

# wwPDB EM Validation Summary Report (i)

#### Apr 17, 2024 - 01:27 pm BST

PDB ID	:	7QP6
EMDB ID	:	EMD-14113
Title	:	Structure of the human 48S initiation complex in open state (h48S AUG open)
Authors	:	Yi, SH.; Petrychenko, V.; Schliep, J.E.; Goyal, A.; Linden, A.; Chari, A.;
		Urlaub, H.; Stark, H.; Rodnina, M.V.; Adio, S.; Fischer, N.
Deposited on	:	2022-01-03
Resolution	:	4.70  Å(reported)
Based on initial model	:	6ZMW

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

We welcome your comments at *validation@mail.wwpdb.org* A user guide is available at https://www.wwpdb.org/validation/2017/EMValidationReportHelp with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

EMDB validation analysis	:	0.0.1.dev92
Mogul	:	1.8.4, CSD as541be (2020)
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)	:	2.36

# 1 Overall quality at a glance (i)

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

The reported resolution of this entry is 4.70 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.



Motric	Whole archive	EM structures
WIEUTC	$(\# {\rm Entries})$	$(\# { m Entries})$
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 a	chain		
1	1	813	15%	51%	•	48	%	
2	3	218		49%	98%			•
3	4	357	13%	71%		·	28%	
4	5	564	15%	57%			43%	
5	6	374	26%		93%			• 6%
6	7	20	5% 25%			75%		
7	8	352	25%		90%			10%
8	9	25			92%			•••

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Mol	Chain	Length	Quality of chain						
9	А	1869	66% 2	• 8%					
10	В	158	• 78%	11% 10%					
11	С	263	86%	12% •					
12	D	194	90%	• 9%					
13	Е	143	93%	5%•					
14	F	59	56% 12%	32%					
15	G	194	89%	• 9%					
16	Н	84	96%						
17	Ι	151	99%						
18	J	130	95%	5%•					
19	K	83	98%	·					
20	L	293	• 72% •	25%					
21	М	135	88%	9% •					
22	Ν	295	69% •	30%					
23	Ο	264	78%	• 20%					
24	Р	151	83%	5% 12%					
25	Q	115	83%	•• 14%					
26	R	208	92%	• 5%					
27	S	249	89%	• 8%					
28	Т	133	89%	5% 6%					
29	V	204	86%	• 10%					
30	Y	146	88%	8% •					
31	Z	243	90%	• 7%					
32	a	165	55% 5%	40%					
33	b	145	76%	24%					

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Mol	Chain	Length	Quality of chain	Quality of chain							
34	с	317	96%								
35	d	145	95% •••								
36	е	125	<b>5</b> 0% • 47%								
37	f	152	91% • 7%	-							
38	h	119	87% 13%								
39	i	56	70% 18% 11%	-							
40	k	156	22% 11% • 66%	I							
41	m	132	79% 12% • 8%	-							
42	n	69	90% . 9%								
43	0	320	23% • 76%								
44	р	113	65% 11% 25%	-							
45	q	144	44% 17% • 39%	-							
46	r	315	80% 7% 13%								
47	s	333	<b>i</b> 36% 5% 59%								
48	t	472	•								
49	u	1382	9% 50% • 49%								
50	V	445	84% · 14%								
51	W	75	44% 55%								
52	х	548	6% 75% • 23%								
53	У	913	11% 75% • 24%								

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# 2 Entry composition (i)

There are 55 unique types of molecules in this entry. The entry contains 109900 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

• Molecule 1 is a protein called Eukaryotic translation initiation factor 3 subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	424	Total 2445	C 1501	N 469	0 470	${f S}{5}$	0	0

• Molecule 2 is a protein called Eukaryotic translation initiation factor 3 subunit K.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	3	213	Total 1057	C 631	N 213	0 213	0	0

• Molecule 3 is a protein called Eukaryotic translation initiation factor 3 subunit F.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	4	257	Total	C	N 257	0	0	0
			1272	101	237	238		

• Molecule 4 is a protein called Eukaryotic translation initiation factor 3 subunit L.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	5	319	Total 1581	C 943	N 319	O 319	0	0

• Molecule 5 is a protein called Eukaryotic translation initiation factor 3 subunit M.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	6	350	Total 1917	C 1159	N 376	O 380	${ m S} { m 2}$	0	0

• Molecule 6 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	7	20	Total 240	C 100	O 120	Р 20	0	0



• Molecule 7 is a protein called Eukaryotic translation initiation factor 3 subunit H.

Mol	Chain	Residues		Ato	ms		AltConf	Trace
7	8	317	Total	С	Ν	0	0	Ο
'	0	011	1571	936	317	318	0	0

• Molecule 8 is a protein called 60S ribosomal protein L41.

Mol	Chain	Residues		Atc	$\mathbf{ms}$			AltConf	Trace
8	9	24	Total 230	C 139	N 62	O 26	${ m S} { m 3}$	0	0

• Molecule 9 is a RNA chain called 18S rRNA.

Mol	Chain	Residues		I	Atoms			AltConf	Trace
9	А	1719	Total 36668	C 16378	N 6574	O 11998	Р 1718	0	0

• Molecule 10 is a protein called 40S ribosomal protein S11.

Mol	Chain	Residues		At	oms			AltConf	Trace
10	В	142	Total 1166	C 743	N 218	0 199	S 6	0	0

• Molecule 11 is a protein called 40S ribosomal protein S4, X isoform.

Mol	Chain	Residues		At	oms			AltConf	Trace
11	С	256	Total 2035	C 1302	N 378	0 347	S 8	0	0

• Molecule 12 is a protein called 40S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	D	177	Total 1477	C 941	N 295	O 239	${ m S} { m 2}$	0	0

• Molecule 13 is a protein called 40S ribosomal protein S23.

Mol	Chain	Residues		At	oms			AltConf	Trace
13	Е	140	Total 1087	C 687	N 215	0 182	${ m S} { m 3}$	0	0

• Molecule 14 is a protein called 40S ribosomal protein S30.



Mol	Chain	Residues		Ato	$\mathbf{ms}$	AltConf	Trace		
14	F	40	Total 330	C 204	N 75	O 50	S 1	0	0

• Molecule 15 is a protein called 40S ribosomal protein S7.

Mol	Chain	Residues		At	oms	AltConf	Trace		
15	G	177	Total 1430	C 917	N 260	O 252	S 1	0	0

• Molecule 16 is a protein called 40S ribosomal protein S27.

Mol	Chain	Residues		At	oms	AltConf	Trace		
16	Н	81	Total 631	C 397	N 116	0 111	${f S}{7}$	0	0

• Molecule 17 is a protein called 40S ribosomal protein S13.

Mol	Chain	Residues		At	oms			AltConf	Trace
17	Ι	150	Total 1208	C 773	N 229	O 205	S 1	0	0

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

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

• Molecule 19 is a protein called 40S ribosomal protein S21.

Mol	Chain	Residues		At	oms			AltConf	Trace
19	K	81	Total 617	C 380	N 114	0 118	${ m S}{ m 5}$	0	0

• Molecule 20 is a protein called 40S ribosomal protein S2.

Mol	Chain	Residues		At	oms			AltConf	Trace
20	L	220	Total 1707	C 1104	N 292	0 301	S 10	0	0

• Molecule 21 is a protein called 40S ribosomal protein S17.



Mol	Chain	Residues		At	oms			AltConf	Trace
21	М	131	Total 1064	C 668	N 198	O 194	$\frac{S}{4}$	0	0

• Molecule 22 is a protein called 40S ribosomal protein SA.

Mol	Chain	Residues		Ate		AltConf	Trace		
22	Ν	207	Total 1633	C 1040	N 288	O 297	S 8	0	0

• Molecule 23 is a protein called 40S ribosomal protein S3a.

Mol	Chain	Residues		At	AltConf	Trace			
23	О	211	Total 1715	C 1088	N 307	O 306	S 14	0	0

• Molecule 24 is a protein called 40S ribosomal protein S14.

Mol	Chain	Residues		At	oms			AltConf	Trace
24	Р	133	Total 997	C 610	N 196	0 185	S 6	0	0

• Molecule 25 is a protein called 40S ribosomal protein S26.

Mol	Chain	Residues		At	oms	AltConf	Trace		
25	Q	99	Total 792	C 492	N 165	0 130	${ m S}{ m 5}$	0	0

• Molecule 26 is a protein called 40S ribosomal protein S8.

Mol	Chain	Residues		At	$\mathbf{oms}$			AltConf	Trace
26	R	198	Total 1627	C 1021	N 322	O 279	${ m S}{ m 5}$	0	0

• Molecule 27 is a protein called 40S ribosomal protein S6.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
27	S	230	Total 1862	C 1164	N 371	O 320	S 7	0	0

• Molecule 28 is a protein called 40S ribosomal protein S24.



Mol	Chain	Residues		At	oms			AltConf	Trace
28	Т	125	Total 1015	C 642	N 199	0 169	${f S}{5}$	0	0

• Molecule 29 is a protein called 40S ribosomal protein S5.

Mol	Chain	Residues		At	oms			AltConf	Trace
29	V	184	Total 1461	C 914	N 276	0 264	${ m S} 7$	0	0

• Molecule 30 is a protein called 40S ribosomal protein S16.

Mol	Chain	Residues		At	oms			AltConf	Trace
30	Y	141	Total 1124	C 715	N 212	0 194	${ m S} { m 3}$	0	0

• Molecule 31 is a protein called 40S ribosomal protein S3.

Mol	Chain	Residues		At	AltConf	Trace			
31	Ζ	227	Total 1765	C 1125	N 317	0 315	S 8	0	0

• Molecule 32 is a protein called 40S ribosomal protein S10.

Mol	Chain	Residues		At	AltConf	Trace			
32	a	99	Total 834	C 544	N 149	0 135	S 6	0	0

• Molecule 33 is a protein called 40S ribosomal protein S15.

Mol	Chain	Residues		At	AltConf	Trace			
33	b	110	Total 913	C 580	N 168	0 158	${ m S} 7$	0	0

• Molecule 34 is a protein called Receptor of activated protein C kinase 1.

Mol	Chain	Residues		At	AltConf	Trace			
34	С	313	Total 2436	C 1535	N 424	O 465	S 12	0	0

• Molecule 35 is a protein called 40S ribosomal protein S19.



Mol	Chain	Residues		At	oms			AltConf	Trace
35	d	142	Total 1105	C 692	N 213	O 197	${ m S} { m 3}$	0	0

• Molecule 36 is a protein called 40S ribosomal protein S25.

Mol	Chain	Residues		Ato	$\mathbf{ms}$	AltConf	Trace		
36	е	66	Total	С	N	0	S	0	0
			523	338	93	91	1		

• Molecule 37 is a protein called 40S ribosomal protein S18.

Mol	Chain	Residues		At	AltConf	Trace			
37	f	142	Total 1176	С 737	N 239	0 199	S 1	0	0

• Molecule 38 is a protein called 40S ribosomal protein S20.

Mol	Chain	Residues		At	oms	AltConf	Trace		
38	h	103	Total 817	C 511	N 155	0 147	${f S}$ $4$	0	0

• Molecule 39 is a protein called 40S ribosomal protein S29.

Mol	Chain	Residues		Ato	$\mathbf{ms}$	AltConf	Trace		
39	i	50	Total 419	C 262	N 85	O 67	${ m S}{ m 5}$	0	0

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

Mol	Chain	Residues		Atc	$\mathbf{ms}$		AltConf	Trace	
40	k	53	Total	С	N	0	S	0	0
			435	276	82	70	1		

• Molecule 41 is a protein called 40S ribosomal protein S12.

Mol	Chain	Residues		At	oms			AltConf	Trace
41	m	122	Total 950	C 596	N 168	0 177	S 9	0	0

• Molecule 42 is a protein called 40S ribosomal protein S28.



Mol	Chain	Residues		Ate	oms			AltConf	Trace
42	n	63	Total 498	C 302	N 101	O 93	${ m S} { m 2}$	0	0

• Molecule 43 is a protein called Eukaryotic translation initiation factor 3 subunit G.

Mol	Chain	Residues		Ato	ms	AltConf	Trace	
43	0	77	Total 616	C 389	N 111	O 116	0	0

• Molecule 44 is a protein called Eukaryotic translation initiation factor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	р	85	Total 691	C 438	N 125	0 126	$\begin{array}{c} \mathrm{S} \\ \mathrm{2} \end{array}$	0	0

• Molecule 45 is a protein called Eukaryotic translation initiation factor 1A, X-chromosomal.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	q	88	Total 714	C 451	N 129	O 130	$\frac{S}{4}$	0	0

• Molecule 46 is a protein called Eukaryotic translation initiation factor 2 subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	r	275	Total 2215	C 1398	N 387	0 418	S 12	0	0

• Molecule 47 is a protein called Eukaryotic translation initiation factor 2 subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	S	138	Total 1123	C 709	N 206	O 199	S 9	0	0

• Molecule 48 is a protein called Eukaryotic translation initiation factor 2 subunit 3.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	t	356	Total 1750	C 1038	N 356	O 356	0	0

• Molecule 49 is a protein called Eukaryotic translation initiation factor 3 subunit A.



Mol	Chain	Residues	Atoms					AltConf	Trace
49	u	706	Total 5383	C 3379	N 982	O 999	S 23	1	0

• Molecule 50 is a protein called Eukaryotic translation initiation factor 3 subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	v	384	Total 2635	$\begin{array}{c} \mathrm{C} \\ 1657 \end{array}$	N 477	0 489	S 12	0	0

• Molecule 51 is a RNA chain called Initiator Met-tRNA-i.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	W	75	Total 1604	C 717	N 298	O 515	Р 74	0	0

• Molecule 52 is a protein called Eukaryotic translation initiation factor 3 subunit D.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	х	421	Total 2831	C 1746	N 521	O 555	S 9	0	0

• Molecule 53 is a protein called Eukaryotic translation initiation factor 3 subunit C.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	У	697	Total 5470	C 3437	N 980	0 1018	$\frac{\mathrm{S}}{35}$	0	0

• Molecule 54 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
54	Q	1	Total Zn 1 1	0
54	k	1	Total Zn 1 1	0

• Molecule 55 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	AltConf
55	d	1	Total Mg 1 1	0
55	f	1	Total Mg 1 1	0



#### 3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2and 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: Eukaryotic translation initiation factor 3 subunit B



49%

Chain 3:



98%







• Molecule 10: 40S ribosomal protein S11 Chain B: 78% 11% 10% ARG VAL LEU LEU LEU GLY GLY GLY ME7 R3 • Molecule 11: 40S ribosomal protein S4, X isoform Chain C: 86% 12% ALA LYS GLN SER SER SER • Molecule 12: 40S ribosomal protein S9 Chain D: 90% 9% LYS LYS GLY GLY GLY ALA ALA ALA ALA ALA ALA ALA ALA ASP ASP GLU GLU ASP • Molecule 13: 40S ribosomal protein S23 Chain E: 93% 5% • • Molecule 14: 40S ribosomal protein S30 Chain F: 32% 56% 12% LYS VAL HIS GLY SER õ VAL THR PRO GLY GLY LYS LYS LYS LYS CLY SLYS ASN ASN ASN ASN SER K99 • Molecule 15: 40S ribosomal protein S7 Chain G: 89% 9% MET PHE SER SER SER SER SER LYS ASN GLV GLU LYS • Molecule 16: 40S ribosomal protein S27 Chain H: 96%





• Molecule 17: 40S ribosomal protein S13

Chain I:	99%	
MET G2 R20 A151		
• Molecule	18: 40S ribosomal protein S15a	
Chain J:	95% 5% •	
MET V2 C30 D54 P77	000 080 1900	
• Molecule	19: 40S ribosomal protein S21	
Chain K:	98%	
M1 K81 ASN PHE		
• Molecule	20: 40S ribosomal protein S2	
Chain L:	72% · 25%	
MET ALA ASP ASP ALA GLY ALA ALA	OLY PRO PRO PRO PRO PRO PRO PRO PRO PRO PRO	dL0 K58
T116 R117 Q120 R167 R167 R194	TT230 TT230 TT230 TT276 TT28 TT276 TTR TTR TTR CLM CLM CLM CLM CLM CLM CLM TTR TTR TTR TTR TTR TTR TTR	
• Molecule	21: 40S ribosomal protein S17	
Chain M:	•	
MET G2 116 R47 I61	V66 K72 K72 K72 K72 K78 K78 K78 K78 K78 K78 K78 K78	
• Molecule	22: 40S ribosomal protein SA	
Chain N:	69% · 30%	
MET S2 Q33 E136 E136 E208	CLU CLU CLYS CLU CLYS CLU CLYS CLU CLYS CLU CLY CLU CLU CLY CLU CLU CLU CLU CLU CLU CLU CLU CLU CLU	VAL VAL ILE GLN



#### 

• Molecule 23: 40S ribosomal protein S3a Chain O: 78% 20% PRO VAL GLN GLU SER VAL • Molecule 24: 40S ribosomal protein S14 Chain P: 83% 5% 12% • Molecule 25: 40S ribosomal protein S26 Chain Q: 83% 14% PHE PRO PRO ALA ALA ALA ALA ALA PRO PRO PRO PRO PRO PRO PRO PRO • Molecule 26: 40S ribosomal protein S8 Chain R: 92% • 5% LYS GLY ALA ALA LYS LYS LEU LEU PRO GLU GLU • Molecule 27: 40S ribosomal protein S6 Chain S: 8% 89% • Molecule 28: 40S ribosomal protein S24 Chain T: 5% 6% 89% MET ASN ASF LYS LYS PRO LYS GLU • Molecule 29: 40S ribosomal protein S5



Chain V:		86%		• 10%
MET THR GLU THR GLU GLU ALA ALA ALA ALA ALA ALA CLU THR THR	PR0 16 17 17 19 119 119 119 119 119 119 119 11	THR VAL R135 8187 8187 K193 D194 E195	N203 R204	
• Molecule 30: 40S	ribosomal protei	n S16		
Chain Y:		88%		8% •
MET PRD SER LYS CLY PE QLY PE Q11 T20 C25 C25 C25 C25	L47 L57 D67 181 181 V100 K106	D123 K143 R146		
• Molecule 31: 40S	ribosomal protei	n S3		
Chain Z:		90%		• 7%
M1 142 143 144 144 144 144 144 144 144 144 144	R178 8209 1217 1218 1218 1218 7219 7220	GLY GLY LYS FRO FRO FRO PRO GLN FRO GLN	VAL PRO THR ALA	
• Molecule 32: 40S	ribosomal protei	n S10		
Chain a:	55%	5%	40%	
M1 M29 M29 M29 M29 K53 K53 F66 F66 F67 F67	193 193 GLU GLU GLU ARG PRO PRO PRO	GLY LEU GLU GLU GLU GLU ARG PRO ARG ARG THA ARG ARG ARG ARG ARG	GLY GLU ALA ASP ASP ASP ASP ASP ASP ASP ASP	SER VALA VAL PRO GLY ALA ASP LYS LYS ALA
GLU ALA GLY GLY ALA ALA ALA ALA ALA GLY PHE GLU PHE GLV CLV CLV CLV CLV CLV CLV CLV CLV CLV C	GLY PHE GLY GLY GLY GLY GLN PRO PRO CLN CLN			
• Molecule 33: 40S	ribosomal protei	n S15		
Chain b:	76%		24	%
MET ALA GLU VAL GLU GLU GLU CVS CLN LVS THR PHE PHE ARG ARG CVS CVS CVS CVS CVS CVS CVS CVS CVS CVS	F15 K124 PRO LYS LYS H1S GLY ARG PRO FRO GLY ILE	ALA THR HIS SER SER ARG PHG PHG ILEU LVS		
• Molecule 34: Rec	eptor of activated	l protein C kinas	se 1	
Chain c:		96%		
MET 12 833 833 107 1107 113 113 1134	Y246 1265 1275 8276 1314 1314 1314 1314 1314	ARG		
• Molecule 35: 40S	ribosomal protei	n S19		
Chain d:		95%		• •





 $\bullet$  Molecule 36: 40S ribosomal protein S25

Chain e	50%	·	47%	
MET PRO PRO LYS ASP ASP	LYS LYS LYS LYS LYS ASP CYS SER ALA ALA ALA LYS LYS LYS ASP CYS ASP ASP	PRO VAL ASN LYS SER GLY GLY LYS LYS LYS	LVS LVS TRP SER CVS GLYS GLYS ASP ASP LVS LVS LEU DS1 D51	L58 R76 ASN ASN L175 G17 G17 ASP ASP
ALA PRO ALA GLY GLU	ASP ALA			
• Molec	ule 37: 40S ribosoma	l protein S18		
Chain f:		91%		• 7%
MET SER LEU V4 E7	160 160 1145 1145 1145 1145 1145 1145 1145 114			
• Molec	ule 38: 40S ribosoma	l protein S20		
Chain h	: •	87%		13%
MET ALA PHE LYS ASP THR	CLY CLYS CLYS THR PRO PRO PRO CLU CLU CLU CLU CLU CLU CLU CLU			
• Molec	ule 39: 40S ribosoma	l protein S29		
Chain i:		70%	18%	• 11%
MET GLN GLN LEU	YT 98 89 89 812 812 812 813 813 130 136	C39 R40 Y46 D56		
• Molec	ule 40: Ubiquitin-408	s ribosomal pro	otein S27a	
Chain k	: 22% 11%	· ·	66%	
MET GLN ILE PHE VAL LYS	THR LEU THR CLY CLY CLY CLY CLY CLY CLV CLU CLU CLU CLU CLU CLU SER ASP	THR TLE GLU GLU ASN VAL LYS LYS TLE GLN ASP	LYS GLU GLU GLU CLE PRO ASP CLN CLN CLN CLN CLN CLN CLN CLN CLN CLN	GLN LEU GLU GLU ASP GLY ASP CLEU SER ASP ASP ASN
ILE GLN GLU SER THR	LEU HIS LEU VAL LEU LEU ARG GIY GIY AIA LYS LYS ARG	LYS LYS SER TYR THR THR THR PRO LYS ASN	H93 K94 R95 R95 R95 R96 L100 V102 L103 K104 Y105 Y105 Y105 V104 Y107 V112 K107 V12 K107 K107 K107 K107 K107 K107 K107 K107	ASN GLY LYS LYS R119 B114 E120 C126 C126 C126 M132
F136 D137 R138 H139 Y140	C141 C142 K143 M151 LYS PLO CLU ASP LYS			

 $\bullet$  Molecule 41: 40S ribosomal protein S12



Chain m:		79%		12% • 8%	-
MET ALA GLU GLY GLY ALA ALA GLY GLY	M12 H12 L52 L52 E58 E58 E66 T74	181 191 191 195 196 196 199 199	V103 V109 K112 E117 1124	K132	
• Molecule 42:	40S ribosomal pro	tein S28			
Chain n:		90%		• 9%	
MET ASP THR SER R5 V6 V46 V46 V46	ULL LEU				
• Molecule 43:	Eukaryotic transla	tion initiation	factor 3 subu	nit G	
Chain o:	23% •		76%		
MET PRO THR GLY GLY ASP ASP SER LYS PRO SER SER	TRP ALA ASP CLN CLN CLN CLN CLN CVS CVS	VAL VAL THR SER GLU GLU LEU LEU LYS GLY GLY PRO	LEU ALA THR GLY ASP ASP ASP ASP ASP FHR SER FRO GLU	GLU LEU LEU PRO GLY ALA PRO FRO	PRO LYS GLU VAL ILE
ASN GLY ASN ILF LYS THR VAL THR GLU TYR LYS	ILLE ASP ASP GLU GLY CLYS CLYS CLYS LYS CLYS CLYS THE ARG THR	ARG TLE GLU GLU ARG LYS ALA SER LYS SER LYS ALA	VAL ALA ARG ARG LYS ASN TRP LYS LYS PHE	GLY ASN SER GLU PHE ASP PRO PRO GLY PRO	ASN VAL ALA THR THR
THR VAL SER ASP ASP ASP VAL SER MET THR PHE TLE	THR SER LYS CLV CLYS CLV ASP ASN CYS CLV GLU GLU GLU ASP	MET MET ASN LYS LYS GLY GLY GLN LYS GLN TLE VAL	SER CYS CYS ARG ILE CYS CYS GLY ASP HIS TRP	THR THR ARG CYS CYS PRO TYR LYS ASP THR LEU	GLY PRO MET GLN LYS
GLU LEU ALA GLU GLU GLN CLU CLU CLU CLY CLY CLY CLY CLY	GLU LYS GLU CLYS GLV FRO GLV GLU FRO GLU FRO GLU GLU	THR GLN GLN ASN LYS THR GLY CYS TYR YAL PRO	PRO SER LEU ARG GLY SER ARG ARG	GLY GLU SER MET GLN PRO ARG ARG ALA	ASP ASP N238 A239 T240
S286 Y305 L310 M314 ALA LYS PR0	SER THR ASN				
• Molecule 44:	Eukaryotic transla	tion initiation	factor 1		
Chain p:	65%		11%	25%	
MET SER ALA ALA ILE GLN ASN HIS SER PHE ASP	PRO PHE ALA ASP ASP ASP GLY GLY ASP CLY ASP LEU LEU FLU	GLV GLU GLU GLU G40 C40 C40 C41 C43 C48 C48 C48	G 49 I 50 K 58 L 59 K 65 K 65 V 98	L102 L108 F113	
• Molecule 45:	Eukaryotic transla	tion initiation	factor 1A, X-	$\operatorname{chromosomal}$	
Chain q:	44%	17%	•	39%	
MET PRO LYS LYS LYS GLY GLY GLY LYS ASN	ARG ARG ARG CLY CLY CLU ASN CLU SSI SSI SS2 R23 R23 R23 R24	L20 V27 F28 Q33 C34 C34 C35 C34 C35 C34 C35 C35 C35 C35 C35 C35 C35 C35 C35 C35	L47 C51 F52 F53 G54 V55 V55 V55 V55 C63 C63	K64 R66 173 173 R82 D83	D86 N87 E99 A100
R101 8102 1103 1103 1109 1109 010 010 011 H1S ALA	ILE ASN GLU THR ASP ASP PHC GLY ASP ASP ASP ASP	LLC GLN GLN GLN ASP ASP ASP ASP ASP ASP	GLU ASP ILE ASP ASP ILE ILE		

• Molecule 46: Eukaryotic translation initiation factor 2 subunit 1



Chain r:	80%	7% 13%	
MET PRO CLA CLA V33 V34 V34 V33 V33 V33 V33 V33 V33 V33	N1 69 6	1229 1240 1248 2349 1278 263 1270 1270 1270 1271 1273	ASP THR THR
ASP CLU CLU CLU LEU ALA MET MET MET MET MET ARG CLU ARG ARG ARG ARG ARG ARG ARG ARG ARG ARG	ALA GLU GLU MET ALA ALA ALA GLU ASP		
• Molecule 47: Eukaryotic transl	ation initiation factor 2	subunit 2	
Chain s: 36%	5% 59%		
MET SER GLY ASP ASP ASP HE ASP PHE ASP PRO LYS LYS LYS LYS LYS LYS CLYS STL YS CLYS MET	LEU ASP GLU GLY ASP ASP ASP ALU CLU CLU CLU CLU CLU SER CLU CLU CLU CLU CLU CLU CLU	GLU WAL CLU PRO PRO PRO GLU GLU GLU GLU GLU	ASP
THR LYS LYS LYS ARC ASP ASP ASP ASP ASP CEU ASP CEU ASP CEU CYS LYS LYS LYS LYS	THR LYS LYS LYS TLE PHE PHE ASP GLU GLU GLU GLU CLU CLU CLU CLU CLU	TILE GLU GLU SER ASP VAL ASP CLN CLN CLN CLN CLU CLU CLU CLU CLU CLU CLU CLU CLU CLU	MET
LEU GLY ASN LYS LYS LYS LYS LYS LYS LYS LYS ASP PHE ASP ASP ASP CLU LYS CLU CLU CLU CLU CLU CLU CLU CLU CLU CLU	LLU LLU GLU GLU GLU GLU GLU ASP ASP ASP CLYS ASP ASP ASP SER SER SER SER ASV ASV ASP ASP ASP ASP ASP ASP ASP ASP ASP ASP	THR THR CLY PRO CLY TRP ALA ALA CLU CLU CLU CLU CLU CLU CLU CLU CLU CLU	781M
R188 E189 V196 V210 V210 V210 V219 V219 V219 V224 V234 V234 V234 V234 V234 V234 V234	4266 H282 ← R285 R285 R286 R290 R290 R290 R290 R290 R313 R11E R11E R11E	GLAN GLAN PHE GLAN ALA ALA ALA ALA ALA ASIG ALA ASIG ALA ASIA ASIA ASIA ASIA ASIA ASIA ASIA	
• Molecule 48: Eukaryotic transla	ation initiation factor 2	subunit 3	
Chain t: 7	4%	• 25%	
MET MET ALA ALA ALA CLY CLY CLY CLY CLY CLY CLY CLY CLY CLY	VAL TVAL LYS LEU LYS LEU FRO FRO E34 E34 LYS LYS LYS LYS LYS LYS ASP ASP	SER CVS CVS PRO PRO PRO CVS CVS CVS SER SER SER SER SER SER SER SER SER SE	GLU
PHE ASP ASP ASP ASP THR ASN CYS CYS ASN ASN ASN ASN ASN ASN ASN ASN ASN AS	1222 1223 1223 1224 1224 1224 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1224 1223 1223	dLU VAL ASP ASP ASP LFEU LFEU CLY GLY CLY CLY CLY CLY CLV CLV CLV CLV CLV CLV CLV CLV CLV CLV	Pass
A350 A350 R385 THR R385 CLU CLU CLY CLY CLY CLY CLY CLY CLY CLY CLY CLY	ILLYE LYE PRO THR VAL ASP ASP		
• Molecule 49: Eukaryotic transla	ation initiation factor 3	subunit A	
Chain u: 50%	·	49%	
M1 R14 R62 R62 0119 0119 0120 0122 0122 0122 0214 0214 0214 0215 0226 1262 2263 1295 1295	M306 M306 P333 P333 F335 F335 A339 A339 A338 A339 M344 M344	1348 1348 1348 1350 1359 1359 1359 1359 1359 1359 1359 1359	1435 + 14355 + 14355 + 143555 + 14355 + 143555 + 143555 + 143555 + 143555 + 143555 + 143555 + 143555 + 143555 + 1435555 + 1435555 + 14355555 + 14355555 + 143555555555555555555555555555555555555
V459 P479 P479 P479 P479 P505 P506 P509 P509 P509 P539 P539 P539	A540 H541 1542 K646 4656 A553 A556 K659 K659 K659	8561 8562 8663 8653 8653 6573 6573 6573 1587 8583 8583 8583 8583 8583 8583 8583 8	L594 E595 R697 E598 A599 A599 C602 C602 C602 C602





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• Molecule 51: Initiator Met-tRNA-i





# 4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	57184	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE	Depositor
	CORRECTION	
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{\AA}^2)$	48	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	59000	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	20.695	Depositor
Minimum map value	-7.349	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	2.3	Depositor
Map size (Å)	417.59998, 417.59998, 417.59998	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.16, 1.16, 1.16	Depositor



# 5 Model quality (i)

### 5.1 Standard geometry (i)

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

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

Mal	Chain	Bond lengths		Bond angles		
		RMSZ	# Z  > 5	RMSZ	# Z  > 5	
1	1	0.77	0/2466	1.15	9/3400~(0.3%)	
2	3	0.68	0/1055	0.67	0/1469	
3	4	0.73	0/1269	0.83	0/1762	
4	5	0.72	0/1575	0.70	0/2187	
5	6	0.68	0/1926	0.79	1/2669~(0.0%)	
6	7	0.34	0/259	0.89	0/396	
7	8	0.72	0/1569	0.81	0/2183	
8	9	0.46	0/231	0.80	0/294	
9	А	0.65	0/40362	0.90	90/62905~(0.1%)	
10	В	0.56	0/1186	0.81	1/1585~(0.1%)	
11	С	0.55	0/2077	0.79	0/2796	
12	D	0.52	0/1502	0.67	0/2008	
13	Е	0.54	0/1105	0.80	1/1476~(0.1%)	
14	F	0.53	0/332	0.76	0/434	
15	G	0.54	0/1451	0.75	0/1942	
16	Н	0.56	0/644	0.76	0/864	
17	Ι	0.57	0/1232	0.78	0/1656	
18	J	0.55	0/1051	0.74	1/1406~(0.1%)	
19	Κ	0.62	0/623	0.75	0/833	
20	L	0.58	0/1743	0.82	1/2354~(0.0%)	
21	М	0.59	0/1078	0.91	0/1447	
22	Ν	0.57	1/1670~(0.1%)	0.74	0/2271	
23	Ο	0.54	0/1742	0.74	0/2330	
24	Р	0.84	0/1010	1.24	3/1353~(0.2%)	
25	Q	0.60	0/805	0.86	1/1079~(0.1%)	
26	R	0.53	0/1654	0.71	0/2203	
27	S	0.54	0/1885	0.72	0/2510	
28	Т	0.51	0/1032	0.68	0/1371	
29	V	0.57	0/1481	0.78	0/1988	
30	Y	0.56	0/1142	0.79	0/1528	
31	Ζ	0.58	0/1793	0.80	0/2414	
32	a	0.55	0/859	0.75	$0/1\overline{159}$	



Mal	Mol Chain		ond lengths	Bond angles		
IVIOI	Unam	RMSZ	# Z  > 5	RMSZ	# Z  > 5	
33	b	0.53	0/929	0.71	0/1241	
34	с	0.54	0/2493	0.76	0/3394	
35	d	0.55	0/1123	0.74	1/1504~(0.1%)	
36	е	0.55	0/529	0.73	0/712	
37	f	0.52	0/1194	0.73	0/1599	
38	h	0.56	0/827	0.76	0/1110	
39	i	0.55	0/429	0.89	1/568~(0.2%)	
40	k	0.58	0/444	1.08	1/588~(0.2%)	
41	m	0.65	0/960	0.96	3/1286~(0.2%)	
42	n	0.56	0/500	0.80	0/669	
43	0	0.58	0/628	0.76	0/846	
44	р	0.59	0/701	1.03	0/936	
45	q	0.61	0/722	0.90	0/963	
46	r	0.36	0/2247	0.67	0/3029	
47	s	0.57	0/1142	0.79	0/1534	
48	t	0.71	0/1745	0.75	0/2417	
49	u	0.56	2/5475~(0.0%)	0.74	0/7432	
50	V	0.59	0/2672	0.75	0/3647	
51	W	0.39	0/1795	0.88	2/2798~(0.1%)	
52	Х	0.61	0/2874	0.77	0/3925	
53	У	0.55	0/5557	0.70	1/7503~(0.0%)	
All	All	0.61	3/114795~(0.0%)	0.84	117/163973~(0.1%)	

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Ζ	Observed(Å)	$\mathrm{Ideal}(\mathrm{\AA})$
22	Ν	136	GLU	CD-OE2	-5.45	1.19	1.25
49	u	14[A]	ARG	C-O	5.12	1.33	1.23
49	u	14[B]	ARG	C-O	5.12	1.33	1.23

The worst 5 of 117 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	$Observed(^{o})$	$Ideal(^{o})$
9	А	1304	U	C2'-C3'-O3'	11.53	134.87	109.50
9	А	1155	U	O5'-P-OP1	-11.51	95.34	105.70
9	А	1273	С	O5'-P-OP2	-9.28	97.34	105.70
9	А	392	А	C2'-C3'-O3'	8.64	128.51	109.50
9	А	367	U	C2'-C3'-O3'	8.50	128.21	109.50

There are no chirality outliers.

There are no planarity outliers.



#### 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	Perce	ntiles
1	1	420/813~(52%)	394 (94%)	20 (5%)	6 (1%)	11	47
2	3	209/218~(96%)	205~(98%)	4 (2%)	0	100	100
3	4	251/357~(70%)	230 (92%)	18 (7%)	3 (1%)	13	50
4	5	307/564~(54%)	299 (97%)	8 (3%)	0	100	100
5	6	348/374~(93%)	320 (92%)	28 (8%)	0	100	100
7	8	313/352~(89%)	276 (88%)	36 (12%)	1 (0%)	41	76
8	9	22/25~(88%)	22 (100%)	0	0	100	100
10	В	138/158~(87%)	132 (96%)	6 (4%)	0	100	100
11	С	254/263~(97%)	246 (97%)	7(3%)	1 (0%)	34	72
12	D	175/194~(90%)	175 (100%)	0	0	100	100
13	Е	138/143~(96%)	136 (99%)	1 (1%)	1 (1%)	22	62
14	F	38/59~(64%)	37~(97%)	1 (3%)	0	100	100
15	G	171/194~(88%)	163 (95%)	8 (5%)	0	100	100
16	Н	79/84~(94%)	77~(98%)	2(2%)	0	100	100
17	Ι	148/151~(98%)	144 (97%)	4 (3%)	0	100	100
18	J	127/130~(98%)	123 (97%)	4(3%)	0	100	100
19	K	79/83~(95%)	77 (98%)	2 (2%)	0	100	100
20	L	218/293~(74%)	210 (96%)	8 (4%)	0	100	100
21	М	129/135~(96%)	123 (95%)	5 (4%)	1 (1%)	19	60
22	N	205/295~(70%)	196 (96%)	9 (4%)	0	100	100
23	0	209/264~(79%)	198 (95%)	10 (5%)	1 (0%)	29	68

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Perce	ntiles
24	Р	131/151~(87%)	120~(92%)	11 (8%)	0	100	100
25	Q	97/115~(84%)	94~(97%)	2(2%)	1 (1%)	15	54
26	R	194/208~(93%)	192 (99%)	2(1%)	0	100	100
27	S	228/249~(92%)	225~(99%)	3 (1%)	0	100	100
28	Т	123/133~(92%)	123 (100%)	0	0	100	100
29	V	180/204~(88%)	173~(96%)	6 (3%)	1 (1%)	25	65
30	Y	139/146~(95%)	137~(99%)	2(1%)	0	100	100
31	Z	225/243~(93%)	221 (98%)	4 (2%)	0	100	100
32	a	97/165~(59%)	94 (97%)	3 (3%)	0	100	100
33	b	108/145~(74%)	104 (96%)	4 (4%)	0	100	100
34	с	311/317~(98%)	304 (98%)	7 (2%)	0	100	100
35	d	140/145~(97%)	135~(96%)	5 (4%)	0	100	100
36	е	64/125~(51%)	62 (97%)	2(3%)	0	100	100
37	f	140/152~(92%)	136 (97%)	4 (3%)	0	100	100
38	h	101/119~(85%)	98~(97%)	3 (3%)	0	100	100
39	i	48/56~(86%)	45 (94%)	2 (4%)	1 (2%)	7	38
40	k	49/156~(31%)	46 (94%)	2(4%)	1 (2%)	7	40
41	m	120/132~(91%)	114 (95%)	5 (4%)	1 (1%)	19	60
42	n	61/69~(88%)	59~(97%)	2(3%)	0	100	100
43	О	75/320~(23%)	74 (99%)	1 (1%)	0	100	100
44	р	83/113 (74%)	81 (98%)	1 (1%)	1 (1%)	13	50
45	q	86/144 (60%)	75 (87%)	9 (10%)	2 (2%)	6	36
46	r	273/315~(87%)	249 (91%)	23 (8%)	1 (0%)	34	72
47	S	136/333~(41%)	120 (88%)	15 (11%)	1 (1%)	22	62
48	t	346/472~(73%)	329~(95%)	11 (3%)	6 (2%)	9	43
49	u	705/1382~(51%)	676 (96%)	28 (4%)	1 (0%)	51	85
50	v	380/445~(85%)	349 (92%)	31 (8%)	0	100	100
52	x	415/548~(76%)	385~(93%)	30 (7%)	0	100	100
53	у	691/913~(76%)	661 (96%)	29 (4%)	1 (0%)	51	85
All	All	9724/13164~(74%)	9264 (95%)	428 (4%)	32 (0%)	44	76

5 of 32 Ramachandran outliers are listed below:



Mol	Chain	Res	Type
1	1	282	PRO
1	1	427	PRO
1	1	648	ILE
3	4	264	GLY
23	0	117	TRP

#### 5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent side chain 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	Perce	entiles
1	1	97/701~(14%)	96~(99%)	1 (1%)	76	86
5	6	49/335~(15%)	48 (98%)	1 (2%)	55	73
8	9	23/24~(96%)	22~(96%)	1 (4%)	29	54
10	В	129/142~(91%)	112 (87%)	17 (13%)	4	20
11	С	220/225~(98%)	190 (86%)	30 (14%)	3	19
12	D	158/168~(94%)	156 (99%)	2 (1%)	69	82
13	Ε	112/115~(97%)	107 (96%)	5 (4%)	27	53
14	F	33/48~(69%)	26 (79%)	7 (21%)	1	7
15	G	159/174~(91%)	154 (97%)	5(3%)	40	62
16	Н	73/76~(96%)	73 (100%)	0	100	100
17	Ι	130/131~(99%)	129~(99%)	1 (1%)	81	89
18	J	112/113~(99%)	107~(96%)	5 (4%)	27	53
19	Κ	65/67~(97%)	65~(100%)	0	100	100
20	L	186/225~(83%)	179~(96%)	7 (4%)	33	58
21	М	119/122~(98%)	108 (91%)	11 (9%)	9	31
22	Ν	173/243~(71%)	172 (99%)	1 (1%)	86	92
23	Ο	192/231~(83%)	189 (98%)	3~(2%)	62	79
24	Р	104/119~(87%)	98 (94%)	6 (6%)	20	47
25	Q	86/98~(88%)	83 (96%)	3 (4%)	36	60
26	R	$17\overline{2}/180~(96\%)$	$1\overline{66}\ (96\%)$	6 (4%)	36	60

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Mol	Chain	Analysed	Rotameric	Outliers	Perce	entiles
27	S	200/218~(92%)	192 (96%)	8 (4%)	31	56
28	Т	107/115~(93%)	101 (94%)	6~(6%)	21	48
29	V	156/170~(92%)	149~(96%)	7~(4%)	27	53
30	Y	117/121~(97%)	105 (90%)	12 (10%)	7	27
31	Ζ	190/202~(94%)	182 (96%)	8 (4%)	30	55
32	a	90/136~(66%)	81 (90%)	9 (10%)	7	28
33	b	100/130~(77%)	100 (100%)	0	100	100
34	с	272/275~(99%)	264 (97%)	8 (3%)	42	64
35	d	112/115~(97%)	109 (97%)	3(3%)	44	66
36	е	58/103~(56%)	55~(95%)	3(5%)	23	50
37	f	123/132~(93%)	119 (97%)	4 (3%)	38	61
38	h	94/107~(88%)	94 (100%)	0	100	100
39	i	44/49~(90%)	34 (77%)	10 (23%)	1	6
40	k	47/140~(34%)	30~(64%)	17 (36%)	0	1
41	m	104/108~(96%)	87 (84%)	17 (16%)	2	14
42	n	56/62~(90%)	55~(98%)	1 (2%)	59	77
43	О	64/277~(23%)	60~(94%)	4~(6%)	18	44
44	р	74/96~(77%)	63~(85%)	11 (15%)	3	16
45	q	75/123~(61%)	51~(68%)	24 (32%)	0	2
46	r	247/280~(88%)	226~(92%)	21 (8%)	10	36
47	$\mathbf{S}$	128/304~(42%)	111 (87%)	17 (13%)	4	20
49	u	528/1259~(42%)	519~(98%)	9(2%)	60	78
50	V	206/406~(51%)	197~(96%)	9 (4%)	28	54
52	Х	206/494~(42%)	197~(96%)	9 (4%)	28	54
53	у	564/811 (70%)	554 (98%)	10 (2%)	59	77
All	All	6354/9770~(65%)	6015 (95%)	339 (5%)	26	49

5 of 339 residues with a non-rotameric side chain are listed below:

Mol	Chain	Res	Type
44	р	50	ILE
47	s	187	MET
44	р	108	LEU

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Mol	Chain	Res	Type
45	q	101	ARG
47	s	304	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
10	В	65	ASN
25	Q	86	ASN
31	Ζ	56	GLN
40	k	139	HIS
41	m	46	GLN

#### 5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
51	W	74/75~(98%)	41 (55%)	0
6	7	19/20~(95%)	15 (78%)	0
9	А	1708/1869~(91%)	442 (25%)	52 (3%)
All	All	1801/1964~(91%)	498~(27%)	52~(2%)

5 of 498 RNA backbone outliers are listed below:

Mol	Chain	$\mathbf{Res}$	Type
6	7	10	А
6	7	11	А
6	7	12	А
6	7	13	А
6	7	14	А

5 of 52 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
9	А	1313	А
9	А	1600	G
9	А	1863	А
9	А	1434	С
9	А	1521	С



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

26 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).

Mal	Turne	Chain	Dec	Tiple	Bond lengths			Bond angles		
WIOI	туре	Unam	nes	LIIIK	Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
9	PSU	А	1081	9	$18,\!21,\!22$	1.12	1 (5%)	22,30,33	1.19	2 (9%)
9	OMG	А	683	9	$18,\!26,\!27$	0.94	1 (5%)	19,38,41	0.81	0
9	PSU	А	822	9	18,21,22	1.13	1 (5%)	22,30,33	1.14	2 (9%)
9	OMC	А	174	9	19,22,23	0.61	0	26,31,34	0.44	0
9	OMG	А	509	9	18,26,27	1.10	1 (5%)	19,38,41	1.17	1 (5%)
9	A2M	А	668	9	18,25,26	0.67	0	18,36,39	0.77	0
9	OMC	А	1703	9	19,22,23	0.72	1 (5%)	26,31,34	0.50	0
9	OMC	А	517	9	19,22,23	0.63	0	26,31,34	0.45	0
9	MA6	А	1850	9	18,26,27	0.81	0	19,38,41	1.15	1 (5%)
9	5MU	А	814	9	19,22,23	0.94	1 (5%)	28,32,35	0.92	1 (3%)
9	OMG	А	644	9	18,26,27	0.90	1 (5%)	19,38,41	0.49	0
9	A2M	А	1678	9	18,25,26	0.63	0	18,36,39	0.64	0
9	5MC	А	1374	9	18,22,23	0.68	0	26,32,35	0.62	0
9	PSU	А	1243	9	18,21,22	1.28	2 (11%)	22,30,33	1.06	2 (9%)
9	OMU	А	121	9	19,22,23	0.89	0	26,31,34	0.84	1 (3%)
9	A2M	А	484	9	18,25,26	0.70	0	18,36,39	0.56	0
9	A2M	А	166	9	18,25,26	0.68	0	18,36,39	0.86	0
9	MA6	А	1851	9	18,26,27	0.63	0	19,38,41	0.69	0
9	PSU	А	612	9	18,21,22	1.07	1 (5%)	22,30,33	0.95	1 (4%)
9	PSU	А	119	9	18,21,22	1.11	2 (11%)	22,30,33	1.15	2 (9%)
9	A2M	А	159	9	18,25,26	0.79	0	18,36,39	0.60	0
9	A2M	А	27	9	18,25,26	0.72	0	18,36,39	0.69	0
9	PSU	А	823	9	18,21,22	1.15	2 (11%)	22,30,33	1.14	2 (9%)
9	OMU	А	116	9	$19,\!22,\!23$	0.72	0	26,31,34	0.77	0
9	UR3	А	1830	9	19,22,23	0.98	1 (5%)	26,32,35	1.84	5 (19%)
9	A2M	А	1031	9	$18,\!25,\!26$	0.74	0	18,36,39	0.72	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



Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	PSU	А	1081	9	-	1/7/25/26	0/2/2/2
9	OMG	А	683	9	-	0/5/27/28	0/3/3/3
9	PSU	А	822	9	-	0/7/25/26	0/2/2/2
9	OMC	А	174	9	-	0/9/27/28	0/2/2/2
9	OMG	А	509	9	-	1/5/27/28	0/3/3/3
9	A2M	А	668	9	-	2/5/27/28	0/3/3/3
9	OMC	А	1703	9	-	0/9/27/28	0/2/2/2
9	OMC	А	517	9	-	1/9/27/28	0/2/2/2
9	MA6	А	1850	9	-	3/7/29/30	0/3/3/3
9	5MU	А	814	9	-	0/7/25/26	0/2/2/2
9	OMG	А	644	9	-	1/5/27/28	0/3/3/3
9	A2M	А	1678	9	-	0/5/27/28	0/3/3/3
9	5MC	А	1374	9	-	0/7/25/26	0/2/2/2
9	PSU	А	1243	9	-	0/7/25/26	0/2/2/2
9	OMU	А	121	9	-	0/9/27/28	0/2/2/2
9	A2M	А	484	9	-	0/5/27/28	0/3/3/3
9	A2M	А	166	9	-	0/5/27/28	0/3/3/3
9	MA6	А	1851	9	-	5/7/29/30	0/3/3/3
9	PSU	А	612	9	-	0/7/25/26	0/2/2/2
9	PSU	А	119	9	-	0/7/25/26	0/2/2/2
9	A2M	А	159	9	-	2/5/27/28	0/3/3/3
9	A2M	А	27	9	-	0/5/27/28	0/3/3/3
9	PSU	А	823	9	-	0/7/25/26	0/2/2/2
9	OMU	A	116	9	-	1/9/27/28	0/2/2/2
9	UR3	А	1830	9	-	2/7/25/26	0/2/2/2
9	A2M	A	1031	9	-	0/5/27/28	0/3/3/3

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	А	1243	PSU	C6-C5	3.36	1.39	1.35
9	А	822	PSU	C6-C5	3.32	1.39	1.35
9	А	119	PSU	C6-C5	3.25	1.39	1.35
9	А	509	OMG	C6-N1	-3.06	1.33	1.37
9	А	823	PSU	C6-C5	2.86	1.38	1.35

The worst 5 of 20 bond angle outliers are listed below:



Mol	Chain	Res	Type	Atoms	Ζ	$Observed(^{o})$	$Ideal(^{o})$
9	А	1830	UR3	C4-N3-C2	-5.57	119.32	124.56
9	А	1850	MA6	N1-C6-N6	4.21	121.49	117.06
9	А	1830	UR3	C1'-N1-C2	3.51	122.91	116.99
9	А	1830	UR3	O4'-C1'-N1	3.17	115.60	108.36
9	А	1081	PSU	C6-C5-C4	-3.06	116.06	118.20

There are no chirality outliers.

5 of 19 torsion outliers are listed below:

Mol	Chain	$\mathbf{Res}$	Type	Atoms
9	А	509	OMG	C1'-C2'-O2'-CM2
9	А	1830	UR3	O4'-C1'-N1-C6
9	А	1830	UR3	O4'-C1'-N1-C2
9	А	1850	MA6	C5-C6-N6-C10
9	А	1851	MA6	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

#### 5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

#### 5.6 Ligand geometry (i)

Of 4 ligands modelled in this entry, 4 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-14113. 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



6.1.2 Raw map



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



#### 6.2 Central slices (i)

#### 6.2.1 Primary map



X Index: 180



Y Index: 180



Z Index: 180

#### 6.2.2 Raw map



X Index: 180

Y Index: 180

Z Index: 180

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: 152



Y Index: 178



Z Index: 176

#### 6.3.2 Raw map



X Index: 152

Y Index: 219

Z Index: 176

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)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 2.3. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

#### 6.5.2 Raw map



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



#### Mask visualisation (i) 6.6

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

A mask typically either:

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

#### emd\_14113\_msk\_1.map (i) 6.6.1



Х



# 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  $1983 \text{ nm}^3$ ; this corresponds to an approximate mass of 1791 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 0.213  ${\rm \AA^{-1}}$ 



# 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 0.213  ${\rm \AA^{-1}}$ 



#### 8.2 Resolution estimates (i)

$\mathbf{Bosolution} \text{ ostimato } (\mathbf{\hat{\lambda}})$	Estimation criterion (FSC cut-off)			
Resolution estimate (A)	0.143	0.5	Half-bit	
Reported by author	4.70	-	-	
Author-provided FSC curve	4.68	6.67	4.78	
Unmasked-calculated*	6.05	8.58	6.41	

\*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 6.05 differs from the reported value 4.7 by more than 10 %



# 9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-14113 and PDB model 7QP6. 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 2.3 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 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 (2.3).



#### 9.4 Atom inclusion (i)



At the recommended contour level, 91% of all backbone atoms, 88% of all non-hydrogen atoms, are inside the map.



1.0

0.0 <0.0

#### 9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (2.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	$\mathbf{Q} ext{-score}$
All	0.8750	0.2330
1	0.6150	0.1310
3	0.5170	0.0340
4	0.7820	0.0690
5	0.6800	0.0350
6	0.6940	0.0470
7	0.7750	0.0750
8	0.6890	0.0500
9	0.9520	0.3600
А	0.9790	0.3000
В	0.9270	0.3770
С	0.9190	0.3440
D	0.8790	0.2860
E	0.9050	0.3440
F	0.9430	0.3260
G	0.8620	0.2610
Н	0.8560	0.2960
Ι	0.8970	0.3010
J	0.8570	0.3270
K	0.8760	0.3220
L	0.8410	0.3060
М	0.8050	0.2890
Ν	0.8520	0.3010
0	0.8790	0.2790
Р	0.9210	0.3330
Q	0.9110	0.3460
R	0.8730	0.2320
S	0.9110	0.2370
Т	0.9310	0.2600
V	0.8600	0.2450
Y	0.9330	0.3310
Z	0.8200	0.2690
a	0.9170	0.3070
b	0.8880	0.2390
С	0.8820	0.2080

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Chain	Atom inclusion	Q-score
d	0.9120	0.2490
е	0.9020	0.2170
f	0.9040	0.2210
h	0.8870	0.2810
i	0.8850	0.3160
k	0.9600	0.2020
m	0.8250	0.1530
n	0.8240	0.2720
0	0.8700	0.1880
р	0.9040	0.3000
q	0.8660	0.2420
r	0.8270	0.1290
S	0.8410	0.1650
t	0.9630	0.1080
u	0.7060	0.1010
V	0.7540	0.0650
W	0.9330	0.1920
X	0.7950	0.1230
V	0.7390	0.1240

