



## wwPDB EM Validation Summary Report ⓘ

Jul 8, 2024 – 02:22 am BST

PDB ID : 7QH4  
EMDB ID : EMD-13961  
Title : Structure of the B. subtilis disome - collided 70S ribosome  
Authors : Kratzat, H.; Buschauer, R.; Berninghausen, O.; Beckmann, R.  
Deposited on : 2021-12-10  
Resolution : 5.45 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](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>.

---

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

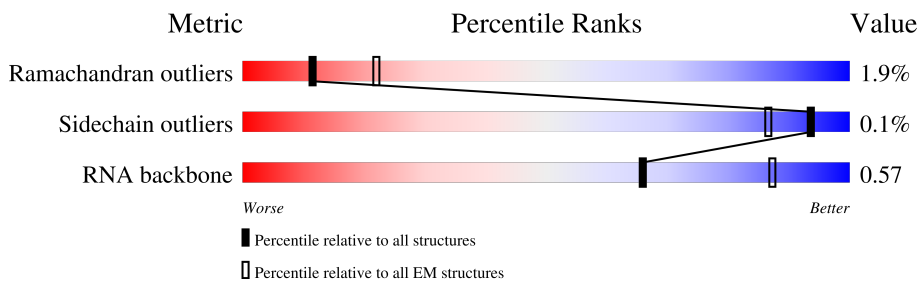
EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

# 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 5.45 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	2928	
2	B	119	
3	C	277	
4	D	208	
5	E	207	
6	F	179	
7	G	179	
8	H	166	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
9	I	141	40% 93% 6%
10	J	145	8% 97% ..
11	K	122	28% 98% .
12	L	146	20% 99% .
13	M	144	28% 96% .
14	N	120	98% ..
15	O	120	13% 95% 5%
16	P	115	15% 99% .
17	Q	119	5% 98% .
18	R	102	. 97% ..
19	S	113	14% 91% 5%
20	T	95	11% 98% .
21	U	103	13% 94% ..
22	V	94	19% 87% 13%
23	Y	62	29% 90% 6%
24	Z	66	11% 98% .
25	a	59	8% 97% ..
26	b	59	15% 90% 8%
27	c	49	18% 98% .
28	d	44	32% 100%
29	e	66	27% 95% ..
30	f	37	11% 97% .
31	W	1555	. 65% 26% 8% .
32	X	246	13% 89% 9%
33	g	218	20% 96% .

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
34	h	200	46% 98%
35	i	166	24% 97%
36	j	95	9% 98%
37	k	156	12% 97%
38	l	132	5% 98%
39	m	130	6% 96%
40	n	102	13% 96%
41	o	131	22% 89%
42	p	138	30% 94%
43	q	121	14% 90%
44	r	61	7% 93%
45	s	89	97%
46	t	90	97%
47	u	87	8% 99%
48	v	79	8% 86%
49	w	92	10% 89%
50	x	88	10% 97%
51	l	77	14% 70% 23% 5%
51	y	77	40% 68% 27%

## 2 Entry composition i

There are 51 unique types of molecules in this entry. The entry contains 136043 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 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	A	2923	62767	28002	11589	20253	2923	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1558	C	G	conflict	GB 1864548803

- Molecule 2 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	B	112	2395	1068	435	780	112	0	0

- Molecule 3 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	275	2111	1312	416	377	6	0	0

- Molecule 4 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	207	1575	988	290	292	5	0	0

- Molecule 5 is a protein called 50S ribosomal protein L4.

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

- Molecule 6 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	178	1404	893	245	259	7	0	0

- Molecule 7 is a protein called Ribosomal protein L6.

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

- Molecule 8 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	123	955	602	163	189	1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	154	THR	ALA	conflict	UNP A0A063X7V1

- Molecule 9 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	I	133	981	617	173	185	6	0	0

- Molecule 10 is a protein called 50S ribosomal protein L13.

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

- Molecule 11 is a protein called 50S ribosomal protein L14.

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

- Molecule 12 is a protein called 50S ribosomal protein L15.

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

- Molecule 13 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	138	Total	C	N	O	S	0	0
			1097	703	208	181	5		

- Molecule 14 is a protein called 50S ribosomal protein L17.

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

- Molecule 15 is a protein called 50S ribosomal protein L18.

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

- Molecule 16 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	P	114	Total	C	N	O	0	0
			936	595	184	157		

- Molecule 17 is a protein called 50S ribosomal protein L20.

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

- Molecule 18 is a protein called 50S ribosomal protein L21.

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

- Molecule 19 is a protein called 50S ribosomal protein L22.

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

- Molecule 20 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	93	Total	C	N	O	S	0	0
			752	472	137	139	4		

- Molecule 21 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	100	Total	C	N	O	S	0	0
			754	473	141	137	3		

- Molecule 22 is a protein called 50S ribosomal protein L27.

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

- Molecule 23 is a protein called 50S ribosomal protein L28.

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

- Molecule 24 is a protein called 50S ribosomal protein L29.

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

- Molecule 25 is a protein called 50S ribosomal protein L30.

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

- Molecule 26 is a protein called 50S ribosomal protein L32.



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

- Molecule 27 is a protein called 50S ribosomal protein L33.

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

- Molecule 28 is a protein called 50S ribosomal protein L34.

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

- Molecule 29 is a protein called 50S ribosomal protein L35.

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

- Molecule 30 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	f	36	Total	C	N	O	S	0	0
			288	181	59	44	4		

- Molecule 31 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	W	1544	Total	C	N	O	P	0	0
			33115	14768	6067	10736	1544		

- Molecule 32 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	X	224	Total	C	N	O	0	0
			896	448	224	224		

- Molecule 33 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms			AltConf	Trace	
33	g	210	Total	C	N	O	0	0
			840	420	210	210		

- Molecule 34 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms			AltConf	Trace	
34	h	199	Total	C	N	O	0	0
			797	398	199	200		

- Molecule 35 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms			AltConf	Trace	
35	i	165	Total	C	N	O	0	0
			661	330	165	166		

- Molecule 36 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms			AltConf	Trace	
36	j	95	Total	C	N	O	0	0
			381	190	95	96		

- Molecule 37 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms			AltConf	Trace	
37	k	153	Total	C	N	O	0	0
			613	306	153	154		

- Molecule 38 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms			AltConf	Trace	
38	l	131	Total	C	N	O	0	0
			525	262	131	132		

- Molecule 39 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms			AltConf	Trace	
39	m	130	Total	C	N	O	0	0
			521	260	130	131		

- Molecule 40 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms			AltConf	Trace	
40	n	102	Total	C	N	O	0	0
			409	204	102	103		

- Molecule 41 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms			AltConf	Trace	
41	o	118	Total	C	N	O	0	0
			472	236	118	118		

- Molecule 42 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms			AltConf	Trace	
42	p	137	Total	C	N	O	0	0
			549	274	137	138		

- Molecule 43 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms			AltConf	Trace	
43	q	119	Total	C	N	O	0	0
			476	238	119	119		

- Molecule 44 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms			AltConf	Trace	
44	r	60	Total	C	N	O	0	0
			241	120	60	61		

- Molecule 45 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms			AltConf	Trace	
45	s	88	Total	C	N	O	0	0
			353	176	88	89		

- Molecule 46 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms			AltConf	Trace	
46	t	89	Total	C	N	O	0	0
			357	178	89	90		

- Molecule 47 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms				AltConf	Trace
47	u	86	Total	C	N	O	0	0
			345	172	86	87		

- Molecule 48 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	v	71	Total	C	N	O	0	0
			285	142	71	72		

- Molecule 49 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms				AltConf	Trace
49	w	84	Total	C	N	O	0	0
			336	168	84	84		

- Molecule 50 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms				AltConf	Trace
50	x	86	Total	C	N	O	0	0
			345	172	86	87		

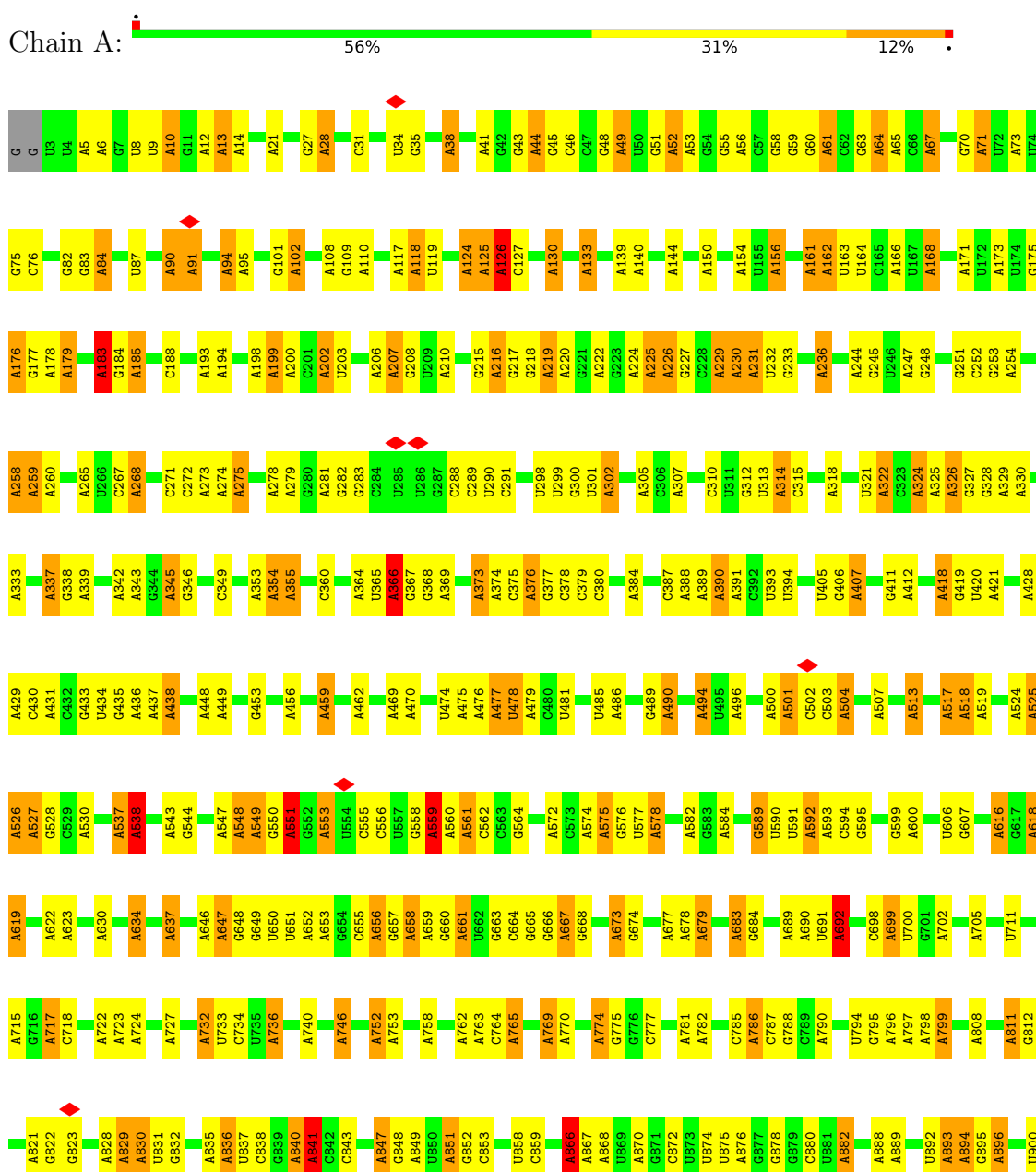
- Molecule 51 is a RNA chain called tRNA.

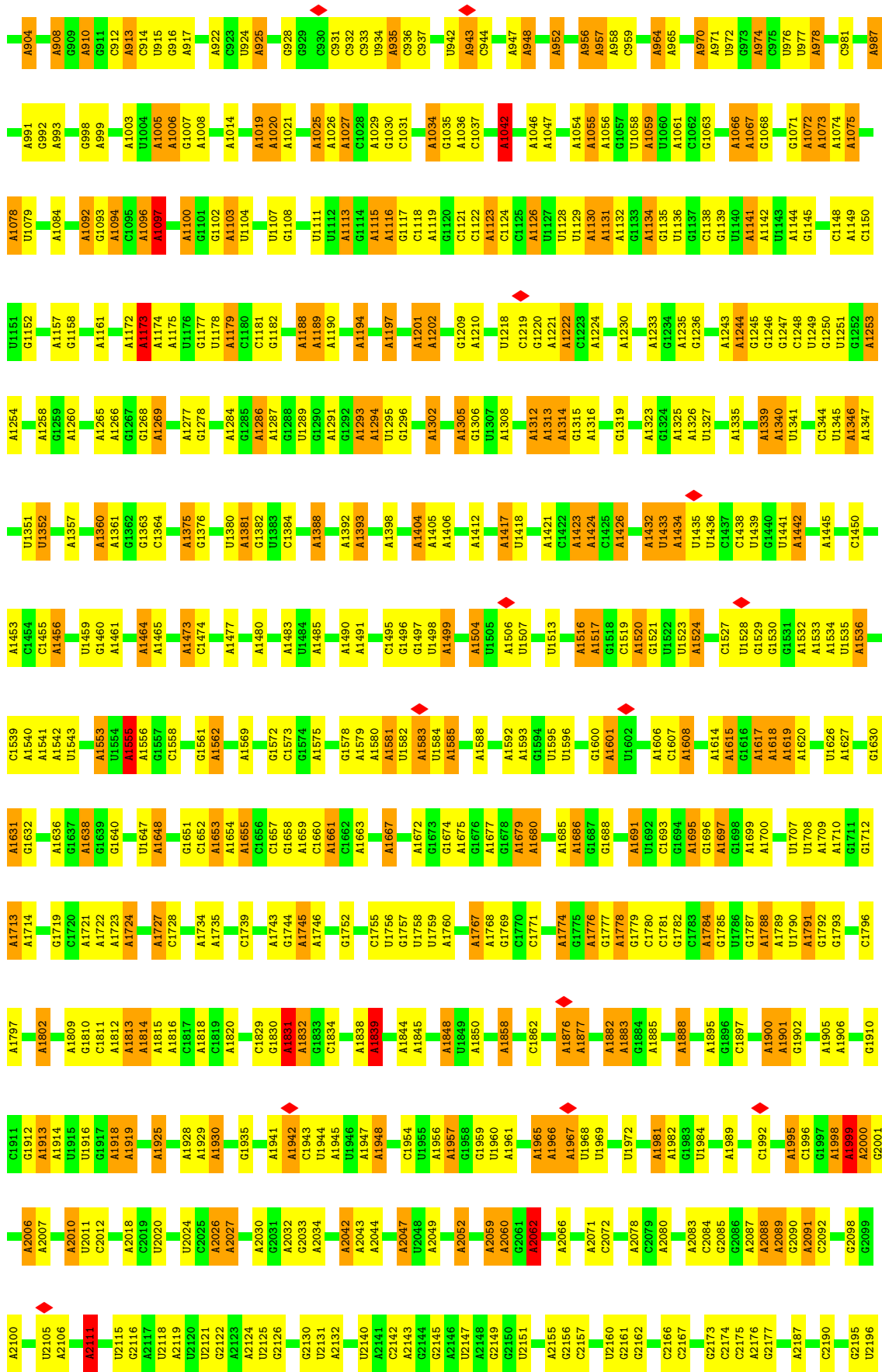
Mol	Chain	Residues	Atoms					AltConf	Trace
51	y	77	Total	C	N	O	P	0	0
			1643	731	290	545	77		
51	1	77	Total	C	N	O	P	0	0
			1643	731	290	545	77		

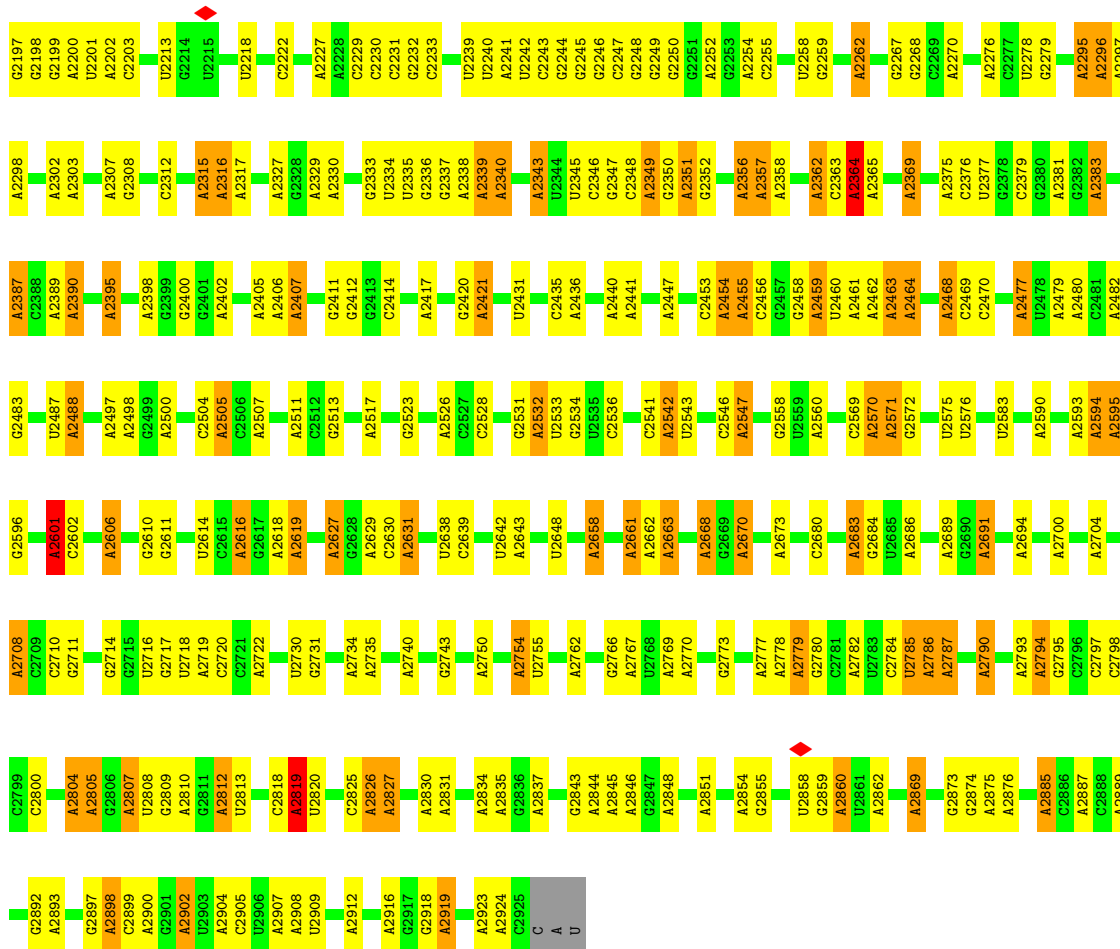
### 3 Residue-property plots

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.

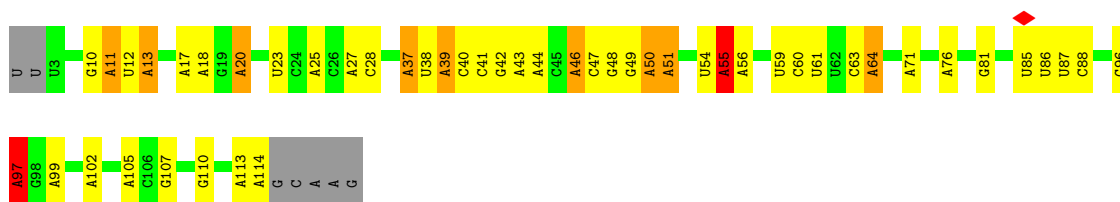
#### • Molecule 1: 23S rRNA



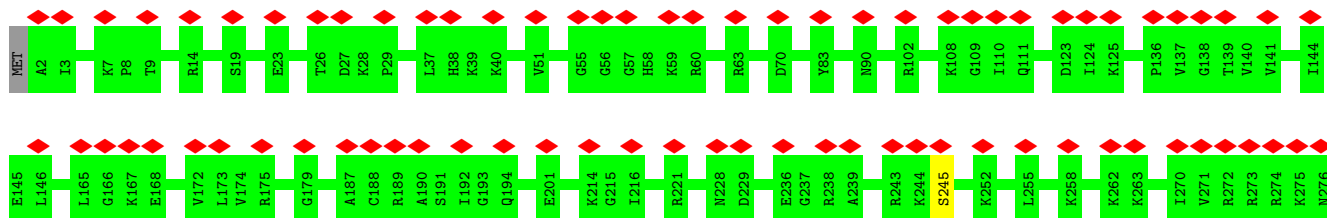




• Molecule 2: 5S rRNA

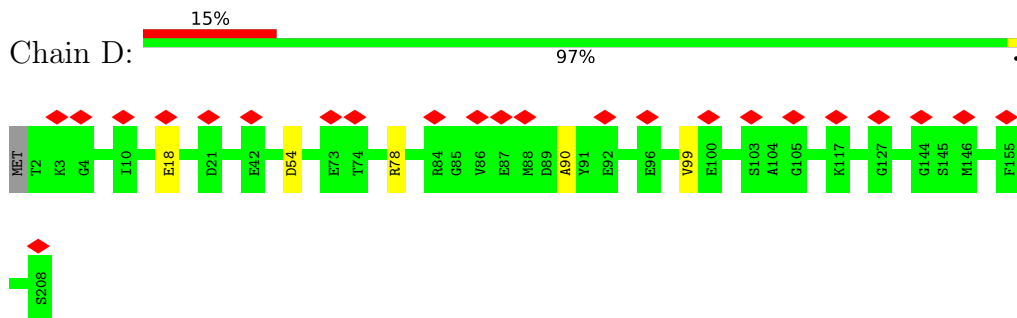


• Molecule 3: 50S ribosomal protein L2

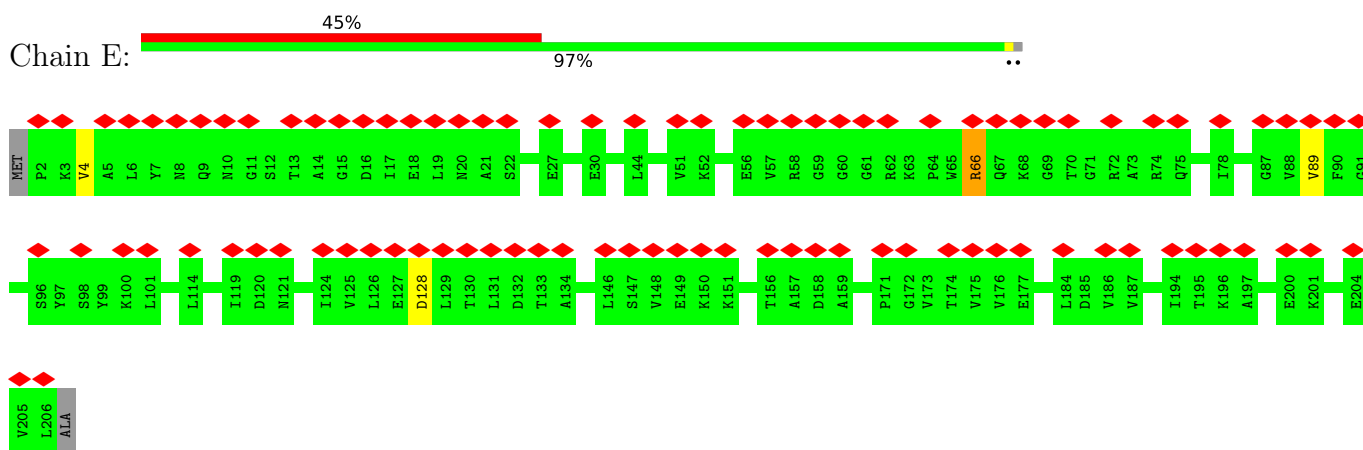


LYS

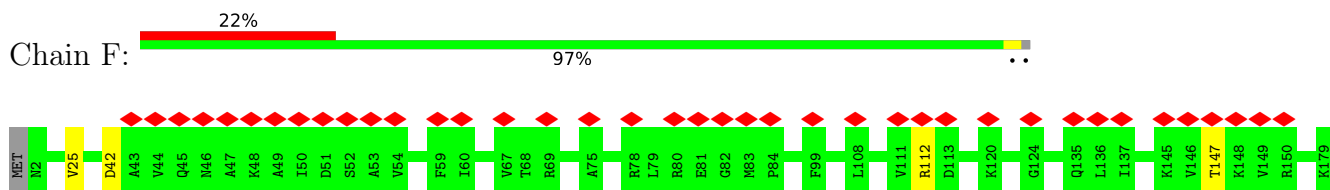
- Molecule 4: 50S ribosomal protein L3



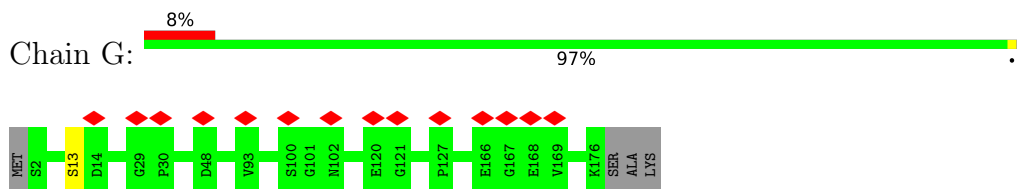
- Molecule 5: 50S ribosomal protein L4



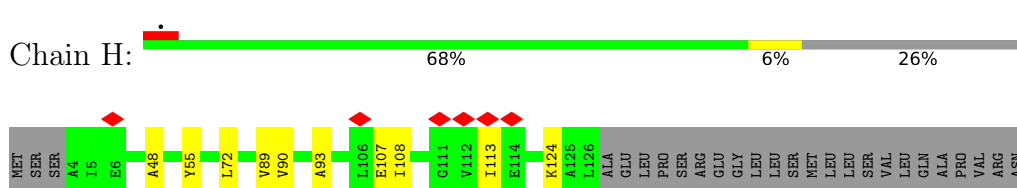
- Molecule 6: 50S ribosomal protein L5



- Molecule 7: Ribosomal protein L6



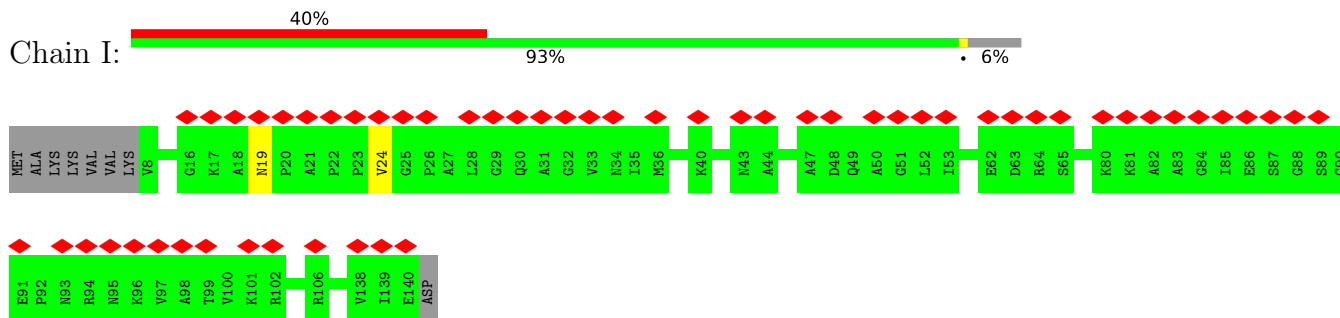
- Molecule 8: 50S ribosomal protein L10



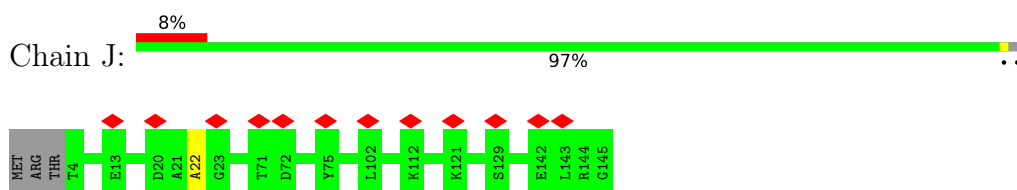


VAL  
ALA  
GLU  
GLN  
LYS  
VAL  
GLU  
GLU  
GLN  
GLY  
ALA

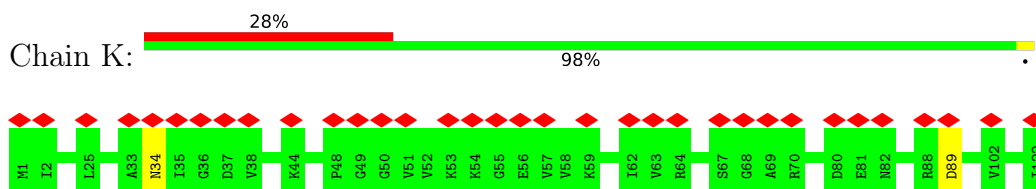
- Molecule 9: 50S ribosomal protein L11



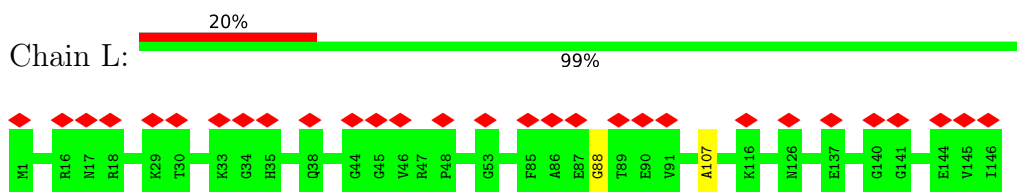
- Molecule 10: 50S ribosomal protein L13



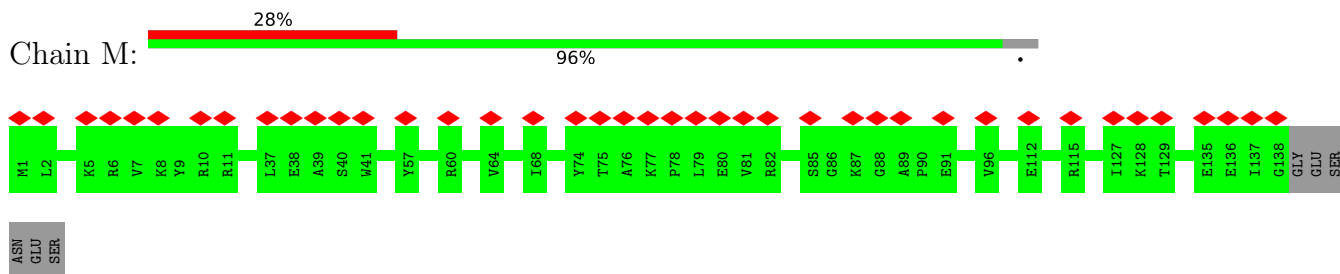
- Molecule 11: 50S ribosomal protein L14



- Molecule 12: 50S ribosomal protein L15



- Molecule 13: 50S ribosomal protein L16

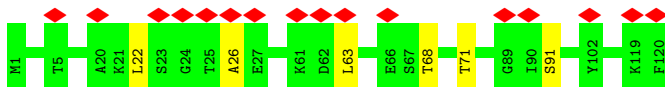


- Molecule 14: 50S ribosomal protein L17

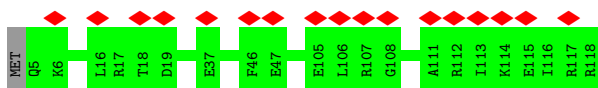




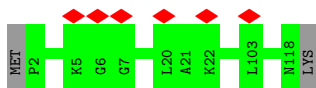
- Molecule 15: 50S ribosomal protein L18



- Molecule 16: 50S ribosomal protein L19



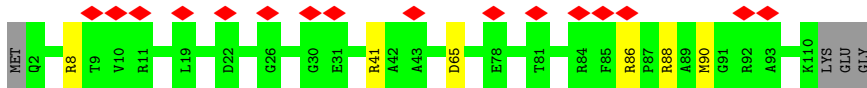
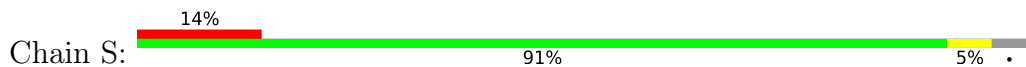
- Molecule 17: 50S ribosomal protein L20



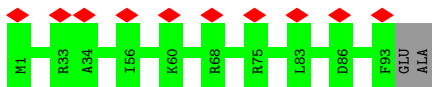
- Molecule 18: 50S ribosomal protein L21



- Molecule 19: 50S ribosomal protein L22



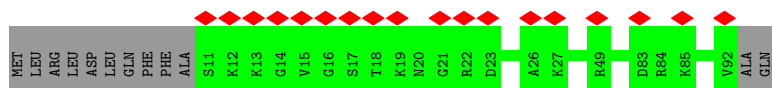
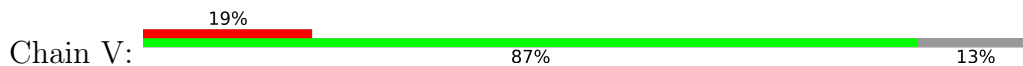
- Molecule 20: 50S ribosomal protein L23



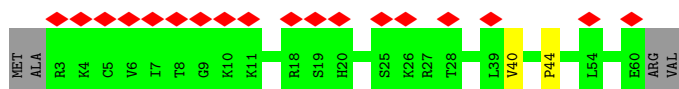
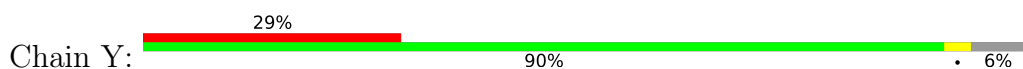
- Molecule 21: 50S ribosomal protein L24



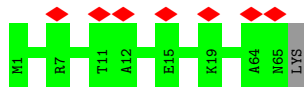
- Molecule 22: 50S ribosomal protein L27



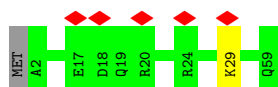
- Molecule 23: 50S ribosomal protein L28



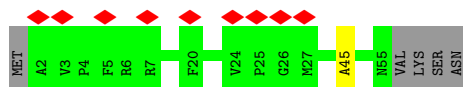
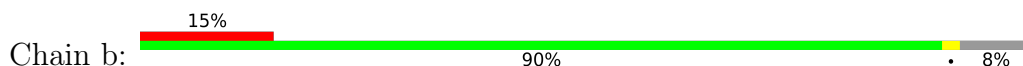
- Molecule 24: 50S ribosomal protein L29



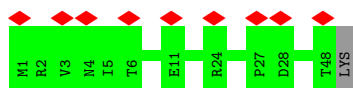
- Molecule 25: 50S ribosomal protein L30



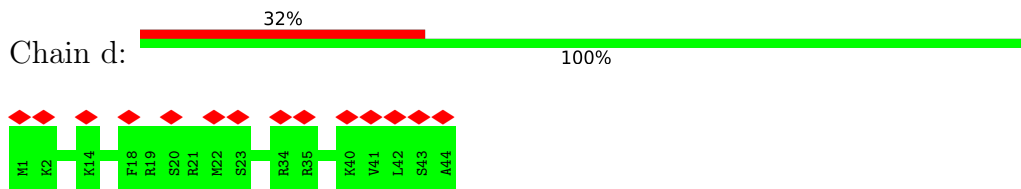
- Molecule 26: 50S ribosomal protein L32



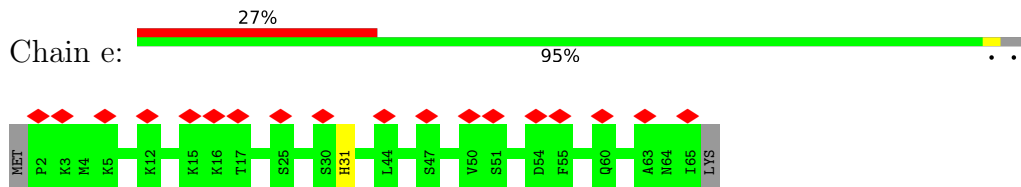
- Molecule 27: 50S ribosomal protein L33



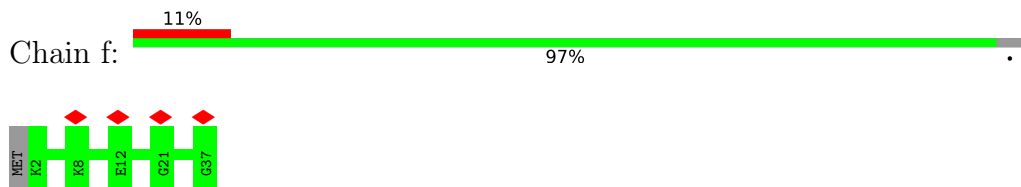
• Molecule 28: 50S ribosomal protein L34



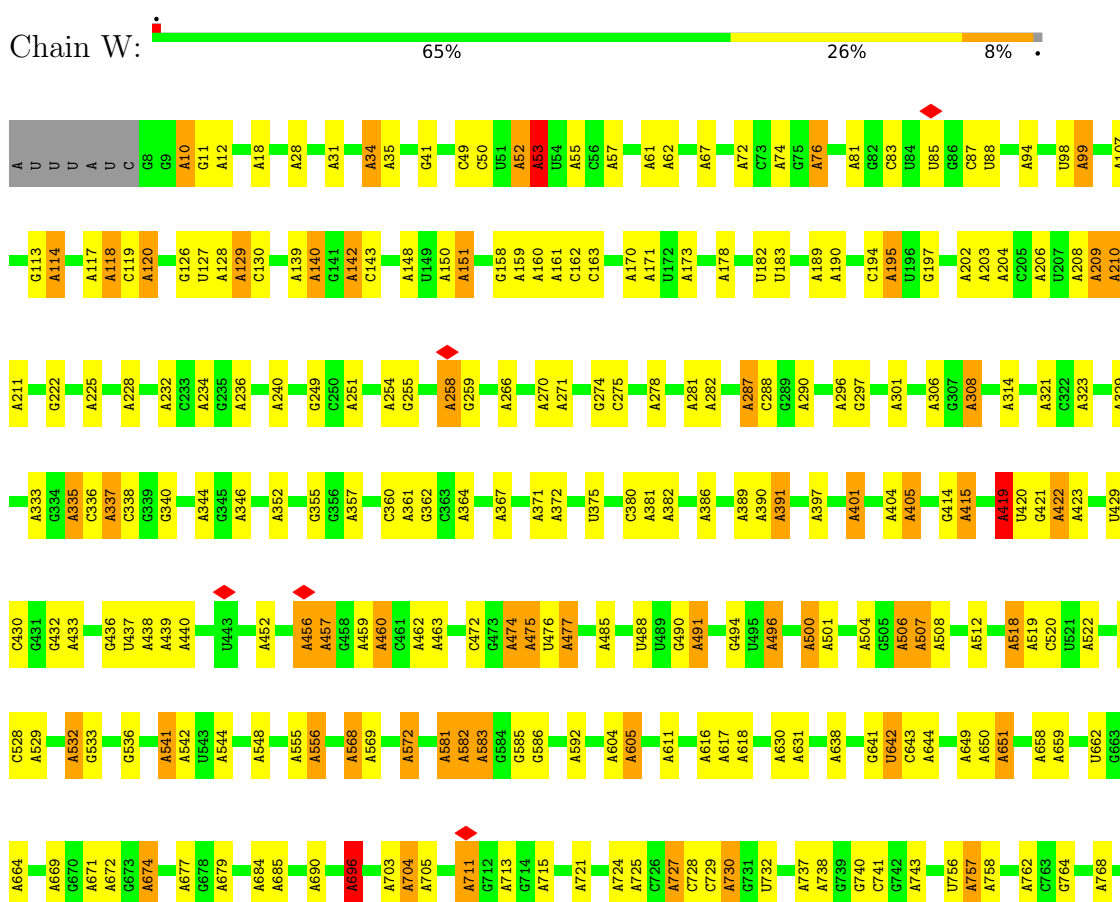
• Molecule 29: 50S ribosomal protein L35

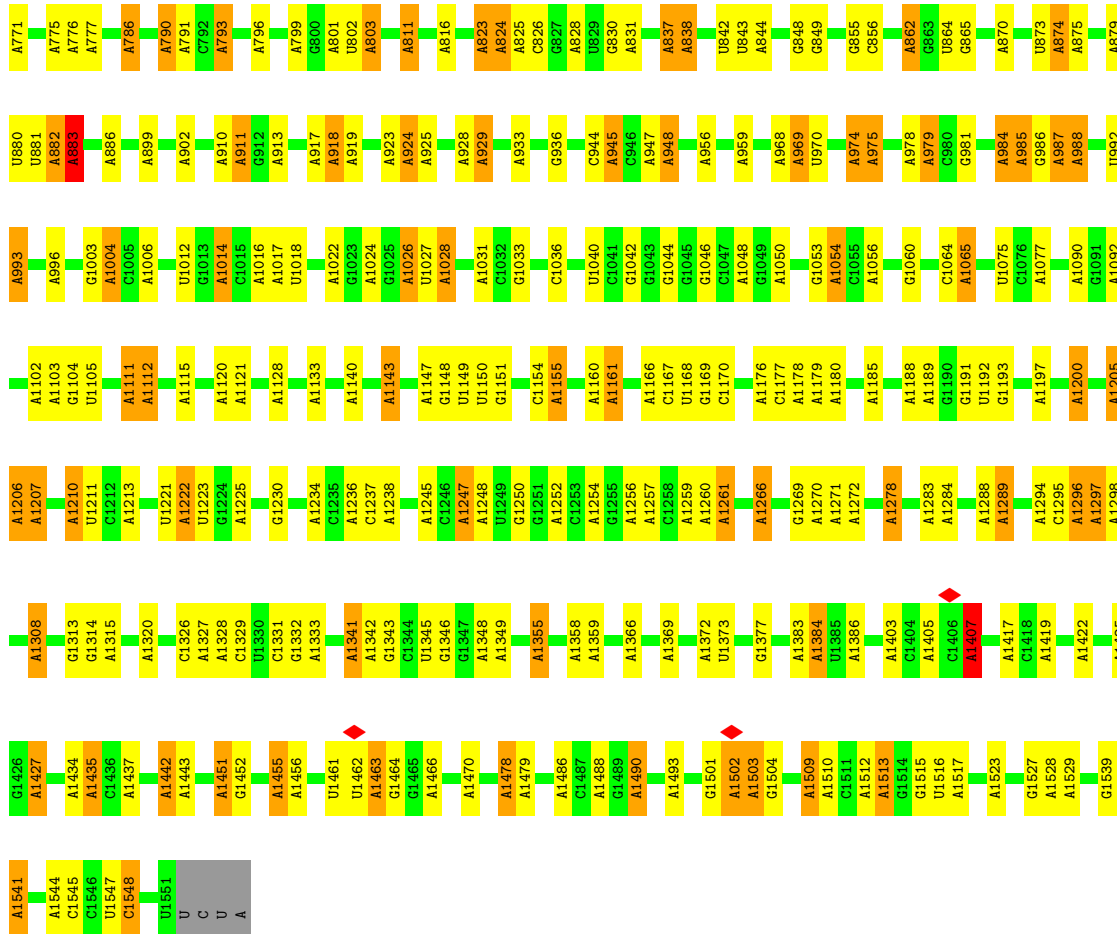


• Molecule 30: 50S ribosomal protein L36

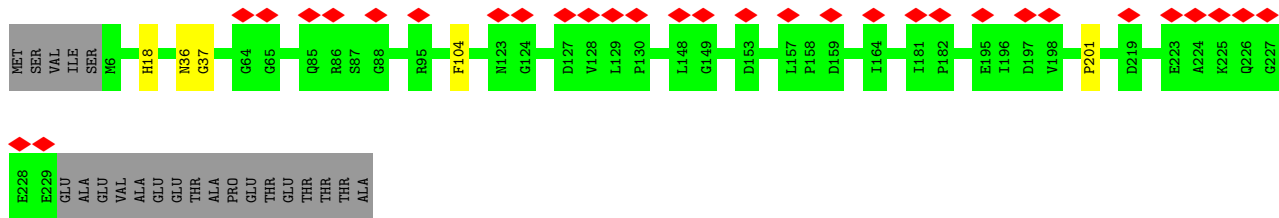
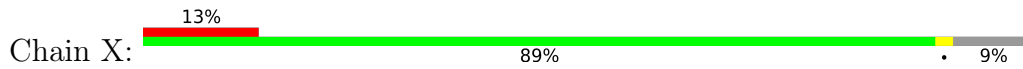


• Molecule 31: 16S rRNA

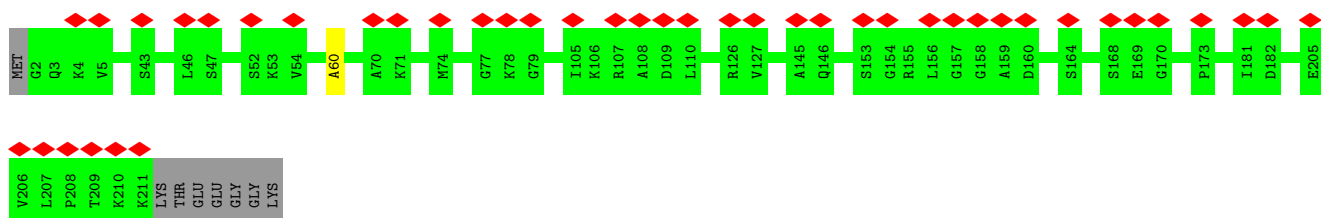




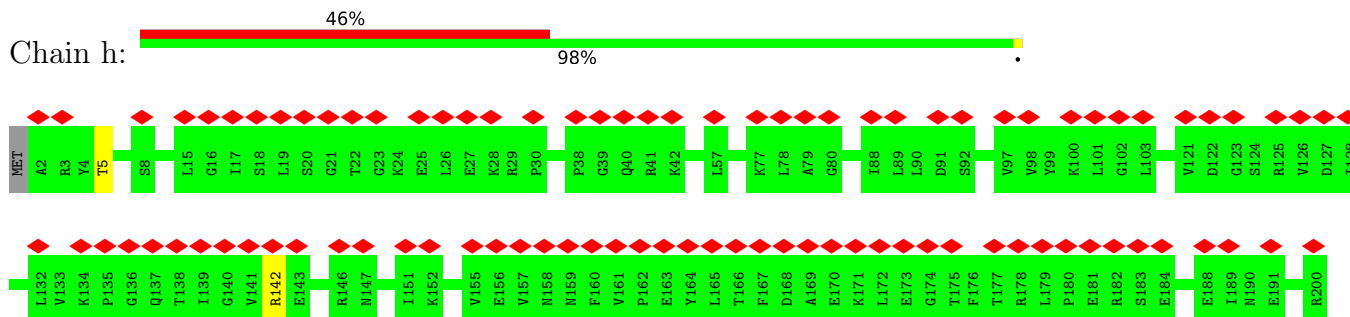
• Molecule 32: 30S ribosomal protein S2



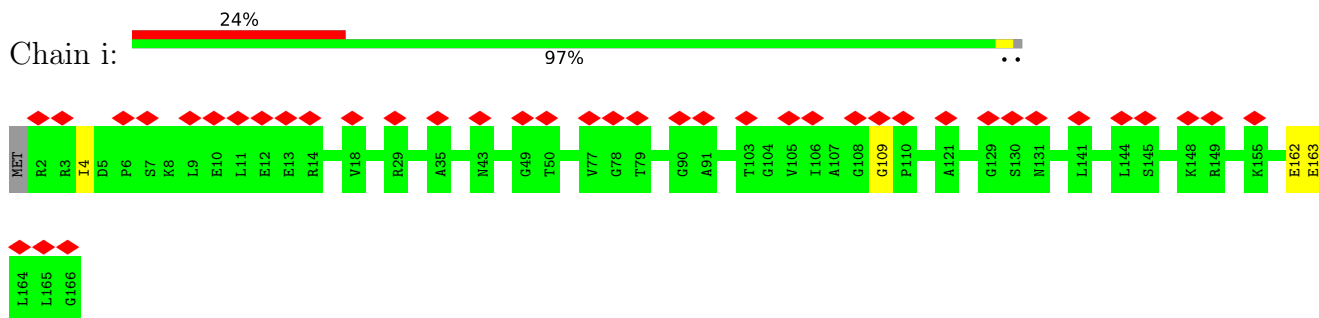
• Molecule 33: 30S ribosomal protein S3



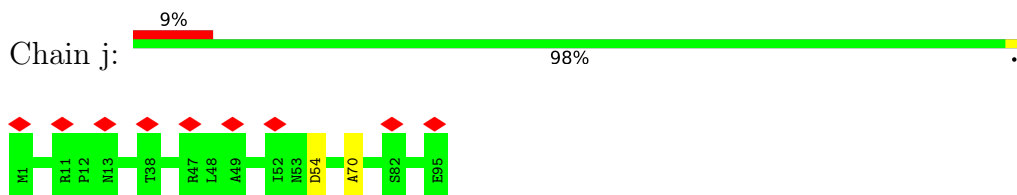
- Molecule 34: 30S ribosomal protein S4



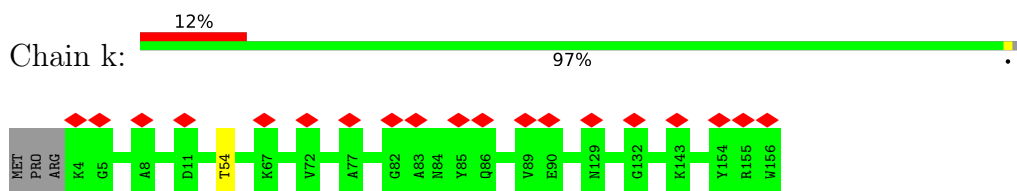
- Molecule 35: 30S ribosomal protein S5



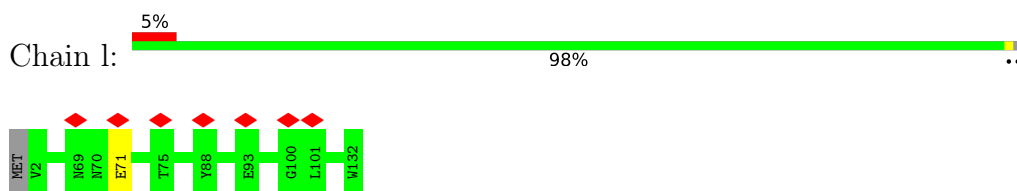
- Molecule 36: 30S ribosomal protein S6



- Molecule 37: 30S ribosomal protein S7



- Molecule 38: 30S ribosomal protein S8



- Molecule 39: 30S ribosomal protein S9

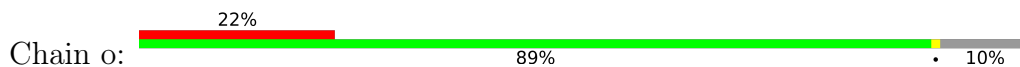




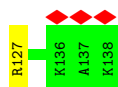
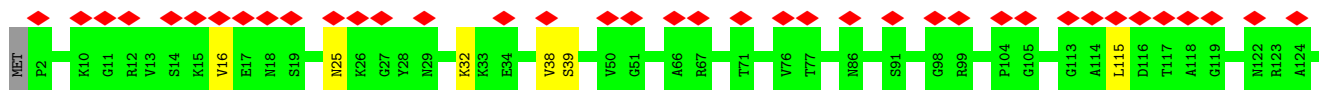
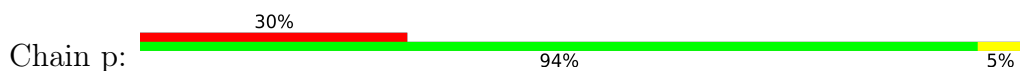
- Molecule 40: 30S ribosomal protein S10



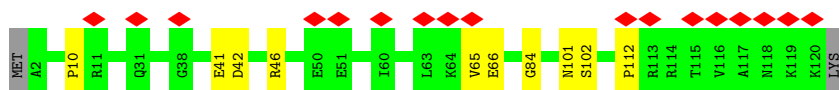
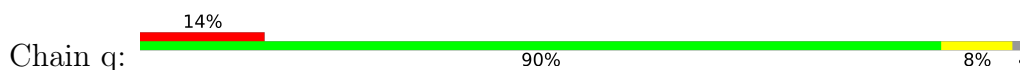
- Molecule 41: 30S ribosomal protein S11



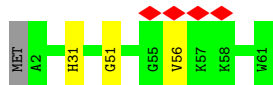
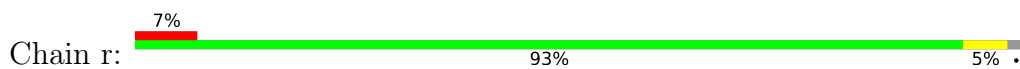
- Molecule 42: 30S ribosomal protein S12



- Molecule 43: 30S ribosomal protein S13

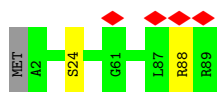


- Molecule 44: 30S ribosomal protein S14 type Z

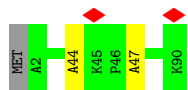


- Molecule 45: 30S ribosomal protein S15

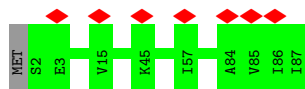




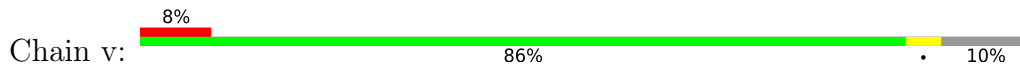
- Molecule 46: 30S ribosomal protein S16



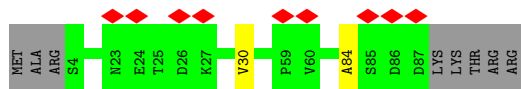
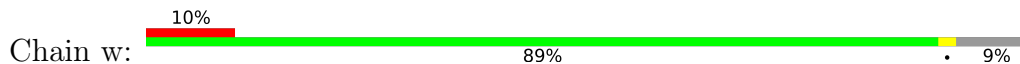
- Molecule 47: 30S ribosomal protein S17



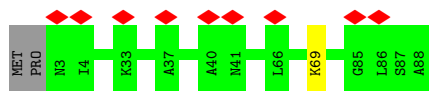
- Molecule 48: 30S ribosomal protein S18



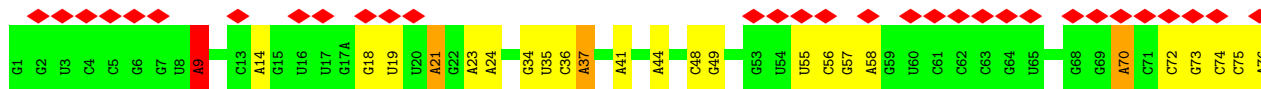
- Molecule 49: 30S ribosomal protein S19



- Molecule 50: 30S ribosomal protein S20

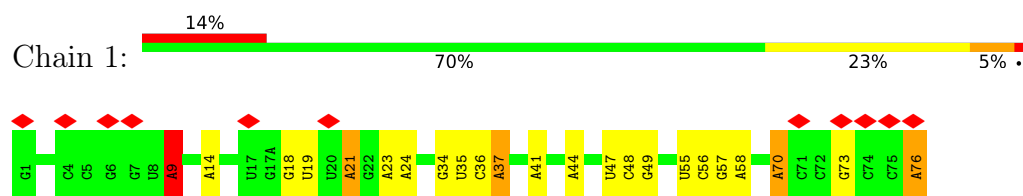


- Molecule 51: tRNA



- Molecule 51: tRNA





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	12739	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)	4000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	1.496	Depositor
Minimum map value	-0.769	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.082	Depositor
Recommended contour level	0.22	Depositor
Map size (Å)	650.4, 650.4, 650.4	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.084, 1.084, 1.084	Depositor

## 5 Model quality i

### 5.1 Standard geometry i

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	1.37	1882/70307 (2.7%)	2.92	7351/109687 (6.7%)
2	B	1.30	67/2678 (2.5%)	2.78	247/4174 (5.9%)
3	C	0.27	0/2148	0.48	0/2881
4	D	0.28	0/1597	0.47	0/2140
5	E	0.27	0/1580	0.50	0/2132
6	F	0.29	0/1423	0.51	0/1910
7	G	0.24	0/1360	0.43	0/1832
8	H	0.26	0/963	0.49	0/1298
9	I	0.26	0/995	0.48	0/1346
10	J	0.26	0/1146	0.49	0/1542
11	K	0.28	0/927	0.47	0/1245
12	L	0.23	0/1093	0.44	0/1457
13	M	0.21	0/1120	0.38	0/1496
14	N	0.26	0/960	0.50	0/1284
15	O	0.30	0/921	0.54	1/1236 (0.1%)
16	P	0.24	0/949	0.44	0/1269
17	Q	0.27	0/952	0.45	0/1266
18	R	0.28	0/797	0.53	0/1070
19	S	0.34	0/851	0.59	0/1146
20	T	0.30	0/759	0.47	0/1011
21	U	0.27	0/764	0.52	0/1022
22	V	0.30	0/638	0.50	0/847
23	Y	0.30	0/448	0.58	0/596
24	Z	0.24	0/531	0.48	0/707
25	a	0.24	0/457	0.44	0/613
26	b	0.23	0/433	0.48	0/574
27	c	0.26	0/406	0.44	0/540
28	d	0.21	0/370	0.44	0/483
29	e	0.24	0/519	0.48	0/680
30	f	0.20	0/291	0.37	0/383
31	W	1.36	975/37074 (2.6%)	2.90	3795/57834 (6.6%)
32	X	0.32	0/895	0.40	0/1117
33	g	0.30	0/839	0.38	0/1047
34	h	0.26	0/796	0.42	0/992

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
35	i	0.26	0/660	0.46	0/822
36	j	0.32	0/380	0.41	0/472
37	k	0.26	0/612	0.39	0/762
38	l	0.24	0/524	0.43	0/652
39	m	0.27	0/520	0.51	0/647
40	n	0.28	0/408	0.39	0/507
41	o	0.22	0/471	0.42	0/587
42	p	0.24	0/548	0.50	0/682
43	q	0.31	0/475	0.52	0/592
44	r	0.21	0/240	0.49	0/297
45	s	0.27	0/352	0.42	0/437
46	t	0.27	0/356	0.41	0/442
47	u	0.27	0/344	0.43	0/427
48	v	0.31	0/284	0.44	0/352
49	w	0.33	0/335	0.46	0/417
50	x	0.27	0/344	0.41	0/427
51	l	1.03	29/1834 (1.6%)	2.18	105/2858 (3.7%)
51	y	1.00	26/1834 (1.4%)	2.08	94/2858 (3.3%)
All	All	1.20	2979/148508 (2.0%)	2.59	11593/223095 (5.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	81
2	B	0	2
5	E	0	1
19	S	0	2
31	W	0	35
51	l	0	2
51	y	0	2
All	All	0	125

The worst 5 of 2979 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
31	W	508	A	C8-N7	8.64	1.37	1.31
1	A	1188	A	C8-N7	8.30	1.37	1.31
31	W	1372	A	C8-N7	8.24	1.37	1.31
1	A	526	A	C8-N7	8.18	1.37	1.31

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
31	W	631	A	C8-N7	8.17	1.37	1.31

The worst 5 of 11593 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1134	A	C2-N3-C4	20.46	120.83	110.60
1	A	1691	A	C2-N3-C4	20.44	120.82	110.60
31	W	1308	A	C2-N3-C4	20.37	120.78	110.60
1	A	226	A	C2-N3-C4	20.30	120.75	110.60
31	W	993	A	C2-N3-C4	20.23	120.72	110.60

There are no chirality outliers.

5 of 125 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	126	A	Sidechain
1	A	168	A	Sidechain
1	A	52	A	Sidechain
1	A	64	A	Sidechain
1	A	67	A	Sidechain

## 5.2 Too-close contacts [i](#)

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

## 5.3 Torsion angles [i](#)

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

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	273/277 (99%)	264 (97%)	8 (3%)	1 (0%)	34	72
4	D	205/208 (99%)	189 (92%)	11 (5%)	5 (2%)	6	33

*Continued on next page...*

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	E	203/207 (98%)	184 (91%)	16 (8%)	3 (2%)	10	45
6	F	176/179 (98%)	154 (88%)	18 (10%)	4 (2%)	6	34
7	G	173/179 (97%)	164 (95%)	8 (5%)	1 (1%)	25	65
8	H	121/166 (73%)	97 (80%)	14 (12%)	10 (8%)	1	12
9	I	131/141 (93%)	122 (93%)	7 (5%)	2 (2%)	10	45
10	J	140/145 (97%)	130 (93%)	9 (6%)	1 (1%)	22	62
11	K	120/122 (98%)	112 (93%)	6 (5%)	2 (2%)	9	41
12	L	144/146 (99%)	132 (92%)	10 (7%)	2 (1%)	11	45
13	M	136/144 (94%)	129 (95%)	7 (5%)	0	100	100
14	N	117/120 (98%)	109 (93%)	7 (6%)	1 (1%)	17	56
15	O	118/120 (98%)	106 (90%)	7 (6%)	5 (4%)	3	22
16	P	112/115 (97%)	100 (89%)	12 (11%)	0	100	100
17	Q	115/119 (97%)	112 (97%)	3 (3%)	0	100	100
18	R	99/102 (97%)	82 (83%)	15 (15%)	2 (2%)	7	37
19	S	107/113 (95%)	96 (90%)	8 (8%)	3 (3%)	5	30
20	T	91/95 (96%)	86 (94%)	5 (6%)	0	100	100
21	U	98/103 (95%)	87 (89%)	8 (8%)	3 (3%)	4	27
22	V	80/94 (85%)	77 (96%)	3 (4%)	0	100	100
23	Y	56/62 (90%)	53 (95%)	1 (2%)	2 (4%)	3	25
24	Z	63/66 (96%)	60 (95%)	3 (5%)	0	100	100
25	a	56/59 (95%)	54 (96%)	1 (2%)	1 (2%)	8	40
26	b	52/59 (88%)	47 (90%)	4 (8%)	1 (2%)	8	38
27	c	46/49 (94%)	44 (96%)	2 (4%)	0	100	100
28	d	42/44 (96%)	41 (98%)	1 (2%)	0	100	100
29	e	62/66 (94%)	56 (90%)	5 (8%)	1 (2%)	9	43
30	f	34/37 (92%)	33 (97%)	1 (3%)	0	100	100
32	X	222/246 (90%)	204 (92%)	13 (6%)	5 (2%)	6	34
33	g	208/218 (95%)	193 (93%)	14 (7%)	1 (0%)	29	69
34	h	197/200 (98%)	191 (97%)	4 (2%)	2 (1%)	15	54
35	i	163/166 (98%)	150 (92%)	9 (6%)	4 (2%)	5	32
36	j	93/95 (98%)	88 (95%)	3 (3%)	2 (2%)	6	35

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
37	k	151/156 (97%)	144 (95%)	6 (4%)	1 (1%)	22	62
38	l	129/132 (98%)	123 (95%)	5 (4%)	1 (1%)	19	59
39	m	128/130 (98%)	113 (88%)	10 (8%)	5 (4%)	3	23
40	n	100/102 (98%)	88 (88%)	8 (8%)	4 (4%)	3	23
41	o	116/131 (88%)	106 (91%)	9 (8%)	1 (1%)	17	56
42	p	135/138 (98%)	118 (87%)	10 (7%)	7 (5%)	2	19
43	q	117/121 (97%)	94 (80%)	13 (11%)	10 (8%)	1	11
44	r	58/61 (95%)	51 (88%)	4 (7%)	3 (5%)	2	19
45	s	86/89 (97%)	82 (95%)	2 (2%)	2 (2%)	6	34
46	t	87/90 (97%)	82 (94%)	3 (3%)	2 (2%)	6	34
47	u	84/87 (97%)	78 (93%)	6 (7%)	0	100	100
48	v	69/79 (87%)	64 (93%)	2 (3%)	3 (4%)	2	22
49	w	82/92 (89%)	75 (92%)	5 (6%)	2 (2%)	6	33
50	x	84/88 (96%)	77 (92%)	6 (7%)	1 (1%)	13	49
All	All	5479/5758 (95%)	5041 (92%)	332 (6%)	106 (2%)	11	38

5 of 106 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
8	H	93	ALA
9	I	19	ASN
15	O	26	ALA
21	U	87	ASP
35	i	4	ILE

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	223/225 (99%)	223 (100%)	0	100	100
4	D	168/169 (99%)	168 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	E	169/170 (99%)	168 (99%)	1 (1%)	86	91
6	F	153/154 (99%)	153 (100%)	0	100	100
7	G	148/151 (98%)	148 (100%)	0	100	100
8	H	105/139 (76%)	105 (100%)	0	100	100
9	I	103/110 (94%)	103 (100%)	0	100	100
10	J	120/123 (98%)	120 (100%)	0	100	100
11	K	101/101 (100%)	101 (100%)	0	100	100
12	L	110/110 (100%)	110 (100%)	0	100	100
13	M	111/116 (96%)	111 (100%)	0	100	100
14	N	99/100 (99%)	99 (100%)	0	100	100
15	O	93/93 (100%)	93 (100%)	0	100	100
16	P	99/100 (99%)	99 (100%)	0	100	100
17	Q	96/98 (98%)	96 (100%)	0	100	100
18	R	83/84 (99%)	83 (100%)	0	100	100
19	S	90/93 (97%)	89 (99%)	1 (1%)	73	84
20	T	84/85 (99%)	84 (100%)	0	100	100
21	U	84/87 (97%)	84 (100%)	0	100	100
22	V	64/74 (86%)	64 (100%)	0	100	100
23	Y	47/50 (94%)	47 (100%)	0	100	100
24	Z	56/57 (98%)	56 (100%)	0	100	100
25	a	52/53 (98%)	52 (100%)	0	100	100
26	b	48/53 (91%)	48 (100%)	0	100	100
27	c	46/47 (98%)	46 (100%)	0	100	100
28	d	39/39 (100%)	39 (100%)	0	100	100
29	e	54/56 (96%)	54 (100%)	0	100	100
30	f	34/35 (97%)	34 (100%)	0	100	100
All	All	2679/2772 (97%)	2677 (100%)	2 (0%)	93	97

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	E	66	ARG
19	S	90	MET



Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 38 such sidechains are listed below:

Mol	Chain	Res	Type
22	V	37	GLN
29	e	31	HIS
23	Y	23	ASN
26	b	40	HIS
30	f	36	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	2922/2928 (99%)	817 (27%)	83 (2%)
2	B	111/119 (93%)	32 (28%)	4 (3%)
31	W	1543/1555 (99%)	235 (15%)	17 (1%)
51	1	76/77 (98%)	15 (19%)	1 (1%)
51	y	76/77 (98%)	18 (23%)	0
All	All	4728/4756 (99%)	1117 (23%)	105 (2%)

5 of 1117 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	8	U
1	A	9	U
1	A	10	A
1	A	13	A
1	A	27	G

5 of 105 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1965	A
1	A	2468	A
31	W	1154	C
1	A	2155	A
1	A	2278	U

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

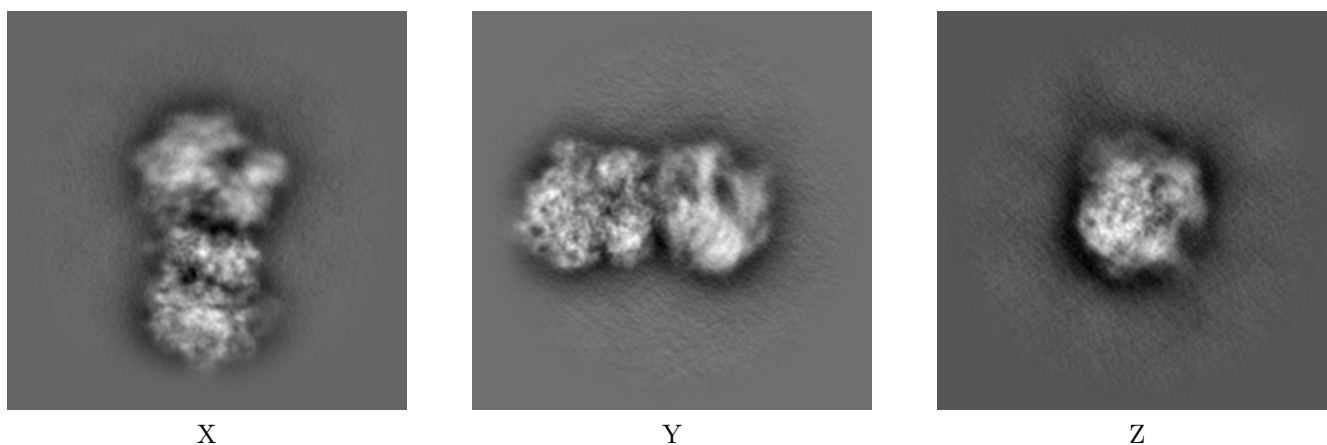
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13961. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

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

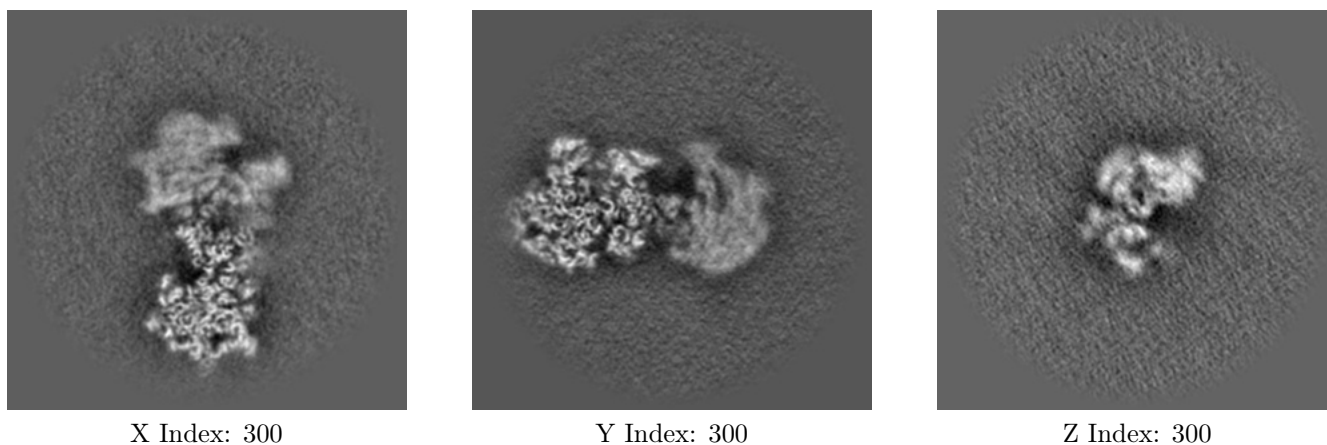
#### 6.1.1 Primary map



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

### 6.2 Central slices [i](#)

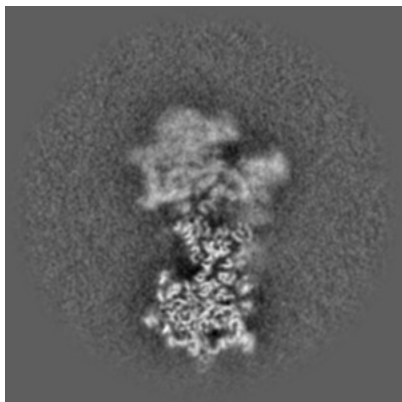
#### 6.2.1 Primary map



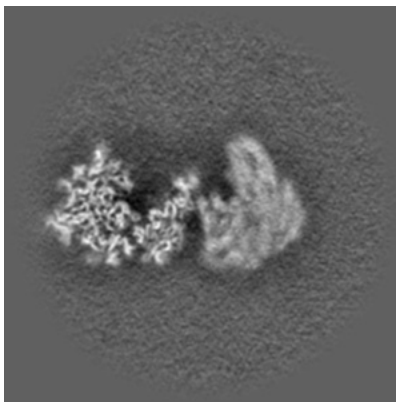
The images above show central slices of the map in three orthogonal directions.

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

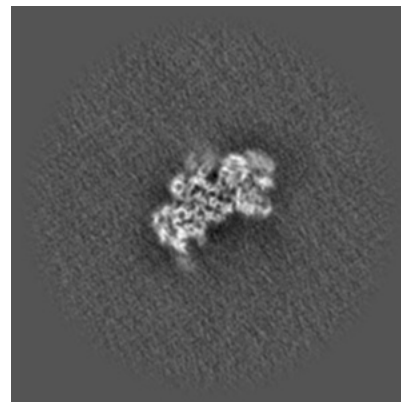
### 6.3.1 Primary map



X Index: 299



Y Index: 273

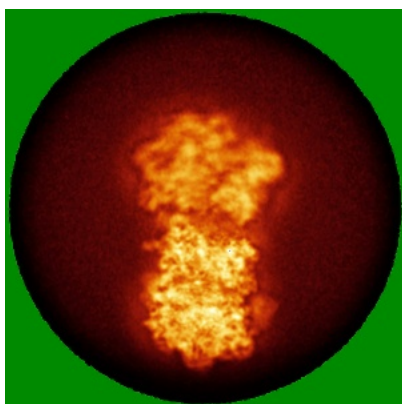


Z Index: 236

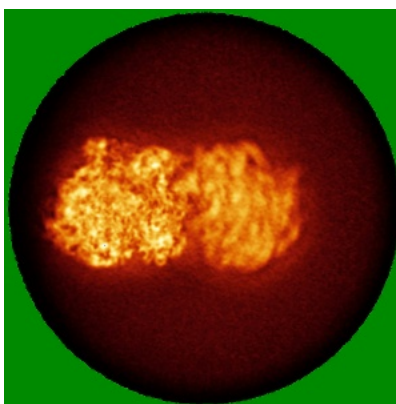
The images above show the largest variance slices of the map in three orthogonal directions.

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

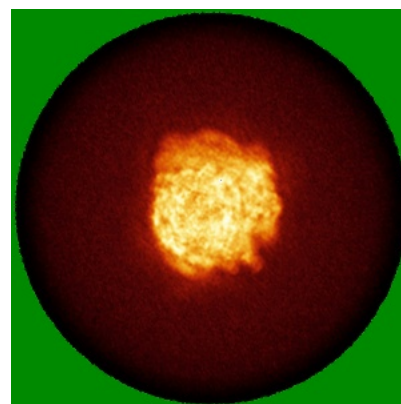
### 6.4.1 Primary map



X



Y

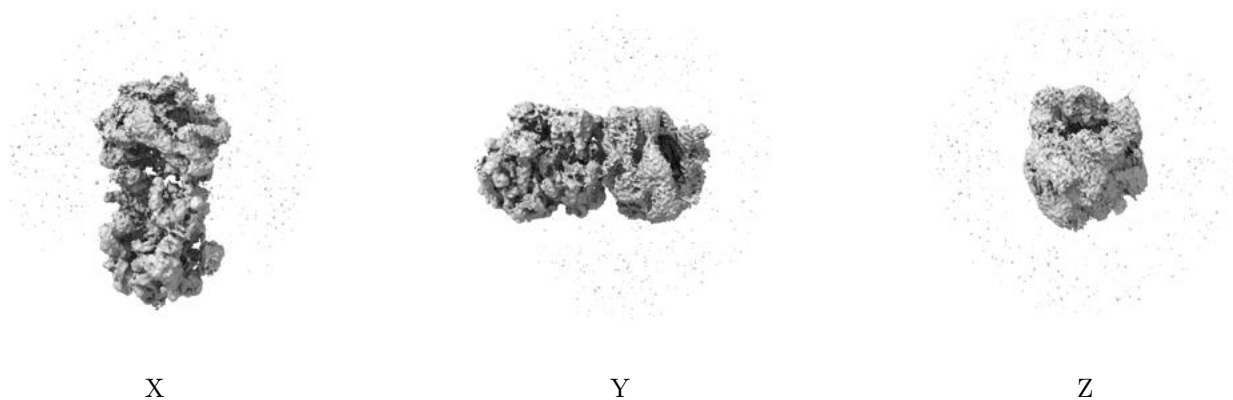


Z

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

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

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.22. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

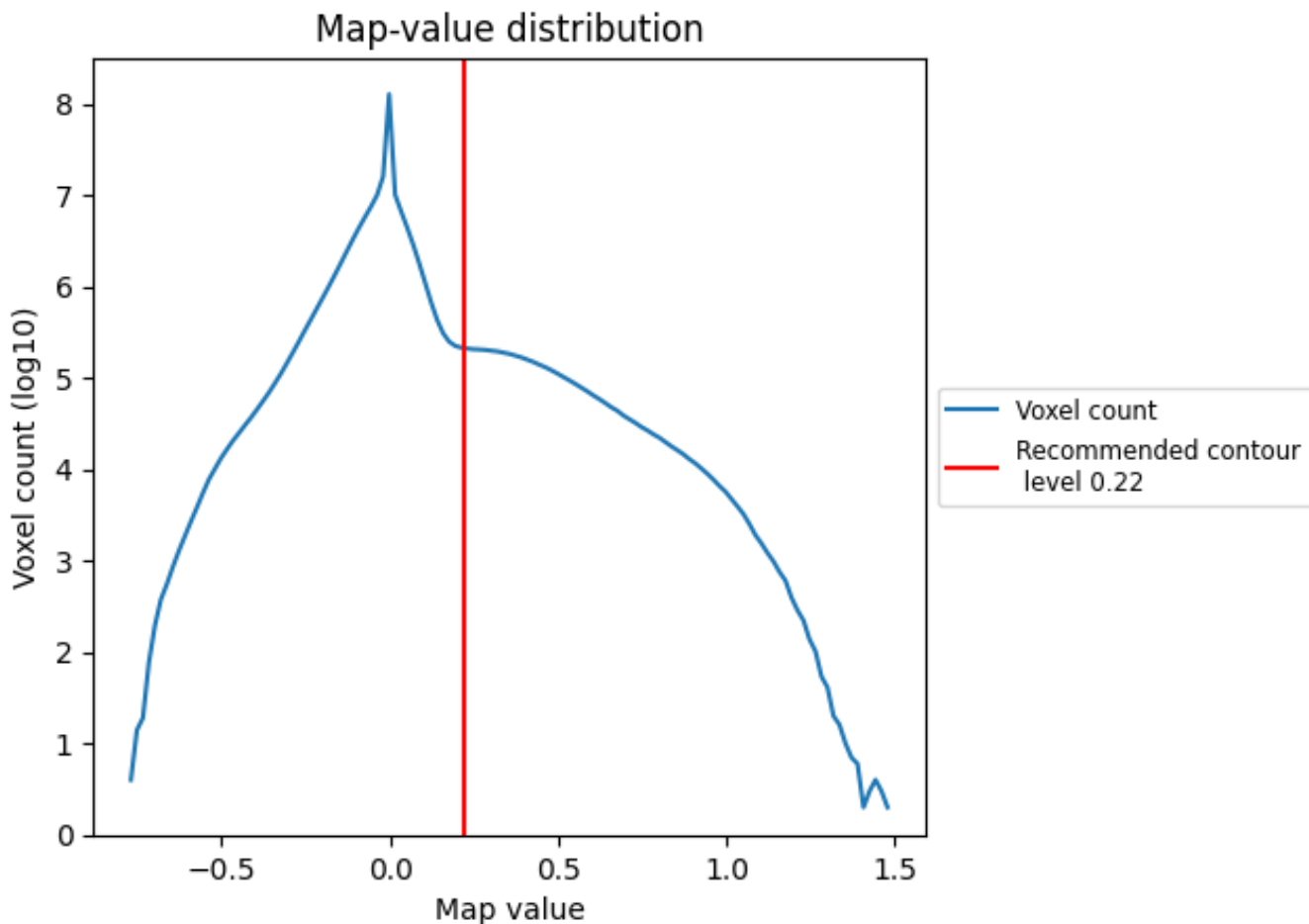
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

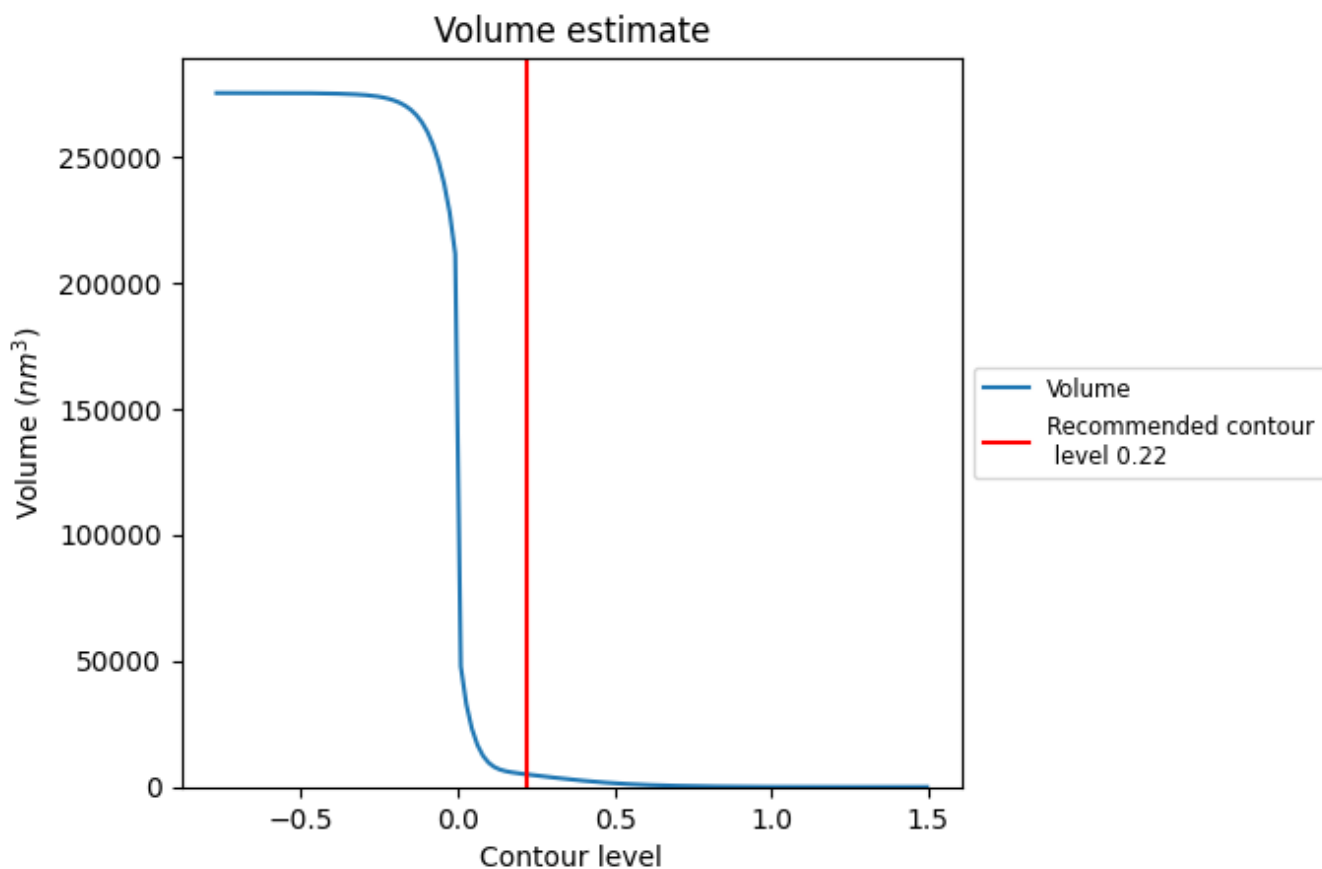
This section contains the results of statistical analysis of the map.

### 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.

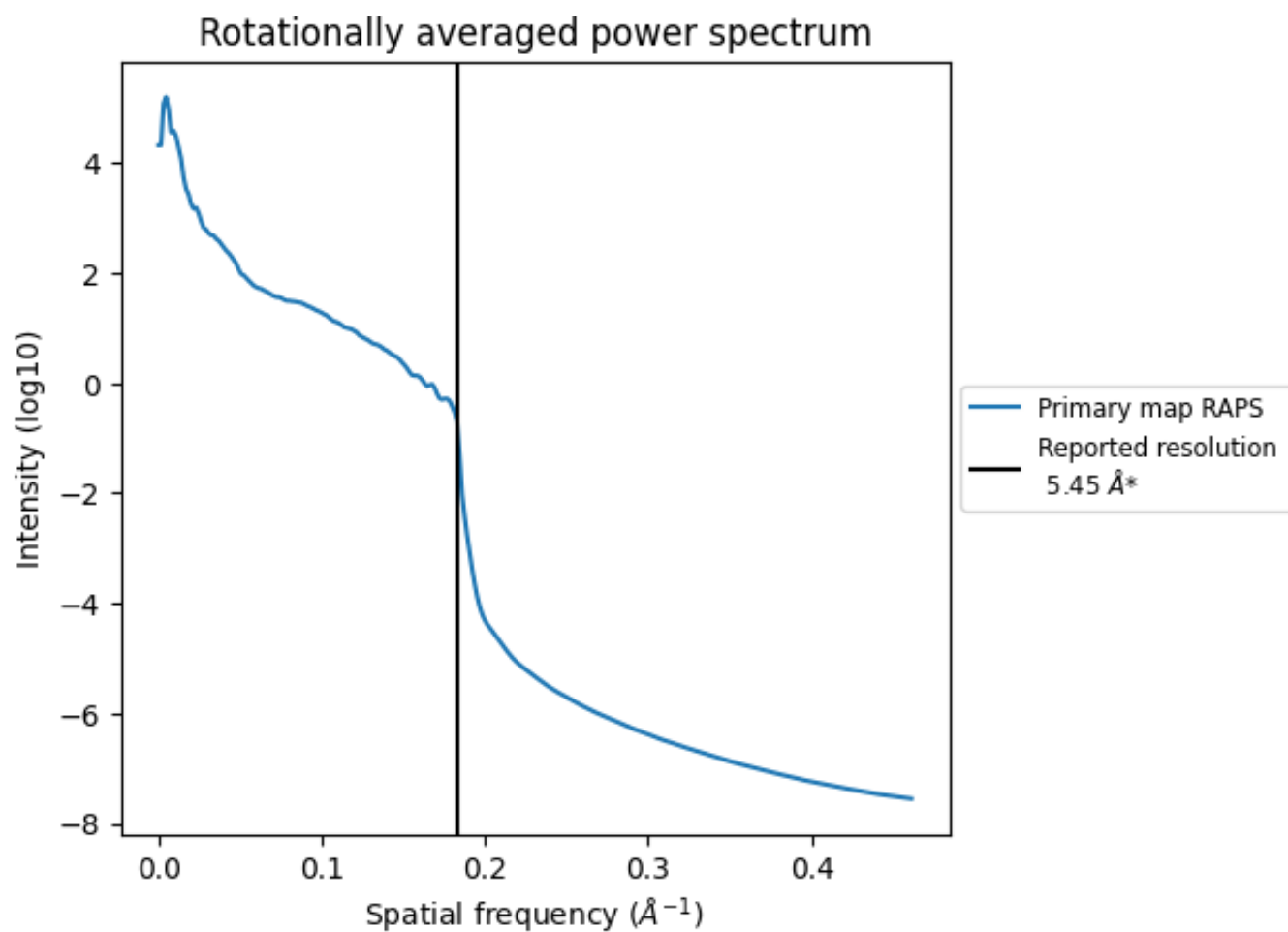
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 4985  $\text{nm}^3$ ; this corresponds to an approximate mass of 4503 kDa.

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

### 7.3 Rotationally averaged power spectrum [i](#)



\*Reported resolution corresponds to spatial frequency of  $0.183 \text{\AA}^{-1}$



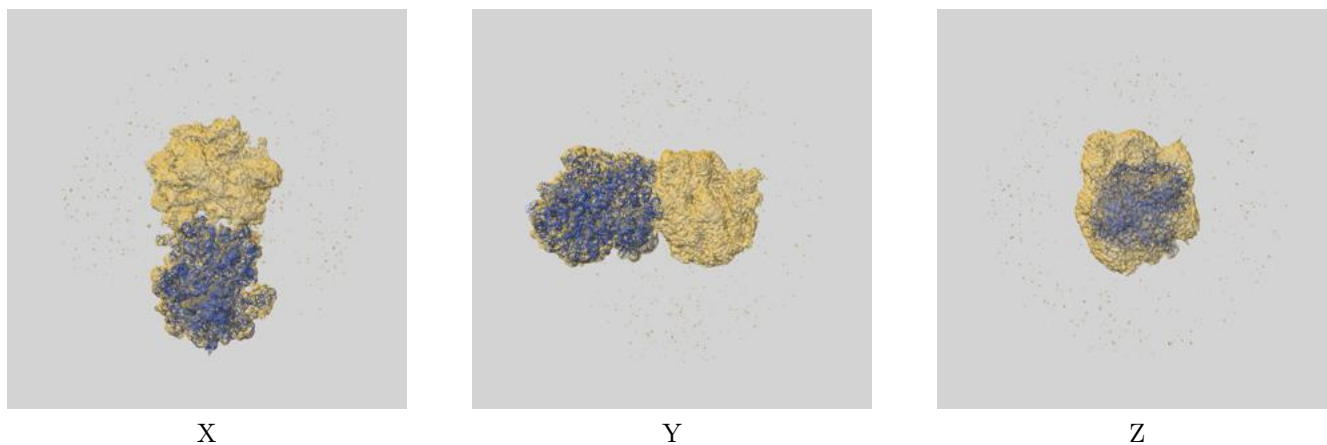
## 8 Fourier-Shell correlation

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

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

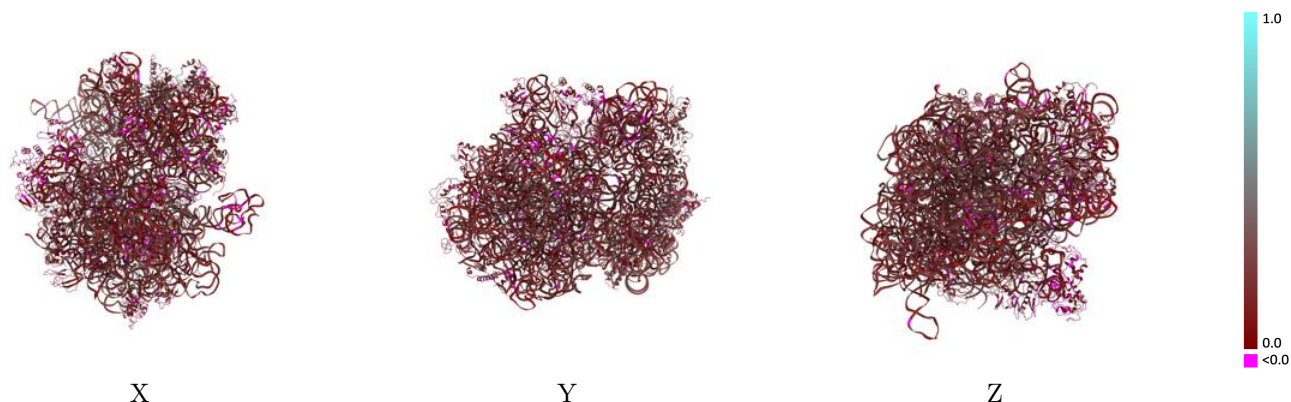
This section contains information regarding the fit between EMDB map EMD-13961 and PDB model 7QH4. Per-residue inclusion information can be found in section 3 on page 13.

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



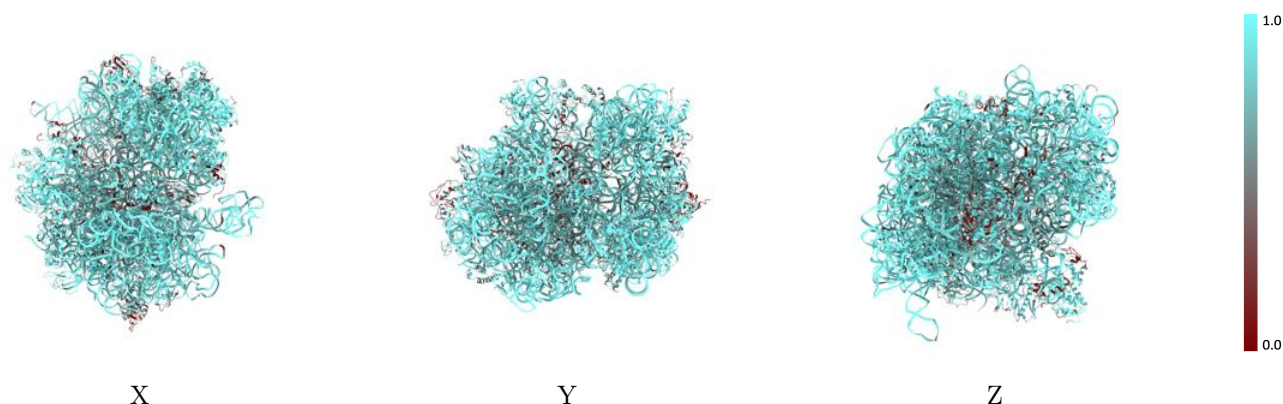
The images above show the 3D surface view of the map at the recommended contour level 0.22 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



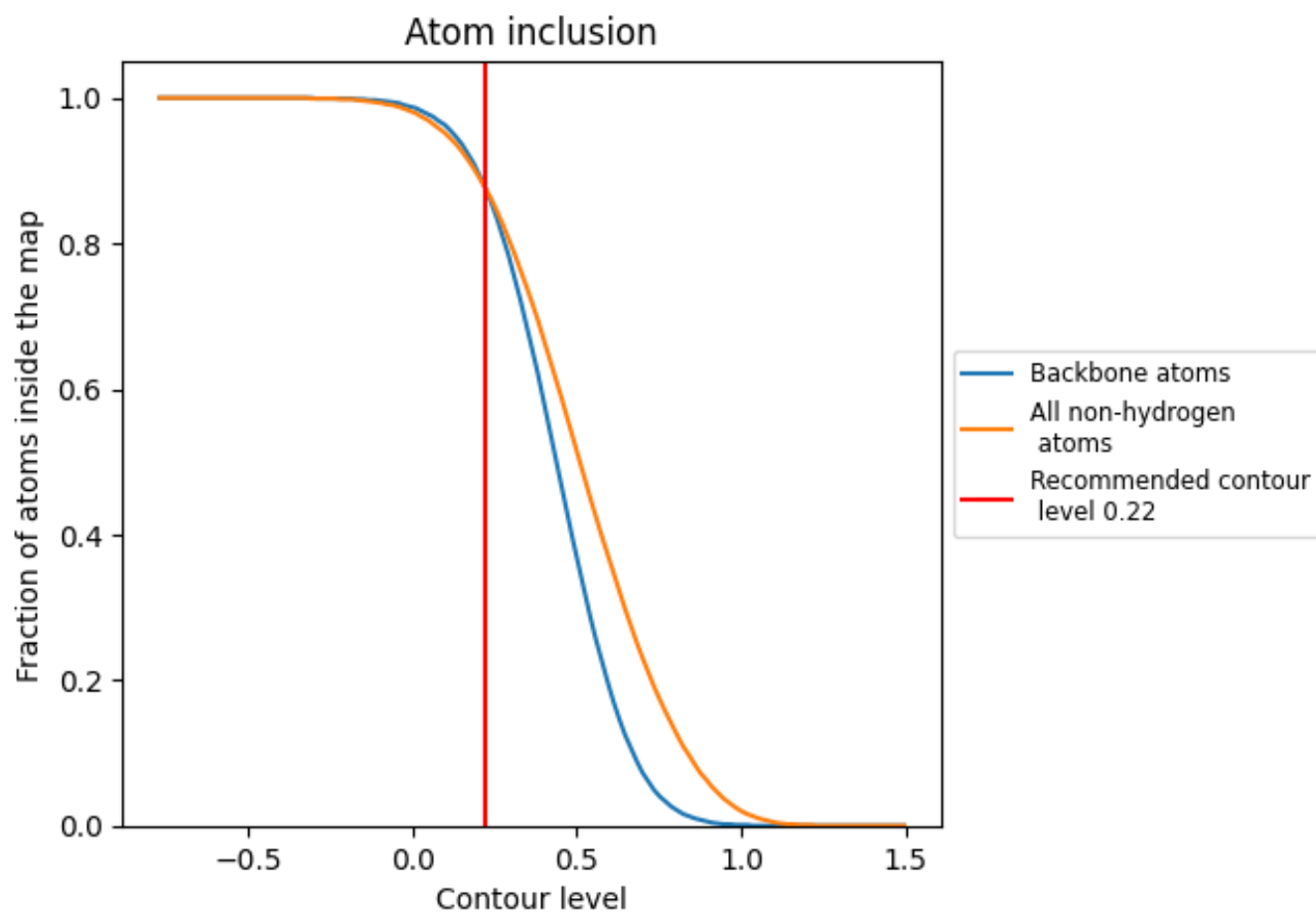
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.22).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 88% of all backbone atoms, 88% 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 (0.22) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8780	 0.1680
1	 0.6760	 0.1600
A	 0.9390	 0.1840
B	 0.9520	 0.1650
C	 0.5980	 0.1140
D	 0.7070	 0.1130
E	 0.4760	 0.1250
F	 0.6730	 0.0990
G	 0.8240	 0.1160
H	 0.8940	 0.0720
I	 0.5550	 0.0520
J	 0.7630	 0.1250
K	 0.5610	 0.1310
L	 0.6660	 0.0960
M	 0.5690	 0.1140
N	 0.8380	 0.1160
O	 0.8340	 0.0880
P	 0.7070	 0.1370
Q	 0.8000	 0.1090
R	 0.8330	 0.1260
S	 0.6950	 0.1250
T	 0.7780	 0.1180
U	 0.7400	 0.1070
V	 0.6720	 0.0670
W	 0.9460	 0.1760
X	 0.8000	 0.2430
Y	 0.5720	 0.0820
Z	 0.7940	 0.1240
a	 0.7980	 0.1210
b	 0.6930	 0.1170
c	 0.6820	 0.1240
d	 0.5250	 0.0910
e	 0.6070	 0.0990
f	 0.7770	 0.0850
g	 0.7330	 0.2560



*Continued on next page...*

Continued from previous page...

Chain	Atom inclusion	Q-score
h	 0.4820	 0.1830
i	 0.6810	 0.2470
j	 0.8710	 0.1880
k	 0.8400	 0.1880
l	 0.9240	 0.2310
m	 0.9190	 0.1480
n	 0.8440	 0.1840
o	 0.7030	 0.1710
p	 0.6320	 0.1890
q	 0.8300	 0.1190
r	 0.9210	 0.1960
s	 0.9460	 0.2380
t	 0.9440	 0.2470
u	 0.8870	 0.1770
v	 0.8700	 0.1880
w	 0.8720	 0.1060
x	 0.8640	 0.2110
y	 0.5150	 0.1260