is a protein called 39S ribosomal protein L36, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	4	37	Total 333	C 212	N 71	O 47	S 3	0	0

- Molecule 50 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
50	E	1	Total 1	Mg 1	0
50	A	49	Total 49	Mg 49	0

- Molecule 51 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
51	0	1	Total 1	Zn 1	0
51	r	1	Total 1	Zn 1	0
51	4	1	Total 1	Zn 1	0

- Molecule 52 is water.

Mol	Chain	Residues	Atoms		AltConf
52	O	1	Total 1	O 1	0
52	T	1	Total 1	O 1	0
52	b	1	Total 1	O 1	0
52	i	1	Total 1	O 1	0
52	A	10	Total 10	O 10	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.
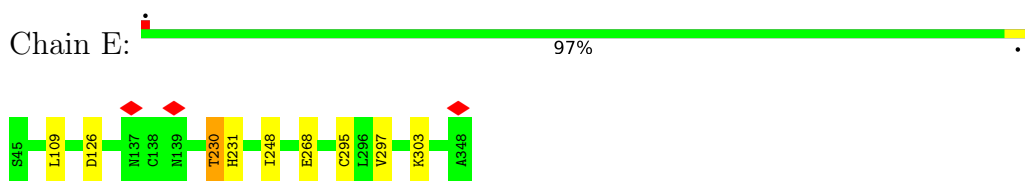
- Molecule 1: 39S ribosomal protein L2, mitochondrial

Chain D:
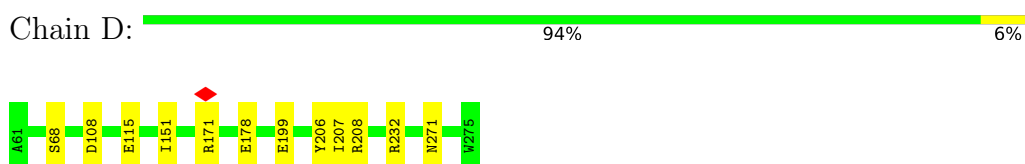
- Molecule 2: 39S ribosomal protein L3, mitochondrial

Chain E:

- Molecule 3: 39S ribosomal protein L4, mitochondrial
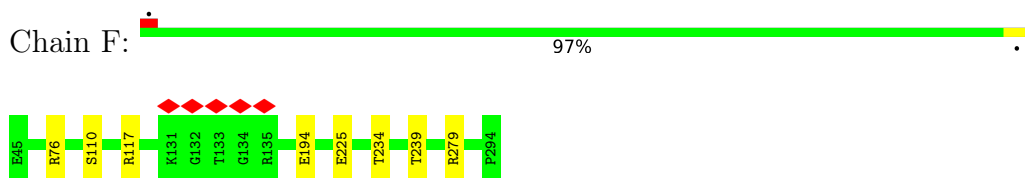
Chain F:

- Molecule 4: 39S ribosomal protein L9, mitochondrial
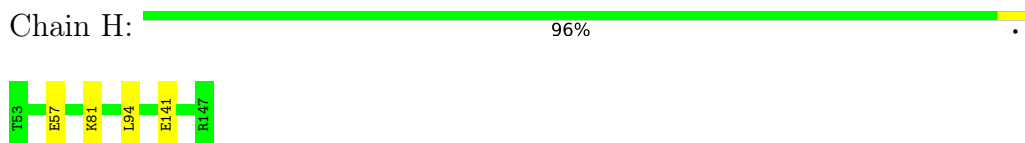
Chain H:

- Molecule 5: 39S ribosomal protein L10, mitochondrial
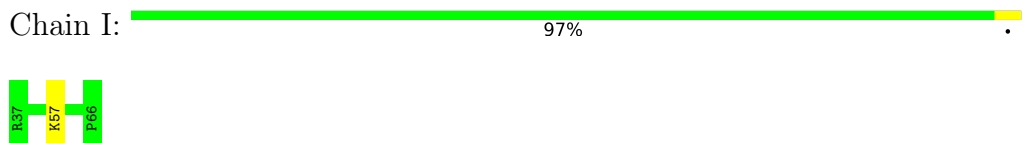
Chain I:

- Molecule 6: 39S ribosomal protein L13, mitochondrial

Chain K:

95%   5%

S2 S51 F67 Q94 L112 N115 E143 E144 E162 L178

• Molecule 7: 39S ribosomal protein L14, mitochondrial

Chain L:

97%

A31 N43 S44 Q72 R130 E133 V145

• Molecule 8: 39S ribosomal protein L15, mitochondrial

Chain M:

97%

A10 R44 R134 D146 E161 T175 V187 C188 V274 D279 S296

• Molecule 9: 39S ribosomal protein L16, mitochondrial

Chain N:

99%

R51 F52 L58 V59 P60 K61 V62 E84 K116 E203 H237 V251

• Molecule 10: 39S ribosomal protein L17, mitochondrial

Chain O:

97%

I9 S10 I42 D61 Q154 Q160

• Molecule 11: 39S ribosomal protein L18, mitochondrial

Chain P:

97%

V39 F72 Q134 N142 Q147 Y179

• Molecule 12: 39S ribosomal protein L19, mitochondrial

Chain Q:

99%

R74 F75 Y189 P226 K290

• Molecule 13: 39S ribosomal protein L20, mitochondrial

Chain R:

99%

L10 T66 Y148

• Molecule 14: 39S ribosomal protein L21, mitochondrial

Chain S:

95%   5%

G49 E71 E78 R104 D112 C124 L134 K151 N196 L204

• Molecule 15: 39S ribosomal protein L22, mitochondrial

Chain T:

92%   7%

I47 R149 G150 Q151 C152 R155 ILE ARG TYR HIS GLY ARG GLY ARG PHE GLY ILE M167 L212

• Molecule 16: 39S ribosomal protein L23, mitochondrial

Chain U:

98%

A2 E47 L153

• Molecule 17: 39S ribosomal protein L24, mitochondrial

Chain V:

94%   6%

T169 L194 M199 K211 Y216

• Molecule 18: 39S ribosomal protein L27, mitochondrial

Chain W:

99%

R49 M147 L148

• Molecule 19: 39S ribosomal protein L28, mitochondrial

Chain X:

98%

P2 C154 D189 E220 K221 S244

• Molecule 20: 39S ribosomal protein L47, mitochondrial

Chain Y:

95%   5%

G63 L64 L101 E116 R121 L142 D143 L153 R198 K237

• Molecule 21: 39S ribosomal protein L30, mitochondrial

Chain Z:

96%   .

K35 Y80 A94 V99 S105 E132 W149

• Molecule 22: 39S ribosomal protein L32, mitochondrial

Chain 0:

96%   .

A79 T86 C131 T153 F185 T186

• Molecule 23: 39S ribosomal protein L33, mitochondrial

Chain 1:

94%   6%

K14 F28 N31 T32 L37 R38 E39 I62
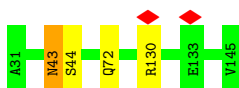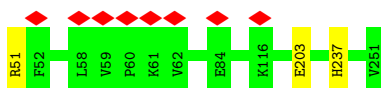
• Molecule 24: 39S ribosomal protein L34, mitochondrial

Chain 2:

98%   .

A48 H92

• Molecule 25: 39S ribosomal protein L35, mitochondrial

Chain 3:

98%   .

L94 T106 H181 V188

• Molecule 26: 39S ribosomal protein L37, mitochondrial

Chain 5:

96%   .

Y31 R39 E56 D84 H108 E134 R144 E148 H160 Y176 N183 L315 R350 T361 L415 A422

• Molecule 27: 39S ribosomal protein L38, mitochondrial

Chain 6:

- Molecule 28: 39S ribosomal protein L39, mitochondrial

Chain 7:
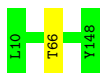

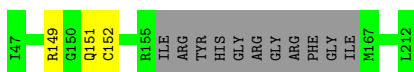- Molecule 29: 39S ribosomal protein L41, mitochondrial

Chain 9:
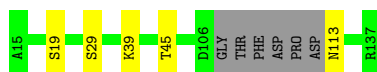
- Molecule 30: 39S ribosomal protein L42, mitochondrial

Chain a:

- Molecule 31: 39S ribosomal protein L43, mitochondrial

Chain b:
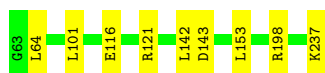

- Molecule 32: 39S ribosomal protein L44, mitochondrial

Chain c:
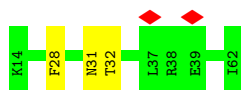

- Molecule 33: 39S ribosomal protein L45, mitochondrial

Chain d:
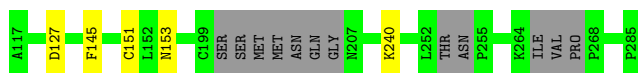
- Molecule 34: 39S ribosomal protein L48, mitochondrial

Chain f:

94%   6%

Y48 K60 K64

• Molecule 35: 39S ribosomal protein L49, mitochondrial

Chain g:

96%

F38 E44 H63 T68 R90 Y152 F166

• Molecule 36: 39S ribosomal protein L50, mitochondrial

Chain h:

90%   7%

P53 P54 L55 R58 V77 F78 GLY SER SER LEU P83 H103 K139 E142 L143 S157
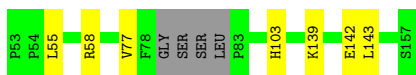
• Molecule 37: 39S ribosomal protein L51, mitochondrial

Chain i:

99%

I32 R75 R128

• Molecule 38: 39S ribosomal protein L52, mitochondrial

Chain j:

98%

A23 V78 L93 A108

• Molecule 39: Ribosomal protein 63, mitochondrial

Chain o:

96%

R22 L29 L49 F82 S102
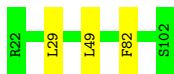
• Molecule 40: Peptidyl-tRNA hydrolase ICT1, mitochondrial

9%

Chain p:

99%

E38 L73 N96 E109 K174 L175 H176 R179 R189 Q190 K191 R192 I193

• Molecule 41: Growth arrest and DNA damage-inducible proteins-interacting protein 1

Chain q:　99%

Y25 R49 M125

• Molecule 42: 39S ribosomal protein S18a, mitochondrial

Chain r:　89%　8%

P57 C70 C73 E110 R134 LEU PRO GLU GLY VAL PRO LYS SER LYS PRO Q146 R173 H196
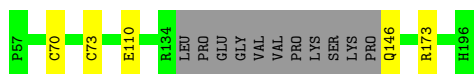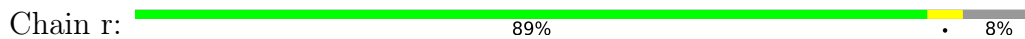
• Molecule 43: 39S ribosomal protein S30, mitochondrial

Chain s:　91%　5%

V41 P119 PRO PRO PRO ALA GLU PRO GLU PRO GLU PRO GLU PRO GLU PRO ALA LEU ASP LEU A140 C147 Q152 Y156 E170 L174 L180 R203 H221 E249 L271 H296 R313 S331 Y342 T404 N427 K430
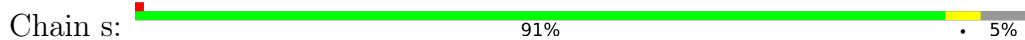
• Molecule 44: Mitochondrial assembly of ribosomal large subunit protein 1

Chain u:　95%　5%

K91 L100 R119 R133 F140 Y141 H148 R185 D201

• Molecule 45: MIEF1 upstream open reading frame protein

9%

Chain v:　99%

A2 R18 Q22 L23 R24 D47 K57 K65 I70
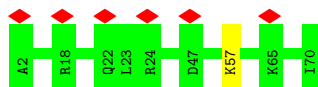
• Molecule 46: Acyl carrier protein, mitochondrial

70%

Chain w:　100%

L74 T75 L76 E77 G78 I79 Q80 D81 R82 V83 L84 Y85 V86 L89 Y90 D91 K92 I93 D94 P95 E96 K97 L98 S99 V100 N101 M105 K106 D107 L108 G109 L110 A121 D124 E125 F126 G127 F128 E129 I130 P131 D132 I133 D134 A135 E136 K137 L138 E143 I144 V145 D146 Y147 I148 A149

D150 K151 K152
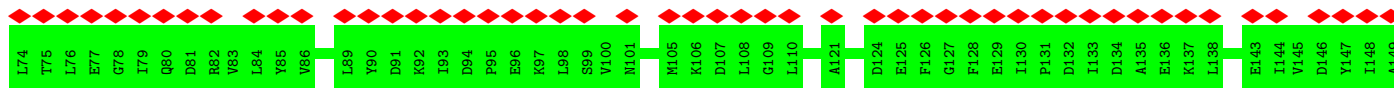
• Molecule 47: 16S ribosomal RNA

Chain A:　74%　26%
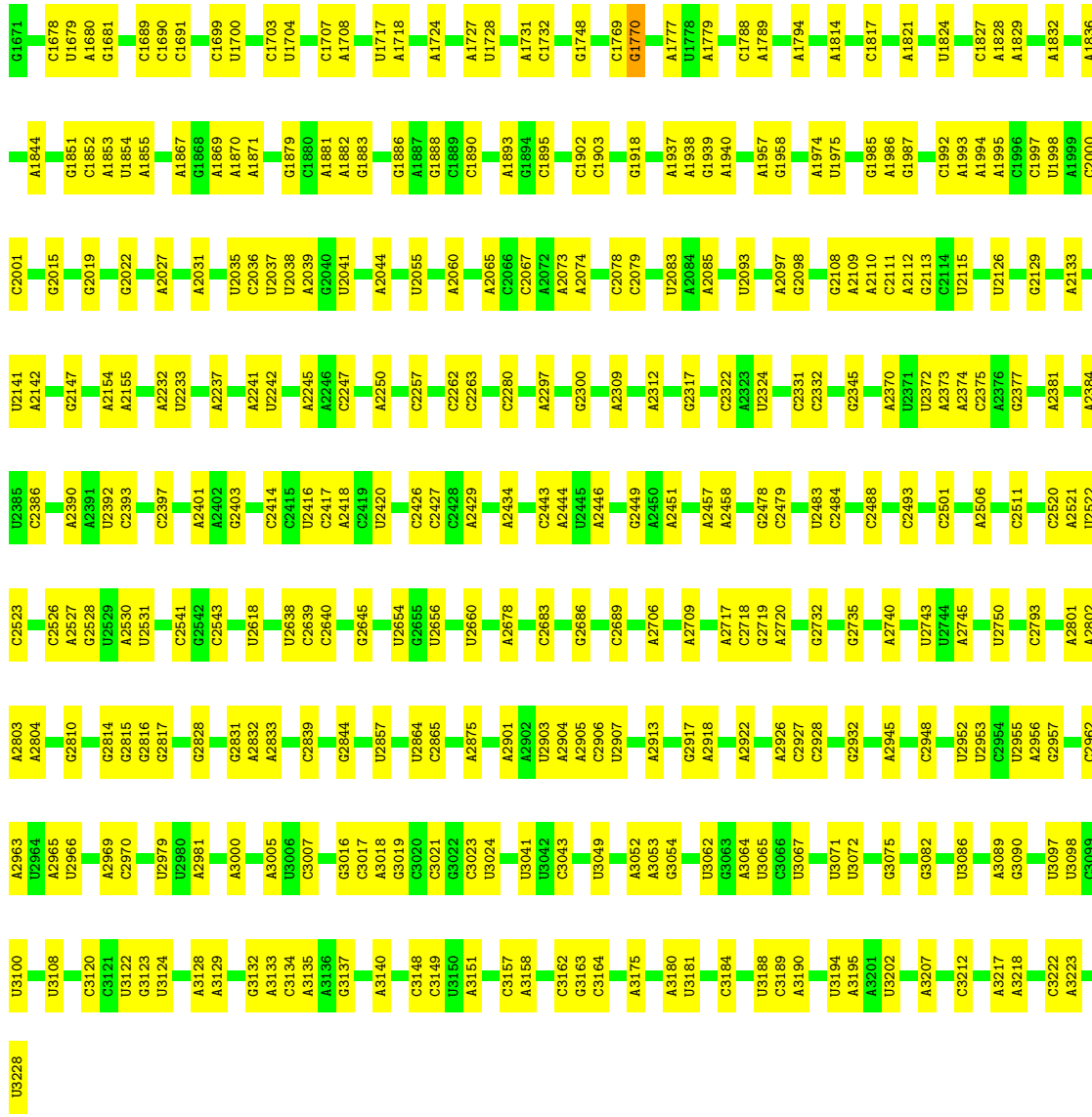
• Molecule 48: mitochondrial tRNAVal

Chain B:
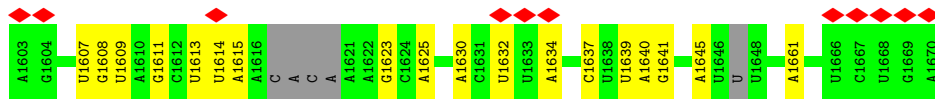
• Molecule 49: 39S ribosomal protein L36, mitochondrial

Chain 4:
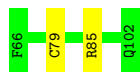
4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	224933	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	52.5	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.066	Depositor
Minimum map value	-0.017	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	381.59998, 381.59998, 381.59998	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, MG

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	D	0.37	0/1701	0.51	0/2288
2	E	0.44	0/2465	0.50	0/3344
3	F	0.49	0/2071	0.51	0/2817
4	H	0.38	0/798	0.51	0/1073
5	I	0.32	0/255	0.44	0/345
6	K	0.48	0/1495	0.46	0/2029
7	L	0.36	0/904	0.49	0/1218
8	M	0.46	0/2359	0.54	0/3185
9	N	0.29	0/1663	0.45	0/2236
10	O	0.46	0/1269	0.50	0/1708
11	P	0.30	0/1173	0.47	0/1588
12	Q	0.40	0/1846	0.47	0/2487
13	R	0.50	0/1163	0.49	0/1557
14	S	0.44	0/1276	0.52	0/1729
15	T	0.49	0/1304	0.48	0/1755
16	U	0.49	0/1058	0.51	0/1434
17	V	0.40	0/411	0.45	0/555
18	W	0.39	0/823	0.49	0/1113
19	X	0.40	0/2090	0.46	0/2825
20	Y	0.43	0/1540	0.47	0/2063
21	Z	0.37	0/960	0.49	0/1295
22	0	0.39	0/895	0.47	0/1201
23	1	0.25	0/413	0.46	0/550
24	2	0.57	0/373	0.55	0/496
25	3	0.53	0/852	0.49	0/1136
26	5	0.34	0/3294	0.48	0/4488
27	6	0.34	0/2546	0.46	0/3465
28	7	0.35	0/2391	0.48	0/3234
29	9	0.42	0/972	0.48	0/1306
30	a	0.44	0/694	0.51	0/941
31	b	0.45	0/1202	0.51	0/1626
32	c	0.39	0/2261	0.45	0/3055

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	d	0.28	0/1344	0.47	0/1817
34	f	0.35	0/146	0.43	0/193
35	g	0.48	0/1102	0.51	0/1503
36	h	0.32	0/850	0.46	0/1154
37	i	0.54	0/849	0.49	0/1135
38	j	0.39	0/703	0.44	0/947
39	o	0.39	0/704	0.49	0/945
40	p	0.29	0/1058	0.47	0/1415
41	q	0.35	0/867	0.43	0/1176
42	r	0.41	0/1103	0.47	0/1493
43	s	0.44	0/3114	0.51	0/4225
44	u	0.30	0/949	0.46	0/1281
45	v	0.26	0/597	0.44	0/796
46	w	0.25	0/647	0.41	0/871
47	A	0.85	0/29818	0.86	11/46362 (0.0%)
48	B	0.19	0/1328	0.72	0/2056
49	4	0.39	0/341	0.51	0/451
All	All	0.59	0/90037	0.65	11/127962 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1
2	E	0	1
7	L	0	1
15	T	0	1
21	Z	0	1
All	All	0	5

There are no bond length outliers.

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
47	A	3149	C	C6-N1-C2	-7.98	117.11	120.30
47	A	3148	C	N1-C2-O2	6.80	122.98	118.90
47	A	3163	G	N1-C2-N2	-5.81	110.97	116.20
47	A	2403	G	N3-C4-N9	5.74	129.44	126.00
47	A	3023	C	N3-C2-O2	-5.63	117.96	121.90

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	206	TYR	Peptide
2	E	230	THR	Peptide
7	L	43	ASN	Peptide
15	T	151	GLN	Peptide
21	Z	94	ALA	Peptide

5.2 Too-close contacts ⓘ

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

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	213/215 (99%)	191 (90%)	21 (10%)	1 (0%)	29	61
2	E	302/304 (99%)	273 (90%)	27 (9%)	2 (1%)	22	54
3	F	248/250 (99%)	228 (92%)	20 (8%)	0	100	100
4	H	93/95 (98%)	83 (89%)	10 (11%)	0	100	100
5	I	28/30 (93%)	27 (96%)	1 (4%)	0	100	100
6	K	175/177 (99%)	162 (93%)	13 (7%)	0	100	100
7	L	113/115 (98%)	95 (84%)	17 (15%)	1 (1%)	17	48
8	M	285/287 (99%)	269 (94%)	16 (6%)	0	100	100
9	N	199/201 (99%)	187 (94%)	12 (6%)	0	100	100
10	O	150/152 (99%)	142 (95%)	8 (5%)	0	100	100
11	P	139/141 (99%)	129 (93%)	10 (7%)	0	100	100
12	Q	215/217 (99%)	192 (89%)	22 (10%)	1 (0%)	29	61
13	R	137/139 (99%)	133 (97%)	4 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
14	S	154/156 (99%)	141 (92%)	13 (8%)	0	100	100
15	T	151/166 (91%)	140 (93%)	11 (7%)	0	100	100
16	U	121/125 (97%)	115 (95%)	6 (5%)	0	100	100
17	V	46/48 (96%)	44 (96%)	2 (4%)	0	100	100
18	W	98/100 (98%)	95 (97%)	3 (3%)	0	100	100
19	X	241/243 (99%)	230 (95%)	11 (5%)	0	100	100
20	Y	173/175 (99%)	164 (95%)	9 (5%)	0	100	100
21	Z	113/115 (98%)	101 (89%)	12 (11%)	0	100	100
22	0	106/108 (98%)	102 (96%)	4 (4%)	0	100	100
23	1	47/49 (96%)	45 (96%)	2 (4%)	0	100	100
24	2	43/45 (96%)	39 (91%)	4 (9%)	0	100	100
25	3	93/95 (98%)	87 (94%)	6 (6%)	0	100	100
26	5	390/392 (100%)	363 (93%)	27 (7%)	0	100	100
27	6	284/292 (97%)	253 (89%)	30 (11%)	1 (0%)	34	66
28	7	285/287 (99%)	262 (92%)	23 (8%)	0	100	100
29	9	113/123 (92%)	106 (94%)	7 (6%)	0	100	100
30	a	76/80 (95%)	64 (84%)	12 (16%)	0	100	100
31	b	146/148 (99%)	131 (90%)	15 (10%)	0	100	100
32	c	271/287 (94%)	255 (94%)	16 (6%)	0	100	100
33	d	149/169 (88%)	133 (89%)	16 (11%)	0	100	100
34	f	15/17 (88%)	13 (87%)	2 (13%)	0	100	100
35	g	127/129 (98%)	115 (91%)	12 (9%)	0	100	100
36	h	97/105 (92%)	89 (92%)	8 (8%)	0	100	100
37	i	95/97 (98%)	92 (97%)	3 (3%)	0	100	100
38	j	84/86 (98%)	81 (96%)	3 (4%)	0	100	100
39	o	79/81 (98%)	76 (96%)	3 (4%)	0	100	100
40	p	117/125 (94%)	110 (94%)	7 (6%)	0	100	100
41	q	99/101 (98%)	95 (96%)	4 (4%)	0	100	100
42	r	125/140 (89%)	111 (89%)	14 (11%)	0	100	100
43	s	366/390 (94%)	331 (90%)	35 (10%)	0	100	100
44	u	109/111 (98%)	100 (92%)	9 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
45	v	67/69 (97%)	60 (90%)	7 (10%)	0	100	100
46	w	77/79 (98%)	71 (92%)	6 (8%)	0	100	100
49	4	35/37 (95%)	33 (94%)	2 (6%)	0	100	100
All	All	6889/7093 (97%)	6358 (92%)	525 (8%)	6 (0%)	54	82

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	230	THR
12	Q	226	PRO
27	6	325	ASP
2	E	231	HIS
7	L	130	ARG

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	173/173 (100%)	163 (94%)	10 (6%)	20	50
2	E	259/259 (100%)	252 (97%)	7 (3%)	44	77
3	F	217/217 (100%)	209 (96%)	8 (4%)	34	68
4	H	86/86 (100%)	82 (95%)	4 (5%)	26	59
5	I	28/28 (100%)	27 (96%)	1 (4%)	35	69
6	K	155/155 (100%)	147 (95%)	8 (5%)	23	55
7	L	98/98 (100%)	95 (97%)	3 (3%)	40	74
8	M	245/245 (100%)	236 (96%)	9 (4%)	34	68
9	N	168/168 (100%)	165 (98%)	3 (2%)	59	85
10	O	133/133 (100%)	129 (97%)	4 (3%)	41	75
11	P	123/123 (100%)	119 (97%)	4 (3%)	38	72
12	Q	199/199 (100%)	197 (99%)	2 (1%)	76	92
13	R	117/117 (100%)	116 (99%)	1 (1%)	78	93

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
14	S	141/141 (100%)	133 (94%)	8 (6%)	20	51
15	T	138/146 (94%)	136 (99%)	2 (1%)	67	89
16	U	110/110 (100%)	108 (98%)	2 (2%)	59	85
17	V	44/44 (100%)	41 (93%)	3 (7%)	16	42
18	W	83/83 (100%)	82 (99%)	1 (1%)	71	91
19	X	219/219 (100%)	215 (98%)	4 (2%)	59	85
20	Y	158/158 (100%)	149 (94%)	9 (6%)	20	51
21	Z	106/106 (100%)	102 (96%)	4 (4%)	33	67
22	0	97/97 (100%)	93 (96%)	4 (4%)	30	64
23	1	46/46 (100%)	43 (94%)	3 (6%)	17	45
24	2	39/39 (100%)	38 (97%)	1 (3%)	46	77
25	3	88/88 (100%)	86 (98%)	2 (2%)	50	80
26	5	353/353 (100%)	339 (96%)	14 (4%)	31	65
27	6	259/259 (100%)	249 (96%)	10 (4%)	32	66
28	7	263/263 (100%)	255 (97%)	8 (3%)	41	75
29	9	99/104 (95%)	94 (95%)	5 (5%)	24	56
30	a	76/76 (100%)	72 (95%)	4 (5%)	22	54
31	b	130/130 (100%)	126 (97%)	4 (3%)	40	74
32	c	241/251 (96%)	231 (96%)	10 (4%)	30	64
33	d	146/157 (93%)	141 (97%)	5 (3%)	37	71
34	f	15/15 (100%)	14 (93%)	1 (7%)	16	43
35	g	119/119 (100%)	114 (96%)	5 (4%)	30	63
36	h	96/99 (97%)	89 (93%)	7 (7%)	14	38
37	i	86/86 (100%)	85 (99%)	1 (1%)	71	91
38	j	68/68 (100%)	66 (97%)	2 (3%)	42	76
39	o	70/70 (100%)	67 (96%)	3 (4%)	29	62
40	p	115/115 (100%)	114 (99%)	1 (1%)	78	93
41	q	86/86 (100%)	85 (99%)	1 (1%)	71	91
42	r	118/128 (92%)	113 (96%)	5 (4%)	30	63
43	s	326/344 (95%)	312 (96%)	14 (4%)	29	62
44	u	105/105 (100%)	99 (94%)	6 (6%)	20	51

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
45	v	59/59 (100%)	58 (98%)	1 (2%)	60	86
46	w	73/73 (100%)	73 (100%)	0	100	100
49	4	36/36 (100%)	34 (94%)	2 (6%)	21	52
All	All	6209/6274 (99%)	5993 (96%)	216 (4%)	39	70

5 of 216 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
26	5	176	TYR
29	9	113	ASN
43	s	221	HIS
26	5	361	THR
27	6	374	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
2	E	128	HIS
13	R	36	ASN
32	c	69	HIS
42	r	79	HIS
43	s	382	GLN

5.3.3   RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
47	A	1230/1256 (97%)	323 (26%)	10 (0%)
48	B	51/61 (83%)	17 (33%)	1 (1%)
All	All	1281/1317 (97%)	340 (26%)	11 (0%)

5 of 340 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
47	A	1678	C
47	A	1679	U
47	A	1680	A
47	A	1681	G
47	A	1689	C

5 of 11 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
47	A	2638	U
47	A	2718	C
48	B	1614	U
47	A	2905	A
47	A	2417	C

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

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

5.5   Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6   Ligand geometry ⓘ

Of 53 ligands modelled in this entry, 53 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7   Other polymers ⓘ

There are no such residues in this entry.

5.8   Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
47	A	25
27	6	3

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Mol	Chain	Number of breaks
40	p	3
48	B	2
16	U	1
30	a	1

The worst 5 of 35 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	2545:U	O3'	2611:C	P	40.96
1	6	79:GLY	C	131:PRO	N	39.19
1	U	112:PRO	C	140:SER	N	37.93
1	A	2880:A	O3'	2896:G	P	32.37
1	A	2982:C	O3'	2994:U	P	30.68

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-13967. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections ⓘ

6.1.1 Primary map

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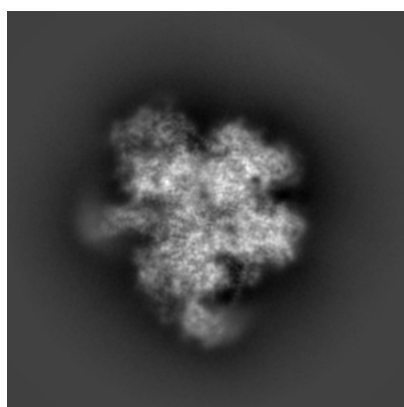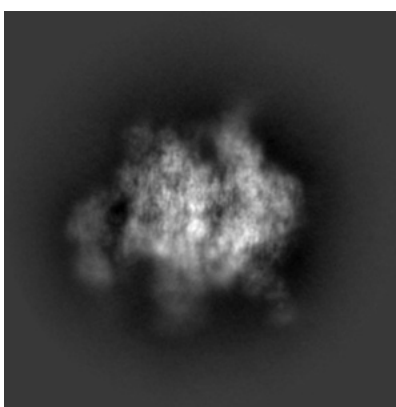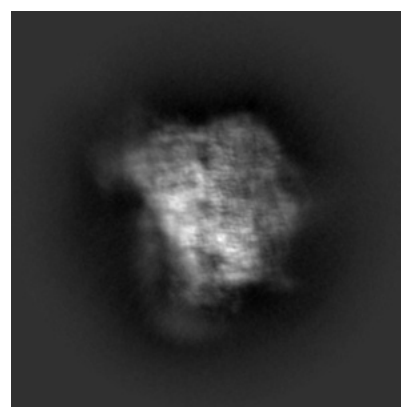
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
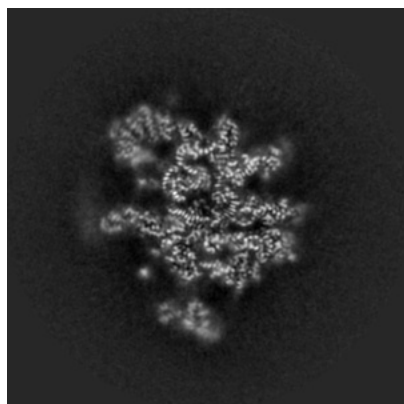
6.2.1 Primary map
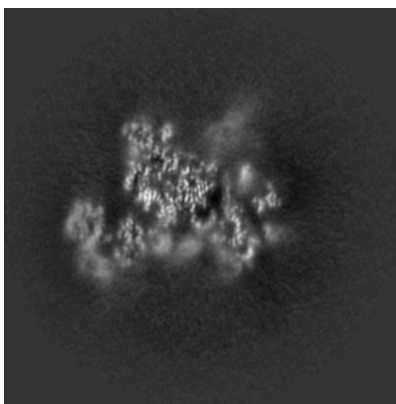
X Index: 180   Y Index: 180   Z Index: 180
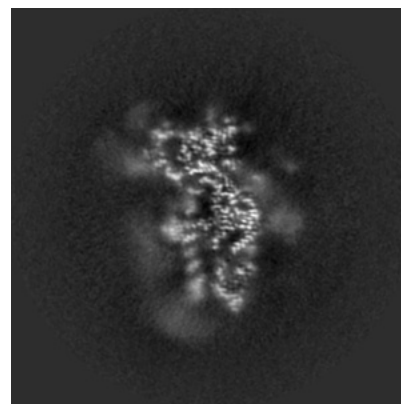
The images above show central slices of the map in three orthogonal directions.

6.3   Largest variance slices ⓘ
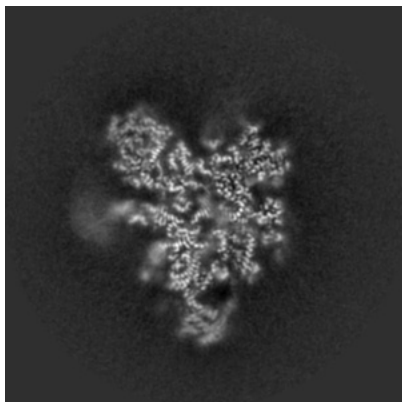
6.3.1   Primary map
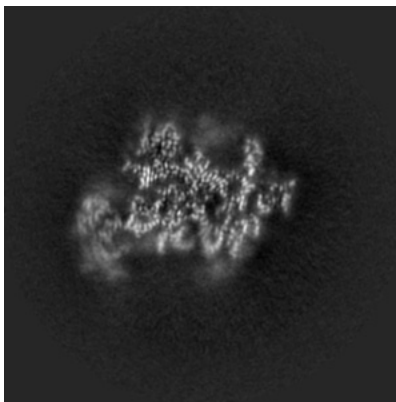
| X Index: 164 | Y Index: 164 | Z Index: 221 |
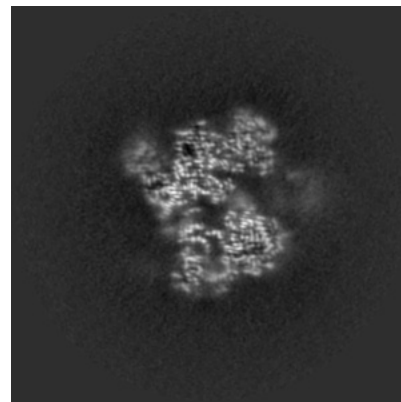
The images above show the largest variance slices of the map in three orthogonal directions.
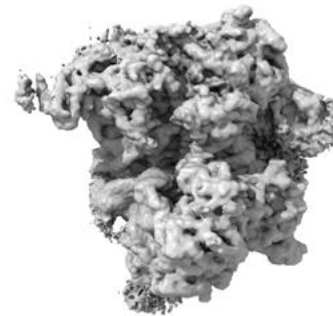
6.4   Orthogonal surface views ⓘ

6.4.1   Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.01. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5   Mask visualisation (i)

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

7 Map analysis ⓘ

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

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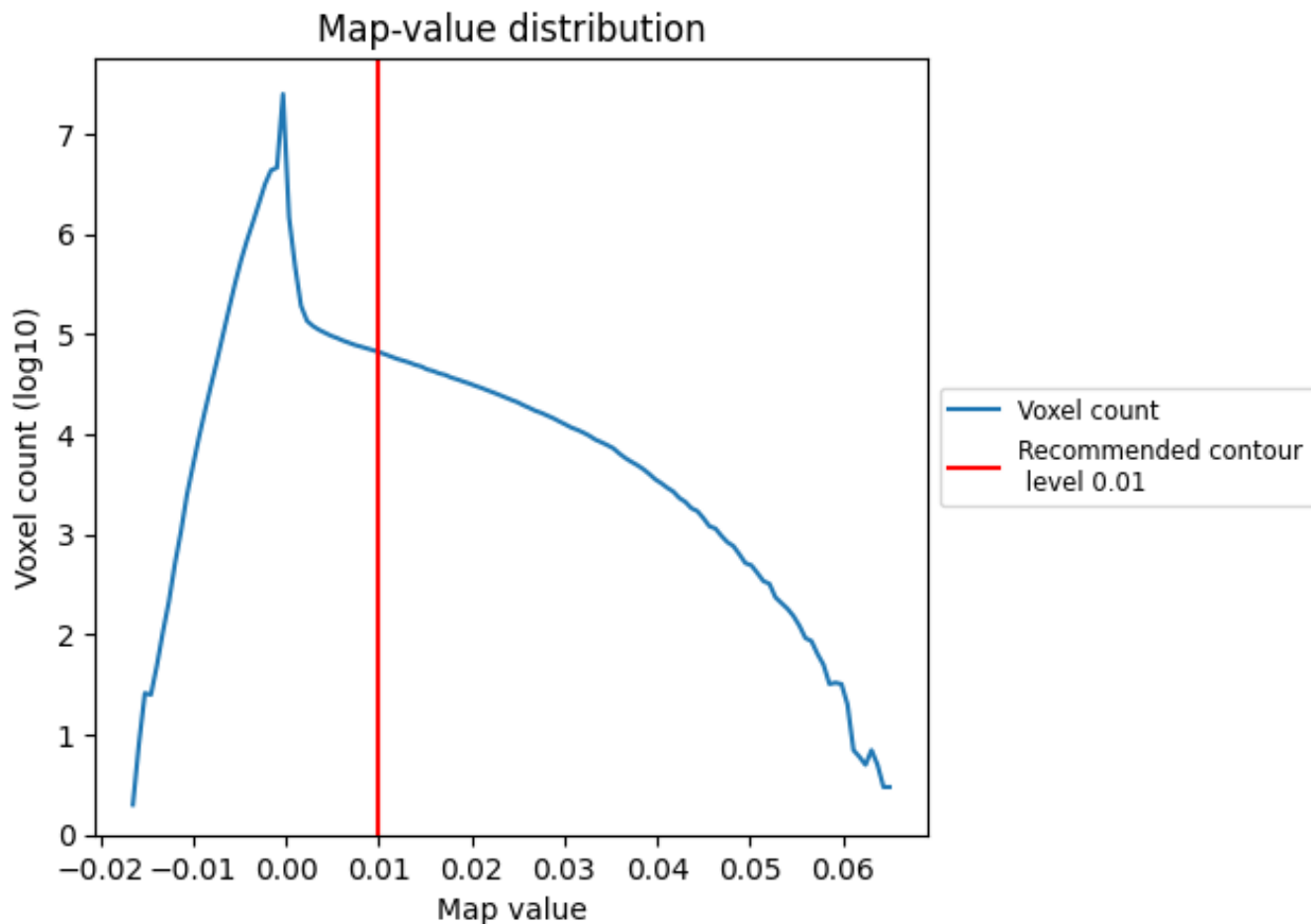
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2   Volume estimate ⓘ
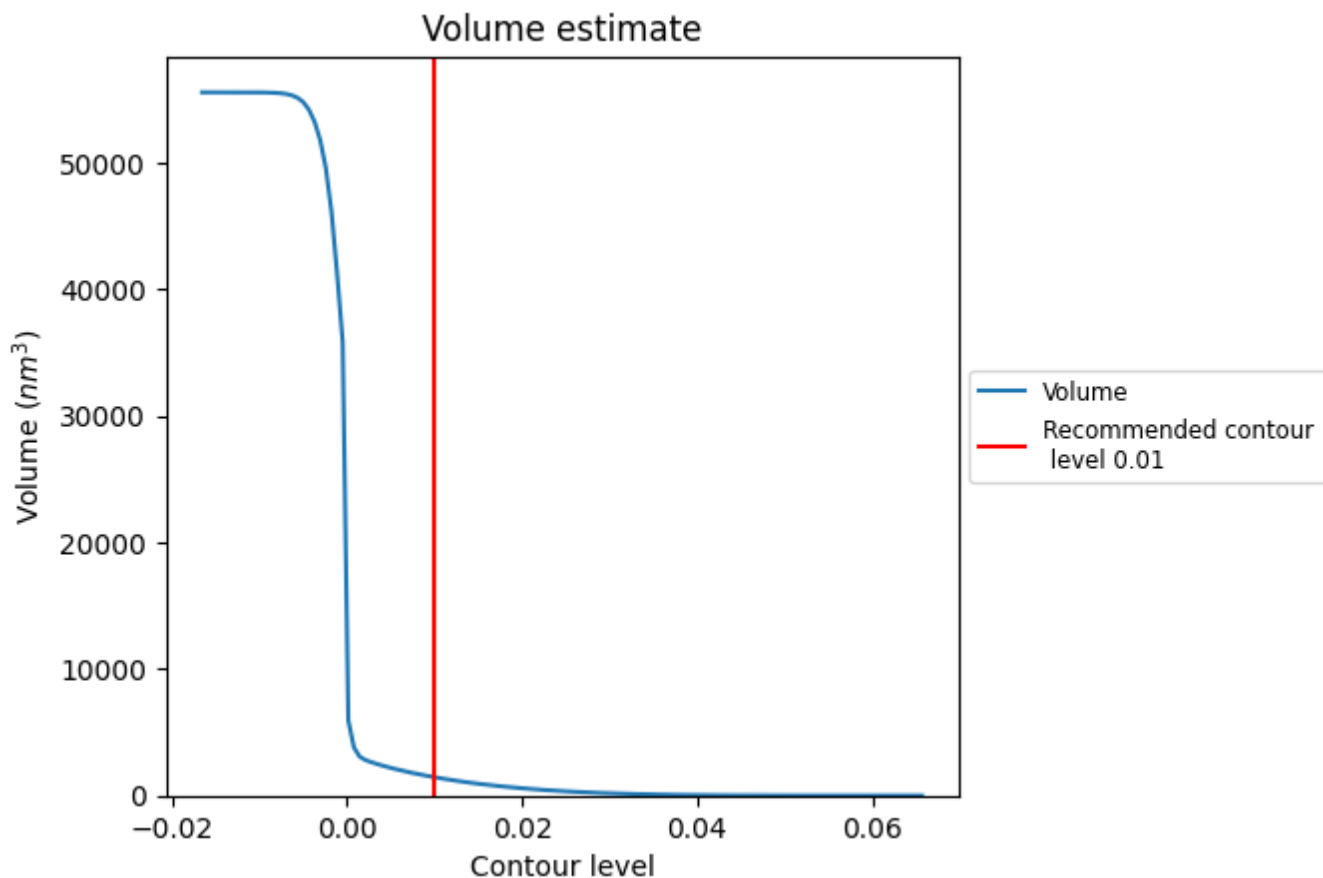
The volume at the recommended contour level is 1452 nm^3; this corresponds to an approximate mass of 1312 kDa.

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 ⓘ
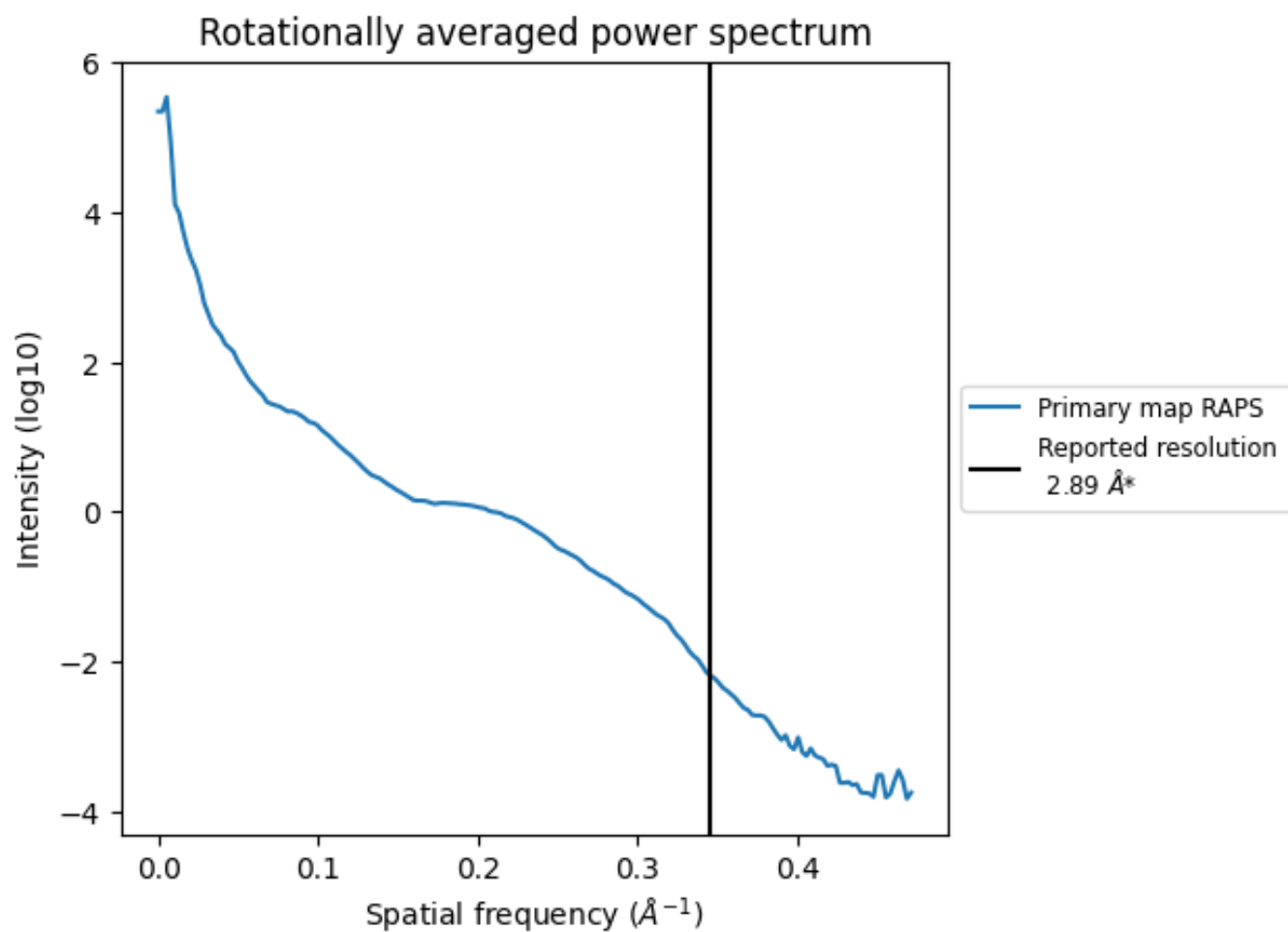
*Reported resolution corresponds to spatial frequency of 0.346 Å^{-1}

8 Fourier-Shell correlation ⓘ

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

8.1 FSC ⓘ
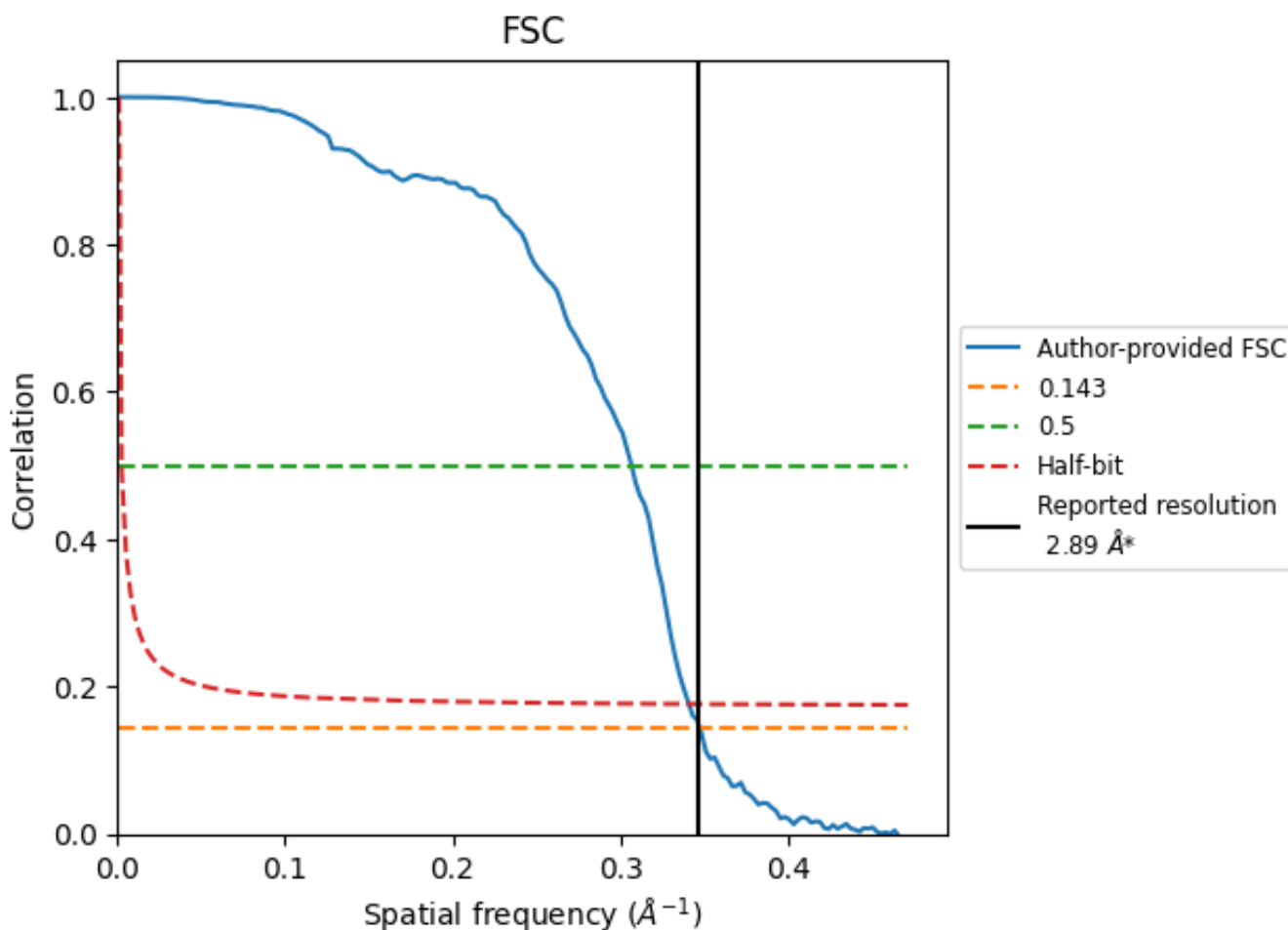
*Reported resolution corresponds to spatial frequency of 0.346 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.89	-	-
Author-provided FSC curve	2.88	3.26	2.93
Unmasked-calculated*	-	-	-

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

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-13967 and PDB model 7QH7. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay ⓘ

X   Y   Z
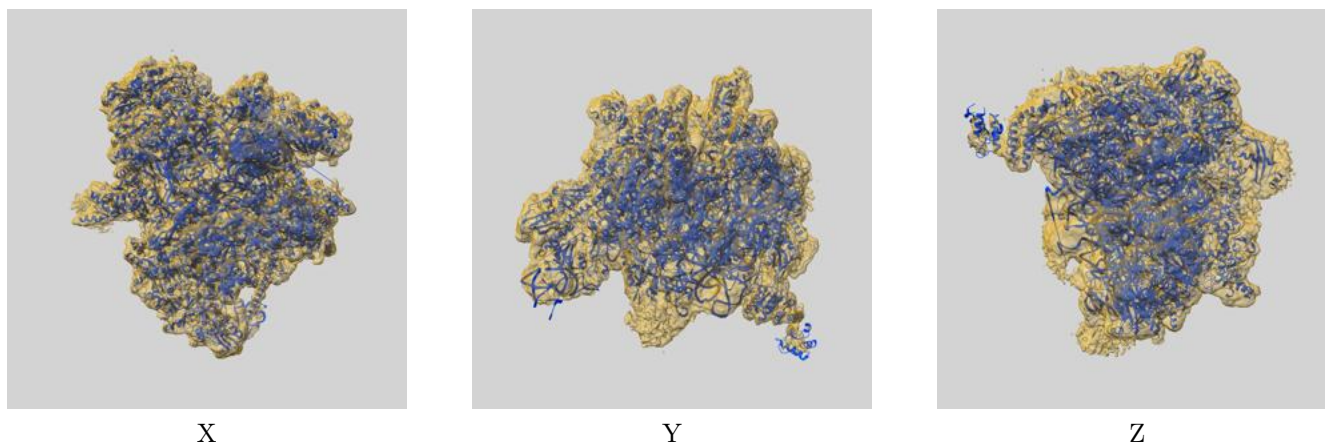
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2　Atom inclusion ⓘ
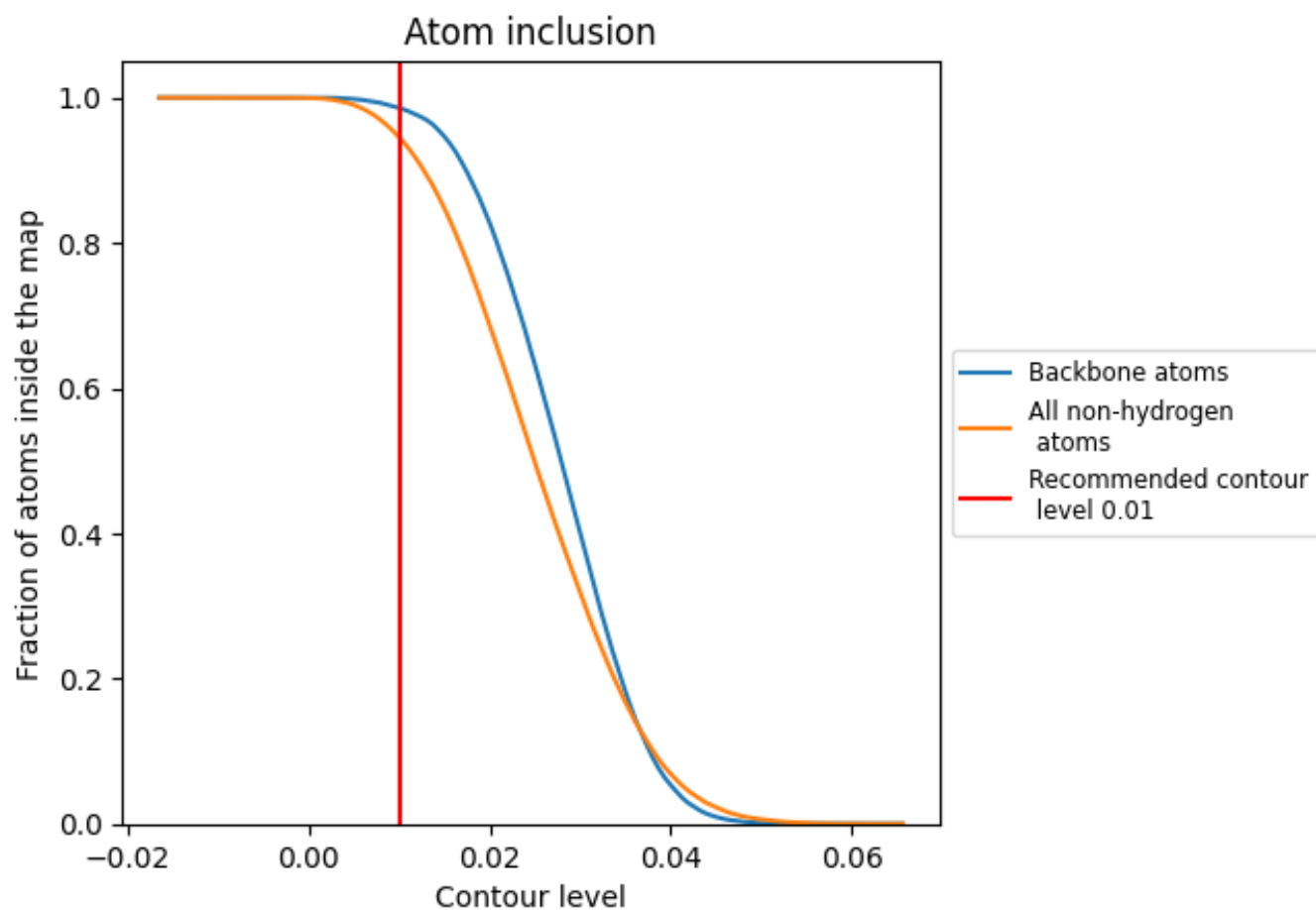
At the recommended contour level, 99% of all backbone atoms, 95% of all non-hydrogen atoms, are inside the map.