



# wwPDB EM Validation Summary Report ⓘ

Mar 19, 2026 – 09:28 PM UTC

PDB ID : 8ZFF / pdb\_00008zff  
EMDB ID : EMD-60059  
Title : Structure of the Bacterial Ribosome without hypoxia-induced rRNA modifications  
Authors : Ishiguro, K.; Yokoyama, T.; Shirouzu, M.; Ito, T.; Suzuki, T.  
Deposited on : 2024-05-07  
Resolution : 2.59 Å(reported)  
Based on initial model : 7K00

This is a wwPDB EM Validation Summary 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.

The types of validation reports are described at

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

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

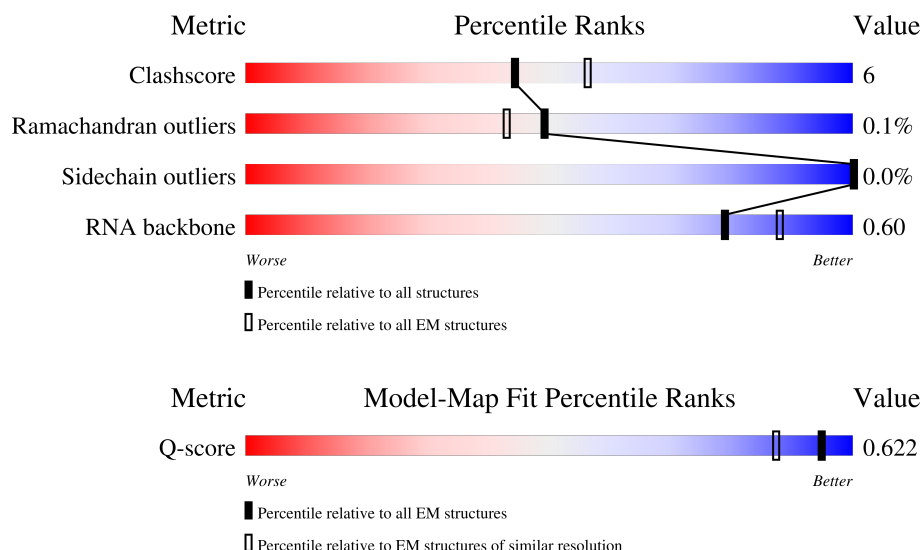
EMDB validation analysis : 0.0.1.dev132  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 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 2.59 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	7741 ( 2.09 - 3.09 )

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	1542	
2	B	241	
3	C	233	
























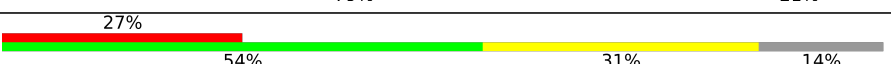

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Mol	Chain	Length	Quality of chain
4	D	206	
5	E	167	
6	F	135	
7	G	179	
8	H	130	
9	I	130	
10	J	103	
11	K	129	
12	L	124	
13	M	118	
14	N	101	
15	O	89	
16	P	82	
17	Q	84	
18	R	75	
19	S	92	
20	T	87	
21	U	71	
22	a	2904	
23	b	120	
24	c	273	
25	d	209	
26	e	201	
27	f	179	
28	g	177	

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Mol	Chain	Length	Quality of chain
29	h	149	
30	i	142	
31	j	123	
32	k	144	
33	l	136	
34	m	127	
35	n	117	
36	o	115	
37	p	118	
38	q	103	
39	r	110	
40	s	100	
41	t	104	
42	u	94	
43	v	85	
44	w	78	
45	x	63	
46	y	59	
47	z	57	
48	0	55	
49	1	46	
50	2	65	
51	3	38	
52	4	70	
53	X	66	

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Mol	Chain	Length	Quality of chain
54	Z	77	<div><div></div><div>8%</div><div>56%</div><div>35%</div><div>8%</div><div></div></div>

## 2 Entry composition

There are 55 unique types of molecules in this entry. The entry contains 140322 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 RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1512	Total	C	N	O	P	0	0
			32466	14487	5964	10503	1512		

- Molecule 2 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	224	Total	C	N	O	S	0	0
			1753	1109	315	321	8		

- Molecule 3 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	206	Total	C	N	O	S	0	0
			1624	1028	305	288	3		

- Molecule 4 is a protein called Small ribosomal subunit protein uS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	205	Total	C	N	O	S	0	0
			1643	1026	315	298	4		

- Molecule 5 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	156	Total	C	N	O	S	0	0
			1152	717	217	212	6		

- Molecule 6 is a protein called Small ribosomal subunit protein bS6, fully modified isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	103	Total	C	N	O	S	0	0
			839	530	151	151	7		

- Molecule 7 is a protein called Small ribosomal subunit protein uS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	153	Total	C	N	O	S	0	0
			1203	750	231	218	4		

- Molecule 8 is a protein called Small ribosomal subunit protein uS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	129	Total	C	N	O	S	0	0
			979	616	173	184	6		

- Molecule 9 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	127	Total	C	N	O	S	0	0
			1022	634	206	179	3		

- Molecule 10 is a protein called Small ribosomal subunit protein uS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	98	Total	C	N	O	S	0	0
			786	493	150	142	1		

- Molecule 11 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	117	Total	C	N	O	S	0	0
			877	540	173	161	3		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	119	IAS	ASN	conflict	UNP P0A7R9

- Molecule 12 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	123	Total	C	N	O	S	0	0
			957	591	196	165	5		

- Molecule 13 is a protein called Small ribosomal subunit protein uS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	115	Total	C	N	O	S	0	0
			891	552	179	157	3		

- Molecule 14 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	100	Total	C	N	O	S	0	0
			805	499	164	139	3		

- Molecule 15 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	88	Total	C	N	O	S	0	0
			714	439	144	130	1		

- Molecule 16 is a protein called Small ribosomal subunit protein bS16.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	81	Total	C	N	O	S	0	0
			643	403	127	112	1		

- Molecule 17 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	79	Total	C	N	O	S	0	0
			641	406	120	112	3		

- Molecule 18 is a protein called Small ribosomal subunit protein bS18.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	66	Total	C	N	O	S	0	0
			544	345	102	96	1		

- Molecule 19 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	84	Total	C	N	O	S	0	0
			668	427	127	112	2		

- Molecule 20 is a protein called Small ribosomal subunit protein bS20.



Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	86	Total	C	N	O	S	0	0
			670	414	138	115	3		

- Molecule 21 is a protein called Small ribosomal subunit protein bS21.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	70	Total	C	N	O	S	0	0
			589	366	125	97	1		

- Molecule 22 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	a	2761	Total	C	N	O	P	0	0
			59301	26460	10925	19155	2761		

- Molecule 23 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	b	119	Total	C	N	O	P	0	0
			2549	1135	466	829	119		

- Molecule 24 is a protein called Large ribosomal subunit protein uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	c	271	Total	C	N	O	S	0	0
			2082	1288	423	364	7		

- Molecule 25 is a protein called Large ribosomal subunit protein uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	d	209	Total	C	N	O	S	0	0
			1566	980	288	294	4		

- Molecule 26 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	e	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 27 is a protein called Large ribosomal subunit protein uL5.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	f	177	Total	C	N	O	S	0	0
			1410	899	249	256	6		

- Molecule 28 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	g	176	Total	C	N	O	S	0	0
			1323	832	243	246	2		

- Molecule 29 is a protein called Large ribosomal subunit protein bL9.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	h	41	Total	C	N	O	S	0	0
			303	194	54	54	1		

- Molecule 30 is a protein called Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	i	142	Total	C	N	O	S	0	0
			1129	714	212	199	4		

- Molecule 31 is a protein called Large ribosomal subunit protein uL14.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	j	123	Total	C	N	O	S	0	0
			946	593	181	166	6		

- Molecule 32 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	k	144	Total	C	N	O	S	0	0
			1053	654	207	190	2		

- Molecule 33 is a protein called Large ribosomal subunit protein uL16.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	l	136	Total	C	N	O	S	0	0
			1075	686	205	177	7		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	82	MS6	MET	conflict	UNP P0ADY7

- Molecule 34 is a protein called Large ribosomal subunit protein bL17.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	m	118	Total	C	N	O	S	0	0
			945	585	194	161	5		

- Molecule 35 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	n	116	Total	C	N	O		0	0
			892	552	178	162			

- Molecule 36 is a protein called Large ribosomal subunit protein bL19.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	o	114	Total	C	N	O	S	0	0
			917	574	179	163	1		

- Molecule 37 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	p	117	Total	C	N	O		0	0
			947	604	192	151			

- Molecule 38 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	q	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 39 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	r	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 40 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	s	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 41 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	t	102	Total	C	N	O		0	0
			779	492	146	141			

- Molecule 42 is a protein called Large ribosomal subunit protein bL25.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	u	94	Total	C	N	O	S	0	0
			753	479	137	134	3		

- Molecule 43 is a protein called Large ribosomal subunit protein bL27.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	v	78	Total	C	N	O	S	0	0
			592	365	119	107	1		

- Molecule 44 is a protein called Large ribosomal subunit protein bL28.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	w	77	Total	C	N	O	S	0	0
			625	388	129	106	2		

- Molecule 45 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	x	62	Total	C	N	O	S	0	0
			501	308	98	94	1		

- Molecule 46 is a protein called Large ribosomal subunit protein uL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	y	58	Total	C	N	O	S	0	0
			449	281	87	79	2		

- Molecule 47 is a protein called Large ribosomal subunit protein bL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	z	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 48 is a protein called Large ribosomal subunit protein bL33.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	0	51	Total	C	N	O		0	0
			417	269	76	72			

- Molecule 49 is a protein called Large ribosomal subunit protein bL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	1	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 50 is a protein called Large ribosomal subunit protein bL35.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	2	64	Total	C	N	O	S	0	0
			504	323	105	74	2		

- Molecule 51 is a protein called Large ribosomal subunit protein bL36A.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	3	38	Total	C	N	O	S	0	0
			302	185	65	48	4		

- Molecule 52 is a protein called Large ribosomal subunit protein bL31.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	4	60	Total	C	N	O	S	0	0
			480	299	90	85	6		

- Molecule 53 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	X	6	Total	C	N	O	P	0	0
			130	58	25	41	6		

- Molecule 54 is a RNA chain called P-site tRNA-fMet.

Mol	Chain	Residues	Atoms						AltConf	Trace
54	Z	77	Total	C	N	O	P	S	0	0
			1645	734	297	536	77	1		

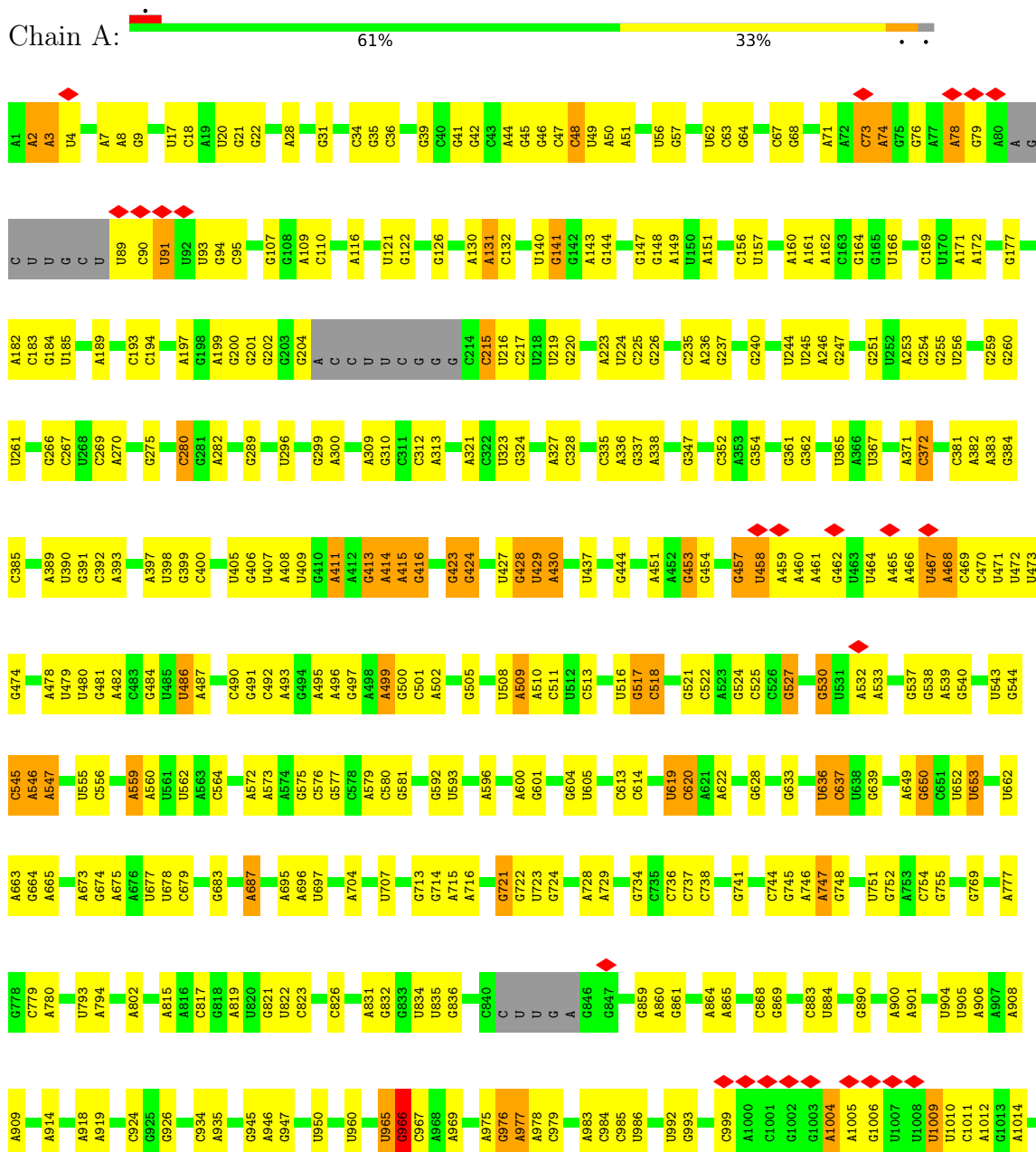
- Molecule 55 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

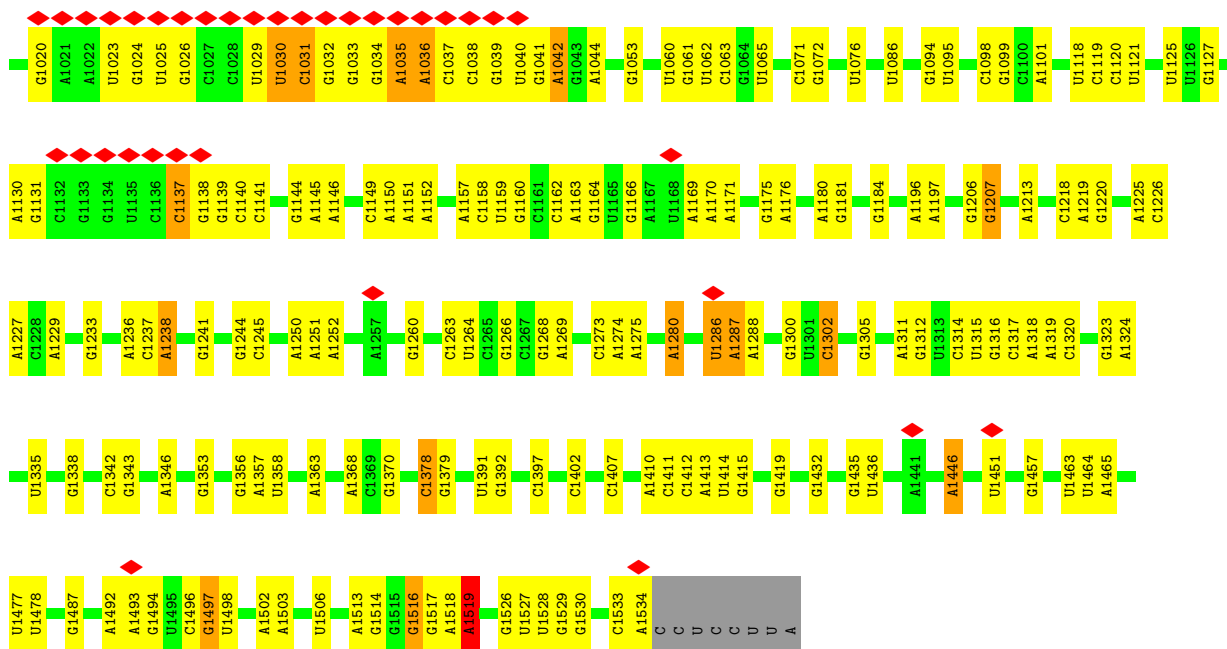
Mol	Chain	Residues	Atoms		AltConf
55	A	119	Total	Mg	0
			119	119	
55	a	328	Total	Mg	0
			328	328	
55	b	6	Total	Mg	0
			6	6	
55	c	1	Total	Mg	0
			1	1	
55	d	1	Total	Mg	0
			1	1	
55	z	1	Total	Mg	0
			1	1	
55	Z	1	Total	Mg	0
			1	1	

### 3 Residue-property plots

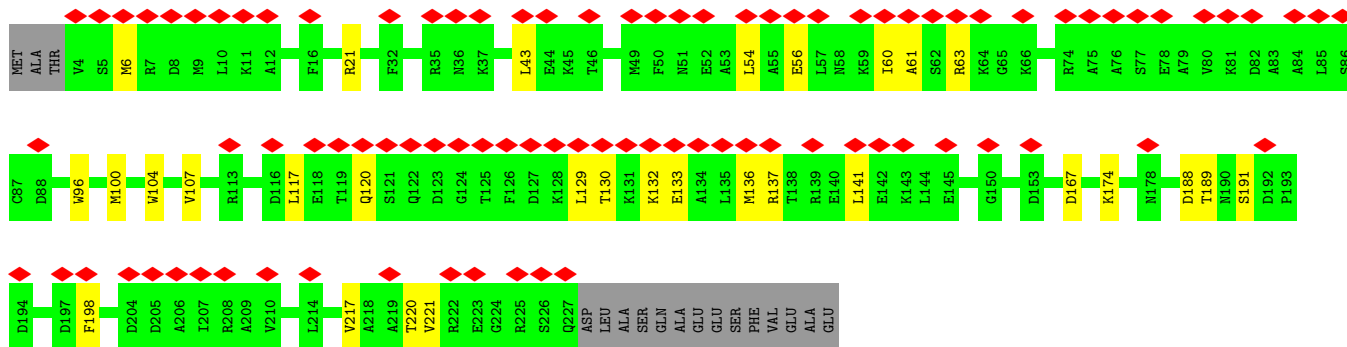
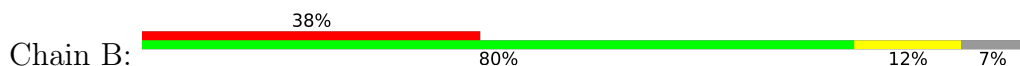
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

#### • Molecule 1: 16S rRNA

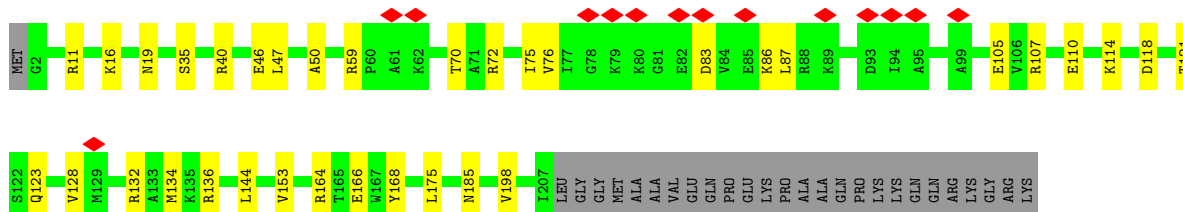
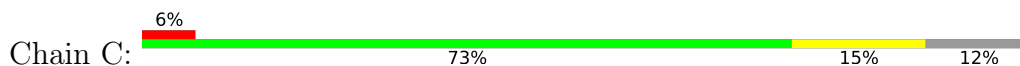




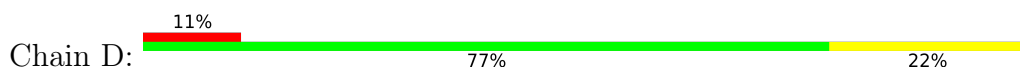
• Molecule 2: Small ribosomal subunit protein uS2



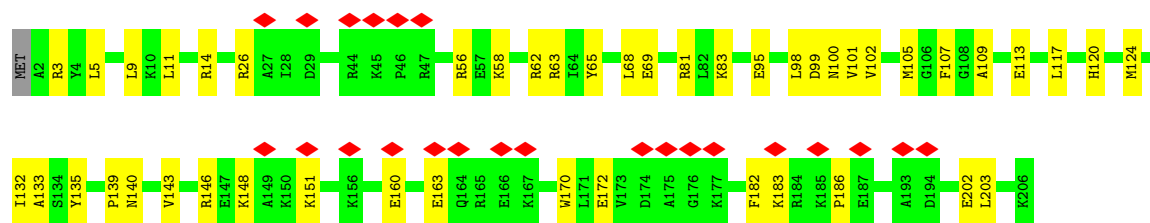
• Molecule 3: Small ribosomal subunit protein uS3



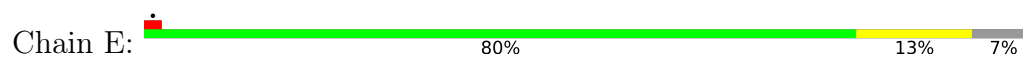
• Molecule 4: Small ribosomal subunit protein uS4



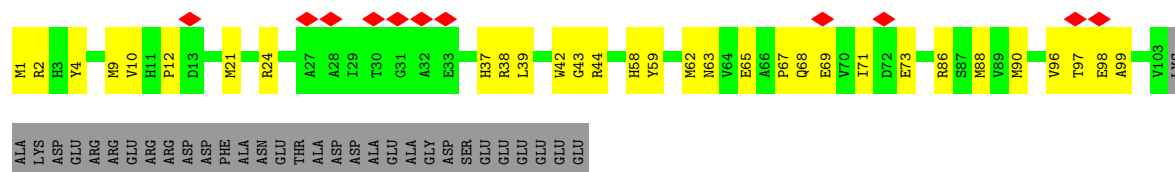




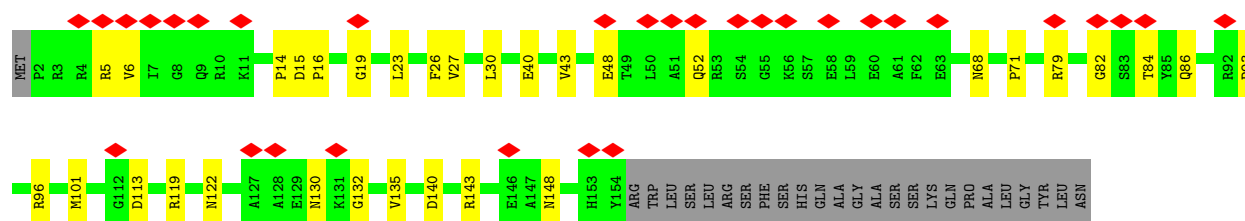
- Molecule 5: Small ribosomal subunit protein uS5



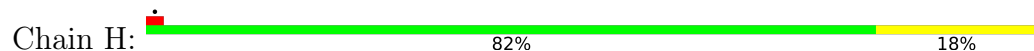
- Molecule 6: Small ribosomal subunit protein bS6, fully modified isoform



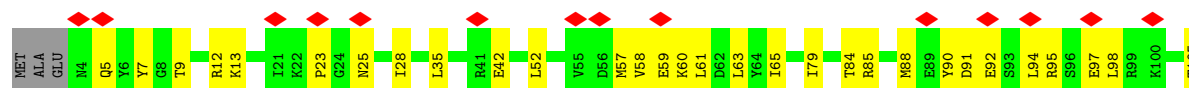
- Molecule 7: Small ribosomal subunit protein uS7



- Molecule 8: Small ribosomal subunit protein uS8



- Molecule 9: Small ribosomal subunit protein uS9

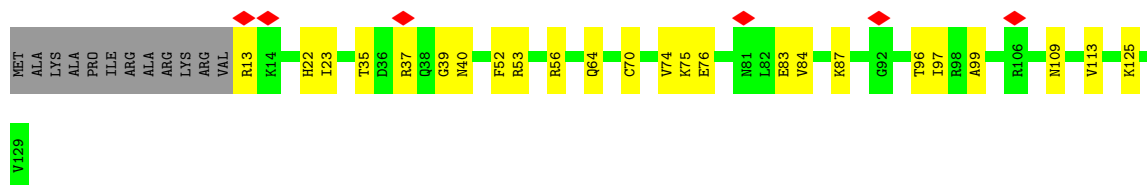
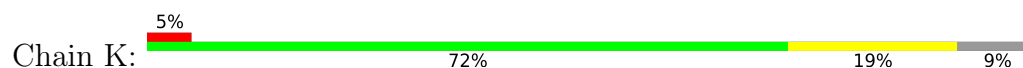




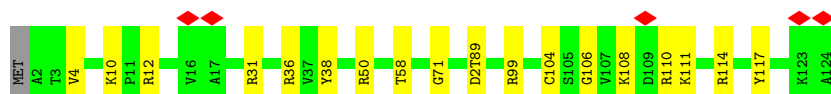
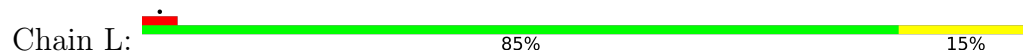
- Molecule 10: Small ribosomal subunit protein uS10



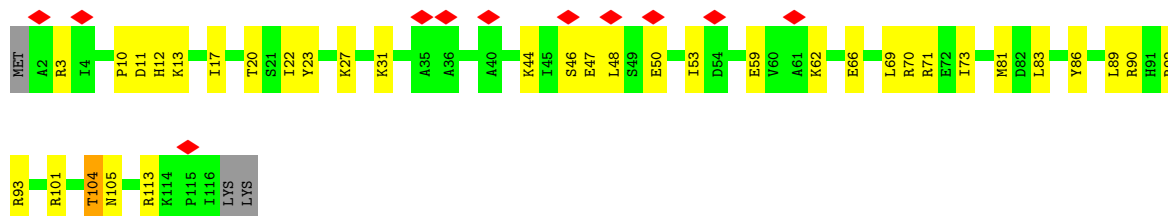
- Molecule 11: Small ribosomal subunit protein uS11



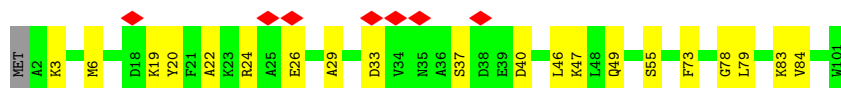
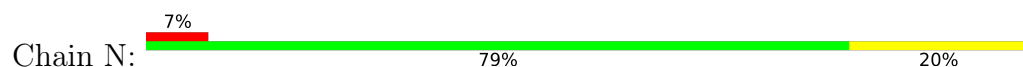
- Molecule 12: Small ribosomal subunit protein uS12



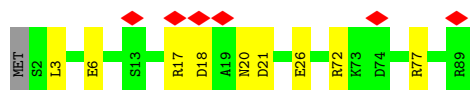
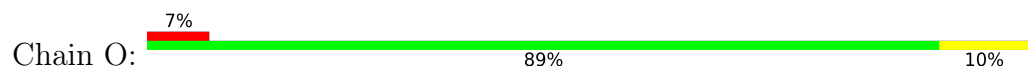
- Molecule 13: Small ribosomal subunit protein uS13



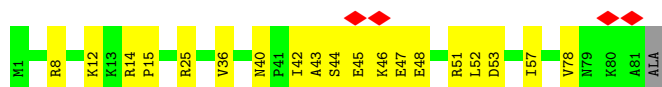
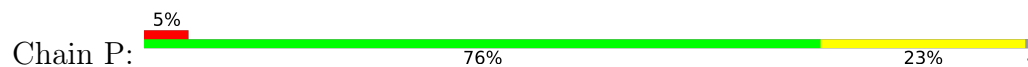
- Molecule 14: Small ribosomal subunit protein uS14



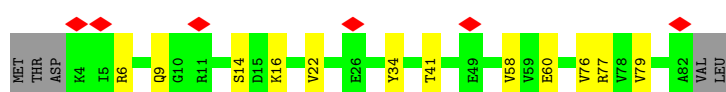
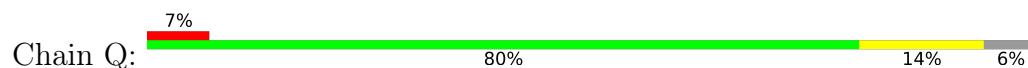
- Molecule 15: Small ribosomal subunit protein uS15



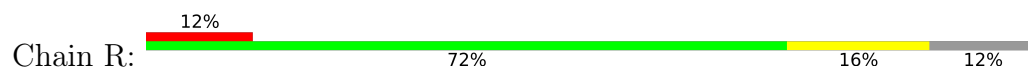
- Molecule 16: Small ribosomal subunit protein bS16



- Molecule 17: Small ribosomal subunit protein uS17



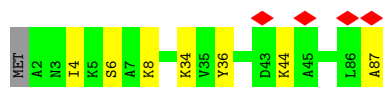
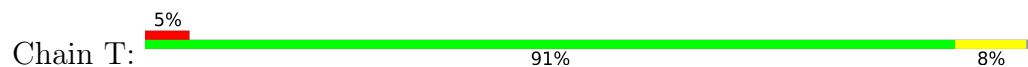
- Molecule 18: Small ribosomal subunit protein bS18



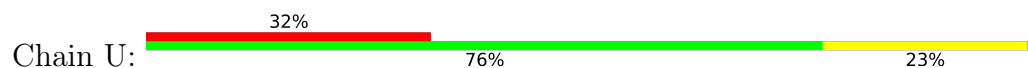
- Molecule 19: Small ribosomal subunit protein uS19

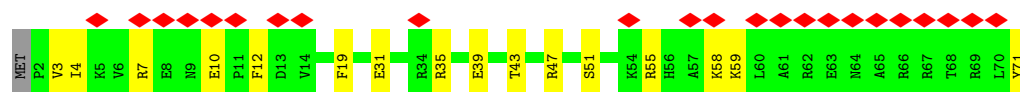


- Molecule 20: Small ribosomal subunit protein bS20

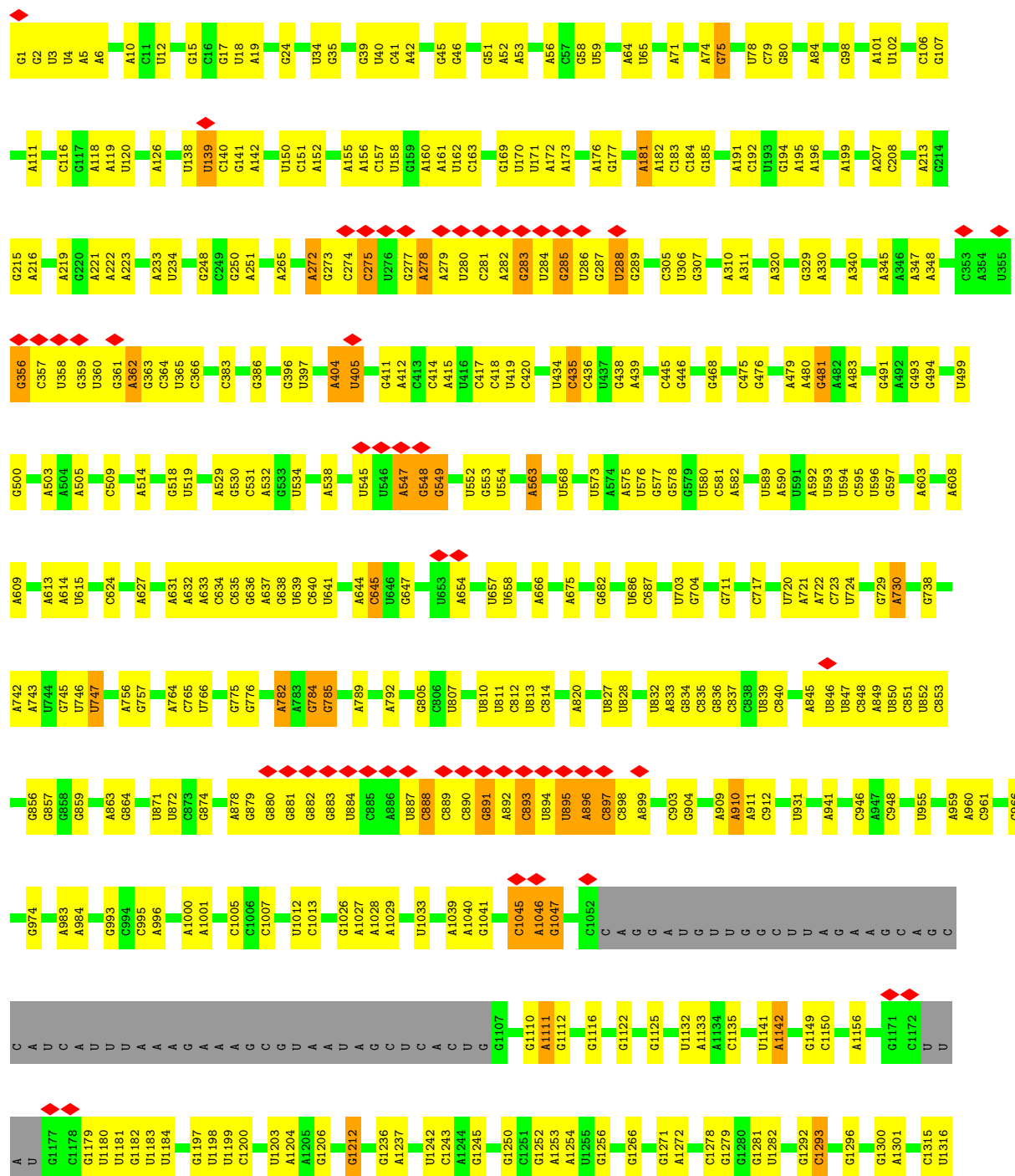


- Molecule 21: Small ribosomal subunit protein bS21





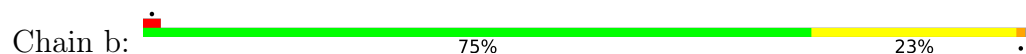
• Molecule 22: 23S rRNA



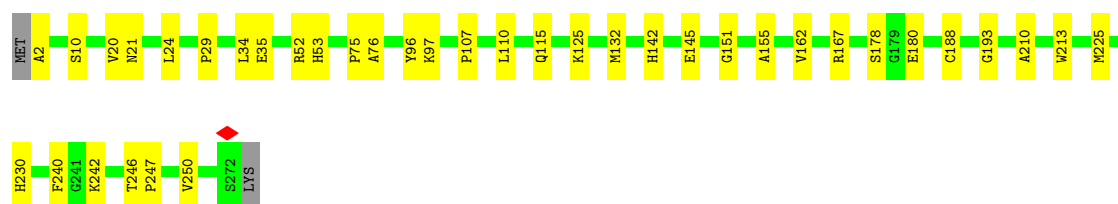
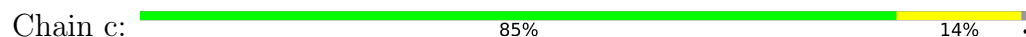
A2748	G2625	C2499	G2383	A2287	C	A	C2023	G1873	C1764	A1614	G1527	A1431	C1319
G2626	C2626	G2502	U2384	A2288	C	G	G2024	C1874	A1773	A1618	A1528	G1432	C1320
G2627	G2627	A2503	C2385	U2291	C	A	U2026	G1875	C1774	A1618	G1529	A1433	A1434
G2630	G2630	U2504	C	U2292	C	U	G2027	A1889	U1782	G1622	C1531	G1436	U1329
A2635	A2635	G2505	U2392	G2293	C	A	A2030	A1890	A1786	A1626	A1532	U1340	U1340
G2636	G2636	U2514	U2394	G2294	U	G	A2031	C1902	A1786	A1626	G1533	G1341	G1341
U2637	U2637	C2515	U2298	A2298	U	U	G2032	C1905	C1790	U1636	U1534	A1342	A1342
G2638	G2638	A2516	G2396	U2299	A	G	A2033	G1906	A1791	A1637	A1535	G1343	G1343
C2646	C2646	U2518	U2402	C2301	A	G	G2038	U1911	U1794	C1646	C1536	U1442	U1442
U2647	U2647	U2522	C2403	U2302	U	A	U2039	A1912	C1795	U1647	G1537	U1443	C1349
G2648	G2648	U2529	A2406	U2305	U	G	C2043	A1913	U1796	G1648	G1538	G1444	C1350
U2650	U2650	G2532	G2410	U2308	C	C	U2045	C1914	U1797	G1649	U1539	G1445	U1351
A2657	A2657	U2532	U2419	U2312	U	U	A2052	U1915	U1798	A1654	G1540	C1447	C1447
G2661	G2661	U2537	C2420	C2313	U	U	G2055	A1916	G1799	G1667	C1541	G1448	A1354
G2663	G2663	U2537	A2425	G2316	U	U	G2056	U1917	C1800	A1677	A1548	G1448	G1355
U2680	U2680	A2547	G2429	A2317	U	U	A2060	G1929	A1801	G1674	G1547	G1460	G1361
C2681	C2681	U2548	A2430	A2322	G	A	G2061	U1930	A1802	A1678	A1549	U1460	C1362
U2687	U2687	U2552	A2435	G2325	U	G	A2062	U1931	A1803	A1683	U1554	A1470	C1363
G2688	G2688	G2553	U2441	C2326	C	C	G2065	A1937	G1814	G1684	C1558	G1473	G1370
U2689	U2689	U2554	C2442	A2327	A	A	A2069	U1938	A1815	C1685	U1559	U1474	A1371
U2690	U2690	U2555	C2443	A2328	C	C	A2070	U1939	C1816	C1686	G1560	G1475	A1378
C2696	C2696	G2556	G2444	U2329	C	C	C2071	U1945	G1824	C1704	U1563	U1476	U1379
U2699	U2699	U2557	G2445	U2330	C	C	C2072	C1962	A1829	A1705	C1564	A1477	G1380
A2700	A2700	C2558	A2448	A2333	U	A	U2074	C1967	C1830	G1710	G1565	U1481	A1383
G2709	G2709	U2568	U2449	A2336	U	U	U2075	A1968	G1831	A1711	A1566	G1482	C1386
G2714	G2714	C2573	G2455	A2340	C	C	U2086	U1969	G1835	G1715	A1569	G1483	A1387
C2715	C2715	U2580	C2456	U2343	C	C	G2087	U1970	C1842	U1720	A1570	U1484	A1392
U2818	U2818	U2580	A2461	U2344	U	A	G2093	G1971	C1843	G1721	A1571	A1485	A1393
G2819	G2819	U2580	C2462	G2345	U	U	A2095	U1980	A1847	U1725	A1572	A1493	U1394
A2820	A2820	C2591	U2477	A2346	G	G	C2096	A1981	U1855	C1728	C1575	A1494	A1395
A2821	A2821	G2592	A2469	C2347	A	A	A2097	U1982	A1848	C1728	C1576	A1495	U1396
C2830	C2830	U2592	U2478	U2347	C	C	U2098	U1983	A1853	U1729	C1577	A1496	U1397
A2835	A2835	A2602	C2475	C2350	C	C	U2099	U1991	A1854	C1730	U1578	C1498	C1398
U2845	U2845	G2603	A2476	A2351	C	C	G2100	G1992	U1856	G1736	A1583	U1405	U1405
G2846	G2846	U2604	U2477	C2361	C	C	A2101	U1993	G1857	G1737	C1585	U1412	U1412
U2847	U2847	U2605	A2478	C2364	A	A	G2102	C1997	A1858	G1738	A1586	A1509	A1413
G2848	G2848	U2608	G2481	U2365	C	C	C	C2000	G1862	U1744	G1587	G1510	G1416
U2849	U2849	U2609	A2482	C2366	U	U	U	G2012	U1864	A1745	A1590	A1515	C1417
C2858	C2858	U2613	C2483	C2373	U	U	G	A2013	G1869	U1746	A1591	G1519	A1427
G2859	G2859	A2614	C2486	C2374	A	A	A	A2014	C1870	U1747	A1597	G1524	C1428
U2860	U2860	U2615	U2491	A2377	U	U	U	A2015	A1871	C1760	A1598	A1526	G1430
G2744	G2744	G2618	C2379	U2378	C	C	U	A2020	A1872		C1600		
G2747	G2747		C2283	C2380	A	A	U				C1607		



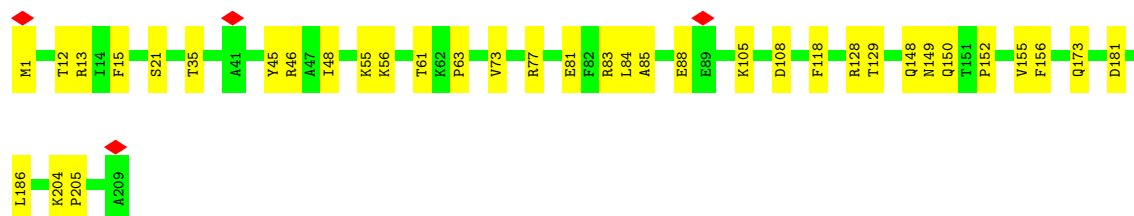
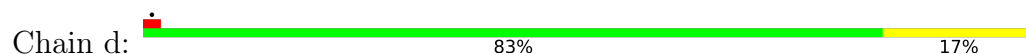
• Molecule 23: 5S rRNA



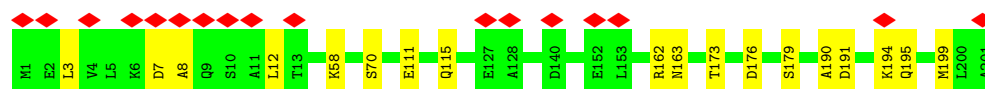
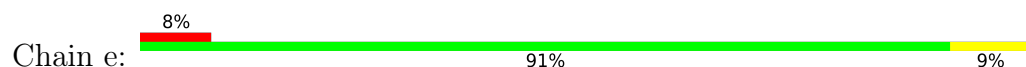
• Molecule 24: Large ribosomal subunit protein uL2



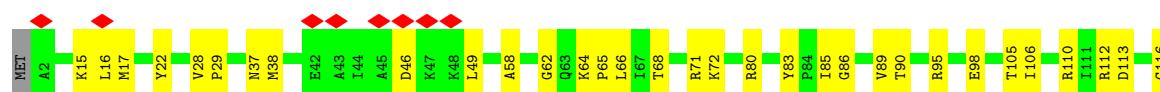
• Molecule 25: Large ribosomal subunit protein uL3

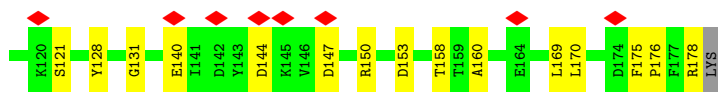


• Molecule 26: Large ribosomal subunit protein uL4

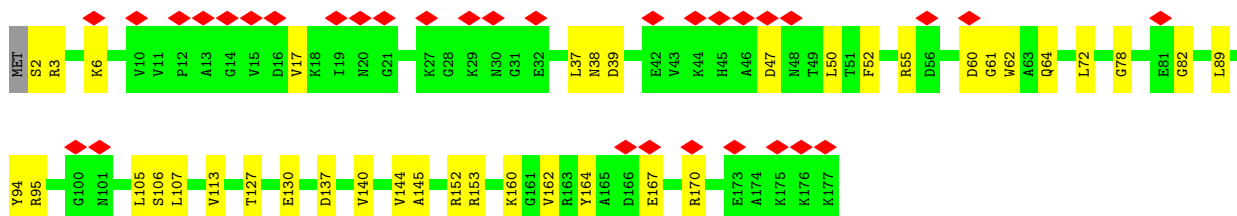
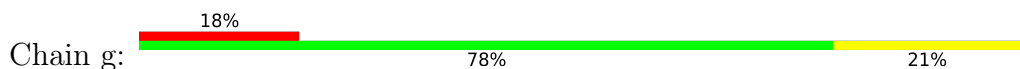


• Molecule 27: Large ribosomal subunit protein uL5

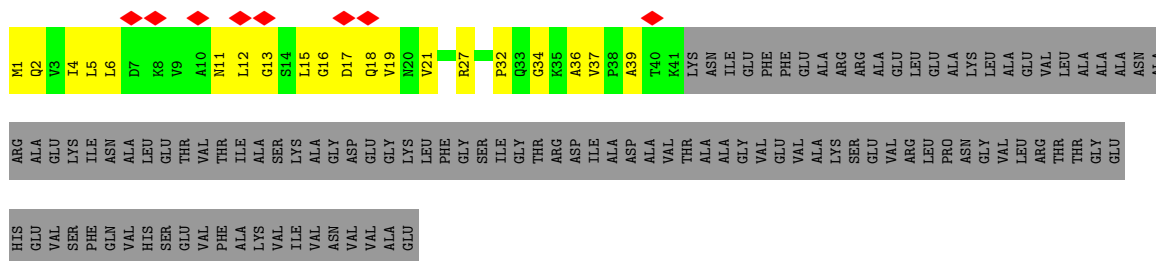




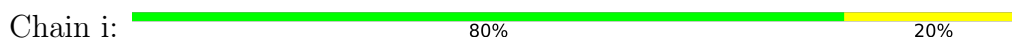
- Molecule 28: Large ribosomal subunit protein uL6



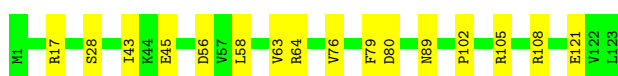
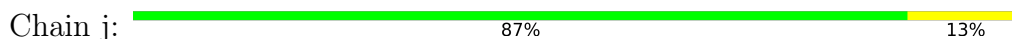
- Molecule 29: Large ribosomal subunit protein bL9



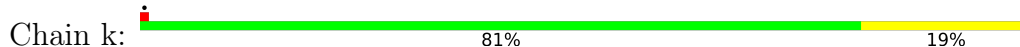
- Molecule 30: Large ribosomal subunit protein uL13



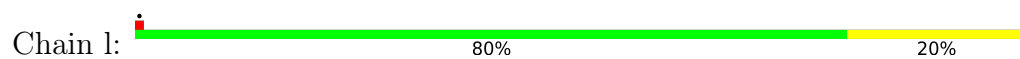
- Molecule 31: Large ribosomal subunit protein uL14



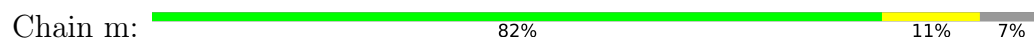
- Molecule 32: Large ribosomal subunit protein uL15



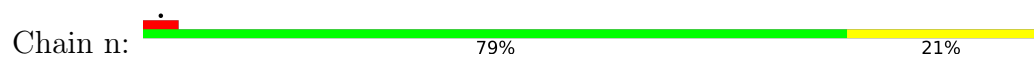
- Molecule 33: Large ribosomal subunit protein uL16



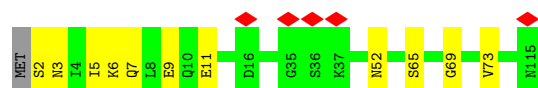
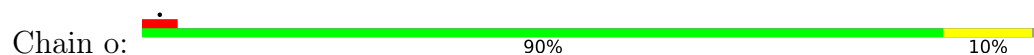
- Molecule 34: Large ribosomal subunit protein bL17



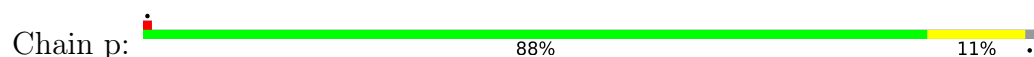
- Molecule 35: Large ribosomal subunit protein uL18



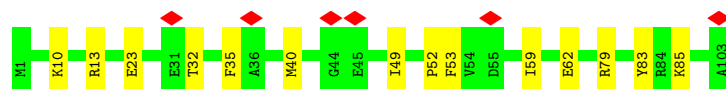
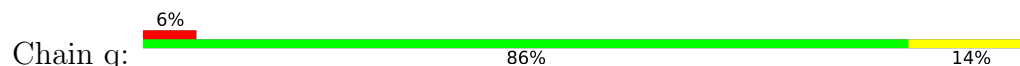
- Molecule 36: Large ribosomal subunit protein bL19



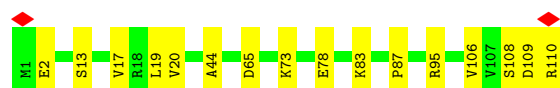
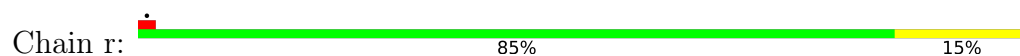
- Molecule 37: Large ribosomal subunit protein bL20



- Molecule 38: Large ribosomal subunit protein bL21

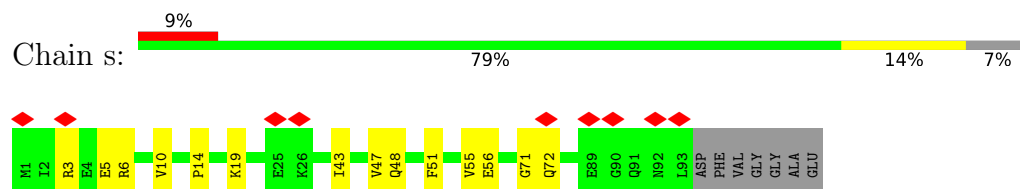


- Molecule 39: Large ribosomal subunit protein uL22

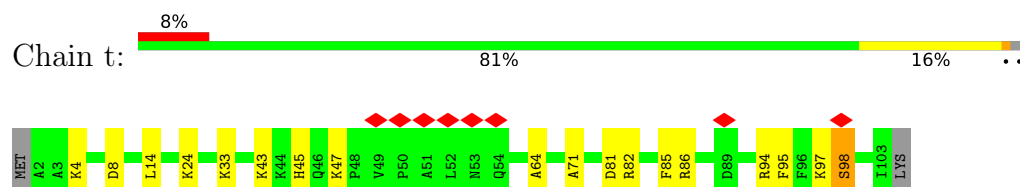




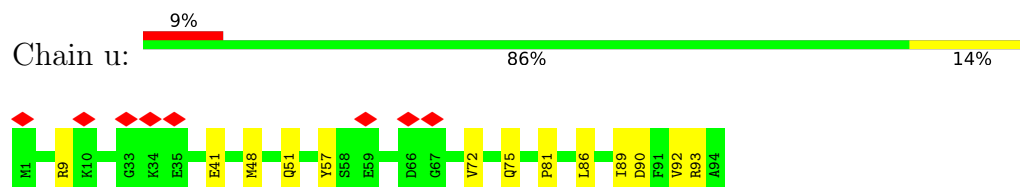
- Molecule 40: Large ribosomal subunit protein uL23



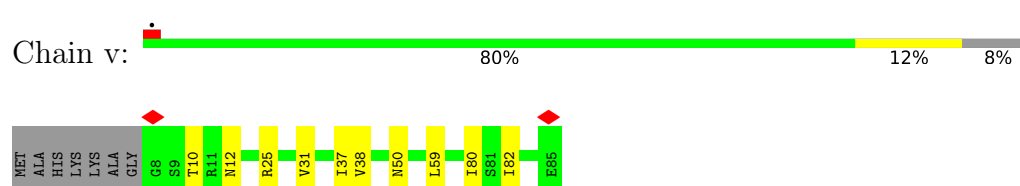
- Molecule 41: Large ribosomal subunit protein uL24



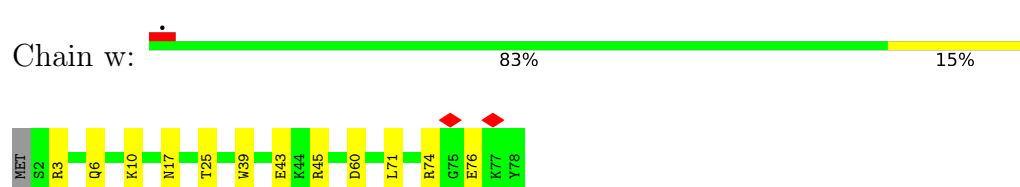
- Molecule 42: Large ribosomal subunit protein bL25



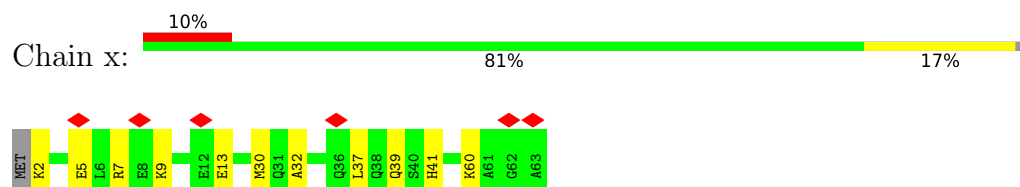
- Molecule 43: Large ribosomal subunit protein bL27



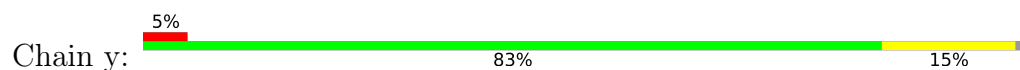
- Molecule 44: Large ribosomal subunit protein bL28



- Molecule 45: Large ribosomal subunit protein uL29

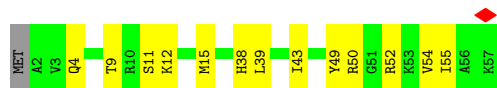
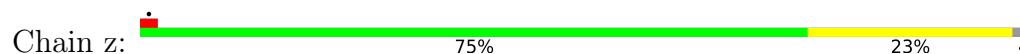


- Molecule 46: Large ribosomal subunit protein uL30





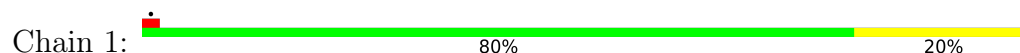
- Molecule 47: Large ribosomal subunit protein bL32



- Molecule 48: Large ribosomal subunit protein bL33



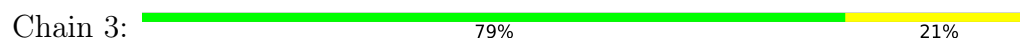
- Molecule 49: Large ribosomal subunit protein bL34



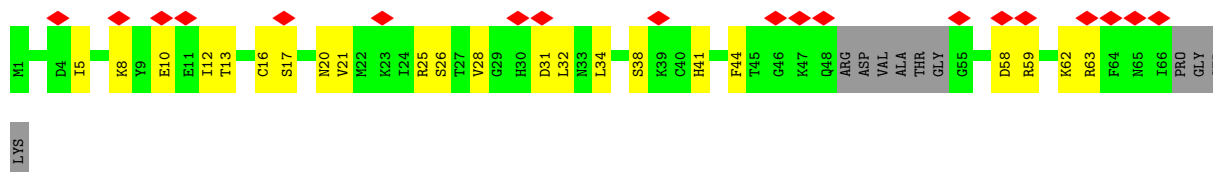
- Molecule 50: Large ribosomal subunit protein bL35



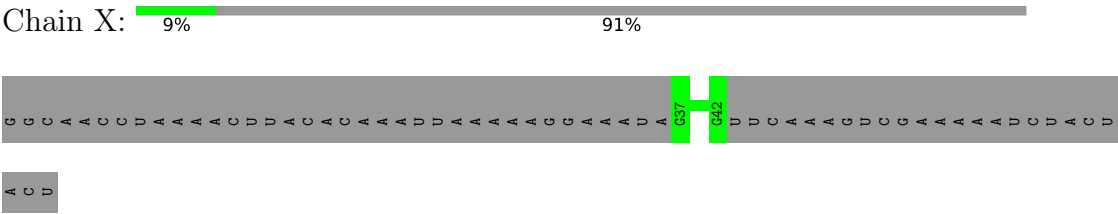
- Molecule 51: Large ribosomal subunit protein bL36A



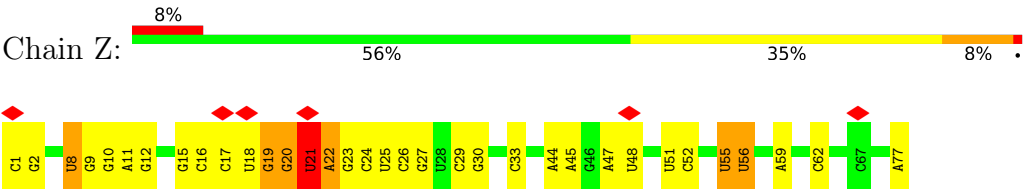
- Molecule 52: Large ribosomal subunit protein bL31



● Molecule 53: mRNA



● Molecule 54: P-site tRNA-fMet



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	244856	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 ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.239	Depositor
Minimum map value	-0.122	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.008	Depositor
Recommended contour level	0.024	Depositor
Map size ( $\text{\AA}$ )	439.9, 439.9, 439.9	wwPDB
Map dimensions	530, 530, 530	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.83, 0.83, 0.83	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: OMG, 1MG, MEQ, G7M, MG, 3TD, 4SU, D2T, 5MC, OMU, 4D4, UR3, 2MA, MA6, MS6, IAS, 6MZ, 2MG, 4OC, PSU, 5MU, OMC, H2U

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	0.35	0/36073	0.30	0/56264
2	B	0.21	0/1784	0.32	0/2403
3	C	0.26	0/1651	0.36	0/2225
4	D	0.27	0/1665	0.37	0/2227
5	E	0.30	0/1165	0.37	0/1568
6	F	0.26	0/858	0.42	0/1160
7	G	0.22	0/1219	0.36	0/1635
8	H	0.31	0/989	0.38	0/1326
9	I	0.27	0/1034	0.42	0/1375
10	J	0.27	0/796	0.43	0/1077
11	K	0.27	0/884	0.35	0/1191
12	L	0.31	0/960	0.40	0/1286
13	M	0.27	0/900	0.45	0/1204
14	N	0.28	0/817	0.43	0/1088
15	O	0.29	0/722	0.38	0/964
16	P	0.31	0/653	0.39	0/877
17	Q	0.28	0/650	0.36	0/871
18	R	0.28	0/553	0.38	0/742
19	S	0.24	0/685	0.39	0/922
20	T	0.29	0/676	0.35	0/895
21	U	0.19	0/597	0.35	0/792
22	a	0.40	0/65842	0.31	0/102711
23	b	0.33	0/2850	0.27	0/4444
24	c	0.36	0/2121	0.39	0/2852
25	d	0.36	0/1576	0.35	0/2119
26	e	0.31	0/1571	0.35	0/2113
27	f	0.27	0/1434	0.36	0/1926
28	g	0.25	0/1343	0.42	0/1816
29	h	0.23	0/306	0.40	0/413
30	i	0.34	0/1152	0.35	0/1551
31	j	0.35	0/955	0.36	0/1279

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
32	k	0.34	0/1062	0.39	0/1413
33	l	0.34	0/1073	0.37	0/1433
34	m	0.37	0/958	0.42	0/1281
35	n	0.29	0/902	0.39	0/1209
36	o	0.34	0/929	0.34	0/1242
37	p	0.38	0/960	0.37	0/1278
38	q	0.35	0/829	0.38	0/1107
39	r	0.34	0/864	0.39	0/1156
40	s	0.30	0/744	0.45	0/994
41	t	0.28	0/787	0.49	2/1051 (0.2%)
42	u	0.29	0/766	0.36	0/1025
43	v	0.35	0/599	0.36	0/792
44	w	0.34	0/635	0.40	0/848
45	x	0.25	0/502	0.38	0/667
46	y	0.33	0/453	0.36	0/605
47	z	0.34	0/450	0.36	0/599
48	0	0.28	0/424	0.31	0/565
49	1	0.38	0/380	0.43	0/498
50	2	0.37	0/513	0.42	0/676
51	3	0.36	0/303	0.38	0/397
52	4	0.21	0/488	0.41	0/649
53	X	0.29	0/145	0.26	0/224
54	Z	0.28	0/1725	0.26	0/2687
All	All	0.36	0/150972	0.33	2/225712 (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
13	M	0	1
50	2	0	1
All	All	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
41	t	98	SER	CA-C-N	5.71	132.44	121.54
41	t	98	SER	C-N-CA	5.71	132.44	121.54

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
50	2	31	HIS	Peptide
13	M	104	THR	Peptide

## 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	32466	0	16359	351	0
2	B	1753	0	1780	19	0
3	C	1624	0	1696	19	0
4	D	1643	0	1707	36	0
5	E	1152	0	1196	17	0
6	F	839	0	833	24	0
7	G	1203	0	1254	22	0
8	H	979	0	1031	17	0
9	I	1022	0	1070	30	0
10	J	786	0	828	19	0
11	K	877	0	884	16	0
12	L	957	0	1017	17	0
13	M	891	0	952	31	0
14	N	805	0	844	12	0
15	O	714	0	734	7	0
16	P	643	0	661	11	0
17	Q	641	0	682	9	0
18	R	544	0	565	9	0
19	S	668	0	693	15	0
20	T	670	0	719	5	0
21	U	589	0	629	10	0
22	a	59301	0	29850	524	0
23	b	2549	0	1291	15	0
24	c	2082	0	2154	26	0
25	d	1566	0	1618	26	0
26	e	1552	0	1619	10	0
27	f	1410	0	1444	37	0
28	g	1323	0	1371	26	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
29	h	303	0	327	15	0
30	i	1129	0	1162	19	0
31	j	946	0	1023	11	0
32	k	1053	0	1129	21	0
33	l	1075	0	1145	16	0
34	m	945	0	989	9	0
35	n	892	0	923	14	0
36	o	917	0	962	8	0
37	p	947	0	1019	12	0
38	q	816	0	839	10	0
39	r	857	0	922	10	0
40	s	738	0	807	9	0
41	t	779	0	831	14	0
42	u	753	0	780	10	0
43	v	592	0	607	6	0
44	w	625	0	652	8	0
45	x	501	0	531	7	0
46	y	449	0	488	5	0
47	z	444	0	458	9	0
48	0	417	0	451	8	0
49	1	377	0	418	9	0
50	2	504	0	572	7	0
51	3	302	0	343	6	0
52	4	480	0	482	18	0
53	X	130	0	66	0	0
54	Z	1645	0	842	16	0
55	A	119	0	0	0	0
55	Z	1	0	0	0	0
55	a	328	0	0	0	0
55	b	6	0	0	0	0
55	c	1	0	0	0	0
55	d	1	0	0	0	0
55	z	1	0	0	0	0
All	All	140322	0	94249	1465	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 6.

The worst 5 of 1465 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:414:A:HO2'	1:A:415:A:H8	0.99	0.97
22:a:1047:G:HO2'	22:a:1110:G:H1	1.13	0.97
1:A:76:G:H1	1:A:93:U:H3	1.11	0.97
22:a:1870:C:HO2'	22:a:1871:A:H8	0.99	0.95
22:a:2100:G:H1	22:a:2189:U:H3	0.95	0.93

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	222/241 (92%)	211 (95%)	11 (5%)	0	100	100
3	C	204/233 (88%)	197 (97%)	7 (3%)	0	100	100
4	D	203/206 (98%)	199 (98%)	4 (2%)	0	100	100
5	E	154/167 (92%)	147 (96%)	7 (4%)	0	100	100
6	F	101/135 (75%)	95 (94%)	6 (6%)	0	100	100
7	G	151/179 (84%)	139 (92%)	12 (8%)	0	100	100
8	H	127/130 (98%)	122 (96%)	5 (4%)	0	100	100
9	I	125/130 (96%)	120 (96%)	5 (4%)	0	100	100
10	J	96/103 (93%)	91 (95%)	4 (4%)	1 (1%)	12	28
11	K	113/129 (88%)	105 (93%)	8 (7%)	0	100	100
12	L	120/124 (97%)	111 (92%)	9 (8%)	0	100	100
13	M	113/118 (96%)	108 (96%)	5 (4%)	0	100	100
14	N	98/101 (97%)	94 (96%)	4 (4%)	0	100	100
15	O	86/89 (97%)	84 (98%)	2 (2%)	0	100	100
16	P	79/82 (96%)	75 (95%)	4 (5%)	0	100	100
17	Q	77/84 (92%)	77 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
18	R	64/75 (85%)	60 (94%)	4 (6%)	0	100	100
19	S	82/92 (89%)	82 (100%)	0	0	100	100
20	T	84/87 (97%)	83 (99%)	1 (1%)	0	100	100
21	U	68/71 (96%)	67 (98%)	1 (2%)	0	100	100
24	c	269/273 (98%)	261 (97%)	8 (3%)	0	100	100
25	d	206/209 (99%)	202 (98%)	3 (2%)	1 (0%)	24	46
26	e	199/201 (99%)	196 (98%)	3 (2%)	0	100	100
27	f	175/179 (98%)	166 (95%)	9 (5%)	0	100	100
28	g	174/177 (98%)	165 (95%)	9 (5%)	0	100	100
29	h	39/149 (26%)	35 (90%)	4 (10%)	0	100	100
30	i	140/142 (99%)	138 (99%)	2 (1%)	0	100	100
31	j	121/123 (98%)	118 (98%)	3 (2%)	0	100	100
32	k	142/144 (99%)	138 (97%)	4 (3%)	0	100	100
33	l	132/136 (97%)	131 (99%)	1 (1%)	0	100	100
34	m	116/127 (91%)	111 (96%)	5 (4%)	0	100	100
35	n	114/117 (97%)	109 (96%)	5 (4%)	0	100	100
36	o	112/115 (97%)	108 (96%)	4 (4%)	0	100	100
37	p	115/118 (98%)	115 (100%)	0	0	100	100
38	q	101/103 (98%)	95 (94%)	6 (6%)	0	100	100
39	r	108/110 (98%)	108 (100%)	0	0	100	100
40	s	91/100 (91%)	87 (96%)	4 (4%)	0	100	100
41	t	100/104 (96%)	91 (91%)	9 (9%)	0	100	100
42	u	92/94 (98%)	89 (97%)	3 (3%)	0	100	100
43	v	76/85 (89%)	73 (96%)	3 (4%)	0	100	100
44	w	75/78 (96%)	73 (97%)	2 (3%)	0	100	100
45	x	60/63 (95%)	56 (93%)	4 (7%)	0	100	100
46	y	56/59 (95%)	54 (96%)	2 (4%)	0	100	100
47	z	54/57 (95%)	54 (100%)	0	0	100	100
48	0	49/55 (89%)	49 (100%)	0	0	100	100
49	1	44/46 (96%)	44 (100%)	0	0	100	100
50	2	62/65 (95%)	59 (95%)	2 (3%)	1 (2%)	7	16

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
51	3	36/38 (95%)	36 (100%)	0	0	100	100
52	4	56/70 (80%)	53 (95%)	3 (5%)	0	100	100
All	All	5481/5913 (93%)	5281 (96%)	197 (4%)	3 (0%)	49	70

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
25	d	149	ASN
10	J	57	VAL
50	2	32	ILE

### 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	186/199 (94%)	186 (100%)	0	100	100
3	C	170/190 (90%)	170 (100%)	0	100	100
4	D	172/173 (99%)	172 (100%)	0	100	100
5	E	119/126 (94%)	119 (100%)	0	100	100
6	F	90/116 (78%)	90 (100%)	0	100	100
7	G	126/147 (86%)	126 (100%)	0	100	100
8	H	104/105 (99%)	104 (100%)	0	100	100
9	I	105/107 (98%)	105 (100%)	0	100	100
10	J	86/90 (96%)	86 (100%)	0	100	100
11	K	89/98 (91%)	89 (100%)	0	100	100
12	L	102/103 (99%)	102 (100%)	0	100	100
13	M	93/96 (97%)	93 (100%)	0	100	100
14	N	83/84 (99%)	83 (100%)	0	100	100
15	O	76/77 (99%)	76 (100%)	0	100	100
16	P	65/65 (100%)	65 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
17	Q	73/78 (94%)	73 (100%)	0	100	100
18	R	57/65 (88%)	57 (100%)	0	100	100
19	S	72/79 (91%)	72 (100%)	0	100	100
20	T	65/66 (98%)	65 (100%)	0	100	100
21	U	60/61 (98%)	60 (100%)	0	100	100
24	c	216/218 (99%)	216 (100%)	0	100	100
25	d	163/163 (100%)	163 (100%)	0	100	100
26	e	165/165 (100%)	165 (100%)	0	100	100
27	f	148/150 (99%)	148 (100%)	0	100	100
28	g	137/138 (99%)	137 (100%)	0	100	100
29	h	32/114 (28%)	32 (100%)	0	100	100
30	i	116/116 (100%)	115 (99%)	1 (1%)	70	87
31	j	104/104 (100%)	104 (100%)	0	100	100
32	k	103/103 (100%)	103 (100%)	0	100	100
33	l	107/107 (100%)	107 (100%)	0	100	100
34	m	98/103 (95%)	98 (100%)	0	100	100
35	n	86/87 (99%)	86 (100%)	0	100	100
36	o	99/100 (99%)	99 (100%)	0	100	100
37	p	89/90 (99%)	89 (100%)	0	100	100
38	q	84/84 (100%)	84 (100%)	0	100	100
39	r	93/93 (100%)	93 (100%)	0	100	100
40	s	80/84 (95%)	80 (100%)	0	100	100
41	t	83/85 (98%)	83 (100%)	0	100	100
42	u	78/78 (100%)	78 (100%)	0	100	100
43	v	59/63 (94%)	59 (100%)	0	100	100
44	w	67/68 (98%)	67 (100%)	0	100	100
45	x	54/55 (98%)	54 (100%)	0	100	100
46	y	48/49 (98%)	48 (100%)	0	100	100
47	z	47/48 (98%)	47 (100%)	0	100	100
48	0	46/49 (94%)	46 (100%)	0	100	100
49	1	38/38 (100%)	38 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
50	2	51/52 (98%)	51 (100%)	0	100	100
51	3	34/34 (100%)	34 (100%)	0	100	100
52	4	55/62 (89%)	55 (100%)	0	100	100
All	All	4573/4825 (95%)	4572 (100%)	1 (0%)	100	100

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
30	i	128	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 46 such sidechains are listed below:

Mol	Chain	Res	Type
28	g	73	ASN
36	o	66	ASN
28	g	88	GLN
33	l	13	HIS
40	s	70	HIS

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1508/1542 (97%)	201 (13%)	6 (0%)
22	a	2757/2904 (94%)	301 (10%)	0
23	b	118/120 (98%)	13 (11%)	0
53	X	5/66 (7%)	0	0
54	Z	76/77 (98%)	10 (13%)	0
All	All	4464/4709 (94%)	525 (11%)	6 (0%)

5 of 525 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	2	A
1	A	3	A
1	A	4	U
1	A	7	A
1	A	9	G

5 of 6 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	636	U
1	A	1030	U
1	A	1035	A
1	A	517	G
1	A	429	U

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

45 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$
22	6MZ	a	2030	22	22,25,26	2.59	4 (18%)	29,36,39	2.43	12 (41%)
54	OMC	Z	33	54	19,22,23	2.86	8 (42%)	25,31,34	0.76	0
1	2MG	A	1516	1	23,26,27	2.53	7 (30%)	33,38,41	2.19	11 (33%)
1	G7M	A	527	1	23,26,27	2.79	8 (34%)	34,39,42	1.77	9 (26%)
22	G7M	a	2069	22,55	23,26,27	2.75	8 (34%)	34,39,42	1.78	9 (26%)
22	PSU	a	2604	22	18,21,22	1.05	2 (11%)	21,30,33	2.01	4 (19%)
33	4D4	l	81	33	9,11,12	1.57	2 (22%)	7,13,15	1.96	2 (28%)
22	2MA	a	2503	22,55	22,25,26	3.73	10 (45%)	32,37,40	2.96	9 (28%)
22	PSU	a	1917	22	18,21,22	1.04	2 (11%)	21,30,33	2.01	5 (23%)
54	PSU	Z	56	54	18,21,22	1.09	1 (5%)	21,30,33	2.01	5 (23%)
22	PSU	a	1911	22	18,21,22	1.04	2 (11%)	21,30,33	1.98	5 (23%)
22	PSU	a	2580	22	18,21,22	1.12	3 (16%)	21,30,33	2.25	6 (28%)
25	MEQ	d	150	25	8,9,10	1.10	0	5,10,12	1.52	2 (40%)
22	PSU	a	746	22,55	18,21,22	1.09	2 (11%)	21,30,33	1.84	4 (19%)
1	2MG	A	1207	1	23,26,27	2.58	8 (34%)	33,38,41	2.16	10 (30%)
22	OMU	a	2552	22	19,22,23	2.73	6 (31%)	25,31,34	1.94	5 (20%)
1	MA6	A	1519	1	23,26,27	1.45	5 (21%)	33,38,41	2.33	12 (36%)
54	5MU	Z	55	54	19,22,23	4.69	6 (31%)	27,32,35	3.66	9 (33%)
1	UR3	A	1498	1	19,22,23	2.64	8 (42%)	26,32,35	1.68	2 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
22	5MU	a	747	22	19,22,23	4.59	7 (36%)	27,32,35	3.78	10 (37%)
22	PSU	a	2605	22	18,21,22	1.04	2 (11%)	21,30,33	2.04	5 (23%)
22	PSU	a	2504	22	18,21,22	1.06	2 (11%)	21,30,33	1.97	4 (19%)
22	1MG	a	745	22	23,26,27	2.78	8 (34%)	33,39,42	1.82	8 (24%)
1	2MG	A	966	1	23,26,27	2.62	7 (30%)	33,38,41	2.21	9 (27%)
22	OMC	a	2498	22,55	19,22,23	2.76	7 (36%)	25,31,34	0.88	1 (4%)
1	PSU	A	516	1,55	18,21,22	1.05	2 (11%)	21,30,33	1.81	5 (23%)
1	5MC	A	967	1	19,22,23	3.90	9 (47%)	26,32,35	1.02	1 (3%)
12	D2T	L	89	12	8,9,10	1.98	1 (12%)	6,11,13	2.07	3 (50%)
22	2MG	a	1835	22	23,26,27	2.55	7 (30%)	33,38,41	2.28	10 (30%)
54	4SU	Z	8	54	18,21,22	4.25	8 (44%)	25,30,33	2.34	4 (16%)
1	MA6	A	1518	1	23,26,27	1.48	5 (21%)	33,38,41	2.27	11 (33%)
22	PSU	a	955	22	18,21,22	1.10	2 (11%)	21,30,33	2.08	5 (23%)
22	PSU	a	2457	22	18,21,22	1.10	2 (11%)	21,30,33	2.19	6 (28%)
22	H2U	a	2449	22	18,21,22	1.30	3 (16%)	19,30,33	0.88	1 (5%)
22	OMG	a	2251	22,54	23,26,27	2.56	10 (43%)	32,38,41	1.97	9 (28%)
22	2MG	a	2445	22	23,26,27	2.55	7 (30%)	33,38,41	2.27	10 (30%)
33	MS6	l	82	33	5,7,8	1.03	1 (20%)	2,7,9	1.38	0
54	H2U	Z	21	54	18,21,22	1.05	2 (11%)	19,30,33	0.74	1 (5%)
22	5MC	a	1962	22	19,22,23	3.68	9 (47%)	26,32,35	1.07	2 (7%)
1	5MC	A	1407	1	19,22,23	3.74	9 (47%)	26,32,35	1.01	2 (7%)
1	4OC	A	1402	1,55	20,23,24	2.95	8 (40%)	25,32,35	1.03	2 (8%)
22	6MZ	a	1618	22	22,25,26	2.60	4 (18%)	29,36,39	2.37	11 (37%)
22	5MU	a	1939	22	19,22,23	4.55	7 (36%)	27,32,35	3.80	10 (37%)
22	3TD	a	1915	22	19,22,23	4.13	7 (36%)	23,32,35	1.88	4 (17%)
11	IAS	K	119	11	6,7,8	1.01	0	3,8,10	1.28	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
22	6MZ	a	2030	22	-	2/9/27/28	0/3/3/3
54	OMC	Z	33	54	-	0/9/27/28	0/2/2/2
1	2MG	A	1516	1	-	0/9/27/28	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	G7M	A	527	1	-	3/7/25/26	0/3/3/3
22	G7M	a	2069	22,55	-	1/7/25/26	0/3/3/3
22	PSU	a	2604	22	-	0/7/25/26	0/2/2/2
33	4D4	l	81	33	-	3/11/12/14	-
22	2MA	a	2503	22,55	-	0/7/25/26	0/3/3/3
22	PSU	a	1917	22	-	0/7/25/26	0/2/2/2
54	PSU	Z	56	54	-	0/7/25/26	0/2/2/2
22	PSU	a	1911	22	-	0/7/25/26	0/2/2/2
22	PSU	a	2580	22	-	0/7/25/26	0/2/2/2
25	MEQ	d	150	25	-	2/8/9/11	-
22	PSU	a	746	22,55	-	2/7/25/26	0/2/2/2
1	2MG	A	1207	1	-	0/9/27/28	0/3/3/3
22	OMU	a	2552	22	-	1/9/27/28	0/2/2/2
1	MA6	A	1519	1	-	2/11/29/30	0/3/3/3
54	5MU	Z	55	54	-	2/7/25/26	0/2/2/2
1	UR3	A	1498	1	-	0/7/25/26	0/2/2/2
22	5MU	a	747	22	-	0/7/25/26	0/2/2/2
22	PSU	a	2605	22	-	0/7/25/26	0/2/2/2
22	PSU	a	2504	22	-	2/7/25/26	0/2/2/2
22	1MG	a	745	22	-	0/7/25/26	0/3/3/3
1	2MG	A	966	1	-	2/9/27/28	0/3/3/3
22	OMC	a	2498	22,55	-	1/9/27/28	0/2/2/2
1	PSU	A	516	1,55	-	2/7/25/26	0/2/2/2
1	5MC	A	967	1	-	0/7/25/26	0/2/2/2
12	D2T	L	89	12	-	3/7/12/14	-
22	2MG	a	1835	22	-	0/9/27/28	0/3/3/3
54	4SU	Z	8	54	-	0/7/25/26	0/2/2/2
1	MA6	A	1518	1	-	0/11/29/30	0/3/3/3
22	PSU	a	955	22	-	0/7/25/26	0/2/2/2
22	PSU	a	2457	22	-	0/7/25/26	0/2/2/2
22	H2U	a	2449	22	-	0/7/38/39	0/2/2/2
22	OMG	a	2251	22,54	-	1/9/27/28	0/3/3/3
22	2MG	a	2445	22	-	2/9/27/28	0/3/3/3
33	MS6	l	82	33	-	1/4/6/8	-
54	H2U	Z	21	54	-	7/7/38/39	0/2/2/2
22	5MC	a	1962	22	-	0/7/25/26	0/2/2/2
1	5MC	A	1407	1	-	0/7/25/26	0/2/2/2
1	4OC	A	1402	1,55	-	1/9/29/30	0/2/2/2
22	6MZ	a	1618	22	-	0/9/27/28	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
22	5MU	a	1939	22	-	0/7/25/26	0/2/2/2
22	3TD	a	1915	22	-	2/7/25/26	0/2/2/2
11	IAS	K	119	11	-	0/7/7/8	-

The worst 5 of 228 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
22	a	1915	3TD	C6-C5	12.83	1.49	1.35
22	a	2503	2MA	C4-N3	11.08	1.48	1.34
54	Z	55	5MU	C6-N1	10.64	1.56	1.38
54	Z	55	5MU	C2-N1	10.60	1.55	1.38
22	a	1618	6MZ	C6-N6	10.60	1.46	1.34

The worst 5 of 255 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
22	a	747	5MU	C5-C4-N3	12.23	125.95	115.32
22	a	1939	5MU	C5-C4-N3	12.22	125.95	115.32
54	Z	55	5MU	C5-C4-N3	12.05	125.79	115.32
22	a	1939	5MU	C5-C6-N1	-10.27	112.16	123.31
22	a	747	5MU	C5-C6-N1	-10.11	112.33	123.31

There are no chirality outliers.

5 of 42 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	966	2MG	O4'-C4'-C5'-O5'
33	l	81	4D4	NE-CD-CG-CB
54	Z	21	H2U	O4'-C4'-C5'-O5'
54	Z	21	H2U	O4'-C1'-N1-C6
54	Z	21	H2U	C2'-C1'-N1-C6

There are no ring outliers.

10 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
22	a	2030	6MZ	2	0
1	A	1516	2MG	1	0
54	Z	56	PSU	1	0
1	A	1207	2MG	1	0
1	A	1519	MA6	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
54	Z	55	5MU	1	0
1	A	966	2MG	1	0
54	Z	21	H2U	1	0
22	a	1939	5MU	1	0
22	a	1915	3TD	1	0

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 457 ligands modelled in this entry, 457 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

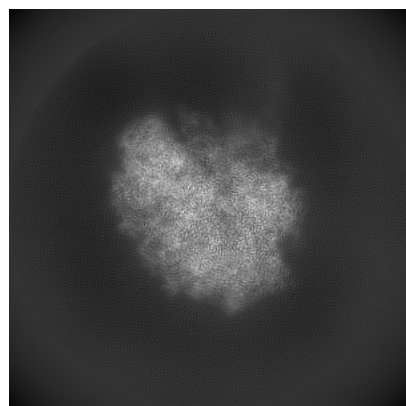
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-60059. These allow visual inspection of the internal detail of the map and identification of artifacts.

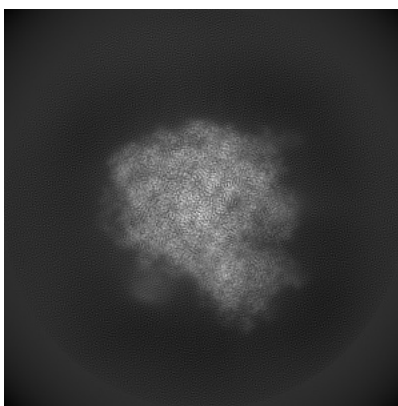
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

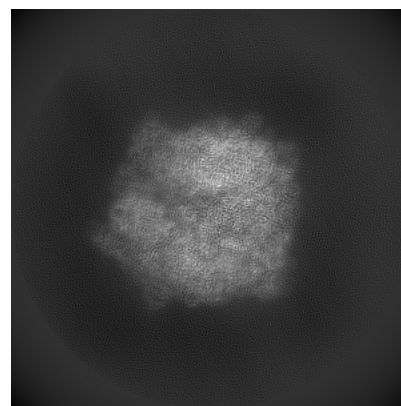
#### 6.1.1 Primary map



X

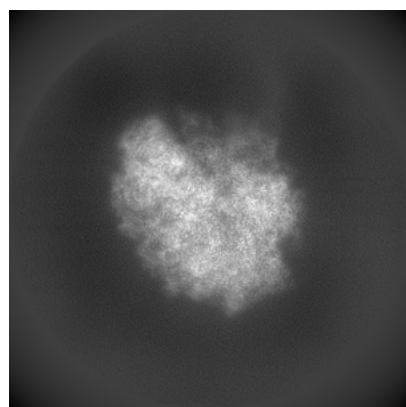


Y

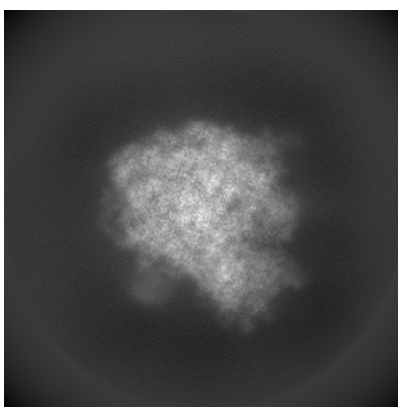


Z

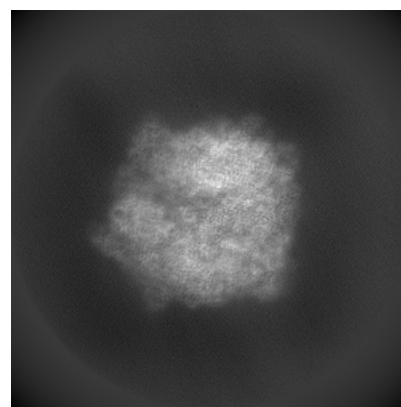
#### 6.1.2 Raw map



X



Y

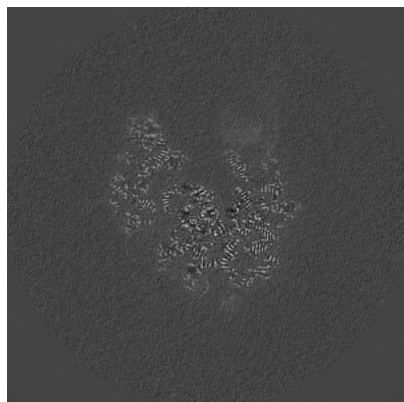


Z

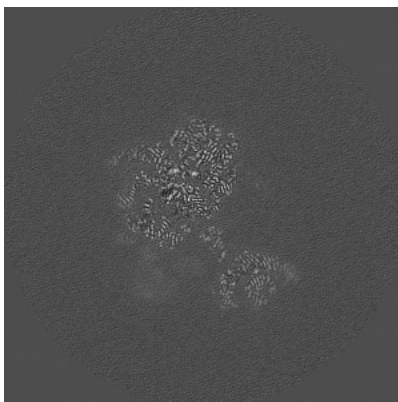
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

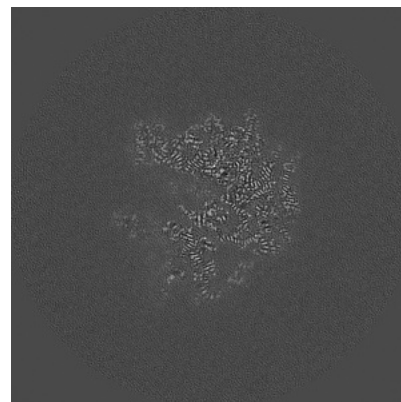
### 6.2.1 Primary map



X Index: 265

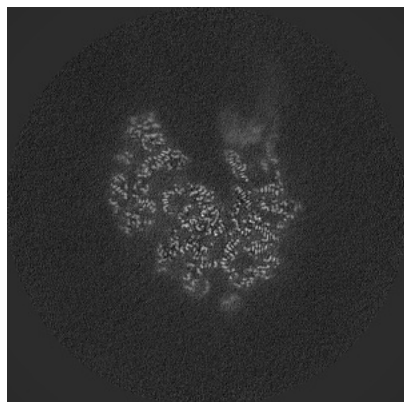


Y Index: 265

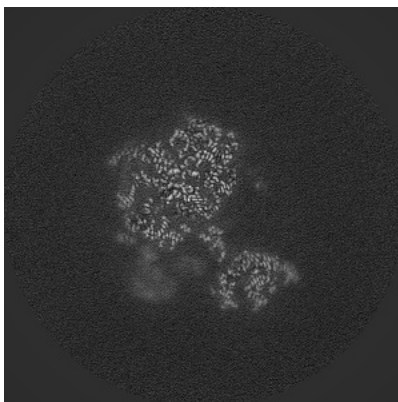


Z Index: 265

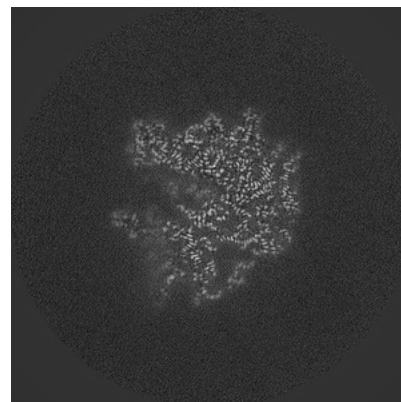
### 6.2.2 Raw map



X Index: 265



Y Index: 265

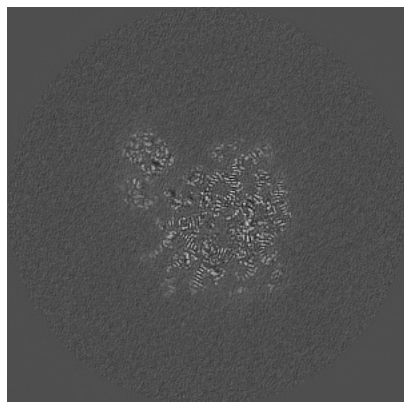


Z Index: 265

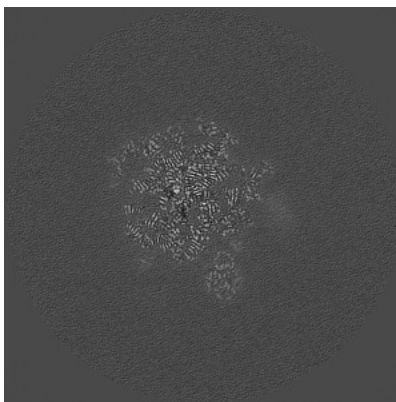
The images above show central slices of the map in three orthogonal directions.

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

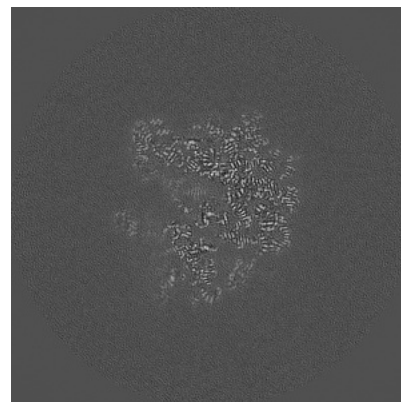
### 6.3.1 Primary map



X Index: 298

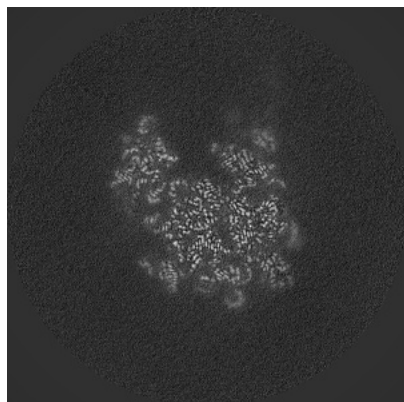


Y Index: 319

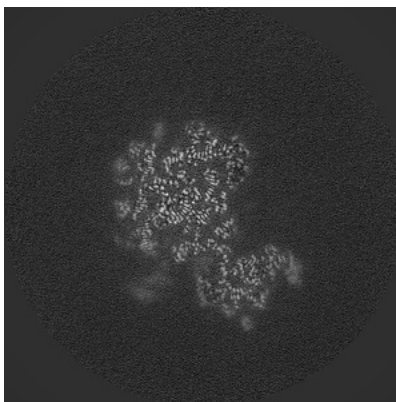


Z Index: 269

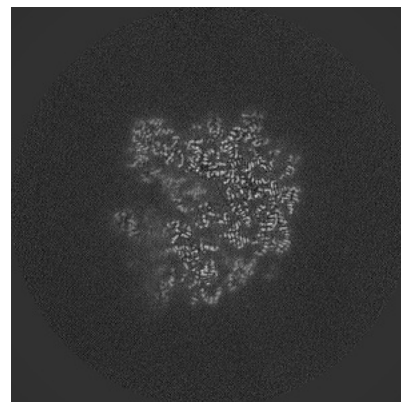
### 6.3.2 Raw map



X Index: 285



Y Index: 244



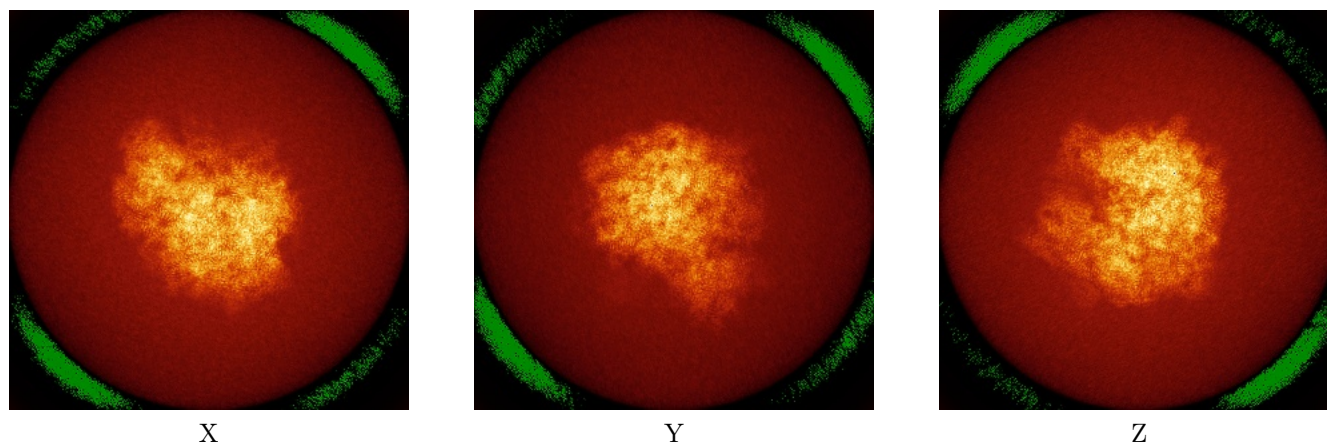
Z Index: 270

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

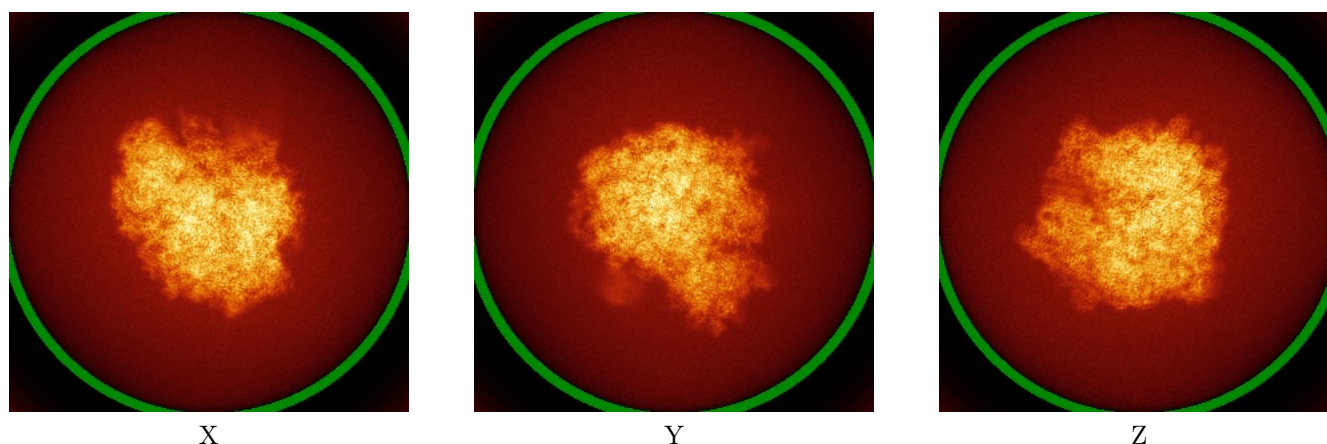


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

### 6.4.1 Primary map



### 6.4.2 Raw map



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](#)

This section was not generated.

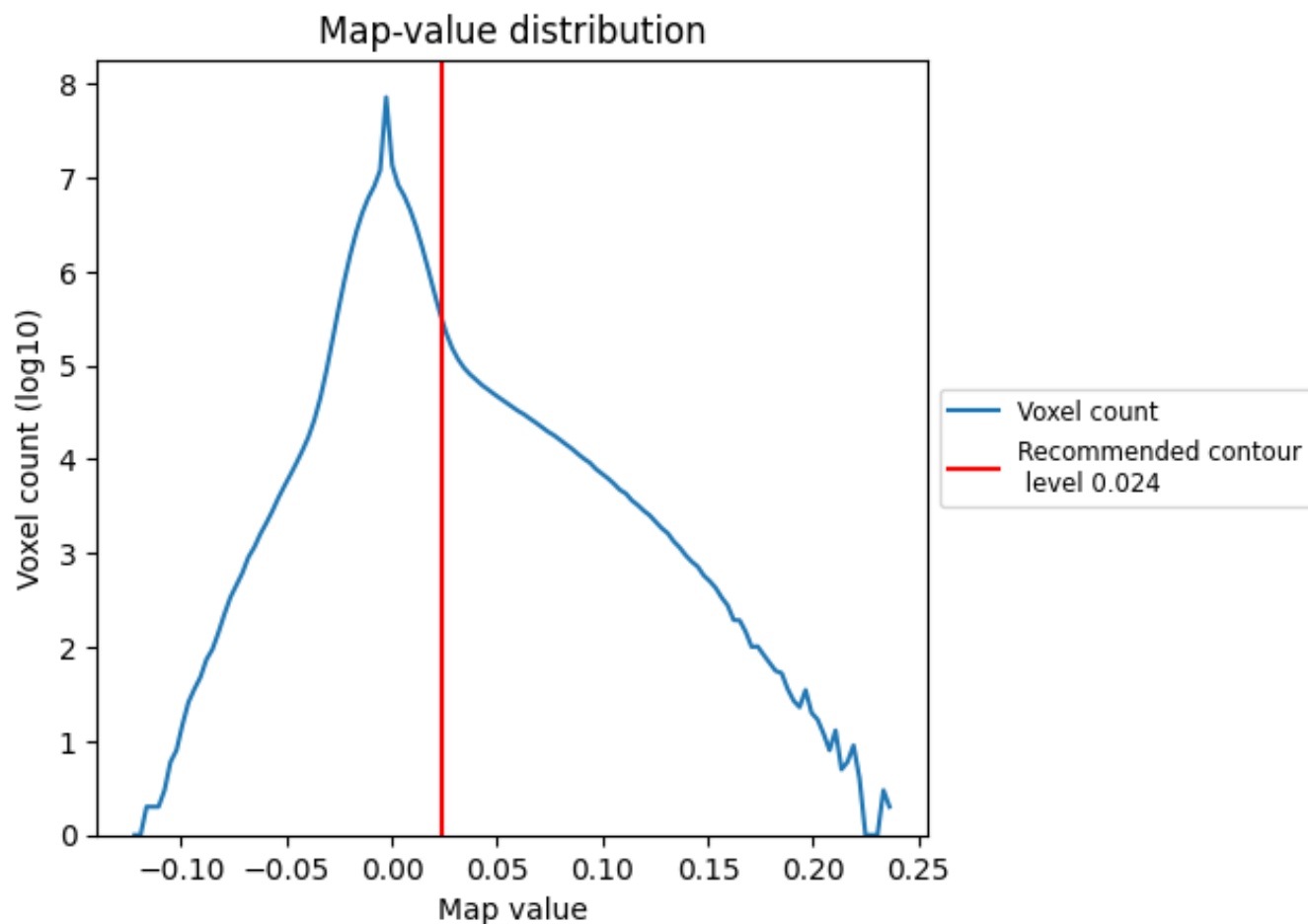
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

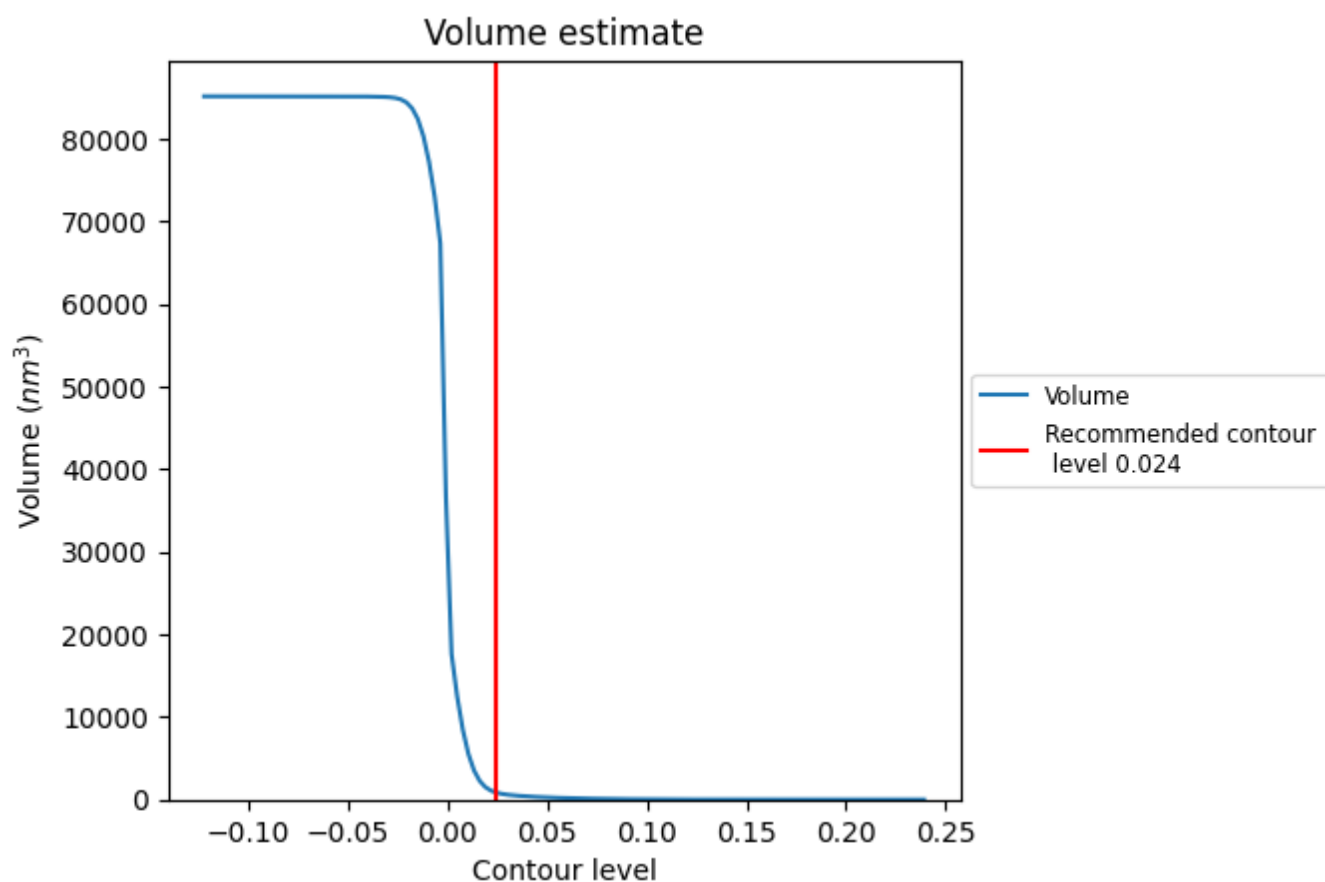
This section contains the results of statistical analysis of the map.

### 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](#)

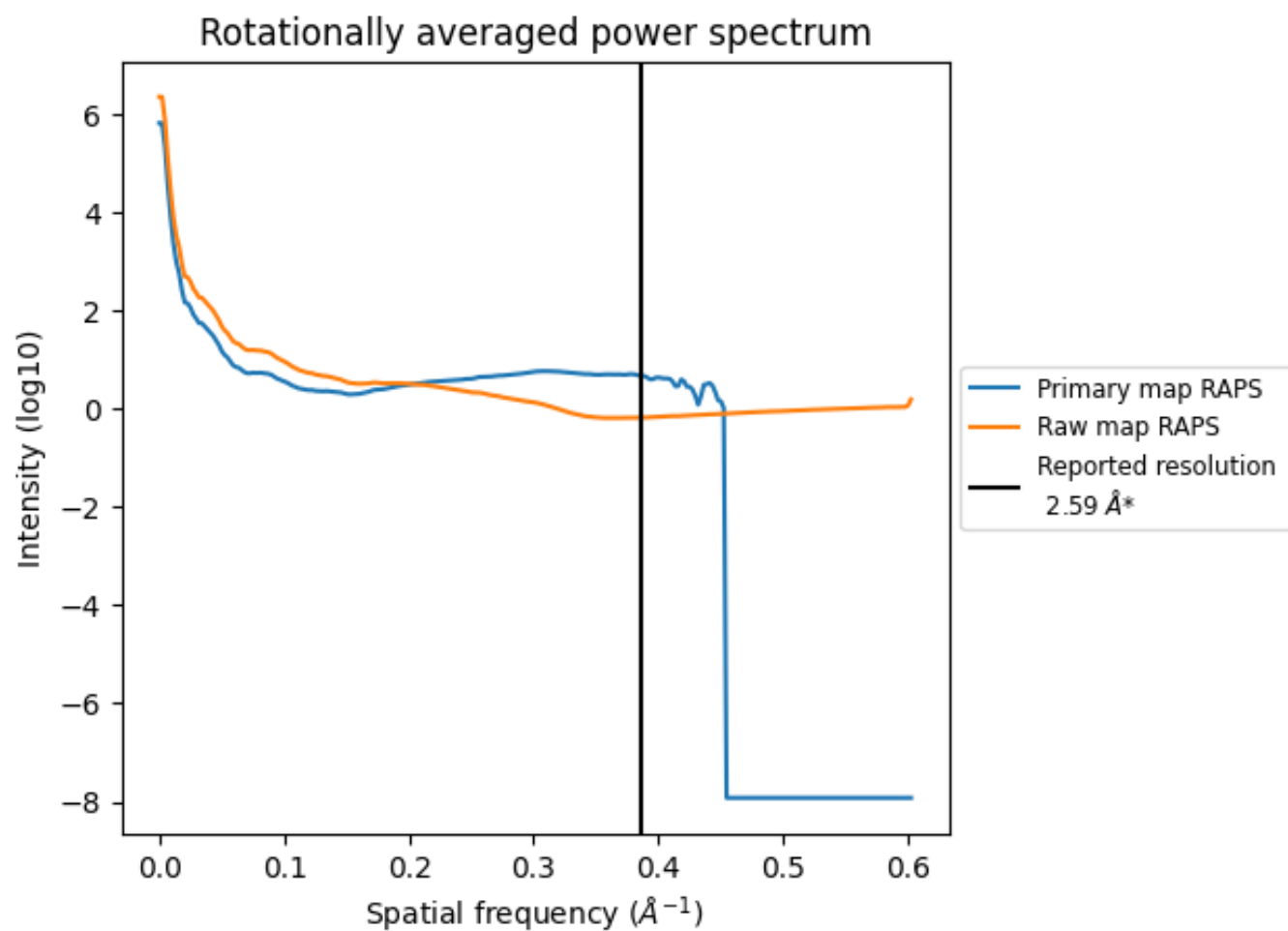


The volume at the recommended contour level is 892  $\text{nm}^3$ ; this corresponds to an approximate mass of 806 kDa.

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 ⓘ

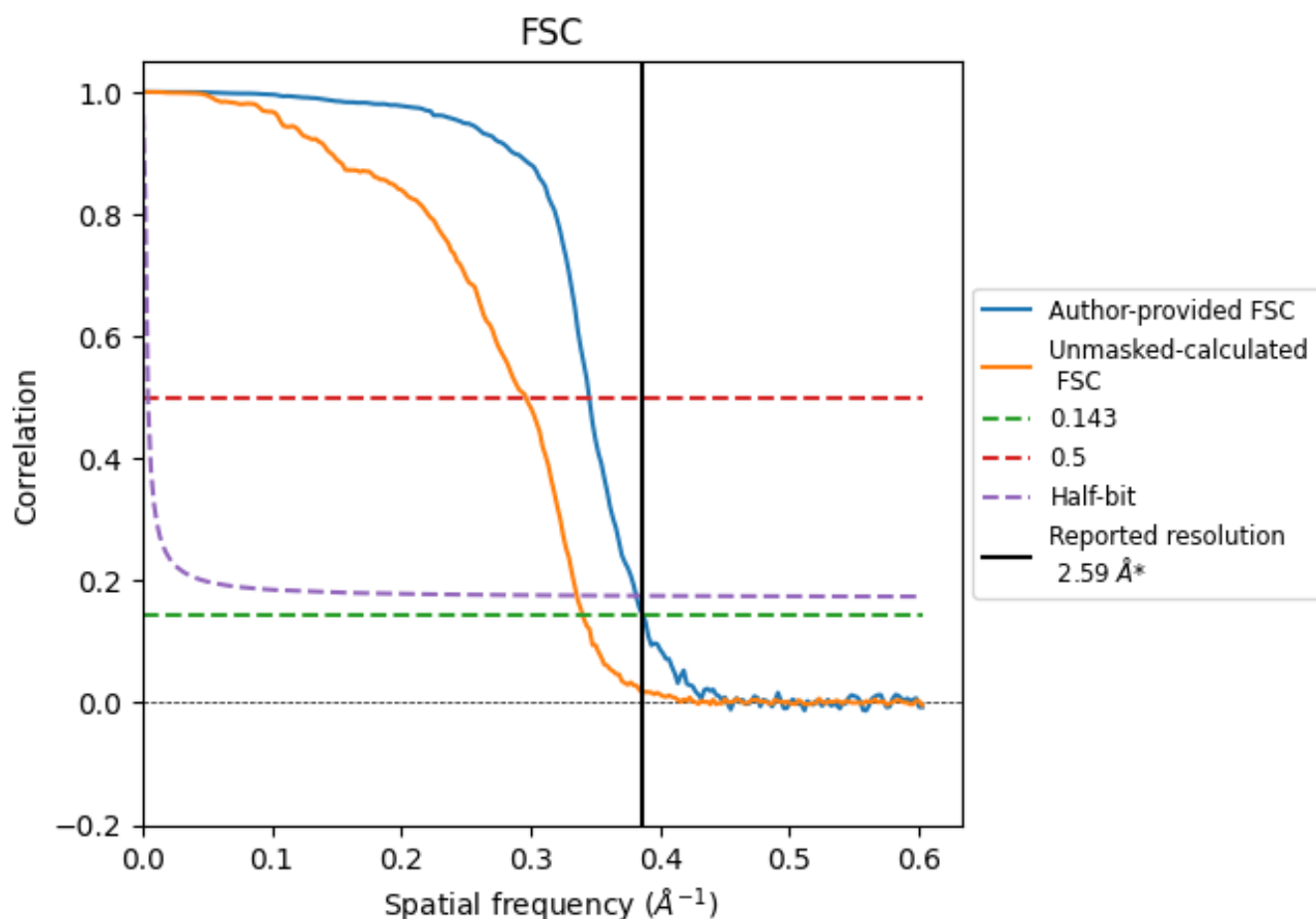


\*Reported resolution corresponds to spatial frequency of  $0.386 \text{ \AA}^{-1}$

## 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 0.386  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

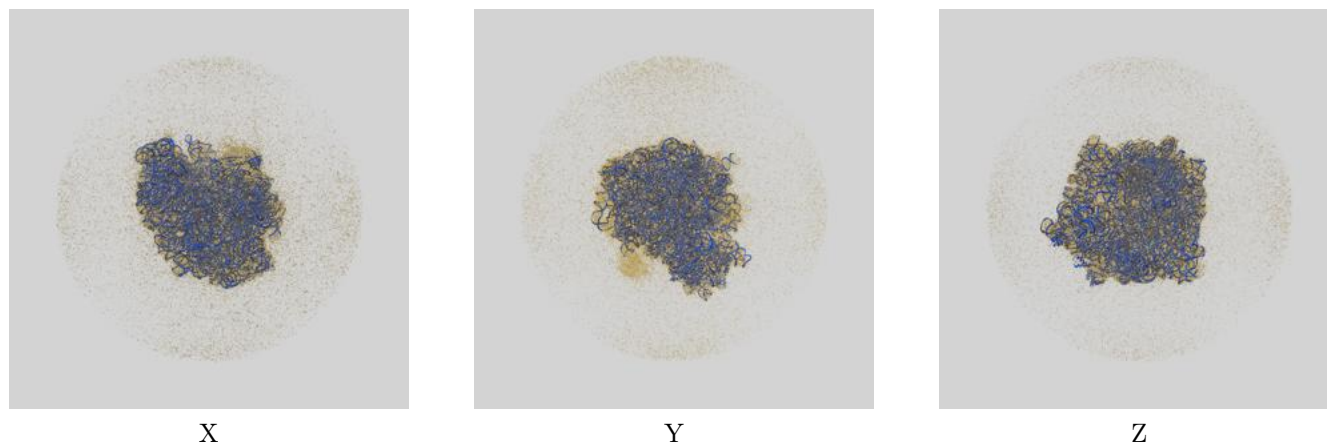
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.59	-	-
Author-provided FSC curve	2.59	2.90	2.62
Unmasked-calculated*	2.94	3.37	2.98

\*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 2.94 differs from the reported value 2.59 by more than 10 %

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

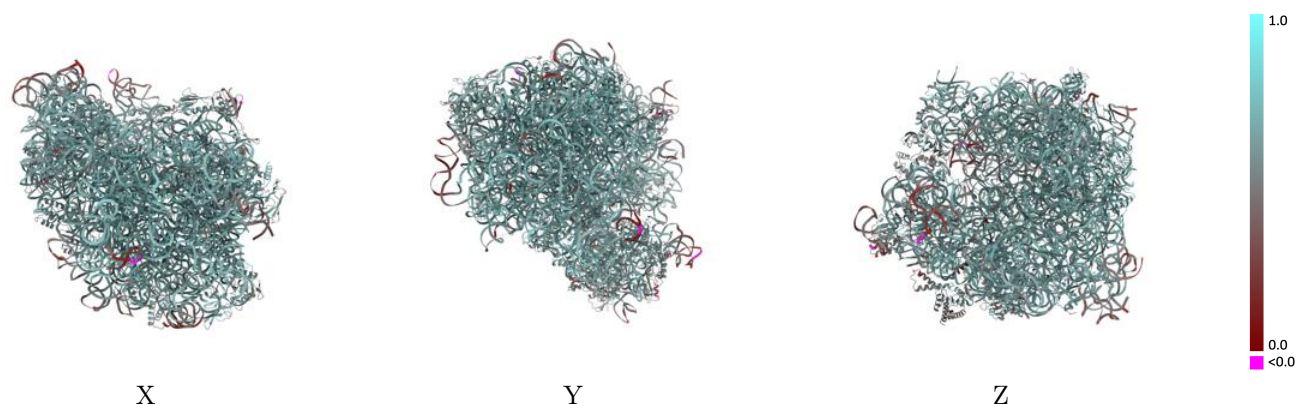
This section contains information regarding the fit between EMDB map EMD-60059 and PDB model 8ZFF. Per-residue inclusion information can be found in section [3](#) on page [15](#).

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



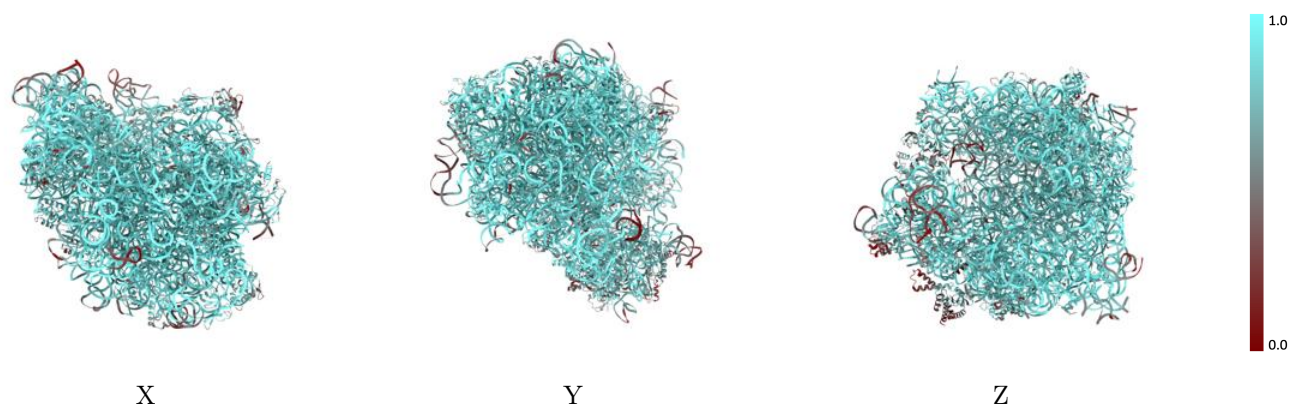
The images above show the 3D surface view of the map at the recommended contour level 0.024 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



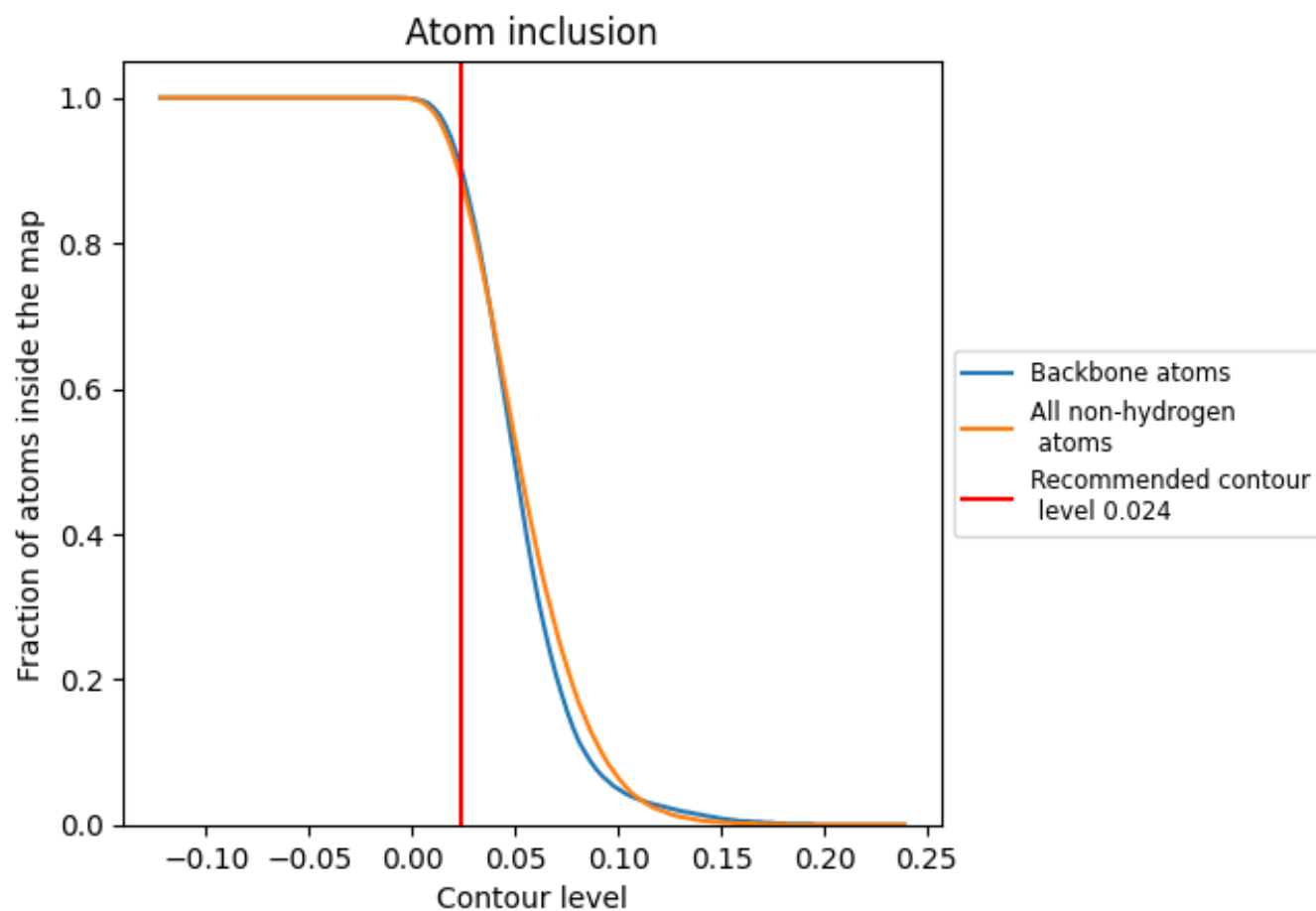
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.024).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 89% 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 (0.024) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8860	 0.6220
0	 0.8510	 0.6340
1	 0.9610	 0.6730
2	 0.9550	 0.6740
3	 0.9250	 0.6440
4	 0.5500	 0.5030
A	 0.9030	 0.6210
B	 0.4960	 0.4960
C	 0.7730	 0.6030
D	 0.7530	 0.5780
E	 0.8720	 0.6420
F	 0.7160	 0.5480
G	 0.6400	 0.5330
H	 0.8810	 0.6420
I	 0.7500	 0.5660
J	 0.5810	 0.4960
K	 0.8070	 0.5880
L	 0.8750	 0.6240
M	 0.7440	 0.5640
N	 0.8140	 0.6060
O	 0.8360	 0.6150
P	 0.8650	 0.6070
Q	 0.8030	 0.5880
R	 0.7670	 0.5740
S	 0.7270	 0.5600
T	 0.8570	 0.6080
U	 0.5190	 0.4790
X	 0.7390	 0.5210
Z	 0.7720	 0.5410
a	 0.9330	 0.6390
b	 0.9080	 0.6140
c	 0.9640	 0.6810
d	 0.9170	 0.6600
e	 0.8070	 0.6060
f	 0.7360	 0.5660



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Chain	Atom inclusion	Q-score
g	 0.6550	 0.5210
h	 0.6830	 0.4990
i	 0.9260	 0.6570
j	 0.9160	 0.6570
k	 0.8950	 0.6410
l	 0.9220	 0.6580
m	 0.9640	 0.6730
n	 0.8600	 0.6170
o	 0.9020	 0.6570
p	 0.9540	 0.6700
q	 0.8410	 0.6110
r	 0.8930	 0.6340
s	 0.8260	 0.5920
t	 0.7450	 0.5630
u	 0.7980	 0.6070
v	 0.9220	 0.6640
w	 0.8980	 0.6440
x	 0.7180	 0.5310
y	 0.8900	 0.6250
z	 0.8810	 0.6400