wwPDB EM Validation Summary Report (i)

Nov 9, 2024 – 11:03 am GMT

PDB ID	:	9G8O
EMDB ID	:	EMD-51134
Title	:	human 40S ribosome bound by a SKI238-exosome complex
Authors	:	Koegel, A.; Keidel, A.; Loukeri, M.J.; Kuhn, C.C.; Langer, L.M.; Schaefer, I.B.; Conti, E.
Deposited on	:	2024-07-23
Resolution	:	3.40 Å(reported)

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

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

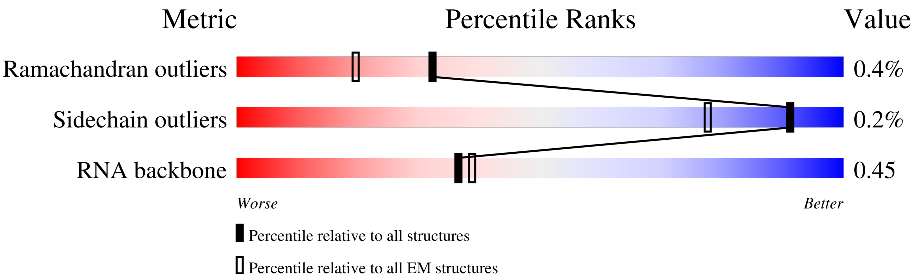
EMDB validation analysis	:	0.0.1.dev113
MolProbity	:	4.02b-467
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 3.40 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	B	1568	59% / 59% 40%
2	C	305	100% / 100%
2	D	305	100% / 100%
3	F	295	97% / 96% • •
4	J	199	92% / 92% • 8%
5	K	443	80% / 80% 20%
6	L	280	95% / 94% 5%
7	N	245	98% / 98% •

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Mol	Chain	Length	Quality of chain
8	O	239	87% / 87% 13%
9	A	1246	89% / 89% 11%
10	E	274	24% / 24% 76%
11	G	272	92% / 92% 8%
12	H	279	85% / 85% 15%
13	I	297	97% / 97% •
14	X	250	28% / 19% 30% • 51%
15	Ln	25	12% / 96% •
16	M	1096	89% / 89% 11%
17	S2	1869	• / 67% 25% • 7%
18	SA	295	• / 74% • 25%
19	SB	264	• / 80% • 19%
20	SC	293	• / 75% • 24%
21	SD	243	• / 92% 8%
22	SE	263	• / 98% •
23	SF	204	89% 11%
24	SG	249	12% / 92% • 5%
25	SH	194	14% / 96% • •
26	SI	208	7% / 98% ••
27	SJ	194	• / 93% • 5%
28	SK	165	9% / 59% 41%
29	SL	158	12% / 96% • •
30	SM	132	36% / 79% 21%
31	SN	151	6% / 97% ••
32	SO	151	5% / 90% • 7%

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Mol	Chain	Length	Quality of chain
33	SP	145	11% / 85% / 15%
34	SQ	146	• / 95% / 5%
35	SR	135	• / 96% / • •
36	SS	152	13% / 94% / 6%
37	ST	145	• / 99% / •
38	SU	119	10% / 87% / 13%
39	SV	83	96% / •
40	SW	130	99% / •
41	SX	143	• / 98% / ••
42	SY	133	5% / 96% / • •
43	SZ	125	7% / 58% / 42%
44	Sa	115	8% / 92% / • 7%
45	Sb	84	• / 99% / •
46	Sc	69	84% / • 14%
47	Sd	56	98% / •
48	Se	59	14% / 98% / •
49	Sf	156	21% / 41% / 59%
50	Sg	317	9% / 98% / •

2 Entry composition (i)

There are 50 unique types of molecules in this entry. The entry contains 125225 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 Superkiller complex protein 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	934	7299	4637	1259	1359	44	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	GLY	-	expression tag	UNP Q6PGP7
B	-2	PRO	-	expression tag	UNP Q6PGP7
B	-1	ASP	-	expression tag	UNP Q6PGP7
B	0	SER	-	expression tag	UNP Q6PGP7

- Molecule 2 is a protein called WD repeat-containing protein 61.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	305	2373	1507	399	462	5	0	0
2	D	305	2373	1507	399	462	5	0	0

- Molecule 3 is a protein called Exosome complex component RRP42.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	F	286	2194	1373	374	432	15	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	-3	GLY	-	expression tag	UNP Q15024
F	-2	PRO	-	expression tag	UNP Q15024
F	-1	ASP	-	expression tag	UNP Q15024
F	0	SER	-	expression tag	UNP Q15024

- Molecule 4 is a protein called Exosome complex component CSL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	J	184	1414	889	248	267	10	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	-3	GLY	-	expression tag	UNP Q9Y3B2
J	-2	PRO	-	expression tag	UNP Q9Y3B2
J	-1	ASP	-	expression tag	UNP Q9Y3B2
J	0	SER	-	expression tag	UNP Q9Y3B2

- Molecule 5 is a protein called Exosome complex component RRP45.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	K	353	2764	1734	482	529	19	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	-3	GLY	-	expression tag	UNP Q06265
K	-2	PRO	-	expression tag	UNP Q06265
K	-1	ASP	-	expression tag	UNP Q06265
K	0	SER	-	expression tag	UNP Q06265

- Molecule 6 is a protein called Exosome complex component RRP43.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	L	265	2020	1272	337	397	14	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	-3	GLY	-	expression tag	UNP Q96B26
L	-2	PRO	-	expression tag	UNP Q96B26
L	-1	ASP	-	expression tag	UNP Q96B26
L	0	SER	-	expression tag	UNP Q96B26

- Molecule 7 is a protein called Exosome complex component RRP41.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	N	241	1819	1123	343	344	9	0	0

- Molecule 8 is a protein called Exosome complex component RRP46.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	O	208	1566	979	278	297	12	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	-3	GLY	-	expression tag	UNP Q9NQT4
O	-2	PRO	-	expression tag	UNP Q9NQT4
O	-1	ASP	-	expression tag	UNP Q9NQT4
O	0	SER	-	expression tag	UNP Q9NQT4

- Molecule 9 is a protein called Helicase SKI2W.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	A	1112	8706	5519	1526	1613	48	0	0

- Molecule 10 is a protein called Isoform 2 of HBS1-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	E	66	525	340	89	95	1	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	365	GLY	-	expression tag	UNP Q9Y450
E	366	PRO	-	expression tag	UNP Q9Y450
E	367	ASP	-	expression tag	UNP Q9Y450
E	368	SER	-	expression tag	UNP Q9Y450
E	633	LEU	-	expression tag	UNP Q9Y450
E	634	GLU	-	expression tag	UNP Q9Y450
E	635	VAL	-	expression tag	UNP Q9Y450
E	636	LEU	-	expression tag	UNP Q9Y450
E	637	PHE	-	expression tag	UNP Q9Y450
E	638	GLN	-	expression tag	UNP Q9Y450

- Molecule 11 is a protein called Exosome complex component MTR3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	G	251	1852	1149	352	344	7	0	0

- Molecule 12 is a protein called Exosome complex component RRP40.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	H	237	1806	1136	329	329	12	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	-3	GLY	-	expression tag	UNP Q9NQT5
H	-2	PRO	-	expression tag	UNP Q9NQT5
H	-1	ASP	-	expression tag	UNP Q9NQT5
H	0	SER	-	expression tag	UNP Q9NQT5
H	225	HIS	TYR	variant	UNP Q9NQT5

- Molecule 13 is a protein called Exosome complex component RRP4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	I	289	2263	1424	405	419	15	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	-3	GLY	-	expression tag	UNP Q13868
I	-2	PRO	-	expression tag	UNP Q13868
I	-1	ASP	-	expression tag	UNP Q13868
I	0	SER	-	expression tag	UNP Q13868

- Molecule 14 is a RNA chain called CrPV-IRES RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
14	X	123	2514	1126	375	890	123	0	0

- Molecule 15 is a protein called 60S ribosomal protein L41.

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

- Molecule 16 is a protein called DIS3-like exonuclease 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	M	975	7903	4986	1405	1471	41	0	0

There are 43 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	-41	MET	-	initiating methionine	UNP Q8TF46
M	-40	SER	-	expression tag	UNP Q8TF46
M	-39	ALA	-	expression tag	UNP Q8TF46
M	-38	TRP	-	expression tag	UNP Q8TF46
M	-37	SER	-	expression tag	UNP Q8TF46
M	-36	HIS	-	expression tag	UNP Q8TF46
M	-35	PRO	-	expression tag	UNP Q8TF46
M	-34	GLN	-	expression tag	UNP Q8TF46
M	-33	PHE	-	expression tag	UNP Q8TF46
M	-32	GLU	-	expression tag	UNP Q8TF46
M	-31	LYS	-	expression tag	UNP Q8TF46
M	-30	GLY	-	expression tag	UNP Q8TF46
M	-29	GLY	-	expression tag	UNP Q8TF46
M	-28	GLY	-	expression tag	UNP Q8TF46
M	-27	SER	-	expression tag	UNP Q8TF46
M	-26	GLY	-	expression tag	UNP Q8TF46
M	-25	GLY	-	expression tag	UNP Q8TF46
M	-24	GLY	-	expression tag	UNP Q8TF46
M	-23	SER	-	expression tag	UNP Q8TF46
M	-22	GLY	-	expression tag	UNP Q8TF46
M	-21	GLY	-	expression tag	UNP Q8TF46
M	-20	SER	-	expression tag	UNP Q8TF46
M	-19	ALA	-	expression tag	UNP Q8TF46
M	-18	TRP	-	expression tag	UNP Q8TF46
M	-17	SER	-	expression tag	UNP Q8TF46
M	-16	HIS	-	expression tag	UNP Q8TF46
M	-15	PRO	-	expression tag	UNP Q8TF46
M	-14	GLN	-	expression tag	UNP Q8TF46
M	-13	PHE	-	expression tag	UNP Q8TF46
M	-12	GLU	-	expression tag	UNP Q8TF46
M	-11	LYS	-	expression tag	UNP Q8TF46

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Chain	Residue	Modelled	Actual	Comment	Reference
M	-10	THR	-	expression tag	UNP Q8TF46
M	-9	ALA	-	expression tag	UNP Q8TF46
M	-8	GLY	-	expression tag	UNP Q8TF46
M	-7	LEU	-	expression tag	UNP Q8TF46
M	-6	GLU	-	expression tag	UNP Q8TF46
M	-5	VAL	-	expression tag	UNP Q8TF46
M	-4	LEU	-	expression tag	UNP Q8TF46
M	-3	PHE	-	expression tag	UNP Q8TF46
M	-2	GLN	-	expression tag	UNP Q8TF46
M	-1	GLY	-	expression tag	UNP Q8TF46
M	0	PRO	-	expression tag	UNP Q8TF46
M	486	ASN	ASP	conflict	UNP Q8TF46

- Molecule 17 is a RNA chain called 18S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	S2	1739	Total 36835	C 16429	N 6582	O 12086	P 1738	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
18	SA	222	Total 1747	C 1109	N 306	O 324	S 8	0	0

- Molecule 19 is a protein called 40S ribosomal protein S3a.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	SB	214	Total 1738	C 1103	N 310	O 311	S 14	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
20	SC	222	Total 1725	C 1115	N 298	O 302	S 10	0	0

- Molecule 21 is a protein called 40S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	SD	224	Total 1745	C 1112	N 314	O 312	S 7	0	0

- Molecule 22 is a protein called 40S ribosomal protein S4, X isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	SE	262	Total 2076	C 1324	N 386	O 358	S 8	0	0

- Molecule 23 is a protein called 40S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	SF	182	Total 1445	C 906	N 271	O 261	S 7	0	0

- Molecule 24 is a protein called 40S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	SG	237	Total 1923	C 1200	N 387	O 329	S 7	0	0

- Molecule 25 is a protein called 40S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	SH	189	Total 1521	C 969	N 280	O 271	S 1	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
26	SI	206	Total 1686	C 1058	N 332	O 291	S 5	0	0

- Molecule 27 is a protein called 40S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	SJ	185	Total 1525	C 969	N 306	O 248	S 2	0	0

- Molecule 28 is a protein called 40S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	SK	97	Total 816	C 533	N 144	O 133	S 6	0	0

- Molecule 29 is a protein called 40S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	SL	153	Total 1247	C 793	N 234	O 214	S 6	0	0

- Molecule 30 is a protein called 40S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	SM	104	Total 793	C 496	N 139	O 152	S 6	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
SM	52	GLN	LEU	conflict	UNP P25398
SM	69	LEU	CYS	conflict	UNP P25398
SM	99	ASN	LYS	conflict	UNP P25398

- Molecule 31 is a protein called 40S ribosomal protein S13.

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

- Molecule 32 is a protein called 40S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	SO	140	Total 1049	C 642	N 204	O 197	S 6	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
33	SP	123	Total 1005	C 638	N 188	O 172	S 7	0	0

- Molecule 34 is a protein called 40S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	SQ	139	Total 1105	C 704	N 207	O 191	S 3	0	0

- Molecule 35 is a protein called 40S ribosomal protein S17.

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

- Molecule 36 is a protein called 40S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	SS	143	Total 1184	C 743	N 240	O 200	S 1	0	0

- Molecule 37 is a protein called 40S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	ST	143	Total 1112	C 697	N 214	O 198	S 3	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
38	SU	104	Total 821	C 514	N 155	O 148	S 4	0	0

- Molecule 39 is a protein called 40S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	SV	83	Total 636	C 393	N 117	O 121	S 5	0	0

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

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

- Molecule 41 is a protein called 40S ribosomal protein S23.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	SX	141	Total 1098	C 693	N 219	O 183	S 3	0	0

- Molecule 42 is a protein called 40S ribosomal protein S24.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	SY	131	Total 1065	C 673	N 209	O 178	S 5	0	0

- Molecule 43 is a protein called 40S ribosomal protein S25.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	SZ	72	Total 570	C 366	N 104	O 99	S 1	0	0

- Molecule 44 is a protein called 40S ribosomal protein S26.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	Sa	107	Total 847	C 528	N 176	O 138	S 5	0	0

- Molecule 45 is a protein called 40S ribosomal protein S27.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	Sb	83	Total 651	C 408	N 121	O 115	S 7	0	0

- Molecule 46 is a protein called 40S ribosomal protein S28.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	Sc	59	Total 464	C 281	N 93	O 88	S 2	0	0

- Molecule 47 is a protein called 40S ribosomal protein S29.

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

- Molecule 48 is a protein called 40S ribosomal protein S30.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	Se	58	Total 459	C 284	N 100	O 74	S 1	0	0

- Molecule 49 is a protein called Ubiquitin.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	Sf	64	522	329	99	87	7	0	0

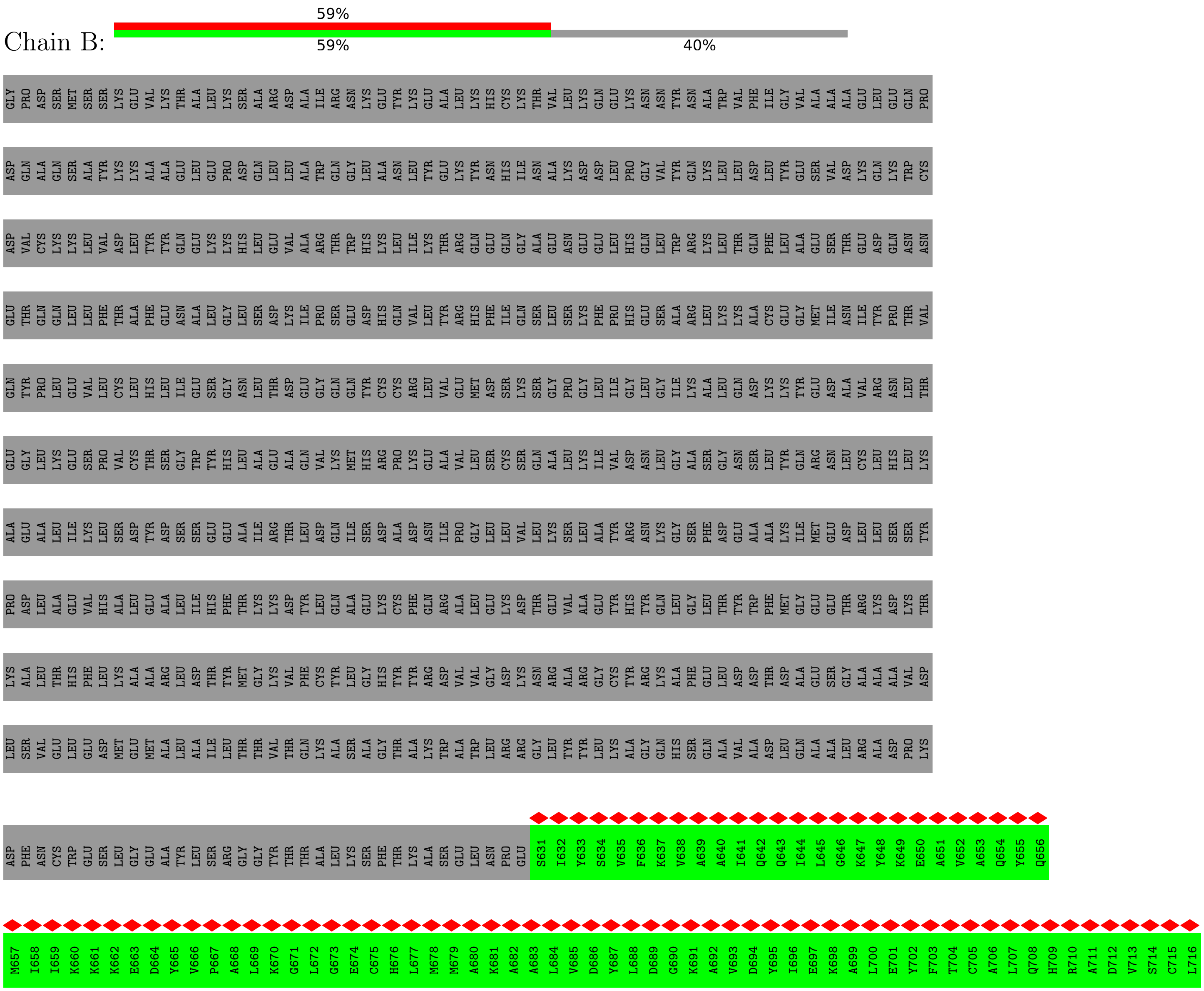
- Molecule 50 is a protein called Receptor of activated protein C kinase 1.

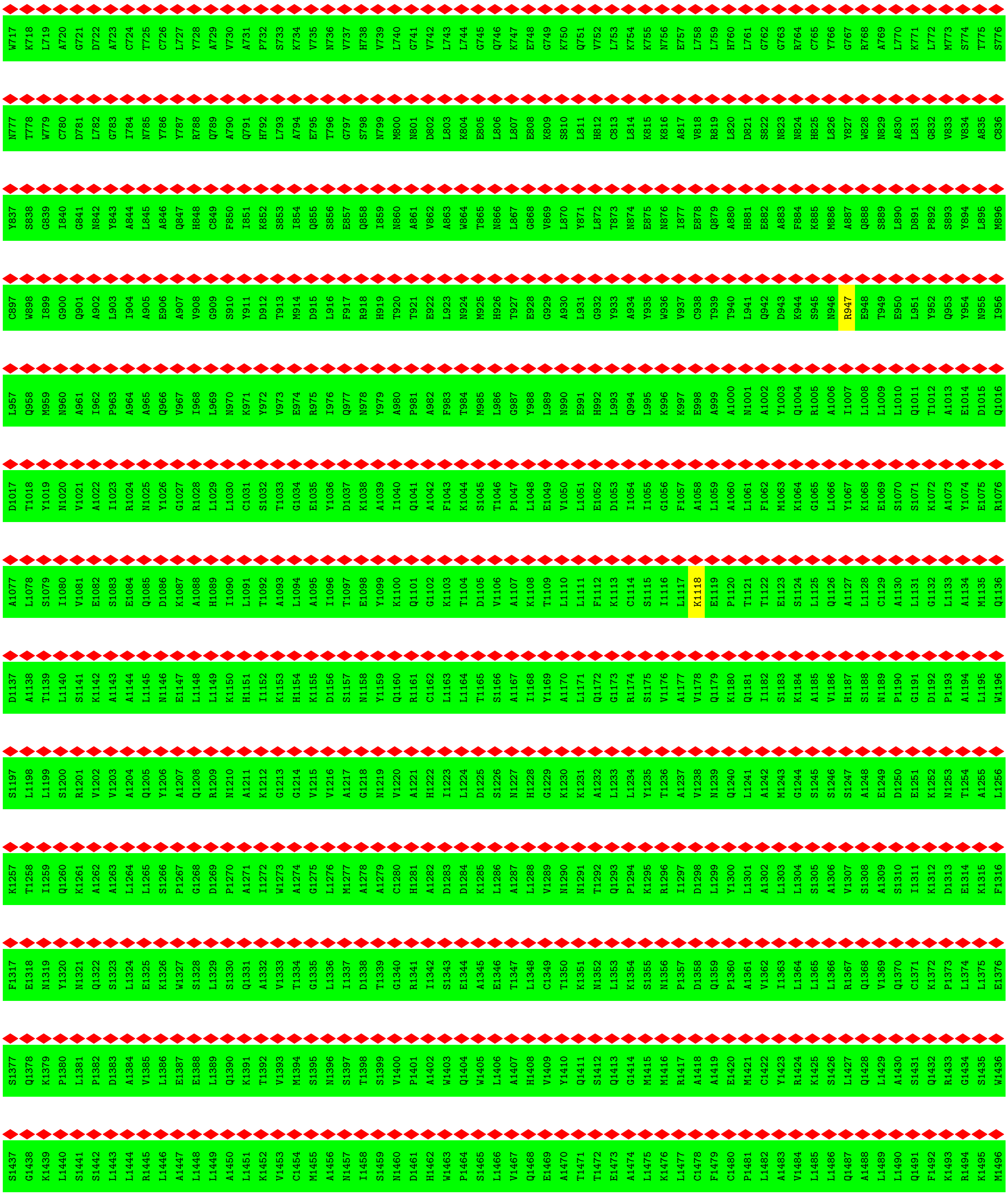
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	Sg	312	2429	1531	423	463	12	0	0

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: Superkiller complex protein 3

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N777 T778 W779 C780 D781 L782 G783 I784 N785 Y786 Y787 R788 Q789 A790 Q791 H792 L793 A794 E795 T796 G797 S798 N799 M800 N801 D802 L803 K804 E805 L806 L807 E808 K809 S810 L811 H812 C813 L814 K815 K816 A817 V818 R819 L820 D821 S822 N823 N824 H825 L826 Y827 W828 N829 A830 L831 G832 V833 V834 A835 C836
Y837 S838 G839 I840 G841 N842 Y843 A844 L845 A846 Q847 H848 C849 F850 I851 K852 S853 I854 Q855 S856 E857 Q858 I859 N860 A861 V862 A863 W864 T865 N866 L867 G868 V869 L870 Y871 L872 T873 N874 E875 N876 I877 E878 Q879 A880 H881 E882 A883 F884 K885 M886 A887 Q888 S889 L890 D891 P892 S893 Y894 L895 M896
C897 W898 I899 G900 Q901 A902 L903 I904 A905 E906 A907 V908 G909 S910 Y911 D912 T913 M914 D915 L916 F917 R918 H919 T920 T921 E922 L923 N924 M925 H926 T927 E928 G929 A930 L931 G932 Y933 A934 Y935 W936 V937 C938 T939 T940 L941 Q942 D943 K944 S945 N946 R947 E948 T949 E950 L951 Y952 Q953 Y954 N955 I956
L957 Q958 M959 N960 A961 I962 P963 A964 A965 Q966 V967 I968 L969 N970 K971 Y972 V973 E974 R975 I976 Q977 N978 Y979 A980 P981 A982 F983 T984 M985 L986 G987 Y988 L989 N990 E991 H992 L993 Q994 L995 K996 K997 E998 A999 A1000 N1001 A1002 Y1003 Q1004 R1005 A1006 I1007 L1008 L1009 L1010 Q1011 T1012 A1013 E1014 D1015 Q1016
D1017 T1018 Y1019 N1020 V1021 A1022 I1023 R1024 N1025 Y1026 G1027 R1028 L1029 L1030 C1031 S1032 T1033 G1034 E1035 Y1036 D1037 K1038 A1039 I1040 Q1041 A1042 F1043 K1044 S1045 T1046 P1047 L1048 E1049 V1050 L1051 E1052 D1053 I1054 I1055 G1056 F1057 A1058 L1059 A1060 L1061 F1062 M1063 K1064 G1065 L1066 Y1067 K1068 E1069 S1070 S1071 K1072 A1073 Y1074 E1075 R1076
A1077 L1078 S1079 I1080 V1081 E1082 S1083 E1084 Q1085 D1086 K1087 A1088 H1089 I1090 L1091 T1092 A1093 L1094 A1095 I1096 T1097 E1098 Y1099 K1100 Q1101 G1102 K1103 T1104 D1105 V1106 A1107 K1108 T1109 L1110 L1111 F1112 K1113 C1114 S1115 I1116 L1117 K1118 E1119 P1120 T1121 T1122 E1123 S1124 L1125 Q1126 A1127 L1128 C1129 A1130 L1131 G1132 L1133 A1134 M1135 Q1136
D1137 A1138 T1139 L1140 S1141 K1142 A1143 A1144 L1145 N1146 E1147 L1148 L1149 K1150 H1151 I1152 K1153 H1154 K1155 D1156 S1157 N1158 Y1159 Q1160 R1161 C1162 L1163 L1164 T1165 S1166 A1167 I1168 Y1169 A1170 L1171 Q1172 G1173 R1174 S1175 V1176 A1177 V1178 Q1179 K1180 Q1181 I1182 S1183 K1184 A1185 V1186 H1187 S1188 N1189 P1190 G1191 D1192 P1193 A1194 L1195 W1196
S1197 L1198 L1199 S1200 R1201 V1202 V1203 A1204 Q1205 Y1206 G1207 Q1208 R1209 N1210 A1211 K1212 G1213 G1214 V1215 V1216 A1217 G1218 N1219 V1220 A1221 H1222 I1223 L1224 D1225 S1226 N1227 H1228 G1229 K1230 K1231 A1232 L1233 L1234 Y1235 T1236 A1237 V1238 N1239 Q1240 L1241 A1242 M1243 G1244 S1245 S1246 S1247 A1248 E1249 D1250 E1251 K1252 N1253 T1254 A1255 L1256
K1257 T1258 I1259 Q1260 K1261 A1262 A1263 L1264 L1265 S1266 P1267 G1268 D1269 P1270 A1271 I1272 W1273 A1274 G1275 L1276 M1277 A1278 A1279 C1280 H1281 A1282 D1283 D1284 K1285 L1286 A1287 L1288 V1289 N1290 N1291 T1292 Q1293 P1294 K1295 R1296 I1297 D1298 L1299 Y1300 L1301 A1302 L1303 L1304 S1305 A1306 V1307 S1308 A1309 S1310 I1311 K1312 D1313 E1314 K1315 F1316
F1317 E1318 N1319 Y1320 N1321 Q1322 S1323 L1324 E1325 K1326 W1327 S1328 L1329 S1330 Q1331 A1332 V1333 T1334 G1335 L1336 I1337 D1338 T1339 G1340 R1341 I1342 S1343 E1344 A1345 E1346 T1347 L1348 C1349 T1350 K1351 N1352 L1353 K1354 S1355 N1356 P1357 D1358 Q1359 P1360 A1361 V1362 I1363 L1364 L1365 L1366 R1367 Q1368 V1369 Q1370 C1371 K1372 P1373 L1374 L1375 E1376
S1377 Q1378 K1379 P1380 L1381 P1382 D1383 A1384 V1385 L1386 E1387 E1388 L1389 Q1390 K1391 T1392 V1393 M1394 S1395 N1396 S1397 T1398 S1399 V1400 P1401 A1402 W1403 Q1404 W1405 L1406 A1407 H1408 V1409 Y1410 Q1411 S1412 Q1413 G1414 M1415 M1416 R1417 A1418 A1419 E1420 M1421 C1422 Y1423 R1424 K1425 S1426 L1427 Q1428 L1429 A1430 S1431 Q1432 R1433 G1434 S1435 W1436
S1437 G1438 K1439 L1440 S1441 S1442 L1443 L1444 R1445 L1446 A1447 L1448 L1449 A1450 L1451 K1452 V1453 C1454 M1455 A1456 N1457 I1458 S1459 N1460 D1461 H1462 W1463 P1464 S1465 L1466 V1467 Q1468 E1469 A1470 T1471 T1472 E1473 A1474 L1475 K1476 L1477 C1478 F1479 C1480 P1481 L1482 A1483 V1484 L1485 L1486 Q1487 A1488 L1489 L1490 Q1491 F1492 K1493 R1494 K1495 M1496

E1500 E1506 R1507 V1508 V1509 Y1510 Q1511 P1512 G1513 Y1514 P1515 K1516 S1517 I1518 A1519 S1520 T1521 A1522 R1523 W1524 Y1525 L1526 L1527 R1528 H1529 L1530 D1534 D1535 Y1536 E1537 L1538 I1539 D1540 V1541 L1542 V1543 N1544 N1545 A1546 K1547 T1548 H1549 G1550 D1551 T1552 R1553 A1554 L1555 E1556 L1557 N1558 Q1559 R1560 L1561 S1562 S1563 Q1564

- Molecule 2: WD repeat-containing protein 61

Chain C: 100% 100%

M1 T2 N3 Q4 Y5 G6 I7 L8 F9 K10 Q11 E12 Q13 A14 H15 D16 D17 A18 I19 W20 S21 V22 A23 W24 G25 T26 N27 K28 K29 E30 N31 S32 E33 T34 V35 V36 T37 G38 S39 L40 D41 D42 L43 V44 K45 V46 W47 K48 W49 R50 D51 E52 R53 L54 D55 L56 Q57 W58 S59 L60

E61 G62 H63 Q64 L65 G66 V67 V68 S69 V70 D71 I72 S73 H74 T75 L76 P77 I78 A79 A80 S81 S82 S83 L84 D85 A86 H87 I88 R89 L90 W91 D92 L93 E94 N95 G96 K97 Q98 I99 K100 S101 I102 D103 A104 G105 P106 V107 D108 A109 W110 T111 L112 A113 F114 S115 P116 D117 S118 Q119 Y120

L121 A122 T123 G124 T125 H126 V127 G128 K129 V130 N131 I132 F133 G134 V135 E136 S137 G138 K139 K140 E141 Y142 S143 L144 D145 T146 R147 G148 K149 F150 I151 L152 S153 I154 A155 Y156 S157 P158 D159 G160 K161 Y162 L163 A164 S165 G166 A167 I168 D169 G170 I171 I172 N173 I174 F175 D176 I177 A178 T179 G180

K181 L182 L183 H184 T185 L186 E187 G188 H189 A190 M191 P192 I193 R194 S195 L196 T197 F198 S199 P200 D201 S202 Q203 L204 L205 V206 T207 A208 S209 D210 D211 G212 Y213 I214 K215 I216 Y217 D218 V219 Q220 H221 A222 N223 L224 A225 G226 T227 L228 S229 G230 H231 A232 S233 W234 V235 L236 N237 V238 A239 F240

C241 P242 D243 D244 T245 H246 F247 V248 S249 S250 S251 S252 D253 K254 S255 V256 K257 V258 W259 D260 V261 G262 T263 R264 T265 C266 V267 H268 T269 F270 F271 D272 H273 Q274 D275 Q276 V277 W278 G279 V280 K281 Y282 N283 G284 N285 G286 S287 K288 I289 V290 S291 V292 G293 D294 D295 Q296 E297 I298 H299 I300

Y301 D302 C303 P304 I305

- Molecule 2: WD repeat-containing protein 61

Chain D: 100% 100%

M1 T2 N3 Q4 Y5 G6 I7 L8 F9 K10 Q11 E12 Q13 A14 H15 D16 D17 A18 I19 W20 S21 V22 A23 W24 G25 T26 N27 K28 K29 E30 N31 S32 E33 T34 V35 V36 T37 G38 S39 L40 D41 D42 L43 V44 K45 V46 W47 K48 W49 R50 D51 E52 R53 L54 D55 L56 Q57 W58 S59 L60

E61 G62 H63 Q64 L65 G66 V67 V68 S69 V70 D71 I72 S73 H74 T75 L76 P77 I78 A79 A80 S81 S82 S83 L84 D85 A86 H87 I88 R89 L90 W91 D92 L93 E94 N95 G96 K97 Q98 I99 K100 S101 I102 D103 A104 G105 P106 V107 D108 A109 W110 T111 L112 A113 F114 S115 P116 D117 S118 Q119 Y120

L121 A122 T123 G124 T125 H126 V127 G128 K129 V130 N131 I132 F133 G134 V135 E136 S137 G138 K139 K140 E141 Y142 S143 L144 D145 T146 R147 G148 K149 F150 I151 L152 S153 I154 A155 Y156 S157 P158 D159 G160 K161 Y162 L163 A164 S165 G166 A167 I168 D169 G170 I171 I172 N173 I174 F175 D176 I177 A178 T179 G180

K181 L182 L183 H184 T185 L186 E187 G188 H189 A190 M191 P192 I193 R194 S195 L196 T197 F198 S199 P200 D201 S202 Q203 L204 L205 V206 T207 A208 S209 D210 D211 G212 Y213 I214 K215 I216 Y217 D218 V219 Q220 H221 A222 N223 L224 A225 G226 T227 L228 S229 G230 H231 A232 S233 W234 V235 L236 N237 V238 A239 F240

C241 P242 D243 D244 T245 H246 F247 V248 S249 S250 S251 S252 D253 K254 S255 V256 K257 V258 W259 D260 V261 G262 T263 R264 T265 C266 V267 H268 T269 F270 F271 D272 H273 Q274 D275 Q276 V277 W278 G279 V280 K281 Y282 N283 G284 N285 G286 S287 K288 I289 V290 S291 V292 G293 D294 D295 Q296 E297 I298 H299 I300

Y301 D302 C303 P304 I305

• Molecule 3: Exosome complex component RRP42

Chain F: 97% / 96%

GLY PRO ASP SER MET ALA SER VAL T5 L6 S7 E8 A9 E10 K11 V12 Y13 I14 V15 H16 G17 V18 Q19 E20 D21 L22 R23 V24 D25 G26 R27 G28 C29 E30 D31 Y32 R33 C34 V35 E36 V37 E38 T39 D40 V41 V42 S43 N44 T45 S46 G47 S48 A49 R50 V51 K52 L53 G54 H55 T56

D57 I58 L59 V60 G61 V62 K63 A64 E65 M66 G67 T68 P69 K70 L71 E72 K73 P74 N75 E76 G77 Y78 L79 E80 F81 F82 V83 D84 C85 S86 A87 S88 A89 T90 P91 E92 F93 E94 G95 R96 G97 G98 D99 D100 L101 G102 T103 E104 I105 A106 N107 T108 L109 Y110 R111 I112 F113 N114 N115 K116

S117 S118 V119 D120 L121 K122 T123 L124 C125 I126 S127 P128 R129 E130 H131 C132 W133 V134 L135 Y136 V137 D138 V139 L140 L141 L142 E143 C144 G145 G146 N147 L148 F149 D150 A151 I152 S153 I154 A155 V156 K157 A158 A159 L160 F161 N162 T163 R164 I165 P166 R167 V168 R169 V170 L171 E172 D173 E174 E175 G176

S177 K178 D179 I180 E181 L182 S183 D184 D185 P186 Y187 D188 C189 I190 R191 L192 S193 V194 E195 N196 V197 P198 C199 I200 V201 T202 L203 C204 K205 I206 G207 Y208 R209 H210 V211 V212 D213 A214 T215 L216 Q217 E218 E219 A220 C221 S222 L223 A224 S225 L226 L227 V228 S229 V230 T231 S232 K233 G234 V235 V236

T237 C238 M239 R240 K241 V242 G243 K244 G245 S246 L247 D248 P249 E250 S251 I252 F253 E254 M255 M256 E257 T258 G259 K260 R261 V262 G263 K264 V265 L266 H267 A268 S269 L270 Q271 S272 V273 V274 H275 K276 E277 E278 S279 L280 G281 P282 K283 R284 Q285 K286 V287 G288 F289 L290 GLY

• Molecule 4: Exosome complex component CSL4

Chain J: 92% / 92% • 8%

GLY PRO ASP SER MET ALA PRO PRO V5 R6 Y7 C8 I9 P10 G11 E12 R13 L14 C15 N16 L17 E18 E19 G20 S21 P22 G23 S24 G25 T26 Y27 T28 R29 H30 G31 Y32 I33 F34 S35 S36 L37 A38 G39 C40 L41 M42 K43 S44 S45 E46 N47 G48 A49 L50 P51 V52 V53 S54 V55 V56

R57 E58 T59 E60 S61 Q62 L63 L64 P65 D66 V67 G68 A69 I70 V71 T72 C73 K74 V75 S76 S77 I78 N79 S80 R81 F82 A83 K84 V85 H86 I87 L88 Y89 V90 G91 S92 M93 P94 L95 K96 N97 S98 F99 R100 G101 T102 I103 R104 K105 E106 D107 V108 R109 A110 T111 E112 K113 D114 K115 V116

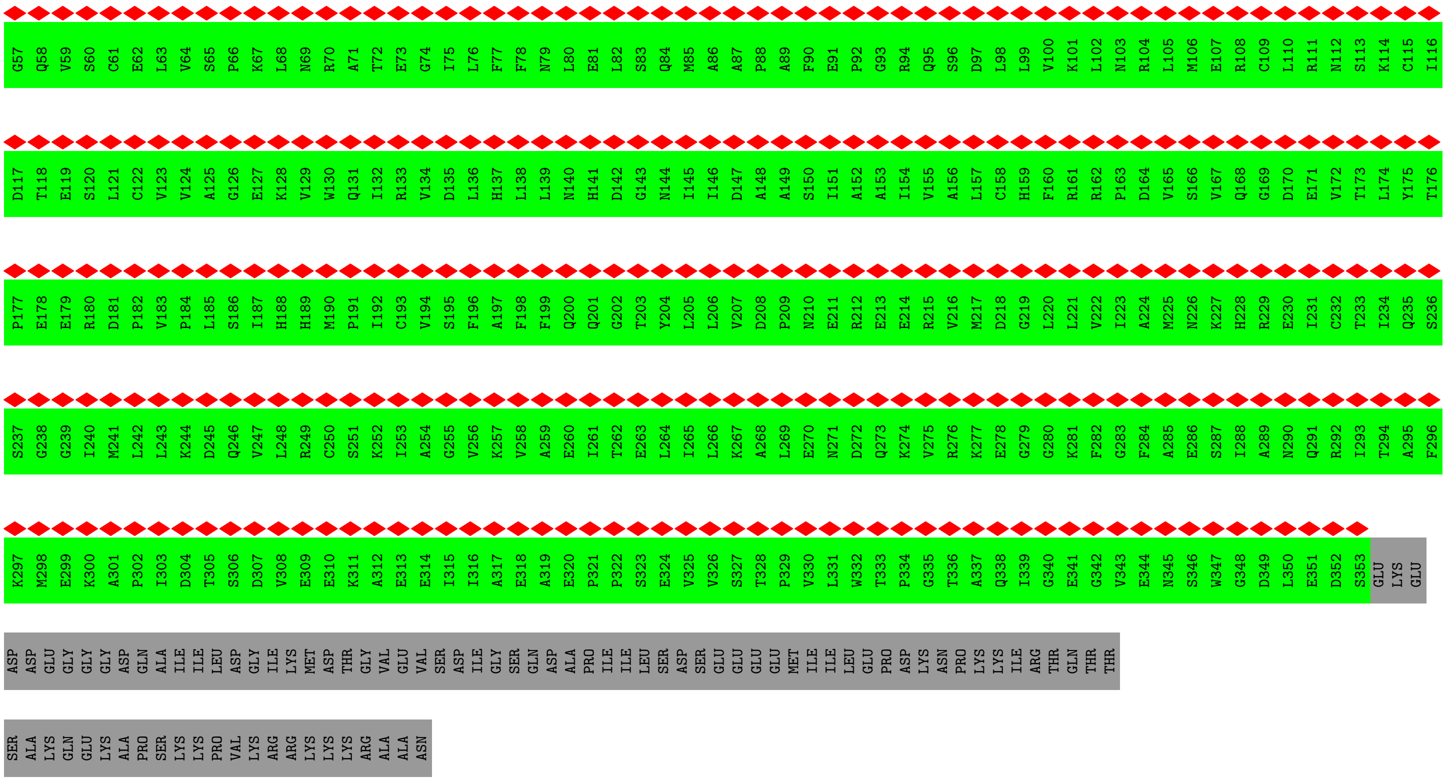
E117 I118 Y119 K120 S121 F122 R123 P124 G125 D126 I127 V128 L129 A130 K131 V132 I133 S134 L135 G136 D137 A138 Q139 S140 N141 Y142 L143 L144 T145 T146 A147 E148 N149 E150 L151 G152 V153 V154 V155 A156 H157 S158 E159 S160 G161 I162 Q163 M164 V165 P166 I167 S168 W169 C170 E171 M172 Q173 C174 P175 K176

T177 H178 T179 K180 E181 F182 R183 K184 V185 A186 R187 V188 GLN PRO GLU PHE LEU GLN THR

• Molecule 5: Exosome complex component RRP45

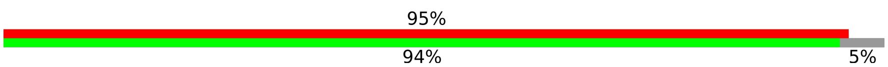
Chain K: 80% / 80% 20%

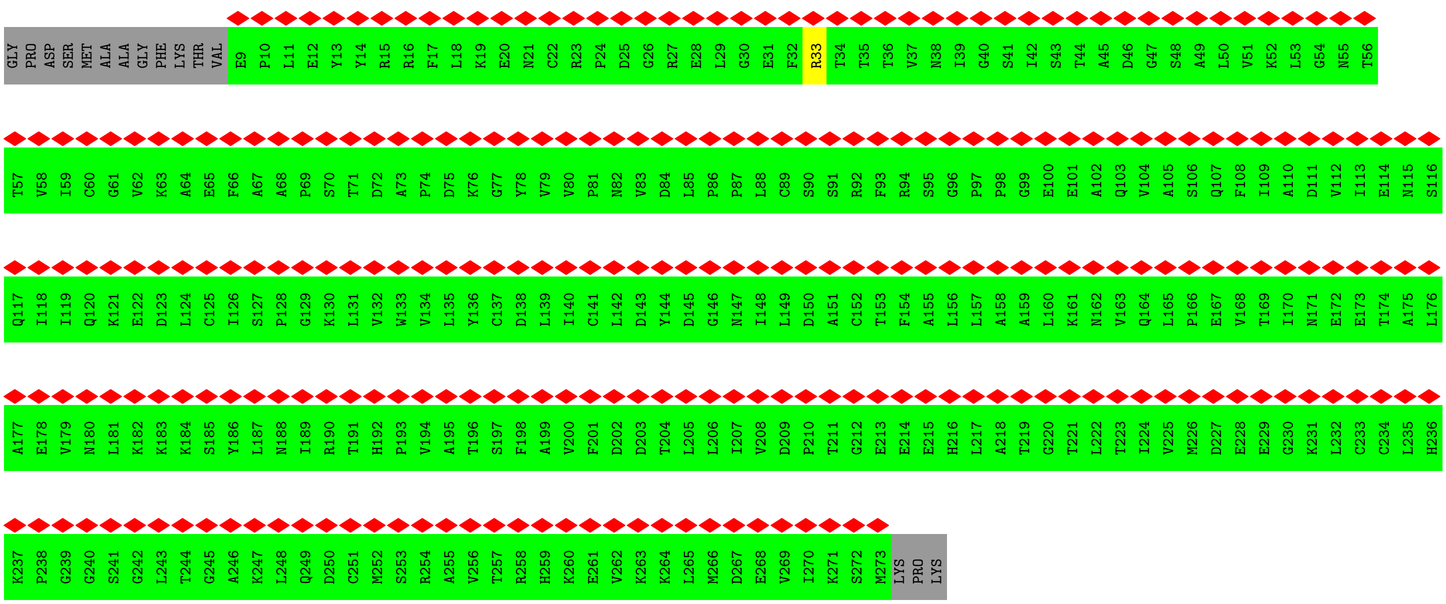
GLY PRO ASP SER M1 K2 E3 T4 P5 L6 S7 N8 C9 E10 R11 R12 F13 L14 L15 R16 A17 I18 E19 E20 K21 K22 R23 L24 D25 G26 R27 Q28 T29 Y30 D31 Y32 R33 N34 I35 R36 I37 S38 F39 G40 T41 D42 Y43 G44 C45 C46 I47 V48 E49 L50 G51 K52 T53 R54 V55 L56



• Molecule 6: Exosome complex component RRP43

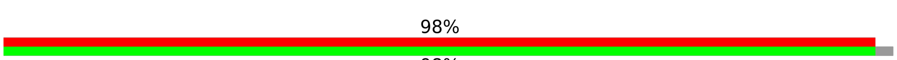
Chain L:





• Molecule 7: Exosome complex component RRP41

Chain N:



MET ALA GLY L3 E4 L5 L6 S7 D8 Q9 G10 Y11 R12 V13 D14 G15 R16 R17 A18 G19 E20 L21 R22 K23 I24 Q25 A26 R27 M28 G29 V30 F31 A32 Q33 A34 D35 G36 S37 A38 Y39 I40 E41 Q42 G43 N44 T45 K46 A47 L48 A49 V50 V51 Y52 G53 P54 H55 E56 I57 R58 G59

S60 R61 A62 R63 A64 L65 P66 D67 R68 A69 L70 V71 N72 C73 Q74 Y75 S76 S77 A78 T79 F80 S81 T82 G83 E84 R85 K86 R87 R88 P89 H90 G91 D92 R93 K94 S95 C96 E97 M98 G99 L100 Q101 L102 R103 Q104 T105 F106 E107 A108 A109 I110 L111 T112 Q113 L114 H115 P116 R117 S118 Q119

I120 D121 I122 Y123 V124 Q125 V126 L127 Q128 A129 D130 G131 G132 T133 Y134 A135 A136 C137 V138 N139 A140 A141 T142 L143 A144 V145 L146 D147 A148 G149 I150 P151 M152 R153 D154 F155 V156 C157 A158 C159 S160 A161 G162 F163 V164 D165 G166 T167 A168 L169 A170 D171 L172 S173 H174 V175 E176 E177 A178 A179

G180 G181 P182 Q183 L184 A185 L186 A187 L188 L189 P190 A191 S192 G193 Q194 I195 A196 L197 L198 E199 M200 D201 A202 R203 L204 H205 E206 D207 H208 L209 E210 R211 V212 L213 E214 A215 A216 A217 Q218 A219 A220 R221 D222 V223 H224 T225 L226 L227 D228 R229 V230 V231 R232 Q233 H234 V235 R236 E237 A238 S239

I240 L241 L242 G243 ASP

• Molecule 8: Exosome complex component RRP46

Chain O: 87% 87% 13%

GLY PRO ASP SER MET GLU GLU GLU THR HIS THR ASP ALA LYS ILE ARG ALA GLU ASN GLY THR GLY SER SER PRO ARG GLY PRO GLY C26 S27 L28 R29 H30 F31 A32 C33 E34 Q35 N36 L37 L38 S39 R40 P41 D42 G43 S44 A45 S46 F47 L48 Q49 G50 D51 T52 S53 V54 L55 A56

G57 V58 Y59 G60 P61 A62 E63 V64 K65 V66 S67 K68 E69 I70 F71 N72 K73 A74 T75 L76 E77 V78 I79 L80 R81 P82 K83 I84 G85 L86 P87 G88 V89 A90 E91 K92 S93 R94 E95 R96 L97 I98 R99 N100 T101 C102 E103 A104 V105 V106 L107 G108 T109 L110 H111 P112 R113 T114 S115 I116

T117 V118 V119 L120 Q121 V122 V123 S124 D125 A126 G127 S128 L129 L130 A131 C132 C133 L134 N135 A136 A137 C138 M139 A140 L141 V142 D143 A144 G145 V146 P147 M148 R149 A150 L151 F152 C153 G154 V155 A156 C157 A158 L159 D160 S161 D162 G163 T164 L165 V166 L167 D168 P169 T170 S171 K172 Q173 E174 K175 E176

A177 R178 A179 V180 L181 T182 F183 A184 L185 D186 S187 V188 E189 R190 K191 L192 L193 M194 S195 S196 T197 K198 G199 L200 Y201 S202 D203 T204 E205 L206 Q207 Q208 C209 L210 A211 A212 A213 Q214 A215 A216 S217 Q218 H219 V220 F221 R222 F223 Y224 R225 E226 S227 L228 Q229 R230 R231 Y232 S233 LYS SER

• Molecule 9: Helicase SKI2W

Chain A: 89% 89% 11%

M1 M2 E3 T4 E5 R6 L7 V8 L9 P10 P11 P12 D13 P14 L15 D16 L17 P18 L19 R20 A21 V22 E23 L24 G25 C26 T27 G28 H29 W30 E31 L32 L33 N34 L35 P36 G37 A38 P39 E40 S41 S42 L43 P44 H45 G46 L47 P48 P49 C50 A51 P52 D53 L54 Q55 Q56 E57 A58 E59 Q60

L61 F62 L63 S64 S65 P66 A67 W68 L69 P70 L71 H72 G73 V74 E75 H76 S77 A78 R79 K80 W81 Q82 R83 K84 T85 D86 P87 W88 S89 L90 L91 A92 V93 L94 G95 A96 P97 V98 P99 S100 D101 L102 Q103 A104 Q105 R106 H107 P108 T109 T110 G111 Q112 I113 L114 G115 Y116 K117 E118 V119 L120

L121 E122 ASN THR ASN LEU SER ALA THR THR SER LEU SER LEU ARG ARG PRO PRO GLY PRO ALA SER GLN SER LEU TRP GLY ASN PRO THR GLN TYR PRO PHE TRP PRO G157 G158 M159 D160 E161 P162 T163 I164 T165 D166 L167 N168 T169 R170 E171 E172 A173 E174 E175 E176 I177 D178 F179 E180

K181 D182 L183 L184 T185 I186 P187 P188 G189 F190 K191 K192 G193 M194 D195 F196 A197 PRO LYS ASP CYS PRO THR PRO ALA PRO GLY LEU LEU SER LEU SER CYS MET LEU GLU PRO LEU ASP LEU GLY GLY GLY ASP GLU ASP GLU ASN GLU ALA VAL GLY GLN PRO GLY GLY PRO ARG GLY ASP

THR VAL SER ALA SER PRO CYS SER ALA PRO LEU ALA ARG ALA ALA SER SER LEU GLU ASP LEU VAL LEU LYS GLU ALA SER THR ALA VAL SER THR PRO GLU ALA PRO GLU PRO PRO SER GLN GLU Q282 W283 A284 I285 P286 V287 D288 A289 T290 S291 P292 V293 G294 D295 F296 Y297 R298 L299 I300

P301 Q302 P303 A304 F305 Q306 W307 A308 F309 E310 P311 D312 V313 F314 Q315 K316 Q317 A318 I319 L320 H321 L322 E323 R324 H325 D326 S327 V328 F329 V330 A331 A332 H333 T334 S335 A336 G337 K338 T339 V340 V341 A342 E343 Y344 A345 I346 A347 L348 A349 Q350 K351 H352 M353 T354 R355 T356 I357 Y358 T359 S360

P361 I362 K363 A364 L365 S366 N367 Q368 K369 F370 R371 D372 F373 R374 N375 T376 F377 G378 D379 V380 G381 L382 L383 T384 G385 D386 V387 Q388 L389 H390 P391 E392 A393 S394 C395 L396 I397 M398 T399 T400 E401 I402 L403 R404 S405 M406 L407 Y408 S409 G410 S411 D412 V413 I414 R415 D416 L417 E418 W419 V420

I421 F422 D423 E424 V425 H426 Y427 I428 N429 D430 V431 E432 R433 G434 V435 V436 W437 E438 E439 V440 L441 I442 M443 L444 P445 D446 H447 V448 S449 I450 I451 L452 L453 S454 A455 T456 V457 P458 N459 A460 L461 E462 F463 A464 D465 W466 I467 G468 R469 L470 K471 R472 R473 Q474 I475 Y476 V477 I478 S479 T480

V481 T482 R483 P484 V485 P486 L487 E488 H489 Y490 L491 F492 T493 G494 N495 S496 S497 K498 T499 Q500 G501 E502 L503 F504 L505 L506 L507 D508 S509 R510 G511 A512 F513 H514 T515 K516 G517 Y518 Y519 A520 A521 V522 E523 A524 K525 K526 E527 R528 M529 SER LYS HIS ALA GLN THR PHE GLY ALA LYS GLN

PRO THR HIS GLN GLY G546 Q549 D550 R551 G552 V553 Y554 L555 S556 L557 L558 A559 S560 L561 R562 T563 R564 A565 Q566 L567 P568 V569 V570 V571 F572 T573 F574 S575 R576 G577 R578 C579 D580 E581 Q582 A583 S584 G585 L586 T587 S588 L589 D590 L591 T592 T593 S594 S595 E596 K597 S598 E599 I600 H601

L602 F603 L604 Q605 R606 C607 L608 A609 R610 L611 R612 G613 S614 D615 R616 Q617 L618 P619 Q620 V621 L622 H623 M624 S625 E626 L627 L628 N629 R630 G631 L632 G633 V634 H635 H636 S637 G638 I639 L640 P641 I642 L643 K644 E645 I646 V647 E648 M649 L650 F651 S652 R653 G654 L655 V656 K657 V658 L659 F660 A661

T662 E663 T664 F665 A666 M667 G668 V669 N670 M671 P672 A673 R674 T675 V676 V677 F678 D679 S680 M681 R682 K683 H684 D685 G686 S687 T688 F689 R690 D691 L692 L693 P694 G695 E696 Y697 V698 Q699 M700 A701 G702 R703 A704 G705 R706 R707 G708 L709 D710 P711 T712 G713 T714 V715 I716 L717 L718 C719 K720 G721

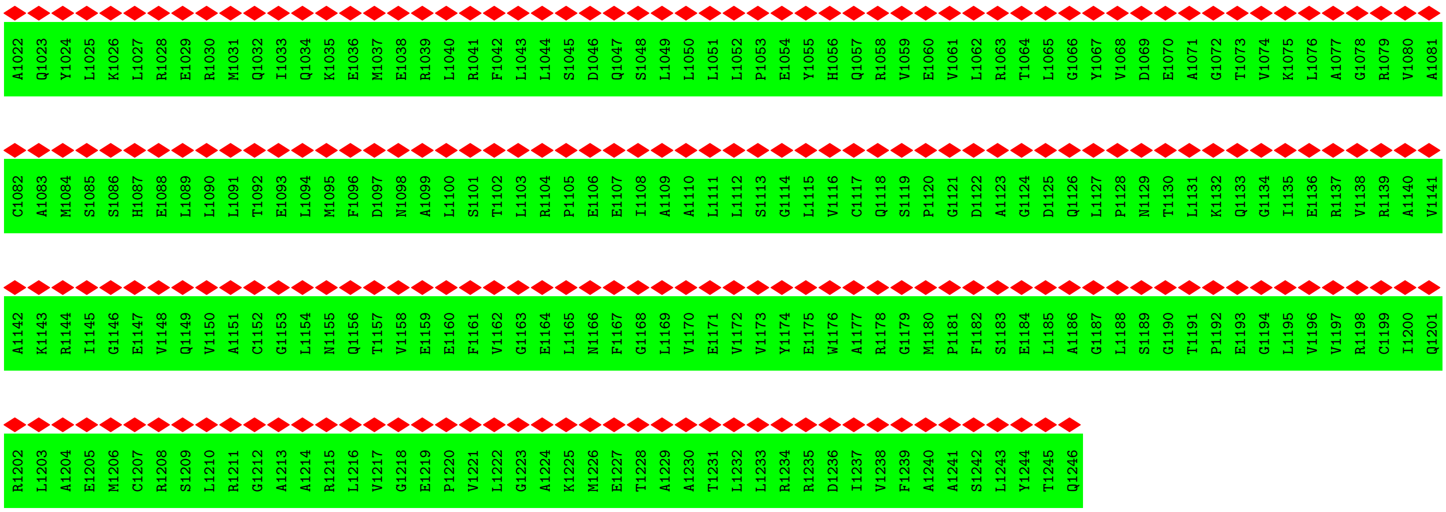
R722 V723 P724 E725 M726 A727 D728 L729 H730 R731 M732 M733 M734 G735 K736 P737 S738 Q739 L740 Q741 S742 Q743 F744 R745 L746 T747 Y748 T749 M750 I751 L752 N753 L754 L755 R756 V757 D758 A759 L760 R761 V762 E763 D764 M765 M766 K767 R768 S769 F770 S771 E772 F773 P774 S775 R776 K777 D778 S779 K780 A781

H782 E783 Q784 A785 L786 A787 E788 L789 T790 K791 R792 L793 G794 A795 L796 E797 E798 P799 D800 M801 T802 G803 Q804 L805 V806 D807 L808 P809 E810 Y811 Y812 S813 W814 G815 E816 E817 L818 T819 E820 T821 Q822 H823 M824 I825 Q826 R827 R828 I829 M830 E831 S832 V833 N834 G835 L836 K837 S838 L839 S840 A841

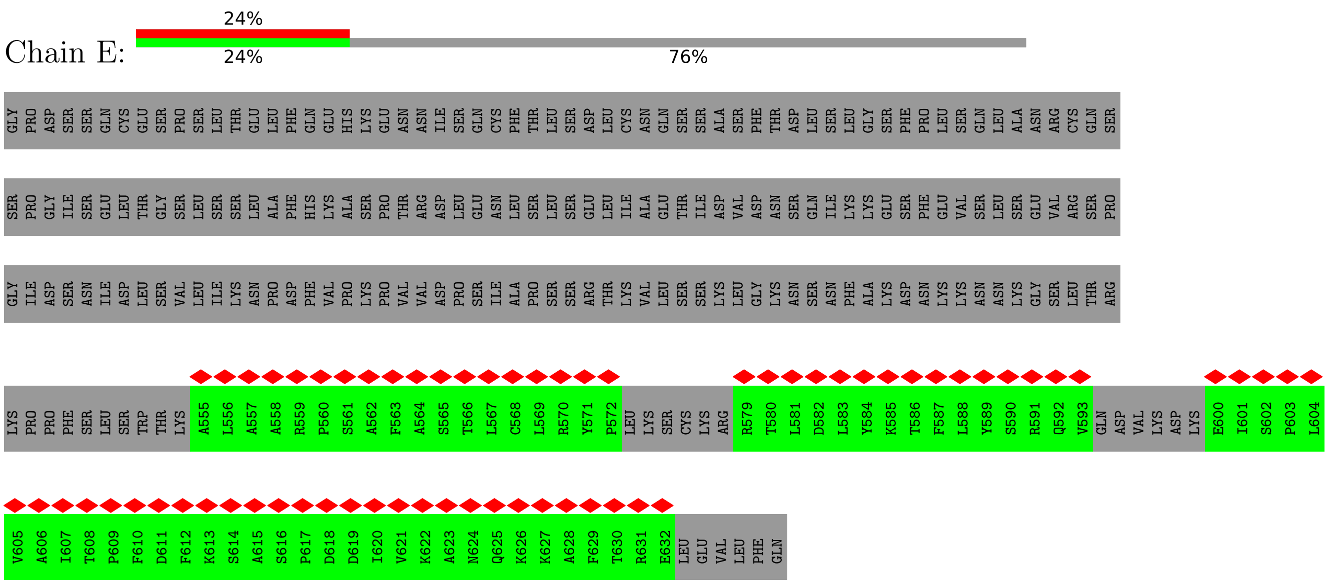
G842 R843 V844 V845 V846 V847 K848 N849 Q850 E851 H852 H853 N854 A855 L856 G857 V858 I859 L860 Q861 V862 S863 S864 N865 S866 T867 S868 R869 V870 F871 T872 T873 L874 V875 L876 C877 D878 K879 P880 L881 S882 Q883 D884 P885 Q886 D887 R888 G889 P890 A891 T892 A893 E894 V895 P896 Y897 P898 D899 D900 L901

V902 G903 F904 K905 L906 F907 L908 P909 E910 G911 P912 C913 D914 H915 T916 V917 V918 K919 L920 Q921 P922 G923 D924 M925 A926 A927 I928 T929 T930 K931 V932 L933 R934 V935 N936 G937 E938 K939 I940 L941 E942 D943 F944 S945 K946 R947 Q948 Q949 P950 K951 F952 K953 K954 D955 P956 P957 L958 A959 A960 V961

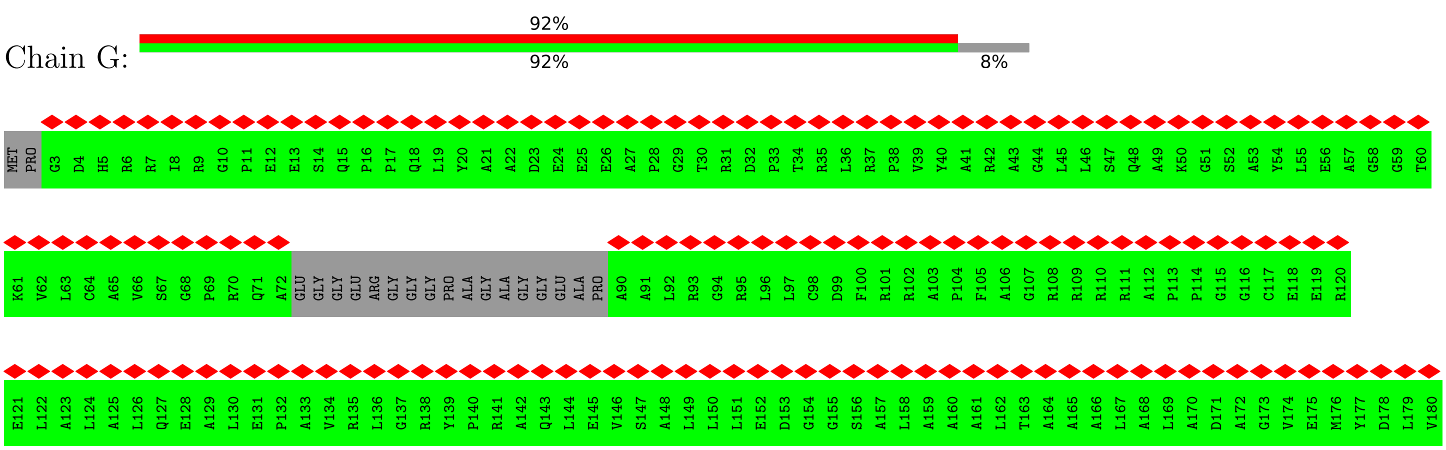
T962 T963 A964 V965 Q966 E967 L968 L969 R970 L971 A972 Q973 A974 H975 P976 A977 G978 P979 P980 T981 L982 D983 P984 V985 N986 D987 L988 Q989 L990 K991 D992 M993 S994 V995 V996 E997 G998 G999 L1000 R1001 A1002 R1003 K1004 L1005 E1006 E1007 L1008 I1009 Q1010 G1011 A1012 Q1013 C1014 V1015 H1016 S1017 P1018 R1019 F1020 P1021



- Molecule 10: Isoform 2 of HBS1-like protein



- Molecule 11: Exosome complex component MTR3



V181 G182 C183 G184 L185 S186 L187 A188 P189 G190 P191 A192 P193 T194 W195 L196 L197 D198 P199 T200 R201 L202 E203 E204 E205 R206 A207 A208 A209 G210 L211 T212 V213 A214 L215 M216 P217 V218 L219 N220 Q221 V222 A223 G224 L225 L226 G227 S228 G229 E230 G231 G232 L233 T234 E235 S236 W237 A238 E239 A240

V241 R242 L243 G244 L245 E246 G247 C248 Q249 R250 L251 Y252 P253 V254 L255 Q256 Q257 S258 L259 V260 R261 A262 A263 R264 R265 R266 G267 A268 A269 A270 GLN PRO

- Molecule 12: Exosome complex component RRP40

Chain H: 85% 85% 15%

GLY PRO ASP SER MET ALA GLU PRO ALA SER VAL ALA ALA GLU SER LEU ALA GLY SER ARG A17 R18 A19 A20 R21 T22 V23 L24 G25 Q26 V27 V28 L29 P30 G31 E32 E33 L34 L35 L36 P37 E38 GLN GLU ASP ALA GLU GLY PRO GLY GLY ALA VAL GLU ARG PRO LEU SER LEU ASN

ALA ARG ALA CYS S61 R62 V63 R64 V65 V66 C67 G68 P69 G70 L71 R72 R73 C74 G75 D76 R77 L78 L79 V80 T81 K82 C83 G84 R85 L86 R87 H88 K89 E90 P91 G92 S93 G94 S95 G96 G97 G98 V99 Y100 W101 V102 D103 S104 Q105 Q106 K107 R108 Y109 V110 P111 V112 K113 G114 D115 H116

V117 I118 G119 I120 V121 T122 A123 K124 S125 G126 D127 I128 F129 K130 V131 D132 V133 G134 G135 S136 E137 P138 A139 S140 L141 S142 Y143 L144 S145 F146 E147 G148 A149 T150 K151 R152 N153 R154 P155 N156 V157 Q158 V159 G160 D161 L162 I163 Y164 G165 Q166 F167 V168 V169 A170 N171 K172 D173 M174 E175 P176

E177 M178 V179 C180 I181 D182 S183 C184 G185 R186 A187 N188 G189 M190 G191 V192 I193 G194 Q195 D196 G197 L198 L199 F200 K201 V202 T203 L204 G205 L206 I207 R208 K209 L210 L211 A212 P213 D214 C215 E216 I217 I218 Q219 E220 V221 G222 K223 L224 H225 P226 L227 E228 I229 V230 F231 G232 M233 N234 G235 R236

I237 W238 V239 K240 A241 K242 T243 I244 Q245 Q246 T247 L248 I249 L250 A251 N252 I253 L254 E255 A256 C257 E258 H259 M260 T261 S262 D263 Q264 R265 K266 Q267 I268 F269 S270 R271 L272 A273 E274 S275

- Molecule 13: Exosome complex component RRP4

Chain I: 97% 97% •

GLY PRO ASP SER M1 A2 M3 E4 M5 R6 L7 P8 V9 A10 R11 K12 P13 L14 S15 E16 R17 L18 G19 R20 D21 T22 K23 K24 H25 L26 V27 V28 P29 G30 D31 T32 I33 T34 T35 D36 T37 G38 F39 M40 R41 G42 H43 G44 T45 Y46 M47 G48 E49 E50 K51 L52 I53 A54 S55 V56

A57 G58 S59 V60 E61 R62 V63 N64 K65 L66 I67 C68 V69 K70 A71 L72 K73 T74 R75 Y76 I77 G78 E79 V80 G81 D82 I83 V84 V85 G86 R87 I88 T89 E90 V91 Q92 Q93 K94 R95 W96 K97 V98 E99 T100 N101 S102 R103 L104 D105 S106 V107 L108 L109 L110 S111 S112 M113 N114 L115 P116

G117 G118 E119 L120 R121 R122 R123 S124 A125 E126 D127 E128 L129 A130 M131 R132 G133 F134 L135 Q136 E137 G138 D139 L140 I141 S142 A143 E144 V145 Q146 A147 V148 F149 S150 D151 G152 A153 V154 S155 L156 H157 T158 R159 S160 L161 K162 Y163 G164 K165 L166 G167 Q168 G169 V170 L171 V172 Q173 V174 S175 P176

S177 L178 V179 K180 R181 Q182 K183 T184 H185 F186 H187 D188 L189 P190 C191 G192 A193 S194 V195 I196 L197 G198 N199 N200 G201 F202 I203 W204 I205 Y206 P207 T208 P209 E210 H211 K212 GLU GLU GLU ALA G217 G218 F219 I220 A221 N222 L223 E224 P225 V226 S227 L228 A229 D230 R231 E232 V233 I234 S235 R236

L237 R238 N239 C240 I241 I242 S243 L244 V245 T246 Q247 R248 M249 M250 L251 Y252 D253 T254 S255 I256 L257 Y258 C259 Y260 E261 A262 S263 L264 P265 H266 Q267 I268 K269 D270 I271 L272 K273 P274 E275 I276 M277 E278 E279 I280 V281 M282 E283 T284 R285 Q286 R287 L288 L289 E290 Q291 E292 G293

• Molecule 14: CrPV-IRES RNA

Chain X: 28% | 19% 30% • 51%

A A A A A U G U G A U C U U G C U G U G U A A A U A C A A U U U U G A G A G G U U A A U A A A U U A C A A G U A G U G C

U A U U U U U G U A U U U72 G75 U76 U77 A78 U81 A82 U83 U84 U85 A86 G87 C88 U89 U90 U91 A92 C93 G94 U95 U96 C97 C98 A99 G100 G101 A102 U103 G104 C105 C106 U107 A108 G109 U110 G111 G112 C113 A114 G115 C116 C117 A120 C121 A122

A123 U124 A125 U126 C127 C128 A129 G130 G131 A132 A133 G134 C135 C136 C137 U C U C U G C G G U U C G A A A A C C U U U U U A G G U A U U G G U U U U C U A A G

A A A U U U A C C U A193 U194 U195 U196 U197 U198 A199 A200 A201 A202 A203 A204 A205 U206 U207 U208 U209 U210 U211 U212 U213 U214 U215 U216 U217 U218 U219 U220 U221 U222 U223 U224 U225 U226 U227 U228 U229 U230 U231 C232 U233 C234 C235 U236 C237 U238 U239 U240 U241 U242

U243 U244 U245 U246 U247 U248 U249

• Molecule 15: 60S ribosomal protein L41

Chain Ln: 12% | 96% •

M1 Q22 R23 S24 LYS

• Molecule 16: DIS3-like exonuclease 1

Chain M: 89% | 89% 11%

MET SER ALA TRP SER HIS PRO GLN PHE GLU LYS GLY GLY GLY SER GLY GLY GLY SER GLY GLY SER ALA TRP SER HIS PRO GLN PHE GLU LYS THR ALA GLY LEU GLU VAL LEU PHE GLN GLY PRO M1 L2 Q3 K4 R5 E6 K7 V8 L9 L10 L11 R12 T13 F14 Q15 G16 R17 T18

L19 R20 I21 V22 R23 E24 H25 Y26 L27 R28 P29 C30 V31 P32 C33 H34 S35 P36 L37 C38 P39 Q40 P41 A42 A43 C44 S45 H46 D47 G48 K49 L50 L51 S52 S53 D54 V55 T56 H57 Y58 V59 I60 P61 D62 W63 K64 V65 V66 Q67 D68 Y69 L70 E71 I72 L73 E74 F75 P76 E77 L78

K79 G80 I81 I82 F83 M84 Q85 T86 A87 C88 Q89 A90 V91 Q92 H93 Q94 R95 G96 R97 R98 Q99 Y100 N101 K102 L103 R104 N105 L106 L107 K108 D109 A110 R111 H112 D113 C114 I115 L116 F117 A118 N119 E120 F121 Q122 Q123 C124 C125 Y126 L127 P128 R129 E130 R131 G132 E133 S134 M135 E136 K137 W138

Q139 T140 R141 S142 I143 Y144 N145 A146 A147 V148 W149 Y150 Y151 H152 H153 C154 Q155 D156 R157 M158 P159 I160 V161 M162 V163 T164 E165 D166 E167 E168 A169 I170 Q171 Q172 Y173 G174 S175 E176 T177 E178 G179 V180 F181 V182 I183 T184 F185 K186 N187 Y188 L189 D190 N191 F192 W193 P194 D195 L196 K197 A198

A199 H200 E201 L202 C203 D204 S205 I206 L207 Q208 S209 R210 R211 E212 R213 E214 N215 E216 S217 Q218 E219 S220 H221 G222 K223 E224 Y225 P226 E227 H228 L229 P230 L231 E232 V233 L234 E235 A236 G237 I238 K239 S240 G241 R242 Y243 I244 Q245 G246 I247 L248 N249 V250 N251 K252 H253 R254 A255 Q256 I257 E258

A259 F260 V261 R262 L263 GLN GLY ALA SER SER LYS ASP SER ASP LEU VAL SER D276 I277 L278 I279 H280 G281 M282 K283 A284 R285 N286 R287 S288 I289 H290 G291 D292 V293 V294 V295 V296 E297 L298 L299 P300 K301 N302 E303 W304 K305 G306 R307 THR VAL ALA LEU CYS GLU ASN ASP CYS ASP ASP

LYS ALA SER GLY GLU SER PRO SER E327 P328 M329 P330 T331 G332 R333 V334 V335 G336 I337 L338 Q339 K340 N341 W342 R343 D344 Y345 V346 V347 T348 F349 P350 S351 K352 E353 E354 V355 Q356 S357 Q358 G359 K360 N361 A362 Q363 K364 I365 L366 V367 T368 P369 W370 D371 Y372 R373 I374 P375 K376 I377 R378

I379 S380 T381 Q382 Q383 A384 E385 T386 L387 Q388 D389 F390 R391 V392 V393 V394 R395 I396 D397 S398 W399 E400 S401 T402 S403 V404 Y405 P406 N407 G408 H409 F410 V411 R412 V413 L414 G415 R416 I417 G418 D419 L420 E421 G422 E423 I424 A425 T426 I427 L428 V429 E430 N431 S432 I433 S434 V435 I436 P437 F438

S439 E440 A441 Q442 M443 C444 E445 M446 P447 V448 N449 T450 P451 E452 S453 P454 W455 K456 V457 S458 P459 E460 E461 E462 Q463 K464 R465 K466 D467 L468 R469 K470 S471 H472 L473 V474 F475 S476 I477 D478 P479 K480 G481 C482 E483 D484 V485 N486 D487 T488 L489 S490 V491 R492 T493 L494 N495 N496 G497 N498

L499 E500 L501 G502 V503 H504 I505 A506 D507 V508 T509 H510 F511 V512 A513 P514 N515 S516 Y517 I518 D519 I520 E521 A522 R523 T524 R525 A526 T527 T528 Y529 Y530 L531 A532 D533 R534 R535 Y536 D537 M538 L539 P540 S541 V542 L543 S544 A545 D546 L547 C548 S549 L550 L551 G552 G553 V554 D555 R556 Y557 A558

V559 S560 I561 M562 W563 E564 L565 D566 K567 A568 S569 Y570 E571 I572 K573 K574 V575 W576 Y577 G578 R579 T580 I581 I582 R583 S584 A585 Y586 K587 L588 F589 Y590 E591 A592 A593 Q594 E595 L596 L597 D598 G599 N600 L601 SER VAL VAL ASP ASP ILE PRO GLU PHE LYS ASP LEU D614 E615 K616 S617 R618

Q619 A620 K621 L622 E623 E624 L625 V626 W627 A628 I629 G630 K631 L632 T633 D634 I635 A636 R637 H638 V639 R640 A641 K642 R643 D644 G645 C646 G647 A648 L649 E650 L651 E652 G653 V654 E655 V656 C657 V658 Q659 L660 D661 D662 K663 K664 N665 I666 H667 D668 L669 I670 P671 K672 Q673 P674 L675 E676 V677 H678

E679 T680 V681 A682 E683 C684 M685 I686 L687 A688 N689 H690 W691 V692 A693 K694 K695 I696 W697 E698 S699 F700 P701 H702 Q703 A704 L705 L706 R707 Q708 H709 P710 P711 P712 H713 Q714 E715 F716 F717 S718 E719 L720 R721 E722 C723 A724 K725 A726 K727 G728 F729 F730 I731 D732 T733 R734 S735 N736 K737 T738

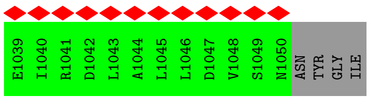
L739 A740 D741 S742 L743 D744 N745 A746 N747 D748 P749 H750 D751 P752 I753 V754 N755 R756 L757 L758 R759 S760 M761 A762 T763 Q764 A765 M766 S767 N768 A769 L770 Y771 F772 S773 T774 G775 S776 C777 A778 E779 E780 E781 F782 H783 H784 Y785 G786 L787 A788 L789 D790 K791 Y792 T793 H794 F795 T796 S797 P798

I799 R800 R801 Y802 S803 D804 I805 V806 V807 H808 R809 L810 L811 M812 A813 A814 I815 S816 K817 D818 K819 K820 M821 E822 I823 K824 G825 N826 L827 F828 S829 N830 K831 D832 L833 E834 E835 L836 C837 R838 H839 I840 N841 N842 R843 N844 Q845 A846 A847 Q848 H849 S850 Q851 K852 Q853 S854 T855 E856 L857 F858

Q859 C860 M861 Y862 F863 K864 D865 K866 D867 P868 A869 T870 E871 E872 R873 C874 I875 S876 D877 G878 V879 I880 Y881 S882 I883 R884 T885 N886 G887 V888 L889 L890 F891 I892 P893 R894 F895 G896 I897 K898 G899 A900 A901 Y902 L903 K904 N905 K906 D907 G908 L909 V910 I911 S912 C913 G914 P915 D916 S917 C918

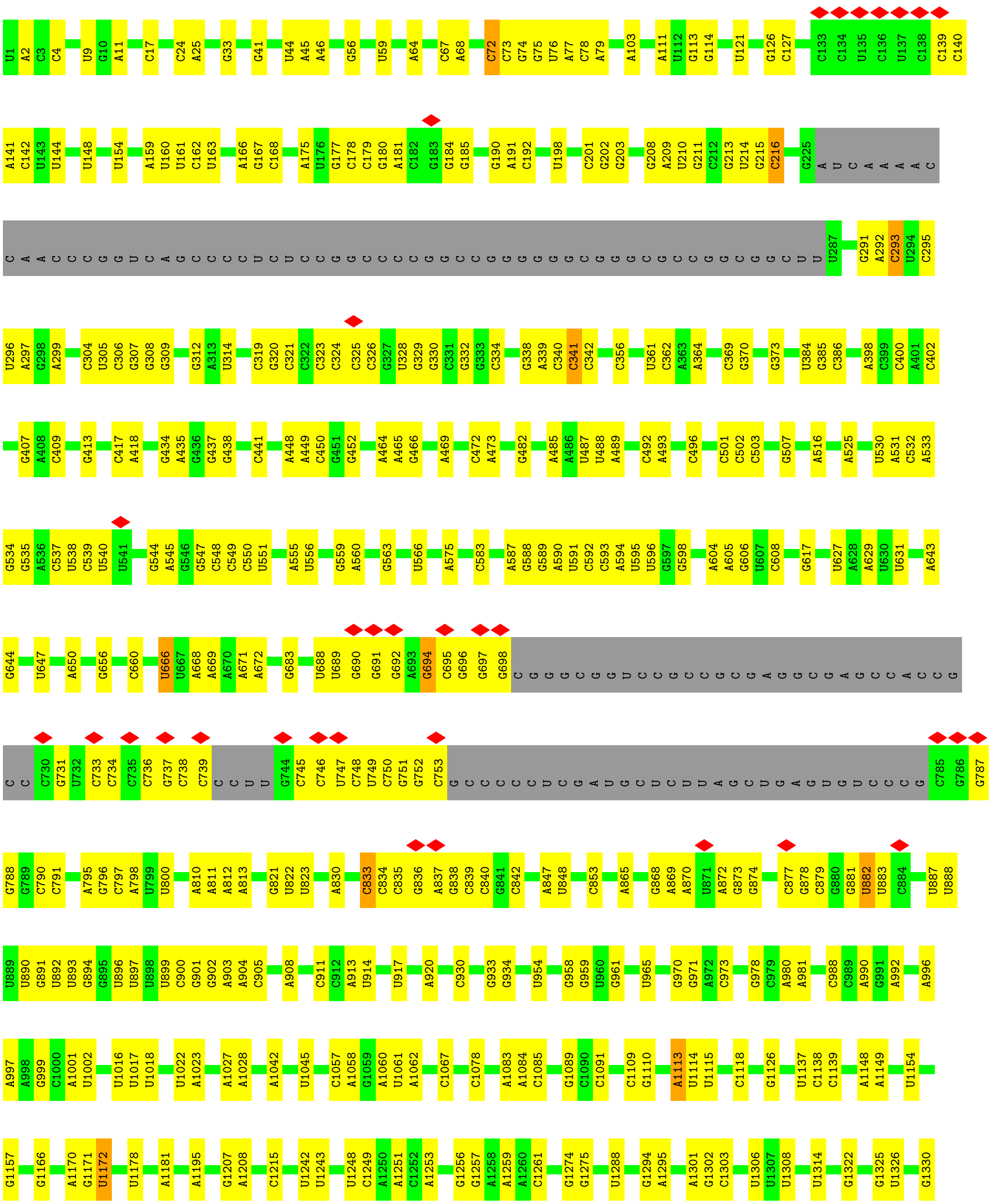
S919 E920 W921 K922 P923 G924 S925 L926 Q927 R928 F929 Q930 N931 K932 I933 T934 S935 T936 T937 T938 D939 G940 E941 S942 V943 T944 F945 H946 L947 F948 D949 H950 V951 T952 V953 R954 I955 S956 I957 Q958 A959 S960 R961 C962 H963 S964 D965 T966 I967 R968 L969 E970 I971 S972 S973 N974 K975 P976 Y977 K978

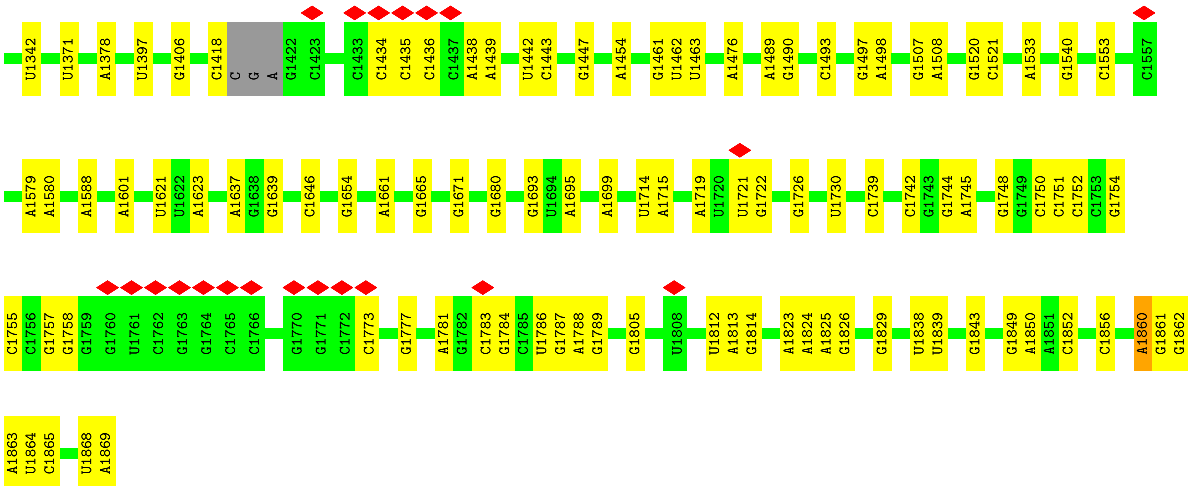
I979 P980 N981 T982 E983 LEU ILE HIS GLN SER SER PRO LEU LEU LYS SER GLU LEU VAL LYS GLU VAL THR LYS SER VAL GLU GLU ALA GLN LEU ALA GLN GLU VAL LYS VAL N1016 I1017 I1018 Q1019 E1020 E1021 Y1022 Q1023 E1024 Y1025 R1026 Q1027 T1028 K1029 G1030 R1031 S1032 L1033 Y1034 T1035 L1036 L1037 E1038



• Molecule 17: 18S ribosomal RNA

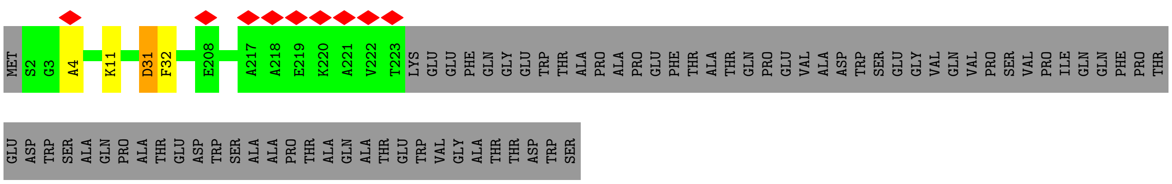
Chain S2:





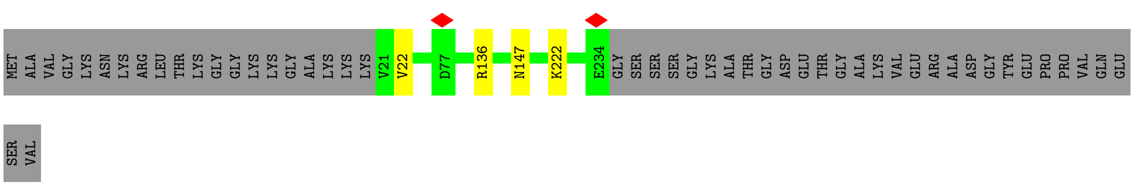
- Molecule 18: 40S ribosomal protein SA

Chain SA:

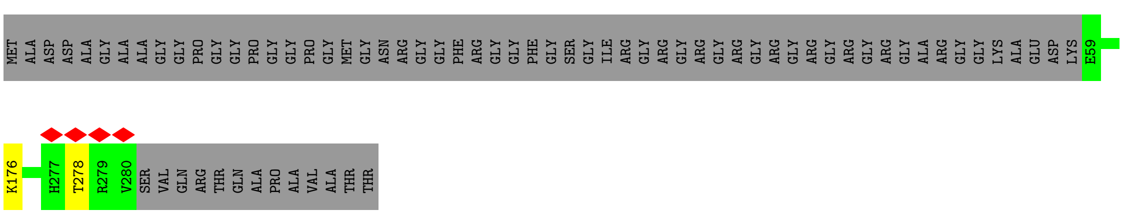
- Molecule 19: 40S ribosomal protein S3a

Chain SB:

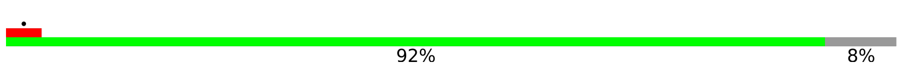



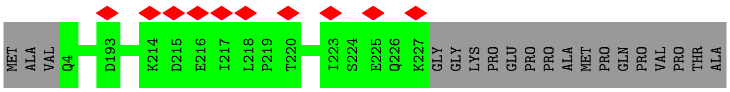
- Molecule 20: 40S ribosomal protein S2

Chain SC:

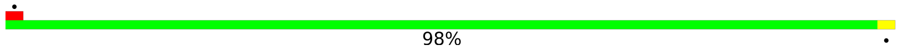



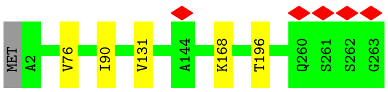
- Molecule 21: 40S ribosomal protein S3

Chain SD:




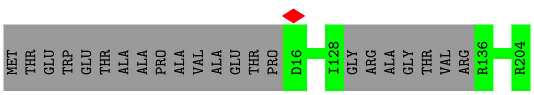
• Molecule 22: 40S ribosomal protein S4, X isoform

Chain SE:


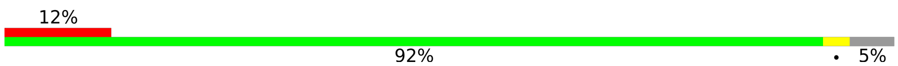


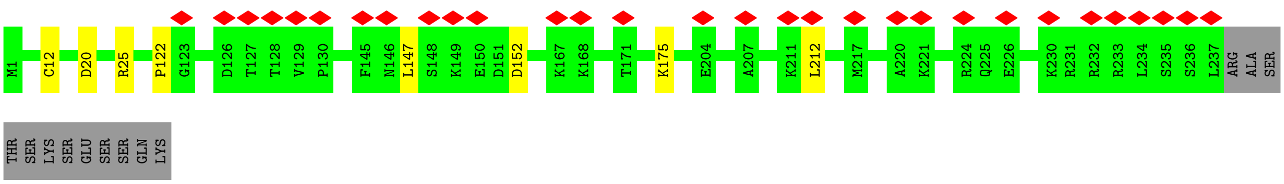
• Molecule 23: 40S ribosomal protein S5

Chain SF:

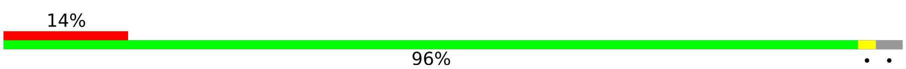



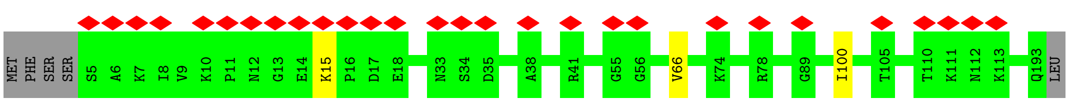
• Molecule 24: 40S ribosomal protein S6

Chain SG:


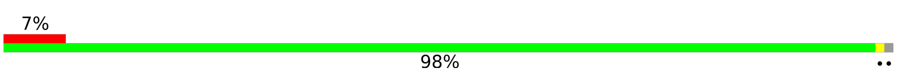


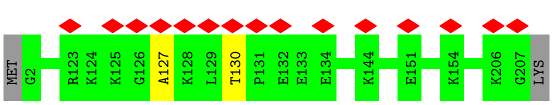
• Molecule 25: 40S ribosomal protein S7

Chain SH:


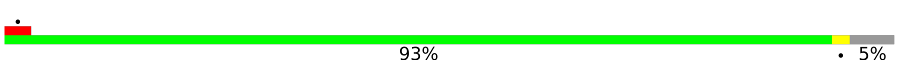


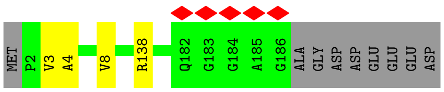
• Molecule 26: 40S ribosomal protein S8

Chain SI:




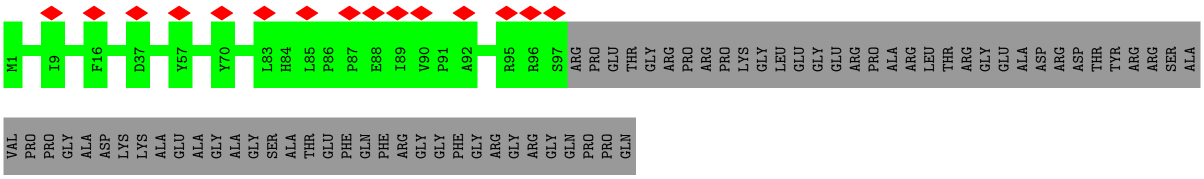
• Molecule 27: 40S ribosomal protein S9

Chain SJ:


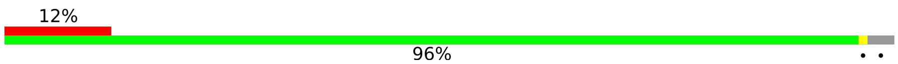


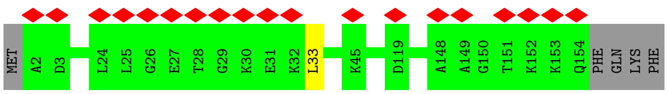
• Molecule 28: 40S ribosomal protein S10

Chain SK: 



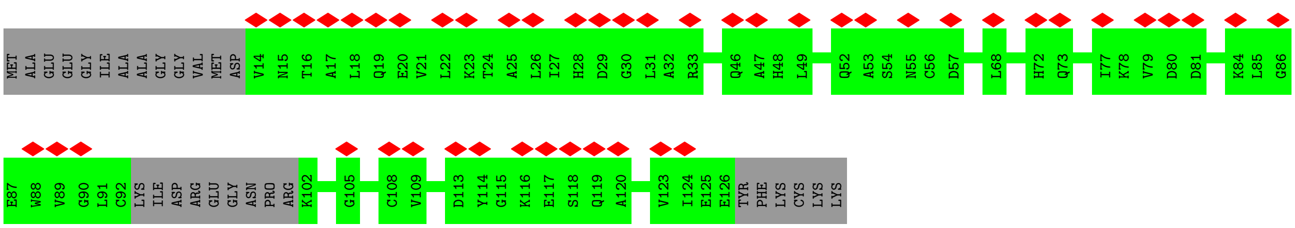
• Molecule 29: 40S ribosomal protein S11

Chain SL: 

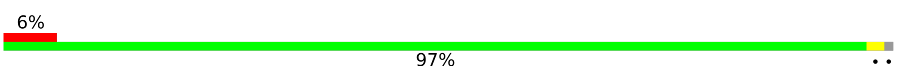


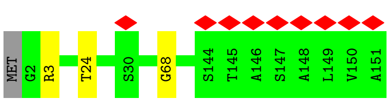
• Molecule 30: 40S ribosomal protein S12

Chain SM: 

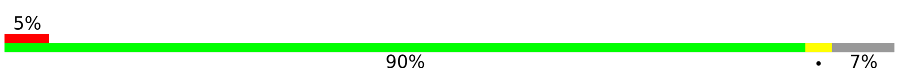


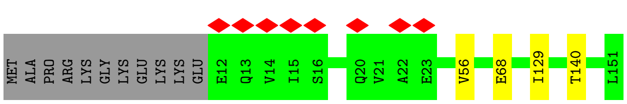
• Molecule 31: 40S ribosomal protein S13

Chain SN: 



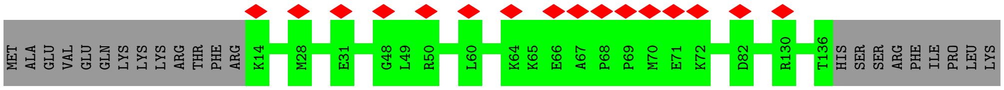
• Molecule 32: 40S ribosomal protein S14

Chain SO: 



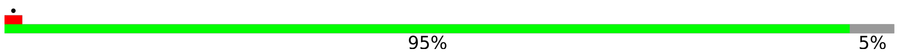
• Molecule 33: 40S ribosomal protein S15

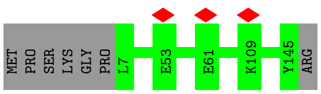
Chain SP:



• Molecule 34: 40S ribosomal protein S16

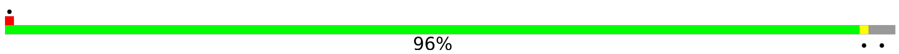
Chain SQ:

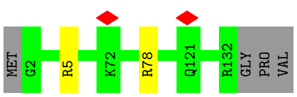




• Molecule 35: 40S ribosomal protein S17

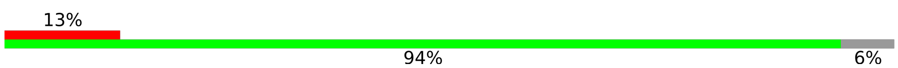
Chain SR:

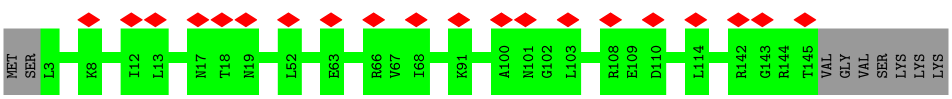




• Molecule 36: 40S ribosomal protein S18

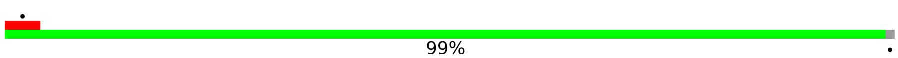
Chain SS:

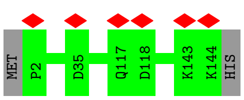




• Molecule 37: 40S ribosomal protein S19

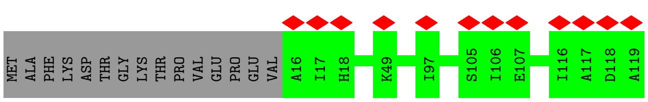
Chain ST:





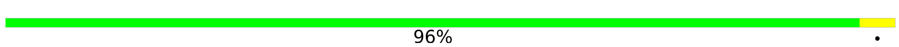
• Molecule 38: 40S ribosomal protein S20

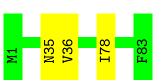
Chain SU:



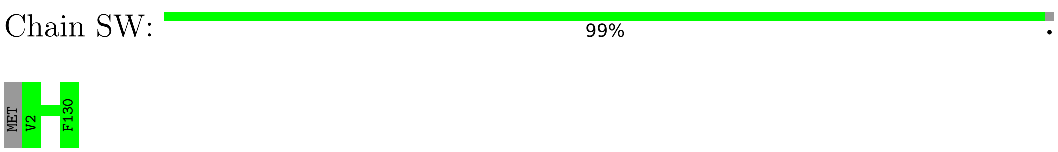
• Molecule 39: 40S ribosomal protein S21

Chain SV:

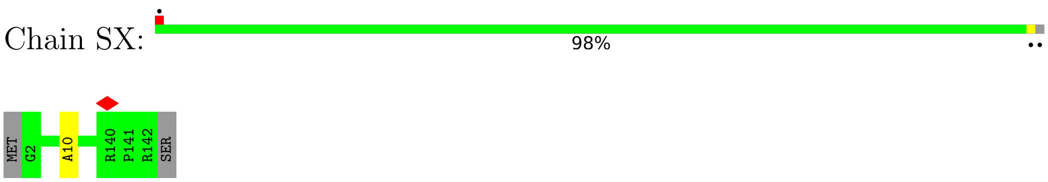




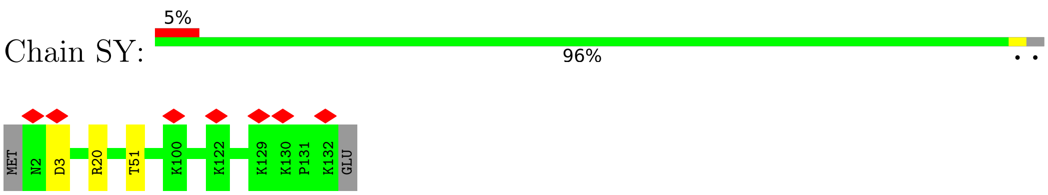
• Molecule 40: 40S ribosomal protein S15a



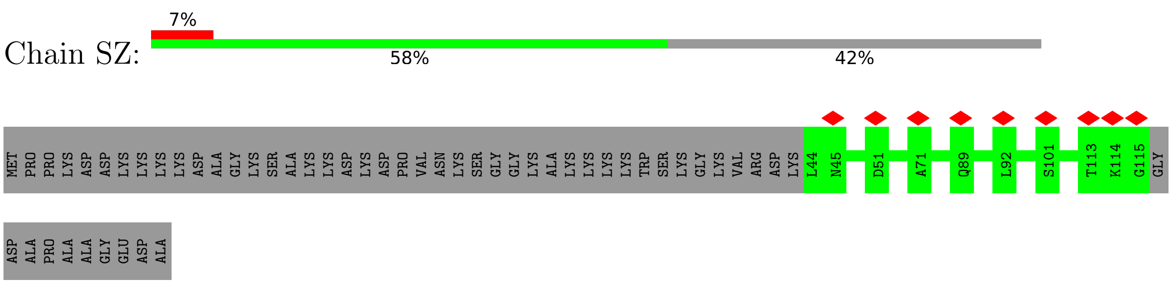
• Molecule 41: 40S ribosomal protein S23



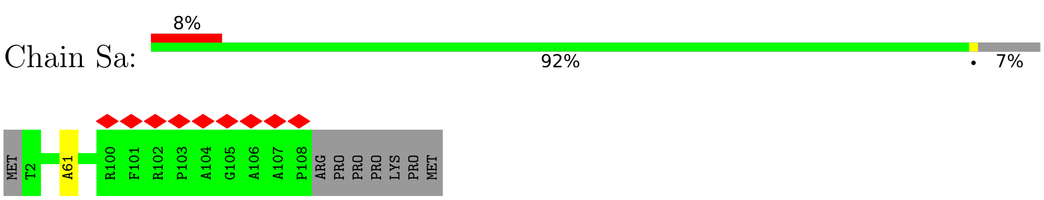
• Molecule 42: 40S ribosomal protein S24



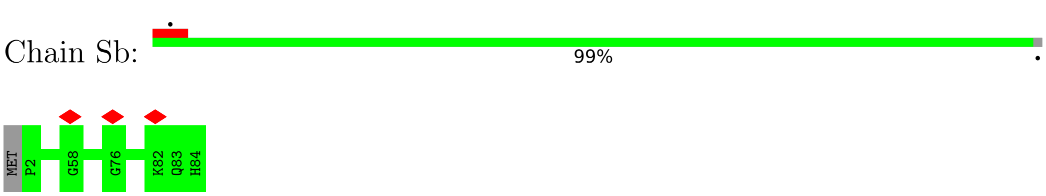
• Molecule 43: 40S ribosomal protein S25



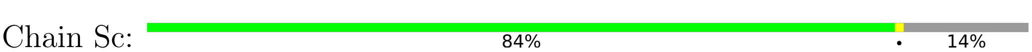
• Molecule 44: 40S ribosomal protein S26



• Molecule 45: 40S ribosomal protein S27



• Molecule 46: 40S ribosomal protein S28



MET ASP THR SER ARG VAL GLN PRO I9 R66 R67 LEU ARG

• Molecule 47: 40S ribosomal protein S29

Chain Sd: 98%

MET G2 D56

• Molecule 48: 40S ribosomal protein S30

Chain Se: 14% 98%

LYS V2 H3 P47 T48 F49 G50 K51 K52 S59

• Molecule 49: Ubiquitin

Chain Sf: 21% 41% 59%

MET GLN ILE PHE VAL LYS THR LEU THR GLY LYS THR ILE THR LEU GLU VAL GLU PRO SER ASP THR ILE GLU ASN VAL LYS ALA LYS ILE GLN ASP LYS GLU GLY ILE PRO PRO ASP GLN GLN ARG LEU ILE PHE ALA GLY LYS GLN LEU GLU ASP GLY ARG THR LEU SER ASP TYR ASN

ILE GLN LYS GLU SER THR LEU HIS LEU VAL LEU ARG LEU ARG GLY GLY ALA LYS LYS ARG LYS LYS LYS SER TYR THR THR P88 R95 V98 K99 K107 V108 D109 E110 N111 G112 K113 I114 S115 R116 L117 R118 R119 E120 C121 P122 S123 D124 E125 C126 G127 A128 G129 V130 F136

C145 L146 F150 N151 LYS PRO GLU ASP LYS

• Molecule 50: Receptor of activated protein C kinase 1

Chain Sg: 9% 98%

MET THR E3 A22 E49 G95 F101 Q143 D144 E145 S157 P158 N159 N162 L230 D231 G232 G233 A238 A250 D268 E273 V274 I275 S276 T277 S278 S279 K280 A290 L298 F299 A300 I314 GLY THR ARG

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	53460	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 ($e^-/\text{Å}^2$)	64.2	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.053	Depositor
Minimum map value	-0.013	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	708.19836, 708.19836, 708.19836	wwPDB
Map dimensions	832, 832, 832	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8512, 0.8512, 0.8512	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	B	0.25	0/7429	0.48	0/10058
2	C	0.25	0/2432	0.54	0/3311
2	D	0.27	0/2432	0.54	0/3311
3	F	0.26	0/2225	0.52	0/3007
4	J	0.25	0/1438	0.54	0/1942
5	K	0.25	0/2807	0.52	0/3792
6	L	0.26	0/2053	0.52	0/2786
7	N	0.25	0/1843	0.56	0/2492
8	O	0.27	0/1586	0.55	0/2145
9	A	0.26	0/8881	0.54	1/12039 (0.0%)
10	E	0.25	0/535	0.52	0/722
11	G	0.25	0/1881	0.59	0/2551
12	H	0.25	0/1832	0.54	0/2467
13	I	0.25	0/2296	0.56	0/3092
14	X	0.35	0/2792	0.99	11/4331 (0.3%)
15	Ln	0.34	0/231	0.80	0/294
16	M	0.24	0/8072	0.50	0/10916
17	S2	0.61	0/41169	0.90	48/64139 (0.1%)
18	SA	0.38	0/1784	0.63	1/2424 (0.0%)
19	SB	0.36	0/1765	0.60	0/2362
20	SC	0.40	0/1762	0.61	0/2381
21	SD	0.33	0/1773	0.57	0/2387
22	SE	0.36	0/2118	0.65	0/2849
23	SF	0.34	0/1465	0.56	0/1969
24	SG	0.32	0/1946	0.65	1/2590 (0.0%)
25	SH	0.31	0/1544	0.58	0/2068
26	SI	0.36	0/1715	0.62	0/2287
27	SJ	0.39	0/1550	0.70	1/2069 (0.0%)
28	SK	0.32	0/840	0.53	0/1133
29	SL	0.40	0/1268	0.63	1/1696 (0.1%)
30	SM	0.28	0/799	0.50	0/1076
31	SN	0.36	0/1232	0.59	0/1656
32	SO	0.33	0/1062	0.67	0/1425
33	SP	0.32	0/1024	0.55	0/1369

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
34	SQ	0.35	0/1122	0.59	0/1503
35	SR	0.33	0/1078	0.59	0/1447
36	SS	0.29	0/1202	0.60	0/1610
37	ST	0.33	0/1131	0.53	0/1515
38	SU	0.31	0/831	0.57	0/1115
39	SV	0.34	0/643	0.60	0/860
40	SW	0.39	0/1051	0.64	0/1406
41	SX	0.37	0/1116	0.60	0/1490
42	SY	0.37	0/1083	0.63	0/1438
43	SZ	0.30	0/576	0.54	0/774
44	Sa	0.38	0/863	0.65	0/1159
45	Sb	0.33	0/665	0.59	0/891
46	Sc	0.31	0/465	0.64	0/621
47	Sd	0.34	0/470	0.56	0/623
48	Se	0.33	0/465	0.62	0/612
49	Sf	0.29	0/533	0.53	0/706
50	Sg	0.30	0/2486	0.54	0/3384
All	All	0.42	0/131361	0.71	64/186290 (0.0%)

There are no bond length outliers.

The worst 5 of 64 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
17	S2	1442	U	OP1-P-O3'	-11.25	80.45	105.20
17	S2	1442	U	OP2-P-O3'	-9.56	84.17	105.20
14	X	215	U	C2-N1-C1'	7.87	127.14	117.70
27	SJ	4	ALA	C-N-CA	7.75	141.07	121.70
17	S2	1646	C	N1-C2-O2	7.64	123.49	118.90

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	Percentiles	
1	B	932/1568 (59%)	874 (94%)	58 (6%)	0	100	100
2	C	303/305 (99%)	272 (90%)	31 (10%)	0	100	100
2	D	303/305 (99%)	259 (86%)	44 (14%)	0	100	100
3	F	284/295 (96%)	267 (94%)	16 (6%)	1 (0%)	30	60
4	J	182/199 (92%)	158 (87%)	23 (13%)	1 (0%)	25	54
5	K	351/443 (79%)	331 (94%)	20 (6%)	0	100	100
6	L	263/280 (94%)	247 (94%)	16 (6%)	0	100	100
7	N	239/245 (98%)	225 (94%)	14 (6%)	0	100	100
8	O	206/239 (86%)	199 (97%)	7 (3%)	0	100	100
9	A	1104/1246 (89%)	1023 (93%)	80 (7%)	1 (0%)	48	78
10	E	60/274 (22%)	51 (85%)	9 (15%)	0	100	100
11	G	247/272 (91%)	239 (97%)	8 (3%)	0	100	100
12	H	233/279 (84%)	213 (91%)	20 (9%)	0	100	100
13	I	285/297 (96%)	261 (92%)	24 (8%)	0	100	100
15	Ln	22/25 (88%)	19 (86%)	3 (14%)	0	100	100
16	M	965/1096 (88%)	921 (95%)	44 (5%)	0	100	100
18	SA	220/295 (75%)	191 (87%)	26 (12%)	3 (1%)	9	31
19	SB	212/264 (80%)	181 (85%)	29 (14%)	2 (1%)	14	41
20	SC	220/293 (75%)	186 (84%)	32 (14%)	2 (1%)	14	41
21	SD	222/243 (91%)	216 (97%)	6 (3%)	0	100	100
22	SE	260/263 (99%)	219 (84%)	36 (14%)	5 (2%)	6	26
23	SF	178/204 (87%)	167 (94%)	11 (6%)	0	100	100
24	SG	235/249 (94%)	197 (84%)	31 (13%)	7 (3%)	3	19
25	SH	187/194 (96%)	154 (82%)	31 (17%)	2 (1%)	12	37
26	SI	204/208 (98%)	177 (87%)	25 (12%)	2 (1%)	13	39

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
27	SJ	183/194 (94%)	160 (87%)	20 (11%)	3 (2%)	8	29
28	SK	95/165 (58%)	87 (92%)	8 (8%)	0	100	100
29	SL	151/158 (96%)	127 (84%)	24 (16%)	0	100	100
30	SM	100/132 (76%)	90 (90%)	10 (10%)	0	100	100
31	SN	148/151 (98%)	142 (96%)	3 (2%)	3 (2%)	6	25
32	SO	138/151 (91%)	107 (78%)	27 (20%)	4 (3%)	3	19
33	SP	121/145 (83%)	115 (95%)	6 (5%)	0	100	100
34	SQ	137/146 (94%)	130 (95%)	7 (5%)	0	100	100
35	SR	129/135 (96%)	125 (97%)	4 (3%)	0	100	100
36	SS	141/152 (93%)	137 (97%)	4 (3%)	0	100	100
37	ST	141/145 (97%)	140 (99%)	1 (1%)	0	100	100
38	SU	102/119 (86%)	96 (94%)	6 (6%)	0	100	100
39	SV	81/83 (98%)	65 (80%)	14 (17%)	2 (2%)	4	22
40	SW	127/130 (98%)	115 (91%)	12 (9%)	0	100	100
41	SX	139/143 (97%)	126 (91%)	12 (9%)	1 (1%)	19	47
42	SY	129/133 (97%)	115 (89%)	12 (9%)	2 (2%)	8	29
43	SZ	70/125 (56%)	65 (93%)	5 (7%)	0	100	100
44	Sa	105/115 (91%)	81 (77%)	23 (22%)	1 (1%)	13	39
45	Sb	81/84 (96%)	66 (82%)	15 (18%)	0	100	100
46	Sc	57/69 (83%)	53 (93%)	4 (7%)	0	100	100
47	Sd	53/56 (95%)	52 (98%)	1 (2%)	0	100	100
48	Se	56/59 (95%)	43 (77%)	13 (23%)	0	100	100
49	Sf	62/156 (40%)	57 (92%)	5 (8%)	0	100	100
50	Sg	310/317 (98%)	288 (93%)	22 (7%)	0	100	100
All	All	10773/12844 (84%)	9829 (91%)	902 (8%)	42 (0%)	32	60

5 of 42 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
18	SA	32	PHE
19	SB	147	ASN
22	SE	76	VAL
24	SG	25	ARG
24	SG	122	PRO

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	780/1316 (59%)	778 (100%)	2 (0%)	91	95
2	C	260/260 (100%)	260 (100%)	0	100	100
2	D	260/260 (100%)	259 (100%)	1 (0%)	89	93
3	F	249/255 (98%)	247 (99%)	2 (1%)	79	87
4	J	160/173 (92%)	160 (100%)	0	100	100
5	K	307/384 (80%)	307 (100%)	0	100	100
6	L	227/238 (95%)	226 (100%)	1 (0%)	89	93
7	N	183/186 (98%)	183 (100%)	0	100	100
8	O	172/196 (88%)	172 (100%)	0	100	100
9	A	953/1062 (90%)	950 (100%)	3 (0%)	91	95
10	E	57/251 (23%)	57 (100%)	0	100	100
11	G	178/188 (95%)	178 (100%)	0	100	100
12	H	196/224 (88%)	196 (100%)	0	100	100
13	I	251/257 (98%)	250 (100%)	1 (0%)	89	93
15	Ln	23/24 (96%)	23 (100%)	0	100	100
16	M	873/973 (90%)	872 (100%)	1 (0%)	92	97
18	SA	184/243 (76%)	183 (100%)	1 (0%)	86	91
19	SB	195/231 (84%)	193 (99%)	2 (1%)	73	83
20	SC	188/225 (84%)	188 (100%)	0	100	100
21	SD	188/202 (93%)	188 (100%)	0	100	100
22	SE	224/225 (100%)	224 (100%)	0	100	100
23	SF	155/170 (91%)	155 (100%)	0	100	100
24	SG	207/218 (95%)	207 (100%)	0	100	100
25	SH	169/174 (97%)	168 (99%)	1 (1%)	84	90
26	SI	178/180 (99%)	178 (100%)	0	100	100
27	SJ	161/168 (96%)	161 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
28	SK	88/136 (65%)	88 (100%)	0	100	100
29	SL	137/142 (96%)	137 (100%)	0	100	100
30	SM	86/108 (80%)	86 (100%)	0	100	100
31	SN	130/131 (99%)	130 (100%)	0	100	100
32	SO	110/119 (92%)	110 (100%)	0	100	100
33	SP	109/130 (84%)	109 (100%)	0	100	100
34	SQ	115/121 (95%)	115 (100%)	0	100	100
35	SR	119/122 (98%)	117 (98%)	2 (2%)	56	74
36	SS	124/132 (94%)	124 (100%)	0	100	100
37	ST	113/115 (98%)	113 (100%)	0	100	100
38	SU	94/107 (88%)	94 (100%)	0	100	100
39	SV	67/67 (100%)	66 (98%)	1 (2%)	60	76
40	SW	112/113 (99%)	112 (100%)	0	100	100
41	SX	113/115 (98%)	113 (100%)	0	100	100
42	SY	113/115 (98%)	112 (99%)	1 (1%)	75	86
43	SZ	63/103 (61%)	63 (100%)	0	100	100
44	Sa	90/98 (92%)	90 (100%)	0	100	100
45	Sb	75/76 (99%)	75 (100%)	0	100	100
46	Sc	52/62 (84%)	51 (98%)	1 (2%)	52	71
47	Sd	48/49 (98%)	48 (100%)	0	100	100
48	Se	47/48 (98%)	47 (100%)	0	100	100
49	Sf	57/140 (41%)	57 (100%)	0	100	100
50	Sg	271/275 (98%)	270 (100%)	1 (0%)	89	93
All	All	9311/10907 (85%)	9290 (100%)	21 (0%)	91	96

5 of 21 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
25	SH	15	LYS
39	SV	35	ASN
50	Sg	280	LYS
42	SY	20	ARG
35	SR	78	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
24	SG	186	GLN
31	SN	90	HIS
37	ST	126	GLN
35	SR	116	ASN
1	B	1432	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
14	X	121/250 (48%)	72 (59%)	3 (2%)
17	S2	1712/1869 (91%)	463 (27%)	19 (1%)
All	All	1833/2119 (86%)	535 (29%)	22 (1%)

5 of 535 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
14	X	77	U
14	X	78	A
14	X	81	U
14	X	82	A
14	X	83	U

5 of 22 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
17	S2	980	A
17	S2	1137	U
17	S2	1061	U
17	S2	1325	G
17	S2	339	A

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 oligosaccharides 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.

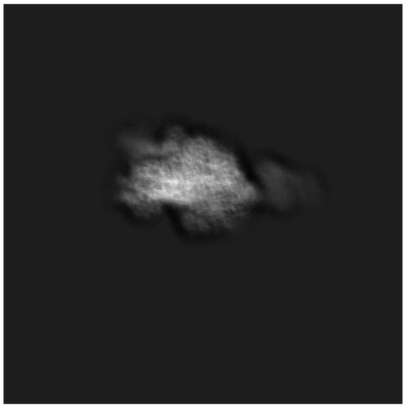
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-51134. These allow visual inspection of the internal detail of the map and identification of artifacts.

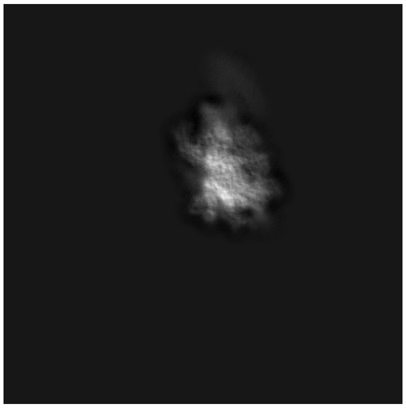
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

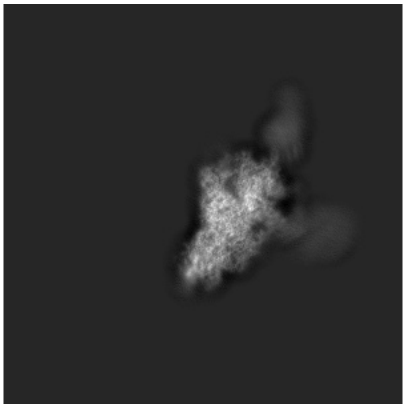
6.1.1 Primary map



X

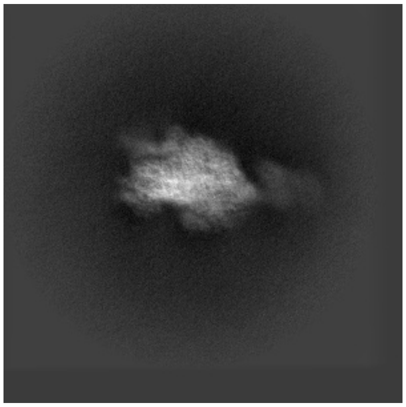


Y

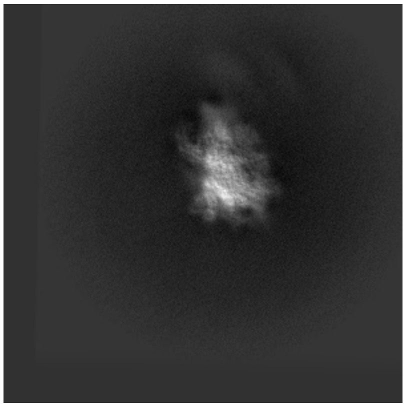


Z

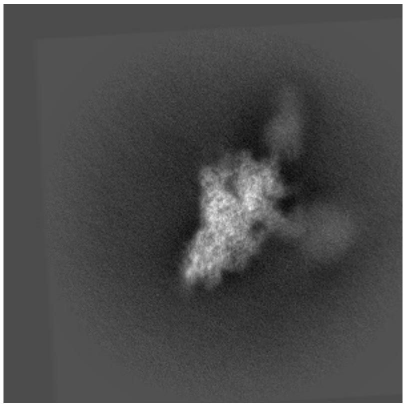
6.1.2 Raw map



X



Y

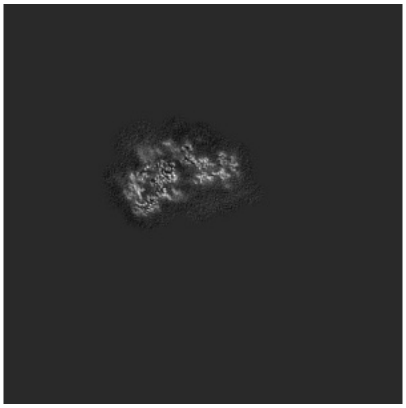


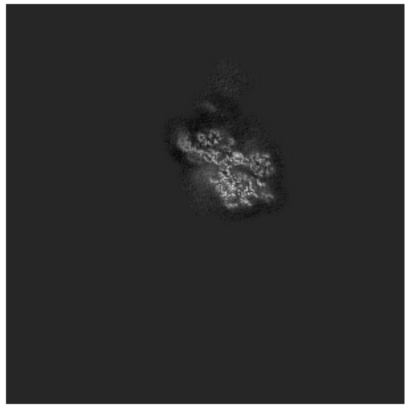
Z

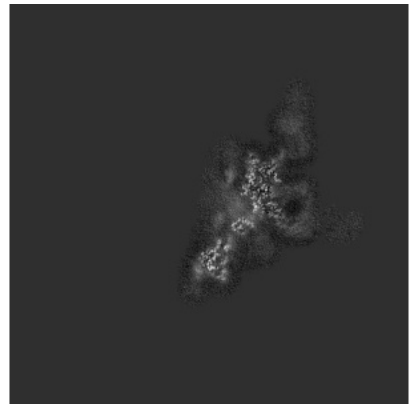
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

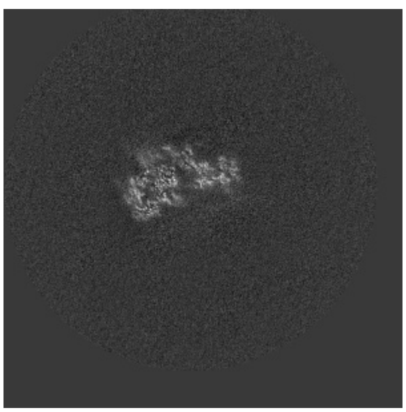
6.2.1 Primary map

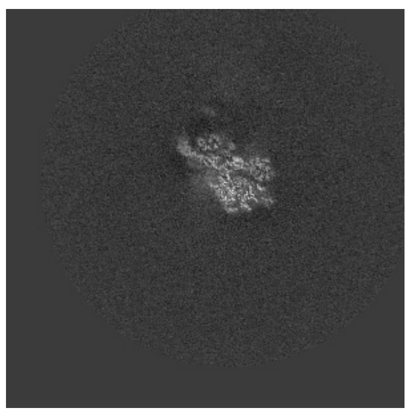

X Index: 416

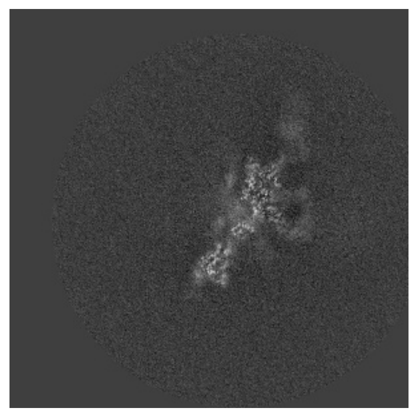

Y Index: 416


Z Index: 416

6.2.2 Raw map


X Index: 416

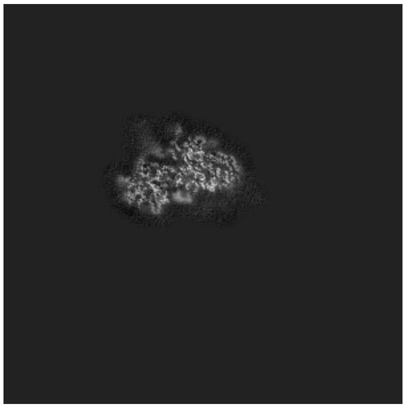

Y Index: 416


Z Index: 416

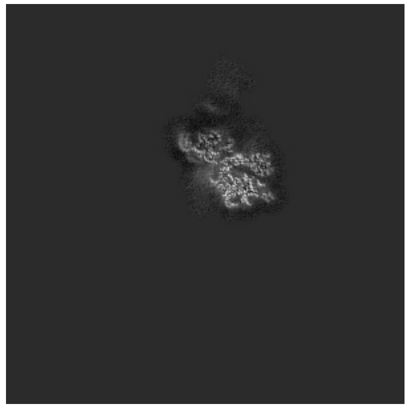
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices

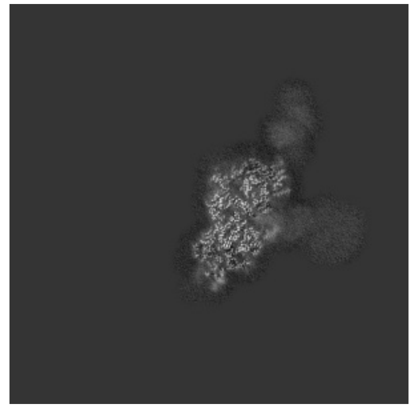
6.3.1 Primary map



X Index: 433

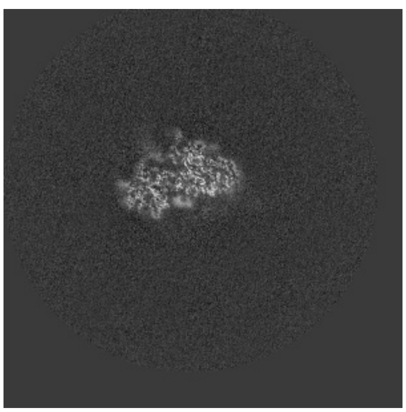


Y Index: 414

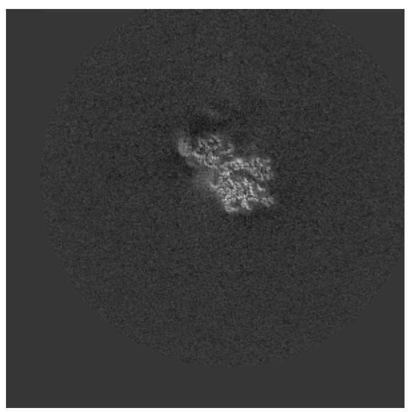


Z Index: 462

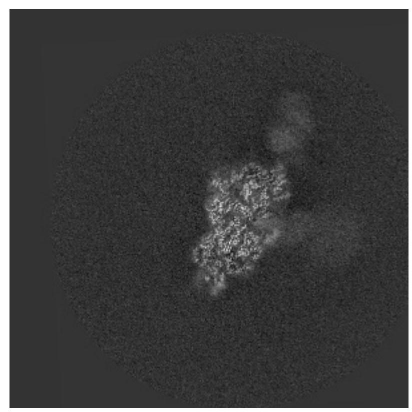
6.3.2 Raw map



X Index: 433



Y Index: 414

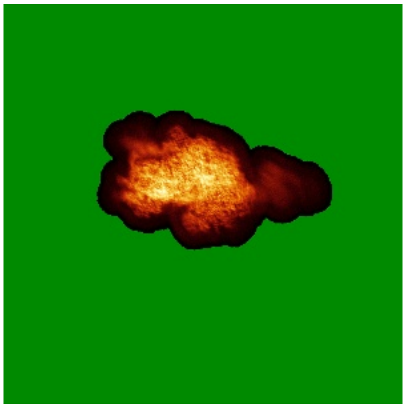


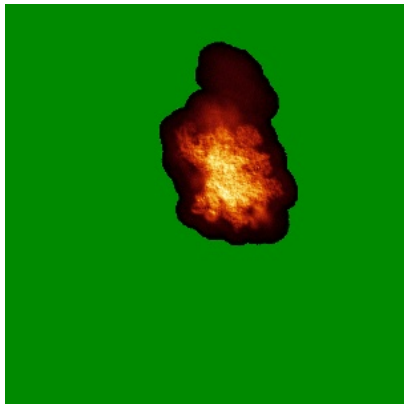
Z Index: 462

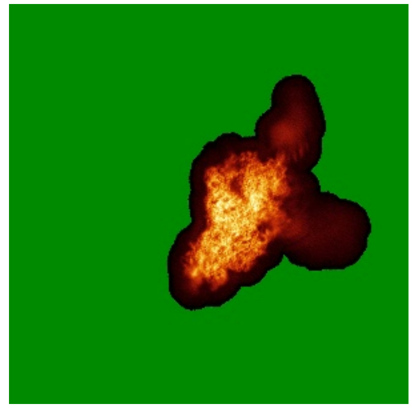
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color)

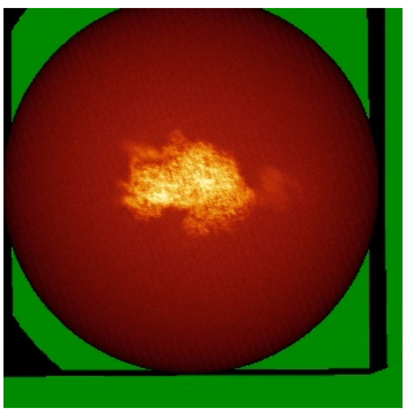
6.4.1 Primary map

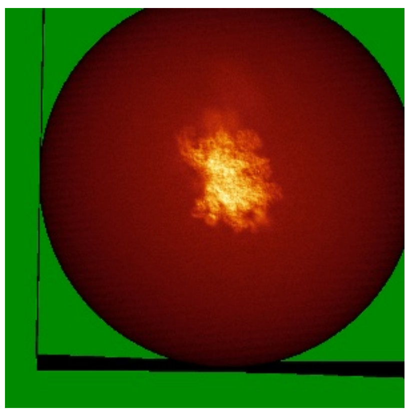

X

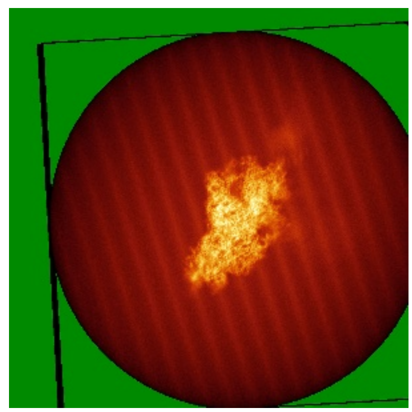

Y


Z

6.4.2 Raw map


X

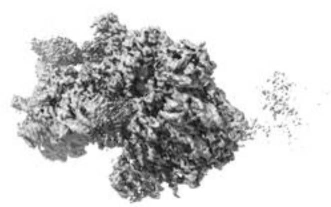

Y


Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X

Y

Z

The images above show the 3D surface view of the map at the recommended contour level 0.01. 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

X

Y

Z

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

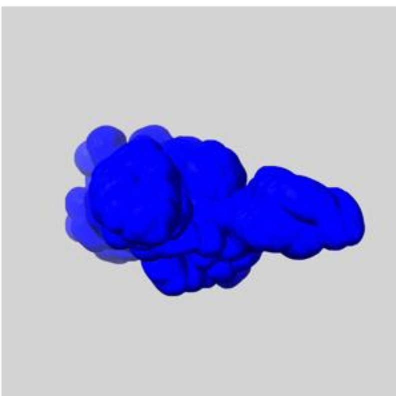
6.6 Mask visualisation (i)

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

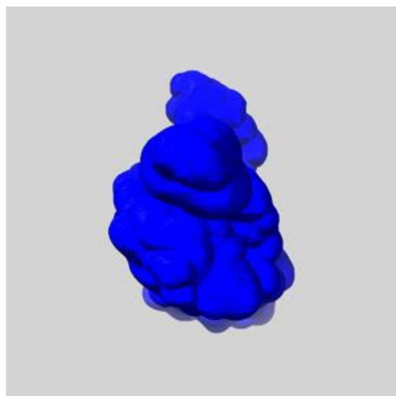
A mask typically either:

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

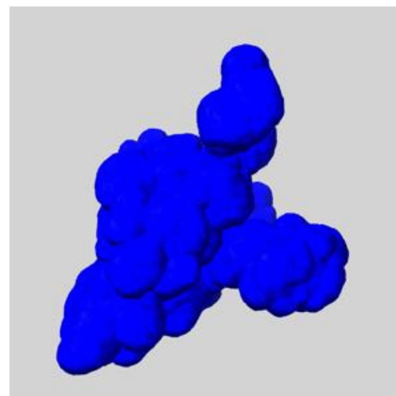
6.6.1 emd_51134_msk_1.map (i)



X



Y

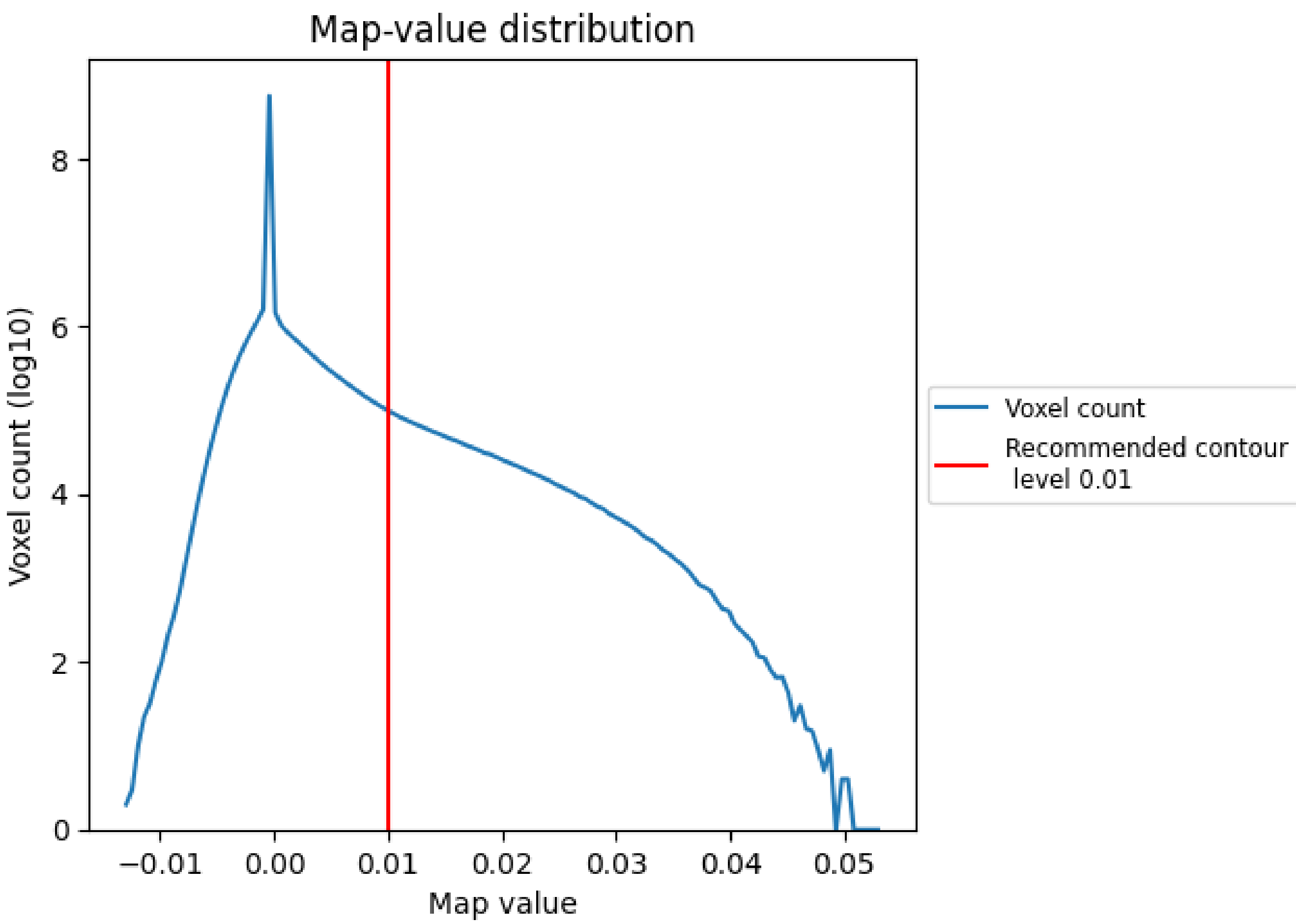


Z

7 Map analysis (i)

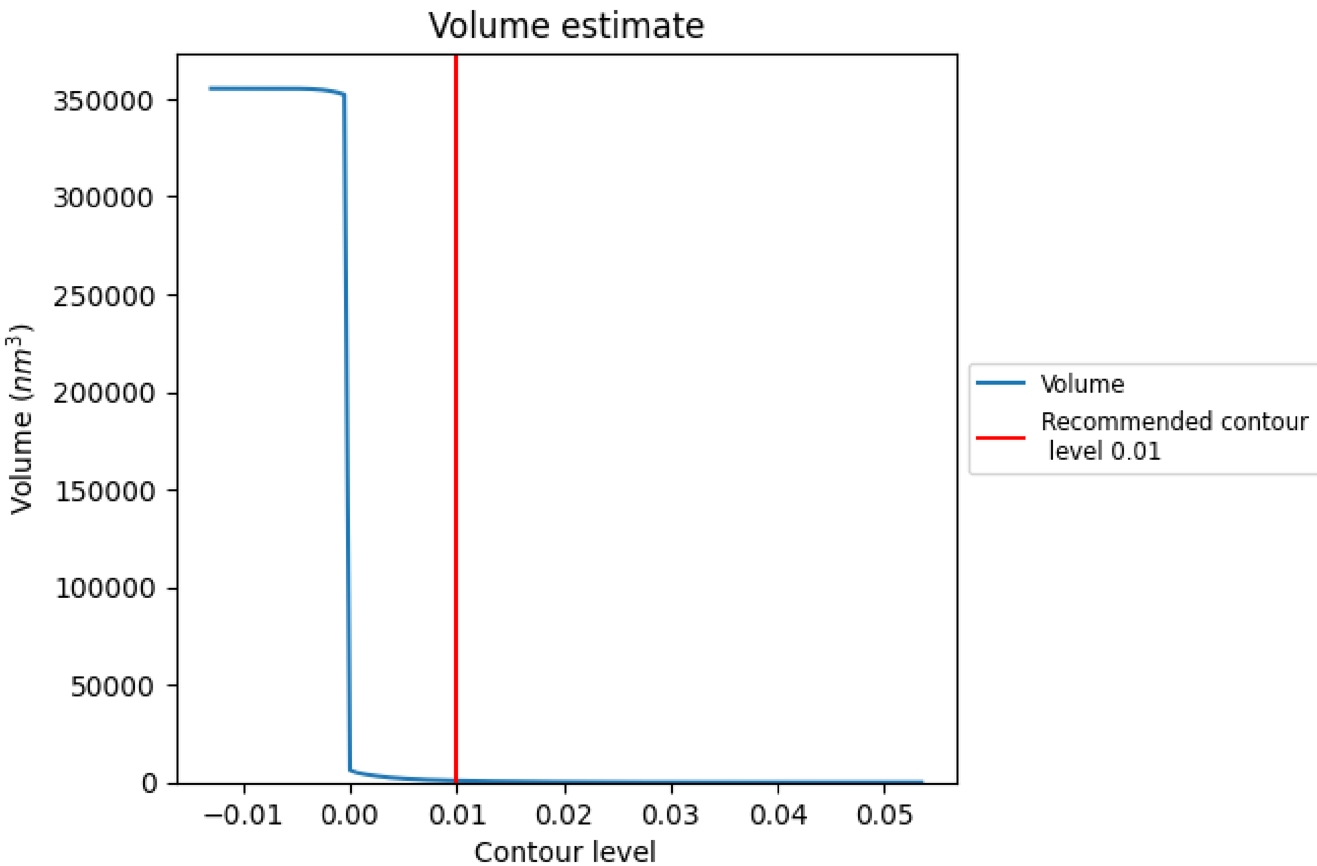
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



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

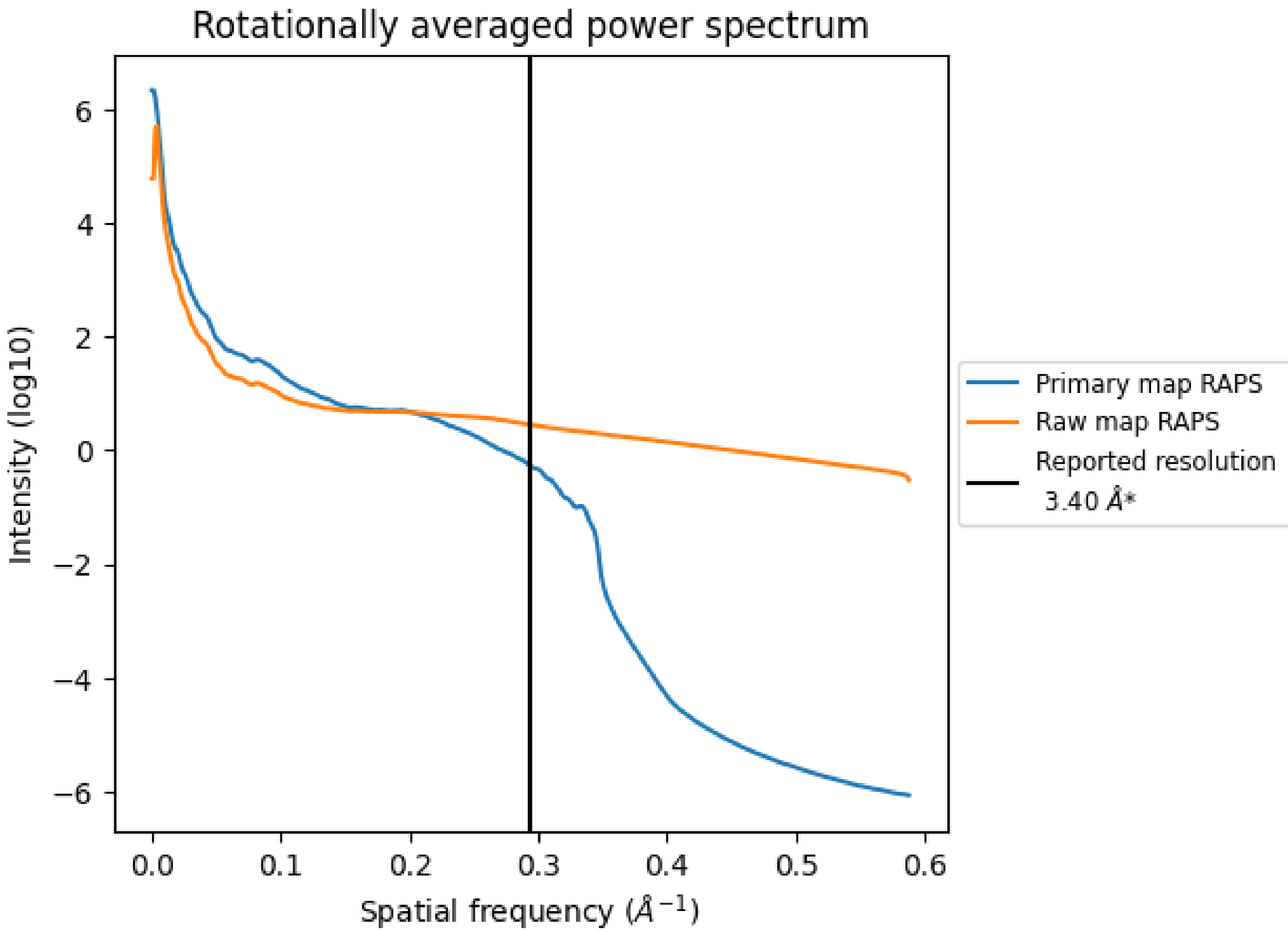
7.2 Volume estimate (i)



The volume at the recommended contour level is 840 nm^3; this corresponds to an approximate mass of 759 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)

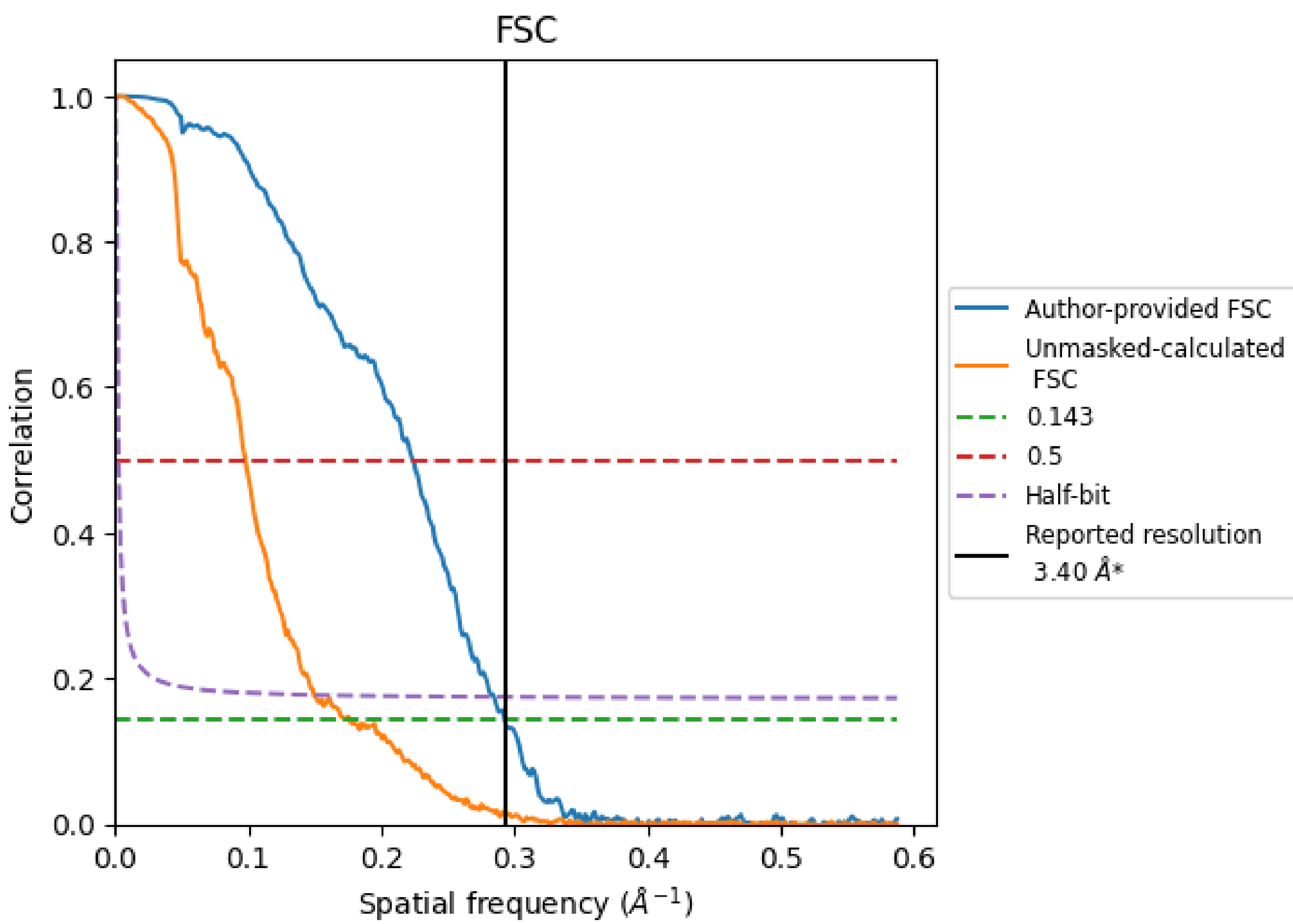


*Reported resolution corresponds to spatial frequency of 0.294 Å^{-1}

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 0.294 $Å^{-1}$

8.2 Resolution estimates ⓘ

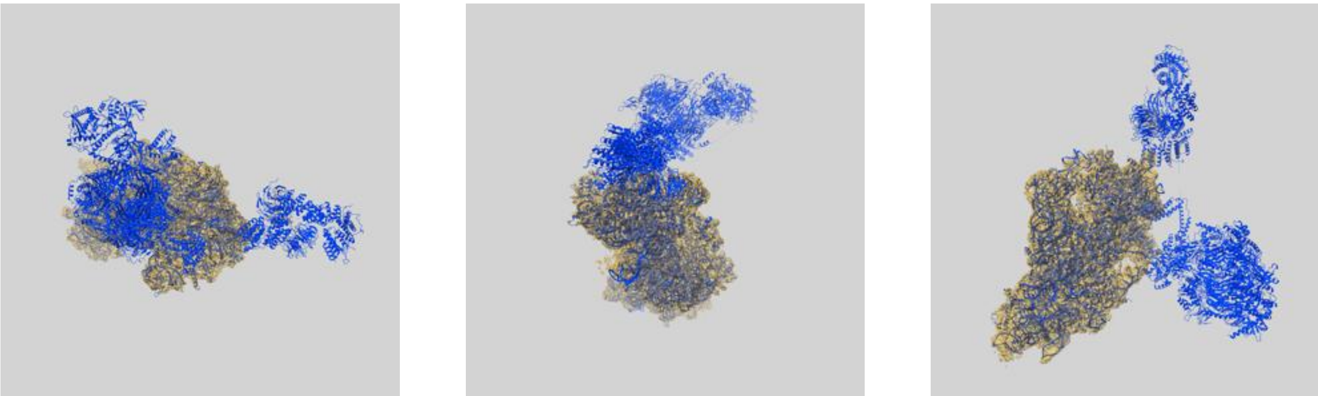
Resolution estimate (Å)	**Estimation criterion (FSC cut-off)**		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.42	4.47	3.51
Unmasked-calculated*	5.67	10.22	6.69

*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 5.67 differs from the reported value 3.4 by more than 10 %

9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-51134 and PDB model 9G8O. Per-residue inclusion information can be found in section 3 on page 16.

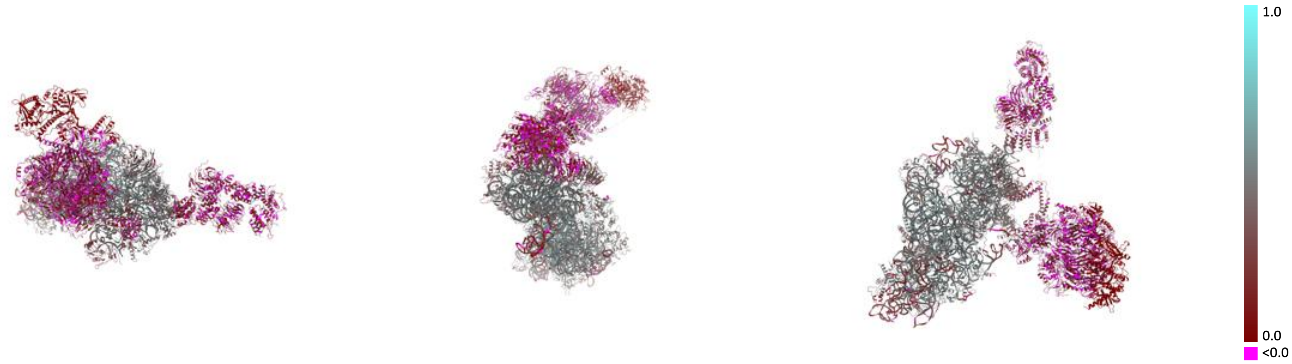
9.1 Map-model overlay (i)



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.01 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.

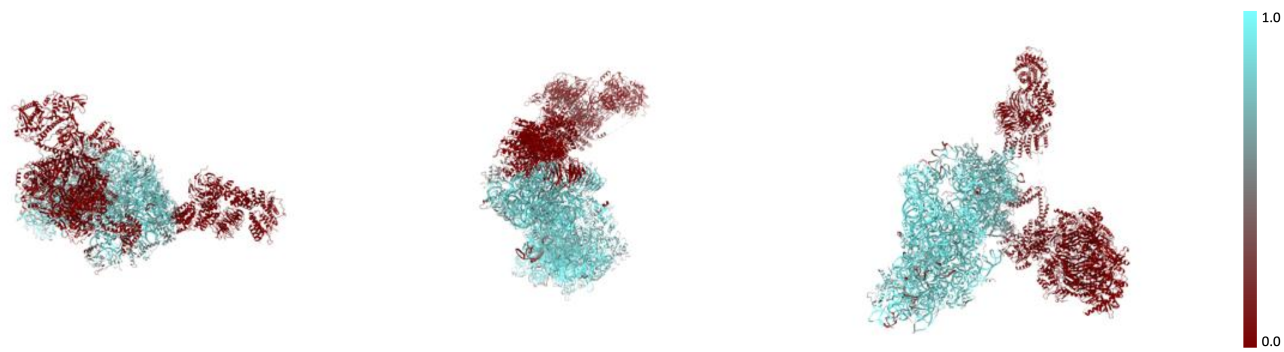
9.2 Q-score mapped to coordinate model (i)



X Y Z

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.

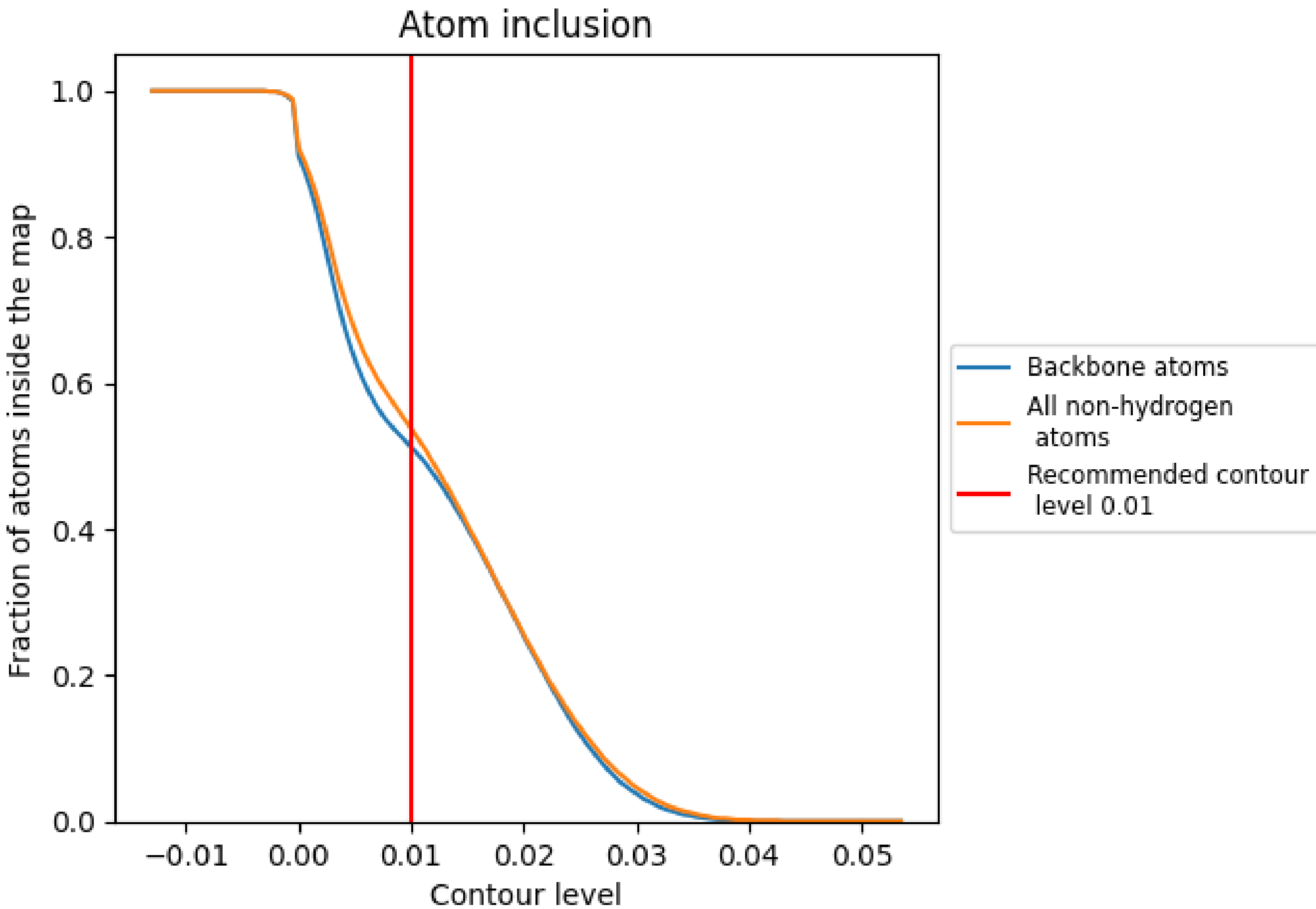
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.01).

9.4 Atom inclusion (i)



At the recommended contour level, 51% of all backbone atoms, 54% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5380	0.3070
A	0.0070	0.1160
B	0.0180	0.1110
C	0.0010	0.0890
D	0.0080	0.1020
E	0.0000	0.0830
F	0.0000	0.0810
G	0.0000	0.0790
H	0.0000	0.0750
I	0.0000	0.0670
J	0.0000	0.0770
K	0.0000	0.0750
L	0.0000	0.0950
Ln	0.8130	0.4340
M	0.0000	0.0030
N	0.0000	0.0570
O	0.0000	0.0840
S2	0.9450	0.4670
SA	0.8690	0.4550
SB	0.8860	0.4580
SC	0.9220	0.4970
SD	0.8130	0.4480
SE	0.8440	0.4780
SF	0.8180	0.4700
SG	0.7160	0.3400
SH	0.6920	0.3960
SI	0.8340	0.4340
SJ	0.9020	0.4780
SK	0.6710	0.4530
SL	0.7950	0.4740
SM	0.4430	0.2760
SN	0.8380	0.4840
SO	0.8680	0.4560
SP	0.6950	0.4450
SQ	0.8250	0.4960

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Chain	Atom inclusion	Q-score
SR	0.8330	0.4370
SS	0.6580	0.4200
ST	0.7530	0.4680
SU	0.7250	0.4440
SV	0.8760	0.4750
SW	0.9190	0.5020
SX	0.9520	0.5080
SY	0.8310	0.4380
SZ	0.6390	0.4010
Sa	0.8830	0.4700
Sb	0.8450	0.4400
Sc	0.8660	0.4890
Sd	0.9160	0.5360
Se	0.7610	0.3800
Sf	0.4040	0.2960
Sg	0.7540	0.3860
X	0.3770	0.1040