W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB EM Validation Summary Report (i)

Jul 7, 2024 – 10:30 am BST

PDB ID	:	7OQE
EMDB ID	:	EMD-13033
Title	:	Saccharomyces cerevisiae spliceosomal pre-A complex (delta BS-A ACT1)
Authors	:	Zhang, Z.; Rigo, N.; Dybkov, O.; Fourmann, J.; Will, C.L.; Kumar, V.; Urlaub, H.; Stark, H.; Luehrmann, R.
Deposited on	:	2021-06-03
Resolution	:	5.90 Å(reported)

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

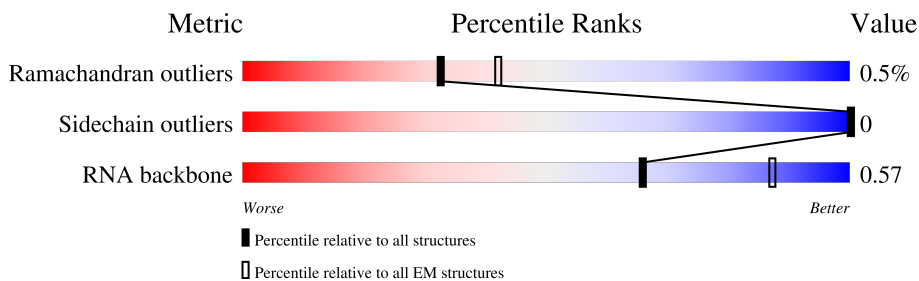|		
EMDB validation analysis	:	0.0.1.dev92
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)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

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 5.90 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	Percentile Ranks	Value
Ramachandran outliers		0.5%
Sidechain outliers		0
RNA backbone		0.57

Worse ← → *Better*

▪ Percentile relative to all structures

▯ Percentile relative to all EM structures

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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=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	F	523	51% 49%
2	I	373	19% · · 77%
3	E	544	100%
4	J	620	17% 83%
5	1	568	23% 75% 23% · ·
6	G	492	49% 51%
7	A	298	44% 56%
8	C	231	84% 16%

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Mol	Chain	Length	Quality of chain
9	b	196	62% 38%
9	s	196	33% 67%
10	d	101	92% 8%
10	v	101	81% 19%
11	e	94	81% 18%
11	w	94	36% 82% 18%
12	f	86	85% 15%
12	x	86	38% 85% 15%
13	g	77	91% 6%
13	y	77	32% 94%
14	h	146	73% 27%
14	t	146	49% 51%
15	i	110	90% 10%
15	u	110	21% 84% 16%
16	H	261	74% 26%
17	D	629	92% 8%
18	B	300	62% 38%
19	K	583	13% 69% 30%
20	O	971	80% 16%
21	U	282	45% 66% 33%
22	V	280	32% 36% 63%
23	T	530	34% 87% 13%
24	S	107	6% 86% 14%
25	Q	436	13% 50% 50%
26	P	1361	5% 86% 13%

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Mol	Chain	Length	Quality of chain
27	R	213	28% 81% 19%
28	Z	85	96%
29	W	238	25% 66% 5% 29%
30	Y	111	6% 75% 24%
31	p	849	32% 52% 48%
32	2	1175	6% 88%

2 Entry composition ⓘ

There are 32 unique types of molecules in this entry. The entry contains 56606 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 Protein NAM8.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	F	267	Total 1335	C 801	N 267	O 267	0	0

- Molecule 2 is a RNA chain called ACT1 pre-mRNA (delta BS-A).

Mol	Chain	Residues	Atoms					AltConf	Trace
2	I	86	Total 1327	C 575	N 111	O 555	P 86	0	0

- Molecule 3 is a protein called U1 small nuclear ribonucleoprotein component PRP42.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	E	544	Total 2732	C 1644	N 544	O 544	0	0

- Molecule 4 is a protein called U1 small nuclear ribonucleoprotein component SNU71.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	J	105	Total 529	C 319	N 105	O 105	0	0

- Molecule 5 is a RNA chain called U1 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	1	558	Total 11822	C 5287	N 2003	O 3974	P 558	0	0

- Molecule 6 is a protein called 56 kDa U1 small nuclear ribonucleoprotein component.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	G	239	Total 1202	C 724	N 239	O 239	0	0

- Molecule 7 is a protein called U1 small nuclear ribonucleoprotein A.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	A	132	Total 668	C 404	N 132	O 132	0	0

- Molecule 8 is a protein called U1 small nuclear ribonucleoprotein C.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	C	195	Total 985	C 595	N 195	O 195	0	0

- Molecule 9 is a protein called Small nuclear ribonucleoprotein-associated protein B.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	b	121	Total 607	C 365	N 121	O 121	0	0
9	s	65	Total 323	C 193	N 65	O 65	0	0

- Molecule 10 is a protein called Small nuclear ribonucleoprotein Sm D3.

Mol	Chain	Residues	Atoms				AltConf	Trace
10	d	93	Total 473	C 287	N 93	O 93	0	0
10	v	82	Total 412	C 248	N 82	O 82	0	0

- Molecule 11 is a protein called Small nuclear ribonucleoprotein E.

Mol	Chain	Residues	Atoms				AltConf	Trace
11	e	77	Total 389	C 235	N 77	O 77	0	0
11	w	77	Total 389	C 235	N 77	O 77	0	0

- Molecule 12 is a protein called Small nuclear ribonucleoprotein F.

Mol	Chain	Residues	Atoms				AltConf	Trace
12	f	73	Total 365	C 219	N 73	O 73	0	0
12	x	73	Total 365	C 219	N 73	O 73	0	0

- Molecule 13 is a protein called Small nuclear ribonucleoprotein G.

Mol	Chain	Residues	Atoms				AltConf	Trace
13	g	72	Total 356	C 212	N 72	O 72	0	0
13	y	75	Total 373	C 223	N 75	O 75	0	0

- Molecule 14 is a protein called Small nuclear ribonucleoprotein Sm D1.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	h	107	Total 535	C 321	N 107	O 107	0	0
14	t	72	Total 363	C 219	N 72	O 72	0	0

- Molecule 15 is a protein called Small nuclear ribonucleoprotein Sm D2.

Mol	Chain	Residues	Atoms				AltConf	Trace
15	i	99	Total 501	C 303	N 99	O 99	0	0
15	u	92	Total 463	C 279	N 92	O 92	0	0

- Molecule 16 is a protein called Protein LUC7.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	H	192	Total 960	C 576	N 192	O 192	0	0

- Molecule 17 is a protein called Pre-mRNA-processing factor 39.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	D	576	Total 2892	C 1740	N 576	O 576	0	0

- Molecule 18 is a protein called U1 small nuclear ribonucleoprotein 70 kDa homolog.

Mol	Chain	Residues	Atoms				AltConf	Trace
18	B	186	Total 940	C 568	N 186	O 186	0	0

- Molecule 19 is a protein called Pre-mRNA-processing protein PRP40.

Mol	Chain	Residues	Atoms				AltConf	Trace
19	K	406	Total 2042	C 1230	N 406	O 406	0	0

- Molecule 20 is a protein called U2 snRNP component HSH155.

Mol	Chain	Residues	Atoms				AltConf	Trace
20	O	812	Total 4108	C 2484	N 812	O 812	0	0

- Molecule 21 is a protein called Pre-mRNA-splicing factor PRP11.

Mol	Chain	Residues	Atoms				AltConf	Trace
21	U	188	Total 943	C 567	N 188	O 188	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
U	121	UNK	-	insertion	UNP Q07350
U	122	UNK	-	insertion	UNP Q07350
U	123	UNK	-	insertion	UNP Q07350
U	124	UNK	-	insertion	UNP Q07350
U	125	UNK	-	insertion	UNP Q07350
U	126	UNK	-	insertion	UNP Q07350
U	127	UNK	-	insertion	UNP Q07350
U	128	UNK	-	insertion	UNP Q07350
U	129	UNK	-	insertion	UNP Q07350
U	130	UNK	-	insertion	UNP Q07350
U	131	UNK	-	insertion	UNP Q07350
U	132	UNK	-	insertion	UNP Q07350
U	133	UNK	-	insertion	UNP Q07350
U	134	UNK	-	insertion	UNP Q07350
U	135	UNK	-	insertion	UNP Q07350
U	136	UNK	-	insertion	UNP Q07350

- Molecule 22 is a protein called Pre-mRNA-splicing factor PRP21.

Mol	Chain	Residues	Atoms				AltConf	Trace
22	V	103	Total 515	C 309	N 103	O 103	0	0

- Molecule 23 is a protein called Pre-mRNA-splicing factor PRP9.

Mol	Chain	Residues	Atoms				AltConf	Trace
23	T	462	Total 2318	C 1394	N 462	O 462	0	0

- Molecule 24 is a protein called Pre-mRNA-splicing factor RDS3.

Mol	Chain	Residues	Atoms				AltConf	Trace
24	S	92	Total 460	C 276	N 92	O 92	0	0

- Molecule 25 is a protein called Cold sensitive U2 snRNA suppressor 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	Q	220	Total 1122	C 682	N 220	O 220	0	0

- Molecule 26 is a protein called Pre-mRNA-splicing factor RSE1.

Mol	Chain	Residues	Atoms				AltConf	Trace
26	P	1186	Total 5972	C 3600	N 1186	O 1186	0	0

- Molecule 27 is a protein called Protein HSH49.

Mol	Chain	Residues	Atoms				AltConf	Trace
27	R	173	Total 868	C 522	N 173	O 173	0	0

- Molecule 28 is a protein called RDS3 complex subunit 10.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	Z	83	Total 412	C 246	N 83	O 83	0	0

- Molecule 29 is a protein called U2 small nuclear ribonucleoprotein A'.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	W	170	Total 862	C 522	N 170	O 170	0	0

- Molecule 30 is a protein called U2 small nuclear ribonucleoprotein B".

Mol	Chain	Residues	Atoms				AltConf	Trace
30	Y	84	Total 418	C 250	N 84	O 84	0	0

- Molecule 31 is a protein called Pre-mRNA-processing ATP-dependent RNA helicase PRP5.

Mol	Chain	Residues	Atoms				AltConf	Trace
31	p	444	Total 2239	C 1351	N 444	O 444	5	0

- Molecule 32 is a RNA chain called U2 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	2	143	Total 3021	C 1351	N 511	O 1017	P 142	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: Protein NAM8

Chain F:
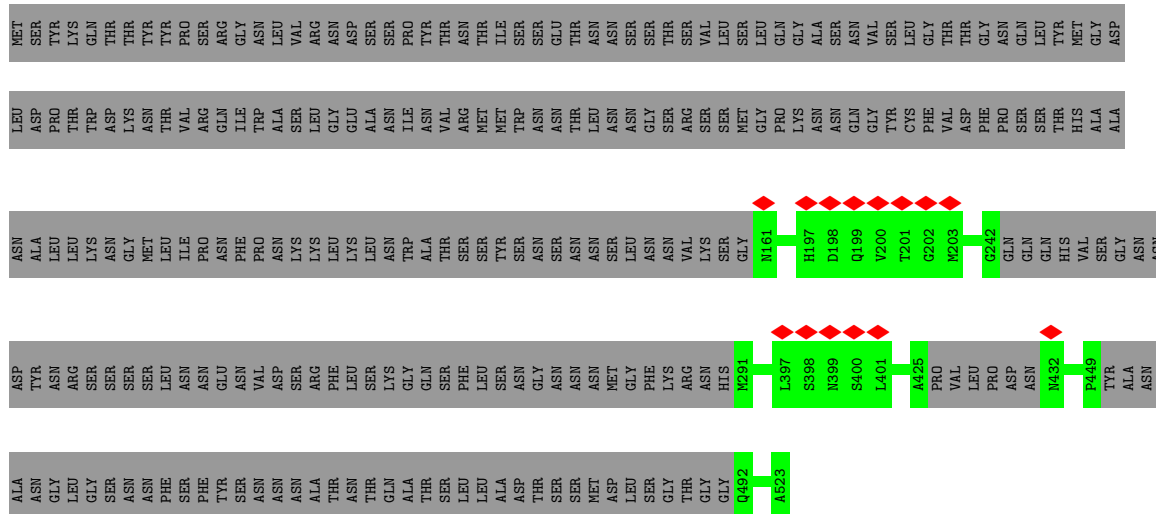
• Molecule 2: ACT1 pre-mRNA (delta BS-A)

Chain I:
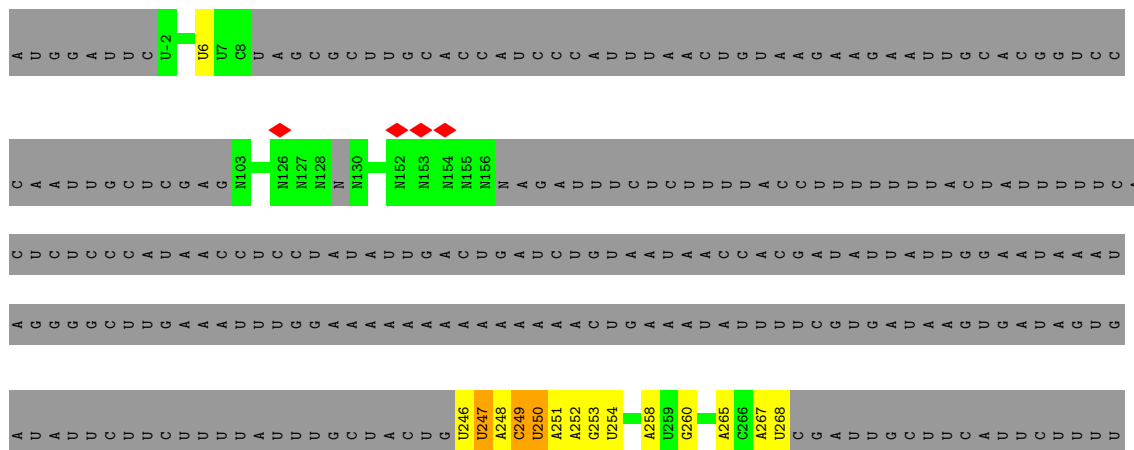
• Molecule 3: U1 small nuclear ribonucleoprotein component PRP42

Chain E:
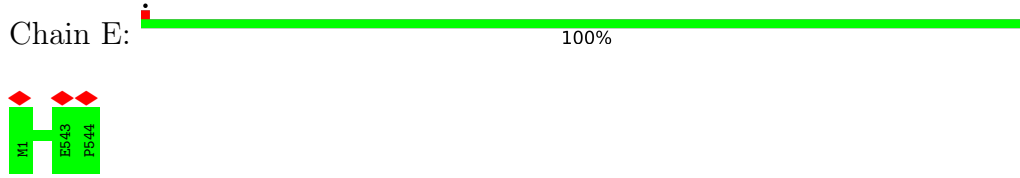
• Molecule 4: U1 small nuclear ribonucleoprotein component SNU71

Chain J:

• Molecule 5: U1 snRNA

Chain 1:

G389 G390 C391 A392 G393 A394 U395 A399 A400 U401 G402 A403 A404 C405 U406 U407 A408 A409 U415 G416 A417 U418 G422 G423 U424 A425 G426 G427 A437 U438 U439 A440 U441 U442 U443 G444 C445 U446 C447 G448 C449 G450 A451 U452 U453 G454 U455 A456 G457 U458 U459 U460 G461 A462 A463

G464 A465 U466 G467 U468 G469 C470 U471 C472 U473 U474 U475 U476 C477 A478 G479 C480 A481 G482 U483 C484 U485 C486 A487 A488 C489 U490 U491 U492 G493 C496 G497 U498 U499 C500 C501 C502 G503 U504 U505 A506 U507 G508 A513 A514 A515 G540 G541 U542 U551 A552 A553 U554 U555 G559

A560 U561 U562 U563 A564 U565 U U U

● Molecule 6: 56 kDa U1 small nuclear ribonucleoprotein component

Chain G: 49%   51%

MET ARG PRO ARG ARG GLY LEU ALA TYR HIS HIS THR LYS PRO LYS GLY GLN LEU SER GLN GLY HIS SER TYR PRO THR THR SER ASN ASP GLY GLN ARG ARG LYS VAL GLY ASN SER GLU ALA PHE Q43 G170 ARG GLY HIS ILE ILE THR SER TYR ARG GLU GLN PRO SER S185

S295 GLY LEU GLN GLY ASP GLN PHE PRO ARG GLN GLN GLN ARG PRO LEU SER ASN SER SER PRO SER SER ASN SER ILE SER SER SER GLN THR ILE GLU ALA GLY ALA THR SER TYR GLN THR GLN THR GLN GLN PRO GLN ARG HIS ALA VAL ASN LYS PRO SER ASN VAL LEU ASN SER SER ARG HIS

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

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

GLY VAL GLY GLU TYR ILE VAL LYS ALA LEU GLU LEU ILE LEU ASN ILE LEU GLU HIS

● Molecule 7: U1 small nuclear ribonucleoprotein A

Chain A: 44%   56%

MET S2 R12 L46 GLN ILE SER SER GLN PRO LEU MET L55 K125 LYS LYS GLY ASN ASP GLU THR Y133 R148 LYS LEU ARG SER ASP ASP ILE CYS ALA LYS LYS PHE ARG LEU LYS ARG GLN ILE ARG ARG LEU LYS HIS LEU LEU ARG SER ARG LYS VAL GLU GLU ALA

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

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

● Molecule 8: U1 small nuclear ribonucleoprotein C

Chain C: 84%   16%

MET THR R3 Q69 K143 S144 A145 K150 Q151 T152 D197 ILE LEU GLN THR THR ILE LYS GLU SER LYS ARG MET HIS SER ASP GLY ILE ARG PRO LYS SER SER ALA ASN GLY TYR LYS ARG ARG TYR GLY ASN

● Molecule 9: Small nuclear ribonucleoprotein-associated protein B

Chain b: 62%   38%

MET S2 P63 ARG LYS ASP SER LYS ASP GLY THR THR L73 K129 E130 K131 LYS PRO GLY LYS ILE ALA LYS PRO ASN THR ALA ASN ALA HIS THR SER ASN SER ARG GLU ILE ALA GLN PRO SER SER ARG TYR ASN GLY GLY ASN ASP ASN ILE GLY ALA ASN ARG

SER ARG PHE ASN ASN GLU ALA PRO PRO GLN THR ARG LYS PHE GLN PRO PRO PRO GLY PHE LYS ARG LYS

• Molecule 9: Small nuclear ribonucleoprotein-associated protein B

Chain s: 33%   67%

MET SER LYS ILE GLN VAL ALA HIS SER SER ARG L12 P54 LYS THR GLN LEU ASP LYS LEU ARG PRO LYS ASP SER ASP GLY THR LEU ASN ILE K76 V97 GLU ASP LYS PRO LEU LEU SER LYS LYS ARG LEU ARG ASP LYS LYS GLU LYS LYS GLN ALA

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

ALA PRO PRO GLN THR ARG LYS PHE GLN PRO PRO PRO GLY PHE LYS ARG LYS

• Molecule 10: Small nuclear ribonucleoprotein Sm D3

Chain d: 92%   8%

MET THR M3 N4 I95 ARG GLY PRO LYS ARG ARG

• Molecule 10: Small nuclear ribonucleoprotein Sm D3

Chain v: 81%   19%

MET THR MET N4 A55 V56 K85 LYS ASN SER SER ARG PRO MET PRO PRO ILE ARG GLY PRO LYS ARG ARG

• Molecule 11: Small nuclear ribonucleoprotein E

Chain e: 81%   18%

MET SER ASN LYS VAL LYS THR K8 Q34 N63 SER ALA ASP GLY LYS GLU ASP VAL GLU K73 A93 ASP

• Molecule 11: Small nuclear ribonucleoprotein E

Chain w: 36%   82%   18%

MET SER ASN LYS VAL LYS THR LYS ALA M10 F18 N19 F20 L21 Q22 Q23 Q24 T25 P26 K42 I43 V44 G45 F46 D55 E56 A57 V58 E59 I60 P61 V62 N63 SER ALA ASP GLY LYS GLU ASP V71 E72 K73 G74 T75 P76 L77 G78 K79 S92 A93 ASP

• Molecule 12: Small nuclear ribonucleoprotein F

Chain f:

85%   15%

MET SER GLU SER ASP ILE SER ALA MET GLN P12 L84 PRO ASN

• Molecule 12: Small nuclear ribonucleoprotein F

Chain x:

38%

85%   15%

MET SER GLU SER ASP ILE SER ALA MET GLN P12 V13 N14 P17 K20 G21 L22 V23 N24 H25 R26 V27 R39 G40 T41 L42 V43 N54 E55 A56 E57 A61 G62 V63 S64 H65 G66 T67 L68 G69 E70 E83 L84 PRO ASN

• Molecule 13: Small nuclear ribonucleoprotein G

Chain g:

91%   6%

MET V2 S3 N20 G21 G48 GLU ASP PRO ALA N53 I77

• Molecule 13: Small nuclear ribonucleoprotein G

Chain y:

32%

94%

MET V2 K14 A26 G27 I28 L29 R30 D42 A43 M44 E45 I46 N47 G48 E49 D50 P51 A52 N53 N54 H55 Q56 L57 G58 L59 Q60 L74 D75 A76 ILE

• Molecule 14: Small nuclear ribonucleoprotein Sm D1

Chain h:

73%   27%

M1 Q49 PRO ARG LEU ASN LYS LEU ASN S58 Q73 PRO THR ALA SER ASP N78 S119 GLY GLN ILE ALA ASN ASP PRO SER LYS LYS ARG ARG ASP PHE GLY ALA PRO ALA ASN LYS ARG PRO ARG ARG GLY LEU

• Molecule 14: Small nuclear ribonucleoprotein Sm D1

Chain t:

49%   51%

M1 P48 GLN PRO ARG LEU ASN LYS LEU ASN SER ASN GLY ILE ALA MET ALA SER LEU TYR LEU THR GLY GLY GLN GLN PRO THR ALA SER ASP N78 L101 ASN LEU ASP SER LEU LEU VAL ASP GLN GLN LYS GLN LEU ASN SER LEU ARG ARG SER GLY GLN ILE ALA ASN ASP PRO

SER LYS LYS ARG ARG ASP PHE GLY ALA PRO ALA ASN LYS ARG PRO ARG ARG GLY LEU

• Molecule 15: Small nuclear ribonucleoprotein Sm D2

Chain i:

90%   10%

MET SER GLN ILE ILE ASP **R8** **K80** GLY LYS **N83** **P108** VAL GLU

• Molecule 15: Small nuclear ribonucleoprotein Sm D2

Chain u:

21%

84%   16%

MET SER GLN ILE ILE ASP ARG PRO LYS HIS GLU LEU SER ARG ALA **E17 L18 E19 E20 L21 E22 E23 F24 E25 F26 K27 H28** **N35 D36** **V39 T40 R41 T42** **G81 K82 N83** **K106 T107 P108** VAL GLU

• Molecule 16: Protein LUC7

Chain H:

74%   26%

MET SER THR **M4** **M19** GLY ARG ASP PHE SER PHE ARG HIS ASN ARG TYR SER HIS GLN LYS ARG ASP LEU **G38** **D140** VAL ARG ILE GLY LEU MET GLY GLN ILE ASP SER LEU ILE ARG ALA ASP VAL SER MET GLY MET GLN SER VAL LYS LEU GLN GLU **L172**

R244 THR THR ASN ALA SER LYS THR ALA THR THR LEU PRO GLY ARG ARG PHE VAL

• Molecule 17: Pre-mRNA-processing factor 39

Chain D:

92%   8%

MET PRO ASP GLU THR ASN PHE THR ILE GLU ASP ILE GLU PRO ARG PRO ASP **A43** **A61 Y62 R63 G64** **L136 A137 T138** **R207 I208** **I212** **D243 I244 V245 L246 R247** **L285** LYS PHE VAL THR ASP SER PRO SER LYS SER LEU ASP LYS GLU PHE VAL MET SER VAL PHE ASP

ARG CYS LEU ILE PRO CYS LEU **Y288** **A417** **V553** LEU ASN THR THR ALA ASN VAL **D561** **E627** GLY LYS
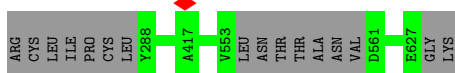
• Molecule 18: U1 small nuclear ribonucleoprotein 70 kDa homolog

Chain B:

62%   38%

M1 **N2** **Y3** **N91** TRP ASN **P94** **I176** **G188** ARG THR VAL LYS TYR PHE LYS PRO ARG ARG LEU GLY GLY GLY LEU GLY ARG GLY TYR SER ASN ARG ASP SER ARG LEU PRO GLY TYR ARG GLY ASN ARG PRO LEU LEU SER ALA ALA THR PRO THR ALA ALA VAL THR SER VAL TYR LYS SER ARG ASN SER ARG THR ARG GLU SER GLN PRO ALA PRO LYS GLU

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

ALA PRO ASP TYR

• Molecule 19: Pre-mRNA-processing protein PRP40

Chain K:

13%

69%   30%

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

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

ASN SER LYS LEU ASN VAL ARG ARG ARG THR LYS GLU E134 R189 SER ALA ASP GLN LEU LEU LYS GLU HIS ASN GLU THR SER K203 S240 T292 F293 I294 T295 W296 Q297 Q298 L299 L300 N301 H302 Y303 V304 F305 D306 K307 M312 R315 H316 F317 K318 V319 L320 T321 H322

E323 D324 N338 E346 L347 R348 L349 R350 N351 Y352 T353 R356 P370 D442 K451 E454 N455 D456 R457 K458 F459 D460 K461 R506 T507 Y508 T509 K510 T511 G512 K513 P514 K515 P516 S517 T518 W519 D520 L521 A522 S523 K524 E525 L526 G527 E528 S529 G536 D537 E538 D539

N540 R543 Q544 E547 D548 E552 SER SER ALA PRO THR ALA GLU SER ALA THR ALA ASN LEU THR LEU THR ALA SER LYS LYS ARG HIS LEU THR PRO ALA VAL GLU LEU ASP TYR

• Molecule 20: U2 snRNP component HSH155

Chain O:

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

GLU ASP SER TYR HIS LYS ARG PHE ASP MET LYS PHE GLU PRO ASP SER ASP THR GLN THR VAL THR SER GLU ASN THR GLN ASP VAL VAL PRO ARG LYS ARG LYS SER ARG TRP ASP THR VAL LYS GLY TYR GLU PRO PRO ASP SER GLU SER THR ALA VAL LYS GLU ASN SER

ASP SER ALA LEU VAL ASN VAL GLU GLY ILE HIS ASP LEU MET PHE PHE LYS PRO SER ASP HIS LYS TYR PHE ALA ASP VAL ILE SER LYS PRO ILE ASP GLU LEU ASN LYS ASP E160 P197 P206 P238 P249 E254 D255 P256 P284 P315 R324 K325 S326

M364 D365 D366 P369 P387 P399 S406 H407 R408 P424 P428 P449 P472 E477 P481 P497 P525 E529 P532 A551 D554 E555 R556 P596 P600 P614 P629 P656 P680 P681 P687 P691 K713 I714

T717 P720 P721 P759 V791 L971

• Molecule 21: Pre-mRNA-splicing factor PRP11

Chain U:

MET ASN TYR LEU GLU GLY VAL GLY VAL SER LYS GLY GLY GLY ILE ALA SER GLU GLN SER GLN PHE ASN LEU GLN LEU ARG ARG LYS GLU VAL GLU SER LEU L34 S35 K36 G37 E38 N39 V40 P41 Y42 T43 F44 Q45 D46 E47 LYS ASP ASP Q51 V52 R53 S54 N55 P56 Y59 K60 N61

H62 S63 G64 K65 E102 K103 SER SER LEU GLY ARG GLU GLY GLN GLN THR THR HIS ASP PHE ARG GLN GLN GLN LYS X121 X122 X123 X124 X125 X126 X127 X128 X129 X130 X131 X132 X133 X134 X135 X136 ILE ILE GLU ALA LYS GLN SER LEU LYS ASN ASN GLY THR ILE PRO VAL CYS LYS ILE

ALA THR VAL LYS ASN PRO LYS ASN G149 S150 V151 G152 L153 Q156 V157 N158 Y159 S160 S161 E162 V163 K164 E165 N166 S167 V168 D169 S170 D171 D172 K173 A174 K175 V176 I182 V183 S184 G185 L186 E187 L188 S189 D190 T191 K192 Q193 K194 G195 K196 K197 F198 L199 V200 Y203 E204 P205 F206

E207 N208 I209 A210 I211 E212 L213 P214 P215 N216 E217 I218 L219 F220 S221 E222 N223 N224 D225 M226 D227 N228 N229 N230 D231 G232 E235 K238 D244 A245 I246 S247 K248 L249 Q253 PHE PHE LYS GLN ALA GLU GLN GLU GLN ALA ASP VAL

• Molecule 22: Pre-mRNA-splicing factor PRP21

Chain V:

32%

36%

63%

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

SER GLY GLU ASP ASN ASP ARG LYS SER GLU ARG GLU ILE ILE ALA ARG PRO PRO ASP PHE LEU PHE SER GLN TYR ASP THR GLY ILE ILE SER R90 R91 D92 M93 E94 V95 I96 K97 L98 T99 A100 R101 Y102 Y103 A104 K105 D106 K107 S108 I109 V110 Q112 M113 I114 S115 K116 D117 G118 E119 A120

R121 L122 N123 F124 M125 N126 S127 S128 H129 P130 L131 H132 K133 T134 F135 T136 D137 F138 V139 A140 Q141 Y142 K143 R144 V145 Y146 S147 F148 T149 G150 Q151 E152 I153 K154 K155 S156 T159 Y170 W171 E172 F173 E174 K175 D176 K177 D178 R179 E180 H181 D182 L184 V185 E186 L187 C188 K189 I190

Q191 F192 ALA ALA ILE PRO TRP ASP LYS PHE THR GLN VAL ALA LYS PHE SER ILE PRO GLU ASP THR GLU ILE PHE GLU GLY SER GLU LEU ASP LEU GLU GLN MET ARG LEU ARG ARG VAL GLN THR GLY ILE LYS LEU PHE ASP SER ILE LYS PRO THR ASN GLU GLU LYS ILE VAL SER

ASP GLN GLY GLN LYS GLN LYS GLY GLY ASP SER LYS GLY LYS LYS ARG LYS ILE ARG ALA VAL GLY GLU THR ARG LEU LYS LYS SER LYS LYS

• Molecule 23: Pre-mRNA-splicing factor PRP9

Chain T:

34%

87%

13%

M1 N2 L3 L4 E5 T6 R7 R8 S9 L10 L11 E12 F43 P44 D45 T46 K47 S51 S52 L53 I54 A55 E56 N57 K58 I59 Y60 K61 F62 K63 K64 V65 K66 Q87 E88 Q91 T92 F93 N94 K95 I96 N97 ARG PRO GLU GLU THR GLN GLU ASP ASP LYS ASP LEU PRO ASN

F112 E113 R114 K115 L116 Q117 Q118 L119 E120 K121 E122 L123 K124 N125 E126 D127 E128 N129 F130 E131 L132 S151 R152 R153 T154 D197 L209 D212 D213 E214 K215 Y216 L217 L218 T219 P220 P221 M222 D223 R224 K225 A254 A255 V256 E257 N258 L259 I260 K261 S262 D263 F264 E265 H266 S267

Y268 C269 R270 G271 S272 L273 R274 S275 E276 A277 K278 G279 I280 Y281 C282 P283 F284 C285 S286 R287 W288 F289 K290 T291 S292 S293 V294 F295 E296 S297 H298 L299 V300 G301 K302 I303 H304 K305 R306 N307 E308 S309 K310 R311 R312 A352 Q359 A363 P364 A365 Y366 D367 S368 T369 E370 K371 E372

G373 A374 E375 Q376 V377 D378 GLY GLU GLN ARG ASP GLY GLN LEU GLN LEU GLU GLN GLU GLU HIS LEU SER GLY LYS SER GLU PHE ASP MET PRO LEU GLY PRO ASP GLY LEU PRO M407 E456 P457 S458 S459 M477 Q478 GLY GLN GLY SER GLN LEU THR SER ILE ALA ALA VAL PRO PRO LYS PRO ASN PRO

SER GLN LEU LYS VAL PRO THR E503 L506 E507 E508 E509 D510 E511 E512 G513 N514 V515 M516 S517 K518 K519 V520 Y521 D522 E523 L524 K525 K526 Q527 G528 LEU VAL

• Molecule 24: Pre-mRNA-splicing factor RDS3

Chain S:

6%

86%

14%

MET S2 R3 H4 Q5 V65 G66 V67 L92 G93 SER ASN ARG LEU ASP ARG HIS PHE GLU LYS LYS LYS VAL

• Molecule 25: Cold sensitive U2 snRNA suppressor 1

Chain Q:

13%

50%   50%

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

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

LEU SER ALA ARG K125 R126 R127 K128 T129 E130 K179 G190 E206 Q207 M208 R209 S210 T211 L212 P213 GLN SER GLY LEU ASP GLY GLN ASP GLU LYS SER LEU GLU ALA SER ARG ALA ARG VAL GLN PRO LYS MET GLY A239 L240 D241 S295 Q296 E297 L298 R299 A300 N303

L304 P305 E306 G307 Q308 M314 K315 M316 K317 D318 I319 G320 L321 P322 T323 P326 G332 L333 N334 W335 D336 I337 T338 N339 L340 K341 G342 N351 H352 H353 SER ARG SER LYS LYS GLN GLY R361 N362 I368 S369 E376 ASN SER LYS GLU ASP THR GLN ILE ALA ASN ALA ASN

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

• Molecule 26: Pre-mRNA-splicing factor RSE1

Chain P:

5%

86%   •   13%

MET TRP GLY GLY LYS MET ALA VAL VAL SER LEU SER PRO HIS THR ALA LYS MET ARG LYS LEU PHE GLY GLN ALA SER THR THR MET ALA TYR ASP GLY LEU LYS ARG GLU ALA ARG ARG THR ARG SER ASP HIS ASN ILE THR MET VAL A53 D81 L82 E83 A84 G85 S86

K87 A107 P133 HIS SER GLY SER ARG ALA LYS ALA SER ASN W144 M164 H165 A166 G167 A168 S188 T262 Q263 N305 ILE THR THR SER LEU ASP ASN ASN TYR ASP ALA ASP TYR ASP THR LEU F323 S354 I355 V363 T364 T397 N398 D399 R400 I413

E447 K448 N449 D450 F461 S452 N461 P486 T543 G544 D545 L571 THR PRO ASP GLU ALA THR ARG SER ALA F581 G614 K615 P626 P627 A628 G629 V658 S659 S660 T667 D673 E697 L705 LYS ASP GLN LYS GLU D711 I736 V758 D759 S784

VAL SER LEU ASN ASN GLU GLU GLU GLU GLU GLU GLU GLU ASP ASP ASP GLU LYS GLU GLU GLU ILE ASN SER SER GLY ALA K814 E890 SER VAL ASN LYS GLN GLU ASN GLY GLY GLY GLU GLU ASP ASN GLU GLU GLU ASP GLU MET GLU GLU GLU MET GLU M918

N934 N935 P936 S966 S967 T988 R989 Q990 K1012 D1013 K1014 I1031 A1102 G1103 S1157 E1158 L1159 S1160 N1161 G1162 A1163 N1264 N1265 ASN MET ARG LYS GLU ASP GLU GLU GLU GLU SER GLY SER VAL LEU GLN GLY ARG HIS GLY ILE GLU ASP GLU ILE I1292 I1299

L1331 N1332 K1342 Q1345 V1346 E1347 M1361

• Molecule 27: Protein HSH49

28%

Chain R:

81%　　　19%

• Molecule 28: RDS3 complex subunit 10

Chain Z:

96%

• Molecule 29: U2 small nuclear ribonucleoprotein A'

25%

Chain W:

66%　　　5%　　　29%

• Molecule 30: U2 small nuclear ribonucleoprotein B"

6%

Chain Y:

75%　　　24%

• Molecule 31: Pre-mRNA-processing ATP-dependent RNA helicase PRP5

32%

Chain p:

52%　　　48%

GLU ASP ASN THR ASP ASN SER ASN ILE ALA LYS ILE ALA LYS LEU LYS ALA LYS LYS ARG VAL LYS LYS GLN ILE TYR TYR SER PRO GLU E210 F218 Y219 I220 E221 S222 E223 T224 V225 S226 S227 M228 S229 E230 M231 E232 V233 E234 E235 L236 R237 L238 S239 I245 K246 G247 T248 G249 C250

P251 K252 P253 D265 L269 I270 T271 GLU K273 L274 H275 F276 G277 S278 K301 T302 G303 S304 P338 T339 R340 E341 L342 A343 L344 Q345 I346 H347 E348 E349 V350 T351 K352 F353 T354 E355 A356 D357 T358 C364 G367 G368 V386 E416 A417 D418 R419 L420 F421 D422 L423 G424

F425 E426 P427 A447 T448 F449 P450 N451 K452 L453 R454 S455 F456 A457 V458 I469 N470 S471 K472 G473 M474 V475 N476 E477 N478 V479 K480 Q481 K482 F483 R484 I485 C486 H487 S488 E489 D490 E491 K492 F493 D494 N495 L496 V497 Q498 L499 I500 H501 E502 R503 S504 E505 F506 F507 ASP GLU VAL GLN

SER GLU ASN ASP GLY GLN SER SER ASP VAL GLU VAL VAL D525 A526 K527 A528 I529 I530 F531 V532 S533 S534 Q535 N536 I537 C538 D539 F540 I541 S542 K543 K544 L545 L546 N547 A548 G549 I550 V551 T552 C553 A554 I555 H556 A557 G558 K559 P560 Y561 Q562 E563 R564 L565 M566 N567 L568 E569 K570 F571

K572 R573 E574 K575 N576 S577 I578 L579 L580 C581 T582 E583 V584 L585 S586 R587 G588 L589 N590 V591 P592 E593 V594 S595 L596 V597 I598 I599 Y600 N601 A602 V603 K604 T605 F606 A607 Q608 Y609 V610 H611 T612 T613 G614 R615 T616 A617 R18 G619 S620 R621 S622 G623 T624 A625 I626 T627 L628 L629 L630 H631

D632 E633 L634 S635 G636 A637 Y638 I639 L640 S641 K642 A643 M644 R645 D646 E647 E648 I649 K650 A651 L652 D653 P654 L655 Q656 A657 K658 E659 L660 Q661 E662 M663 S664 A665 K666 F667 E668 S669 G670 M671 LYS LYS GLY LYS PHE ARG LEU SER LYS GLY PHE GLY GLY LYS GLY LEU GLU ASN ILE LYS

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

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

LEU ILE GLU GLY GLN ASP GLU LYS ASP ILE GLN LEU SER ILE GLU LEU LEU GLU GLN GLN LYS VAL LYS LYS GLU VAL VAL LYS ALA ALA SER LEU LEU LYS SER THR LYS TYR

• Molecule 32: U2 snRNA

Chain 2: [bar diagram showing 6% and 88%]

A C G A A U U U U U U G G C C U U U U G G C U U A G A U C A G32 U33 G34 U35 C41 U42 G43 U44 U45 C46 U47 U48 U49 U50 A66 A67 U68 C74 A A U G78 A79 C82 U83

C84 A85 U86 U A C C U U U A A A U U U G U G A C A A U A108 C109 A110 C111 A112 U113 U117 U118 C121 A122 C C C A A A A A A U A A A A A A U G139 G140 A141 C142 G143 G144 G145 A146

A147 G148 A149 G150 A C U U U U A A G C A A G U U G U U U C C G C U U A A U G U C A G C A G U C U C A C C U A C C U U U U G G C U U G G C C U A

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

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

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

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	217460	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 $(e^-/Å^2)$	44	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.056	Depositor
Minimum map value	-0.013	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.0125	Depositor
Map size (Å)	464.0, 464.0, 464.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.16, 1.16, 1.16	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	F	0.26	0/1342	0.50	0/1868
2	I	0.60	6/768 (0.8%)	0.89	1/1189 (0.1%)
3	E	0.24	0/2743	0.45	0/3841
4	J	0.26	0/530	0.50	1/740 (0.1%)
5	1	0.30	0/13201	1.01	30/20553 (0.1%)
6	G	0.25	0/1208	0.49	0/1689
7	A	0.24	0/671	0.51	0/937
8	C	0.25	0/992	0.48	0/1390
9	b	0.25	0/608	0.51	0/848
9	s	0.30	0/322	0.57	0/446
10	d	0.27	0/479	0.52	0/671
10	v	0.29	0/415	0.54	0/579
11	e	0.24	0/392	0.57	0/546
11	w	0.29	0/392	0.54	0/546
12	f	0.26	0/367	0.54	0/510
12	x	0.31	0/367	0.58	0/510
13	g	0.25	0/355	0.56	0/491
13	y	0.26	0/374	0.50	0/520
14	h	0.24	0/535	0.48	0/743
14	t	0.33	0/364	0.55	0/507
15	i	0.24	0/503	0.52	0/703
15	u	0.32	0/465	0.53	0/650
16	H	0.23	0/962	0.37	0/1340
17	D	0.24	0/2901	0.41	0/4059
18	B	0.24	0/947	0.43	0/1325
19	K	0.52	0/2050	0.94	0/2870
20	O	0.42	0/4149	0.77	30/5819 (0.5%)
21	U	0.22	0/867	0.43	0/1208
22	V	0.38	0/515	0.43	0/719
23	T	0.27	0/2324	0.44	0/3248
24	S	0.27	0/463	0.49	0/645
25	Q	0.27	0/1137	0.47	0/1593
26	P	0.29	1/6009 (0.0%)	0.54	0/8407
27	R	0.28	0/869	0.46	0/1209

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
28	Z	0.26	0/412	0.41	0/573
29	W	0.31	0/869	0.60	0/1219
30	Y	0.27	0/418	0.49	0/582
31	p	0.55	1/2269 (0.0%)	0.66	3/3172 (0.1%)
32	2	4.64	44/3363 (1.3%)	2.45	107/5218 (2.1%)
All	All	1.16	52/57917 (0.1%)	0.92	172/83683 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
7	A	0	1
13	g	0	1
18	B	0	1
23	T	0	1
26	P	0	2
29	W	0	1
32	2	0	2
All	All	0	9

The worst 5 of 52 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
32	2	35	U	C1'-N1	151.33	3.75	1.48
32	2	42	U	C1'-N1	150.94	3.75	1.48
32	2	44	U	C1'-N1	149.92	3.73	1.48
31	p	271	THR	C-N	20.19	1.80	1.34
32	2	1161	U	O3'-P	-15.61	1.42	1.61

The worst 5 of 172 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
32	2	44	U	C6-N1-C1'	-74.43	17.00	121.20
32	2	42	U	C6-N1-C1'	-73.72	17.99	121.20
32	2	35	U	C6-N1-C1'	-73.60	18.16	121.20
32	2	44	U	O4'-C1'-N1	-27.50	86.20	108.20
32	2	42	U	O4'-C1'-N1	-21.03	91.37	108.20

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	A	12	ARG	Peptide
18	B	176	ILE	Peptide
26	P	1013	ASP	Peptide
23	T	458	SER	Peptide
13	g	20	ASN	Peptide

5.2 Too-close contacts ⓘ

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

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	F	259/523 (50%)	251 (97%)	8 (3%)	0	100	100
3	E	542/544 (100%)	521 (96%)	21 (4%)	0	100	100
4	J	101/620 (16%)	92 (91%)	8 (8%)	1 (1%)	15	54
6	G	235/492 (48%)	222 (94%)	13 (6%)	0	100	100
7	A	126/298 (42%)	116 (92%)	10 (8%)	0	100	100
8	C	193/231 (84%)	183 (95%)	10 (5%)	0	100	100
9	b	117/196 (60%)	110 (94%)	7 (6%)	0	100	100
9	s	61/196 (31%)	58 (95%)	3 (5%)	0	100	100
10	d	91/101 (90%)	87 (96%)	4 (4%)	0	100	100
10	v	80/101 (79%)	77 (96%)	3 (4%)	0	100	100
11	e	73/94 (78%)	67 (92%)	5 (7%)	1 (1%)	11	46
11	w	73/94 (78%)	72 (99%)	1 (1%)	0	100	100
12	f	71/86 (83%)	69 (97%)	2 (3%)	0	100	100
12	x	71/86 (83%)	69 (97%)	2 (3%)	0	100	100
13	g	68/77 (88%)	62 (91%)	5 (7%)	1 (2%)	10	45

Continued on next page...

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	y	73/77 (95%)	64 (88%)	6 (8%)	3 (4%)	3	22
14	h	101/146 (69%)	98 (97%)	3 (3%)	0	100	100
14	t	68/146 (47%)	67 (98%)	1 (2%)	0	100	100
15	i	95/110 (86%)	91 (96%)	4 (4%)	0	100	100
15	u	90/110 (82%)	89 (99%)	1 (1%)	0	100	100
16	H	186/261 (71%)	180 (97%)	6 (3%)	0	100	100
17	D	570/629 (91%)	554 (97%)	16 (3%)	0	100	100
18	B	182/300 (61%)	169 (93%)	13 (7%)	0	100	100
19	K	402/583 (69%)	379 (94%)	19 (5%)	4 (1%)	15	54
20	O	810/971 (83%)	772 (95%)	35 (4%)	3 (0%)	34	72
21	U	166/282 (59%)	141 (85%)	24 (14%)	1 (1%)	25	65
22	V	101/280 (36%)	90 (89%)	10 (10%)	1 (1%)	15	54
23	T	454/530 (86%)	414 (91%)	40 (9%)	0	100	100
24	S	90/107 (84%)	79 (88%)	11 (12%)	0	100	100
25	Q	214/436 (49%)	202 (94%)	11 (5%)	1 (0%)	29	69
26	P	1170/1361 (86%)	1055 (90%)	105 (9%)	10 (1%)	17	56
27	R	165/213 (78%)	161 (98%)	3 (2%)	1 (1%)	25	65
28	Z	81/85 (95%)	76 (94%)	4 (5%)	1 (1%)	13	50
29	W	168/238 (71%)	129 (77%)	28 (17%)	11 (6%)	1	16
30	Y	82/111 (74%)	76 (93%)	5 (6%)	1 (1%)	13	50
31	p	445/849 (52%)	431 (97%)	13 (3%)	1 (0%)	47	81
All	All	7874/11564 (68%)	7373 (94%)	460 (6%)	41 (0%)	32	69

5 of 41 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
25	Q	368	ILE
26	P	1299	ILE
29	W	34	LEU
29	W	52	LYS
13	y	50	ASP

5.3.2　Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	F	11/451 (2%)	11 (100%)	0	100	100
3	E	12/519 (2%)	12 (100%)	0	100	100
4	J	3/568 (0%)	3 (100%)	0	100	100
6	G	8/448 (2%)	8 (100%)	0	100	100
7	A	6/273 (2%)	6 (100%)	0	100	100
8	C	8/214 (4%)	8 (100%)	0	100	100
9	b	3/176 (2%)	3 (100%)	0	100	100
9	s	1/176 (1%)	1 (100%)	0	100	100
10	d	7/89 (8%)	7 (100%)	0	100	100
10	v	4/89 (4%)	4 (100%)	0	100	100
11	e	5/83 (6%)	5 (100%)	0	100	100
11	w	5/83 (6%)	5 (100%)	0	100	100
12	f	3/77 (4%)	3 (100%)	0	100	100
12	x	3/77 (4%)	3 (100%)	0	100	100
13	g	1/66 (2%)	1 (100%)	0	100	100
13	y	2/66 (3%)	2 (100%)	0	100	100
14	h	3/129 (2%)	3 (100%)	0	100	100
14	t	3/129 (2%)	3 (100%)	0	100	100
15	i	4/103 (4%)	4 (100%)	0	100	100
15	u	3/103 (3%)	3 (100%)	0	100	100
16	H	5/234 (2%)	5 (100%)	0	100	100
17	D	12/603 (2%)	12 (100%)	0	100	100
18	B	9/265 (3%)	9 (100%)	0	100	100
19	K	10/538 (2%)	10 (100%)	0	100	100
20	O	42/867 (5%)	42 (100%)	0	100	100
21	U	7/236 (3%)	7 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
22	V	1/259 (0%)	1 (100%)	0	100	100
23	T	10/492 (2%)	10 (100%)	0	100	100
24	S	4/97 (4%)	4 (100%)	0	100	100
25	Q	18/392 (5%)	18 (100%)	0	100	100
26	P	45/1244 (4%)	45 (100%)	0	100	100
27	R	5/189 (3%)	5 (100%)	0	100	100
28	Z	1/77 (1%)	1 (100%)	0	100	100
29	W	8/219 (4%)	8 (100%)	0	100	100
30	Y	1/100 (1%)	1 (100%)	0	100	100
31	p	17/768 (2%)	17 (100%)	0	100	100
All	All	290/10499 (3%)	290 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3　RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	I	31/373 (8%)	11 (35%)	0
32	2	138/1175 (11%)	53 (38%)	27 (19%)
5	1	556/568 (97%)	118 (21%)	9 (1%)
All	All	725/2116 (34%)	182 (25%)	36 (4%)

5 of 182 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	I	247	U
2	I	248	A
2	I	249	C
2	I	250	U
2	I	251	A

5 of 36 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
32	2	1124	U

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Mol	Chain	Res	Type
32	2	1150	U
32	2	1125	U
32	2	1142	G
32	2	67	A

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-13033. 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 ⓘ
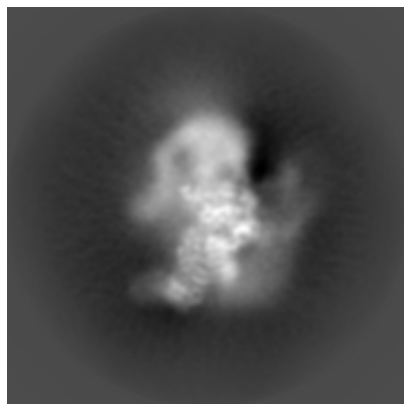
6.1.1 Primary map

X
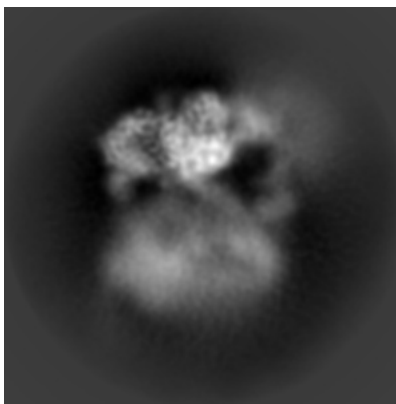
Y
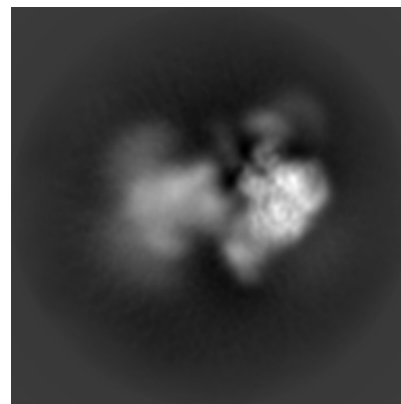
Z

6.1.2 Raw map

X

Y

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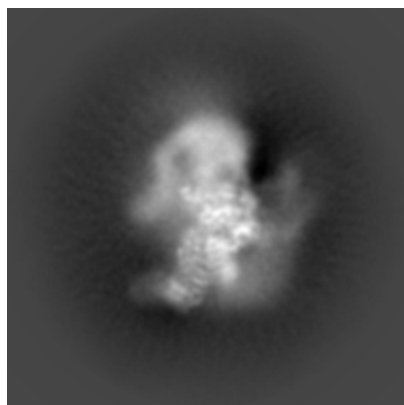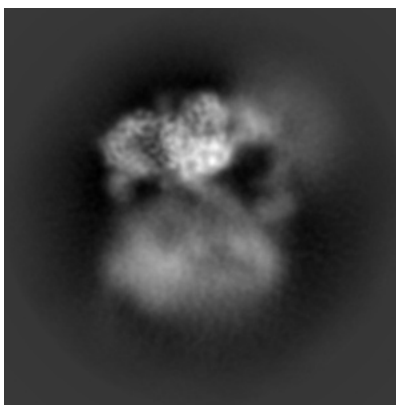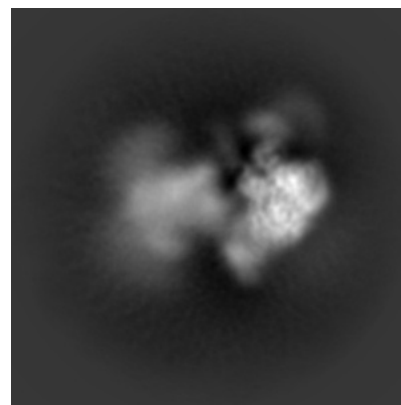
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
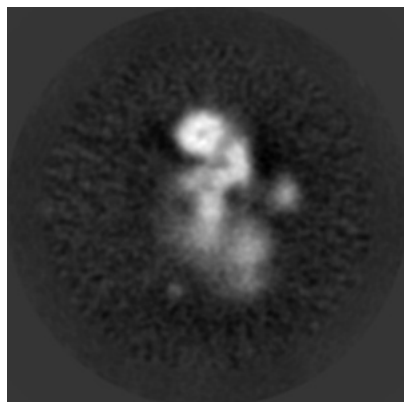
6.2.1 Primary map
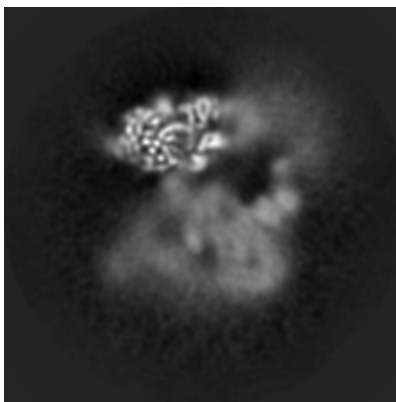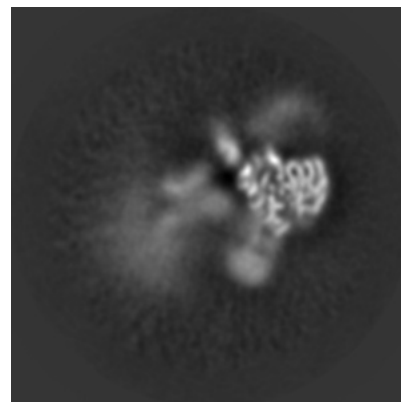
| X Index: 200 | Y Index: 200 | Z Index: 200 |

6.2.2 Raw map
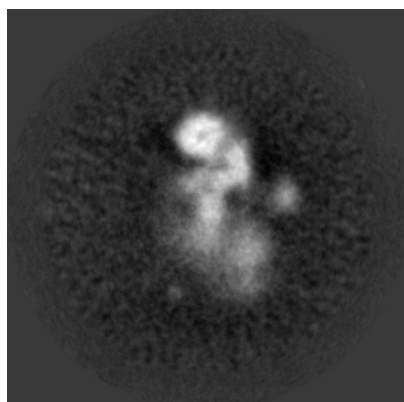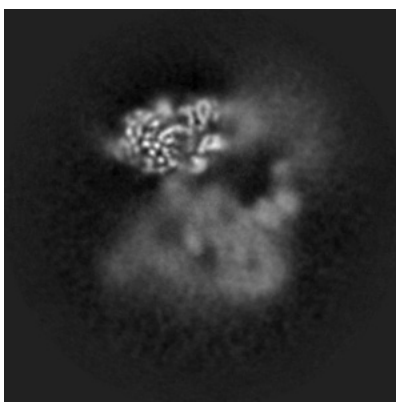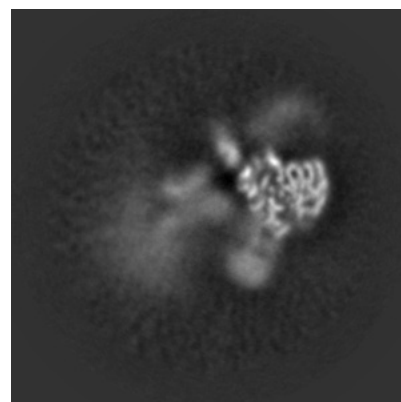
| X Index: 200 | Y Index: 200 | Z Index: 200 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
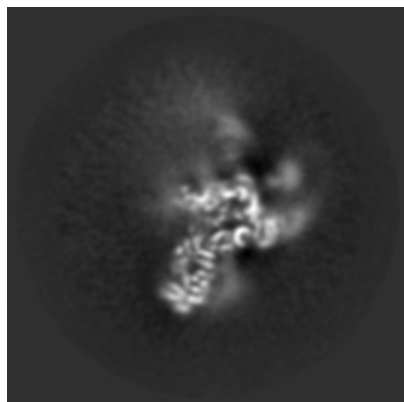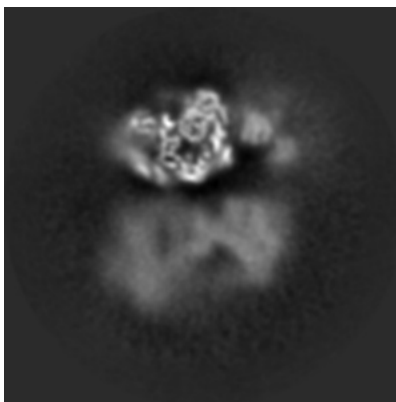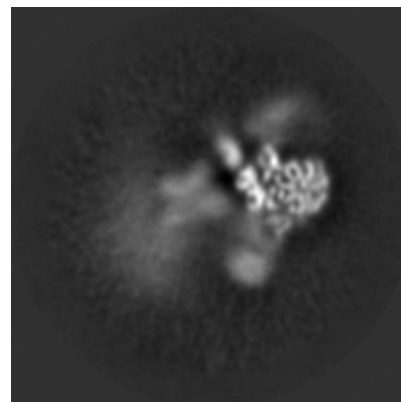
| X Index: 263 | Y Index: 222 | Z Index: 196 |

6.3.2 Raw map
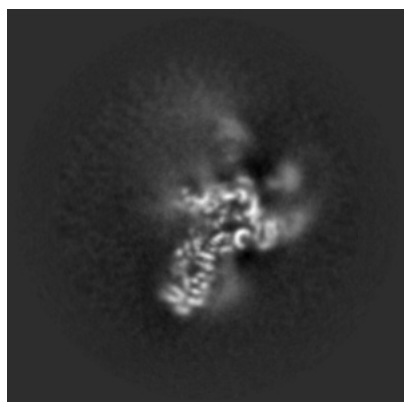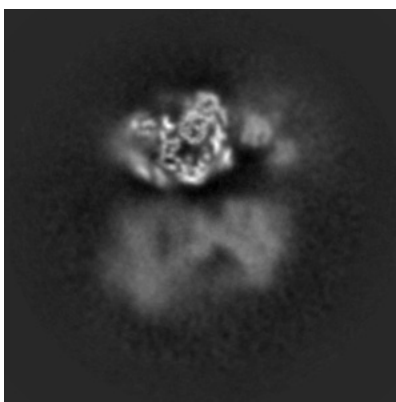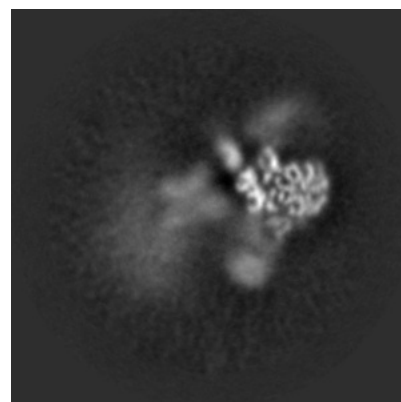
| X Index: 263 | Y Index: 222 | Z Index: 196 |

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
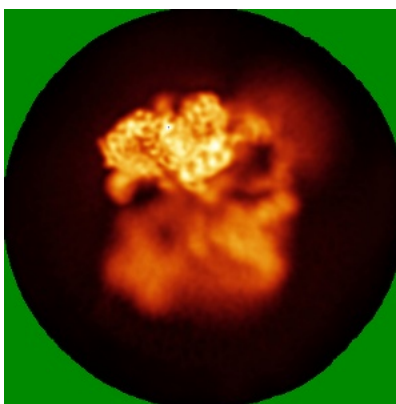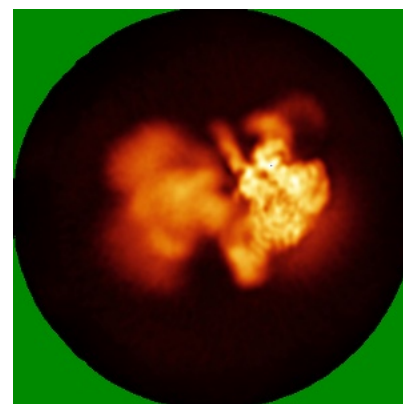
| X | Y | Z |

6.4.2 Raw map

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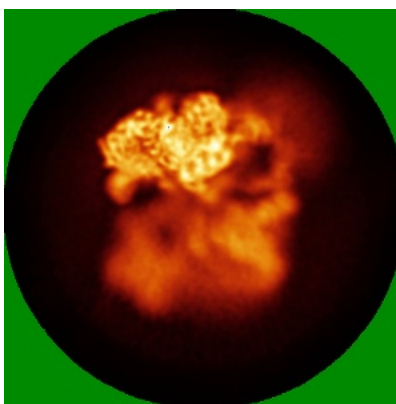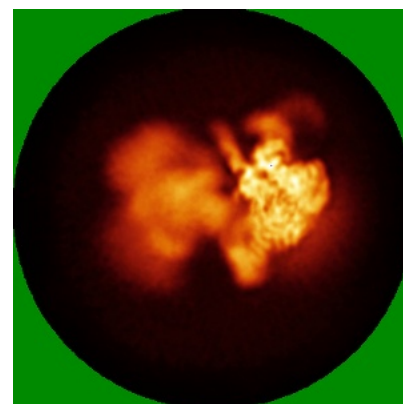
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

X	Y	Z
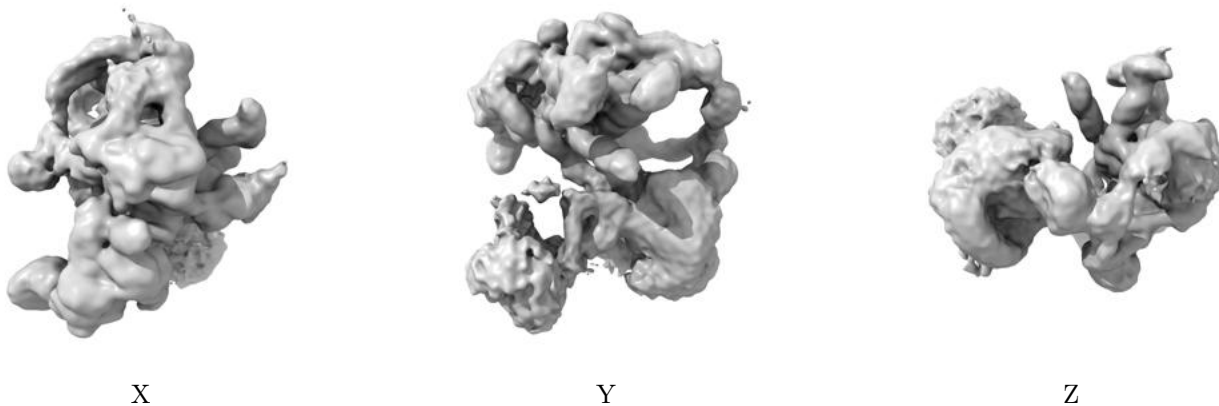
The images above show the 3D surface view of the map at the recommended contour level 0.0125. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

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 ⓘ

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_13033_msk_1.map ⓘ

X   Y   Z
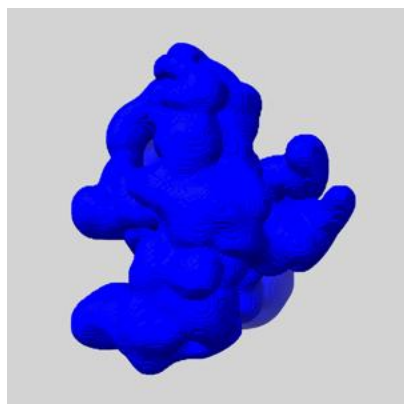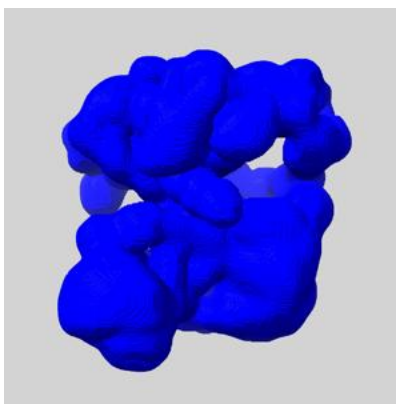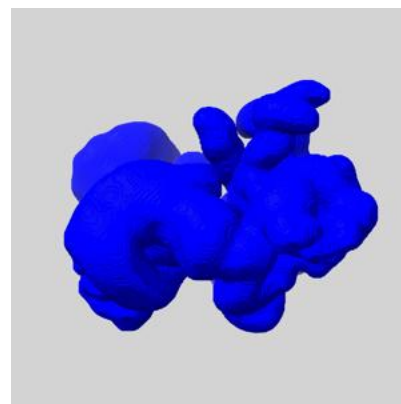
7   Map analysis ⓘ

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

7.1   Map-value distribution ⓘ

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 ⓘ
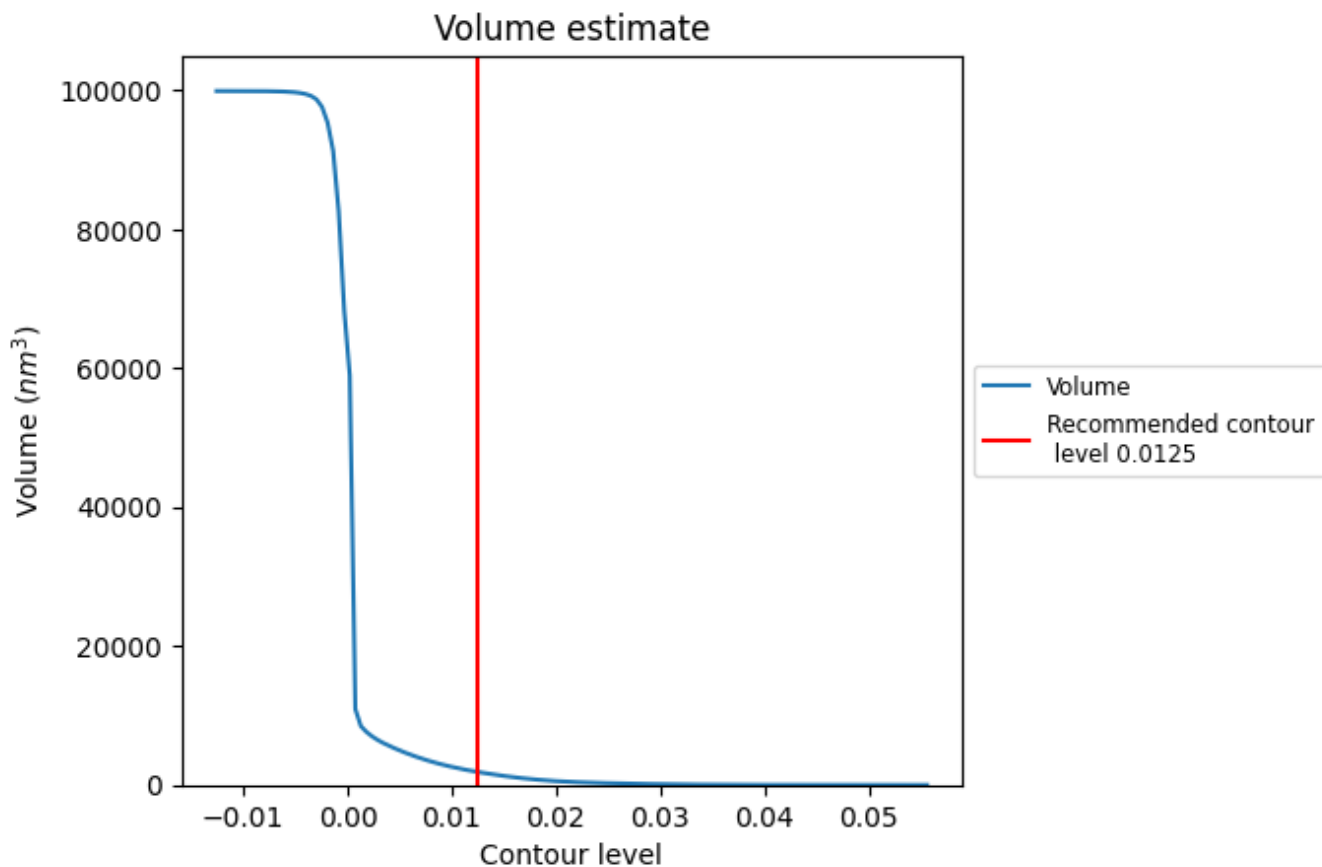
The volume at the recommended contour level is 1867 nm^3; this corresponds to an approximate mass of 1686 kDa.

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)
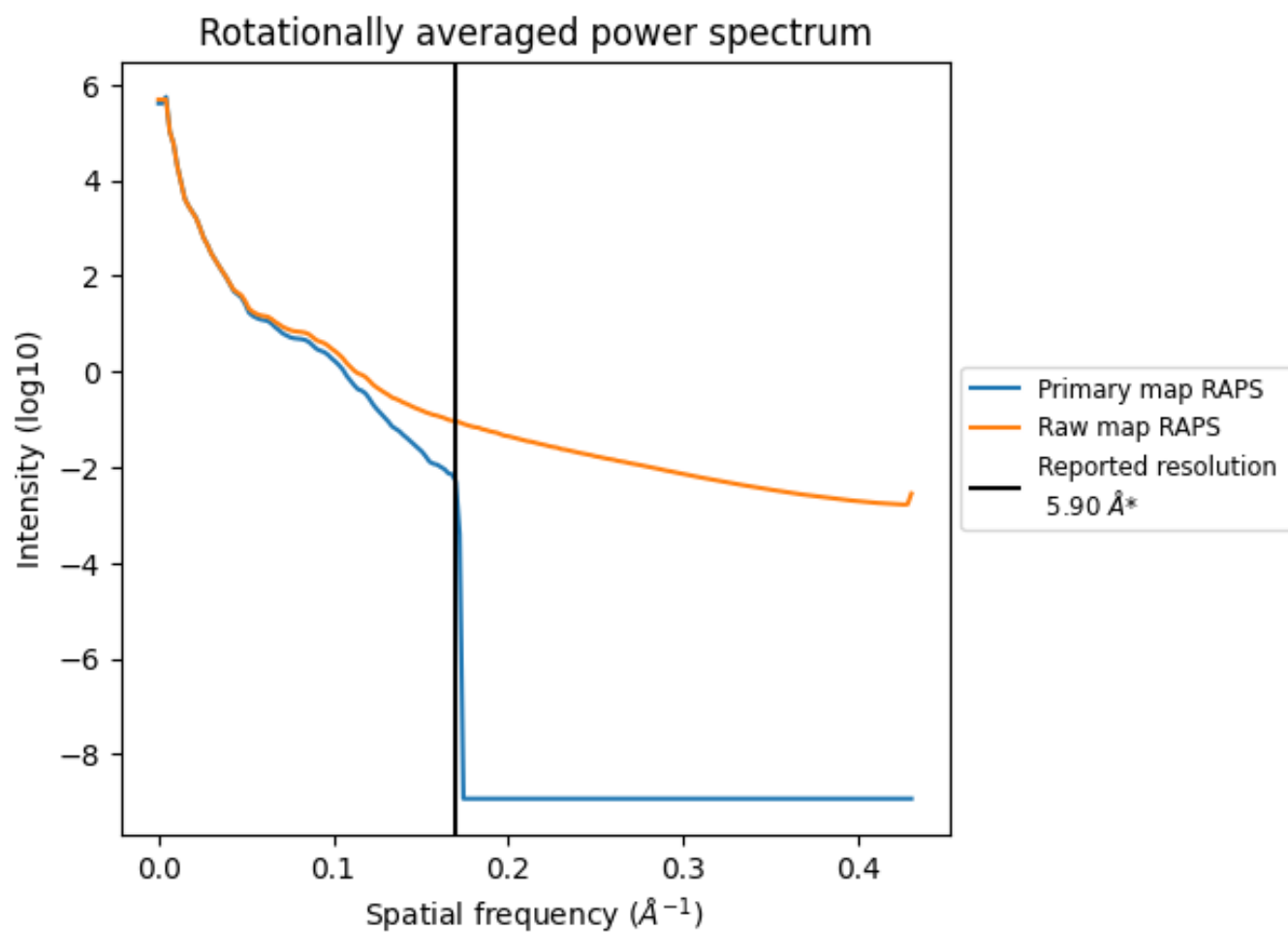
*Reported resolution corresponds to spatial frequency of 0.169 Å^{-1}

8   Fourier-Shell correlation ⓘ

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 ⓘ
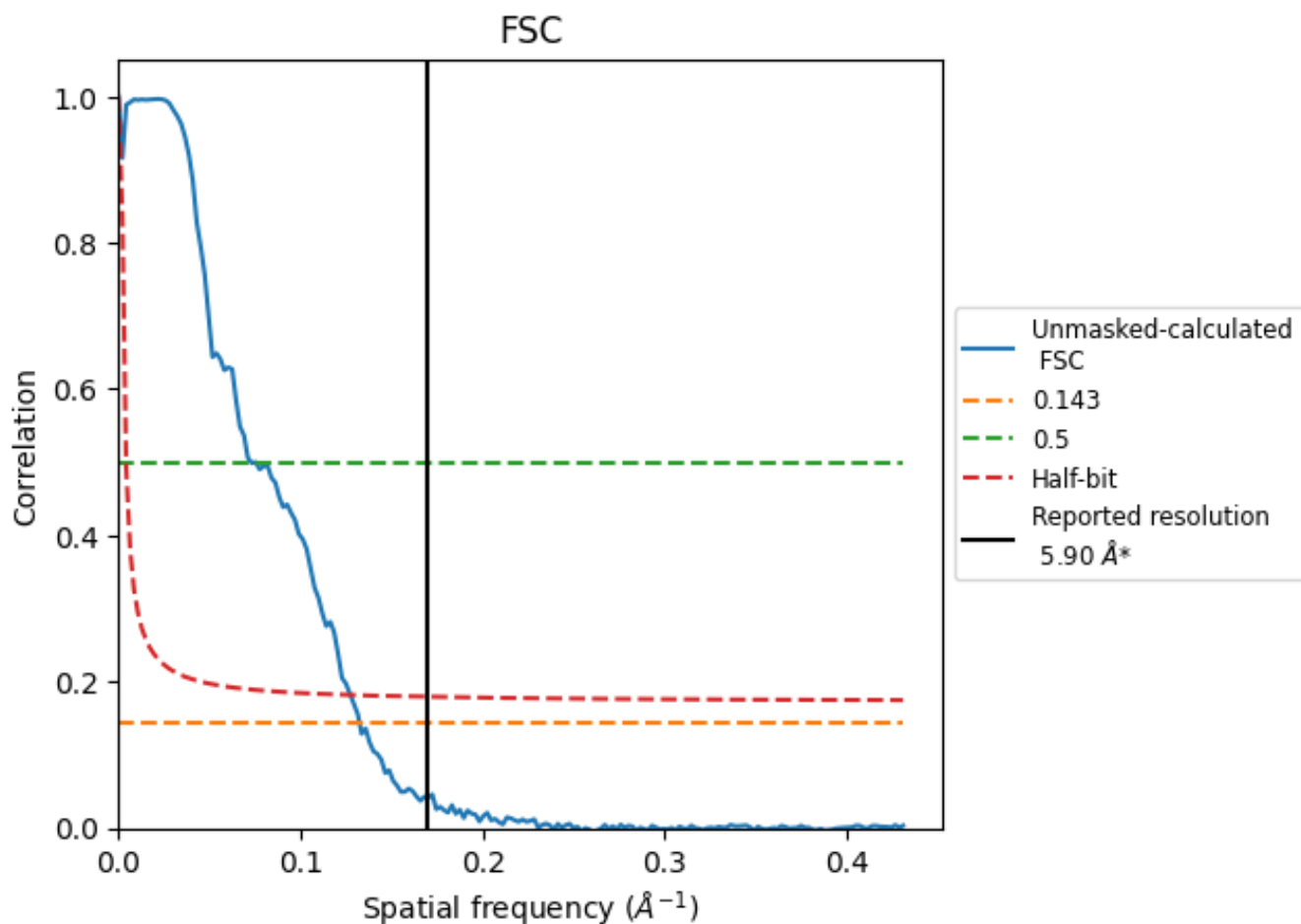
*Reported resolution corresponds to spatial frequency of 0.169 $\mathring{A}^{-1}$

8.2   Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	5.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.55	13.74	7.85

*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 7.55 differs from the reported value 5.9 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-13033 and PDB model 7OQE. Per-residue inclusion information can be found in section 3 on page 11.

9.1 Map-model overlay ⓘ
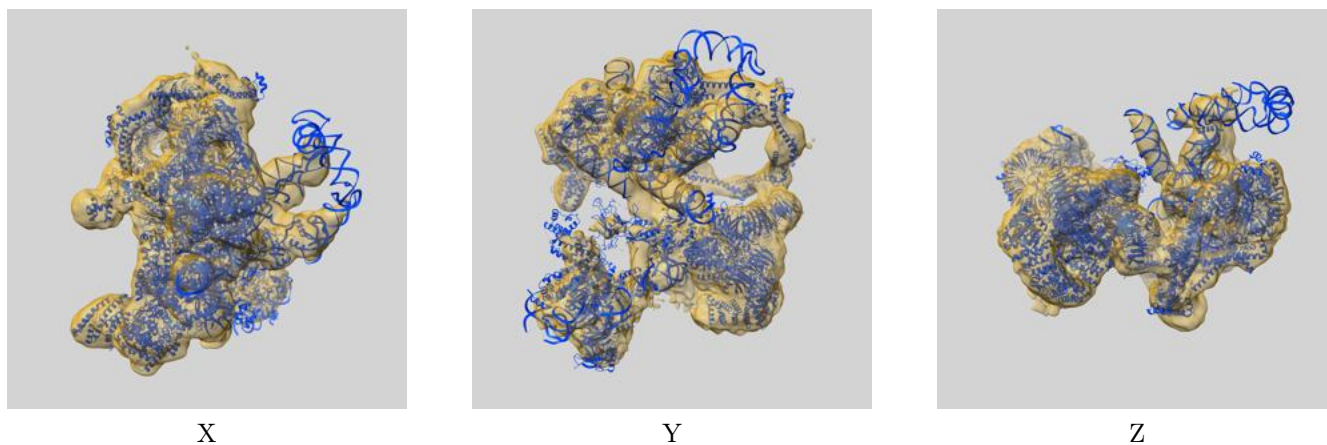
X	Y	Z

The images above show the 3D surface view of the map at the recommended contour level 0.0125 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 ⓘ

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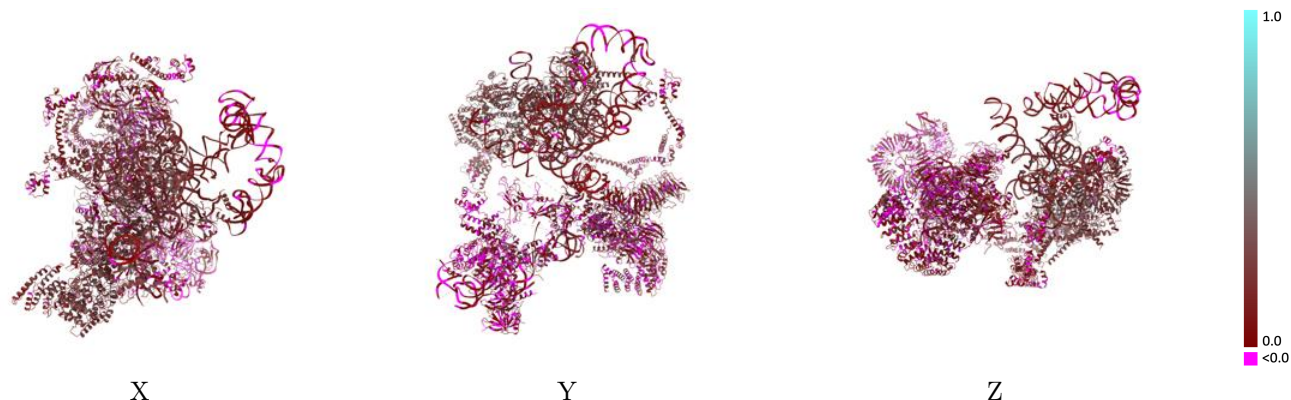
The images above show the model with each residue coloured according its Q-score. This shows
their resolvability in the map with higher Q-score values reflecting better resolvability. Please
note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at
resolutions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

X   Y   Z
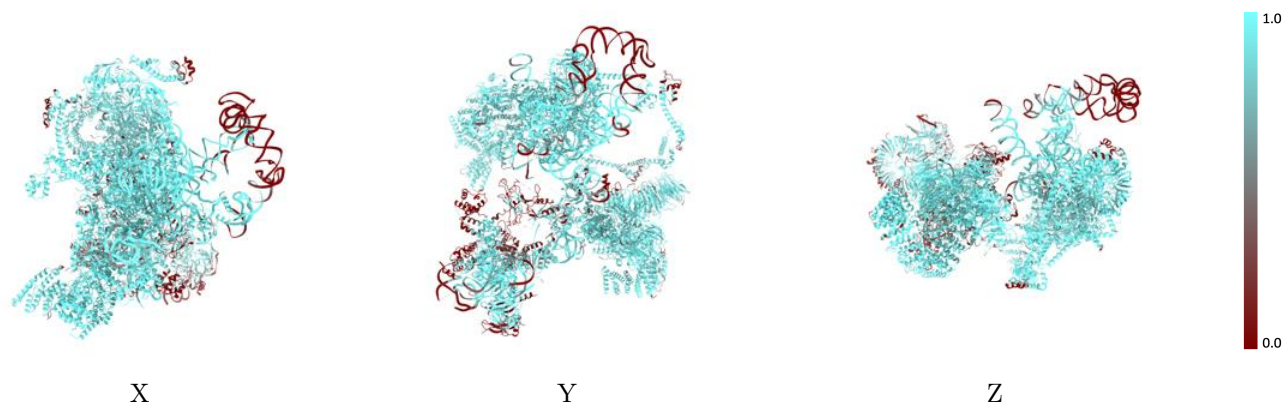
The images above show the model with each residue coloured according to its atom inclusion. This
shows to what extent they are inside the map at the recommended contour level (0.0125).

9.4 Atom inclusion ⓘ
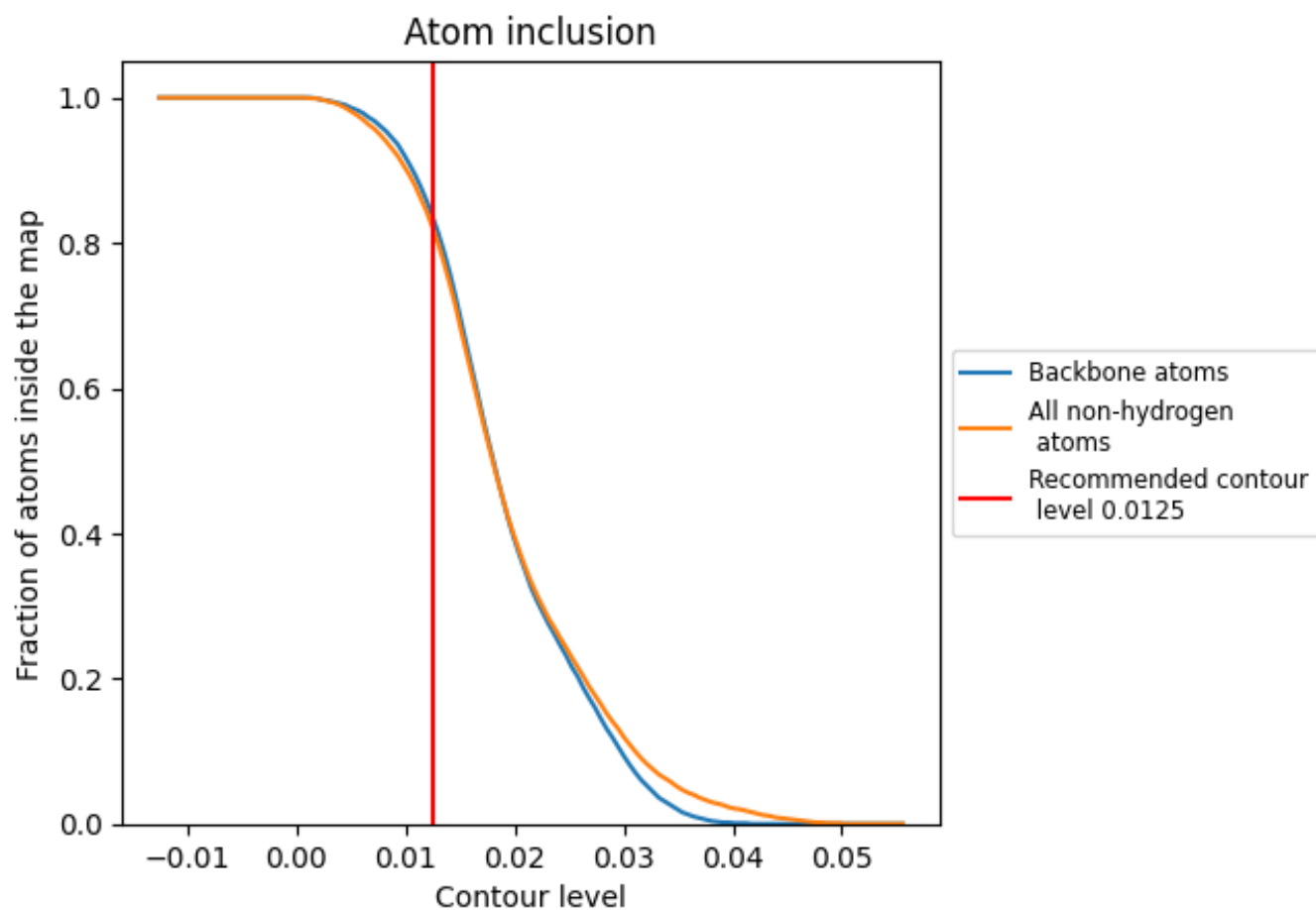
At the recommended contour level, 84% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

9.5　Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.0125) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8200	0.1210
1	0.7420	0.1300
2	0.6690	0.0610
A	0.9910	0.1800
B	0.9770	0.1860
C	0.9590	0.2280
D	0.9720	0.1980
E	0.9920	0.2430
F	0.9440	0.1570
G	0.9950	0.2430
H	0.9920	0.2090
I	0.9190	0.0980
J	0.9790	0.2140
K	0.8150	0.0850
O	0.9740	0.0760
P	0.9430	0.0950
Q	0.7480	0.0690
R	0.6610	0.0790
S	0.9260	0.0800
T	0.6110	0.0560
U	0.3130	0.0370
V	0.1360	0.0200
W	0.6530	0.0130
Y	0.8920	0.0610
Z	0.9660	0.0870
b	0.9650	0.2430
d	0.9790	0.2480
e	0.9970	0.2280
f	1.0000	0.2090
g	0.9610	0.2290
h	0.9960	0.2440
i	0.9960	0.2420
p	0.3890	0.0390
s	1.0000	0.0790
t	1.0000	0.0240

1.0

0.0
<0.0

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Chain	Atom inclusion	Q-score
u	0.7650	-0.0010
v	0.9780	0.0050
w	0.5710	0.0440
x	0.5750	0.0590
y	0.6680	0.0550