



wwPDB EM Validation Summary Report ⓘ

Aug 26, 2024 – 11:00 AM EDT

PDB ID : 9BKD
EMDB ID : EMD-44641
Title : The structure of human Pcd4 bound to the 40S small ribosomal subunit
Authors : Brito Querido, J.; Sokabe, M.; Diaz-Lopez, I.; Gordiyenko, Y.; Zuber, P.; Albacete-Albacete, L.; Ramakrishnan, V.; S.Fraser, C.
Deposited on : 2024-04-27
Resolution : 2.60 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 types of validation reports are described at

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

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

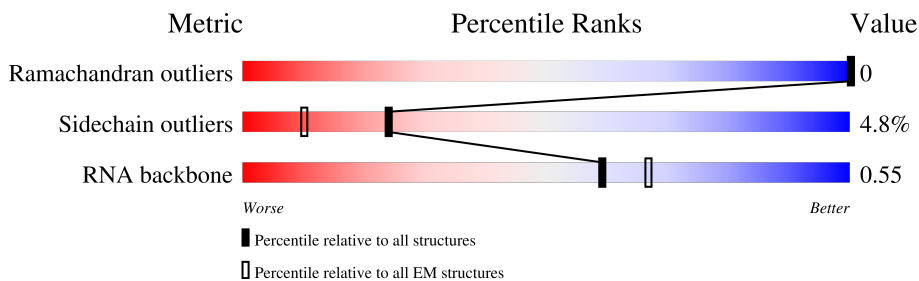
EMDB validation analysis : 0.0.1.dev112
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.38.3

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 2.60 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	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	S	249	
2	G	194	
3	H	84	
4	K	83	
5	L	293	
6	O	264	
7	N	295	
8	Q	115	

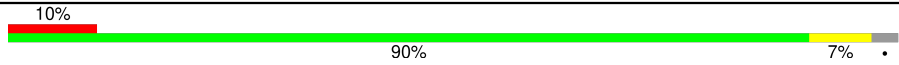
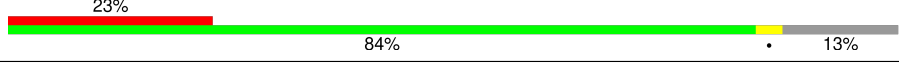

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Mol	Chain	Length	Quality of chain
9	P	151	80% 7% 13%
10	I	151	97%
11	9	25	20% 84% 12%
12	A	1719	7% 74% 22%
13	B	158	5% 86% 9%
14	C	263	96%
15	D	194	90% 9%
16	E	143	96%
17	F	59	80% 20%
18	J	130	97%
19	R	208	7% 91% 5%
20	T	133	90% 7%
21	V	204	9% 87% 10%
22	Y	146	92% 5%
23	Z	243	9% 89% 5% 7%
24	a	165	9% 56% 40%
25	b	145	17% 74% 7% 19%
26	c	317	44% 91% 7%
27	d	145	15% 95%
28	e	125	48% 53% 45%
29	f	152	37% 86% 7% 7%
30	i	56	95%
31	k	156	30% 29% 67%
32	m	132	91% 85% 8% 8%
33	n	69	28% 90% 9%

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Mol	Chain	Length	Quality of chain
34	M	135	
35	h	119	
36	U	469	

2 Entry composition [i](#)

There are 40 unique types of molecules in this entry. The entry contains 74436 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 Small ribosomal subunit protein eS6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	S	230	1862	1164	371	320	7	0	0

- Molecule 2 is a protein called Small ribosomal subunit protein eS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	G	173	1399	895	255	248	1	0	0

- Molecule 3 is a protein called 40S ribosomal protein S27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	H	81	631	397	116	111	7	0	0

- Molecule 4 is a protein called 40S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	K	81	617	380	114	118	5	0	0

- Molecule 5 is a protein called 40S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	L	220	1707	1104	292	301	10	0	0

- Molecule 6 is a protein called 40S ribosomal protein S3a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	O	211	1715	1088	307	306	14	0	0

- Molecule 7 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	N	207	1633	1040	288	297	8	0	0

- Molecule 8 is a protein called 40S ribosomal protein S26.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	Q	99	792	492	165	130	5	0	0

- Molecule 9 is a protein called 40S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	P	131	981	600	193	182	6	0	0

- Molecule 10 is a protein called 40S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	I	150	1208	773	229	205	1	0	0

- Molecule 11 is a protein called 60S ribosomal protein L41.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	9	24	230	139	62	26	3	0	0

- Molecule 12 is a RNA chain called 18S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
12	A	1672	35720	15962	6403	11683	1672	0	0

- Molecule 13 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	B	143	1177	749	222	200	6	0	0

- Molecule 14 is a protein called Small ribosomal subunit protein eS4, X isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	C	256	Total	C	N	O	S	0	0
			2035	1302	378	347	8		

- Molecule 15 is a protein called Small ribosomal subunit protein uS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	D	177	Total	C	N	O	S	0	0
			1477	941	295	239	2		

- Molecule 16 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	E	140	Total	C	N	O	S	0	0
			1087	687	215	182	3		

- Molecule 17 is a protein called Small ribosomal subunit protein eS30.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	F	47	Total	C	N	O	S	0	0
			378	231	85	61	1		

- Molecule 18 is a protein called 40S ribosomal protein S15a.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	J	129	Total	C	N	O	S	0	0
			1034	659	193	176	6		

- Molecule 19 is a protein called Small ribosomal subunit protein eS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	R	198	Total	C	N	O	S	0	0
			1627	1021	322	279	5		

- Molecule 20 is a protein called Small ribosomal subunit protein eS24.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	124	Total	C	N	O	S	0	0
			1011	640	198	168	5		

- Molecule 21 is a protein called 40S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	V	184	1461	914	276	264	7	0	0

- Molecule 22 is a protein called 40S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	Y	141	1124	715	212	194	3	0	0

- Molecule 23 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	Z	227	1765	1125	317	315	8	0	0

- Molecule 24 is a protein called Small ribosomal subunit protein eS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	a	99	834	544	149	135	6	0	0

- Molecule 25 is a protein called 40S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	b	118	972	617	182	166	7	0	0

- Molecule 26 is a protein called Receptor of activated protein C kinase 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	c	313	2436	1535	424	465	12	0	0

- Molecule 27 is a protein called 40S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	d	142	1105	692	213	197	3	0	0

- Molecule 28 is a protein called Small ribosomal subunit protein eS25.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	e	69	Total	C	N	O	S	0	0
			551	356	100	94	1		

- Molecule 29 is a protein called Small ribosomal subunit protein uS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	f	142	Total	C	N	O	S	0	0
			1176	737	239	199	1		

- Molecule 30 is a protein called 40S ribosomal protein S29.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	i	55	Total	C	N	O	S	0	0
			459	286	94	74	5		

- Molecule 31 is a protein called Ubiquitin-40S ribosomal protein S27a.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	k	52	Total	C	N	O	S	0	0
			429	271	82	69	7		

- Molecule 32 is a protein called 40S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	m	122	Total	C	N	O	S	0	0
			950	596	168	177	9		

- Molecule 33 is a protein called 40S ribosomal protein S28.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	n	63	Total	C	N	O	S	0	0
			498	302	101	93	2		

- Molecule 34 is a protein called 40S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	M	131	Total	C	N	O	S	0	0
			1064	668	198	194	4		

- Molecule 35 is a protein called 40S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	h	103	817	511	155	147	4	0	0

- Molecule 36 is a protein called Programmed cell death protein 4.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
36	U	47	354	217	67	70	0	0

- Molecule 37 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
37	Q	1	Total	Zn	0
			1	1	
37	i	1	Total	Zn	0
			1	1	
37	k	1	Total	Zn	0
			1	1	

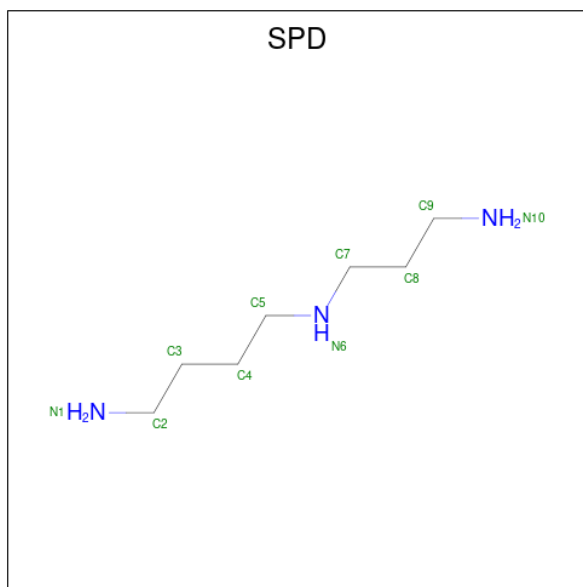
- Molecule 38 is POTASSIUM ION (three-letter code: K) (formula: K) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
38	P	1	Total	K	0
			1	1	
38	A	17	Total	K	0
			17	17	
38	i	1	Total	K	0
			1	1	

- Molecule 39 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
39	A	87	Total	Mg	0
			87	87	
39	f	1	Total	Mg	0
			1	1	

- Molecule 40 is SPERMIDINE (three-letter code: SPD) (formula: C₇H₁₉N₃) (labeled as "Ligand of Interest" by depositor).

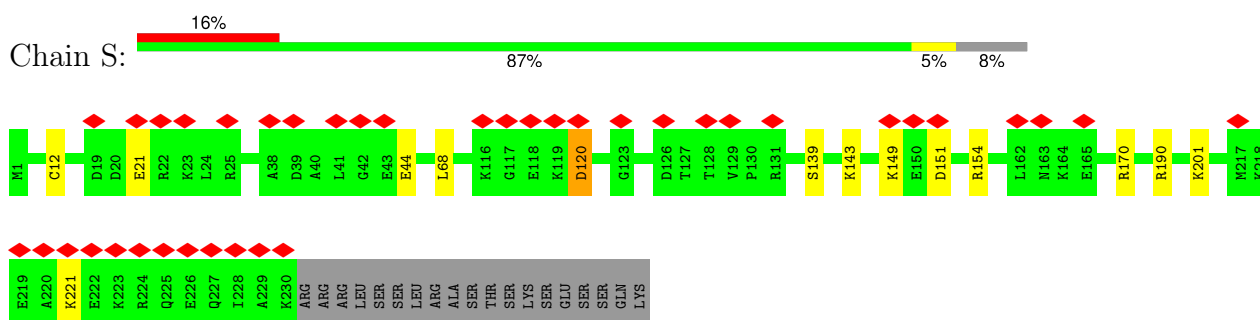


Mol	Chain	Residues	Atoms			AltConf
40	A	1	Total	C	N	0
			10	7	3	

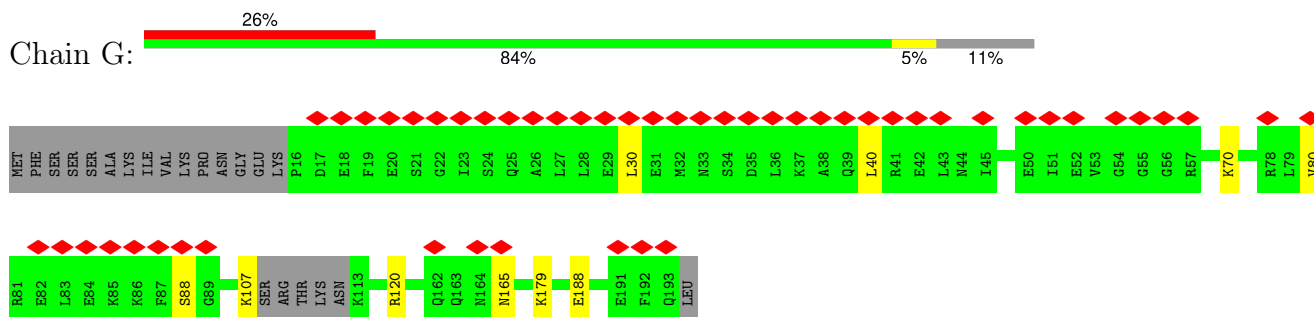
3 Residue-property plots [i](#)

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

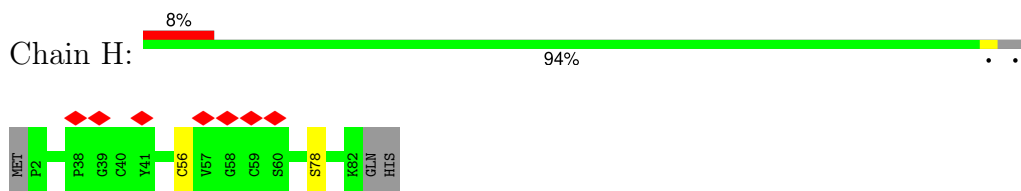
- Molecule 1: Small ribosomal subunit protein eS6



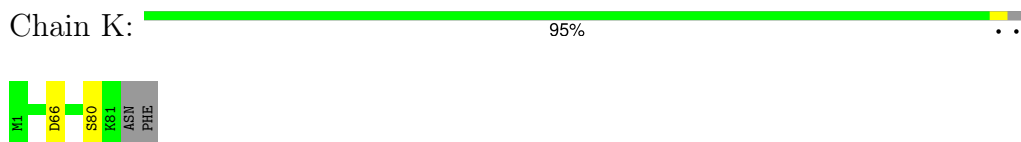
- Molecule 2: Small ribosomal subunit protein eS7

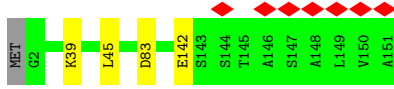


- Molecule 3: 40S ribosomal protein S27

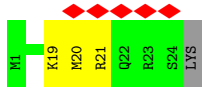
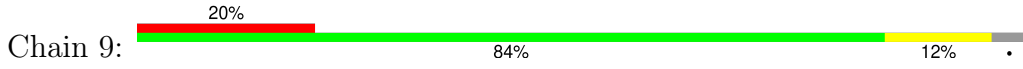


- Molecule 4: 40S ribosomal protein S21

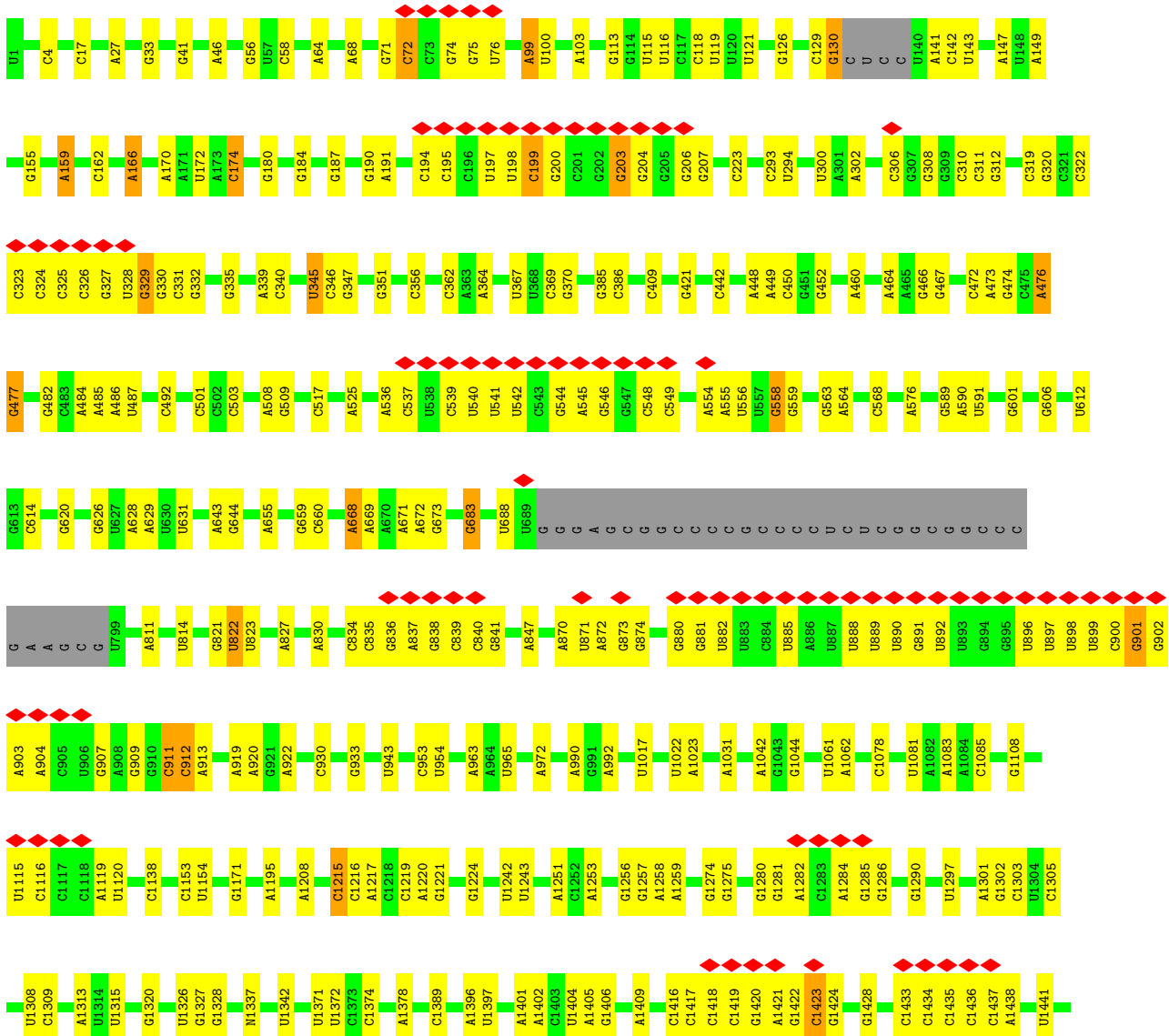


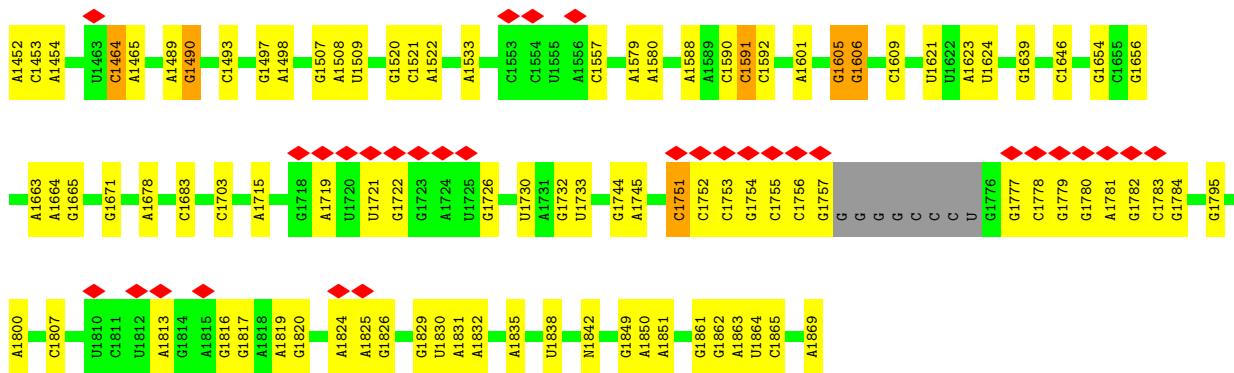


• Molecule 11: 60S ribosomal protein L41

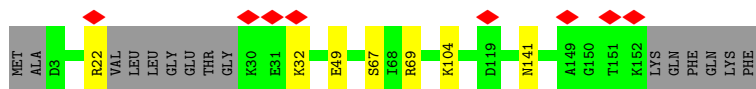
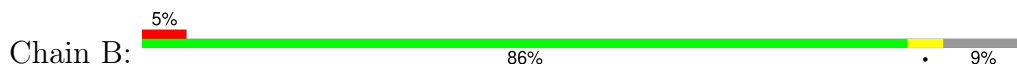


• Molecule 12: 18S rRNA





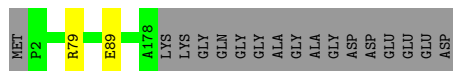
- Molecule 13: Small ribosomal subunit protein uS17



- Molecule 14: Small ribosomal subunit protein eS4, X isoform



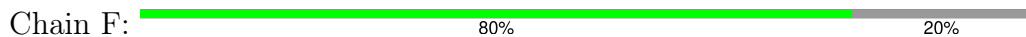
- Molecule 15: Small ribosomal subunit protein uS4



- Molecule 16: Small ribosomal subunit protein uS12



- Molecule 17: Small ribosomal subunit protein eS30



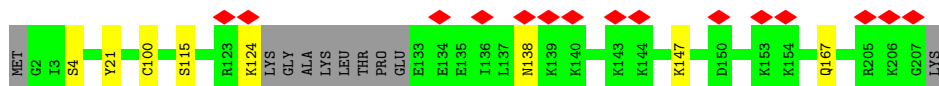
- Molecule 18: 40S ribosomal protein S15a

Chain J:  97%




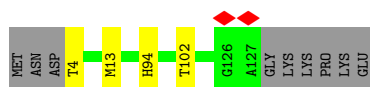
• Molecule 19: Small ribosomal subunit protein eS8

Chain R:  7% 91% 5%




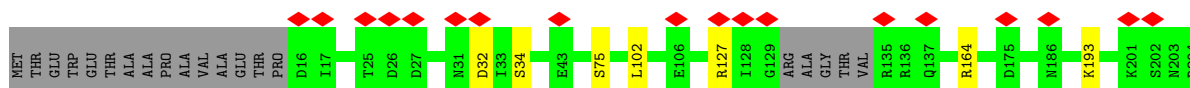
• Molecule 20: Small ribosomal subunit protein eS24

Chain T:  90% 7%



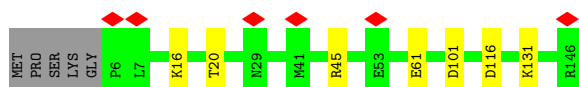
• Molecule 21: 40S ribosomal protein S5

Chain V:  9% 87% 10%




• Molecule 22: 40S ribosomal protein S16

Chain Y:  92% 5%



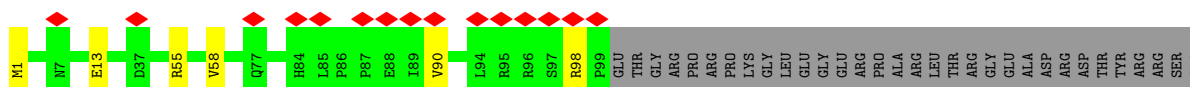
• Molecule 23: Small ribosomal subunit protein uS3

Chain Z:  9% 89% 5% 7%



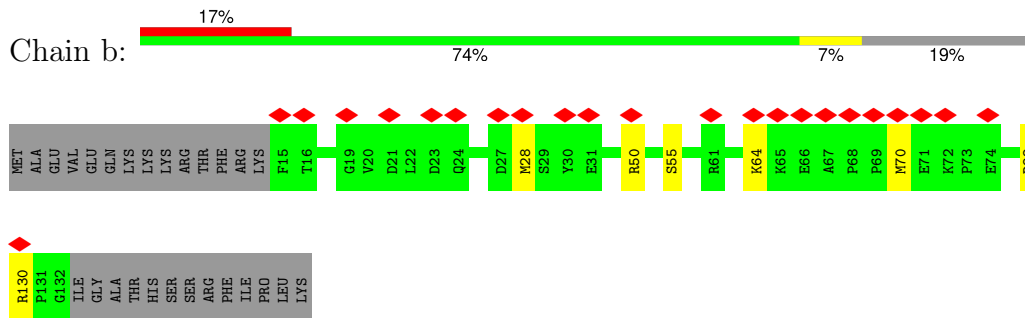
• Molecule 24: Small ribosomal subunit protein eS10

Chain a:  9% 56% 40%

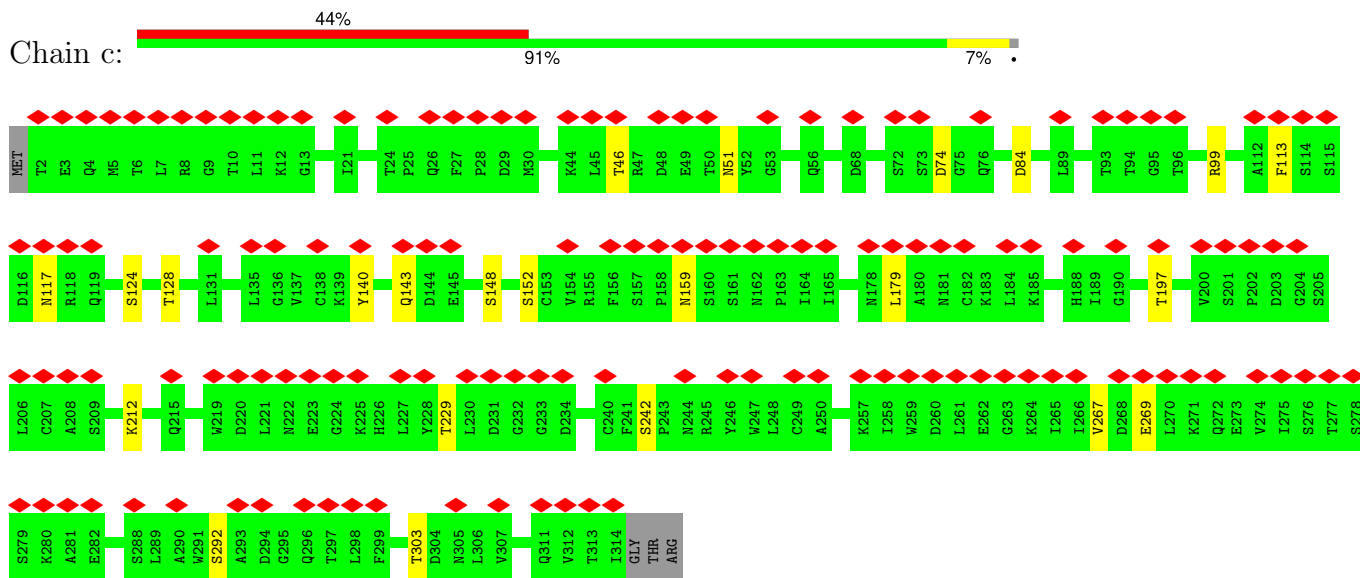


VAL	PRO	PRO	GLY	ALA	ASP	LYS	LYS	ALA	GLU	ALA	ALA	GLY	ALA	GLY	SER	ALA	THR	GLU	PHE	GLN	PHE	ARG	GLY	PHE	GLY	ARG	GLY	GLN	PRO	GLN
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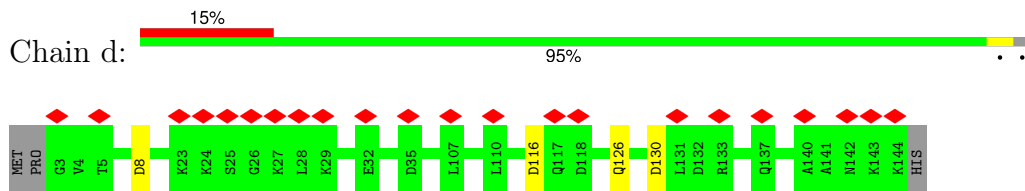
• Molecule 25: 40S ribosomal protein S15



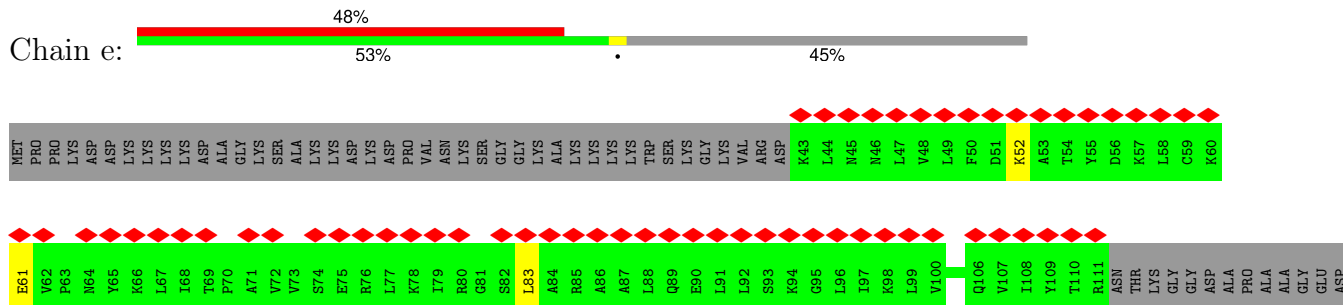
• Molecule 26: Receptor of activated protein C kinase 1



• Molecule 27: 40S ribosomal protein S19

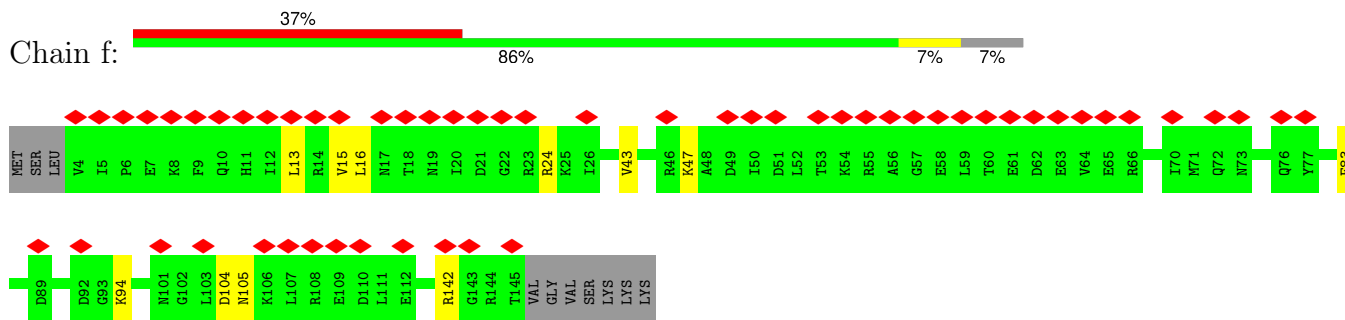


• Molecule 28: Small ribosomal subunit protein eS25

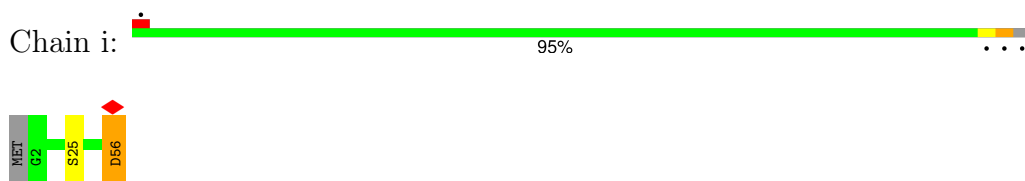


ALA

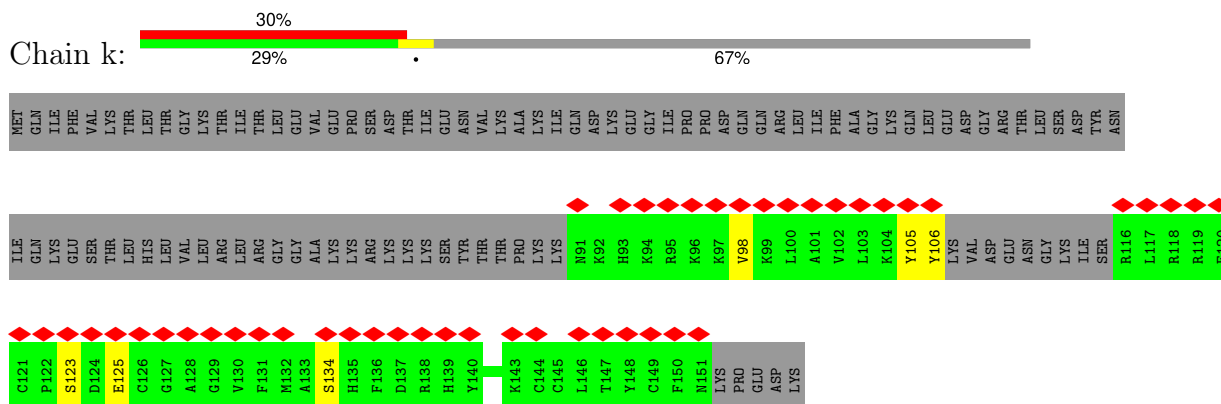
- Molecule 29: Small ribosomal subunit protein uS13



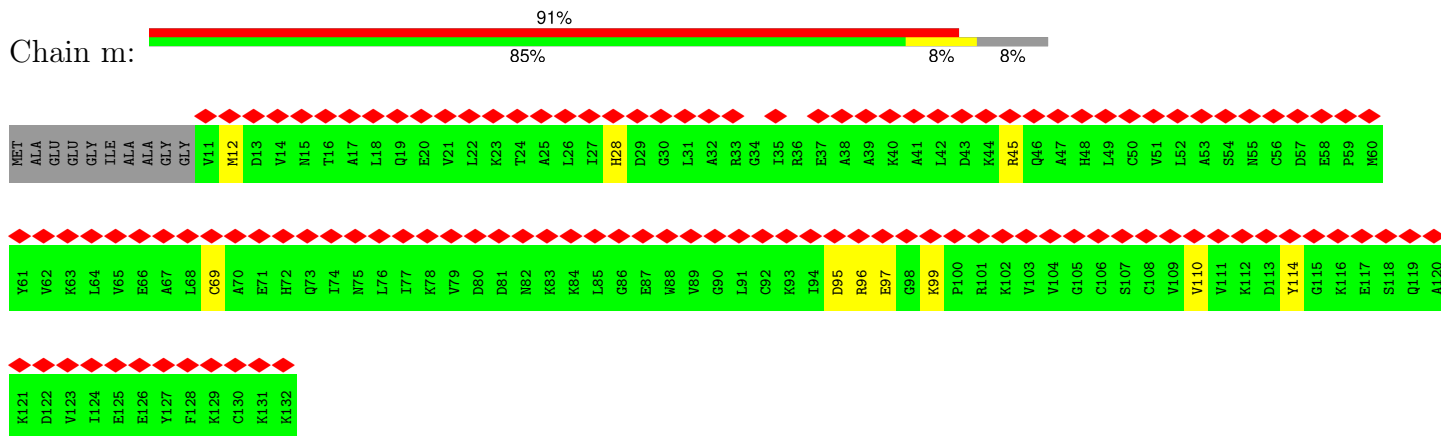
- Molecule 30: 40S ribosomal protein S29



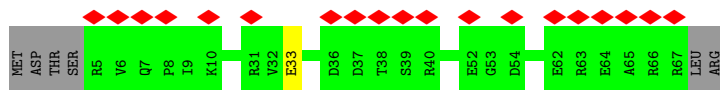
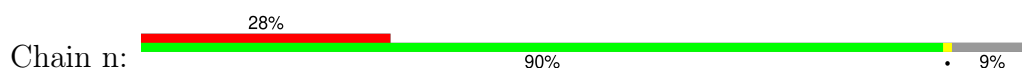
- Molecule 31: Ubiquitin-40S ribosomal protein S27a



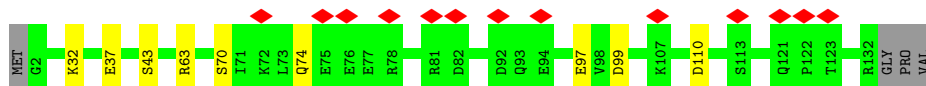
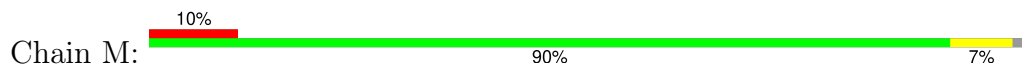
- Molecule 32: 40S ribosomal protein S12



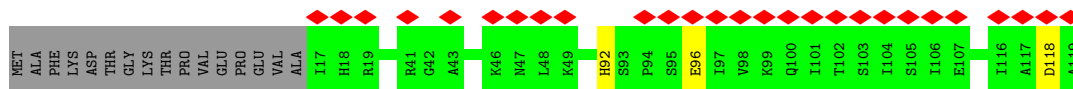
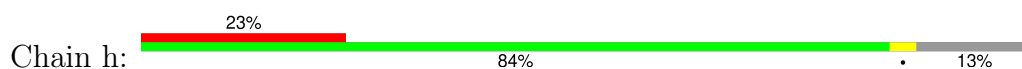
- Molecule 33: 40S ribosomal protein S28



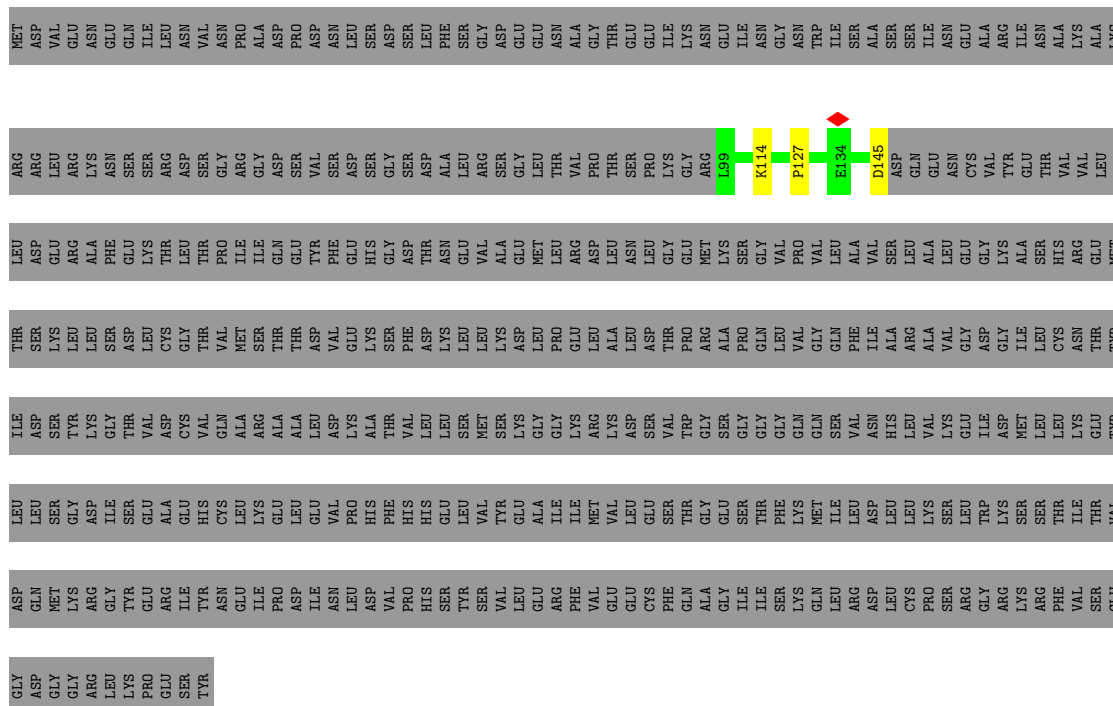
- Molecule 34: 40S ribosomal protein S17



- Molecule 35: 40S ribosomal protein S20



- Molecule 36: Programmed cell death protein 4



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	85656	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 ($e^-/\text{\AA}^2$)	25	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.084	Depositor
Minimum map value	-0.027	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.009	Depositor
Map size (Å)	330.0, 330.0, 330.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.825, 0.825, 0.825	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: JMH, UR3, 5MC, ZN, A2M, K, SPD, 4AC, MG, 5MU, OMU, OMC, PSU, 6MZ, MA6, OMG

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	S	0.32	0/1885	0.72	1/2510 (0.0%)
2	G	0.30	0/1420	0.67	0/1901
3	H	0.30	0/644	0.59	0/864
4	K	0.32	0/623	0.65	0/833
5	L	0.36	0/1743	0.59	0/2354
6	O	0.33	0/1742	0.61	0/2330
7	N	0.32	0/1670	0.61	0/2271
8	Q	0.34	0/805	0.70	0/1079
9	P	0.31	0/993	0.71	0/1330
10	I	0.33	0/1232	0.63	0/1656
11	9	0.31	0/231	0.97	0/294
12	A	0.66	0/39097	0.90	44/60929 (0.1%)
13	B	0.36	0/1197	0.66	0/1599
14	C	0.32	0/2077	0.64	0/2796
15	D	0.32	0/1502	0.72	0/2008
16	E	0.34	0/1105	0.66	0/1476
17	F	0.32	0/380	0.69	0/496
18	J	0.35	0/1051	0.68	0/1406
19	R	0.34	0/1654	0.67	0/2203
20	T	0.33	0/1028	0.69	0/1366
21	V	0.30	0/1481	0.62	0/1988
22	Y	0.32	0/1142	0.67	0/1528
23	Z	0.32	0/1793	0.64	0/2414
24	a	0.36	0/859	0.64	0/1159
25	b	0.33	0/991	0.74	1/1325 (0.1%)
26	c	0.29	0/2493	0.63	0/3394
27	d	0.30	0/1123	0.64	0/1504
28	e	0.30	0/557	0.65	0/748
29	f	0.30	0/1194	0.73	0/1599
30	i	0.38	0/470	0.73	1/623 (0.2%)
31	k	0.32	0/438	0.65	0/580
32	m	0.32	0/960	0.64	0/1286

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	n	0.35	0/500	0.80	0/669
34	M	0.31	0/1078	0.68	1/1447 (0.1%)
35	h	0.32	0/827	0.67	0/1110
36	U	0.33	0/360	0.59	0/482
All	All	0.52	0/78345	0.80	48/113557 (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
6	O	0	1
9	P	0	1
18	J	0	1
All	All	0	3

There are no bond length outliers.

The worst 5 of 48 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	S	120	ASP	CB-CG-OD1	8.39	125.85	118.30
12	A	953	C	P-O3'-C3'	-7.42	110.80	119.70
12	A	1591	C	C6-N1-C2	-7.12	117.45	120.30
25	b	82	ASP	CB-CG-OD2	7.00	124.60	118.30
12	A	1453	C	C2-N1-C1'	6.99	126.49	118.80

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
18	J	23	ARG	Sidechain
6	O	151	ARG	Sidechain
9	P	137	SER	Peptide

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

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	S	228/249 (92%)	220 (96%)	8 (4%)	0	100	100
2	G	169/194 (87%)	164 (97%)	5 (3%)	0	100	100
3	H	79/84 (94%)	74 (94%)	5 (6%)	0	100	100
4	K	79/83 (95%)	78 (99%)	1 (1%)	0	100	100
5	L	218/293 (74%)	212 (97%)	6 (3%)	0	100	100
6	O	209/264 (79%)	207 (99%)	2 (1%)	0	100	100
7	N	205/295 (70%)	204 (100%)	1 (0%)	0	100	100
8	Q	97/115 (84%)	95 (98%)	2 (2%)	0	100	100
9	P	129/151 (85%)	126 (98%)	3 (2%)	0	100	100
10	I	148/151 (98%)	145 (98%)	3 (2%)	0	100	100
11	9	22/25 (88%)	22 (100%)	0	0	100	100
13	B	139/158 (88%)	134 (96%)	5 (4%)	0	100	100
14	C	254/263 (97%)	252 (99%)	2 (1%)	0	100	100
15	D	175/194 (90%)	173 (99%)	2 (1%)	0	100	100
16	E	138/143 (96%)	137 (99%)	1 (1%)	0	100	100
17	F	43/59 (73%)	43 (100%)	0	0	100	100
18	J	127/130 (98%)	122 (96%)	5 (4%)	0	100	100
19	R	194/208 (93%)	189 (97%)	5 (3%)	0	100	100
20	T	122/133 (92%)	121 (99%)	1 (1%)	0	100	100
21	V	180/204 (88%)	173 (96%)	7 (4%)	0	100	100
22	Y	139/146 (95%)	132 (95%)	7 (5%)	0	100	100
23	Z	225/243 (93%)	218 (97%)	7 (3%)	0	100	100
24	a	97/165 (59%)	96 (99%)	1 (1%)	0	100	100
25	b	116/145 (80%)	111 (96%)	5 (4%)	0	100	100
26	c	311/317 (98%)	291 (94%)	20 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
27	d	140/145 (97%)	137 (98%)	3 (2%)	0	100	100
28	e	67/125 (54%)	62 (92%)	5 (8%)	0	100	100
29	f	140/152 (92%)	133 (95%)	7 (5%)	0	100	100
30	i	53/56 (95%)	51 (96%)	2 (4%)	0	100	100
31	k	48/156 (31%)	42 (88%)	6 (12%)	0	100	100
32	m	120/132 (91%)	110 (92%)	10 (8%)	0	100	100
33	n	61/69 (88%)	59 (97%)	2 (3%)	0	100	100
34	M	129/135 (96%)	124 (96%)	5 (4%)	0	100	100
35	h	101/119 (85%)	95 (94%)	6 (6%)	0	100	100
36	U	45/469 (10%)	45 (100%)	0	0	100	100
All	All	4747/5970 (80%)	4597 (97%)	150 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	S	200/218 (92%)	186 (93%)	14 (7%)	12	27
2	G	155/174 (89%)	145 (94%)	10 (6%)	14	31
3	H	73/76 (96%)	71 (97%)	2 (3%)	40	66
4	K	65/67 (97%)	63 (97%)	2 (3%)	35	62
5	L	186/225 (83%)	185 (100%)	1 (0%)	86	95
6	O	192/231 (83%)	188 (98%)	4 (2%)	48	73
7	N	173/243 (71%)	167 (96%)	6 (4%)	31	57
8	Q	86/98 (88%)	84 (98%)	2 (2%)	45	71
9	P	102/119 (86%)	93 (91%)	9 (9%)	8	17
10	I	130/131 (99%)	126 (97%)	4 (3%)	35	62
11	9	23/24 (96%)	20 (87%)	3 (13%)	3	6

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
13	B	130/142 (92%)	123 (95%)	7 (5%)	18	39
14	C	220/225 (98%)	216 (98%)	4 (2%)	54	77
15	D	158/168 (94%)	156 (99%)	2 (1%)	65	84
16	E	112/115 (97%)	109 (97%)	3 (3%)	40	66
17	F	38/48 (79%)	38 (100%)	0	100	100
18	J	112/113 (99%)	110 (98%)	2 (2%)	54	77
19	R	172/180 (96%)	164 (95%)	8 (5%)	22	45
20	T	107/115 (93%)	103 (96%)	4 (4%)	29	55
21	V	156/170 (92%)	149 (96%)	7 (4%)	23	47
22	Y	117/121 (97%)	110 (94%)	7 (6%)	16	35
23	Z	190/202 (94%)	179 (94%)	11 (6%)	17	36
24	a	90/136 (66%)	84 (93%)	6 (7%)	13	29
25	b	106/130 (82%)	97 (92%)	9 (8%)	8	18
26	c	272/275 (99%)	249 (92%)	23 (8%)	8	18
27	d	112/115 (97%)	108 (96%)	4 (4%)	30	56
28	e	61/103 (59%)	58 (95%)	3 (5%)	21	43
29	f	123/132 (93%)	112 (91%)	11 (9%)	8	17
30	i	48/49 (98%)	46 (96%)	2 (4%)	25	50
31	k	46/140 (33%)	40 (87%)	6 (13%)	3	6
32	m	104/108 (96%)	94 (90%)	10 (10%)	7	14
33	n	56/62 (90%)	55 (98%)	1 (2%)	54	77
34	M	119/122 (98%)	111 (93%)	8 (7%)	13	29
35	h	94/107 (88%)	91 (97%)	3 (3%)	34	60
36	U	36/404 (9%)	33 (92%)	3 (8%)	9	19
All	All	4164/5088 (82%)	3963 (95%)	201 (5%)	24	44

5 of 201 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
24	a	58	VAL
26	c	212	LYS
36	U	127	PRO
25	b	50	ARG
26	c	84	ASP

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

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
12	A	1661/1719 (96%)	361 (21%)	19 (1%)

5 of 361 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
12	A	17	C
12	A	33	G
12	A	41	G
12	A	46	A
12	A	56	G

5 of 19 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
12	A	871	U
12	A	1751	C
12	A	1781	A
12	A	1605	G
12	A	339	A

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

34 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
12	PSU	A	1081	12	18,21,22	4.42	8 (44%)	21,30,33	1.98	5 (23%)
12	OMC	A	517	12	19,22,23	2.93	8 (42%)	25,31,34	0.73	0
12	6MZ	A	1832	39,38,12	17,25,26	1.50	2 (11%)	15,36,39	2.70	3 (20%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
12	OMG	A	601	12	19,26,27	2.33	8 (42%)	21,38,41	1.61	5 (23%)
12	JMH	A	1219	39,12	18,22,23	2.64	6 (33%)	23,32,35	1.12	2 (8%)
12	4AC	A	1337	12	21,24,25	3.01	10 (47%)	28,34,37	1.88	6 (21%)
12	OMU	A	116	12	19,22,23	3.14	8 (42%)	25,31,34	1.88	6 (24%)
12	5MC	A	1374	12	19,22,23	3.86	8 (42%)	26,32,35	1.04	2 (7%)
12	A2M	A	27	39,12	18,25,26	4.38	6 (33%)	20,36,39	2.27	6 (30%)
12	A2M	A	668	39,12	18,25,26	4.25	5 (27%)	20,36,39	2.51	8 (40%)
12	UR3	A	1830	12	19,22,23	3.10	7 (36%)	26,32,35	1.77	4 (15%)
12	MA6	A	1850	12	19,26,27	1.57	2 (10%)	18,38,41	4.00	4 (22%)
12	A2M	A	99	39,12	18,25,26	4.42	6 (33%)	20,36,39	2.39	5 (25%)
12	OMG	A	1328	38,12	19,26,27	2.38	8 (42%)	21,38,41	1.58	5 (23%)
12	A2M	A	484	12	18,25,26	4.27	5 (27%)	20,36,39	2.24	7 (35%)
12	PSU	A	1243	12	18,21,22	4.42	7 (38%)	21,30,33	2.10	5 (23%)
12	4AC	A	1842	12	21,24,25	2.97	10 (47%)	28,34,37	1.05	2 (7%)
12	A2M	A	166	12	18,25,26	4.48	5 (27%)	20,36,39	2.56	7 (35%)
12	PSU	A	119	12	18,21,22	4.41	7 (38%)	21,30,33	1.82	4 (19%)
12	OMC	A	174	39,12	19,22,23	3.03	8 (42%)	25,31,34	0.84	0
12	A2M	A	159	12	18,25,26	4.43	6 (33%)	20,36,39	2.23	5 (25%)
12	MA6	A	1851	12	19,26,27	1.64	4 (21%)	18,38,41	4.01	4 (22%)
12	PSU	A	823	12	18,21,22	4.43	7 (38%)	21,30,33	1.92	4 (19%)
12	A2M	A	1031	12	18,25,26	4.39	6 (33%)	20,36,39	2.19	6 (30%)
12	5MU	A	814	12	19,22,23	0.61	0	27,32,35	0.80	1 (3%)
12	OMU	A	121	12	19,22,23	3.18	8 (42%)	25,31,34	1.80	5 (20%)
12	OMG	A	644	12	19,26,27	2.36	8 (42%)	21,38,41	1.60	5 (23%)
12	PSU	A	612	39,12	18,21,22	4.35	8 (44%)	21,30,33	2.18	6 (28%)
12	OMG	A	683	12	19,26,27	2.40	8 (42%)	21,38,41	1.66	6 (28%)
12	A2M	A	1678	12	18,25,26	4.42	6 (33%)	20,36,39	2.23	5 (25%)
12	OMC	A	1703	12	19,22,23	2.97	8 (42%)	25,31,34	0.74	0
12	OMG	A	1490	39,12	19,26,27	2.30	8 (42%)	21,38,41	1.46	5 (23%)
12	OMG	A	509	39,12	19,26,27	2.25	8 (42%)	21,38,41	1.43	3 (14%)
12	PSU	A	822	12	18,21,22	4.37	8 (44%)	21,30,33	2.05	6 (28%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
12	PSU	A	1081	12	-	1/7/25/26	0/2/2/2
12	OMC	A	517	12	-	0/9/27/28	0/2/2/2
12	6MZ	A	1832	39,38,12	-	2/5/27/28	0/3/3/3
12	OMG	A	601	12	-	0/5/27/28	0/3/3/3
12	JMH	A	1219	39,12	-	0/7/25/26	0/2/2/2
12	4AC	A	1337	12	-	2/11/29/30	0/2/2/2
12	OMU	A	116	12	-	0/9/27/28	0/2/2/2
12	5MC	A	1374	12	-	0/7/25/26	0/2/2/2
12	A2M	A	27	39,12	-	0/5/27/28	0/3/3/3
12	A2M	A	668	39,12	-	2/5/27/28	0/3/3/3
12	UR3	A	1830	12	-	0/7/25/26	0/2/2/2
12	MA6	A	1850	12	-	0/7/29/30	0/3/3/3
12	A2M	A	99	39,12	-	2/5/27/28	0/3/3/3
12	OMG	A	1328	38,12	-	0/5/27/28	0/3/3/3
12	A2M	A	484	12	-	0/5/27/28	0/3/3/3
12	PSU	A	1243	12	-	0/7/25/26	0/2/2/2
12	4AC	A	1842	12	-	0/11/29/30	0/2/2/2
12	A2M	A	166	12	-	2/5/27/28	0/3/3/3
12	PSU	A	119	12	-	0/7/25/26	0/2/2/2
12	OMC	A	174	39,12	-	3/9/27/28	0/2/2/2
12	A2M	A	159	12	-	2/5/27/28	0/3/3/3
12	MA6	A	1851	12	-	3/7/29/30	0/3/3/3
12	PSU	A	823	12	-	2/7/25/26	0/2/2/2
12	A2M	A	1031	12	-	0/5/27/28	0/3/3/3
12	5MU	A	814	12	-	0/7/25/26	0/2/2/2
12	OMU	A	121	12	-	0/9/27/28	0/2/2/2
12	OMG	A	644	12	-	1/5/27/28	0/3/3/3
12	PSU	A	612	39,12	-	0/7/25/26	0/2/2/2
12	OMG	A	683	12	-	2/5/27/28	0/3/3/3
12	A2M	A	1678	12	-	0/5/27/28	0/3/3/3
12	OMC	A	1703	12	-	1/9/27/28	0/2/2/2
12	OMG	A	1490	39,12	-	1/5/27/28	0/3/3/3
12	OMG	A	509	39,12	-	0/5/27/28	0/3/3/3
12	PSU	A	822	12	-	2/7/25/26	0/2/2/2

The worst 5 of 227 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	A	166	A2M	O4'-C1'	16.51	1.62	1.40
12	A	159	A2M	O4'-C1'	16.20	1.62	1.40
12	A	99	A2M	O4'-C1'	16.18	1.62	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	A	1678	A2M	O4'-C1'	16.11	1.62	1.40
12	A	1031	A2M	O4'-C1'	16.07	1.62	1.40

The worst 5 of 147 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	A	1851	MA6	N1-C6-N6	-12.09	102.86	116.83
12	A	1850	MA6	C1'-N9-C4	10.52	145.12	126.64
12	A	1850	MA6	N1-C6-N6	-10.32	104.91	116.83
12	A	1851	MA6	C1'-N9-C4	9.23	142.87	126.64
12	A	1832	6MZ	N3-C2-N1	-6.64	119.66	128.67

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
12	A	166	A2M	O4'-C4'-C5'-O5'
12	A	166	A2M	C3'-C4'-C5'-O5'
12	A	823	PSU	O4'-C1'-C5-C4
12	A	823	PSU	O4'-C1'-C5-C6
12	A	1832	6MZ	N1-C6-N6-C9

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 111 ligands modelled in this entry, 110 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
40	SPD	A	2005	-	9,9,9	0.31	0	8,8,8	0.45	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
40	SPD	A	2005	-	-	3/7/7/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

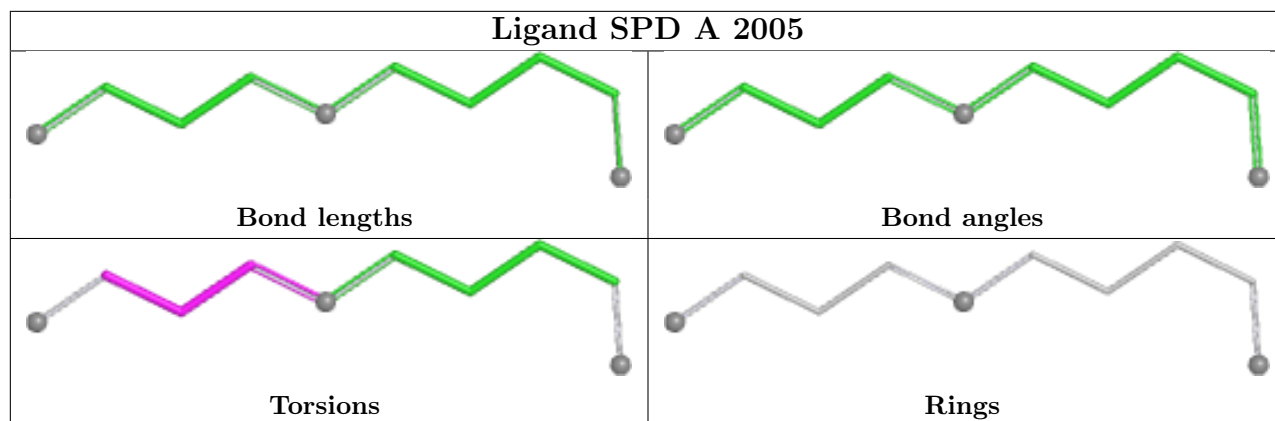
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
40	A	2005	SPD	C8-C7-N6-C5
40	A	2005	SPD	N6-C7-C8-C9
40	A	2005	SPD	C7-C8-C9-N10

There are no ring outliers.

No monomer is involved in short contacts.

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



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
12	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	225:G	O3'	287:U	P	7.96

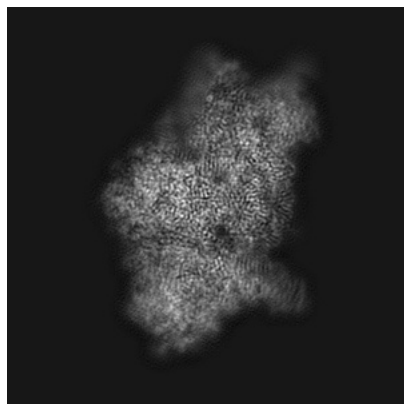
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-44641. These allow visual inspection of the internal detail of the map and identification of artifacts.

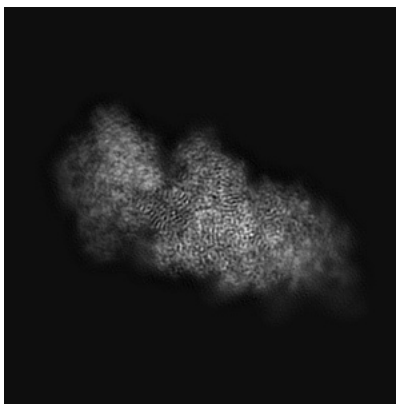
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

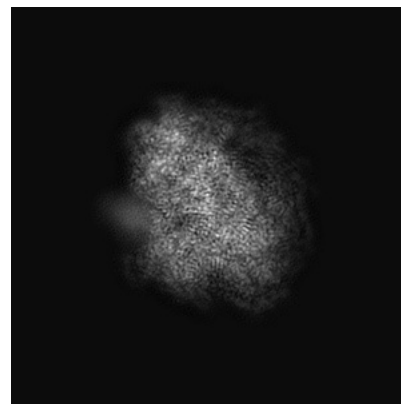
6.1.1 Primary map



X

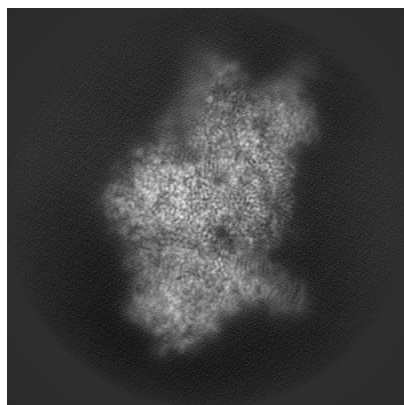


Y

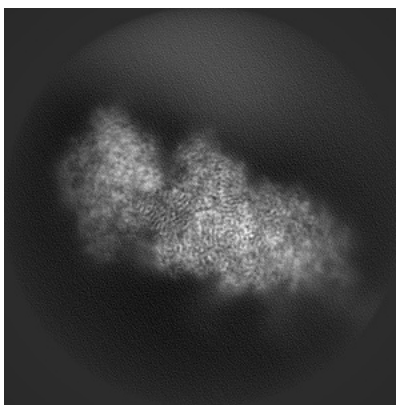


Z

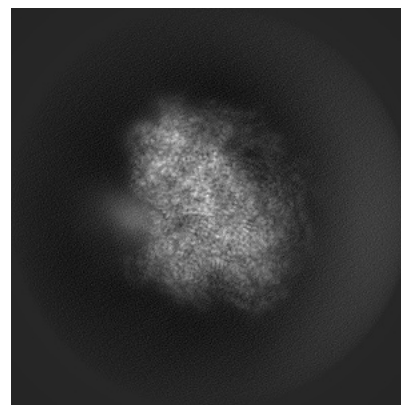
6.1.2 Raw map



X



Y

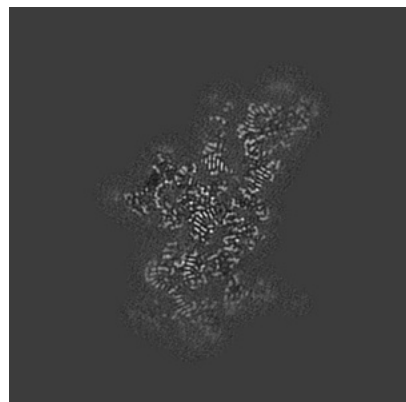


Z

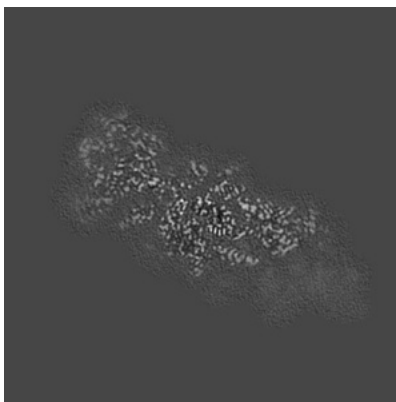
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

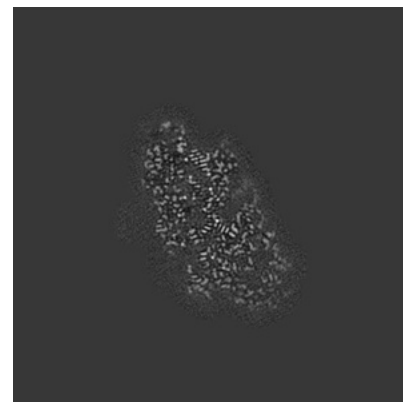
6.2.1 Primary map



X Index: 200

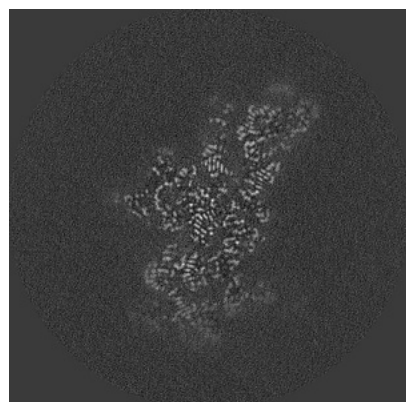


Y Index: 200

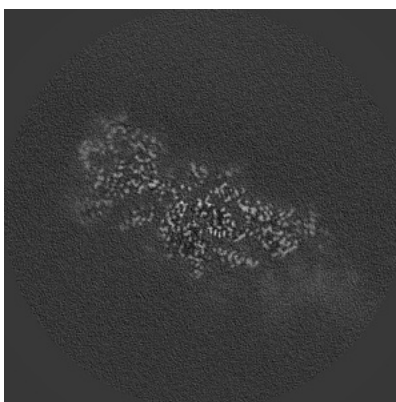


Z Index: 200

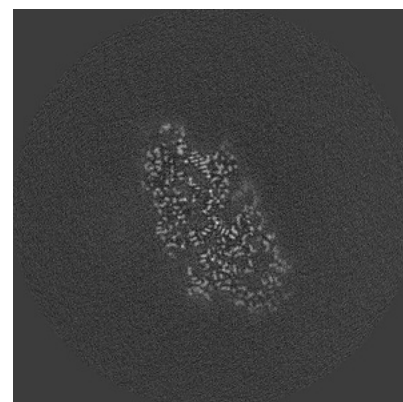
6.2.2 Raw map



X Index: 200



Y Index: 200

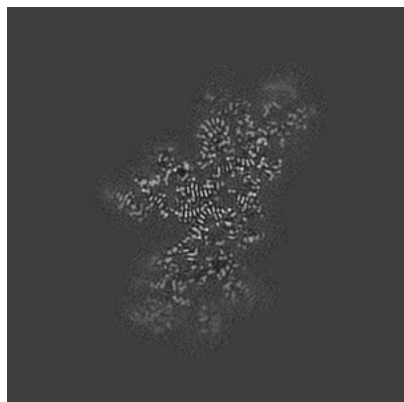


Z Index: 200

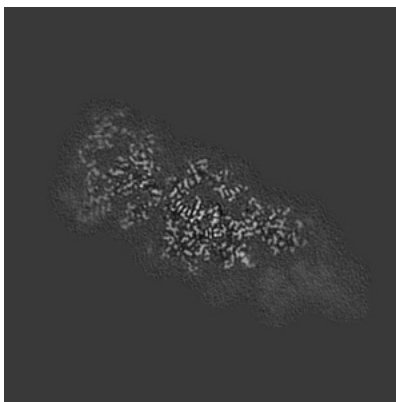
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

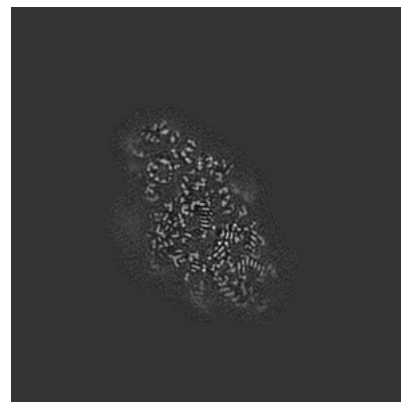
6.3.1 Primary map



X Index: 193

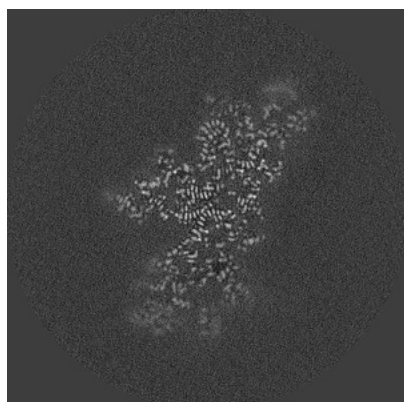


Y Index: 195

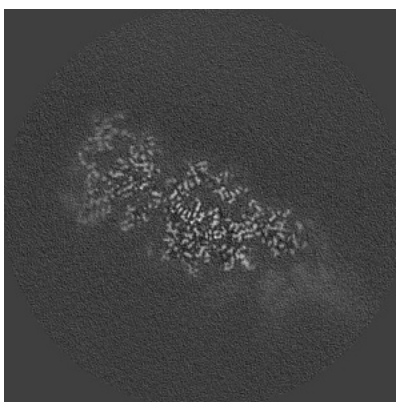


Z Index: 216

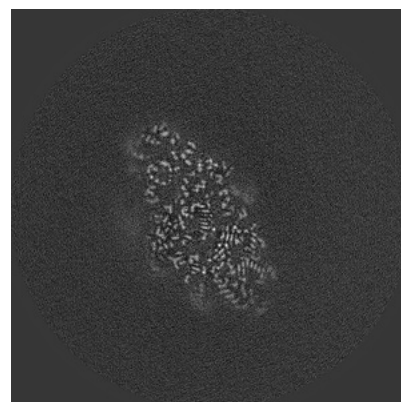
6.3.2 Raw map



X Index: 193



Y Index: 195

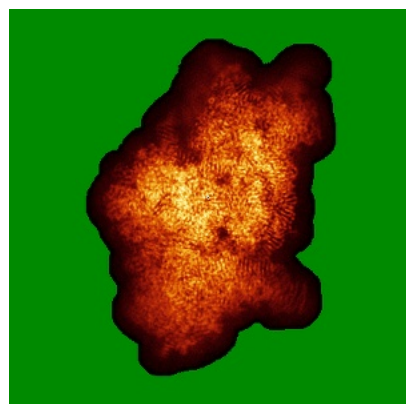


Z Index: 216

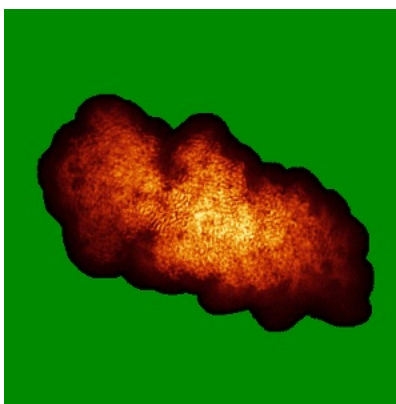
The images above show the largest variance slices of the map in three orthogonal directions.

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

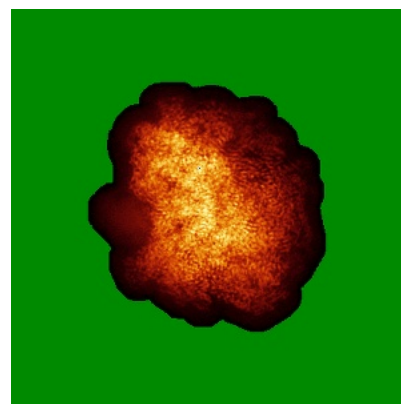
6.4.1 Primary map



X

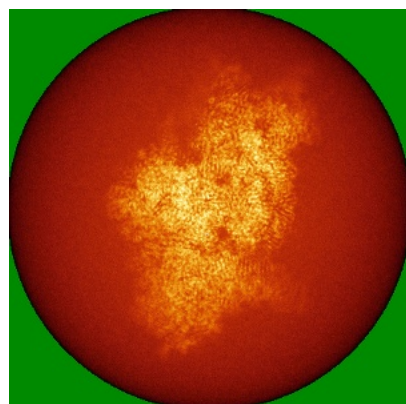


Y

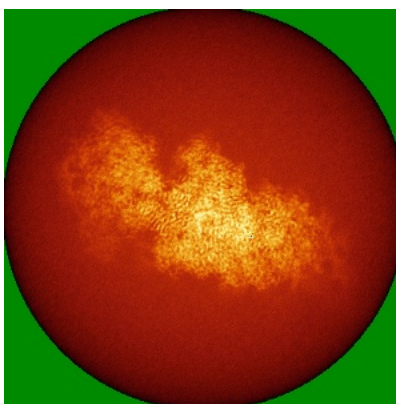


Z

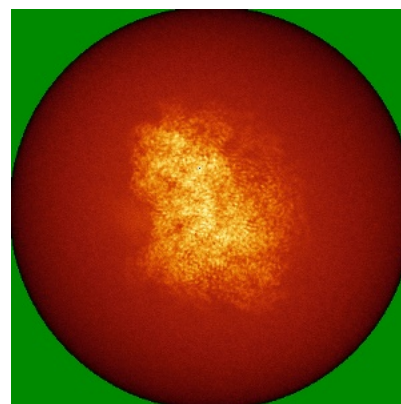
6.4.2 Raw map



X



Y

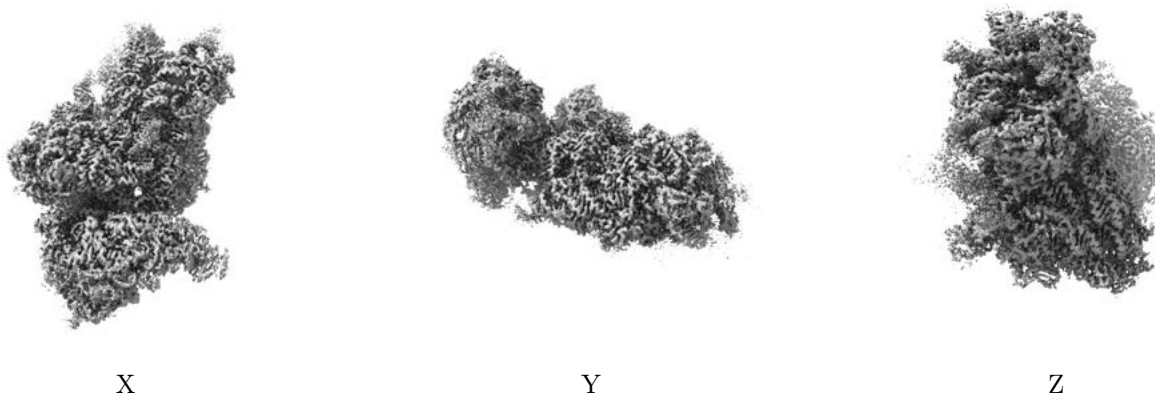


Z

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

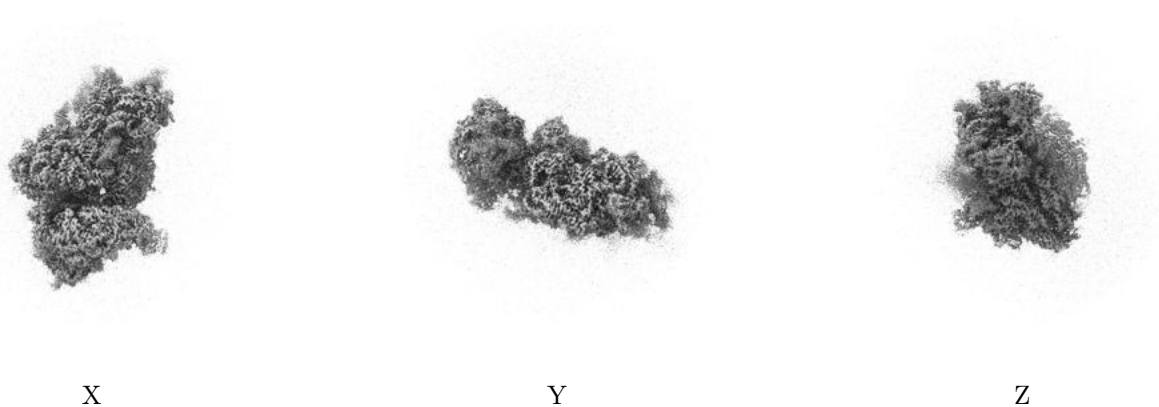
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.009. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

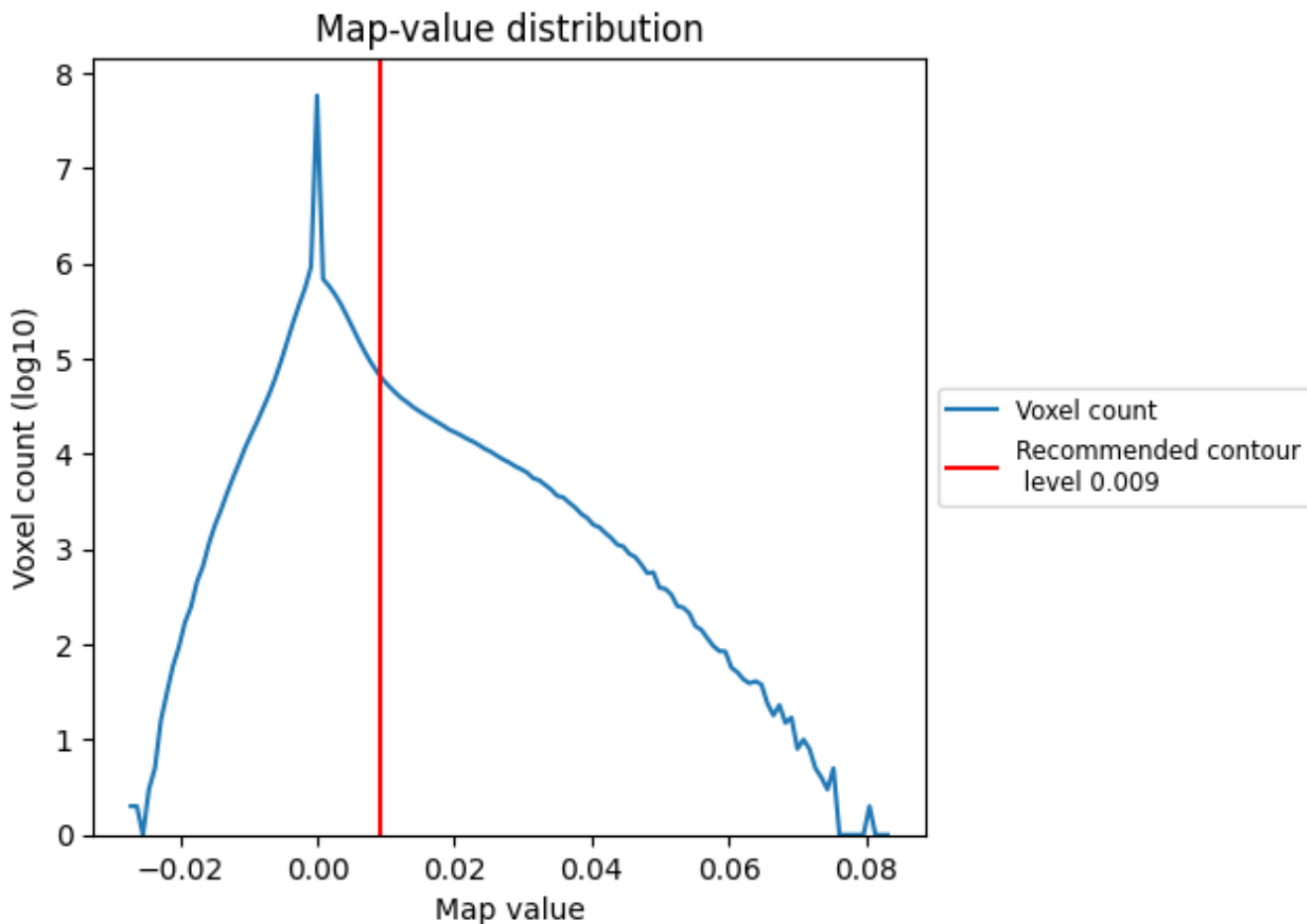
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

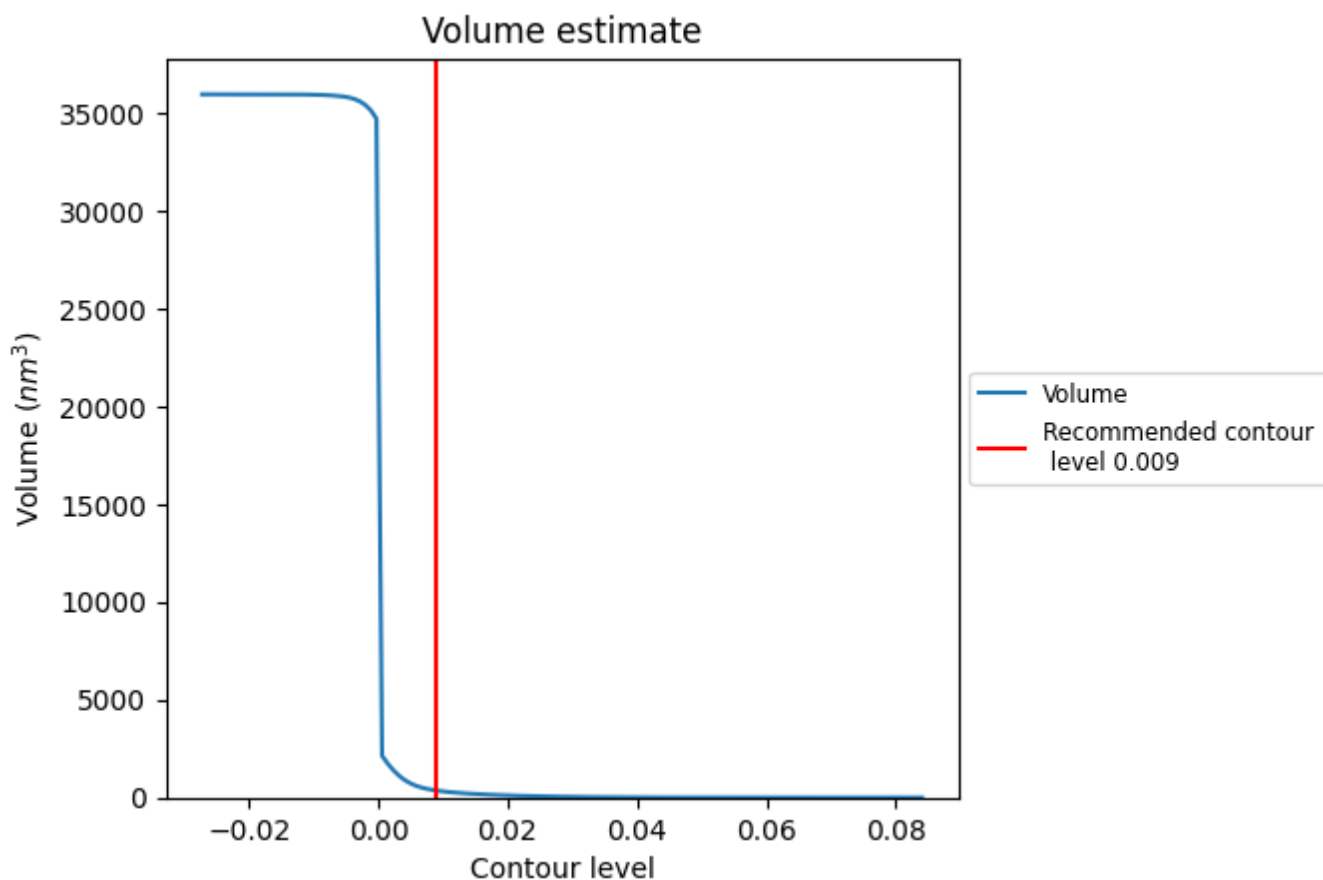
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

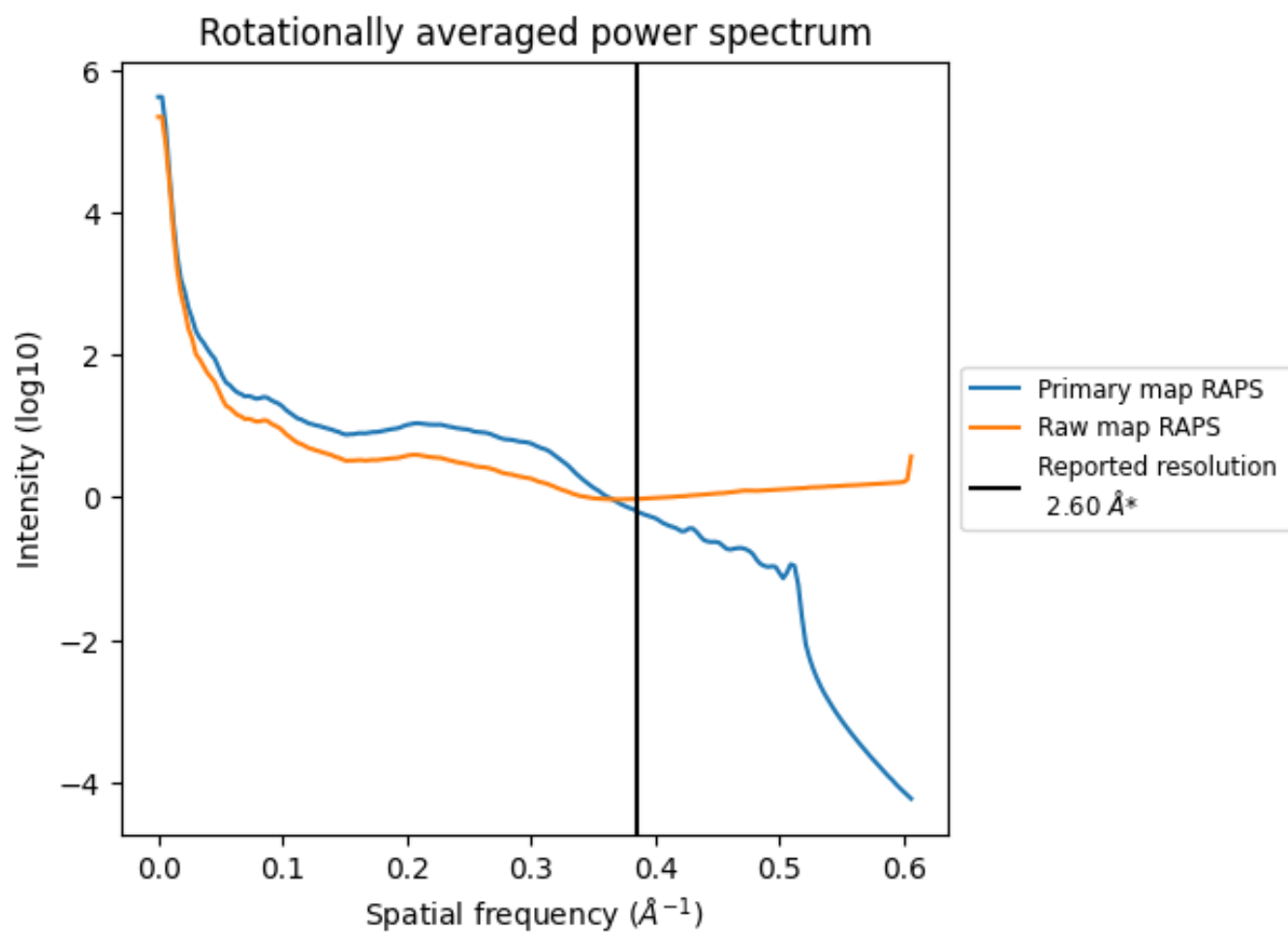
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 359 nm³; this corresponds to an approximate mass of 324 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

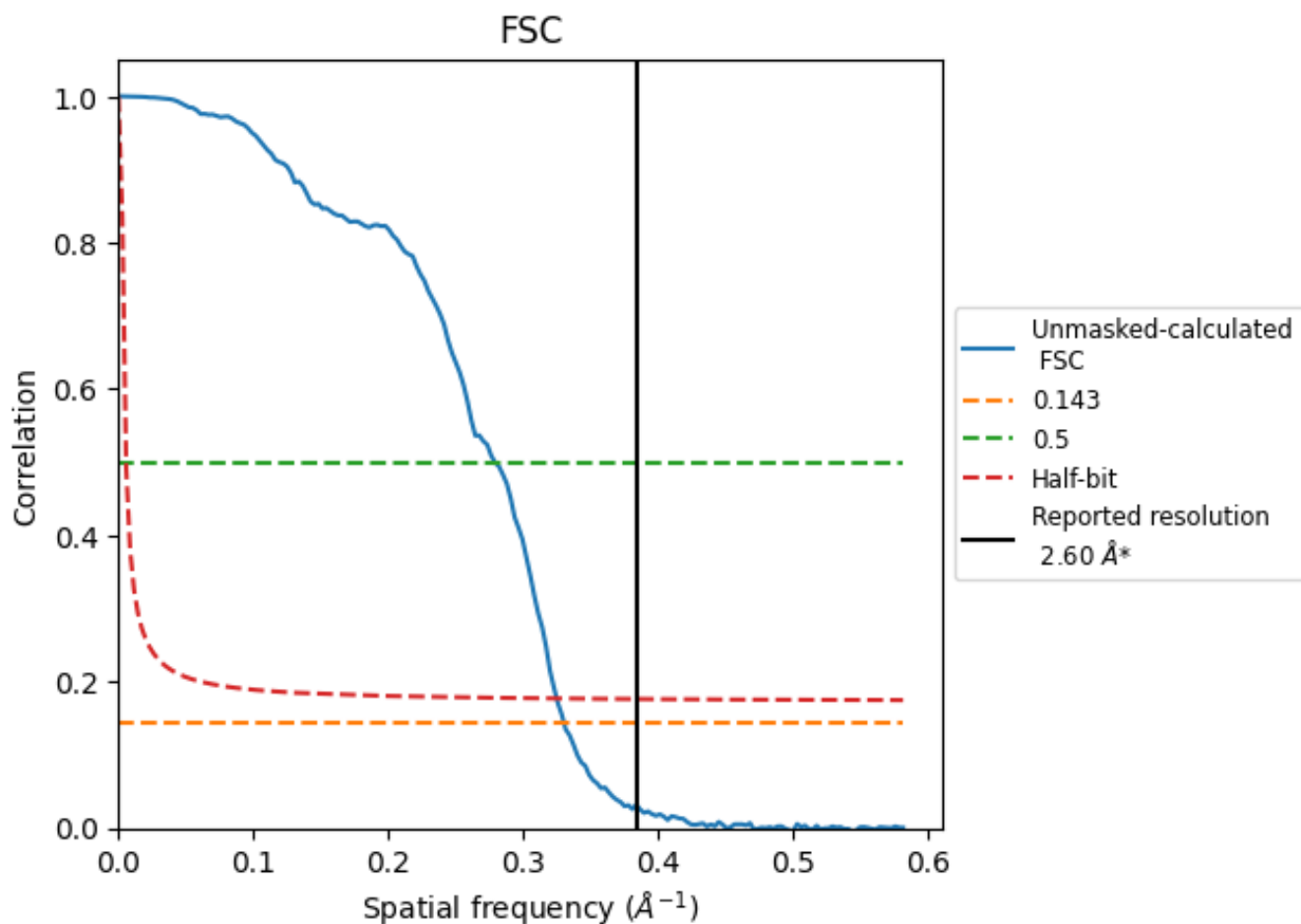


*Reported resolution corresponds to spatial frequency of 0.385 \AA^{-1}

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.385 \AA^{-1}

8.2 Resolution estimates [i](#)

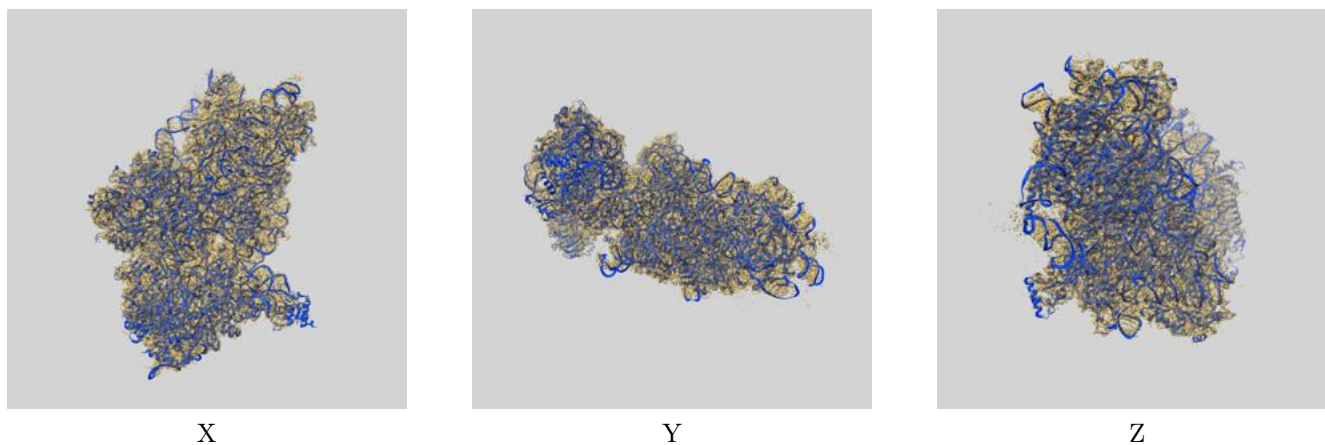
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.60	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.03	3.59	3.08

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.03 differs from the reported value 2.6 by more than 10 %

9 Map-model fit [i](#)

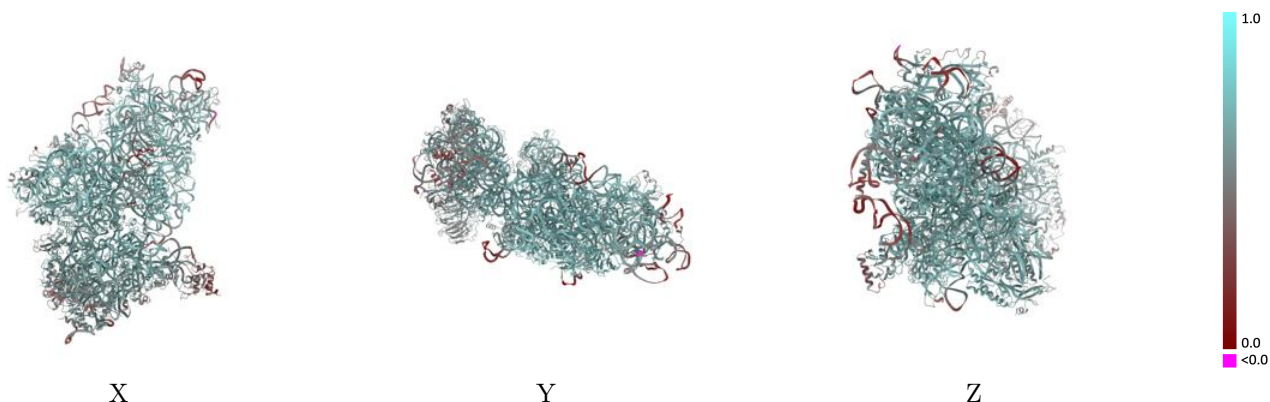
This section contains information regarding the fit between EMDB map EMD-44641 and PDB model 9BKD. Per-residue inclusion information can be found in section [3](#) on page [12](#).

9.1 Map-model overlay [i](#)



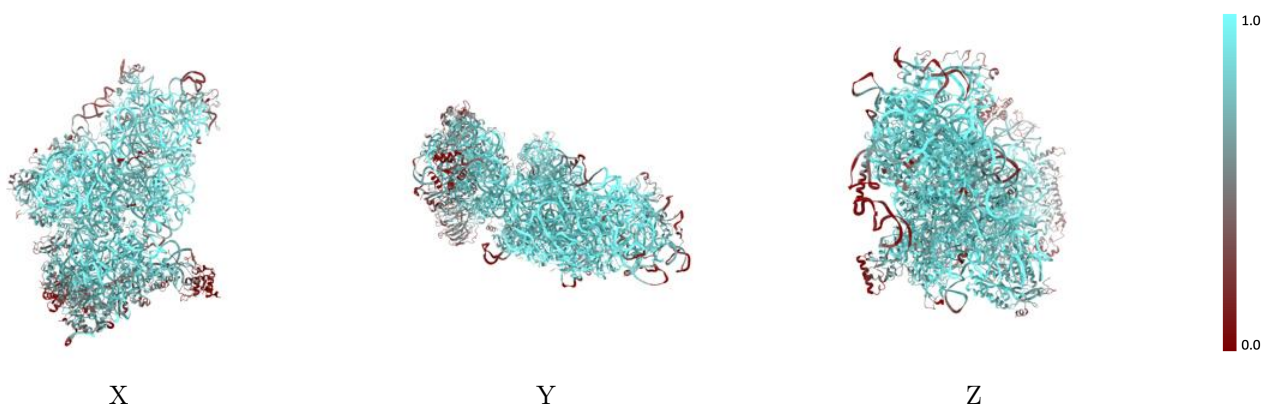
The images above show the 3D surface view of the map at the recommended contour level 0.009 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



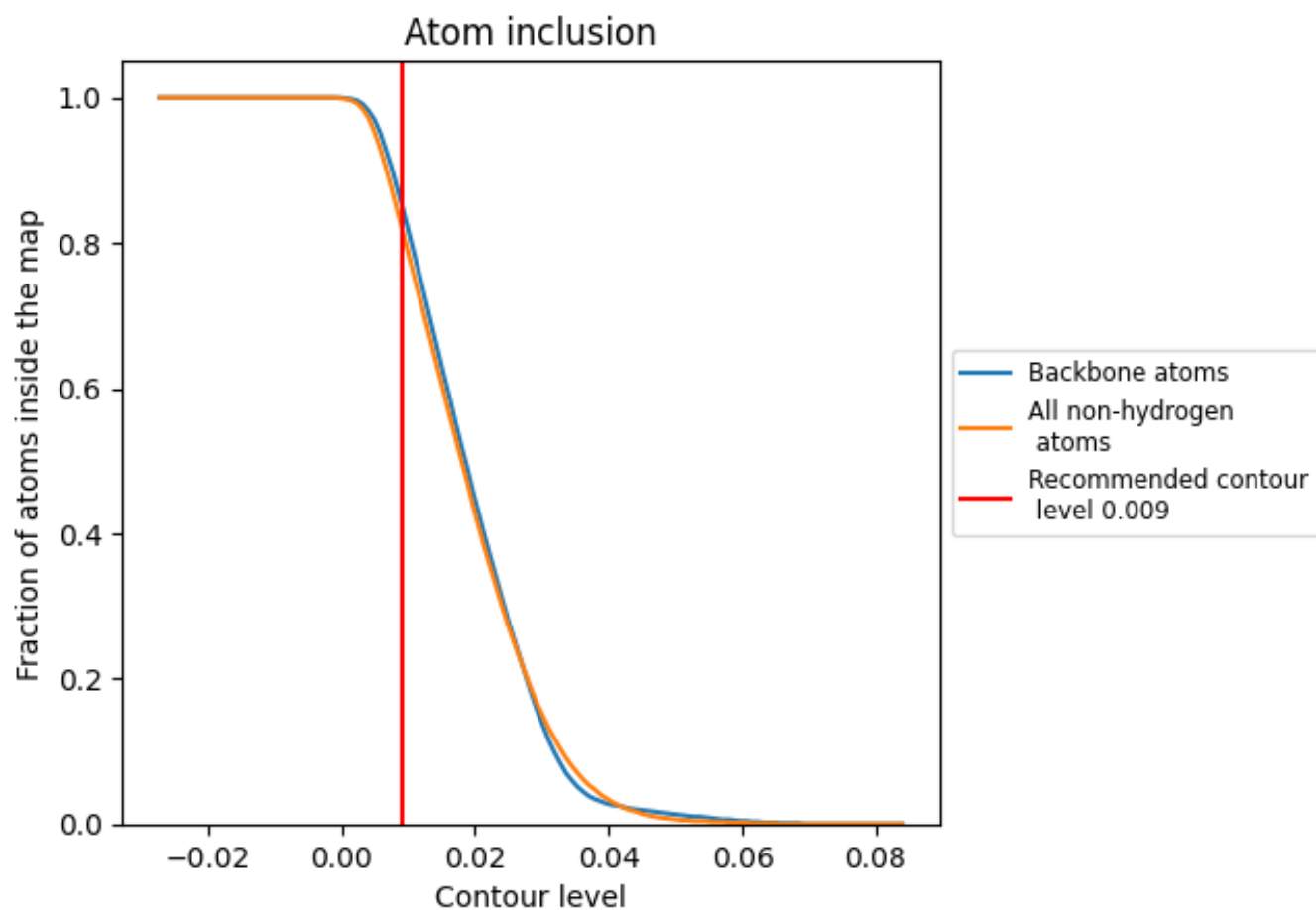
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.009).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 86% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary





The table lists the average atom inclusion at the recommended contour level (0.009) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8230	 0.6140
9	 0.7750	 0.6240
A	 0.8950	 0.6180
B	 0.9050	 0.6690
C	 0.9580	 0.6850
D	 0.9360	 0.6820
E	 0.9560	 0.6920
F	 0.9170	 0.6800
G	 0.5900	 0.5580
H	 0.8040	 0.6290
I	 0.8810	 0.6640
J	 0.9670	 0.6990
K	 0.9220	 0.6740
L	 0.9330	 0.6870
M	 0.7400	 0.6080
N	 0.9370	 0.6760
O	 0.7890	 0.6270
P	 0.8530	 0.6370
Q	 0.9170	 0.6750
R	 0.8320	 0.6290
S	 0.7090	 0.5810
T	 0.9110	 0.6650
U	 0.8690	 0.6330
V	 0.7120	 0.5820
Y	 0.7760	 0.6070
Z	 0.8090	 0.6300
a	 0.7190	 0.5790
b	 0.6080	 0.5600
c	 0.4520	 0.5040
d	 0.7030	 0.5830
e	 0.1780	 0.4490
f	 0.4910	 0.5240
h	 0.6490	 0.5680
i	 0.9280	 0.6720
k	 0.1470	 0.3940



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Chain	Atom inclusion	Q-score
m	 0.0630	 0.3490
n	 0.5560	 0.5180