



## Full wwPDB EM Validation Report ⓘ

Jun 18, 2022 – 09:12 am BST

PDB ID : 7PNT  
EMDB ID : EMD-13551  
Title : Assembly intermediate of mouse mitochondrial ribosome small subunit without mS37 in complex with RbfA and Tfb1m  
Authors : Itoh, Y.; Khawaja, A.; Laptev, I.; Sergiev, P.; Rorbach, J.; Amunts, A.  
Deposited on : 2021-09-08  
Resolution : 3.19 Å(reported)  
Based on initial model : 6RW4

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

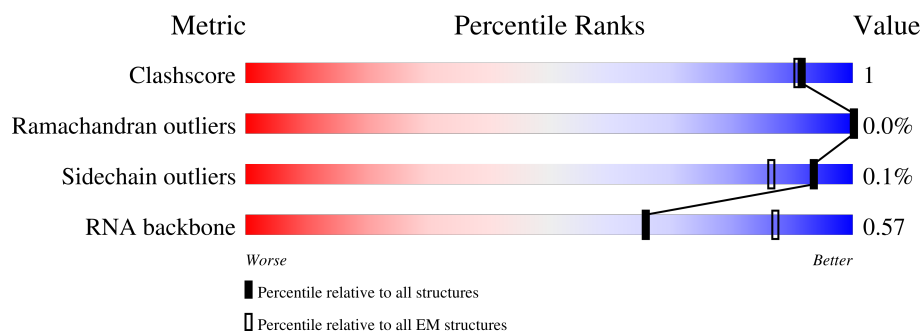
EMDB validation analysis : 0.0.1.dev8  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.28.1

# 1 Overall quality at a glance

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

The reported resolution of this entry is 3.19 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.








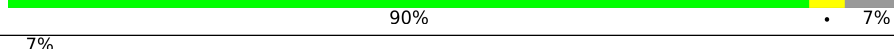
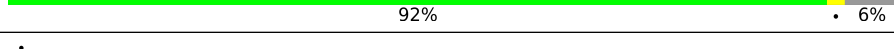
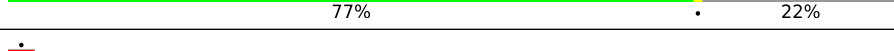
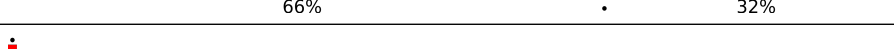
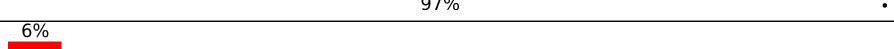
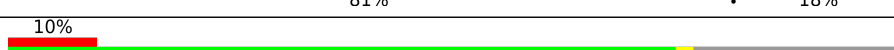

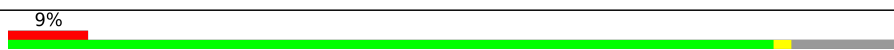

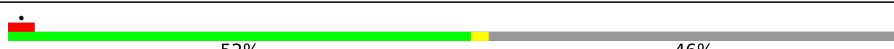


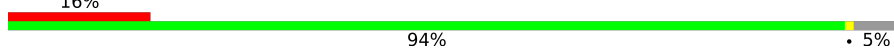
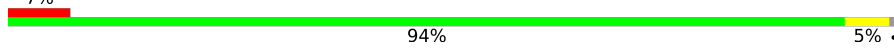


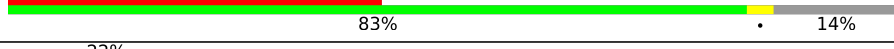



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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

Mol	Chain	Length	Quality of chain
1	A	956	<div> <div>9%</div> <div>76%</div> <div>18%</div> <div>5%</div> </div>
2	B	291	<div> <div>72%</div> <div>23%</div> </div>
3	C	167	<div> <div>75%</div> <div>21%</div> </div>
4	D	432	<div> <div>13%</div> <div>74%</div> <div>22%</div> </div>
5	E	125	<div> <div>5%</div> <div>93%</div> <div>5%</div> </div>
6	F	242	<div> <div>14%</div> <div>82%</div> <div>14%</div> </div>
7	G	390	<div> <div>12%</div> <div>79%</div> <div>17%</div> </div>

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Mol	Chain	Length	Quality of chain
8	H	160	
9	I	191	
10	J	139	
11	K	128	
12	L	258	
13	M	135	
14	N	120	
15	O	254	
16	P	143	
17	Q	86	
18	R	359	
19	S	177	
20	T	171	
21	U	200	
22	V	415	
23	W	186	
24	X	391	
25	Y	384	
26	Z	106	
27	0	218	
28	1	320	
29	3	200	
30	4	685	
31	a	350	
32	c	345	

## 2 Entry composition

There are 38 unique types of molecules in this entry. The entry contains 128436 atoms, of which 59523 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 RNA chain called 12S mitochondrial rRNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	909	Total	C	H	N	O	P	0	0
			29056	8669	9755	3459	6264	909		

- Molecule 2 is a protein called 28S ribosomal protein S2, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	223	Total	C	H	N	O	S	0	0
			3590	1142	1799	326	315	8		

- Molecule 3 is a protein called 28S ribosomal protein S24, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	C	132	Total	C	H	N	O	S	0	0
			2163	690	1091	197	180	5		

- Molecule 4 is a protein called 28S ribosomal protein S5, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	D	337	Total	C	H	N	O	S	0	0
			5414	1686	2732	513	473	10		

- Molecule 5 is a protein called 28S ribosomal protein S6, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	E	122	Total	C	H	N	O	S	0	0
			1986	617	1007	181	178	3		

- Molecule 6 is a protein called 28S ribosomal protein S7, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	F	208	Total	C	H	N	O	S	0	0
			3472	1096	1750	316	299	11		

- Molecule 7 is a protein called 28S ribosomal protein S9, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	G	325	Total	C	H	N	O	S	0	0
			5304	1689	2630	480	491	14		

- Molecule 8 is a protein called 28S ribosomal protein S10, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	H	140	Total	C	H	N	O	S	0	0
			2346	742	1193	200	207	4		

- Molecule 9 is a protein called 28S ribosomal protein S11, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	I	137	Total	C	H	N	O	S	0	0
			2047	629	1038	191	184	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	181	5F0	ASN	conflict	UNP Q9DCA2

- Molecule 10 is a protein called 28S ribosomal protein S12, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	J	108	Total	C	H	N	O	S	0	0
			1749	528	903	172	141	5		

- Molecule 11 is a protein called 28S ribosomal protein S14, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
11	K	101	Total	C	H	N	O	S	0	0
			1743	534	888	175	140	6		

- Molecule 12 is a protein called 28S ribosomal protein S15, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
12	L	176	Total	C	H	N	O	S	0	0
			3041	930	1576	274	255	6		

- Molecule 13 is a protein called 28S ribosomal protein S16, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
13	M	126	Total	C	H	N	O	S	0	0
			2004	623	1009	194	172	6		

- Molecule 14 is a protein called 28S ribosomal protein S17, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
14	N	113	Total	C	H	N	O	S	0	0
			1839	575	951	160	150	3		

- Molecule 15 is a protein called 28S ribosomal protein S18b, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
15	O	197	Total	C	H	N	O	S	0	0
			3146	1014	1548	289	286	9		

- Molecule 16 is a protein called 28S ribosomal protein S18c, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
16	P	97	Total	C	H	N	O	S	0	0
			1610	505	818	140	139	8		

- Molecule 17 is a protein called 28S ribosomal protein S21, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
17	Q	86	Total	C	H	N	O	S	0	0
			1482	453	750	146	126	7		

- Molecule 18 is a protein called 28S ribosomal protein S22, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
18	R	294	Total	C	H	N	O	S	0	0
			4816	1526	2416	418	449	7		

- Molecule 19 is a protein called 28S ribosomal protein S23, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
19	S	136	Total	C	H	N	O	S	0	0
			2257	722	1133	199	201	2		

- Molecule 20 is a protein called 28S ribosomal protein S25, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
20	T	170	Total	C	H	N	O	S	0	0
			2801	892	1413	238	246	12		

- Molecule 21 is a protein called 28S ribosomal protein S26, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
21	U	174	Total	C	H	N	O	S	0	0
			2908	894	1459	283	270	2		

- Molecule 22 is a protein called 28S ribosomal protein S27, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
22	V	365	Total	C	H	N	O	S	0	0
			5970	1911	2972	506	570	11		

- Molecule 23 is a protein called 28S ribosomal protein S28, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
23	W	100	Total	C	H	N	O	S	0	0
			1606	503	813	141	146	3		

- Molecule 24 is a protein called 28S ribosomal protein S29, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
24	X	357	Total	C	H	N	O	S	0	0
			5762	1834	2881	515	522	10		

- Molecule 25 is a protein called 28S ribosomal protein S31, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
25	Y	149	Total	C	H	N	O	S	0	0
			2439	809	1193	201	233	3		

- Molecule 26 is a protein called 28S ribosomal protein S33, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
26	Z	101	Total	C	H	N	O	S	0	0
			1682	526	848	157	148	3		

- Molecule 27 is a protein called 28S ribosomal protein S34, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
27	0	216	Total	C	H	N	O	S	0	0
			3649	1139	1838	355	313	4		

- Molecule 28 is a protein called 28S ribosomal protein S35, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
28	1	278	Total	C	H	N	O	S	0	0
			4464	1403	2241	384	424	12		

- Molecule 29 is a protein called Aurora kinase A-interacting protein.

Mol	Chain	Residues	Atoms						AltConf	Trace
29	3	50	Total	C	H	N	O		0	0
			929	286	489	86	68			

- Molecule 30 is a protein called Pentatricopeptide repeat domain-containing protein 3, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
30	4	589	Total	C	H	N	O	S	0	0
			9558	3064	4800	800	872	22		

- Molecule 31 is a protein called Putative ribosome-binding factor A, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
31	a	134	Total	C	H	N	O	S	0	0
			2169	680	1099	190	197	3		

- Molecule 32 is a protein called Dimethyladenosine transferase 1, mitochondrial.

Mol	Chain	Residues	Atoms						AltConf	Trace
32	c	299	Total	C	H	N	O	S	0	0
			4871	1543	2478	419	421	10		

- Molecule 33 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
33	A	32	Total	Mg	0
			32	32	
33	B	1	Total	Mg	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
33	X	1	Total	Mg	0
			1	1	

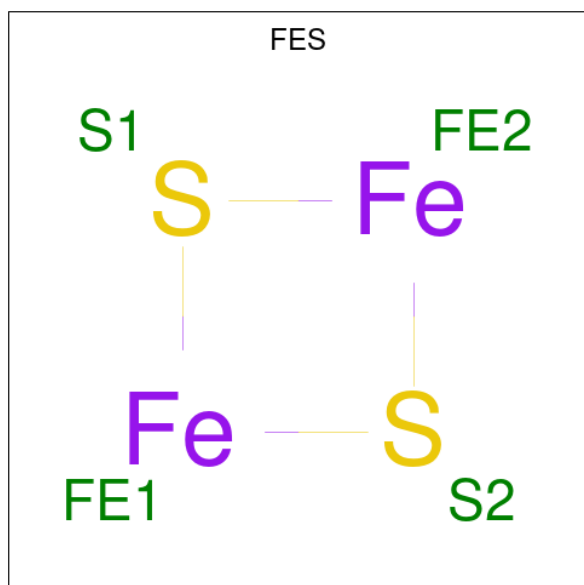
- Molecule 34 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
34	A	7	Total	K	0
			7	7	

- Molecule 35 is ZINC ION (three-letter code: ZN) (formula: Zn).

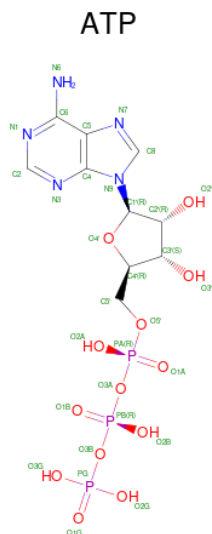
Mol	Chain	Residues	Atoms		AltConf
35	O	1	Total	Zn	0
			1	1	

- Molecule 36 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe<sub>2</sub>S<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
36	P	1	Total	Fe	S	0
			4	2	2	
36	T	1	Total	Fe	S	0
			4	2	2	

- Molecule 37 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms						AltConf
37	X	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	

- Molecule 38 is water.

Mol	Chain	Residues	Atoms	AltConf
38	A	268	Total O 268 268	0
38	B	7	Total O 7 7	0
38	C	23	Total O 23 23	0
38	D	14	Total O 14 14	0
38	F	5	Total O 5 5	0
38	G	9	Total O 9 9	0
38	H	11	Total O 11 11	0
38	I	3	Total O 3 3	0
38	J	4	Total O 4 4	0
38	K	15	Total O 15 15	0
38	L	1	Total O 1 1	0

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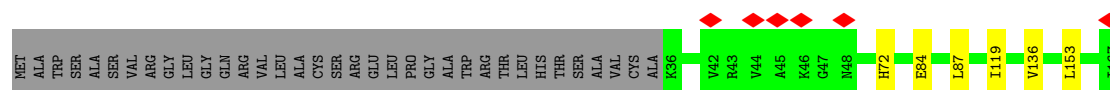
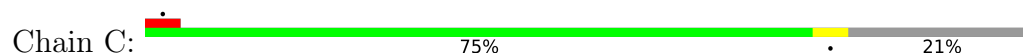
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Mol	Chain	Residues	Atoms		AltConf
38	M	17	Total 17	O 17	0
38	N	2	Total 2	O 2	0
38	O	20	Total 20	O 20	0
38	P	6	Total 6	O 6	0
38	Q	2	Total 2	O 2	0
38	R	5	Total 5	O 5	0
38	S	2	Total 2	O 2	0
38	T	6	Total 6	O 6	0
38	U	3	Total 3	O 3	0
38	X	4	Total 4	O 4	0
38	Y	3	Total 3	O 3	0
38	Z	17	Total 17	O 17	0
38	0	5	Total 5	O 5	0
38	1	11	Total 11	O 11	0
38	4	7	Total 7	O 7	0

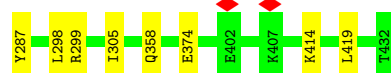
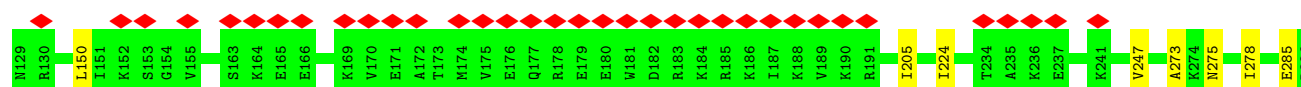
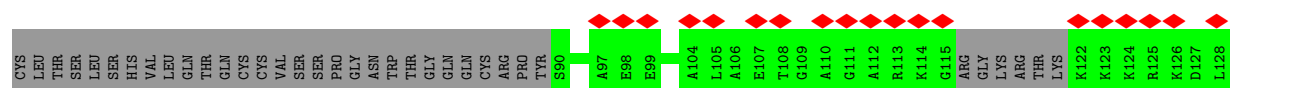
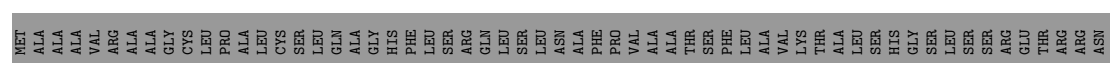
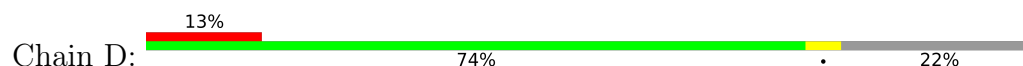




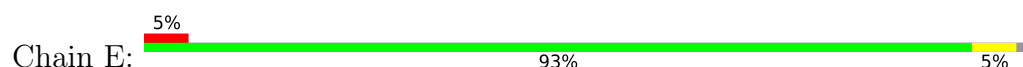
- Molecule 3: 28S ribosomal protein S24, mitochondrial



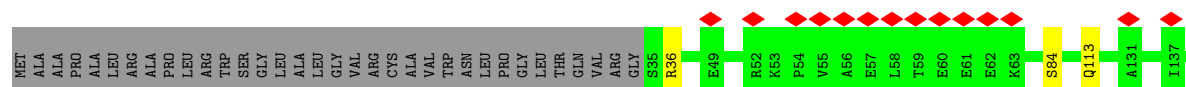
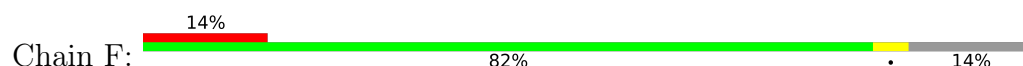
- Molecule 4: 28S ribosomal protein S5, mitochondrial



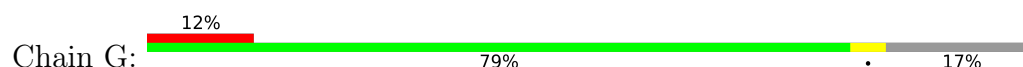
- Molecule 5: 28S ribosomal protein S6, mitochondrial

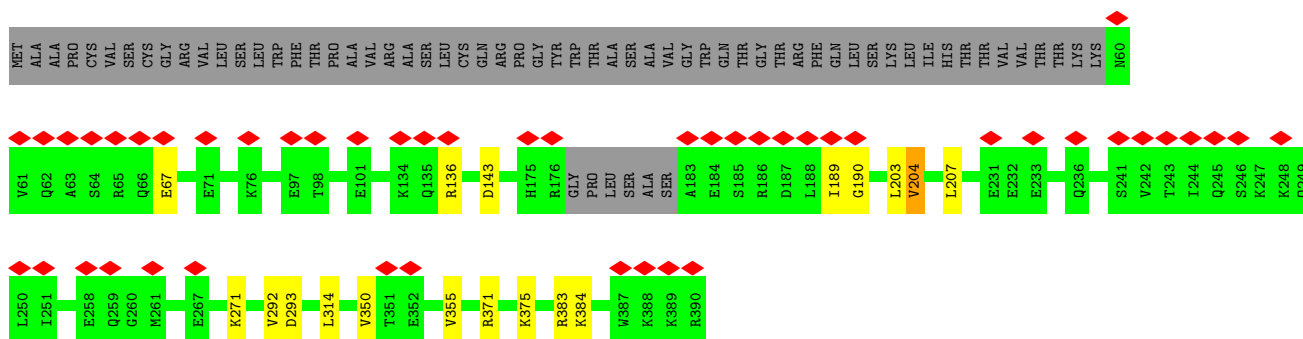


- Molecule 6: 28S ribosomal protein S7, mitochondrial

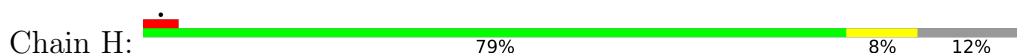


- Molecule 7: 28S ribosomal protein S9, mitochondrial

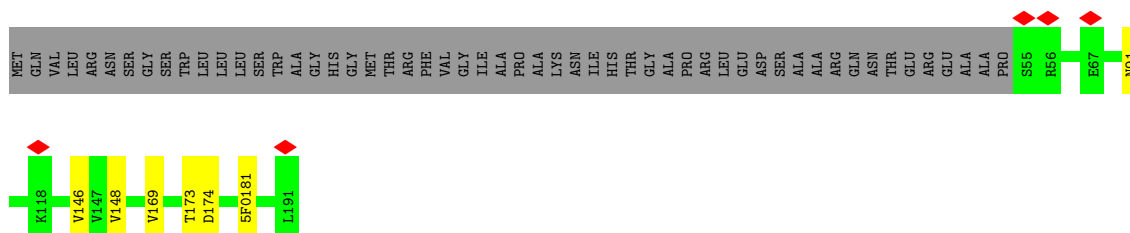




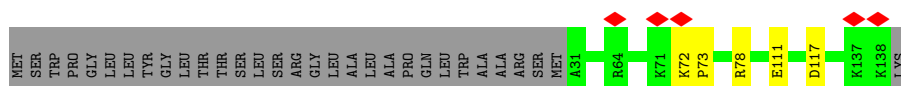
- Molecule 8: 28S ribosomal protein S10, mitochondrial



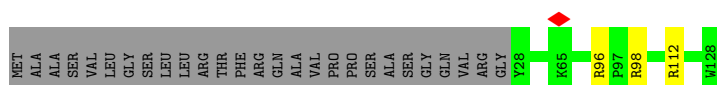
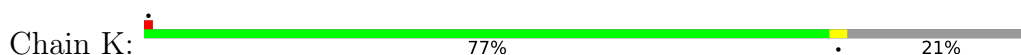
- Molecule 9: 28S ribosomal protein S11, mitochondrial



- Molecule 10: 28S ribosomal protein S12, mitochondrial

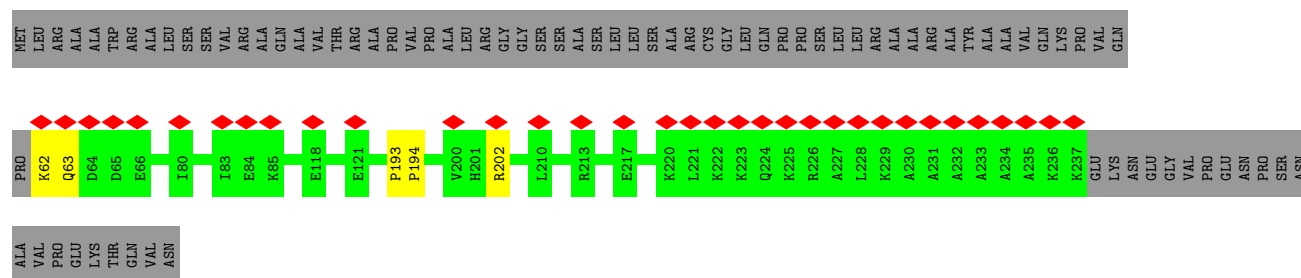


- Molecule 11: 28S ribosomal protein S14, mitochondrial

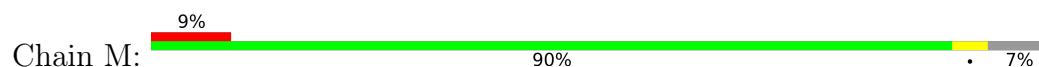


- Molecule 12: 28S ribosomal protein S15, mitochondrial





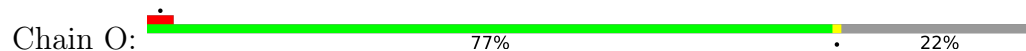
- Molecule 13: 28S ribosomal protein S16, mitochondrial



- Molecule 14: 28S ribosomal protein S17, mitochondrial



- Molecule 15: 28S ribosomal protein S18b, mitochondrial



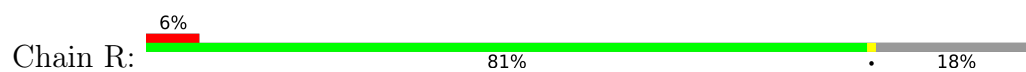
- Molecule 16: 28S ribosomal protein S18c, mitochondrial



- Molecule 17: 28S ribosomal protein S21, mitochondrial



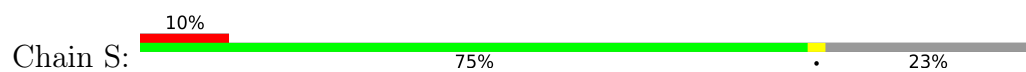
- Molecule 18: 28S ribosomal protein S22, mitochondrial



MET ALA VAL ARG THR PRO LEU SER TRP ARG PHE GLN LEU GLY SER ARG ARG ALA ARG VAL CYS THR ARG THR ALA GLN ARG HIS PRO ASP ALA LEU LEU ALA THR ARG PRO GLN PHE PRO VAL GLY GLN PRO ARG ARG LEU LEU SER SER GLU ALA GLU SER GLY

SER SER E63 V64 K65 T146 S161 R169 V275 L306 A316 K317 E318 A321 K332 T333 R337 Y340 A344 Q349 E350 I351 V352 T353 S354 H355 S356 ALA SER

- Molecule 19: 28S ribosomal protein S23, mitochondrial



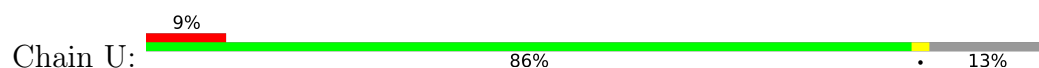
MET A2 V9 K26 R50 K73 Q82 L106 L109 G110 E111 T112 D113 E114 E115 K116 K123 E128 G129 I130 I131 R134 V135 R136 E137 ALA ARG THR VAL VAL ARG GLN ALA SER SER SER GLY HIS GLU PRO GLN ASP ASP LEU ALA GLN ARG GLN LYS VAL GLU PRO

- Molecule 20: 28S ribosomal protein S25, mitochondrial



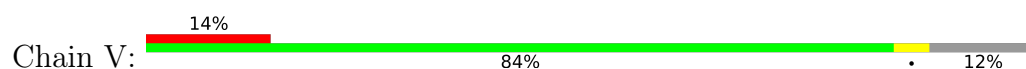
MET P2 V48 M66 T92 K109 E119 Q122 Q146 K157 T160 G161 Y163 L167 K168 A169 S170 T171

- Molecule 21: 28S ribosomal protein S26, mitochondrial



MET LEU ARG ALA LEU ASN ARG LEU ALA ALA ARG PRO GLU THR ARG PRO PRO THR PRO LEU LEU LEU VAL ARG GLY R27 L72 V89 E92 R93 Q96 E127 A128 Q129 E132 K135 A136 E137 A138 Q139 R142 E145 E146 V160 K153 L173 K193 E194 N200

- Molecule 22: 28S ribosomal protein S27, mitochondrial



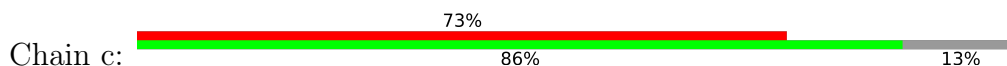
MET ALA PRO MET VAL ARG CYS GLY MET LEU LEU ALA ARG ARG ARG ASP ALA SER ARG CYS LEU LEU ALA GLY LYS ARG CYS L29 L30 S31 A32 A33 Y34 V35 H38 K45 E46 E47 Y48 H49 L50 K59 V67 I79 A80 E83 N100 I113 A121

K153 K154 K158 V175 P176 S177 L181 Y187 E192 K193 T194 E195 R216 Y226 R265 P270 E271 D272 L273 K274 R277 E278 V279 K288 V289 S292 P293 D294 VAL GLN THR SER GLU ALA GLN PRO GLN GLU GLY ASP GLY LEU G310 S311 A312 R330









MET	ALA	ALA	SER	GLY	LYS	LEU	GLY	THR	PHE	ARG	LEU	PRO	PRO	LEU	PRO	THR	ILE	ARG	GLU	ILE	ILE	LYS	LEU	PHE	GLY	LEU	ARG	ALA	VAL	LYS	GLN	LEU	SER	Q35	N36	F37	L38	L39	D40	L41	R42	L43	T44	D45	R46	T47	V48	R49	K50	A51	G52	S53	L54	A55	D56	V57	Y58	V59	Y60																																	
																																	E61	V62	G63	P64	G65	P66	G67	G68	I69	T70	R71	S72	I73	L74	M75	A76	M77	V78	A79	E80	L81	L82	W83	V84	E85	K86	D87	T88	R89	F90	I91	P92	G93	L94	Q95	M96	L97	S98	D99	A100	A101	P102	G103	K104	L105	R106	I107	V108	H109	G110	D111	V112	L113	T114	Y115	K116	I117	E118	K119	A120
																																	F121	P122	G123	M124	I125	R126	R127	Q128	W129	E130	D131	D132	P133	P134	M135	V136	H137	I138	I139	G140	M141	L142	P143	F144	S145	V146	S147	T148	P149	L150	I151	I152	K153	W154	L155	E156	M157	I158	S159	L160	K161	D162	G163	P164	F165	V166	Y167	G168	R169	T170	G171	M172	T173	L174	T175	F176	Q177	K178	E179	V180
																																	A181	E182	R183	L184	V185	A186	T187	T188	K191		R195	L196	S197	I198	M199	A200	Q201	Y202	L203	C204	N205	V206	E207	H208	L209	F210	T211	I212	P213	G214	K215	A216	F217	V218	P219	K220	P221	K222	V223	D224	V225	G226	V227	V228	H229	L230	L233		L234	E235	P236	K237	I238	K239	Q240	P241	F242	K243	L244	
																																	V245	E246	K247	V248	V249	Q250	N251	R256		H261	L264		E270	A271	Q272	R273	L274	E275	S276	T277	G278	R279	L280	L281	Q282	L283	A284	D285	I286	D287	P288	T289	L290	R291	P292		L295	S296	L297	M298	H299	F300	K301	S302	L303	C304	D305	V306	Y307	R308	K309	M310	C311	D312	E313	D314	P315	Q316		
L317	F318	T319	E324		Q328	K329	K330	S331	K332	G333	GLN	GLU	LYS	ASP	GLY	ASP	PRO	GLU	SER	CYS	GLY	PHE																L317	F318	T319	E324		Q328	K329	K330	S331	K332	G333	GLN	GLU	LYS	ASP	GLY	ASP	PRO	GLU	SER	CYS	GLY	PHE																																

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	52361	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 ( $e^-/\text{\AA}^2$ )	31	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	3600	Depositor
Magnification	165000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.622	Depositor
Minimum map value	-0.805	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.030	Depositor
Recommended contour level	0.12	Depositor
Map size (Å)	398.40192, 398.40192, 398.40192	wwPDB
Map dimensions	576, 576, 576	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.69167, 0.69167, 0.69167	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: K, MG, ZN, AYA, ATP, 5F0, FES

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.24	1/21600 (0.0%)	0.67	1/33606 (0.0%)
2	B	0.26	0/1832	0.41	0/2479
3	C	0.26	0/1100	0.43	0/1485
4	D	0.25	0/2737	0.42	0/3671
5	E	0.25	0/997	0.41	0/1347
6	F	0.24	0/1763	0.37	0/2368
7	G	0.25	0/2734	0.39	0/3669
8	H	0.25	0/1179	0.41	0/1597
9	I	0.25	0/1018	0.45	0/1374
10	J	0.26	0/862	0.46	0/1155
11	K	0.24	0/871	0.40	0/1167
12	L	0.23	0/1485	0.36	0/1980
13	M	0.26	0/1017	0.42	0/1366
14	N	0.26	0/907	0.45	0/1228
15	O	0.25	0/1653	0.39	0/2254
16	P	0.26	0/809	0.40	0/1085
17	Q	0.24	0/735	0.40	0/980
18	R	0.25	0/2449	0.38	0/3311
19	S	0.26	0/1148	0.39	0/1541
20	T	0.25	0/1420	0.39	0/1903
21	U	0.24	0/1470	0.37	0/1976
22	V	0.23	0/3059	0.35	0/4135
23	W	0.25	0/805	0.43	0/1084
24	X	0.24	0/2952	0.38	0/3995
25	Y	0.25	0/1283	0.36	0/1730
26	Z	0.26	0/851	0.37	0/1133
27	0	0.24	0/1856	0.42	0/2511
28	1	0.24	0/2271	0.38	0/3078
29	3	0.24	0/448	0.38	0/591
30	4	0.24	0/4868	0.36	0/6597
31	a	0.23	0/1087	0.36	0/1470
32	c	0.24	0/2447	0.38	0/3309

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
All	All	0.24	1/71713 (0.0%)	0.50	1/101175 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1	A	OP3-P	-10.80	1.48	1.61

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	824	A	C5-C6-N1	-5.29	115.05	117.70

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	19301	9755	9761	40	0
2	B	1791	1799	1797	9	0
3	C	1072	1091	1087	5	0
4	D	2682	2732	2727	12	0
5	E	979	1007	1007	3	0
6	F	1722	1750	1748	8	0
7	G	2674	2630	2626	11	0
8	H	1153	1193	1190	9	0
9	I	1009	1038	1028	4	0
10	J	846	903	901	3	0
11	K	855	888	887	2	0
12	L	1465	1576	1574	3	0
13	M	995	1009	1006	4	0
14	N	888	951	947	2	0
15	O	1598	1548	1547	2	0
16	P	792	818	817	3	0
17	Q	732	750	750	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	R	2400	2416	2415	3	0
19	S	1124	1133	1132	3	0
20	T	1388	1413	1413	6	0
21	U	1449	1459	1456	2	0
22	V	2998	2972	2967	10	0
23	W	793	813	811	3	0
24	X	2881	2881	2879	10	0
25	Y	1246	1193	1191	1	0
26	Z	834	848	847	1	0
27	0	1811	1838	1834	5	0
28	1	2223	2241	2238	4	0
29	3	440	489	488	1	0
30	4	4758	4800	4793	13	0
31	a	1070	1099	1096	0	0
32	c	2393	2478	2478	0	0
33	A	32	0	0	0	0
33	B	1	0	0	0	0
33	X	1	0	0	0	0
34	A	7	0	0	0	0
35	O	1	0	0	0	0
36	P	4	0	0	0	0
36	T	4	0	0	0	0
37	X	31	12	12	0	0
38	0	5	0	0	1	0
38	1	11	0	0	0	0
38	4	7	0	0	0	0
38	A	268	0	0	4	0
38	B	7	0	0	0	0
38	C	23	0	0	1	0
38	D	14	0	0	0	0
38	F	5	0	0	2	0
38	G	9	0	0	1	0
38	H	11	0	0	0	0
38	I	3	0	0	0	0
38	J	4	0	0	1	0
38	K	15	0	0	0	0
38	L	1	0	0	0	0
38	M	17	0	0	0	0
38	N	2	0	0	0	0
38	O	20	0	0	1	0
38	P	6	0	0	0	0
38	Q	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
38	R	5	0	0	0	0
38	S	2	0	0	0	0
38	T	6	0	0	0	0
38	U	3	0	0	0	0
38	X	4	0	0	0	0
38	Y	3	0	0	0	0
38	Z	17	0	0	0	0
All	All	68913	59523	59450	157	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (157) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:567:G:N2	1:A:576:C:O2	2.20	0.74
10:J:111:GLU:OE1	38:J:201:HOH:O	2.05	0.74
1:A:217:U:OP1	15:O:146:LYS:NZ	2.22	0.73
1:A:192:A:N7	38:A:1105:HOH:O	2.21	0.72
6:F:84:SER:OG	24:X:372:GLU:OE2	2.07	0.72
3:C:72:HIS:O	38:C:201:HOH:O	2.08	0.71
1:A:336:A:OP1	9:I:91:ASN:ND2	2.24	0.71
7:G:271:LYS:O	38:G:401:HOH:O	2.12	0.67
7:G:383:ARG:NH2	7:G:384:LYS:O	2.28	0.67
8:H:51:GLU:OE1	8:H:100:ARG:NH1	2.27	0.66
1:A:449:A:OP1	1:A:505:G:N2	2.28	0.66
13:M:55:ASP:OD2	20:T:146:GLN:NE2	2.29	0.66
7:G:203:LEU:HD12	7:G:207:LEU:HD11	1.79	0.63
24:X:176:GLU:N	24:X:176:GLU:OE2	2.33	0.61
14:N:3:ILE:HG22	14:N:3:ILE:O	2.02	0.60
20:T:92:THR:HG22	20:T:92:THR:O	2.01	0.60
6:F:161:ILE:O	6:F:168:TYR:N	2.35	0.60
1:A:647:A:OP1	2:B:198:ASN:ND2	2.34	0.60
24:X:116:ARG:NH2	24:X:330:LEU:O	2.35	0.59
11:K:96:ARG:NH2	11:K:98:ARG:O	2.36	0.59
1:A:804:C:OP2	38:A:1102:HOH:O	2.16	0.59
22:V:279:VAL:HG23	22:V:353:LEU:HD11	1.85	0.59
1:A:723:U:OP1	6:F:195:LYS:NZ	2.35	0.58
15:O:136:PRO:O	38:O:402:HOH:O	2.17	0.58
1:A:501:C:OP1	12:L:202:ARG:NH2	2.35	0.58
1:A:817:A:O2'	6:F:242:TRP:OXT	2.22	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:I:148:VAL:HG13	9:I:148:VAL:O	2.03	0.57
1:A:504:A:O2'	29:3:152:ARG:NH1	2.37	0.57
22:V:29:LEU:HD12	22:V:181:LEU:HD23	1.85	0.57
4:D:287:TYR:OH	4:D:374:GLU:OE2	2.22	0.56
22:V:279:VAL:CG2	22:V:353:LEU:HD11	2.36	0.55
1:A:551:A:HO2'	1:A:771:A:HO2'	1.53	0.55
1:A:746:U:O2'	1:A:802:A:N6	2.39	0.55
22:V:67:VAL:O	22:V:100:ASN:ND2	2.39	0.55
22:V:35:VAL:HG12	22:V:35:VAL:O	2.07	0.55
1:A:633:C:O2'	1:A:649:A:N1	2.39	0.54
1:A:469:U:OP2	19:S:50:ARG:NH2	2.41	0.53
1:A:599:U:O2'	1:A:600:A:N7	2.39	0.53
6:F:36:ARG:NH2	38:F:302:HOH:O	2.40	0.53
28:1:83:ARG:NH1	28:1:93:PRO:O	2.39	0.53
18:R:161:SER:O	18:R:169:ARG:NH1	2.40	0.53
1:A:31:A:O3'	38:A:1101:HOH:O	2.18	0.52
16:P:68:LEU:HD21	16:P:80:LEU:HD11	1.90	0.52
10:J:78:ARG:NE	10:J:117:ASP:OD2	2.43	0.52
20:T:160:THR:HG22	20:T:162:LYS:H	1.75	0.51
1:A:43:A:N7	1:A:68:U:O2'	2.42	0.51
3:C:119:ILE:HB	3:C:153:LEU:HD12	1.92	0.51
6:F:113:GLN:OE1	38:F:301:HOH:O	2.19	0.51
24:X:41:VAL:HG12	24:X:41:VAL:O	2.10	0.51
2:B:86:VAL:HG12	2:B:86:VAL:O	2.11	0.51
1:A:579:U:O2'	1:A:796:A:O4'	2.28	0.51
4:D:285:GLU:O	4:D:358:GLN:NE2	2.44	0.51
30:4:386:ILE:HG22	30:4:386:ILE:O	2.11	0.51
7:G:292:VAL:HG12	7:G:293:ASP:N	2.26	0.50
1:A:746:U:HO2'	1:A:802:A:N6	2.09	0.50
4:D:150:LEU:HD21	30:4:109:LEU:CB	2.41	0.49
8:H:80:LEU:HD11	8:H:87:LYS:HA	1.94	0.49
27:0:103:ASP:N	27:0:111:HIS:O	2.43	0.49
21:U:146:GLU:O	21:U:150:VAL:HG23	2.12	0.48
2:B:272:SER:HB3	2:B:273:PRO:HD3	1.94	0.48
2:B:236:ASN:OD1	23:W:118:LYS:NZ	2.47	0.48
22:V:187:TYR:CE1	22:V:353:LEU:HD13	2.49	0.48
13:M:28:ASN:ND2	20:T:160:THR:HG23	2.29	0.48
24:X:144:LEU:CD2	24:X:240:LEU:HD22	2.44	0.48
25:Y:282:PRO:HB2	30:4:89:VAL:CG1	2.44	0.48
4:D:275:ASN:O	4:D:278:ILE:HG22	2.14	0.48
28:1:54:THR:HG23	28:1:76:SER:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:470:U:O2'	4:D:299:ARG:NH1	2.48	0.47
30:4:59:VAL:O	30:4:59:VAL:HG23	2.14	0.47
1:A:696:A:OP2	26:Z:96:LYS:NZ	2.40	0.47
5:E:79:LEU:HG	5:E:93:ILE:HD12	1.96	0.47
8:H:39:VAL:HG22	8:H:100:ARG:O	2.15	0.47
1:A:127:U:O4	1:A:128:A:N6	2.48	0.46
1:A:321:U:O2'	1:A:322:A:N7	2.40	0.46
27:0:61:GLU:O	38:0:301:HOH:O	2.21	0.46
1:A:163:G:H2'	1:A:164:A:H5''	1.98	0.46
1:A:539:U:O2	1:A:540:C:N4	2.49	0.46
20:T:48:VAL:HG13	20:T:66:MET:SD	2.56	0.46
4:D:414:LYS:HG3	4:D:419:LEU:HD22	1.97	0.46
1:A:504:A:N6	1:A:932:A:OP1	2.44	0.46
1:A:601:A:OP2	38:A:1104:HOH:O	2.21	0.46
10:J:72:LYS:CG	10:J:73:PRO:HA	2.46	0.46
8:H:29:ASP:OD1	8:H:30:THR:N	2.48	0.46
1:A:808:A:OP2	7:G:371:ARG:NH2	2.48	0.46
8:H:81:LYS:O	11:K:112:ARG:NH2	2.49	0.46
1:A:613:U:H6	1:A:680:A:HO2'	1.65	0.45
5:E:54:HIS:NE2	5:E:85:ASP:O	2.49	0.45
24:X:92:LEU:HD21	24:X:133:HIS:HB2	1.98	0.45
1:A:160:C:OP1	27:0:19:ARG:NH2	2.50	0.45
8:H:104:LEU:HD12	8:H:104:LEU:N	2.32	0.45
14:N:88:VAL:HG13	14:N:88:VAL:O	2.16	0.45
16:P:139:ILE:HG23	16:P:139:ILE:O	2.17	0.45
6:F:155:VAL:HG23	6:F:156:ILE:N	2.31	0.45
30:4:371:TYR:CE2	30:4:400:LEU:HD21	2.52	0.45
1:A:339:U:O2'	1:A:341:A:N7	2.46	0.45
1:A:766:G:OP1	24:X:272:ARG:NH2	2.48	0.45
19:S:9:VAL:O	19:S:9:VAL:HG13	2.17	0.45
7:G:314:LEU:HD13	7:G:350:VAL:HG11	1.98	0.44
3:C:87:LEU:HD13	3:C:87:LEU:O	2.18	0.44
12:L:62:LYS:HG2	12:L:63:GLN:H	1.81	0.44
24:X:275:ILE:HG22	24:X:276:ALA:N	2.32	0.44
18:R:275:VAL:HG11	18:R:306:LEU:HD12	2.00	0.44
22:V:29:LEU:HD13	22:V:361:VAL:HG11	1.98	0.44
30:4:368:LEU:HD12	30:4:447:LEU:HD13	1.99	0.44
2:B:75:LEU:HD21	2:B:256:ARG:CZ	2.48	0.44
17:Q:42:ARG:O	17:Q:42:ARG:HG3	2.18	0.44
22:V:175:VAL:HG12	22:V:177:SER:H	1.83	0.44
24:X:265:THR:OG1	24:X:275:ILE:O	2.36	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
30:4:350:ILE:HB	30:4:351:PRO:HD3	2.00	0.44
1:A:82:A:H2'	1:A:83:A:O4'	2.17	0.43
17:Q:83:PRO:HA	23:W:107:VAL:HG21	1.99	0.43
1:A:876:A:OP2	22:V:397:GLN:NE2	2.51	0.43
2:B:185:ARG:NH2	7:G:143:ASP:O	2.48	0.43
27:O:37:ASP:O	27:O:41:LEU:N	2.52	0.43
22:V:30:LEU:HD13	22:V:34:TYR:CD1	2.54	0.43
8:H:24:THR:O	8:H:24:THR:HG23	2.18	0.43
13:M:104:ILE:HG23	18:R:146:ILE:HG12	2.00	0.43
4:D:205:ILE:HG21	4:D:224:ILE:HD11	2.00	0.43
24:X:146:LEU:HD21	24:X:237:LEU:HD22	2.01	0.43
16:P:139:ILE:HD11	17:Q:32:THR:CG2	2.49	0.42
6:F:161:ILE:HG22	6:F:162:LEU:N	2.33	0.42
12:L:193:PRO:HA	12:L:194:PRO:HD3	1.96	0.42
1:A:721:A:N6	1:A:742:A:N3	2.68	0.42
1:A:310:A:OP1	1:A:311:U:N3	2.52	0.42
7:G:189:ILE:HG22	7:G:190:GLY:N	2.35	0.42
28:1:110:HIS:CD2	28:1:111:LEU:HG	2.55	0.42
2:B:143:SER:O	2:B:165:THR:HA	2.20	0.42
3:C:136:VAL:HG22	3:C:153:LEU:HD23	2.02	0.42
7:G:350:VAL:HG23	7:G:355:VAL:HG23	2.01	0.42
19:S:112:THR:HG22	19:S:112:THR:O	2.19	0.42
9:I:173:THR:HG22	9:I:174:ASP:N	2.35	0.42
30:4:297:ILE:HG23	30:4:315:ILE:HG23	2.02	0.42
2:B:217:VAL:HG22	2:B:231:TYR:HB2	2.02	0.41
5:E:47:LEU:HD13	5:E:51:ILE:HD12	2.01	0.41
23:W:106:ILE:HG23	23:W:111:LEU:HD23	2.01	0.41
27:O:71:LEU:HD11	27:O:141:LEU:HD22	2.01	0.41
3:C:84:GLU:OE1	3:C:84:GLU:N	2.54	0.41
4:D:150:LEU:HD21	30:4:109:LEU:HB3	2.03	0.41
20:T:163:TYR:CE2	20:T:167:LEU:HD11	2.55	0.41
1:A:89:A:O3'	21:U:72:LEU:HD13	2.21	0.41
1:A:343:A:N3	1:A:423:G:O2'	2.37	0.41
4:D:150:LEU:HD21	30:4:109:LEU:HB2	2.02	0.41
7:G:67:GLU:O	7:G:136:ARG:NH2	2.54	0.41
8:H:104:LEU:HD21	8:H:115:TYR:CE2	2.56	0.41
30:4:167:VAL:HG23	30:4:168:ARG:N	2.36	0.41
30:4:572:PRO:HB2	30:4:575:PRO:HD2	2.02	0.41
13:M:17:LEU:HD23	13:M:81:ALA:HB2	2.02	0.41
1:A:342:A:H2	1:A:424:A:HO2'	1.67	0.41
28:1:43:ARG:N	28:1:44:PRO:CD	2.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
30:4:378:PHE:CD2	30:4:392:ILE:HD12	2.56	0.41
2:B:191:ILE:HA	2:B:217:VAL:O	2.21	0.41
4:D:298:LEU:C	4:D:298:LEU:HD12	2.41	0.41
9:I:146:VAL:HG23	9:I:169:VAL:HG13	2.04	0.40
4:D:298:LEU:HD11	4:D:305:ILE:HD13	2.04	0.40
8:H:104:LEU:HB3	8:H:107:LEU:HD11	2.03	0.40
7:G:204:VAL:HG12	7:G:204:VAL:O	2.22	0.40
4:D:247:VAL:HG22	4:D:273:ALA:HB1	2.02	0.40

There are no symmetry-related clashes.

## 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	
2	B	221/291 (76%)	219 (99%)	2 (1%)	0	100	100
3	C	130/167 (78%)	124 (95%)	6 (5%)	0	100	100
4	D	333/432 (77%)	328 (98%)	5 (2%)	0	100	100
5	E	120/125 (96%)	118 (98%)	2 (2%)	0	100	100
6	F	206/242 (85%)	200 (97%)	6 (3%)	0	100	100
7	G	321/390 (82%)	315 (98%)	5 (2%)	1 (0%)	41	74
8	H	138/160 (86%)	135 (98%)	2 (1%)	1 (1%)	22	61
9	I	133/191 (70%)	129 (97%)	4 (3%)	0	100	100
10	J	106/139 (76%)	105 (99%)	1 (1%)	0	100	100
11	K	99/128 (77%)	98 (99%)	1 (1%)	0	100	100
12	L	174/258 (67%)	173 (99%)	1 (1%)	0	100	100
13	M	124/135 (92%)	124 (100%)	0	0	100	100
14	N	111/120 (92%)	108 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
15	O	195/254 (77%)	192 (98%)	3 (2%)	0	100	100
16	P	95/143 (66%)	94 (99%)	1 (1%)	0	100	100
17	Q	84/86 (98%)	83 (99%)	1 (1%)	0	100	100
18	R	292/359 (81%)	284 (97%)	8 (3%)	0	100	100
19	S	134/177 (76%)	132 (98%)	2 (2%)	0	100	100
20	T	168/171 (98%)	167 (99%)	1 (1%)	0	100	100
21	U	172/200 (86%)	170 (99%)	2 (1%)	0	100	100
22	V	361/415 (87%)	357 (99%)	4 (1%)	0	100	100
23	W	98/186 (53%)	96 (98%)	2 (2%)	0	100	100
24	X	355/391 (91%)	350 (99%)	5 (1%)	0	100	100
25	Y	147/384 (38%)	145 (99%)	2 (1%)	0	100	100
26	Z	99/106 (93%)	98 (99%)	1 (1%)	0	100	100
27	0	214/218 (98%)	211 (99%)	3 (1%)	0	100	100
28	1	276/320 (86%)	274 (99%)	2 (1%)	0	100	100
29	3	48/200 (24%)	48 (100%)	0	0	100	100
30	4	585/685 (85%)	579 (99%)	6 (1%)	0	100	100
31	a	128/350 (37%)	126 (98%)	2 (2%)	0	100	100
32	c	297/345 (86%)	292 (98%)	5 (2%)	0	100	100
All	All	5964/7768 (77%)	5874 (98%)	88 (2%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
8	H	85	ILE
7	G	204	VAL

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	195/247 (79%)	195 (100%)	0	100	100
3	C	113/139 (81%)	113 (100%)	0	100	100
4	D	277/354 (78%)	277 (100%)	0	100	100
5	E	107/110 (97%)	107 (100%)	0	100	100
6	F	180/204 (88%)	180 (100%)	0	100	100
7	G	282/335 (84%)	281 (100%)	1 (0%)	91	95
8	H	130/150 (87%)	130 (100%)	0	100	100
9	I	102/143 (71%)	102 (100%)	0	100	100
10	J	93/117 (80%)	93 (100%)	0	100	100
11	K	90/110 (82%)	90 (100%)	0	100	100
12	L	161/224 (72%)	161 (100%)	0	100	100
13	M	103/112 (92%)	103 (100%)	0	100	100
14	N	97/104 (93%)	97 (100%)	0	100	100
15	O	176/225 (78%)	176 (100%)	0	100	100
16	P	89/125 (71%)	89 (100%)	0	100	100
17	Q	77/77 (100%)	77 (100%)	0	100	100
18	R	261/313 (83%)	261 (100%)	0	100	100
19	S	117/152 (77%)	117 (100%)	0	100	100
20	T	153/154 (99%)	153 (100%)	0	100	100
21	U	149/171 (87%)	149 (100%)	0	100	100
22	V	326/362 (90%)	325 (100%)	1 (0%)	92	96
23	W	87/156 (56%)	87 (100%)	0	100	100
24	X	314/346 (91%)	312 (99%)	2 (1%)	86	94
25	Y	133/341 (39%)	133 (100%)	0	100	100
26	Z	88/93 (95%)	88 (100%)	0	100	100
27	0	190/191 (100%)	188 (99%)	2 (1%)	73	88
28	1	248/279 (89%)	248 (100%)	0	100	100
29	3	46/176 (26%)	46 (100%)	0	100	100
30	4	519/599 (87%)	519 (100%)	0	100	100
31	a	122/299 (41%)	122 (100%)	0	100	100
32	c	266/304 (88%)	265 (100%)	1 (0%)	91	95
All	All	5291/6712 (79%)	5284 (100%)	7 (0%)	93	98

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
7	G	375	LYS
22	V	226	TYR
24	X	74	HIS
24	X	112	HIS
27	0	30	ASP
27	0	48	ARG
32	c	202	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	164	HIS
2	B	198	ASN
3	C	81	HIS
6	F	113	GLN
8	H	137	GLN
12	L	198	GLN
14	N	9	HIS
18	R	246	HIS
22	V	325	GLN
24	X	133	HIS
26	Z	40	GLN
26	Z	82	GLN
28	1	182	HIS
30	4	372	HIS
30	4	376	HIS

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	902/956 (94%)	138 (15%)	0

All (138) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	3	A
1	A	7	U
1	A	16	G
1	A	23	A

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Mol	Chain	Res	Type
1	A	32	G
1	A	40	A
1	A	56	U
1	A	75	U
1	A	83	A
1	A	85	A
1	A	86	U
1	A	92	U
1	A	93	A
1	A	115	A
1	A	120	A
1	A	124	A
1	A	125	A
1	A	126	A
1	A	129	G
1	A	143	G
1	A	148	G
1	A	150	C
1	A	164	A
1	A	167	C
1	A	182	U
1	A	187	C
1	A	203	G
1	A	212	A
1	A	231	A
1	A	245	C
1	A	246	A
1	A	269	A
1	A	273	A
1	A	283	G
1	A	289	A
1	A	291	A
1	A	292	C
1	A	293	G
1	A	311	U
1	A	314	A
1	A	348	A
1	A	349	U
1	A	368	A
1	A	377	G
1	A	389	A
1	A	397	U

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Mol	Chain	Res	Type
1	A	418	A
1	A	426	U
1	A	427	A
1	A	429	A
1	A	430	U
1	A	431	A
1	A	452	A
1	A	454	C
1	A	456	U
1	A	458	A
1	A	462	A
1	A	467	A
1	A	468	U
1	A	469	U
1	A	470	U
1	A	471	A
1	A	476	A
1	A	488	G
1	A	501	C
1	A	502	A
1	A	503	U
1	A	504	A
1	A	505	G
1	A	515	C
1	A	524	U
1	A	526	G
1	A	529	G
1	A	530	U
1	A	531	A
1	A	532	C
1	A	537	U
1	A	538	A
1	A	539	U
1	A	540	C
1	A	565	U
1	A	570	A
1	A	572	A
1	A	573	C
1	A	603	U
1	A	624	U
1	A	625	C
1	A	629	A

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Mol	Chain	Res	Type
1	A	638	A
1	A	639	A
1	A	643	U
1	A	644	A
1	A	648	A
1	A	655	C
1	A	664	C
1	A	667	A
1	A	680	A
1	A	681	G
1	A	697	A
1	A	709	G
1	A	710	A
1	A	731	A
1	A	742	A
1	A	757	A
1	A	760	C
1	A	767	A
1	A	769	U
1	A	770	A
1	A	776	G
1	A	784	A
1	A	786	U
1	A	797	U
1	A	817	A
1	A	828	A
1	A	832	A
1	A	835	C
1	A	851	C
1	A	860	A
1	A	862	A
1	A	863	U
1	A	864	U
1	A	865	A
1	A	866	A
1	A	867	A
1	A	868	C
1	A	873	C
1	A	874	A
1	A	878	U
1	A	879	U
1	A	880	A

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Mol	Chain	Res	Type
1	A	886	U
1	A	895	G
1	A	911	A
1	A	912	A
1	A	934	U
1	A	948	G
1	A	949	G
1	A	952	U

There are no RNA pucker outliers to report.

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

2 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	$\# Z  > 2$
9	5F0	I	181	9	8,8,9	0.60	0	7,9,11	1.05	1 (14%)
17	AYA	Q	2	17	6,7,8	0.76	0	5,8,10	0.54	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
9	5F0	I	181	9	-	0/9/9/10	-
17	AYA	Q	2	17	-	0/4/6/8	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	I	181	5F0	OD1-C1-CB	-2.43	118.34	125.43

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 45 ligands modelled in this entry, 42 are monoatomic - leaving 3 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	$\# Z  > 2$
37	ATP	X	401	33	26,33,33	0.75	0	31,52,52	0.67	0
36	FES	P	201	16,5	0,4,4	-	-	-		
36	FES	T	201	13,20	0,4,4	-	-	-		

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
37	ATP	X	401	33	-	0/18/38/38	0/3/3/3
36	FES	P	201	16,5	-	-	0/1/1/1
36	FES	T	201	13,20	-	-	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

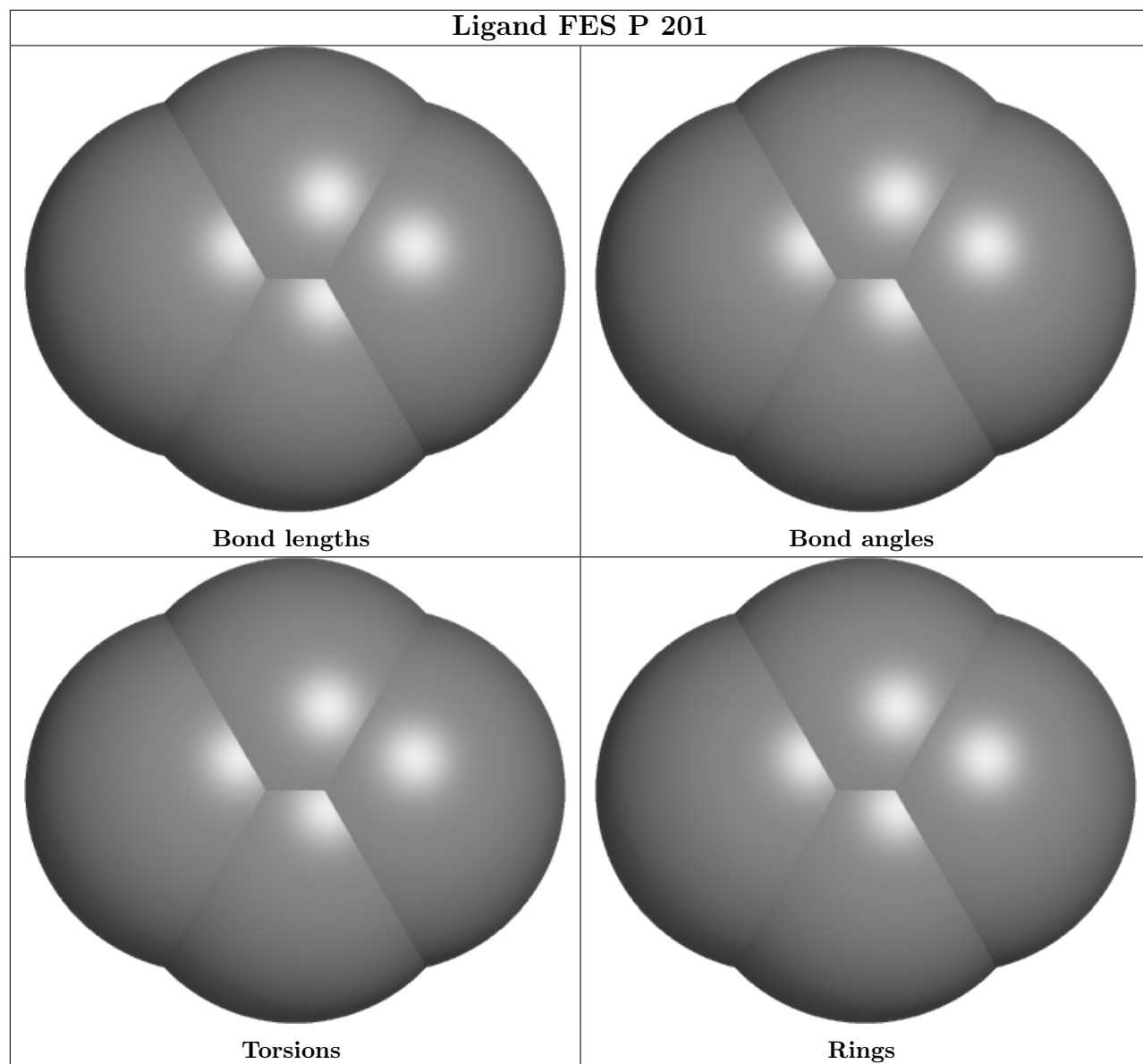
There are no chirality outliers.

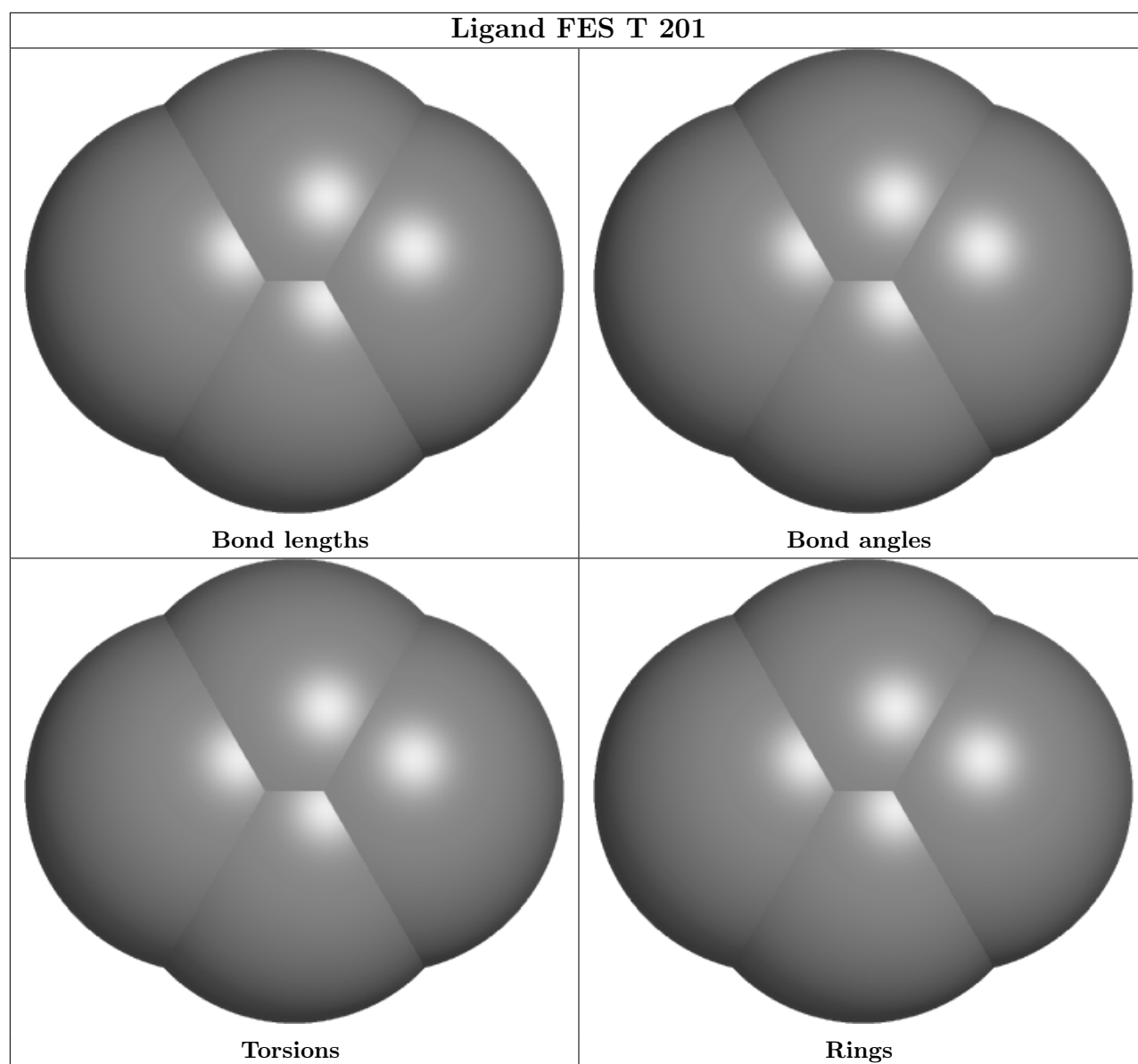
There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.



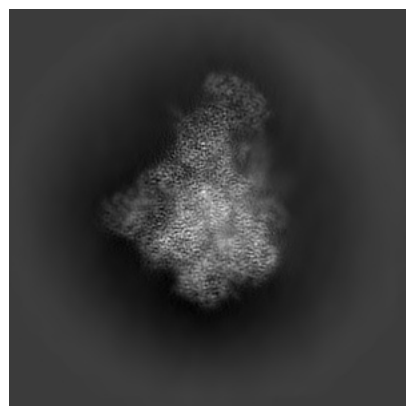
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13551. These allow visual inspection of the internal detail of the map and identification of artifacts.

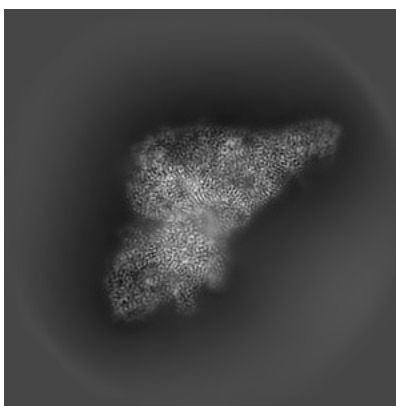
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

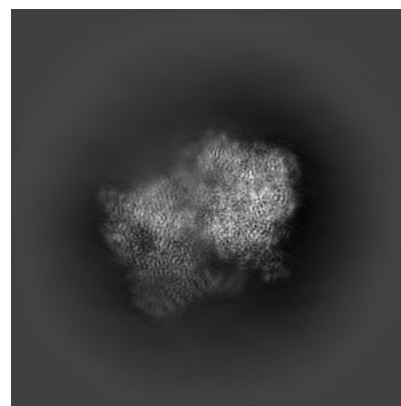
#### 6.1.1 Primary map



X

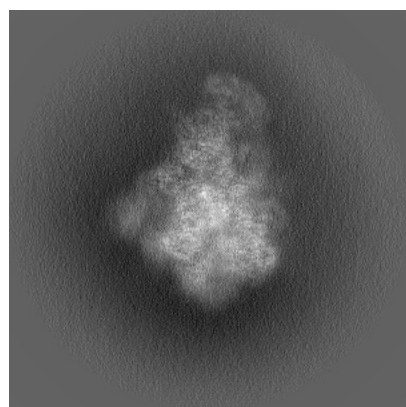


Y

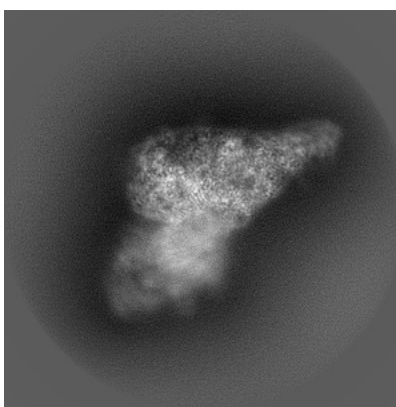


Z

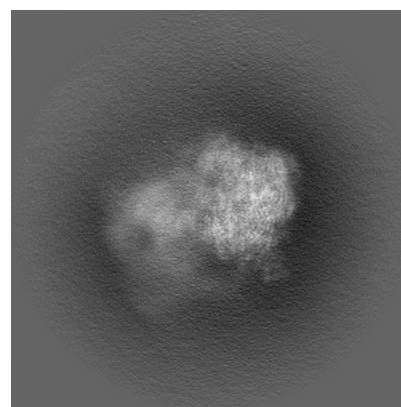
#### 6.1.2 Raw map



X



Y

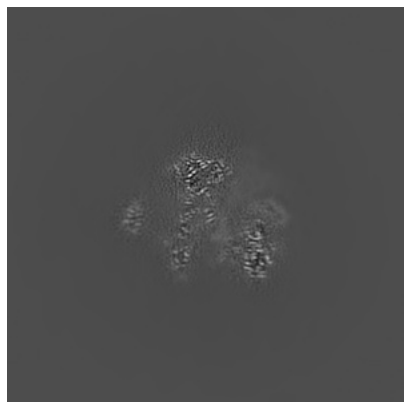


Z

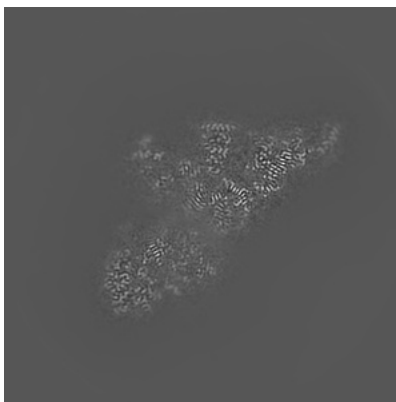
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

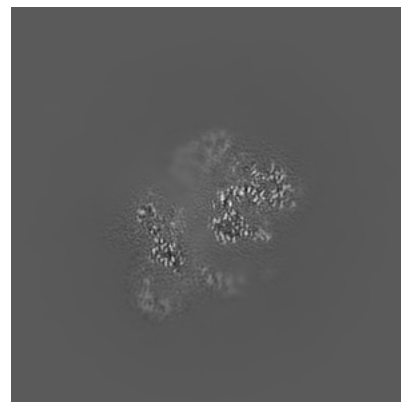
### 6.2.1 Primary map



X Index: 288

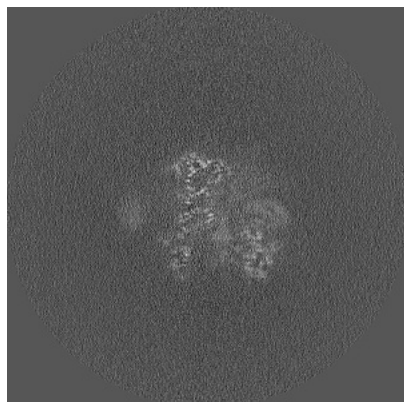


Y Index: 288

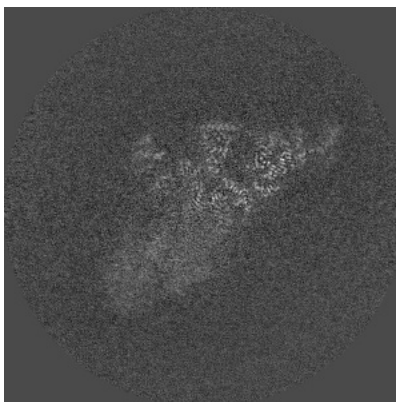


Z Index: 288

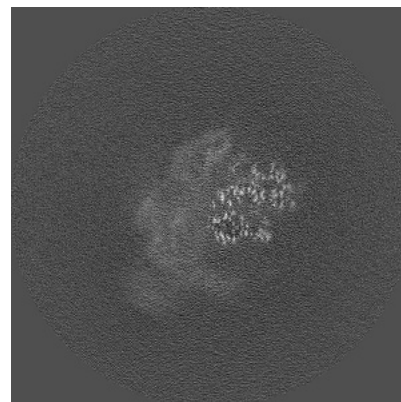
### 6.2.2 Raw map



X Index: 240



Y Index: 240

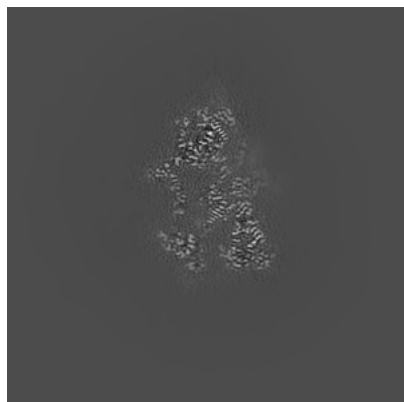


Z Index: 240

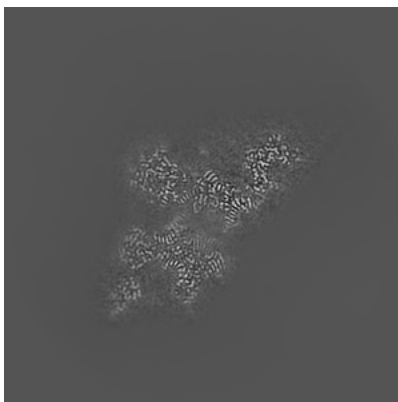
The images above show central slices of the map in three orthogonal directions.

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

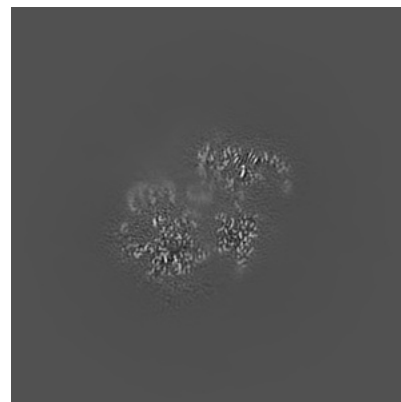
### 6.3.1 Primary map



X Index: 348

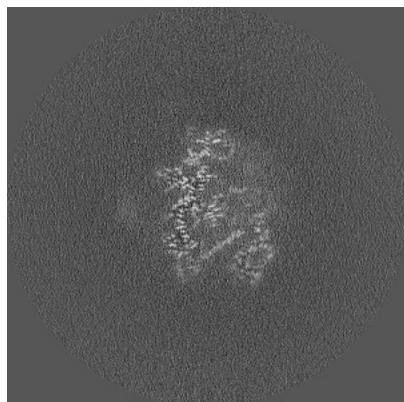


Y Index: 265

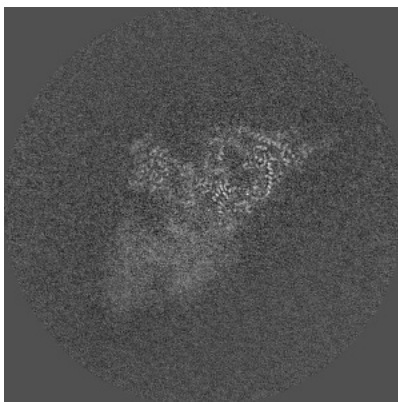


Z Index: 241

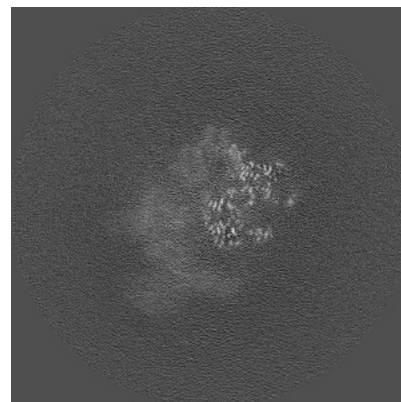
### 6.3.2 Raw map



X Index: 262



Y Index: 232

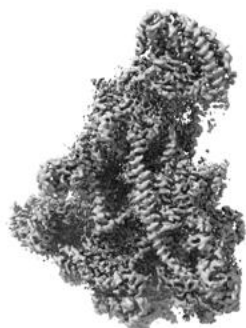


Z Index: 231

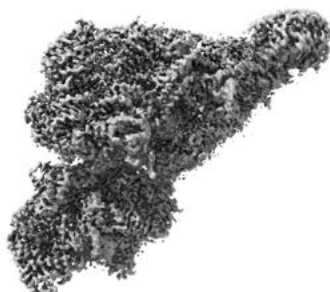
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



X



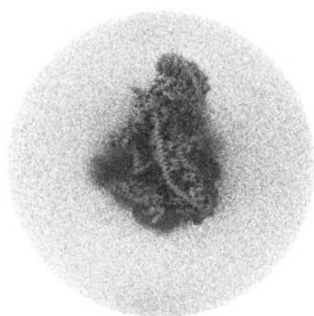
Y



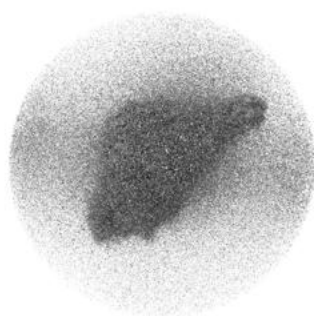
Z

The images above show the 3D surface view of the map at the recommended contour level 0.12. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

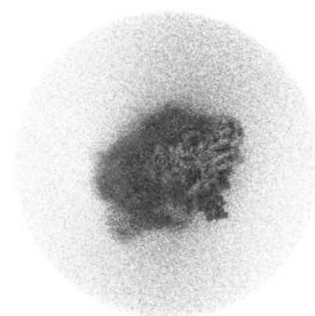
### 6.4.2 Raw map



X



Y



Z

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

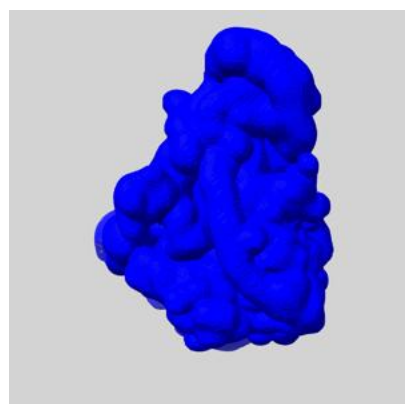
## 6.5 Mask visualisation [i](#)

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

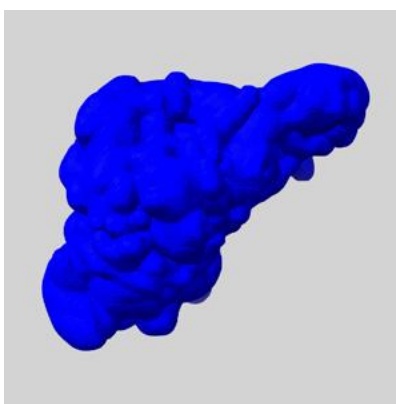
A mask typically either:

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

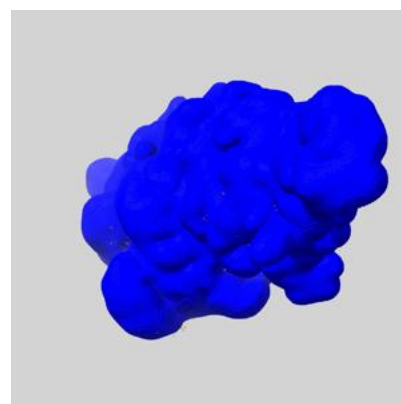
### 6.5.1 emd\_13551\_msk\_1.map [i](#)



X



Y

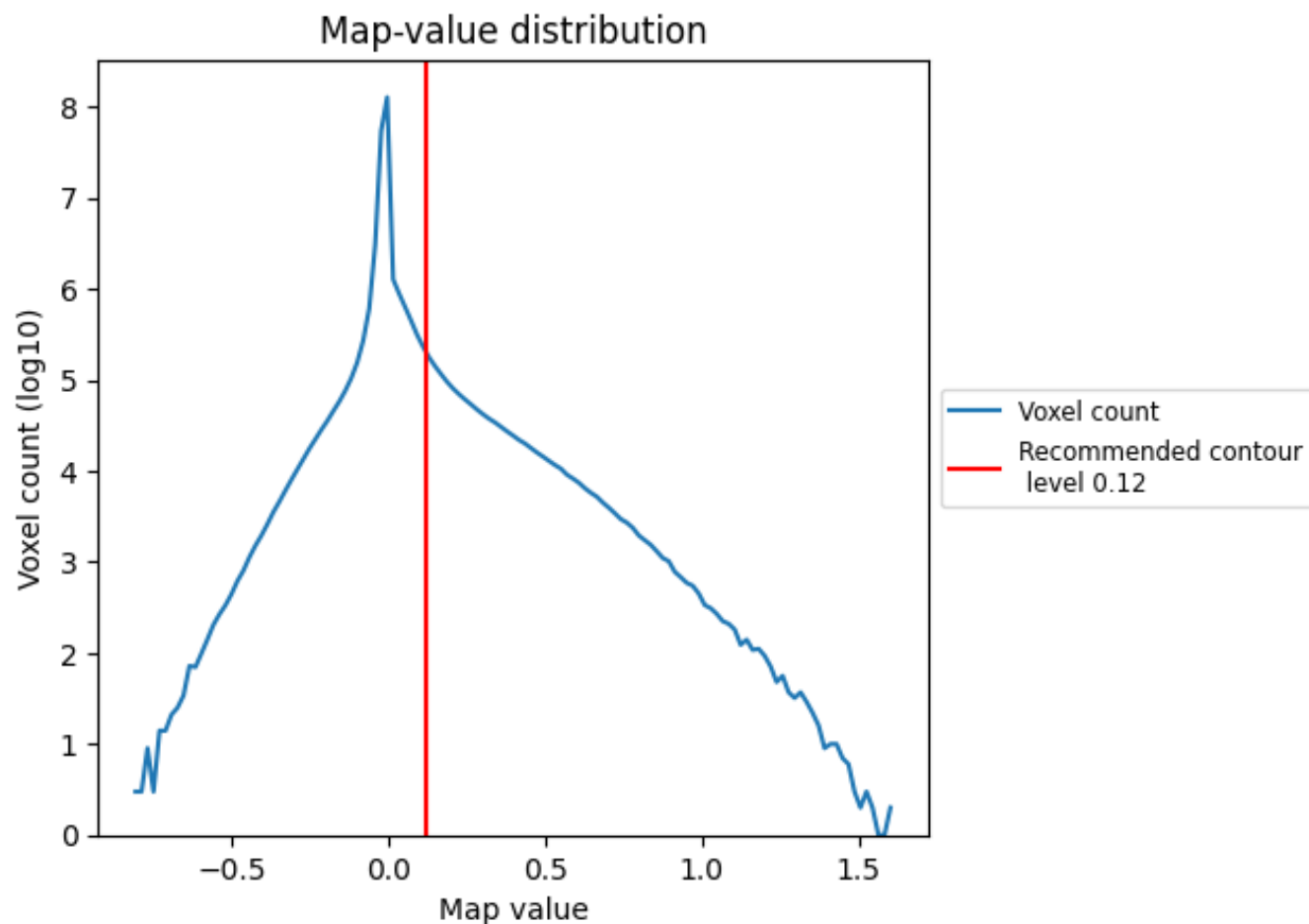


Z

## 7 Map analysis [i](#)

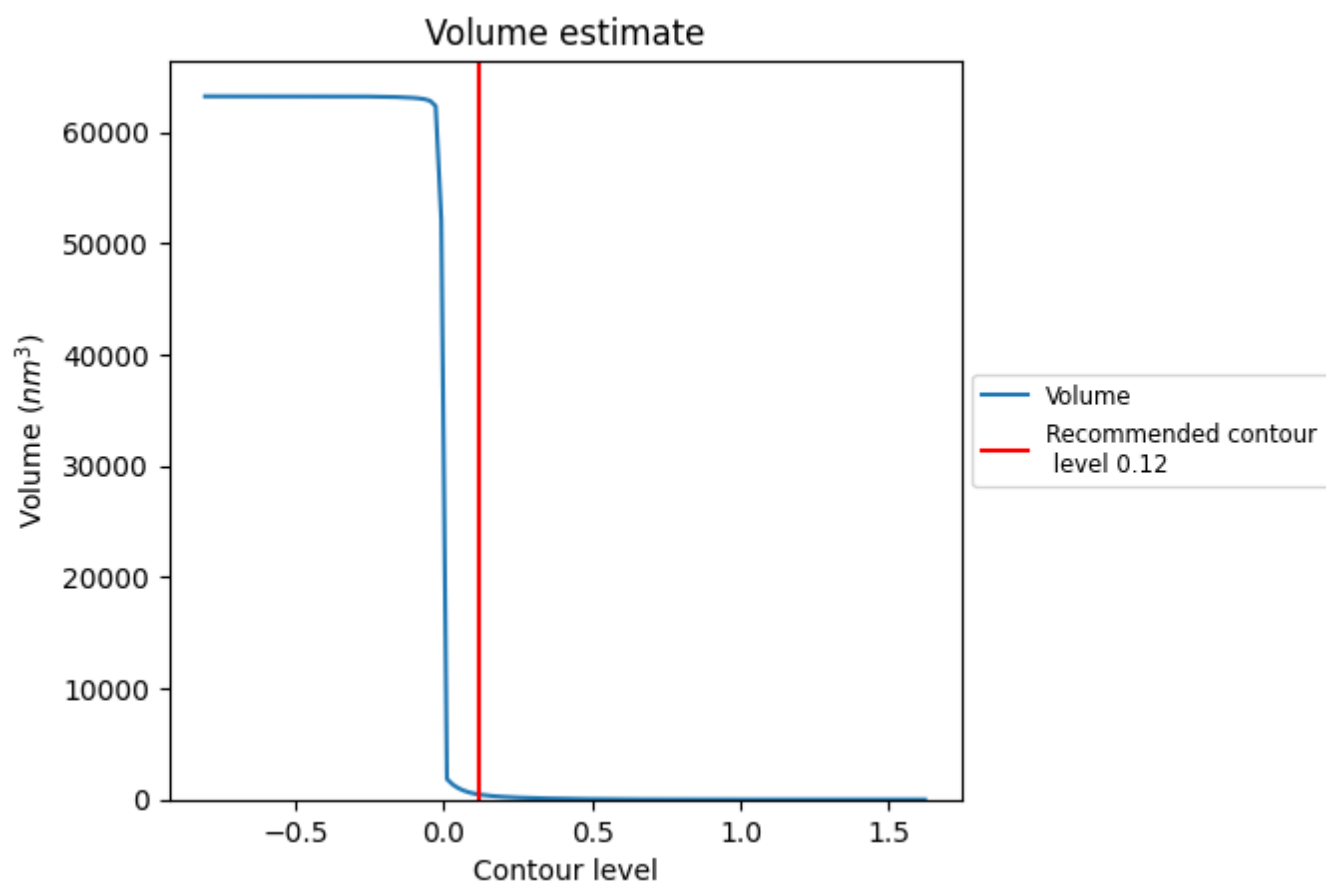
This section contains the results of statistical analysis of the map.

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



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

## 7.2 Volume estimate [i](#)

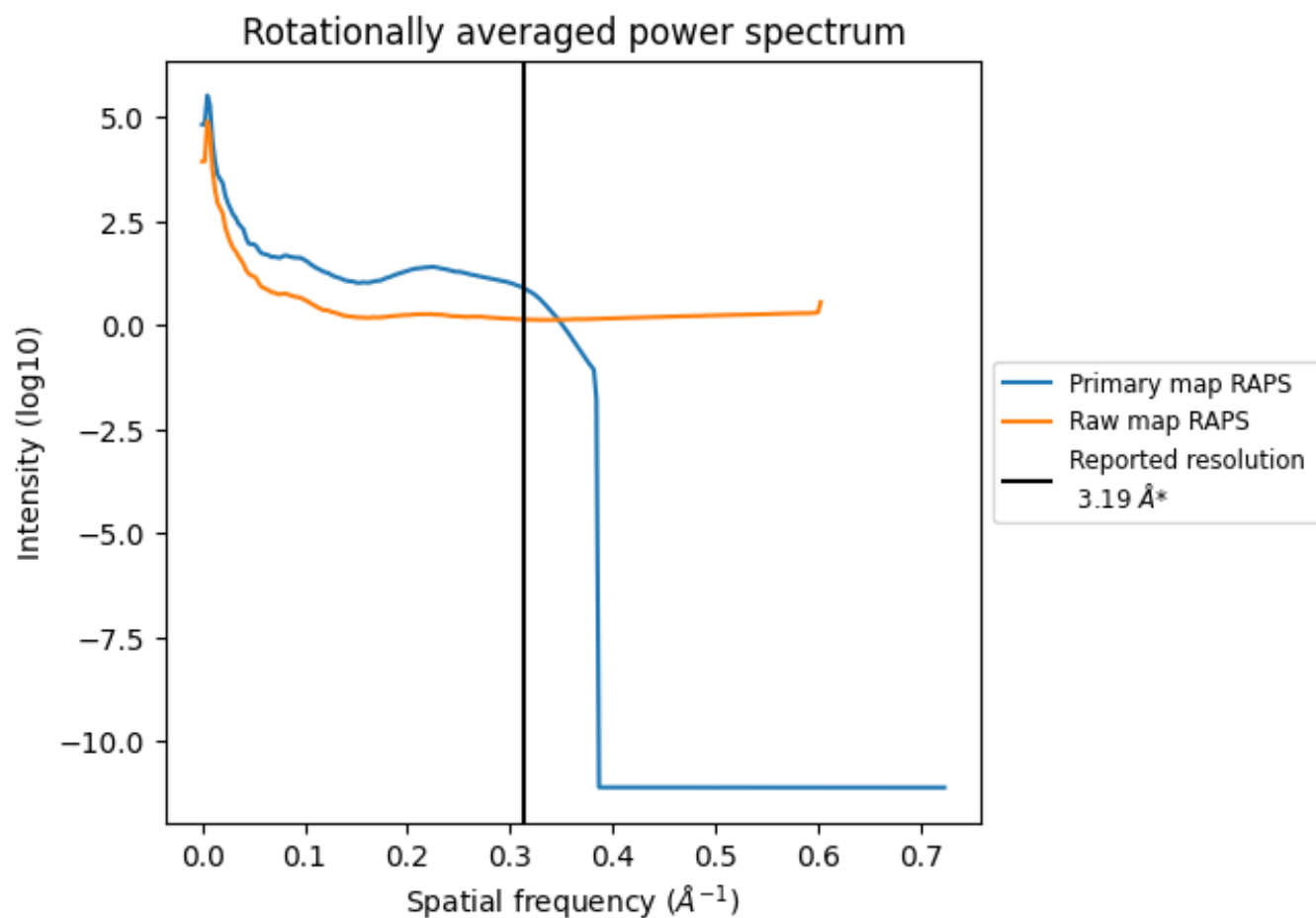


The volume at the recommended contour level is 453 nm<sup>3</sup>; this corresponds to an approximate mass of 410 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.



### 7.3 Rotationally averaged power spectrum ⓘ



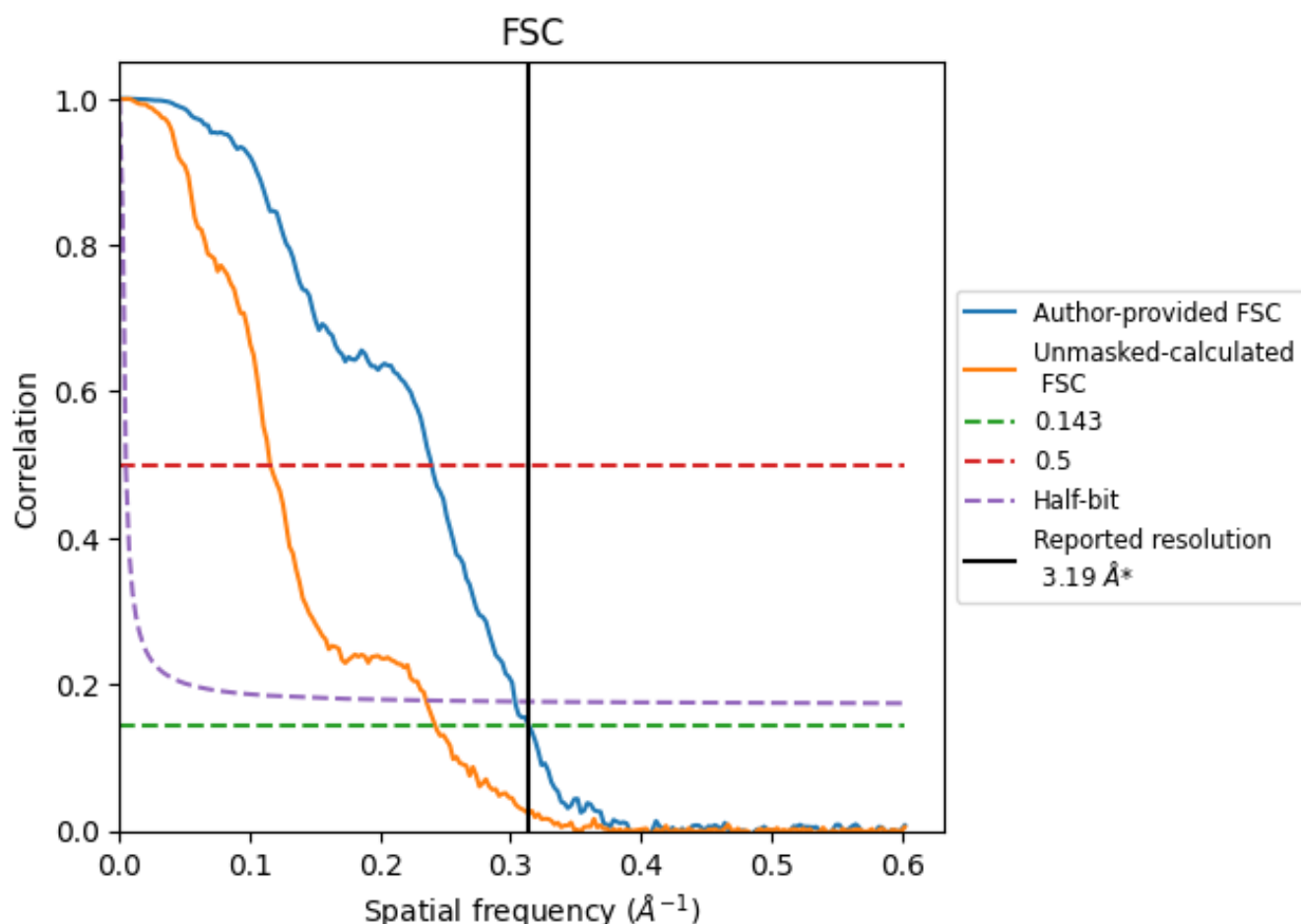
\*Reported resolution corresponds to spatial frequency of 0.313 Å<sup>-1</sup>



## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.313 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

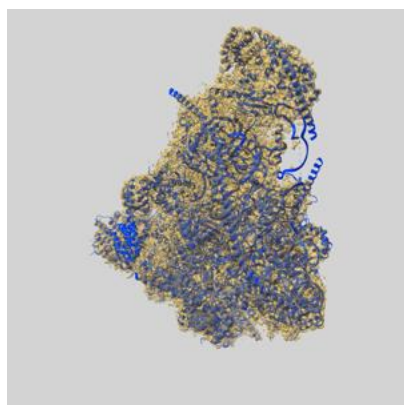
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.19	-	-
Author-provided FSC curve	3.18	4.18	3.30
Unmasked-calculated*	4.13	8.66	4.25

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.13 differs from the reported value 3.19 by more than 10 %

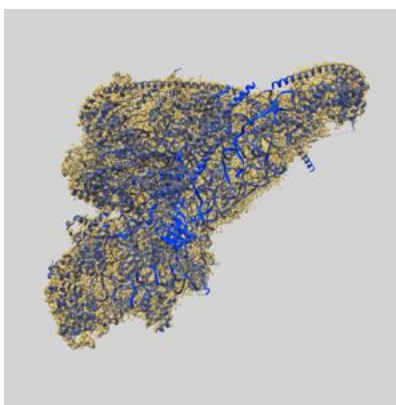
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-13551 and PDB model 7PNT. Per-residue inclusion information can be found in section 3 on page 12.

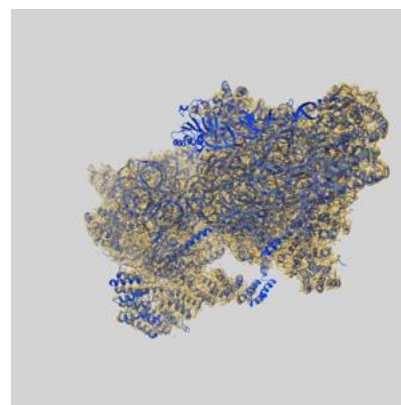
### 9.1 Map-model overlay [i](#)



X



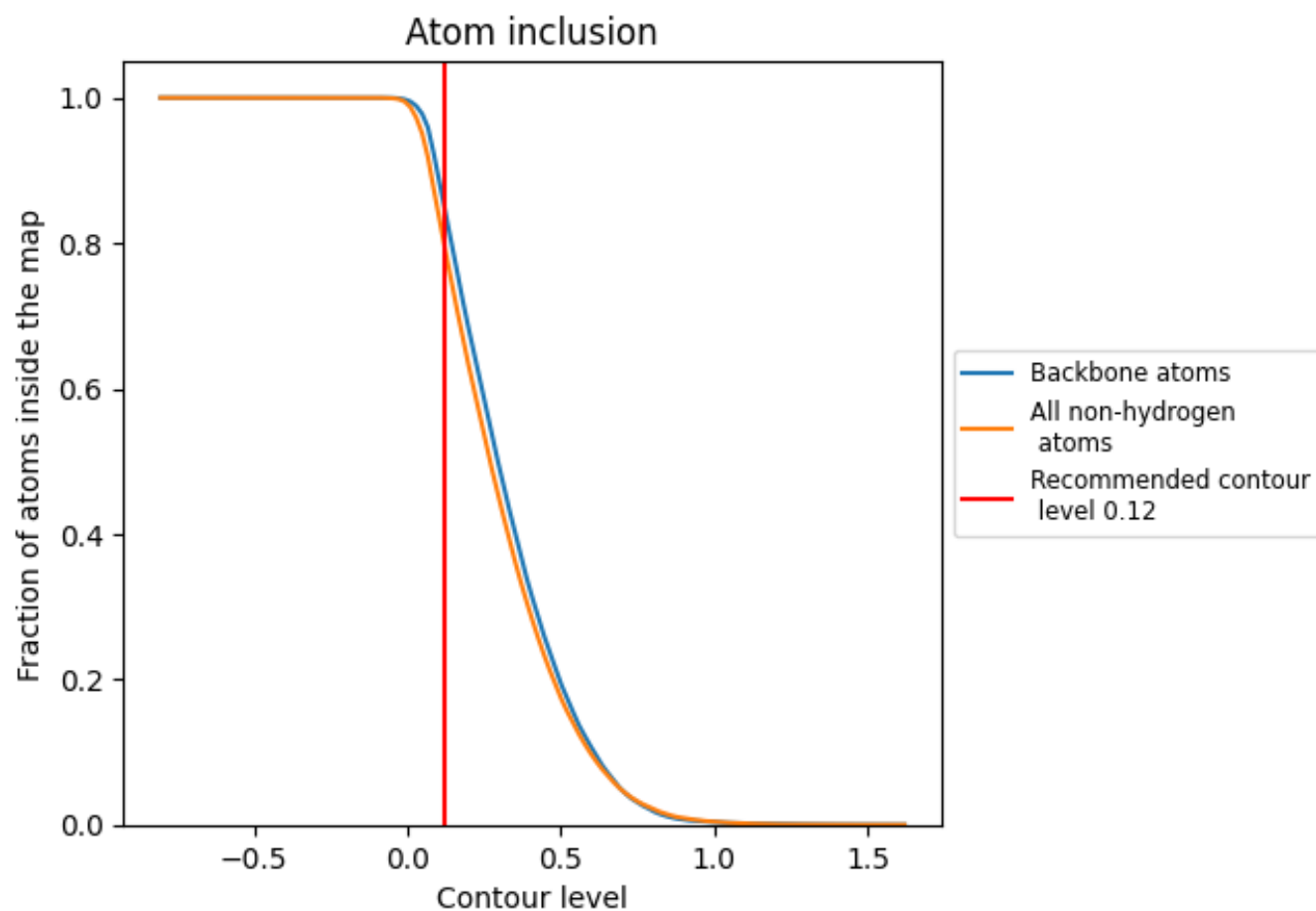
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.12 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, 85% of all backbone atoms, 80% of all non-hydrogen atoms, are inside the map.