



Full wwPDB EM Validation Report ⓘ

Jul 6, 2023 – 07:18 pm BST

PDB ID : 8C6J
EMDB ID : EMD-16452
Title : Human spliceosomal PM5 C* complex
Authors : Dybkov, O.; Kastner, B.; Luehrmann, R.
Deposited on : 2023-01-12
Resolution : 2.80 Å (reported)
Based on initial models : 6HYU, 5MQF, 3MDF, 7OS2, 6QDV, 5HLY, 2OK3, 4PJ3, 6BK8, .

This is a Full wwPDB EM Validation 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 ⓘ symbol.

The types of validation reports are described at

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

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

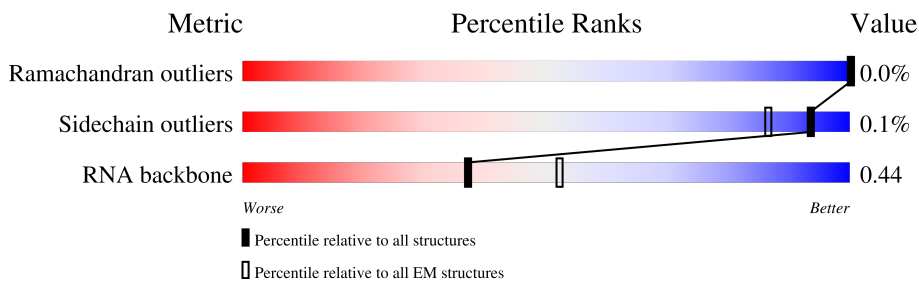
EMDB validation analysis : 0.0.1.dev50
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

1 Overall quality at a glance

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

The reported resolution of this entry is 2.80 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	2	188	
2	4	476	
3	5	116	
4	6	106	
5	7	411	
6	8	174	
7	9	146	
8	A	2335	

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Mol	Chain	Length	Quality of chain
9	B	2136	53% 81% 19%
10	C	972	92% 8%
11	C3	161	61% 99%
12	CD	622	9% 39% 61%
13	CE	301	6% 26% 74%
14	CF	339	45% 54% 45%
15	CI	285	14% 25% 75%
16	CN	301	16% 82% 17%
17	CT	289	12% 35% 65%
18	D	184	67% 33%
19	E	242	5% 5% 90%
20	F	758	16% 84%
21	G	112	53% 47%
22	H	500	92% 8%
23	I	235	15% 20% 64%
24	J	514	6% 71% 29%
25	K	536	55% 45%
26	L	144	100%
27	M	420	69% 31%
28	N	357	86% 14%
29	O	802	19% 68% 32%
30	P	229	51% 49%
31	R	2752	97%
32	S	687	17% 92% 8%
33	T	855	11% 81% 19%

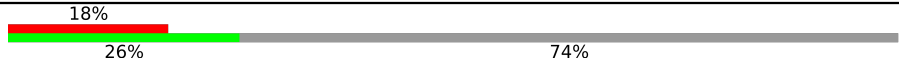


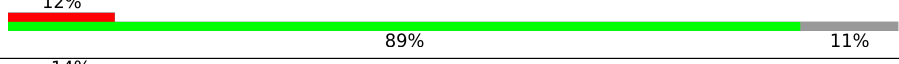

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Mol	Chain	Length	Quality of chain
34	U	1485	80% 90% 10%
35	V	1220	6% 76% 23%
36	W	255	69% 31%
37	Y	225	41% 59%
38	Z	415	9% 21% 79%
39	a	118	17% 87% 13%
39	m	118	5% 81% 19%
40	b	240	34% 66%
40	k	240	34% 66%
41	c	119	67% 33%
41	l	119	67% 33%
42	d	126	67% 33%
42	n	126	66% 34%
43	e	92	86% 14%
43	p	92	88% 12%
44	f	86	6% 84% 16%
44	q	86	84% 16%
45	g	76	96% .
45	r	76	96% .
46	h	586	47% 53%
47	i	166	99% .
48	j	222	33% 43% 57%
49	o	579	89% 11%
50	s	225	48% 100%
51	t	504	16% 27% 73%

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Mol	Chain	Length	Quality of chain
51	u	504	
51	v	504	
51	w	504	
52	y	243	
53	z	451	

2 Entry composition [i](#)

There are 59 unique types of molecules in this entry. The entry contains 111233 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a RNA chain called U2 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	2	142	3010	1346	517	1005	142	0	0

- Molecule 2 is a protein called Splicing factor ESS-2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	4	77	636	395	107	133	1	0	0

- Molecule 3 is a RNA chain called U5 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	5	113	2371	1064	394	801	112	0	0

- Molecule 4 is a RNA chain called U6 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	6	97	2075	928	381	669	97	0	0

- Molecule 5 is a protein called Eukaryotic initiation factor 4A-III.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	7	390	3130	1976	546	589	19	0	0

- Molecule 6 is a protein called RNA-binding protein 8A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	8	91	730	463	122	142	3	0	0

- Molecule 7 is a protein called Protein mago nashi homolog.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
7	9	144	595	306	144	145	0	0

- Molecule 8 is a protein called Pre-mRNA-processing-splicing factor 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	A	2261	17716	11283	3167	3195	71	0	0

- Molecule 9 is a protein called U5 small nuclear ribonucleoprotein 200 kDa helicase.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
9	B	1726	7141	3689	1726	1726	0	0

- Molecule 10 is a protein called 116 kDa U5 small nuclear ribonucleoprotein component.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	C	899	7114	4552	1184	1344	34	0	0

- Molecule 11 is a protein called Peptidyl-prolyl cis-trans isomerase-like 3.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
11	C3	160	669	345	162	162	2	0

- Molecule 12 is a protein called Probable ATP-dependent RNA helicase DDX41.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
12	CD	245	1025	535	245	245	0	0

- Molecule 13 is a protein called Peptidyl-prolyl cis-trans isomerase E.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
13	CE	79	322	164	79	79	0	0

- Molecule 14 is a protein called Protein FAM50A.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	CF	185	Total	C	N	O	0	0
			746	376	185	185		

- Molecule 15 is a protein called Pre-mRNA-splicing factor ISY1 homolog.

Mol	Chain	Residues	Atoms				AltConf	Trace
15	CI	70	Total	C	N	O	0	0
			283	143	70	70		

- Molecule 16 is a protein called Nitric oxide synthase-interacting protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	CN	250	Total	C	N	O	S	0	0
			1643	991	313	327	12		

- Molecule 17 is a protein called Splicing factor C9orf78.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	CT	102	Total	C	N	O	0	0
			414	210	102	102		

- Molecule 18 is a protein called PRKR-interacting protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	D	123	Total	C	N	O	S	0	0
			1013	635	193	180	5		

- Molecule 19 is a RNA chain called PM5 5' Exon.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	E	24	Total	C	N	O	P	0	0
			511	229	97	162	23		

- Molecule 20 is a protein called Splicing factor Cactin.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	F	122	Total	C	N	O	S	0	0
			1088	714	197	175	2		

- Molecule 21 is a protein called Protein FAM32A.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	G	59	Total	C	N	O	S	0	0
			494	308	94	90	2		

- Molecule 22 is a protein called Pre-mRNA-splicing factor CWC22 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	H	459	Total	C	N	O	S	0	0
			3321	2079	603	621	18		

- Molecule 23 is a RNA chain called PM5 Intron.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	I	84	Total	C	N	O	P	0	0
			1727	775	254	614	84		

- Molecule 24 is a protein called Pleiotropic regulator 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	J	367	Total	C	N	O	S	0	0
			2720	1697	504	511	8		

- Molecule 25 is a protein called SNW domain-containing protein 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
25	K	295	Total	C	N	O	P	S	0	0
			2360	1479	431	435	2	13		

- Molecule 26 is a protein called Protein BUD31 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	L	144	Total	C	N	O	S	0	0
			1188	748	218	210	12		

- Molecule 27 is a protein called Pre-mRNA-splicing factor RBM22.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	M	289	Total	C	N	O	S	0	0
			2327	1459	416	432	20		

- Molecule 28 is a protein called U5 small nuclear ribonucleoprotein 40 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	N	306	Total	C	N	O	S	0	0
			2388	1498	419	457	14		

- Molecule 29 is a protein called Cell division cycle 5-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	O	548	Total	C	N	O	S	0	0
			3321	1939	693	682	7		

- Molecule 30 is a protein called Spliceosome-associated protein CWC15 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	P	117	Total	C	N	O	S	0	0
			973	595	190	186	2		

- Molecule 31 is a protein called Serine/arginine repetitive matrix protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	R	76	Total	C	N	O	S	0	0
			399	226	86	86	1		

- Molecule 32 is a protein called Crooked neck-like protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	S	635	Total	C	N	O	S	0	0
			3835	2264	784	781	6		

- Molecule 33 is a protein called Pre-mRNA-splicing factor SYF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	T	689	Total	C	N	O	S	0	0
			4273	2649	798	813	13		

- Molecule 34 is a protein called Intron-binding protein aquarius.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	U	1330	Total	C	N	O	6	0
			5548	2884	1332	1332		

- Molecule 35 is a protein called ATP-dependent RNA helicase DHX8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	V	934	4167	2221	962	983	1	0	0

- Molecule 36 is a protein called U2 small nuclear ribonucleoprotein A'.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
36	W	176	722	370	176	176	0	0

- Molecule 37 is a protein called U2 small nuclear ribonucleoprotein B'.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
37	Y	92	377	193	92	92	0	0

- Molecule 38 is a protein called NF-kappa-B-activating protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	Z	87	454	250	99	103	2	0	0

- Molecule 39 is a protein called Small nuclear ribonucleoprotein Sm D2.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
39	a	103	520	314	103	103	0	0
39	m	95	395	205	95	95	0	0

- Molecule 40 is a protein called Small nuclear ribonucleoprotein-associated proteins B and B'.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
40	b	82	413	249	82	82	0	0
40	k	82	340	176	82	82	0	0

- Molecule 41 is a protein called Small nuclear ribonucleoprotein Sm D1.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	c	80	Total	C	N	O	0	0
			402	242	80	80		
41	l	80	Total	C	N	O	0	0
			329	169	80	80		

- Molecule 42 is a protein called Small nuclear ribonucleoprotein Sm D3.

Mol	Chain	Residues	Atoms				AltConf	Trace
42	d	84	Total	C	N	O	0	0
			420	252	84	84		
42	n	83	Total	C	N	O	0	0
			341	175	83	83		

- Molecule 43 is a protein called Small nuclear ribonucleoprotein E.

Mol	Chain	Residues	Atoms				AltConf	Trace
43	e	79	Total	C	N	O	0	0
			393	235	79	79		
43	p	81	Total	C	N	O	0	0
			327	165	81	81		

- Molecule 44 is a protein called Small nuclear ribonucleoprotein F.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	f	72	Total	C	N	O	0	0
			359	215	72	72		
44	q	72	Total	C	N	O	0	0
			300	156	72	72		

- Molecule 45 is a protein called Small nuclear ribonucleoprotein G.

Mol	Chain	Residues	Atoms				AltConf	Trace
45	g	73	Total	C	N	O	0	0
			365	218	73	74		
45	r	73	Total	C	N	O	0	0
			302	155	73	74		

- Molecule 46 is a protein called Pre-mRNA-splicing factor SLU7.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	h	276	Total	C	N	O	S	0	0
			2280	1433	408	431	8		

- Molecule 47 is a protein called Peptidyl-prolyl cis-trans isomerase-like 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	i	164	1270	810	220	233	7	0	0

- Molecule 48 is a protein called STING ER exit protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
48	j	95	398	208	95	95	0	0

- Molecule 49 is a protein called Pre-mRNA-processing factor 17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	o	513	3918	2478	692	724	24	0	0

- Molecule 50 is a protein called Pre-mRNA-splicing factor SPF27.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
50	s	225	922	471	225	226	0	0

- Molecule 51 is a protein called Pre-mRNA-processing factor 19.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
51	t	137	581	307	137	137	0	0
51	u	130	550	290	130	130	0	0
51	v	138	585	309	138	138	0	0
51	w	131	554	292	131	131	0	0

- Molecule 52 is a protein called Pre-mRNA-splicing factor SYF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	y	216	1423	843	284	294	2	0	0

- Molecule 53 is a protein called Splicing regulator SDE2.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	z	103	Total	C	N	O	S	0	0
			606	346	133	124	3		

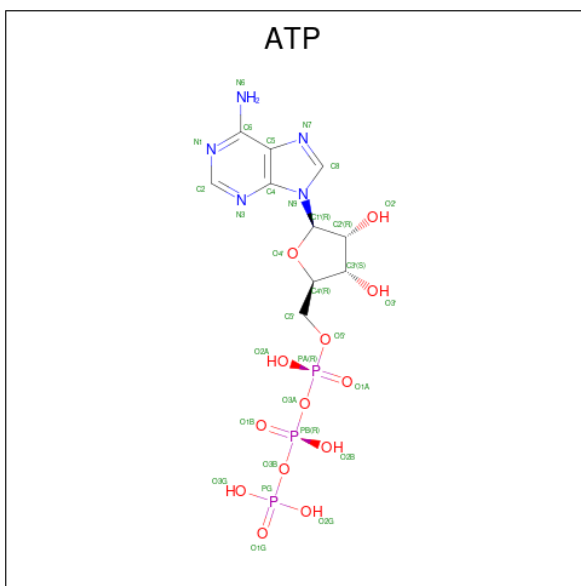
- Molecule 54 is POTASSIUM ION (three-letter code: K) (formula: K) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
54	6	2	Total	K	0
			2	2	

- Molecule 55 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

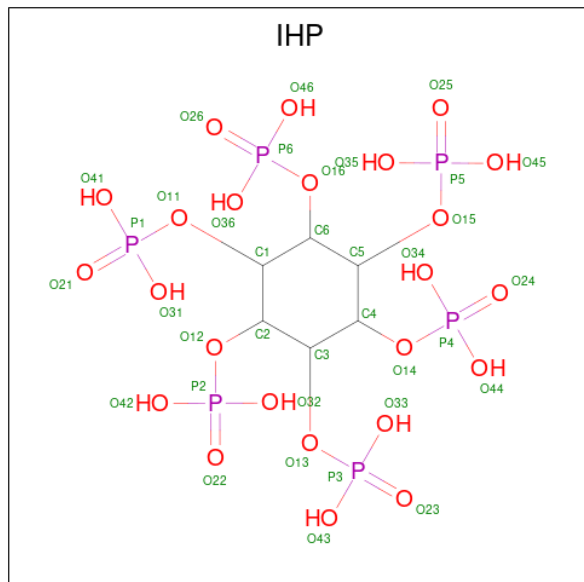
Mol	Chain	Residues	Atoms		AltConf
55	6	5	Total	Mg	0
			5	5	
55	7	1	Total	Mg	0
			1	1	
55	C	1	Total	Mg	0
			1	1	

- Molecule 56 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



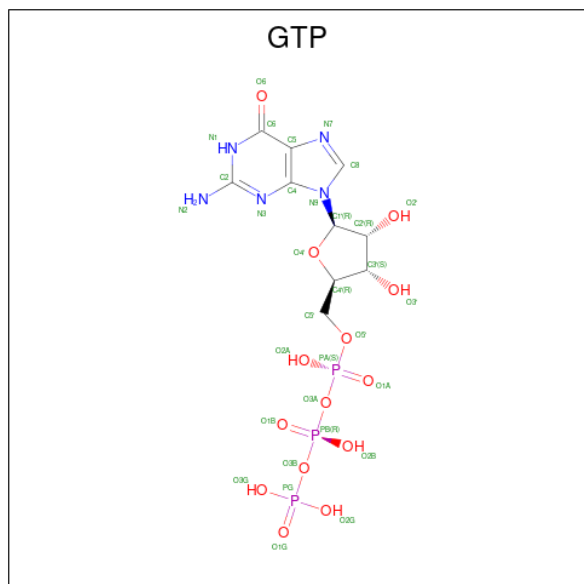
Mol	Chain	Residues	Atoms					AltConf
56	7	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 57 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: $C_6H_{18}O_{24}P_6$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	O	P	
57	A	1	36	6	24	6	0

- Molecule 58 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$) (labeled as "Ligand of Interest" by depositor).

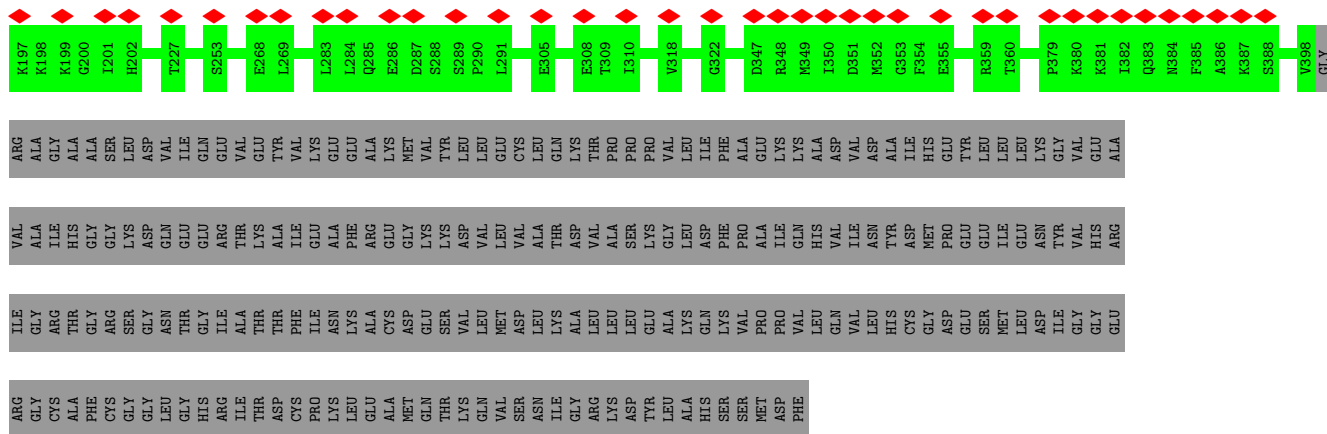


Mol	Chain	Residues	Atoms				AltConf	
			Total	C	N	O		P
58	C	1	32	10	5	14	3	0

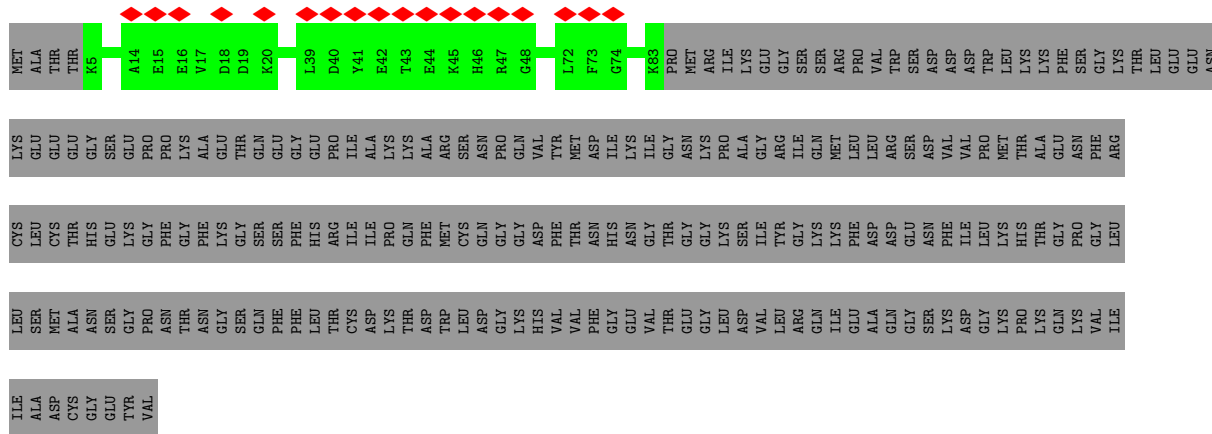
- Molecule 59 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
59	L	3	Total 3	Zn 3	0
59	M	3	Total 3	Zn 3	0

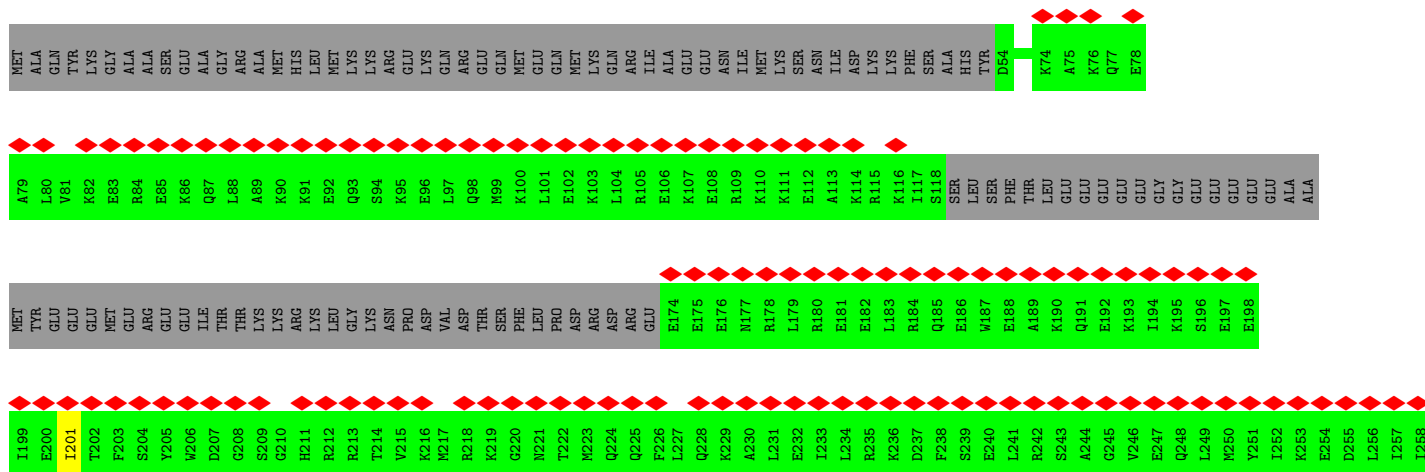
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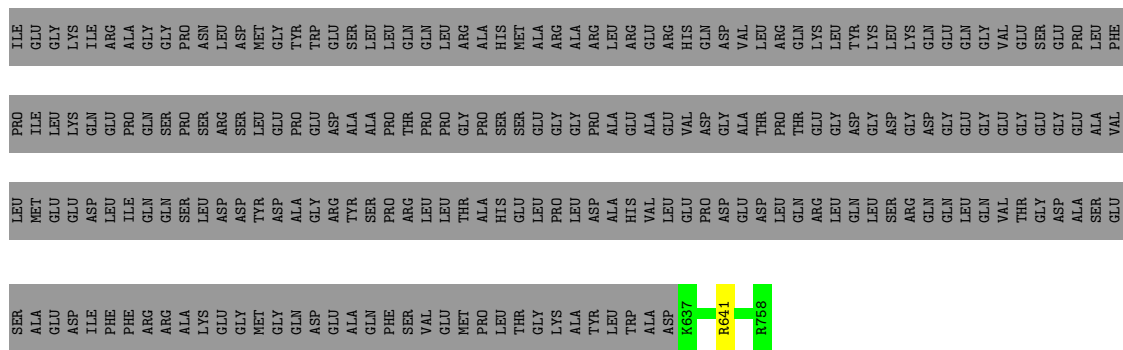


• Molecule 13: Peptidyl-prolyl cis-trans isomerase E

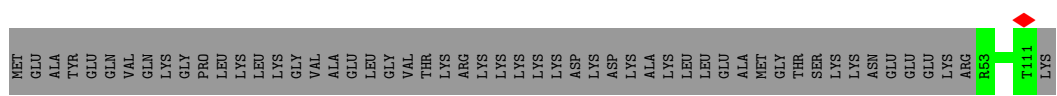


• Molecule 14: Protein FAM50A

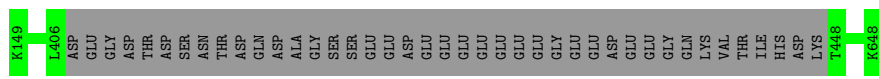




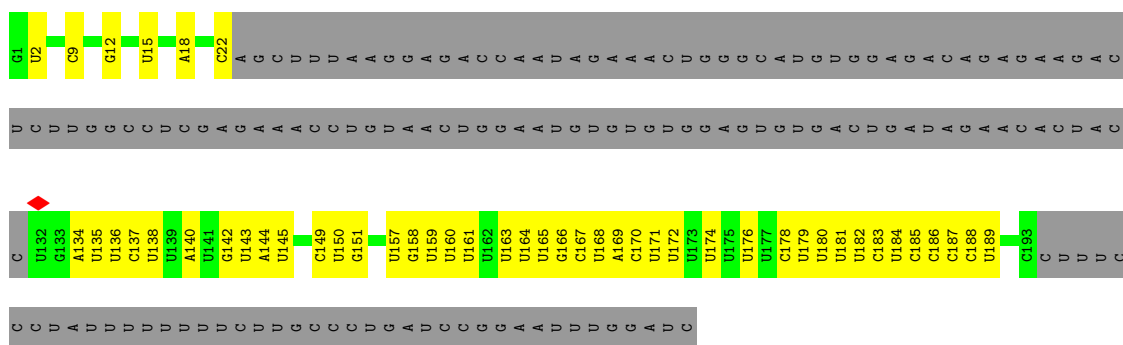
• Molecule 21: Protein FAM32A



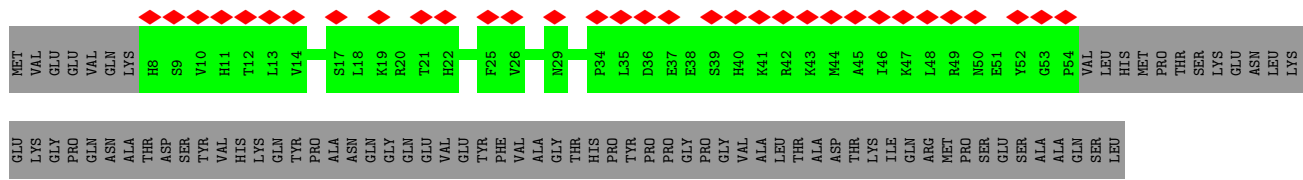
• Molecule 22: Pre-mRNA-splicing factor CWC22 homolog

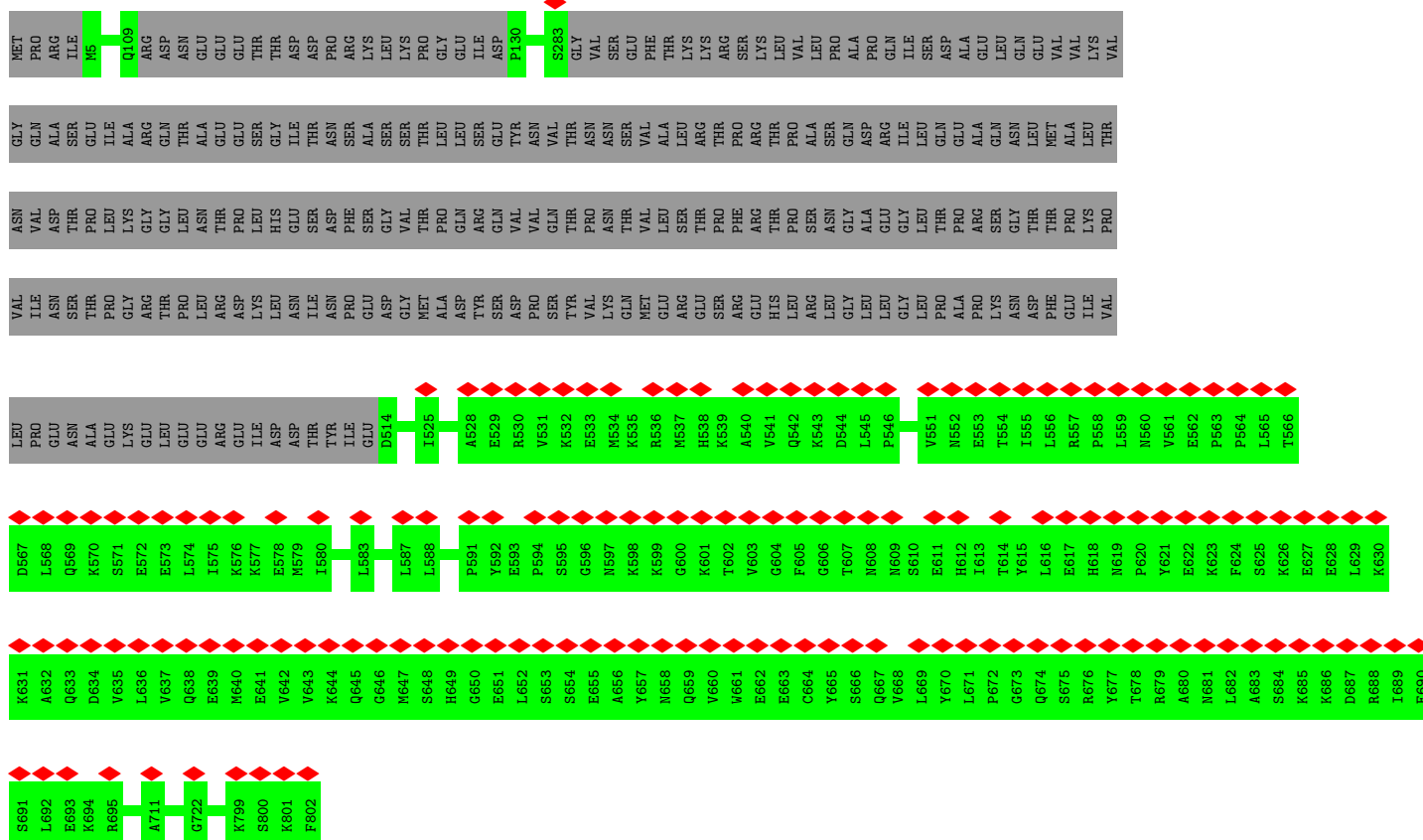


• Molecule 23: PM5 Intron

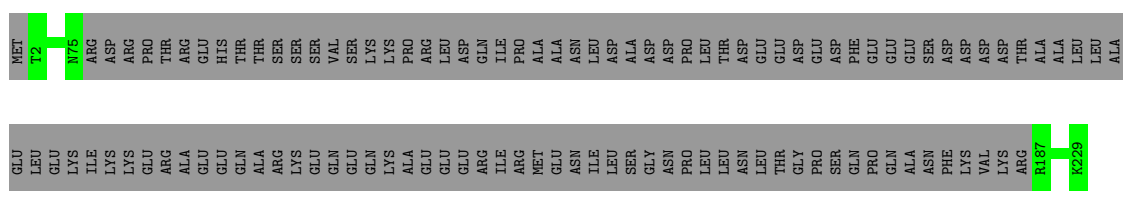


• Molecule 24: Pleiotropic regulator 1

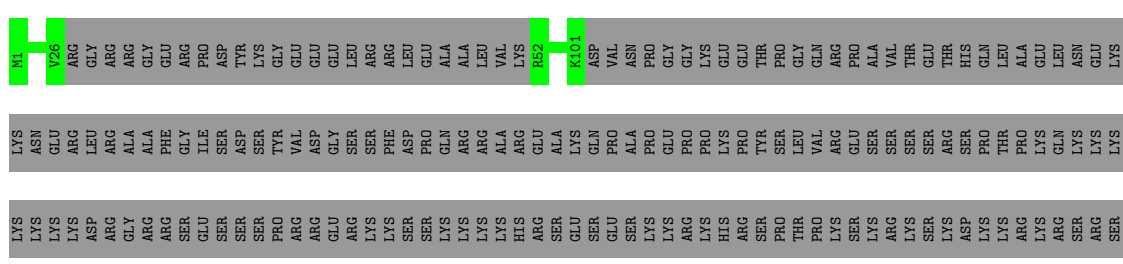




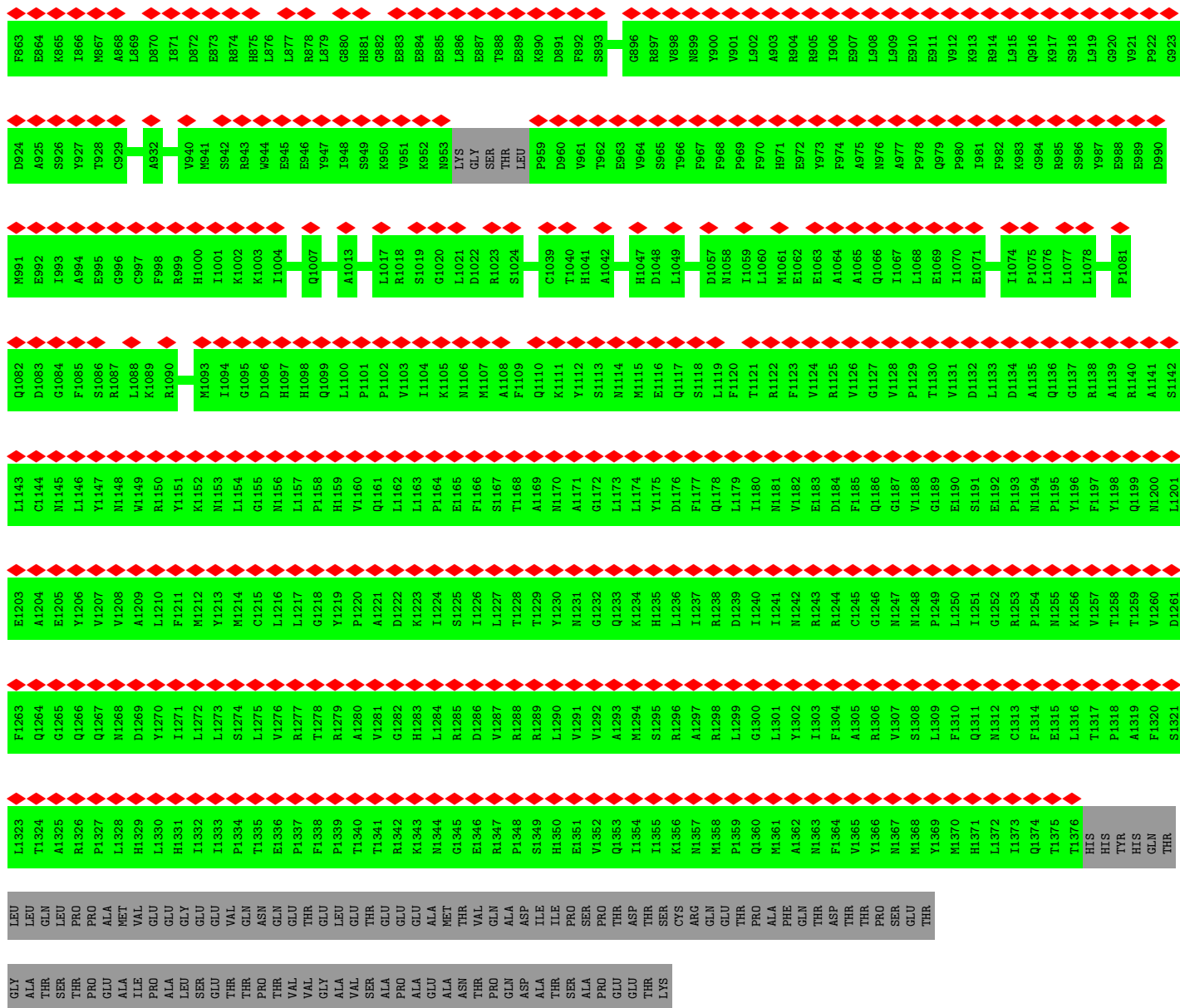
- Molecule 30: Spliceosome-associated protein CWC15 homolog



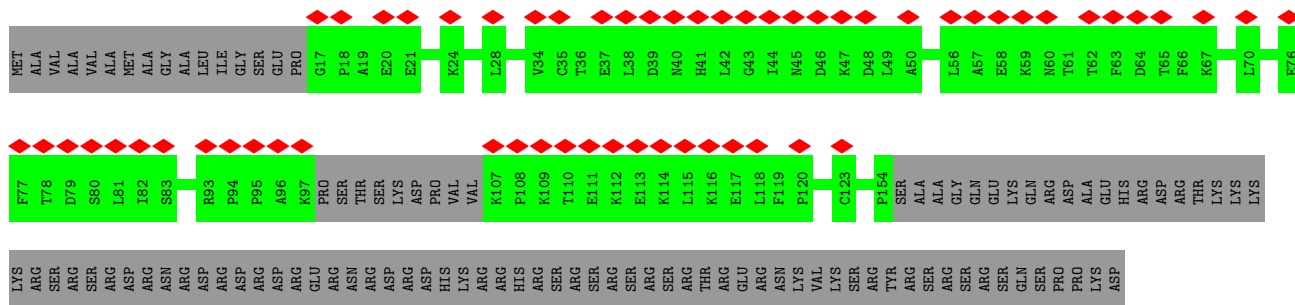
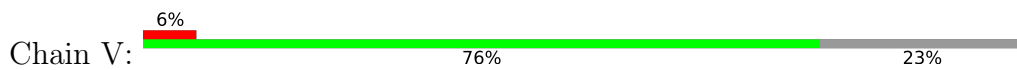
- Molecule 31: Serine/arginine repetitive matrix protein 2

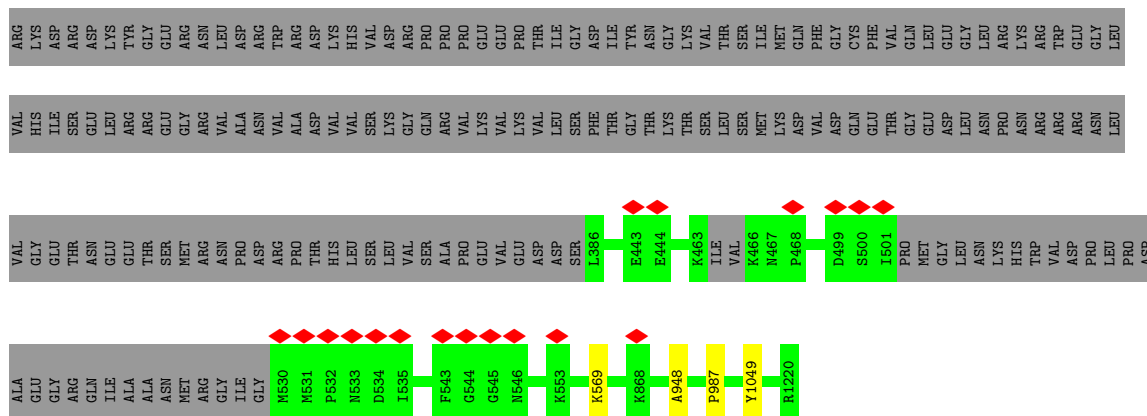


MET	ALA	ALA	PRO	ALA	GLN	PRO	LYS	LYS	ILE	VAL	PRO	PRO	THR	VAL	SER	GLN	ILE	M19	A20	E21	F22	V23	T24	Q25	A27	C28	K29	Y30	W31	A32	F33	H34	I35	K36	K37	K38	S39	P40	F41	D42	I43	K44	V45	L46	E47	D48	I49	V50	E51	K52	E53	V55	S57	B58	F59	A60			
I61	R62	R63	I64	R65	L66	L67	E68	F69	S70	Q71	Y72	L73	E74	M75	Y76	L77	M78	M79	N80	Y81	S82	P83	E84	E85	S86	S87	K88	A89	Y90	L91	M92	L93	C94	C95	C96	M97	V98	N99	E100	K101	F102	R103	E104	M105	V106	P107	A108	E109	I110	I111	F112	K113	K114	K115	P116	L117	H118	F119	L120
F121	F122	F123	K124	H125	I126	L127	K128	A129	A130	L131	A132	E133	T134	D135	G136	E137	F138	S139	L140	H141	E142	Q143	T144	V145	L146	L147	L148	F149	L150	D151	H152	C153	F154	M155	S156	L157	E158	V159	D160	L161	I162	R163	S164	Q165	V166	Q167	Q168	L169	I170	S171	P172	M173	W174	W175	M176	G177	L178	F179	L180
A181	R182	L183	E184	L185	E186	L187	K188	L189	T190	P191	K192	L193	R194	K195	F196	W197	M198	L199	I200	K201	A202	M203	D204	E205	K206	M207	D208	P209	E210	A211	R212	E213	Q214	A215	V216	Q217	E218	R219	R220	F221	L222	S223	Q224	L225	I226	Q227	K228	F229	I230	S231	V232	L233	K234	S235	V236	L237	L238	S239	E240
P241	V242	T243	M244	K245	K246	V247	H248	Y249	C250	E251	R252	F253	I254	E255	L256	M257	L258	D259	L260	E261	A262	L263	L264	P265	T266	R267	R268	W269	F270	M271	T272	L273	D275	D276	S277	H278	L279	L280	V281	H282	C283	Y284	L285	S286	M287	L288	V289	R290	R291	E292	E293	D294	G295	H296	L297	F298	S299	Q300	
L301	L302	D303	M304	L305	K306	F307	Y308	F309	G310	F311	E312	I313	N314	D315	Q316	L317	N318	A319	L320	L321	T322	E323	N324	E325	M326	T327	T328	I329	H330	Y331	D332	R333	I334	L337	Q338	R339	A341	F342	A343	H344	F345	P346	E347	L348	Y349	D350	F351	A352	N355	V356	A357	E358	G359	H359	D360	T361	R362		
E363	S364	L365	V366	K367	F368	F369	G370	F371	L372	S373	S374	N375	T376	L377	H378	Q379	V380	A381	S382	L383	Y384	C385	L386	L387	P388	T389	L390	F391	K392	N393	E394	D395	T396	L397	F398	D399	K400	E401	F402	L403	L404	E405	L406	L407	V408	S409	R410	H411	E412	R413	R414	I415	Q419	Q420	L421	M424	P425		
L426	Y427	P428	T429	E430	K431	I432	I433	W434	E436	N437	I438	V439	P440	T441	E442	Y443	Y444	S445	G446	E447	G448	C449	L450	A451	L452	P453	K454	M455	L456	L457	Q458	F459	L460	T461	L462	Y465	L466	L467	R468	M469	F470	N471	R474	L475	E476	S477	T478	Y479	E480	I481	R482	Q483	E484	D485	E486	D487			
S488	V489	S490	R491	M492	K493	P494	W495	Q496	E498	Y499	G500	G501	V502	V503	F504	G505	G506	W507	A508	R509	M510	A511	Q512	P513	I514	V515	A516	F517	T518	V519	E520	E521	V522	A523	K524	P525	N526	E529	N530	W531	P532	T533	R534	V535	R536	A537	D538	V539	T540	I541	N542	L543	M544	V545	R546	H548			
I549	K550	D551	E552	W553	L556	K558	H559	C562	F563	L564	I565	T566	V567	R568	P569	K571	F572	Y573	G574	T575	K576	F577	D578	R579	L580	L581	P582	F583	L584	E585	Q586	V587	G588	L589	V590	Y591	Y592	R593	I597	Q598	G599	M600	L601	D602	D603	K604	G605	R606	V607	I608	E609	ASP	GLY	PRO					
GLU	P614	R615	P616	N617	L618	R619	G620	E621	S622	R623	T624	F625	L629	D630	P631	N632	Q633	Y634	Q635	Q636	D637	M638	T639	N640	T641	Q642	Q643	N644	G645	A646	E647	D648	V649	Y650	E651	T652	F653	N654	I655	I656	M657	M658	R659	K660	P661	K662	E663	N664	M665	F666	T672	I673	R674	M675	L676	M677	N678		
T679	D680	C681	V682	P683	P684	V685	W686	L687	H688	D689	I690	I691	L692	G693	Y694	D696	S697	S698	S699	A700	H701	Y702	S703	K704	M705	P706	N707	Q708	I709	A710	T711	L712	D713	F714	M715	D716	T717	F718	L719	S720	I721	E722	R723	H724	K725	A726	S727	F728	P729	G730	H731	N732	V733	R734	V735	T736	V737	E738	
D739	P740	A741	L742	Q743	I744	P745	P746	F747	R748	I749	T750	F751	P752	V753	ARG	SER	GLY	LYS	GLY	LYS	LYS	ARG	ASP	ALA	VAL	GLU	ASP	GLU	ASP	THR	E773	K775	T776	L777	I778	V779	E780	F781	H782	V783	I784	P785	M786	R787	G788	P789	Y790	Y792	N793	Q794	P795	K796	R797	M798					
T799	I800	Q801	F802	T803	H804	T805	Q806	I807	E808	A809	I810	R811	A812	G813	M814	P815	P816	L818	T819	M820	V821	V822	G823	P824	P825	G826	T827	G828	K829	T830	D831	V832	A833	V834	Q835	I836	I837	S838	Y841	H842	N843	F844	P845	R848	T849	T853	H854	S855	N856	Q857	A858	L859	N860	Q861	L862				

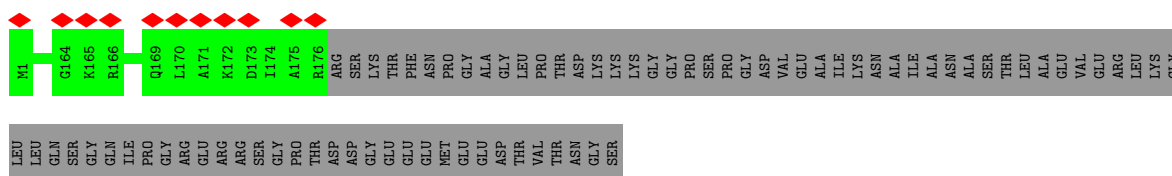


● Molecule 35: ATP-dependent RNA helicase DHX8

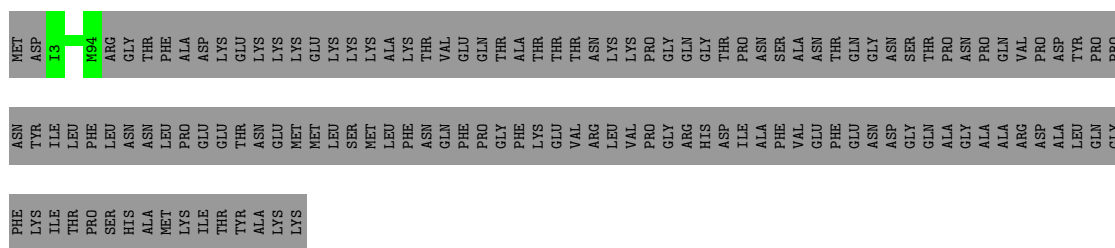




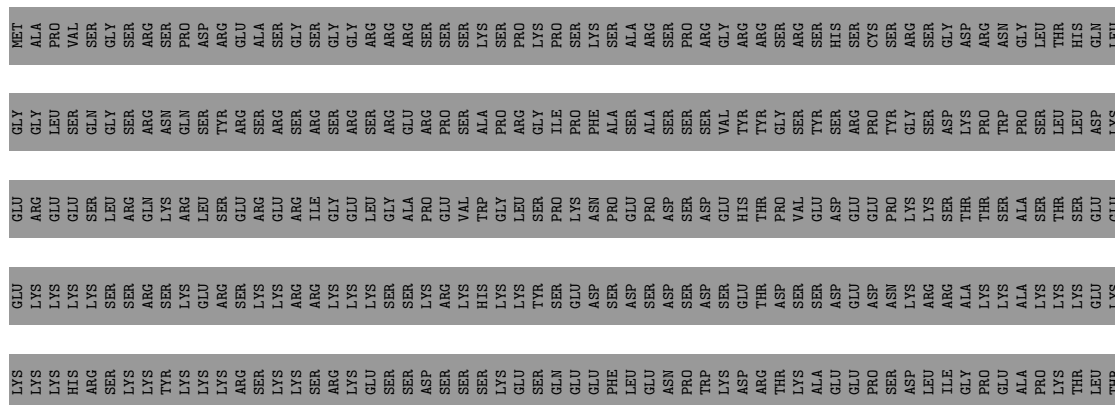
• Molecule 36: U2 small nuclear ribonucleoprotein A'

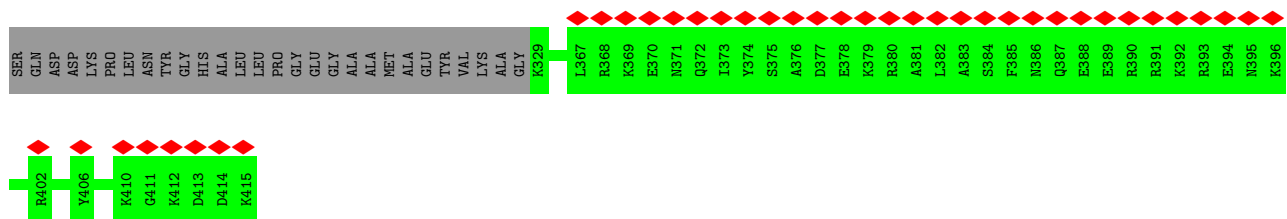


• Molecule 37: U2 small nuclear ribonucleoprotein B''

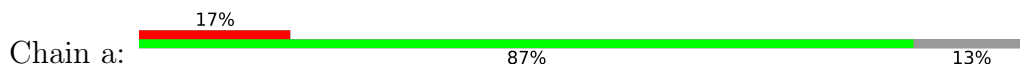


• Molecule 38: NF-kappa-B-activating protein

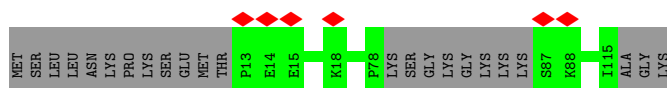
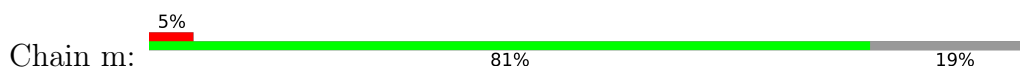




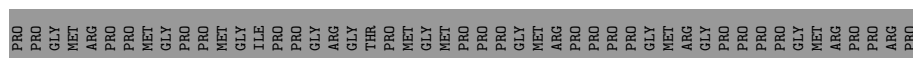
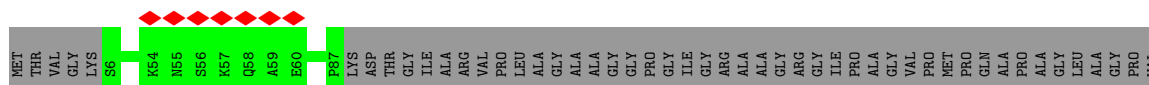
• Molecule 39: Small nuclear ribonucleoprotein Sm D2



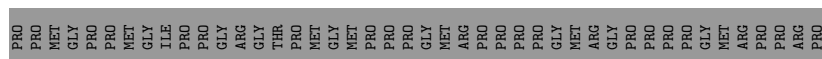
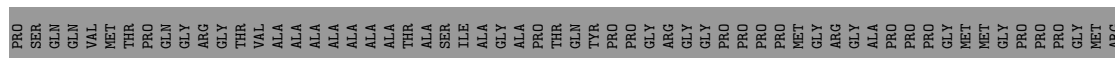
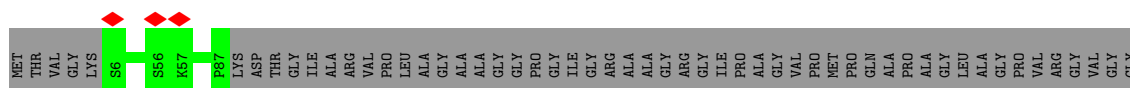
• Molecule 39: Small nuclear ribonucleoprotein Sm D2



• Molecule 40: Small nuclear ribonucleoprotein-associated proteins B and B'



• Molecule 40: Small nuclear ribonucleoprotein-associated proteins B and B'



• Molecule 41: Small nuclear ribonucleoprotein Sm D1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1150057	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	44.24	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.260	Depositor
Minimum map value	-0.359	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.115	Depositor
Map size (Å)	609.0, 609.0, 609.0	wwPDB
Map dimensions	580, 580, 580	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GTP, IHP, ZN, K, SEP, ATP, MG

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	2	0.21	0/3359	0.77	0/5224
2	4	0.24	0/643	0.48	0/862
3	5	0.28	0/2643	0.82	0/4110
4	6	0.28	0/2323	0.74	0/3619
5	7	0.25	0/3179	0.50	0/4291
6	8	0.25	0/748	0.50	0/1012
7	9	0.22	0/600	0.45	0/759
8	A	0.27	0/18188	0.47	0/24579
9	B	0.22	0/7219	0.43	0/9180
10	C	0.27	0/7275	0.49	0/9884
11	C3	0.23	0/675	0.50	0/856
12	CD	0.23	0/1039	0.43	0/1327
13	CE	0.24	0/323	0.48	0/406
14	CF	0.21	0/745	0.39	0/930
15	CI	0.21	0/282	0.31	0/351
16	CN	0.27	0/1674	0.50	0/2247
17	CT	0.21	0/414	0.39	0/518
18	D	0.25	0/1030	0.49	0/1371
19	E	0.25	0/571	0.80	0/889
20	F	0.27	0/1133	0.52	0/1530
21	G	0.24	0/503	0.48	0/672
22	H	0.25	0/3378	0.44	0/4509
23	I	0.22	0/1915	0.82	0/2967
24	J	0.28	0/2791	0.52	0/3788
25	K	0.28	0/2387	0.52	0/3205
26	L	0.26	0/1214	0.50	0/1627
27	M	0.26	0/2375	0.51	0/3204
28	N	0.25	0/2442	0.50	0/3309
29	O	0.23	0/3365	0.45	0/4411
30	P	0.26	0/988	0.53	0/1315
31	R	0.25	0/403	0.43	0/526
32	S	0.24	0/3907	0.44	0/5142

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	T	0.24	0/4328	0.42	0/5947
34	U	0.22	0/5628	0.43	0/7170
35	V	0.23	0/4217	0.42	0/5405
36	W	0.22	0/727	0.43	0/919
37	Y	0.22	0/379	0.43	0/478
38	Z	0.25	0/456	0.45	0/586
39	a	0.23	0/524	0.43	0/732
39	m	0.23	0/398	0.46	0/503
40	b	0.24	0/416	0.44	0/581
40	k	0.23	0/343	0.50	0/435
41	c	0.23	0/404	0.44	0/564
41	l	0.22	0/331	0.49	0/418
42	d	0.24	0/422	0.44	0/588
42	n	0.23	0/343	0.48	0/433
43	e	0.23	0/393	0.44	0/547
43	p	0.22	0/327	0.47	0/409
44	f	0.24	0/362	0.45	0/502
44	q	0.23	0/303	0.48	0/384
45	g	0.23	0/367	0.46	0/509
45	r	0.23	0/304	0.51	0/383
46	h	0.27	0/2334	0.46	0/3138
47	i	0.26	0/1304	0.48	0/1767
48	j	0.23	0/403	0.48	0/514
49	o	0.26	0/4024	0.49	0/5426
50	s	0.23	0/928	0.41	0/1171
51	t	0.23	0/591	0.40	0/759
51	u	0.23	0/559	0.41	0/717
51	v	0.22	0/595	0.37	0/764
51	w	0.22	0/563	0.40	0/722
52	y	0.25	0/1444	0.45	0/1904
53	z	0.23	0/611	0.47	0/797
All	All	0.25	0/114059	0.51	0/153792

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	
2	4	73/476 (15%)	71 (97%)	2 (3%)	0	100	100
5	7	388/411 (94%)	380 (98%)	8 (2%)	0	100	100
6	8	89/174 (51%)	86 (97%)	3 (3%)	0	100	100
7	9	142/146 (97%)	141 (99%)	1 (1%)	0	100	100
8	A	2257/2335 (97%)	2206 (98%)	51 (2%)	0	100	100
9	B	1724/2136 (81%)	1702 (99%)	22 (1%)	0	100	100
10	C	897/972 (92%)	842 (94%)	55 (6%)	0	100	100
11	C3	160/161 (99%)	159 (99%)	1 (1%)	0	100	100
12	CD	243/622 (39%)	241 (99%)	2 (1%)	0	100	100
13	CE	77/301 (26%)	77 (100%)	0	0	100	100
14	CF	179/339 (53%)	177 (99%)	1 (1%)	1 (1%)	25	56
15	CI	66/285 (23%)	66 (100%)	0	0	100	100
16	CN	248/301 (82%)	230 (93%)	16 (6%)	2 (1%)	19	49
17	CT	98/289 (34%)	96 (98%)	2 (2%)	0	100	100
18	D	121/184 (66%)	119 (98%)	2 (2%)	0	100	100
20	F	120/758 (16%)	112 (93%)	8 (7%)	0	100	100
21	G	57/112 (51%)	55 (96%)	2 (4%)	0	100	100
22	H	455/500 (91%)	443 (97%)	12 (3%)	0	100	100
24	J	363/514 (71%)	348 (96%)	15 (4%)	0	100	100
25	K	291/536 (54%)	272 (94%)	18 (6%)	1 (0%)	41	72
26	L	142/144 (99%)	138 (97%)	4 (3%)	0	100	100
27	M	287/420 (68%)	280 (98%)	7 (2%)	0	100	100
28	N	304/357 (85%)	286 (94%)	18 (6%)	0	100	100
29	O	542/802 (68%)	533 (98%)	9 (2%)	0	100	100
30	P	113/229 (49%)	109 (96%)	4 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
31	R	72/2752 (3%)	70 (97%)	2 (3%)	0	100	100
32	S	631/687 (92%)	615 (98%)	16 (2%)	0	100	100
33	T	677/855 (79%)	655 (97%)	22 (3%)	0	100	100
34	U	1328/1485 (89%)	1320 (99%)	8 (1%)	0	100	100
35	V	924/1220 (76%)	893 (97%)	27 (3%)	4 (0%)	34	66
36	W	174/255 (68%)	170 (98%)	4 (2%)	0	100	100
37	Y	90/225 (40%)	90 (100%)	0	0	100	100
38	Z	85/415 (20%)	83 (98%)	2 (2%)	0	100	100
39	a	101/118 (86%)	100 (99%)	1 (1%)	0	100	100
39	m	91/118 (77%)	89 (98%)	2 (2%)	0	100	100
40	b	80/240 (33%)	79 (99%)	1 (1%)	0	100	100
40	k	80/240 (33%)	77 (96%)	3 (4%)	0	100	100
41	c	78/119 (66%)	77 (99%)	1 (1%)	0	100	100
41	l	78/119 (66%)	78 (100%)	0	0	100	100
42	d	82/126 (65%)	80 (98%)	2 (2%)	0	100	100
42	n	81/126 (64%)	79 (98%)	2 (2%)	0	100	100
43	e	77/92 (84%)	76 (99%)	1 (1%)	0	100	100
43	p	79/92 (86%)	79 (100%)	0	0	100	100
44	f	70/86 (81%)	70 (100%)	0	0	100	100
44	q	70/86 (81%)	69 (99%)	1 (1%)	0	100	100
45	g	71/76 (93%)	70 (99%)	1 (1%)	0	100	100
45	r	71/76 (93%)	70 (99%)	1 (1%)	0	100	100
46	h	272/586 (46%)	263 (97%)	9 (3%)	0	100	100
47	i	162/166 (98%)	155 (96%)	7 (4%)	0	100	100
48	j	93/222 (42%)	93 (100%)	0	0	100	100
49	o	511/579 (88%)	476 (93%)	35 (7%)	0	100	100
50	s	223/225 (99%)	220 (99%)	3 (1%)	0	100	100
51	t	135/504 (27%)	133 (98%)	2 (2%)	0	100	100
51	u	128/504 (25%)	123 (96%)	5 (4%)	0	100	100
51	v	136/504 (27%)	136 (100%)	0	0	100	100
51	w	129/504 (26%)	127 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
52	y	212/243 (87%)	209 (99%)	3 (1%)	0	100	100
53	z	101/451 (22%)	98 (97%)	3 (3%)	0	100	100
All	All	16628/27600 (60%)	16191 (97%)	429 (3%)	8 (0%)	100	100

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
14	CF	201	ILE
16	CN	123	SER
35	V	987	PRO
35	V	1049	TYR
16	CN	141	ASP
35	V	569	LYS
25	K	223	PRO
35	V	948	ALA

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	
2	4	70/395 (18%)	70 (100%)	0	100	100
5	7	345/361 (96%)	344 (100%)	1 (0%)	92	98
6	8	76/143 (53%)	76 (100%)	0	100	100
7	9	6/134 (4%)	6 (100%)	0	100	100
8	A	1825/2108 (87%)	1825 (100%)	0	100	100
9	B	79/1908 (4%)	79 (100%)	0	100	100
10	C	799/866 (92%)	797 (100%)	2 (0%)	92	98
11	C3	7/141 (5%)	7 (100%)	0	100	100
12	CD	15/533 (3%)	15 (100%)	0	100	100
13	CE	2/252 (1%)	2 (100%)	0	100	100
14	CF	2/304 (1%)	2 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
15	CI	1/240 (0%)	1 (100%)	0	100	100
16	CN	155/260 (60%)	155 (100%)	0	100	100
17	CT	2/263 (1%)	2 (100%)	0	100	100
18	D	106/157 (68%)	106 (100%)	0	100	100
20	F	111/655 (17%)	110 (99%)	1 (1%)	78	94
21	G	53/99 (54%)	53 (100%)	0	100	100
22	H	324/455 (71%)	324 (100%)	0	100	100
24	J	279/441 (63%)	279 (100%)	0	100	100
25	K	246/457 (54%)	245 (100%)	1 (0%)	91	97
26	L	130/130 (100%)	130 (100%)	0	100	100
27	M	258/361 (72%)	257 (100%)	1 (0%)	91	97
28	N	262/300 (87%)	262 (100%)	0	100	100
29	O	232/709 (33%)	232 (100%)	0	100	100
30	P	103/203 (51%)	103 (100%)	0	100	100
31	R	23/2432 (1%)	23 (100%)	0	100	100
32	S	252/617 (41%)	251 (100%)	1 (0%)	91	97
33	T	225/749 (30%)	225 (100%)	0	100	100
34	U	72/1336 (5%)	72 (100%)	0	100	100
35	V	104/1085 (10%)	104 (100%)	0	100	100
36	W	6/218 (3%)	6 (100%)	0	100	100
37	Y	3/195 (2%)	3 (100%)	0	100	100
38	Z	24/366 (7%)	24 (100%)	0	100	100
39	a	5/110 (4%)	5 (100%)	0	100	100
39	m	5/110 (4%)	5 (100%)	0	100	100
40	b	4/177 (2%)	4 (100%)	0	100	100
40	k	4/177 (2%)	4 (100%)	0	100	100
41	c	3/101 (3%)	3 (100%)	0	100	100
41	l	3/101 (3%)	3 (100%)	0	100	100
42	d	3/101 (3%)	3 (100%)	0	100	100
42	n	3/101 (3%)	3 (100%)	0	100	100
43	e	1/84 (1%)	1 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
43	p	1/84 (1%)	1 (100%)	0	100	100
44	f	4/74 (5%)	4 (100%)	0	100	100
44	q	4/74 (5%)	4 (100%)	0	100	100
45	g	3/66 (4%)	3 (100%)	0	100	100
45	r	3/66 (4%)	3 (100%)	0	100	100
46	h	243/520 (47%)	243 (100%)	0	100	100
47	i	133/134 (99%)	133 (100%)	0	100	100
48	j	6/198 (3%)	6 (100%)	0	100	100
49	o	400/502 (80%)	400 (100%)	0	100	100
50	s	7/196 (4%)	7 (100%)	0	100	100
51	t	11/435 (2%)	11 (100%)	0	100	100
51	u	10/435 (2%)	10 (100%)	0	100	100
51	v	11/435 (2%)	11 (100%)	0	100	100
51	w	10/435 (2%)	10 (100%)	0	100	100
52	y	114/209 (54%)	114 (100%)	0	100	100
53	z	40/371 (11%)	40 (100%)	0	100	100
All	All	7228/24169 (30%)	7221 (100%)	7 (0%)	93	98

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	7	311	MET
10	C	712	LYS
10	C	919	ARG
20	F	641	ARG
25	K	233	PRO
27	M	25	GLN
32	S	281	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
8	A	1450	GLN
8	A	1775	GLN
10	C	538	HIS

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Mol	Chain	Res	Type
28	N	101	ASN
47	i	120	GLN
52	y	203	ASN
52	y	215	ASN
52	y	219	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	139/188 (73%)	51 (36%)	3 (2%)
19	E	23/242 (9%)	11 (47%)	2 (8%)
23	I	82/235 (34%)	47 (57%)	3 (3%)
3	5	112/116 (96%)	39 (34%)	3 (2%)
4	6	96/106 (90%)	27 (28%)	2 (2%)
All	All	452/887 (50%)	175 (38%)	13 (2%)

All (175) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	16	U
1	2	18	U
1	2	19	G
1	2	20	G
1	2	24	A
1	2	25	G
1	2	26	A
1	2	27	U
1	2	31	G
1	2	32	U
1	2	40	C
1	2	41	U
1	2	44	U
1	2	46	U
1	2	47	U
1	2	48	A
1	2	51	A
1	2	52	G
1	2	53	U
1	2	54	U
1	2	95	A
1	2	96	U

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Mol	Chain	Res	Type
1	2	98	G
1	2	99	A
1	2	100	U
1	2	102	U
1	2	103	U
1	2	105	G
1	2	106	G
1	2	107	A
1	2	112	G
1	2	116	A
1	2	117	U
1	2	146	C
1	2	147	G
1	2	150	U
1	2	151	C
1	2	153	A
1	2	160	A
1	2	162	U
1	2	164	C
1	2	165	A
1	2	166	G
1	2	168	A
1	2	169	C
1	2	170	C
1	2	171	U
1	2	177	A
1	2	179	C
1	2	183	G
1	2	184	C
3	5	4	C
3	5	6	C
3	5	8	G
3	5	9	G
3	5	20	G
3	5	22	U
3	5	23	C
3	5	24	G
3	5	25	C
3	5	26	A
3	5	28	A
3	5	45	C
3	5	47	A

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Mol	Chain	Res	Type
3	5	68	C
3	5	69	A
3	5	71	C
3	5	72	U
3	5	74	U
3	5	75	G
3	5	78	U
3	5	79	C
3	5	80	U
3	5	81	U
3	5	82	A
3	5	83	A
3	5	85	C
3	5	87	A
3	5	89	U
3	5	91	U
3	5	92	U
3	5	93	U
3	5	94	U
3	5	95	G
3	5	99	C
3	5	103	C
3	5	104	C
3	5	112	G
3	5	114	C
3	5	115	U
4	6	6	C
4	6	7	G
4	6	10	U
4	6	11	C
4	6	12	G
4	6	26	U
4	6	29	A
4	6	33	G
4	6	34	G
4	6	35	A
4	6	37	C
4	6	38	G
4	6	45	A
4	6	46	G
4	6	49	G
4	6	54	G

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Mol	Chain	Res	Type
4	6	58	G
4	6	59	G
4	6	60	C
4	6	68	C
4	6	69	A
4	6	74	U
4	6	79	C
4	6	80	G
4	6	84	A
4	6	87	C
4	6	88	G
19	E	-23	C
19	E	-21	G
19	E	-20	C
19	E	-18	G
19	E	-17	A
19	E	-16	C
19	E	-15	G
19	E	-14	A
19	E	-13	G
19	E	-12	A
19	E	-7	C
23	I	2	U
23	I	9	C
23	I	12	G
23	I	15	U
23	I	18	A
23	I	22	C
23	I	134	A
23	I	135	U
23	I	136	U
23	I	137	C
23	I	138	U
23	I	140	A
23	I	142	G
23	I	143	U
23	I	144	A
23	I	145	U
23	I	149	C
23	I	151	G
23	I	157	U
23	I	158	G

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Mol	Chain	Res	Type
23	I	159	U
23	I	160	U
23	I	161	U
23	I	163	U
23	I	164	U
23	I	165	U
23	I	166	G
23	I	167	C
23	I	168	U
23	I	169	A
23	I	170	C
23	I	171	U
23	I	172	U
23	I	174	U
23	I	176	U
23	I	178	C
23	I	179	U
23	I	180	U
23	I	181	U
23	I	182	U
23	I	183	C
23	I	184	U
23	I	185	C
23	I	186	C
23	I	187	C
23	I	188	C
23	I	189	U

All (13) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	2	17	U
1	2	45	C
1	2	52	G
3	5	8	G
3	5	82	A
3	5	92	U
4	6	5	U
4	6	58	G
19	E	-19	C
19	E	-18	G
23	I	150	U

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Mol	Chain	Res	Type
23	I	181	U
23	I	183	C

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
25	SEP	K	232	25	8,9,10	0.63	0	8,12,14	0.66	0
25	SEP	K	224	25	8,9,10	0.61	0	8,12,14	0.67	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
25	SEP	K	232	25	-	0/5/8/10	-
25	SEP	K	224	25	-	3/5/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
25	K	224	SEP	CB-OG-P-O2P
25	K	224	SEP	CB-OG-P-O3P
25	K	224	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 15 are monoatomic - leaving 3 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
56	ATP	7	502	55	26,33,33	0.66	0	31,52,52	0.88	1 (3%)
57	IHP	A	3000	-	36,36,36	0.72	0	54,60,60	0.91	3 (5%)
58	GTP	C	1502	55	26,34,34	1.03	3 (11%)	32,54,54	0.80	1 (3%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
56	ATP	7	502	55	-	4/18/38/38	0/3/3/3
57	IHP	A	3000	-	-	2/30/54/54	0/1/1/1
58	GTP	C	1502	55	-	1/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
58	C	1502	GTP	C5-C6	-2.76	1.41	1.47
58	C	1502	GTP	C8-N7	-2.24	1.31	1.35
58	C	1502	GTP	C5-C4	-2.04	1.37	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
57	A	3000	IHP	C6-C1-C2	2.79	116.51	110.41
57	A	3000	IHP	C5-C4-C3	-2.41	105.14	110.41
56	7	502	ATP	C5-C6-N6	2.32	123.87	120.35
57	A	3000	IHP	C6-C5-C4	-2.30	105.37	110.41
58	C	1502	GTP	O6-C6-C5	2.01	128.29	124.37

There are no chirality outliers.

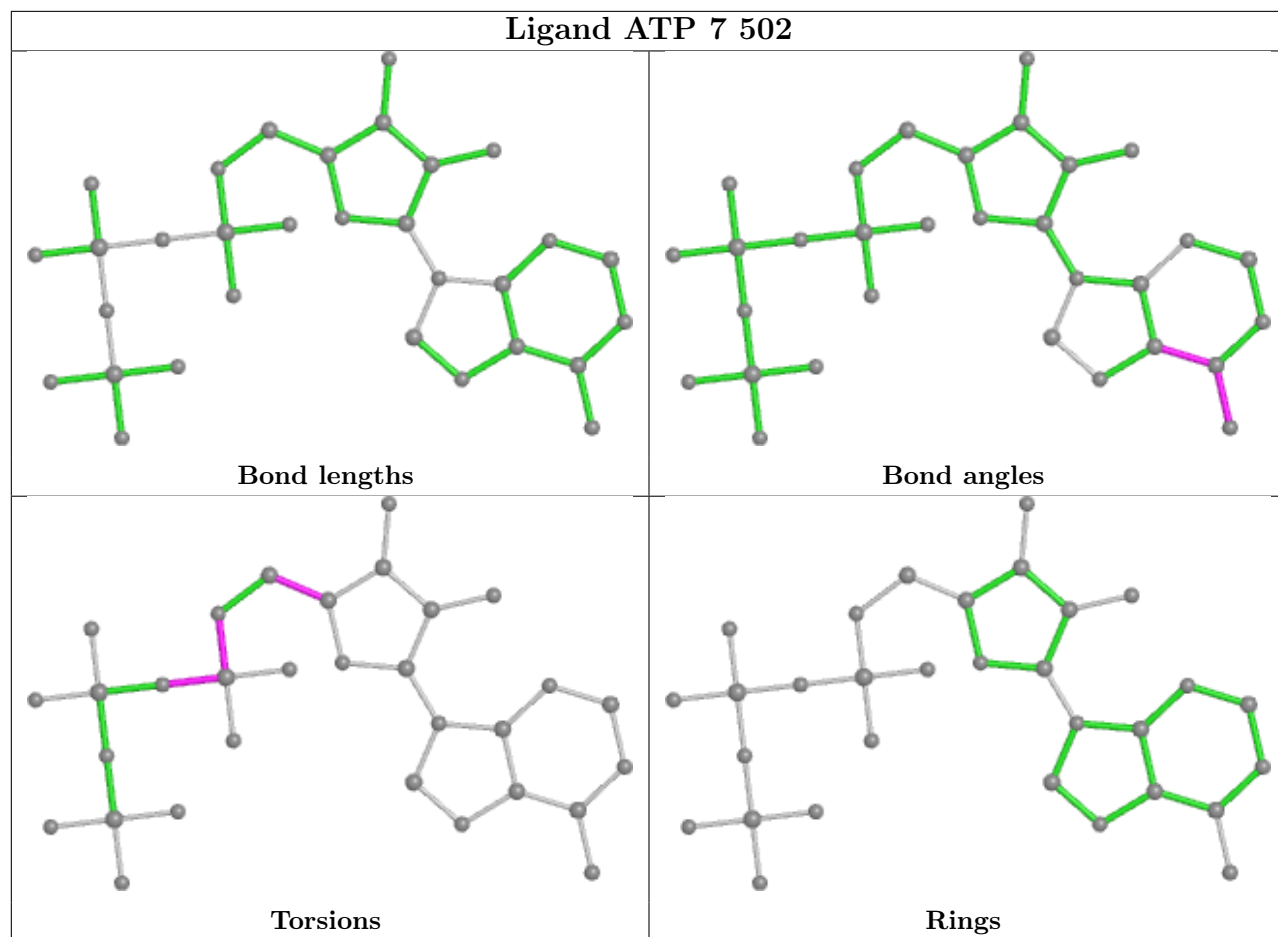
All (7) torsion outliers are listed below:

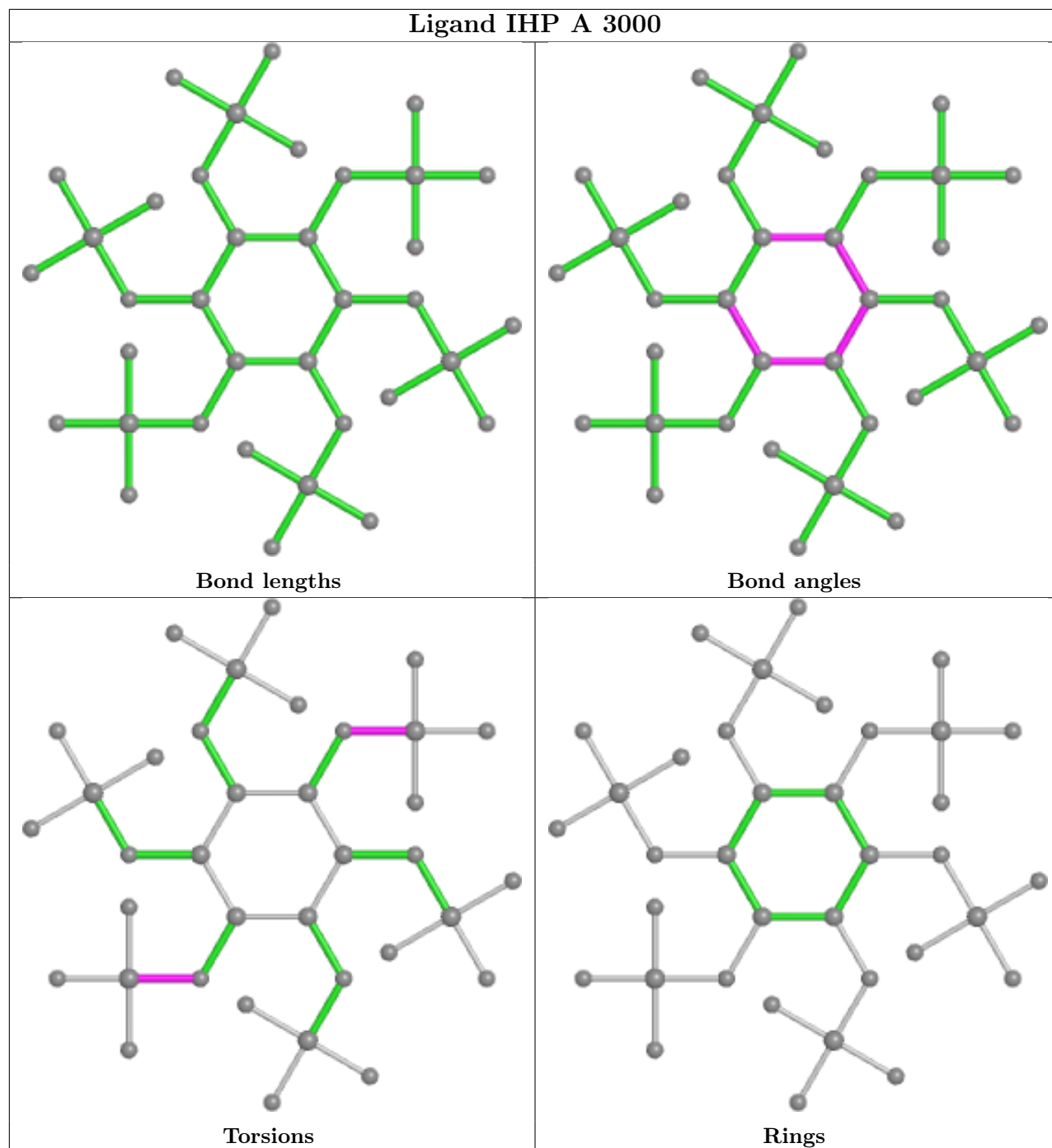
Mol	Chain	Res	Type	Atoms
56	7	502	ATP	C5'-O5'-PA-O1A
56	7	502	ATP	PB-O3A-PA-O5'
57	A	3000	IHP	C4-O14-P4-O24
56	7	502	ATP	O4'-C4'-C5'-O5'
56	7	502	ATP	C3'-C4'-C5'-O5'
57	A	3000	IHP	C1-O11-P1-O41
58	C	1502	GTP	C5'-O5'-PA-O3A

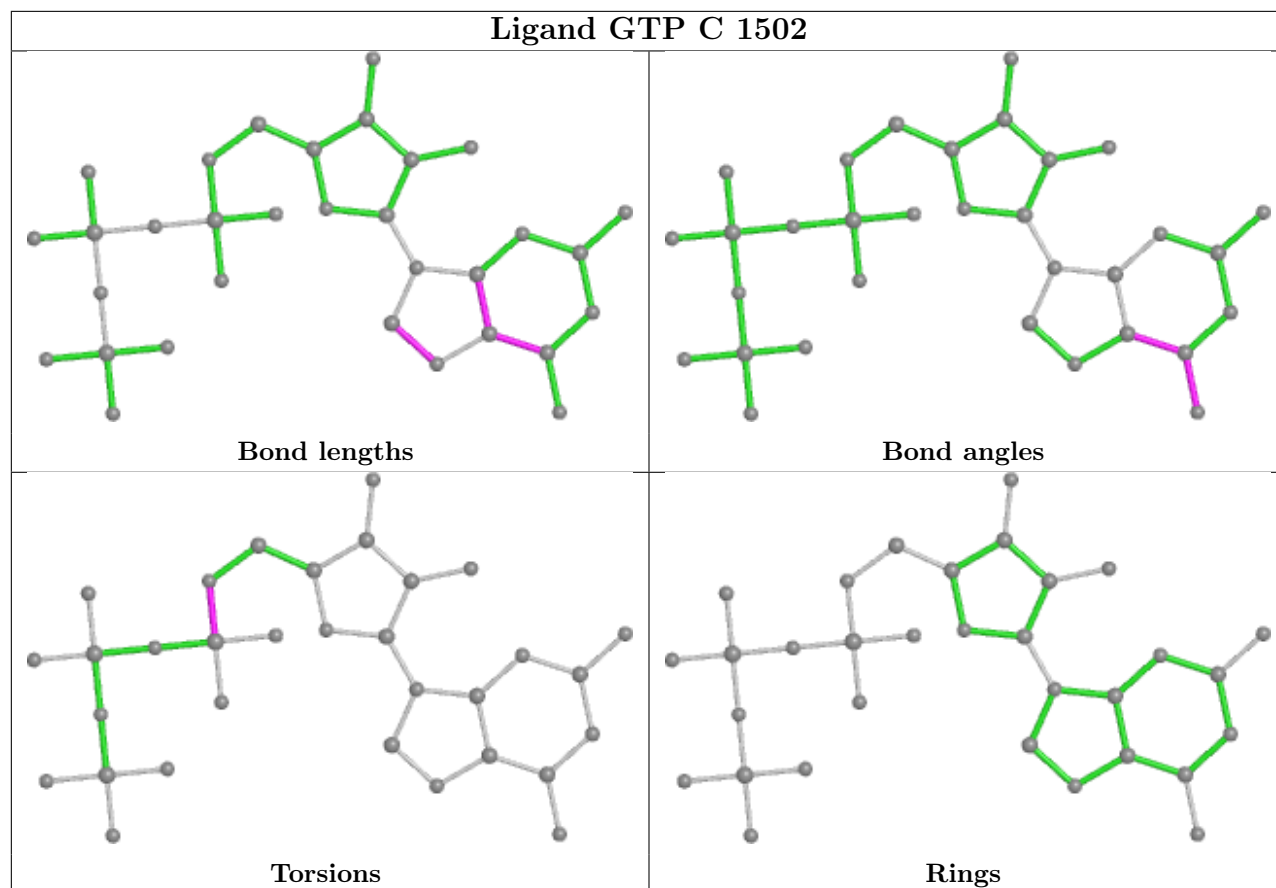
There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







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.

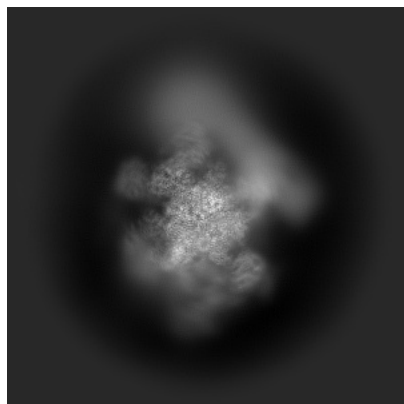
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16452. These allow visual inspection of the internal detail of the map and identification of artifacts.

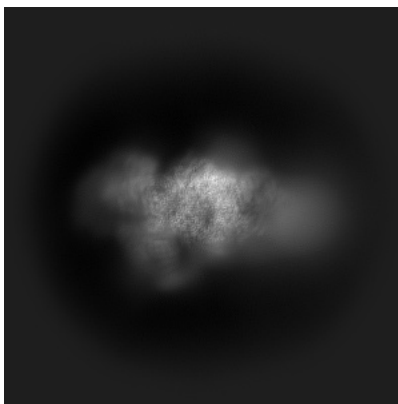
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

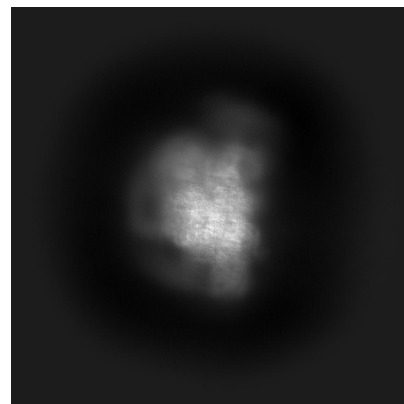
6.1.1 Primary map



X

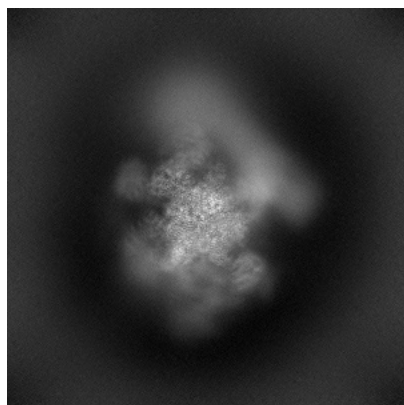


Y

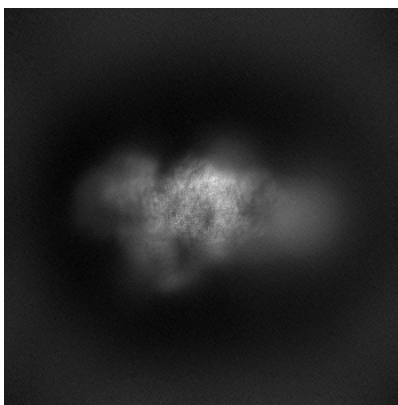


Z

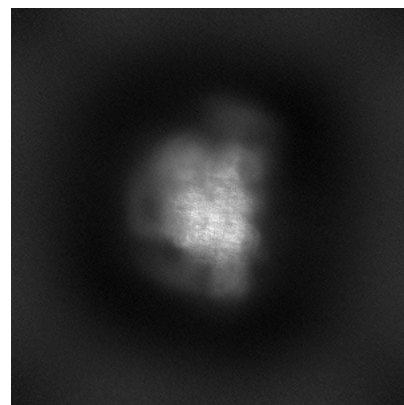
6.1.2 Raw map



X



Y

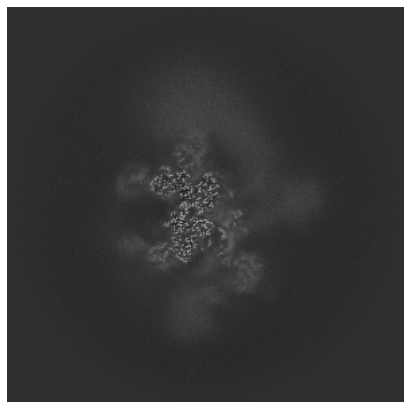


Z

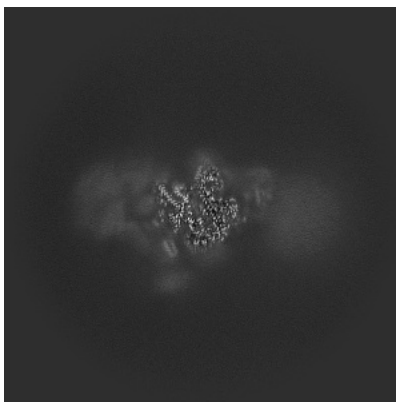
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

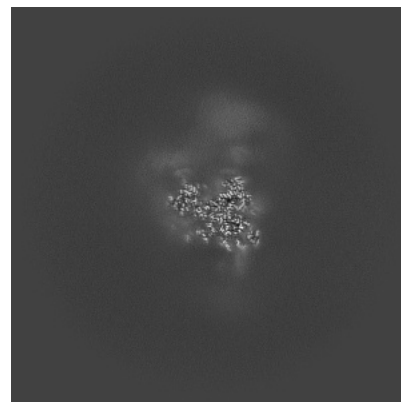
6.2.1 Primary map



X Index: 290

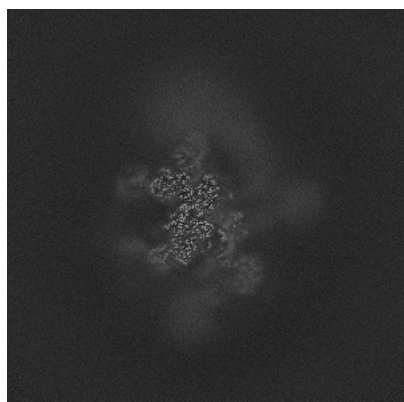


Y Index: 290

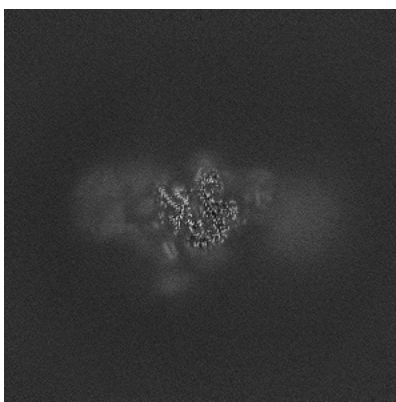


Z Index: 290

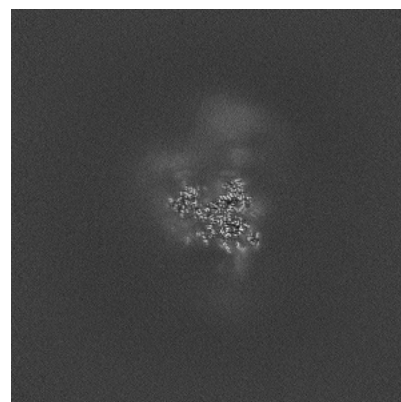
6.2.2 Raw map



X Index: 290



Y Index: 290

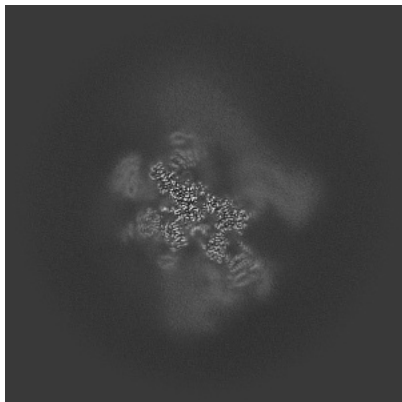


Z Index: 290

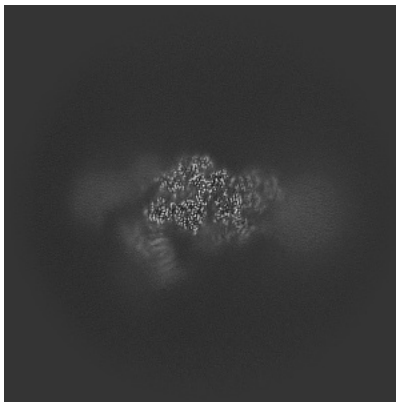
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

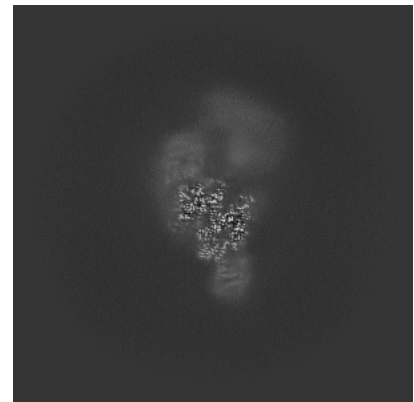
6.3.1 Primary map



X Index: 321

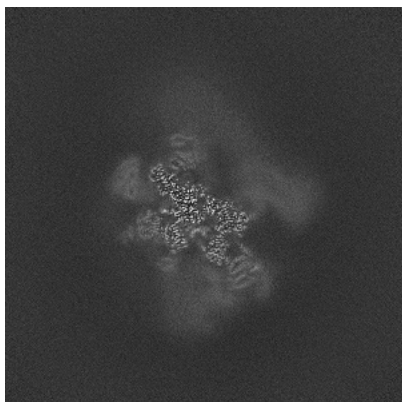


Y Index: 251

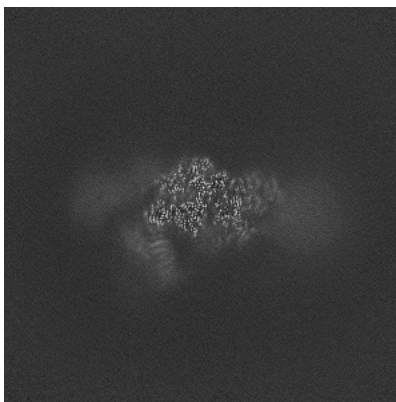


Z Index: 310

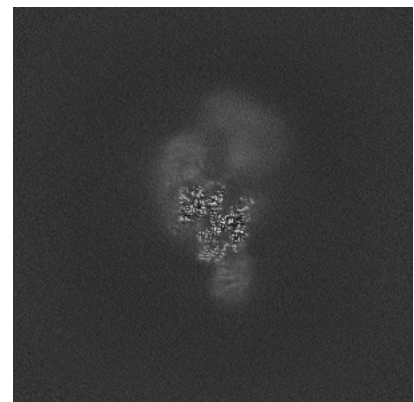
6.3.2 Raw map



X Index: 321



Y Index: 251

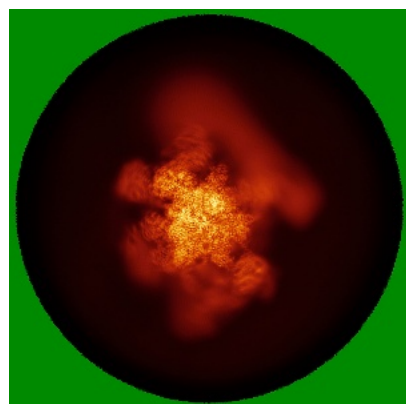


Z Index: 310

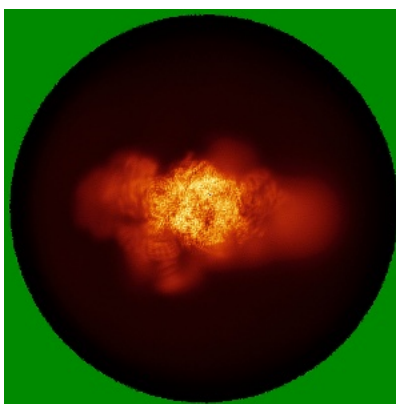
The images above show the largest variance slices of the map in three orthogonal directions.

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

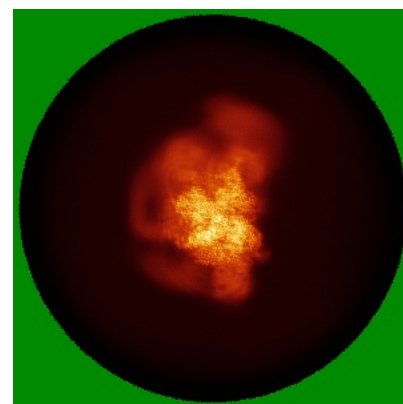
6.4.1 Primary map



X

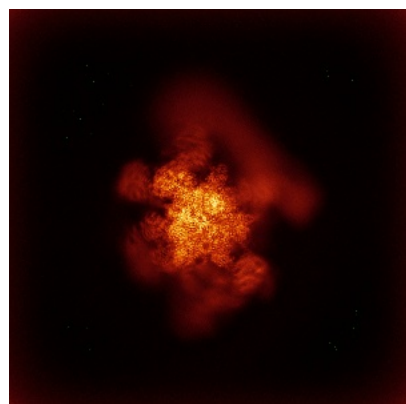


Y

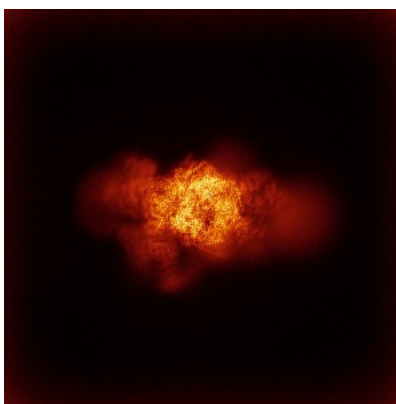


Z

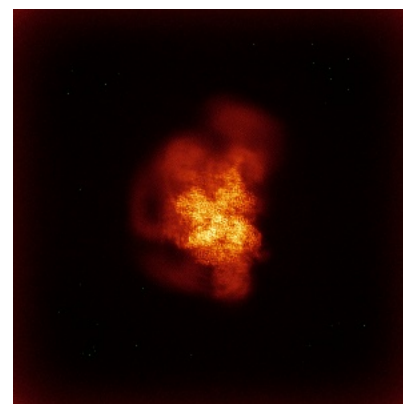
6.4.2 Raw map



X



Y

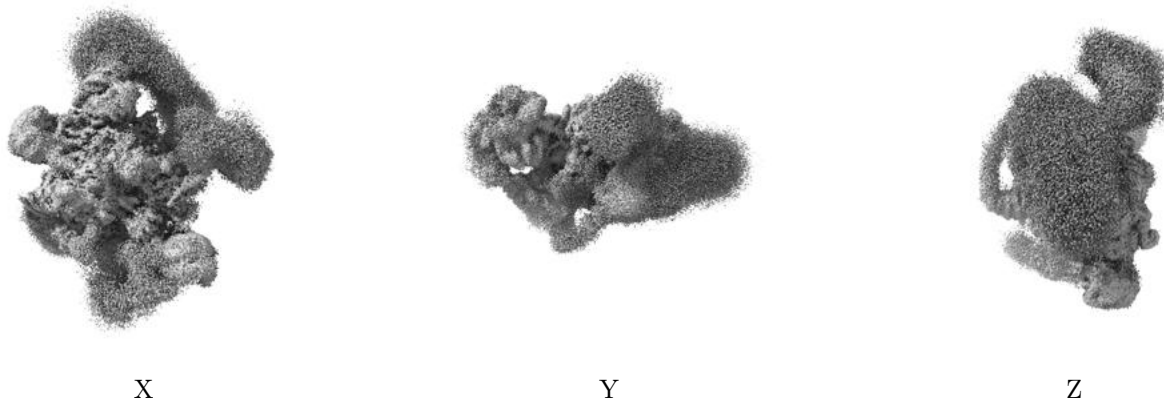


Z

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.

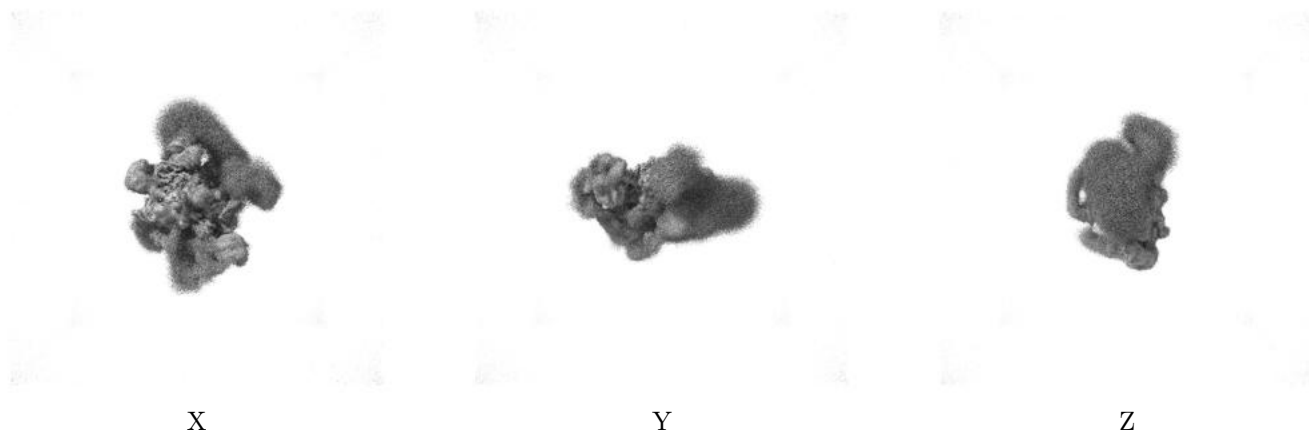
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.115. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

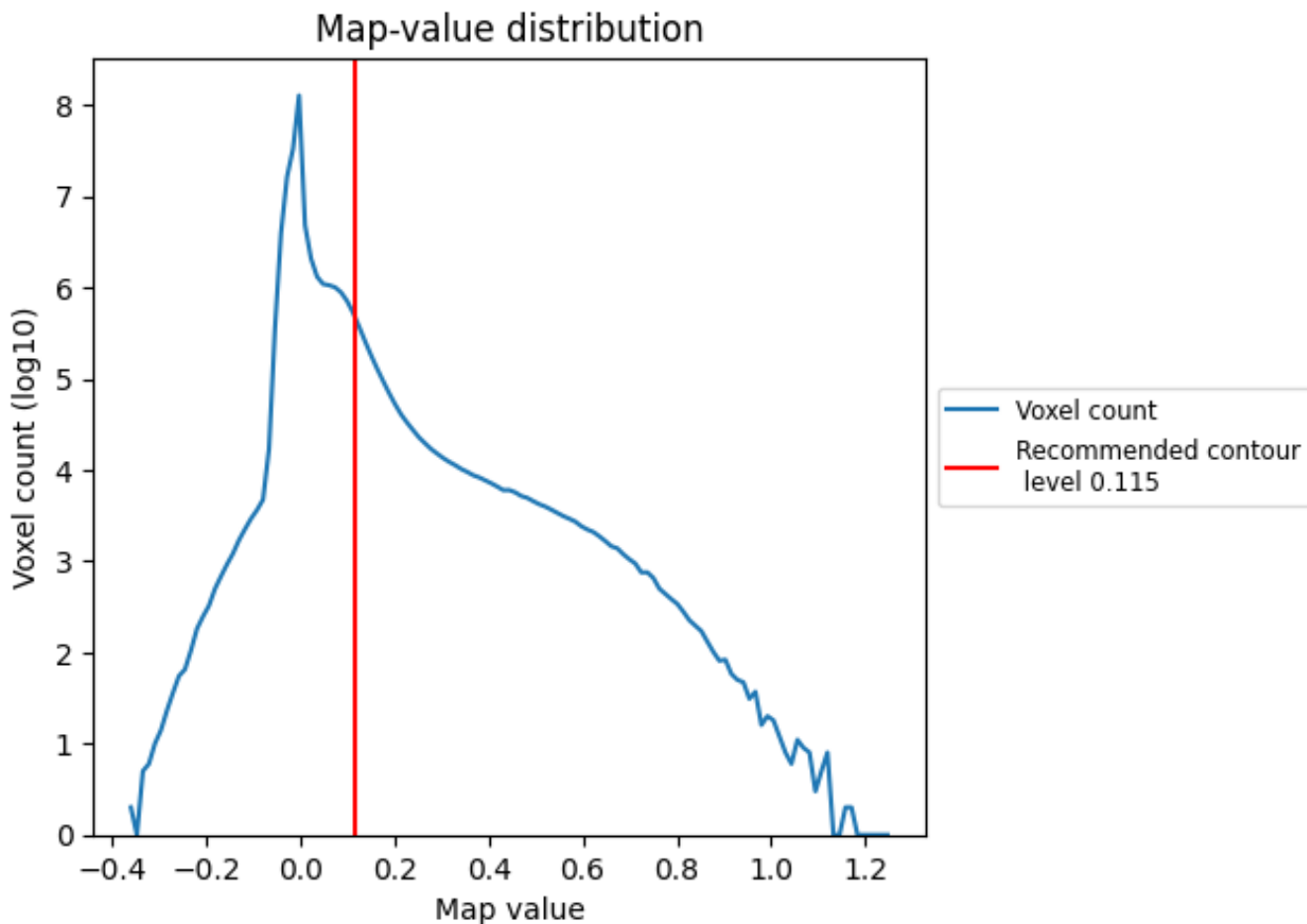
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

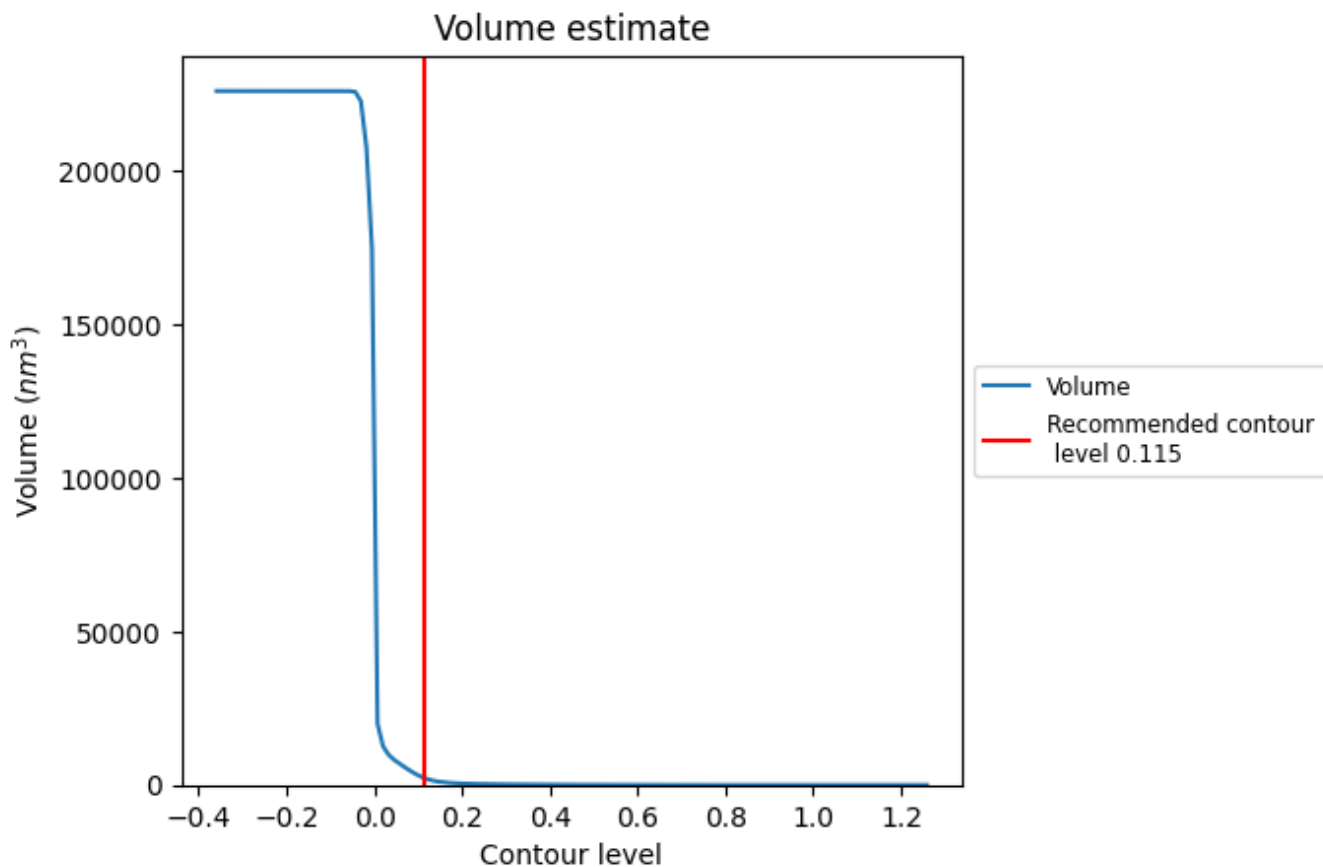
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

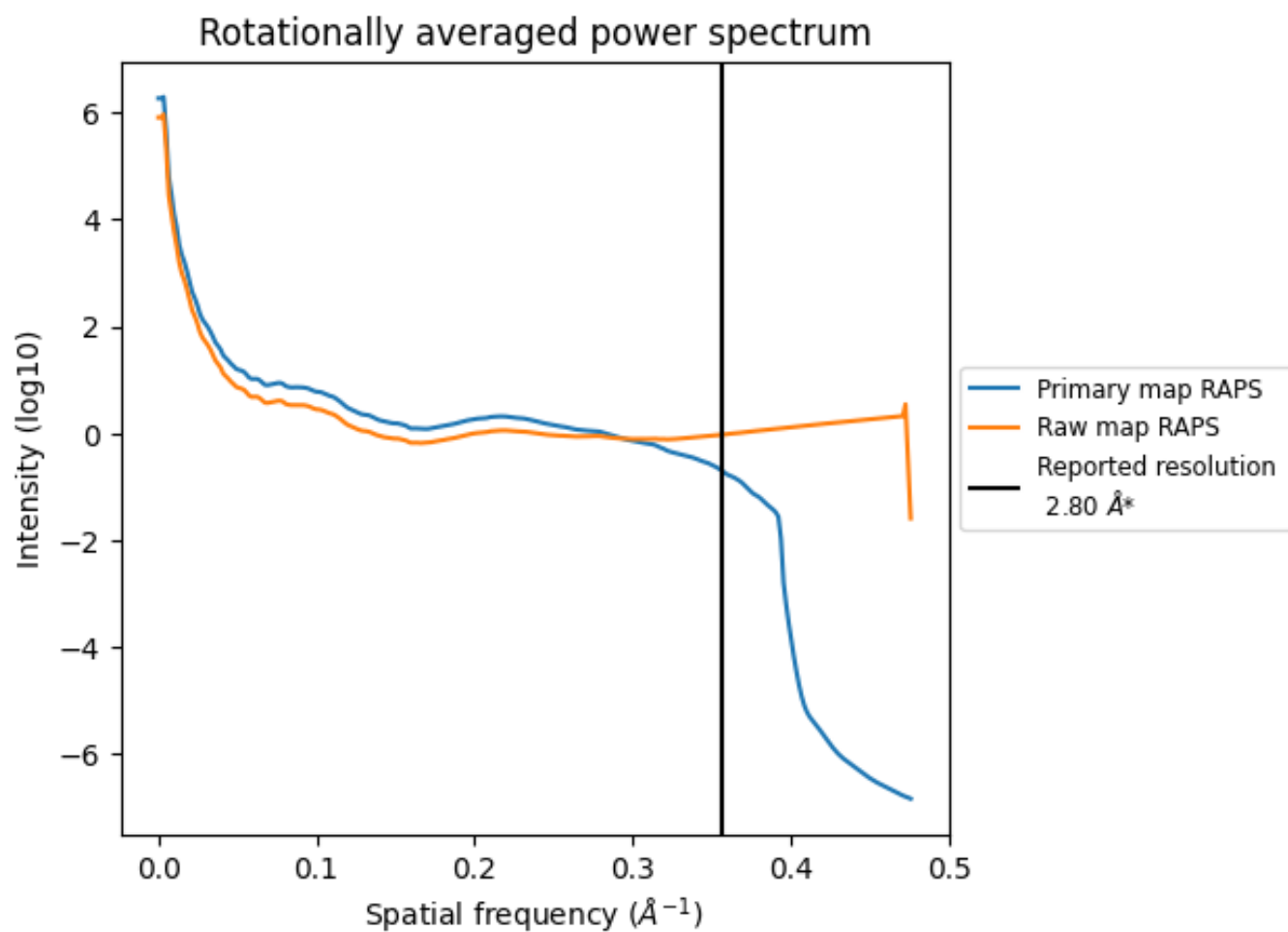
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 2235 nm^3 ; this corresponds to an approximate mass of 2019 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](#)

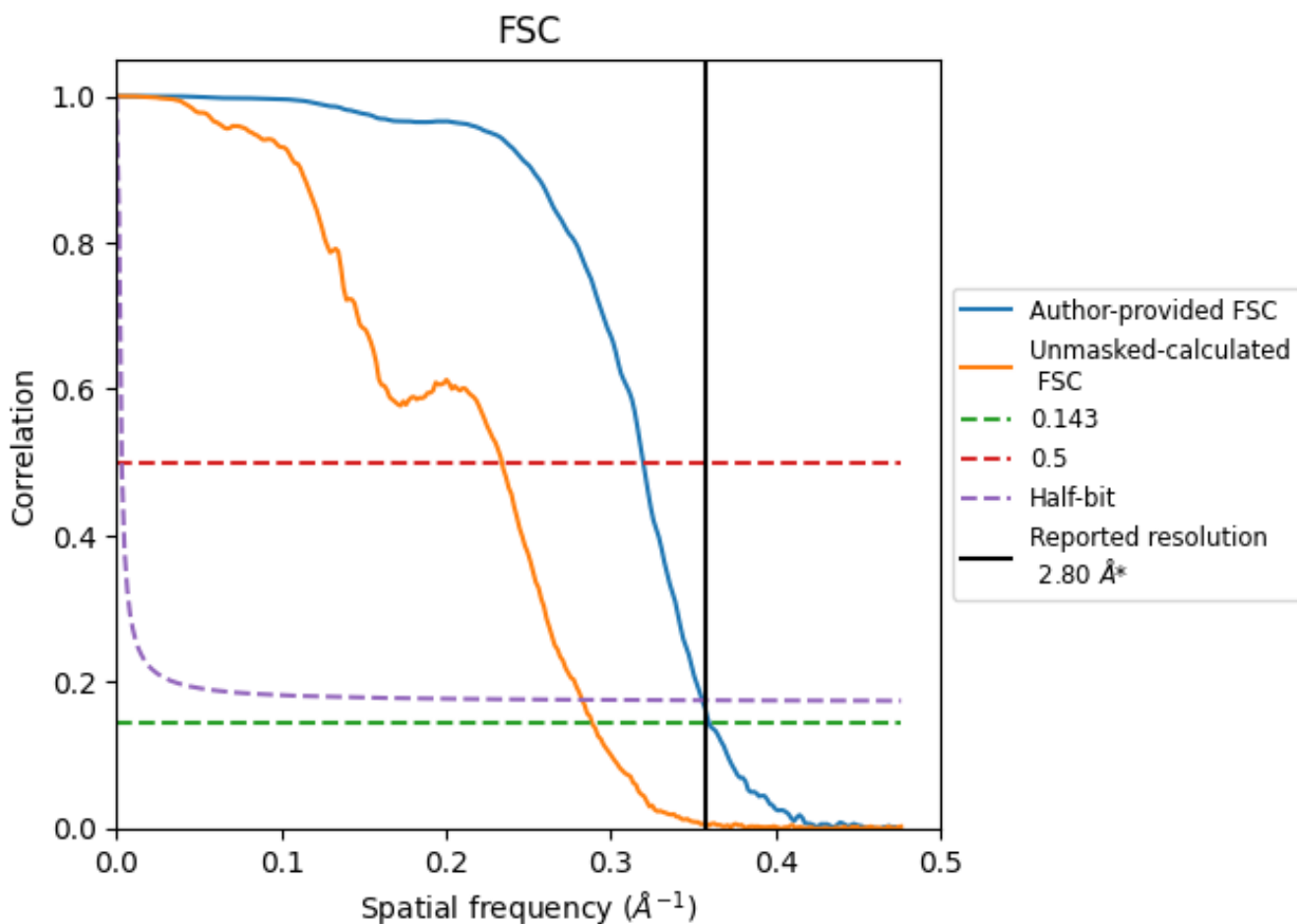


*Reported resolution corresponds to spatial frequency of 0.357 Å⁻¹

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 0.357 \AA^{-1}

8.2 Resolution estimates [i](#)

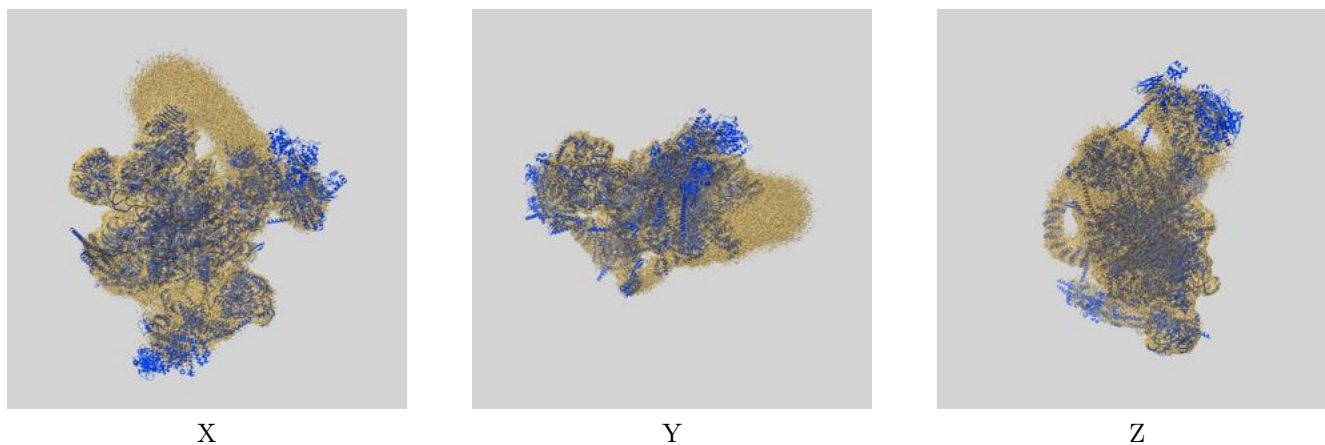
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.80	-	-
Author-provided FSC curve	2.78	3.13	2.81
Unmasked-calculated*	3.46	4.28	3.54

*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 3.46 differs from the reported value 2.8 by more than 10 %

9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-16452 and PDB model 8C6J. Per-residue inclusion information can be found in section 3 on page 17.

9.1 Map-model overlay [i](#)

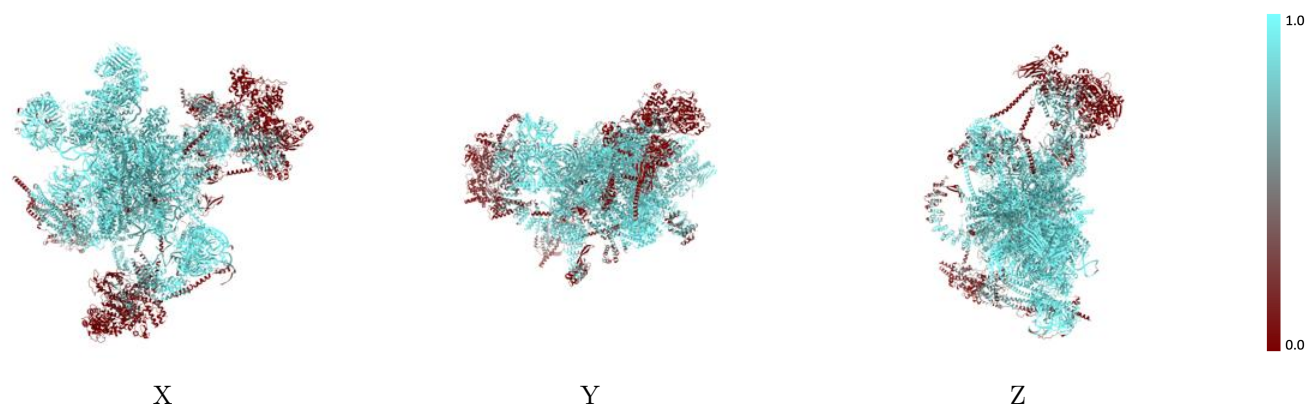


The images above show the 3D surface view of the map at the recommended contour level 0.115 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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

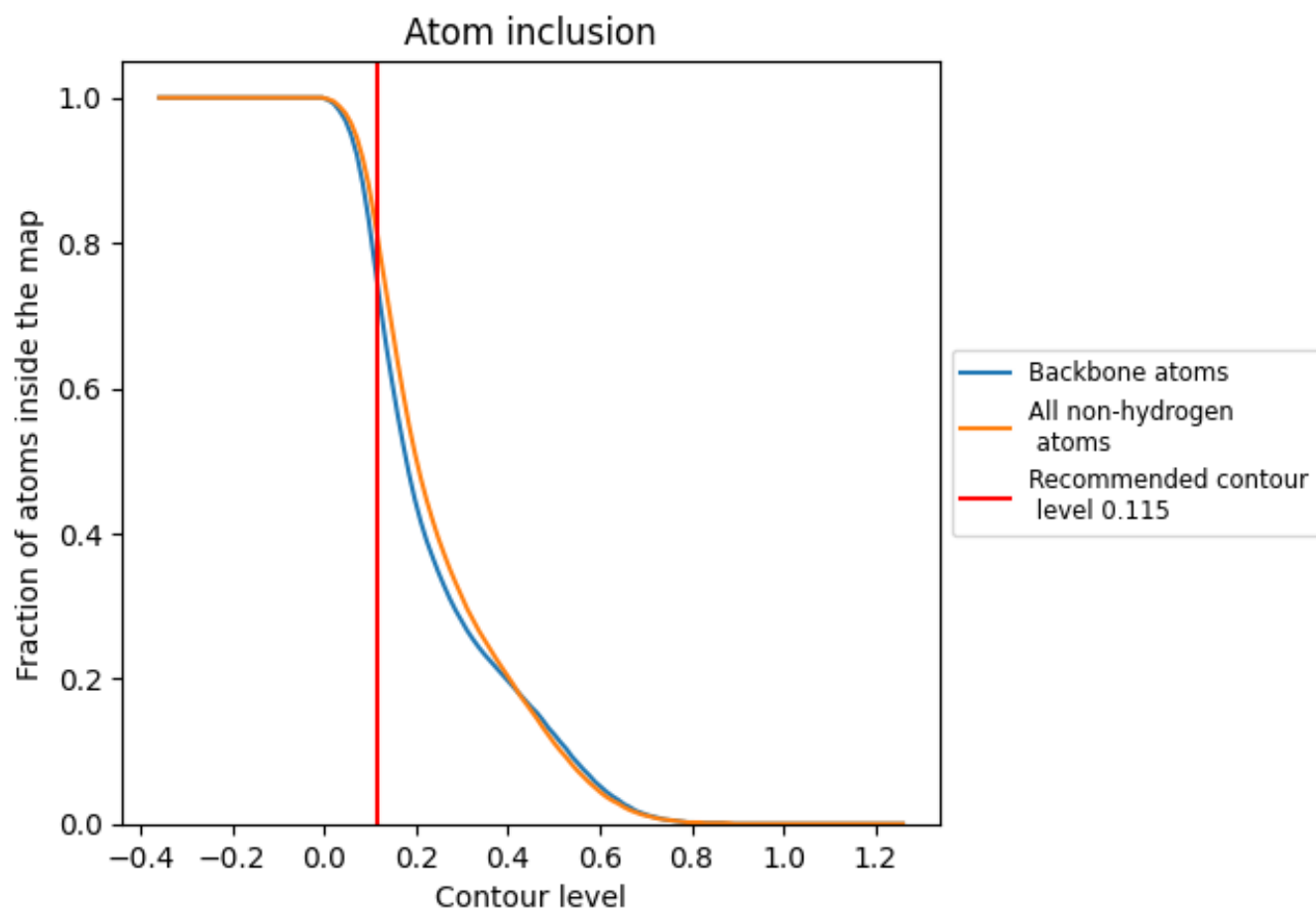
This section was not generated.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.115).

9.4 Atom inclusion [i](#)



At the recommended contour level, 75% of all backbone atoms, 81% 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 (0.115) and Q-score for the entire model and for each chain.

Chain	Atom inclusion
All	0.8120
2	0.9200
4	0.7600
5	0.9690
6	0.9820
7	0.9160
8	0.9360
9	0.9880
A	0.9740
B	0.2780
C	0.9810
C3	0.3120
CD	0.5880
CE	0.7300
CF	0.1770
CI	0.3850
CN	0.7090
CT	0.6160
D	0.9090
E	0.9470
F	0.9870
G	0.9750
H	0.9670
I	0.9750
J	0.9410
K	0.9720
L	0.9920
M	0.9720
N	0.9770
O	0.7810
P	0.9770
R	0.9800
S	0.8460
T	0.8510
U	0.0940



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Chain	Atom inclusion
V	 0.8880
W	 0.9100
Y	 0.9970
Z	 0.6340
a	 0.8040
b	 0.8810
c	 0.9730
d	 0.9930
e	 0.9360
f	 0.8720
g	 0.9530
h	 0.9650
i	 0.9810
j	 0.1960
k	 0.9680
l	 0.9760
m	 0.8960
n	 0.9970
o	 0.9640
p	 0.9850
q	 0.9870
r	 0.9870
s	 0.4790
t	 0.3100
u	 0.2360
v	 0.4390
w	 0.1990
y	 0.8900
z	 0.4650