



wwPDB EM Validation Summary Report ⓘ

Mar 19, 2022 – 06:59 am GMT

PDB ID : 7QV3
EMDB ID : EMD-14159
Title : Bacillus subtilis MutS2-collided disome complex (MutS2 conf.2; Leading 70S)
Authors : Filbeck, S.; Pfeffer, S.
Deposited on : 2022-01-19
Resolution : 5.14 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

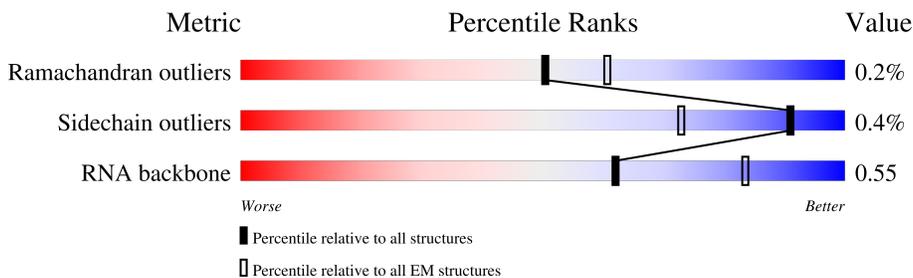
EMDB validation analysis : 0.0.0.dev97
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.27

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 5.14 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 ≥ 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	0	59	
2	1	49	
3	2	44	
4	3	66	
5	4	37	
6	6	66	
7	A	26	
8	B	112	

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Mol	Chain	Length	Quality of chain
9	C	277	98%
10	D	209	98%
11	E	207	99%
12	F	179	97%
13	G	179	98%
14	H	77	81% 19%
15	I	24	33% 100%
16	J	145	98%
17	K	122	100%
18	L	146	100%
19	M	144	94% 6%
20	N	120	99%
21	O	120	98%
22	P	115	100%
23	Q	119	97%
24	R	102	99%
25	S	113	96%
26	T	95	95% 5%
27	U	103	98%
28	V	2928	75% 23%
29	W	94	87% 13%
30	X	149	11% 97%
31	Y	66	98%
32	Z	59	98%
33	a	1533	83% 17%

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Mol	Chain	Length	Quality of chain
34	b	57	23% 100%
35	c	218	17% 94% 6%
36	d	200	96% ..
37	e	166	99% .
38	f	95	97% .
39	g	156	97% .
40	h	132	99% .
41	i	130	79% 21%
42	j	102	93% 7%
43	k	131	90% 10%
44	l	138	99% .
45	m	121	75% 24%
46	n	61	97% ..
47	o	89	94% ..
48	p	90	98% .
49	q	87	97% .
50	r	79	80% 19%
51	s	92	83% 16%
52	t	88	94% 6%
53	u	62	94% 6%
54	v	785	31% 69% 30%
54	w	785	12% 74% 24%

2 Entry composition

There are 54 unique types of molecules in this entry. The entry contains 149707 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 L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	0	54	426	262	86	71	7	0	0

- Molecule 2 is a protein called 50S ribosomal protein L33 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	1	48	401	244	80	73	4	0	0

- Molecule 3 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	2	44	367	222	89	54	2	0	0

- Molecule 4 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	3	64	512	321	107	82	2	0	0

- Molecule 5 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	4	37	296	186	60	45	5	0	0

- Molecule 6 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	6	63	499	312	91	91	5	0	0

- Molecule 7 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	A	26	Total	C	N	O	P	0	0
			559	251	106	176	26		

- Molecule 8 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	B	112	Total	C	N	O	P	0	0
			2392	1068	435	778	111		

- Molecule 9 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	C	272	Total	C	N	O	S	0	0
			2083	1296	408	373	6		

- Molecule 10 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	D	206	Total	C	N	O	S	0	0
			1569	985	289	290	5		

- Molecule 11 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	205	Total	C	N	O	S	0	0
			1561	980	289	290	2		

- Molecule 12 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	F	176	Total	C	N	O	S	0	0
			1386	882	241	256	7		

- Molecule 13 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	G	175	Total	C	N	O	S	0	0
			1342	835	248	257	2		

- Molecule 14 is a RNA chain called P-site tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
14	H	77	1643	731	290	545	77	0	0

- Molecule 15 is a protein called Nascent chain.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
15	I	24	120	72	24	24	0	0

- Molecule 16 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	J	142	1123	710	206	202	5	0	0

- Molecule 17 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	K	122	920	571	173	172	4	0	0

- Molecule 18 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	L	146	1081	671	207	201	2	0	0

- Molecule 19 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	M	135	1076	690	205	176	5	0	0

- Molecule 20 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	N	119	953	583	186	180	4	0	0

- Molecule 21 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	O	120	Total	C	N	O	S	0	0
			912	564	176	171	1		

- Molecule 22 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	P	115	Total	C	N	O	S	0	0
			944	600	185	158	1		

- Molecule 23 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	Q	117	Total	C	N	O	S	0	0
			940	591	189	156	4		

- Molecule 24 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms				AltConf	Trace
24	R	101	Total	C	N	O	0	0
			786	501	139	146		

- Molecule 25 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	S	109	Total	C	N	O	S	0	0
			842	525	164	150	3		

- Molecule 26 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	T	90	Total	C	N	O	S	0	0
			725	452	134	136	3		

- Molecule 27 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	U	101	Total	C	N	O	S	0	0
			762	478	142	138	4		

- Molecule 28 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
28	V	2887	61998	27661	11460	19993	2884	0	0

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
V	243	G	A	conflict	GB 1491848961
V	325	A	-	insertion	GB 1491848961
V	326	A	-	insertion	GB 1491848961
V	327	G	-	insertion	GB 1491848961
V	328	G	-	insertion	GB 1491848961
V	640	U	C	conflict	GB 1491848961
V	2232	A	G	conflict	GB 1491848961

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

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
29	W	82	630	390	123	117	0	0

- Molecule 30 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	X	149	1151	726	205	219	1	0	0

- Molecule 31 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	Y	65	530	328	102	98	2	0	0

- Molecule 32 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	Z	58	455	281	89	84	1	0	0

- Molecule 33 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
33	a	1533	32891	14667	6034	10657	1533	0	0

- Molecule 34 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	b	57	476	295	97	83	1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
b	30	ALA	GLN	conflict	UNP P21478

- Molecule 35 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	c	206	1619	1011	304	301	3	0	0

- Molecule 36 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	d	195	1568	991	291	284	2	0	0

- Molecule 37 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	e	164	1218	767	225	224	2	0	0

- Molecule 38 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	f	92	755	476	132	146	1	0	0

- Molecule 39 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	g	151	Total	C	N	O	S	0	0
			1203	755	224	218	6		

- Molecule 40 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	h	131	Total	C	N	O	S	0	0
			1036	655	191	187	3		

- Molecule 41 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	i	103	Total	C	N	O	0	0
			784	485	151	148		

- Molecule 42 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	j	95	Total	C	N	O	S	0	0
			761	479	139	141	2		

- Molecule 43 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	k	118	Total	C	N	O	S	0	0
			871	537	171	161	2		

- Molecule 44 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	l	136	Total	C	N	O	S	0	0
			1052	653	211	186	2		

- Molecule 45 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms				AltConf	Trace
45	m	92	Total	C	N	O	0	0
			740	459	145	136		

- Molecule 46 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	n	60	Total	C	N	O	S	0	0
			497	317	98	77	5		

- Molecule 47 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	o	85	Total	C	N	O	S	0	0
			710	436	144	129	1		

- Molecule 48 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	p	88	Total	C	N	O	S	0	0
			695	441	128	124	2		

- Molecule 49 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	q	84	Total	C	N	O	S	0	0
			691	435	128	126	2		

- Molecule 50 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	r	64	Total	C	N	O	S	0	0
			518	332	96	88	2		

- Molecule 51 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	s	77	Total	C	N	O	S	0	0
			624	403	110	109	2		

- Molecule 52 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	t	83	Total	C	N	O	S	0	0
			637	390	130	116	1		

- Molecule 53 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	u	58	444	275	92	75	2	0	0

- Molecule 54 is a protein called Endonuclease MutS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	v	548	4289	2680	743	850	16	0	0
54	w	593	4644	2904	804	919	17	0	0

3 Residue-property plots

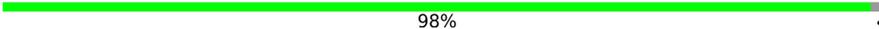
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

- Molecule 1: 50S ribosomal protein L32

Chain 0:  92% 8%



- Molecule 2: 50S ribosomal protein L33 1

Chain 1:  98% .



- Molecule 3: 50S ribosomal protein L34

Chain 2:  100%

There are no outlier residues recorded for this chain.

- Molecule 4: 50S ribosomal protein L35

Chain 3:  97% .



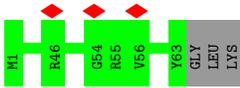
- Molecule 5: 50S ribosomal protein L36

Chain 4:  100%

There are no outlier residues recorded for this chain.

- Molecule 6: 50S ribosomal protein L31

Chain 6:  5% 95% 5%



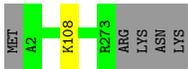
- Molecule 7: mRNA



- Molecule 8: 5S ribosomal RNA



- Molecule 9: 50S ribosomal protein L2



- Molecule 10: 50S ribosomal protein L3



- Molecule 11: 50S ribosomal protein L4



- Molecule 12: 50S ribosomal protein L5



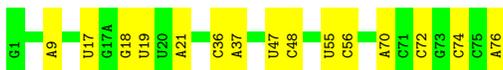
- Molecule 13: 50S ribosomal protein L6





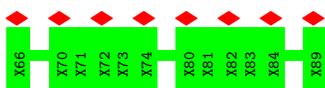
- Molecule 14: P-site tRNA

Chain H: 81% 19%



- Molecule 15: Nascent chain

Chain I: 33% 100%



- Molecule 16: 50S ribosomal protein L13

Chain J: 98%



- Molecule 17: 50S ribosomal protein L14

Chain K: 100%

There are no outlier residues recorded for this chain.

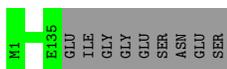
- Molecule 18: 50S ribosomal protein L15

Chain L: 100%

There are no outlier residues recorded for this chain.

- Molecule 19: 50S ribosomal protein L16

Chain M: 94% 6%

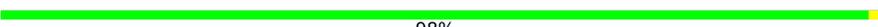


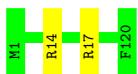
- Molecule 20: 50S ribosomal protein L17

Chain N: 99%

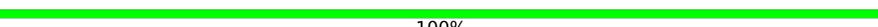


- Molecule 21: 50S ribosomal protein L18

Chain O:  98%



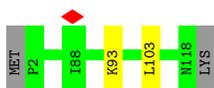
- Molecule 22: 50S ribosomal protein L19

Chain P:  100%

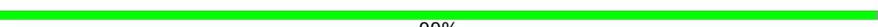
There are no outlier residues recorded for this chain.

- Molecule 23: 50S ribosomal protein L20

Chain Q:  97%



- Molecule 24: 50S ribosomal protein L21

Chain R:  99%

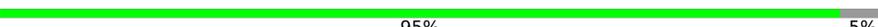


- Molecule 25: 50S ribosomal protein L22

Chain S:  96%



- Molecule 26: 50S ribosomal protein L23

Chain T:  95% 5%



- Molecule 27: 50S ribosomal protein L24

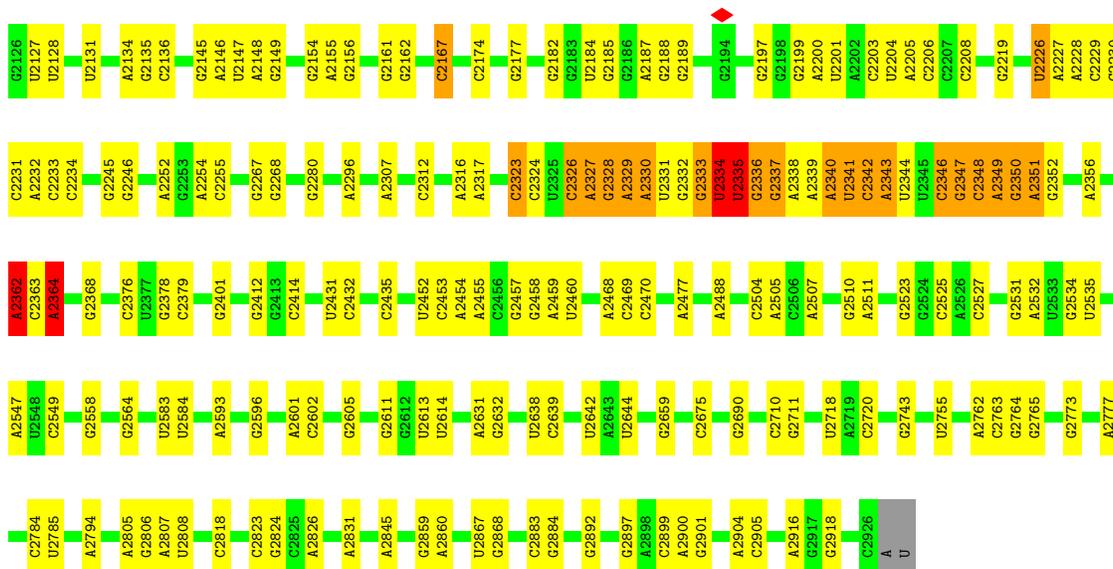
Chain U:  98%



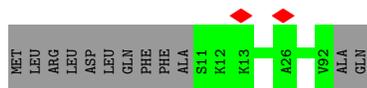
- Molecule 28: 23S ribosomal RNA



G	G2	U8	A13	G23	G26	U34	G46	G51	G60	A71	U74	G75	C76	U77	U78	C79	G85	C86	U87	U88	U89	A90	A91	C92	C93	U99	U100	G101	A117	A118	U119	A124	A125	U138	A139	U141	G145	A162	U163	U164												
G175	A176	G177	A178	A179	C182	A183	G184	A185	C187	C188	A199	A200	C201	A202	A207	G215	A216	A219	A224	A225	A226	A231	U232	G233	C234	U242	G251	C252	G253	A258	G269	C283	C284	U286	G287	C291	G296	G297	U301	A302	A307											
C308	U309	C310	U	U	A	C	G	A	G	U	U	A	C	A	A	G	A	G	U	U	A	C	U	G328	A329	A342	G344	A345	G346	G347	U348	G352	G361	G367	A373	A374	C375	G382	G399	U	C	U	U	C	G406	A407	G410	G411	A412	G417	A418	G419
U420	A421	C432	G433	U434	C441	C442	G443	U444	C445	G458	A459	G471	A476	A477	C482	G483	C491	U498	C502	C503	A504	U505	U506	C509	G512	A527	G528	A530	A537	A548	A549	G550	U554	C555	C556	G568	G572	G573	C577	A574	A575	G576	U577									
A578	G579	A592	G593	C594	G595	U598	G599	G607	A616	G617	A618	A619	U632	A647	G648	G649	A658	A659	U662	C667	A673	A683	A689	G690	U691	A692	A699	U700	A702	C718	A719	G719	U733	U736	C764	A765	G772	G773	C777	C787	G788											
G788	A790	U794	G795	G810	A811	G822	G823	A829	A830	U831	G832	A837	U837	G845	G852	G859	A866	U874	U882	G890	G905	G906	A908	A913	C914	A925	G929	C930	C931	C932	C933	U934	A935	C936	C937	G938	G939	G940	U941	U942	A943	C944	U949									
A957	A958	U959	C961	C962	G963	A964	G973	C980	A987	A991	G992	A999	A1005	G1007	A1020	A1027	A1028	A1029	A1036	A1042	C1051	C1052	C1053	A1054	A1055	U1058	A1059	G1068	A1073	U1079	U1091	A1092	G1093	A1094	U1101	G1102	A1103	U1106														
C1110	U1111	A1116	G1117	C1118	A1119	G1120	C1121	C1124	C1125	A1126	U1127	U1128	A1134	G1135	U1136	G1139	U1140	A1141	C1148	G1158	U1159	G1160	A1161	A1172	A1173	U1178	A1179	C1180	C1181	G1182	G1185	C1186	U1187	A1188	C1216	U	U	C	G1220	A1243	G1244	G1245	C1248	U1249	G1250	U1251						
G1259	A1260	A1264	U1265	A1269	C1270	G1275	A1276	A1277	G1278	A1293	G1296	A1305	G1306	G1311	A1312	A1313	A1314	G1315	A1323	U1324	A1325	A1326	U1327	A1339	A1340	U1341	G1342	C1343	C1344	U1351	U1352	G1362	G1363	C1364	U1365	U1368	C1369	C1370	C1372	A1375	C1384	G1385										
C1389	A1404	C1415	G1416	A1417	U1418	C1422	A1423	C1425	A1426	G1427	G1431	A1434	U1435	U1436	A1442	C1447	U1448	A1449	C1450	U1451	C1452	U1457	U1458	U1459	A1460	A1465	U1466	G1472	A1473	G1474	G1475	C1476	U1489	A1490	A1499	U1500	U1501	G1502	A1506	U1507	C1508	C1514	A1516									
G1525	C1526	G1527	U1528	G1529	G1530	A1531	A1532	U1535	A1536	C1539	A1540	A1541	A1542	U1543	U1547	U	A1553	A1555	A1556	G1557	G1558	C1559	U1560	U1565	A1566	G1568	A1569	U1570	G1571	U1578	U1579	C1573	C1577	A	A	A	U	U	A	C	U	A	G1589	A1614	G1791	C1792	G1793	A1802				
A1631	G1632	U1633	G1634	A1638	G1639	A1653	A1654	A1655	A1661	A1679	A1691	A1692	C1693	G1696	A1697	U1698	A1700	U1708	G1719	A1883	G1726	A1727	U1738	A1745	G1757	U1758	U1759	A1760	G1761	G1775	A1776	G1777	G1778	G1779	C1780	C1781	G1782	C1783	G1784	G1785	A1791	G1792	G1793	A1802								
G1810	C1811	A1812	A1813	G1828	C1829	G1830	U1837	A1838	G1843	A1844	A1845	U1850	A1858	C1862	U1863	G1864	A1877	A1882	A1883	G1884	A1885	G1886	U1887	G1891	A1895	U1899	G1904	A1914	U1915	G1935	G1936	C1943	A1948	G1958	G1959	A1965	A1966	A1967	U1968	U1969												
U1972	U1973	U1984	C1991	C1992	G1993	C1996	A1999	A2000	G2001	G2009	A2010	U2020	G2021	U2022	C2023	U2024	C2025	A2026	C2037	G2050	U2051	A2052	C2053	C2054	A2059	A2060	G2061	A2062	U2063	G2064	C2072	C2079	C2084	G2085	A2089	G2090	G2098	C2114	U2121	G2122	A2123	A2124	U2125									



• Molecule 29: 50S ribosomal protein L27



• Molecule 30: 50S ribosomal protein L9



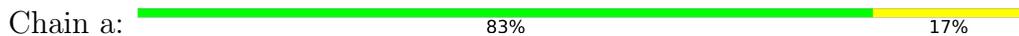
• Molecule 31: 50S ribosomal protein L29

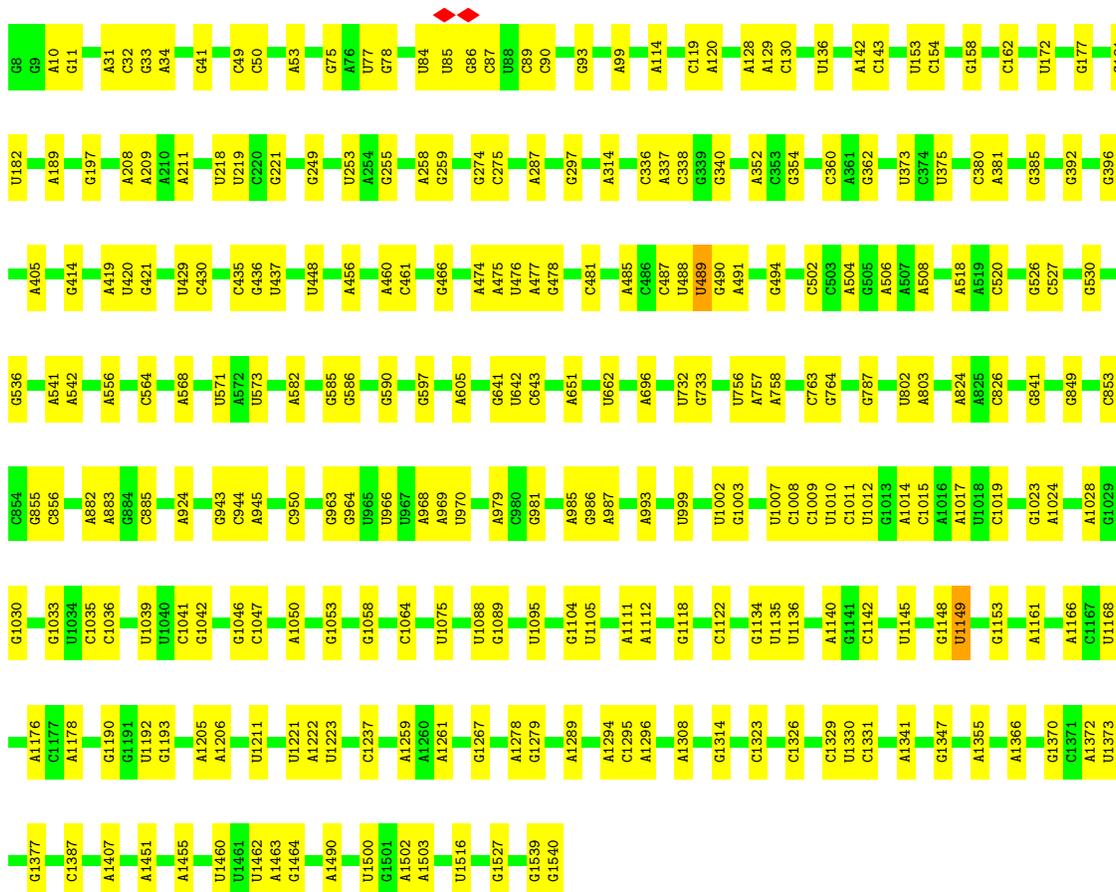


• Molecule 32: 50S ribosomal protein L30



• Molecule 33: 16S ribosomal RNA





• Molecule 34: 30S ribosomal protein S21

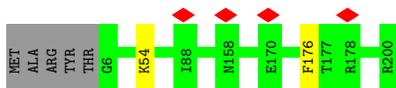


• Molecule 35: 30S ribosomal protein S3

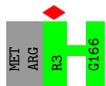


• Molecule 36: 30S ribosomal protein S4





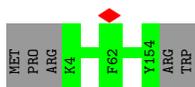
- Molecule 37: 30S ribosomal protein S5



- Molecule 38: 30S ribosomal protein S6



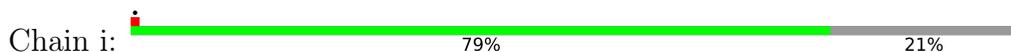
- Molecule 39: 30S ribosomal protein S7



- Molecule 40: 30S ribosomal protein S8



- Molecule 41: 30S ribosomal protein S9



- Molecule 42: 30S ribosomal protein S10



- Molecule 43: 30S ribosomal protein S11



- Molecule 44: 30S ribosomal protein S12



- Molecule 45: 30S ribosomal protein S13



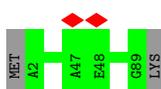
- Molecule 46: 30S ribosomal protein S14



- Molecule 47: 30S ribosomal protein S15



- Molecule 48: 30S ribosomal protein S16



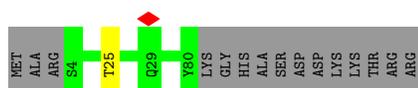
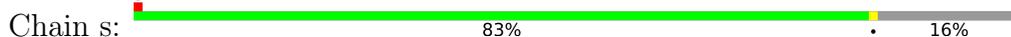
- Molecule 49: 30S ribosomal protein S17



• Molecule 50: 30S ribosomal protein S18



• Molecule 51: 30S ribosomal protein S19



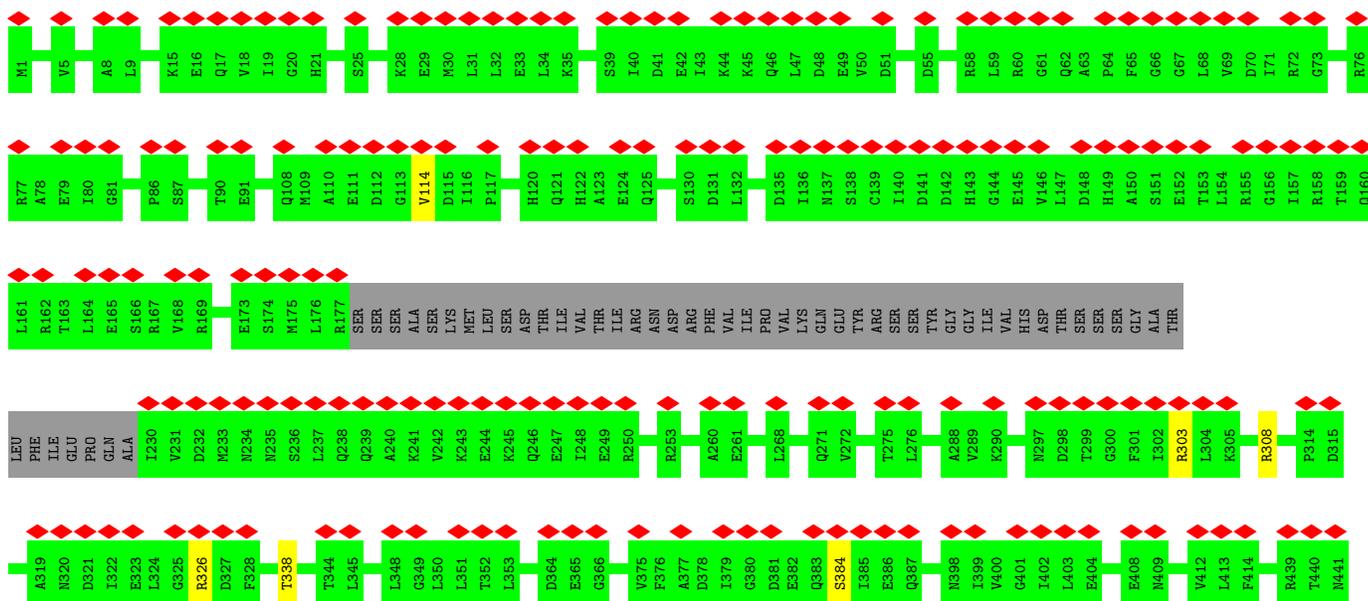
• Molecule 52: 30S ribosomal protein S20



• Molecule 53: 50S ribosomal protein L28



• Molecule 54: Endonuclease MutS2



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	5078	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 ($e^-/\text{\AA}^2$)	46.5	Depositor
Minimum defocus (nm)	750	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.341	Depositor
Minimum map value	-0.207	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.0172	Depositor
Map size (\AA)	590.64, 590.64, 590.64	wwPDB
Map dimensions	368, 368, 368	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.605, 1.605, 1.605	Depositor

5 Model quality i

5.1 Standard geometry i

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	0	0.25	0/433	0.41	0/574
2	1	0.25	0/406	0.44	0/540
3	2	0.26	0/370	0.42	0/483
4	3	0.24	0/519	0.41	0/680
5	4	0.25	0/299	0.40	0/393
6	6	0.26	0/509	0.40	0/678
7	A	0.72	2/627 (0.3%)	1.17	8/975 (0.8%)
8	B	0.18	0/2675	0.73	0/4170
9	C	0.25	0/2120	0.43	0/2845
10	D	0.25	0/1591	0.45	0/2132
11	E	0.24	0/1580	0.41	0/2132
12	F	0.39	0/1405	0.66	0/1887
13	G	0.24	0/1360	0.42	0/1832
14	H	0.16	0/1834	0.72	0/2858
16	J	0.24	0/1146	0.41	0/1542
17	K	0.26	0/927	0.45	0/1245
18	L	0.26	0/1093	0.44	0/1457
19	M	0.25	0/1099	0.41	0/1468
20	N	0.23	0/960	0.41	0/1284
21	O	0.30	0/921	0.55	2/1236 (0.2%)
22	P	0.25	0/957	0.43	0/1279
23	Q	0.25	0/952	0.40	0/1266
24	R	0.26	0/797	0.46	0/1070
25	S	0.24	0/851	0.43	0/1146
26	T	0.24	0/731	0.41	0/974
27	U	0.25	0/772	0.43	0/1032
28	V	0.27	0/69444	0.81	91/108334 (0.1%)
29	W	0.25	0/638	0.43	0/847
30	X	0.24	0/1162	0.41	0/1551
31	Y	0.24	0/531	0.37	0/707
32	Z	0.23	0/457	0.43	0/613
33	a	0.20	0/36826	0.73	4/57450 (0.0%)
34	b	0.26	0/480	0.42	0/628
35	c	0.25	0/1641	0.43	0/2208

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
36	d	0.25	0/1598	0.40	0/2147
37	e	0.25	0/1230	0.43	0/1655
38	f	0.24	0/766	0.41	0/1031
39	g	0.23	0/1220	0.38	0/1637
40	h	0.25	0/1048	0.45	0/1407
41	i	0.23	0/794	0.43	0/1074
42	j	0.23	0/773	0.40	0/1044
43	k	0.25	0/885	0.44	0/1196
44	l	0.25	0/1069	0.45	0/1435
45	m	0.23	0/744	0.41	0/994
46	n	0.24	0/507	0.40	0/672
47	o	0.23	0/718	0.42	0/960
48	p	0.25	0/708	0.41	0/950
49	q	0.25	0/699	0.42	0/933
50	r	0.24	0/526	0.40	0/705
51	s	0.24	0/640	0.43	0/861
52	t	0.23	0/639	0.39	0/852
53	u	0.23	0/448	0.46	0/596
54	v	0.52	0/4341	0.77	6/5847 (0.1%)
54	w	0.53	0/4703	0.78	7/6337 (0.1%)
All	All	0.27	2/162169 (0.0%)	0.72	118/241849 (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
28	V	0	16
54	w	0	2
All	All	0	18

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	41	C	C1'-N1	5.26	1.56	1.48
7	A	50	C	C1'-N1	5.02	1.56	1.48

The worst 5 of 118 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
28	V	138	U	OP1-P-O3'	-39.33	18.68	105.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
28	V	139	A	OP1-P-OP2	-12.74	100.50	119.60
28	V	2340	A	N1-C6-N6	-11.09	111.95	118.60
28	V	2362	A	N1-C6-N6	-11.09	111.95	118.60
28	V	2364	A	N1-C6-N6	-9.31	113.01	118.60

There are no chirality outliers.

5 of 18 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
28	V	2323	C	Sidechain
28	V	2326	C	Sidechain
28	V	2327	A	Sidechain
28	V	2329	A	Sidechain
28	V	924	U	Sidechain

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	0	52/59 (88%)	50 (96%)	2 (4%)	0	100	100
2	1	46/49 (94%)	44 (96%)	2 (4%)	0	100	100
3	2	42/44 (96%)	42 (100%)	0	0	100	100
4	3	62/66 (94%)	60 (97%)	2 (3%)	0	100	100
5	4	35/37 (95%)	33 (94%)	2 (6%)	0	100	100
6	6	61/66 (92%)	60 (98%)	1 (2%)	0	100	100
9	C	270/277 (98%)	260 (96%)	10 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	D	204/209 (98%)	193 (95%)	11 (5%)	0	100	100
11	E	203/207 (98%)	193 (95%)	10 (5%)	0	100	100
12	F	174/179 (97%)	161 (92%)	13 (8%)	0	100	100
13	G	173/179 (97%)	165 (95%)	8 (5%)	0	100	100
16	J	140/145 (97%)	133 (95%)	7 (5%)	0	100	100
17	K	120/122 (98%)	117 (98%)	3 (2%)	0	100	100
18	L	144/146 (99%)	139 (96%)	5 (4%)	0	100	100
19	M	133/144 (92%)	132 (99%)	1 (1%)	0	100	100
20	N	117/120 (98%)	113 (97%)	4 (3%)	0	100	100
21	O	118/120 (98%)	113 (96%)	5 (4%)	0	100	100
22	P	113/115 (98%)	108 (96%)	5 (4%)	0	100	100
23	Q	115/119 (97%)	107 (93%)	6 (5%)	2 (2%)	9	43
24	R	99/102 (97%)	88 (89%)	11 (11%)	0	100	100
25	S	107/113 (95%)	102 (95%)	5 (5%)	0	100	100
26	T	88/95 (93%)	87 (99%)	1 (1%)	0	100	100
27	U	99/103 (96%)	92 (93%)	7 (7%)	0	100	100
29	W	80/94 (85%)	76 (95%)	4 (5%)	0	100	100
30	X	147/149 (99%)	135 (92%)	12 (8%)	0	100	100
31	Y	63/66 (96%)	62 (98%)	1 (2%)	0	100	100
32	Z	56/59 (95%)	53 (95%)	3 (5%)	0	100	100
34	b	55/57 (96%)	53 (96%)	2 (4%)	0	100	100
35	c	204/218 (94%)	194 (95%)	10 (5%)	0	100	100
36	d	193/200 (96%)	176 (91%)	17 (9%)	0	100	100
37	e	162/166 (98%)	155 (96%)	7 (4%)	0	100	100
38	f	90/95 (95%)	87 (97%)	3 (3%)	0	100	100
39	g	149/156 (96%)	144 (97%)	5 (3%)	0	100	100
40	h	129/132 (98%)	116 (90%)	13 (10%)	0	100	100
41	i	101/130 (78%)	95 (94%)	6 (6%)	0	100	100
42	j	93/102 (91%)	87 (94%)	6 (6%)	0	100	100
43	k	116/131 (88%)	110 (95%)	6 (5%)	0	100	100
44	l	134/138 (97%)	124 (92%)	10 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
45	m	90/121 (74%)	85 (94%)	5 (6%)	0	100	100
46	n	58/61 (95%)	52 (90%)	5 (9%)	1 (2%)	9	43
47	o	83/89 (93%)	79 (95%)	4 (5%)	0	100	100
48	p	86/90 (96%)	81 (94%)	5 (6%)	0	100	100
49	q	82/87 (94%)	76 (93%)	6 (7%)	0	100	100
50	r	62/79 (78%)	56 (90%)	5 (8%)	1 (2%)	9	44
51	s	75/92 (82%)	69 (92%)	6 (8%)	0	100	100
52	t	81/88 (92%)	79 (98%)	2 (2%)	0	100	100
53	u	56/62 (90%)	54 (96%)	2 (4%)	0	100	100
54	v	544/785 (69%)	527 (97%)	15 (3%)	2 (0%)	34	72
54	w	589/785 (75%)	569 (97%)	16 (3%)	4 (1%)	22	62
All	All	6293/7048 (89%)	5986 (95%)	297 (5%)	10 (0%)	50	81

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
54	v	384	SER
54	w	384	SER
23	Q	103	LEU
50	r	28	TYR
54	w	382	GLU

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	0	48/53 (91%)	48 (100%)	0	100	100
2	1	46/47 (98%)	46 (100%)	0	100	100
3	2	39/39 (100%)	39 (100%)	0	100	100
4	3	54/56 (96%)	54 (100%)	0	100	100
5	4	35/35 (100%)	35 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
6	6	53/55 (96%)	53 (100%)	0	100	100
9	C	220/225 (98%)	219 (100%)	1 (0%)	88	93
10	D	167/170 (98%)	166 (99%)	1 (1%)	86	91
11	E	169/170 (99%)	169 (100%)	0	100	100
12	F	151/154 (98%)	149 (99%)	2 (1%)	69	82
13	G	148/151 (98%)	148 (100%)	0	100	100
16	J	120/123 (98%)	120 (100%)	0	100	100
17	K	101/101 (100%)	101 (100%)	0	100	100
18	L	110/110 (100%)	110 (100%)	0	100	100
19	M	109/116 (94%)	109 (100%)	0	100	100
20	N	99/100 (99%)	99 (100%)	0	100	100
21	O	93/93 (100%)	93 (100%)	0	100	100
22	P	100/100 (100%)	100 (100%)	0	100	100
23	Q	96/98 (98%)	96 (100%)	0	100	100
24	R	83/84 (99%)	83 (100%)	0	100	100
25	S	90/93 (97%)	90 (100%)	0	100	100
26	T	81/85 (95%)	81 (100%)	0	100	100
27	U	85/87 (98%)	85 (100%)	0	100	100
29	W	64/74 (86%)	64 (100%)	0	100	100
30	X	124/124 (100%)	119 (96%)	5 (4%)	31	56
31	Y	56/57 (98%)	56 (100%)	0	100	100
32	Z	52/53 (98%)	52 (100%)	0	100	100
34	b	51/51 (100%)	51 (100%)	0	100	100
35	c	168/178 (94%)	168 (100%)	0	100	100
36	d	169/173 (98%)	167 (99%)	2 (1%)	71	84
37	e	128/130 (98%)	128 (100%)	0	100	100
38	f	81/84 (96%)	81 (100%)	0	100	100
39	g	127/132 (96%)	127 (100%)	0	100	100
40	h	111/112 (99%)	111 (100%)	0	100	100
41	i	81/102 (79%)	81 (100%)	0	100	100
42	j	86/92 (94%)	86 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
43	k	90/100 (90%)	90 (100%)	0	100	100
44	l	114/116 (98%)	114 (100%)	0	100	100
45	m	80/104 (77%)	79 (99%)	1 (1%)	69	82
46	n	53/54 (98%)	53 (100%)	0	100	100
47	o	80/83 (96%)	79 (99%)	1 (1%)	69	82
48	p	74/76 (97%)	74 (100%)	0	100	100
49	q	77/80 (96%)	77 (100%)	0	100	100
50	r	56/64 (88%)	56 (100%)	0	100	100
51	s	69/81 (85%)	68 (99%)	1 (1%)	67	81
52	t	66/70 (94%)	66 (100%)	0	100	100
53	u	47/50 (94%)	47 (100%)	0	100	100
54	v	472/674 (70%)	470 (100%)	2 (0%)	91	94
54	w	513/674 (76%)	510 (99%)	3 (1%)	86	91
All	All	5386/5933 (91%)	5367 (100%)	19 (0%)	91	94

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
54	v	338	THR
54	w	205	TYR
54	w	592	HIS
54	w	196	ARG
30	X	75	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
54	w	125	GLN
54	w	239	GLN
54	w	551	HIS
48	p	72	ASN
54	v	143	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
14	H	76/77 (98%)	14 (18%)	2 (2%)
28	V	2881/2928 (98%)	634 (22%)	64 (2%)
33	a	1532/1533 (99%)	266 (17%)	0
7	A	25/26 (96%)	12 (48%)	5 (20%)
8	B	111/112 (99%)	28 (25%)	4 (3%)
All	All	4625/4676 (98%)	954 (20%)	75 (1%)

5 of 954 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
7	A	33	A
7	A	34	A
7	A	35	A
7	A	37	G
7	A	38	A

5 of 75 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
28	V	2155	A
28	V	2710	C
28	V	2254	A
28	V	2452	U
28	V	1093	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](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

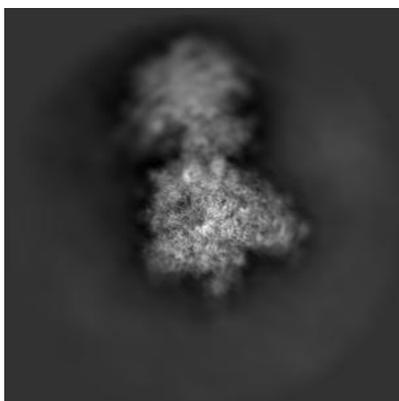
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14159. These allow visual inspection of the internal detail of the map and identification of artifacts.

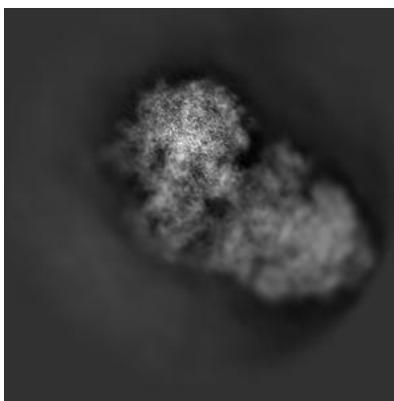
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

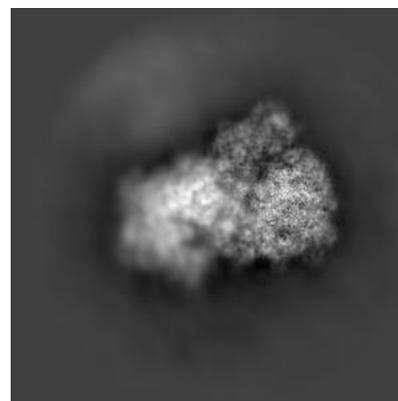
6.1.1 Primary map



X



Y

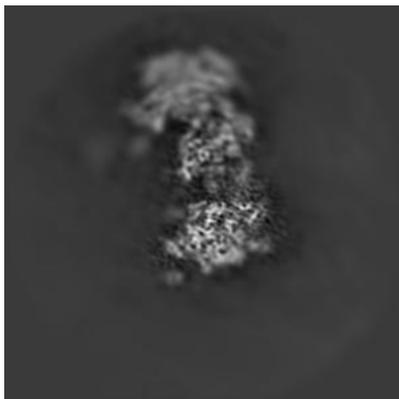


Z

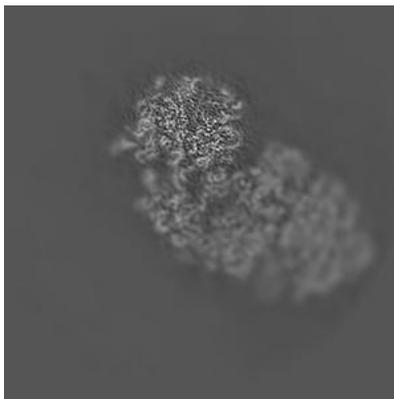
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

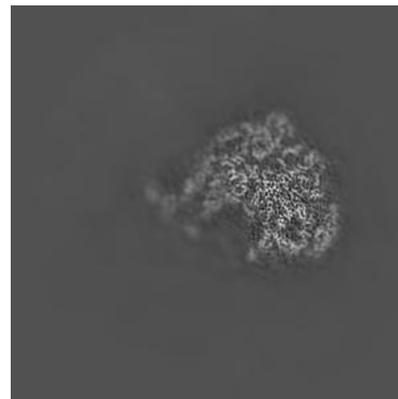
6.2.1 Primary map



X Index: 184



Y Index: 184

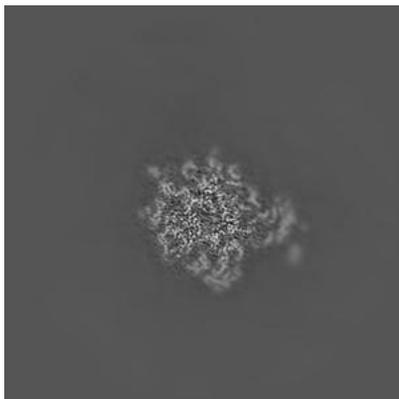


Z Index: 184

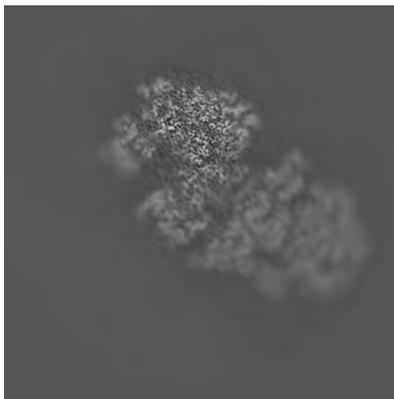
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

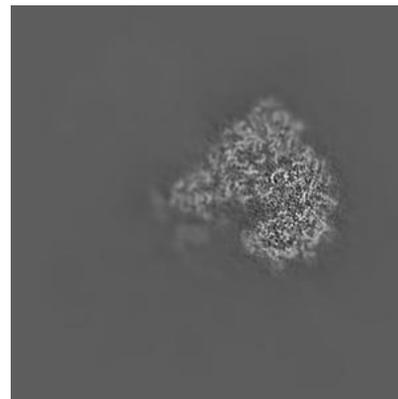
6.3.1 Primary map



X Index: 254



Y Index: 196

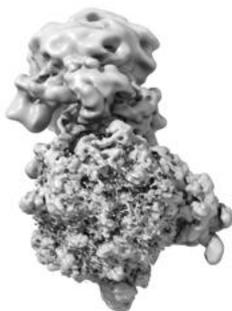


Z Index: 169

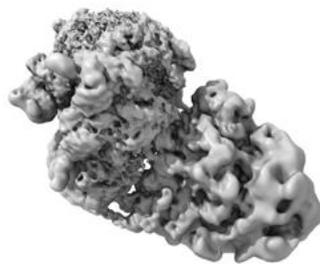
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

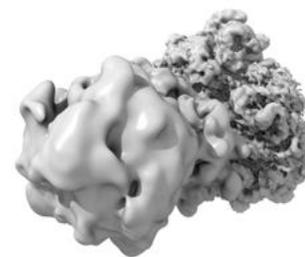
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0172. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

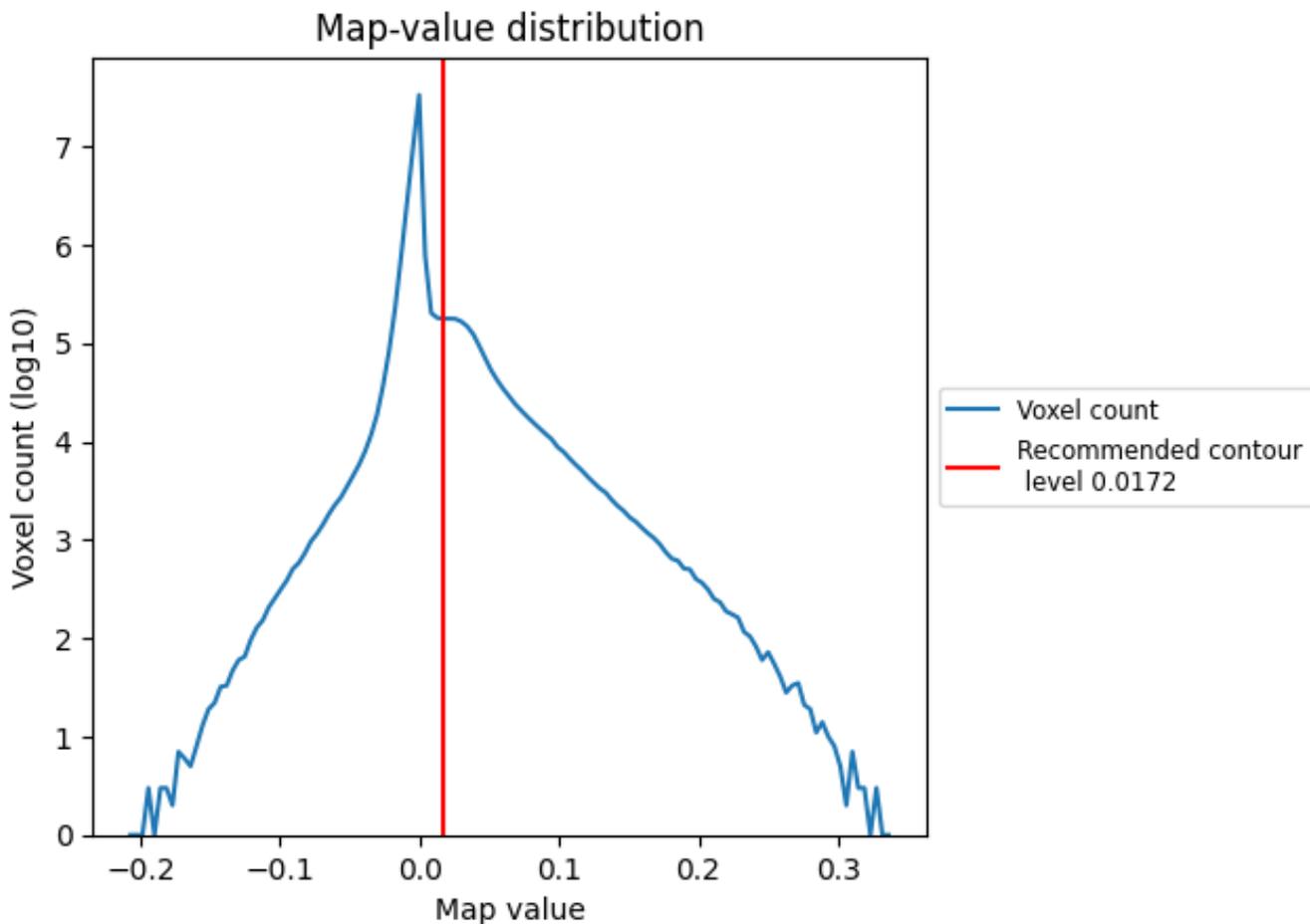
6.5 Mask visualisation

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

7 Map analysis [i](#)

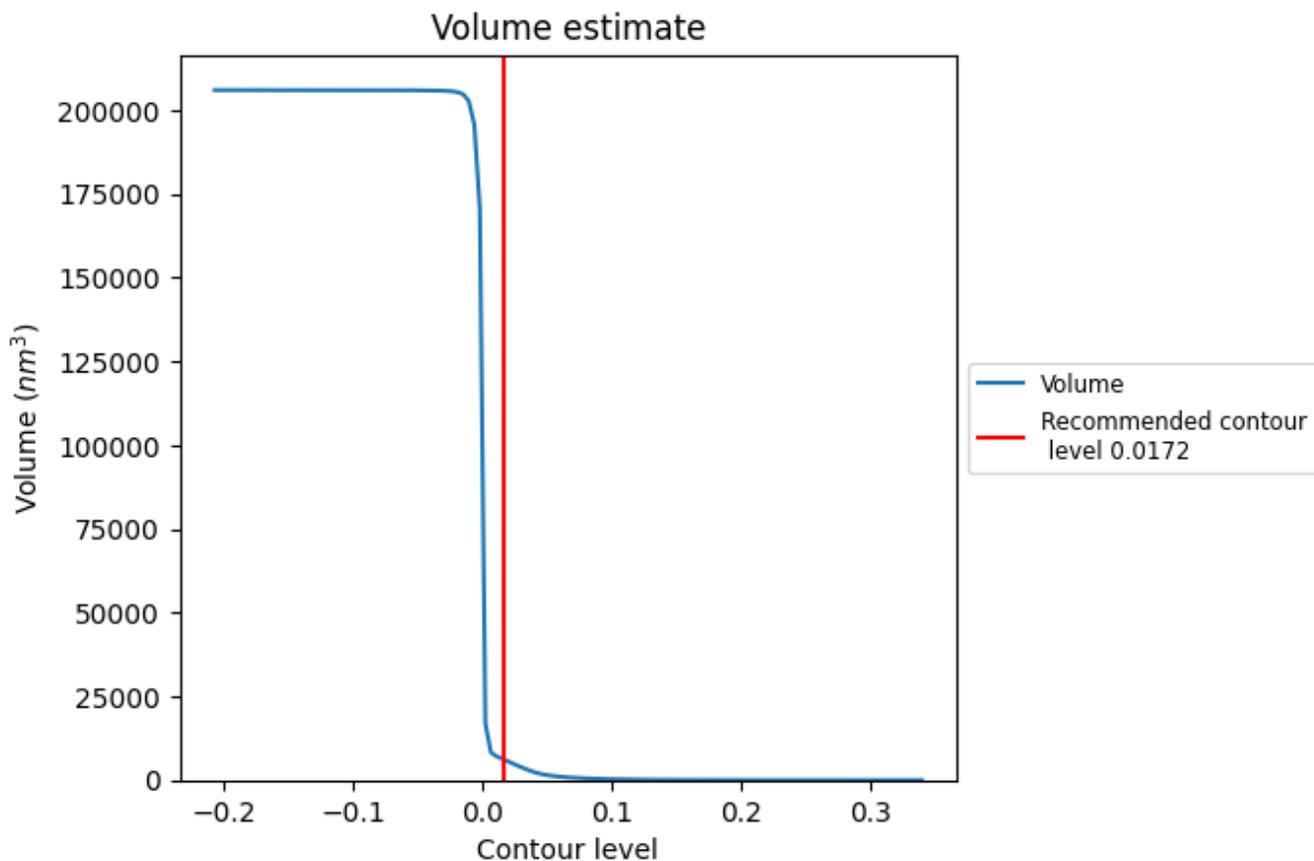
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

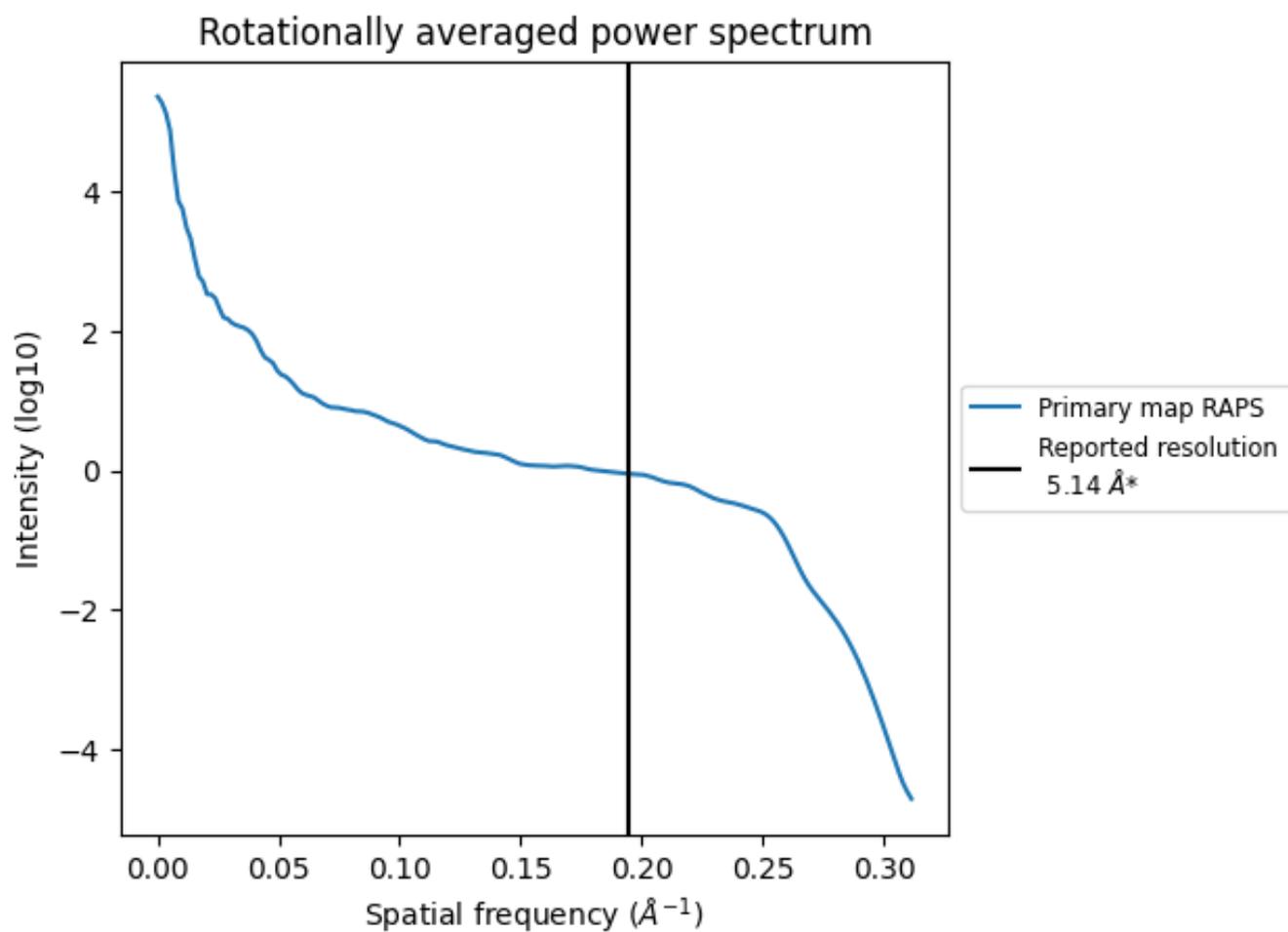
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 6043 nm^3 ; this corresponds to an approximate mass of 5459 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 0.195 Å⁻¹

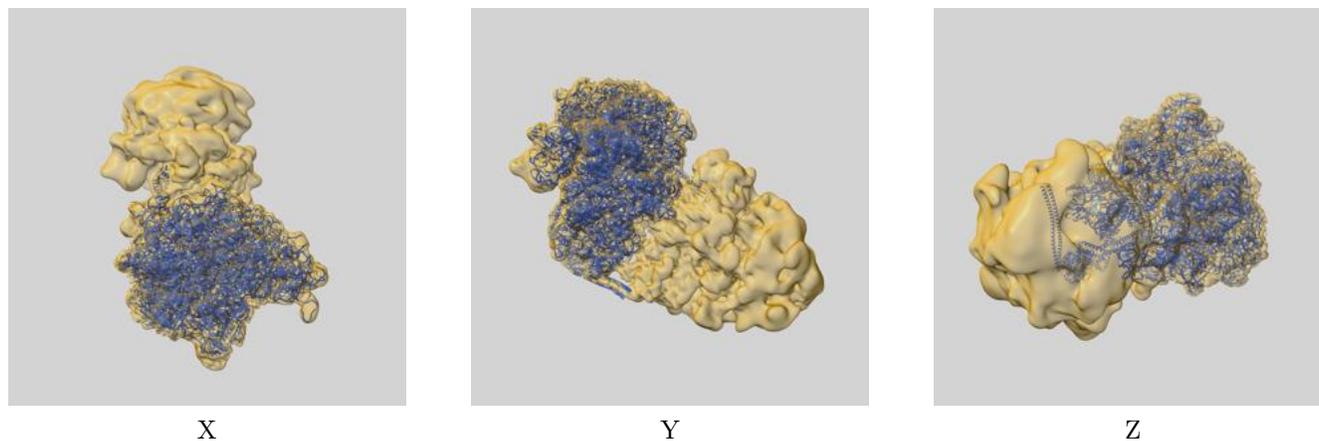
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

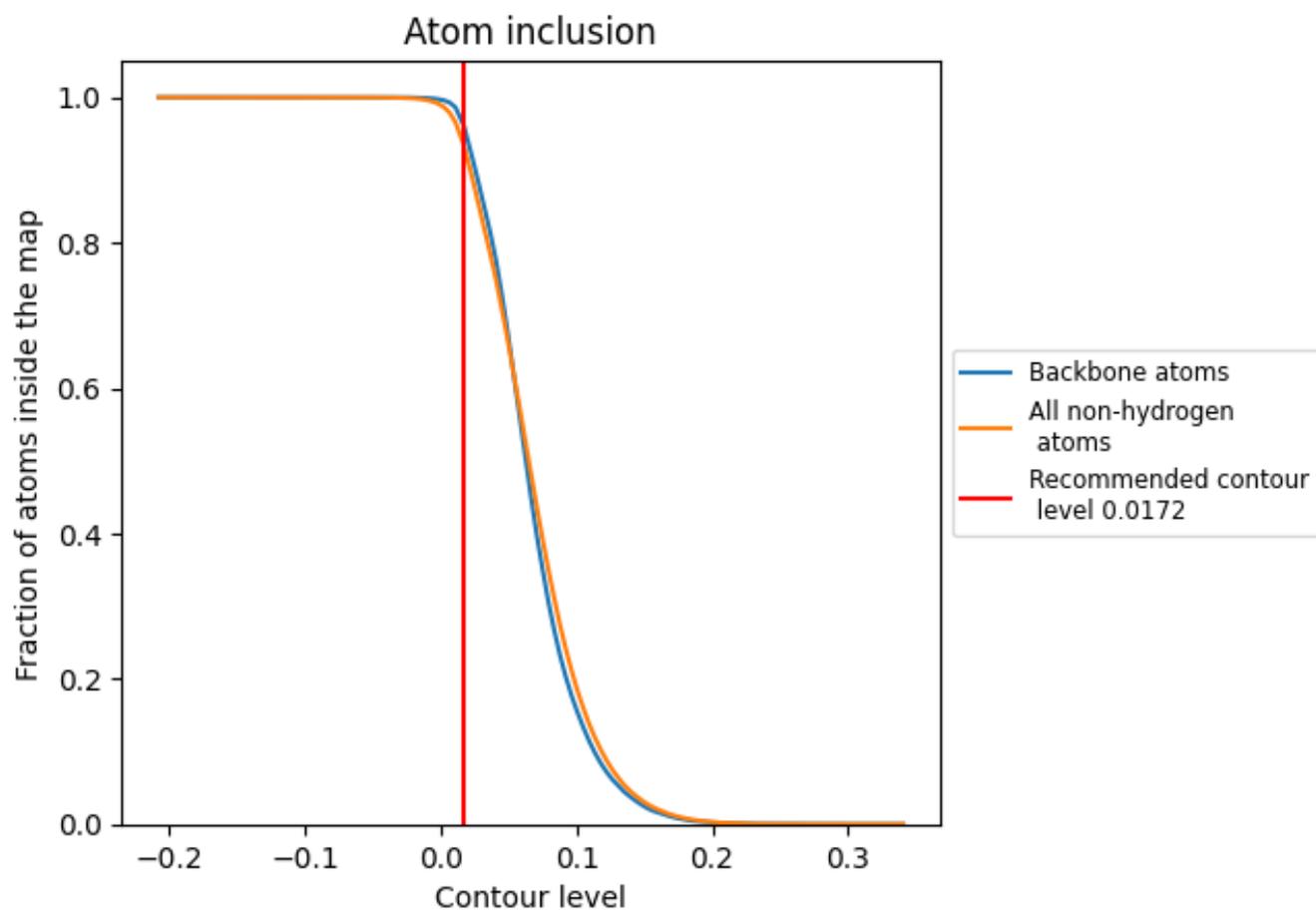
This section contains information regarding the fit between EMDB map EMD-14159 and PDB model 7QV3. Per-residue inclusion information can be found in section 3 on page 14.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.0172 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, 96% of all backbone atoms, 93% of all non-hydrogen atoms, are inside the map.