



wwPDB EM Validation Summary Report ⓘ

Mar 8, 2026 – 03:32 AM UTC

PDB ID : 7W37 / pdb_00007w37
EMDB ID : EMD-32272
Title : Structure of USP14-bound human 26S proteasome in state EA1_UBL
Authors : Zhang, S.; Zou, S.; Yin, D.; Wu, Z.; Mao, Y.
Deposited on : 2021-11-25
Resolution : 3.00 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ 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.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

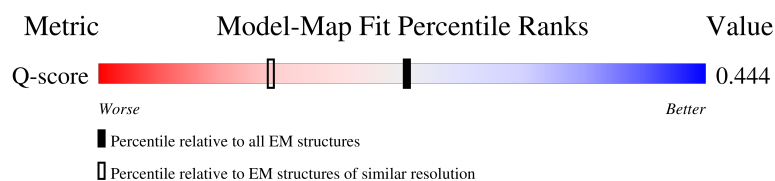
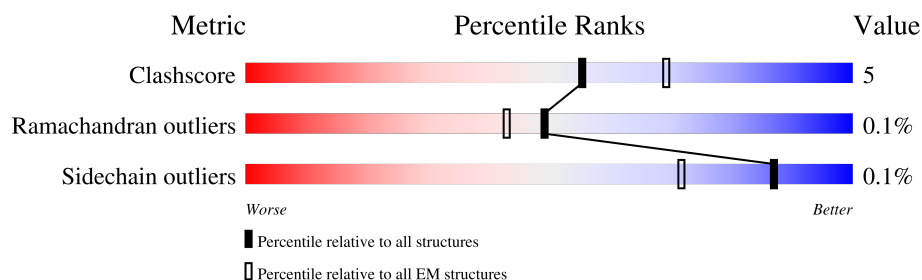
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 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.



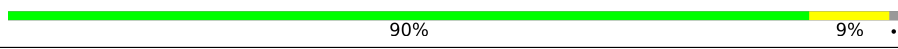
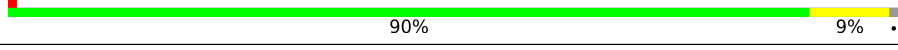
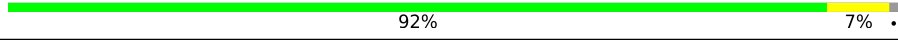
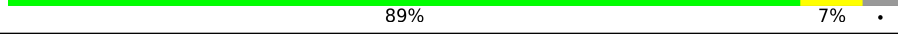
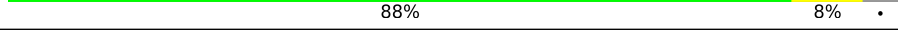
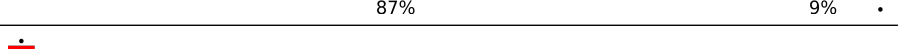
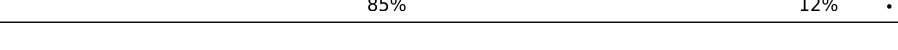
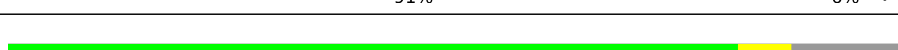
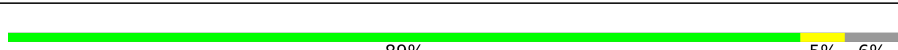
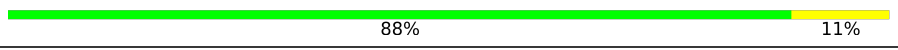
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14081 (2.50 - 3.50)

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	A	433	 82% 13% 5%
2	B	440	 77% 11% 12%
3	C	398	 83% 12% 5%
4	D	418	 77% 14% 9%

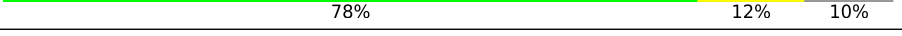
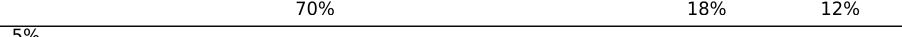
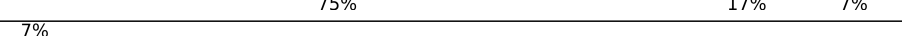
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Mol	Chain	Length	Quality of chain
5	E	403	
6	F	439	
7	G	246	
7	g	246	
8	H	234	
8	h	234	
9	I	261	
9	i	261	
10	J	248	
10	j	248	
11	K	241	
11	k	241	
12	L	269	
12	l	269	
13	M	255	
13	m	255	
14	N	239	
14	n	239	
15	O	277	
15	o	277	
16	P	205	
16	p	205	
17	Q	201	
17	q	201	
18	R	263	

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Mol	Chain	Length	Quality of chain
18	r	263	
19	S	241	
19	s	241	
20	T	264	
20	t	264	
21	U	953	
22	V	534	
23	W	456	
24	X	422	
25	Y	389	
26	Z	324	
27	a	376	
28	b	377	
29	c	310	
30	d	350	
31	f	908	
32	x	494	
33	e	70	

2 Entry composition

There are 37 unique types of molecules in this entry. The entry contains 106025 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 26S protease regulatory subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	413	Total	C	N	O	S	0	0
			3240	2042	567	613	18		

- Molecule 2 is a protein called 26S protease regulatory subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	388	Total	C	N	O	S	0	0
			3042	1915	519	593	15		

- Molecule 3 is a protein called Isoform 2 of 26S proteasome regulatory subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	379	Total	C	N	O	S	0	0
			2968	1867	534	551	16		

- Molecule 4 is a protein called 26S protease regulatory subunit 6B.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	380	Total	C	N	O	S	0	0
			3039	1923	524	579	13		

- Molecule 5 is a protein called 26S proteasome regulatory subunit 10B.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	375	Total	C	N	O	S	0	0
			2860	1796	512	536	16		

- Molecule 6 is a protein called 26S protease regulatory subunit 6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	376	Total	C	N	O	S	0	0
			2858	1802	496	545	15		

- Molecule 7 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	244	Total	C	N	O	S	0	0
			1889	1198	316	362	13		
7	g	244	Total	C	N	O	S	0	0
			1880	1193	318	356	13		

- Molecule 8 is a protein called Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	232	Total	C	N	O	S	0	0
			1805	1152	305	342	6		
8	h	232	Total	C	N	O	S	0	0
			1805	1154	307	338	6		

- Molecule 9 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	250	Total	C	N	O	S	1	0
			1958	1236	336	376	10		
9	i	250	Total	C	N	O	S	0	0
			1955	1234	336	375	10		

- Molecule 10 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	239	Total	C	N	O	S	0	0
			1880	1179	333	363	5		
10	j	239	Total	C	N	O	S	0	0
			1861	1168	332	356	5		

- Molecule 11 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	234	Total	C	N	O	S	0	0
			1777	1117	295	354	11		
11	k	234	Total	C	N	O	S	0	0
			1782	1119	295	357	11		

- Molecule 12 is a protein called Isoform Long of Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	238	Total	C	N	O	S	0	0
			1866	1169	336	350	11		
12	l	238	Total	C	N	O	S	0	0
			1861	1165	335	350	11		

- Molecule 13 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	240	Total	C	N	O	S	0	0
			1876	1191	321	353	11		
13	m	240	Total	C	N	O	S	0	0
			1881	1193	321	356	11		

- Molecule 14 is a protein called Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	202	Total	C	N	O	S	0	0
			1514	949	258	295	12		
14	n	202	Total	C	N	O	S	0	0
			1510	947	258	293	12		

- Molecule 15 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	220	Total	C	N	O	S	0	0
			1649	1038	279	320	12		
15	o	220	Total	C	N	O	S	0	0
			1659	1044	283	320	12		

- Molecule 16 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	204	Total	C	N	O	S	0	0
			1587	1010	264	294	19		
16	p	204	Total	C	N	O	S	0	0
			1591	1013	265	294	19		

- Molecule 17 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	199	Total	C	N	O	S	0	0
			1588	1017	270	292	9		

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Mol	Chain	Residues	Atoms					AltConf	Trace
17	q	199	Total	C	N	O	S	0	0
			1588	1017	270	292	9		

- Molecule 18 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	201	Total	C	N	O	S	0	0
			1559	982	274	294	9		
18	r	201	Total	C	N	O	S	0	0
			1559	982	274	294	9		

- Molecule 19 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	213	Total	C	N	O	S	0	0
			1641	1041	281	309	10		
19	s	213	Total	C	N	O	S	0	0
			1654	1047	284	313	10		

- Molecule 20 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	216	Total	C	N	O	S	0	0
			1683	1062	291	318	12		
20	t	216	Total	C	N	O	S	0	0
			1687	1064	291	320	12		

- Molecule 21 is a protein called 26S proteasome non-ATPase regulatory subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	862	Total	C	N	O	S	0	0
			6748	4279	1147	1277	45		

- Molecule 22 is a protein called 26S proteasome non-ATPase regulatory subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	V	472	Total	C	N	O	S	0	0
			3754	2387	673	681	13		

- Molecule 23 is a protein called 26S proteasome non-ATPase regulatory subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	W	446	Total	C	N	O	S	0	0
			3635	2302	622	687	24		

- Molecule 24 is a protein called 26S proteasome non-ATPase regulatory subunit 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	X	380	Total	C	N	O	S	0	0
			3009	1918	509	570	12		

- Molecule 25 is a protein called 26S proteasome non-ATPase regulatory subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	Y	378	Total	C	N	O	S	0	0
			3115	1987	533	578	17		

- Molecule 26 is a protein called 26S proteasome non-ATPase regulatory subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	Z	286	Total	C	N	O	S	0	0
			2281	1457	392	427	5		

- Molecule 27 is a protein called 26S proteasome non-ATPase regulatory subunit 13.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	a	373	Total	C	N	O	S	0	0
			2995	1911	510	559	15		

- Molecule 28 is a protein called 26S proteasome non-ATPase regulatory subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	b	191	Total	C	N	O	S	0	0
			1458	910	261	279	8		

- Molecule 29 is a protein called 26S proteasome non-ATPase regulatory subunit 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	c	287	Total	C	N	O	S	0	0
			2260	1430	389	422	19		

- Molecule 30 is a protein called 26S proteasome non-ATPase regulatory subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	d	257	Total	C	N	O	S	0	0
			2116	1371	346	390	9		

- Molecule 31 is a protein called 26S proteasome non-ATPase regulatory subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	f	889	Total	C	N	O	S	0	0
			6866	4315	1174	1331	46		

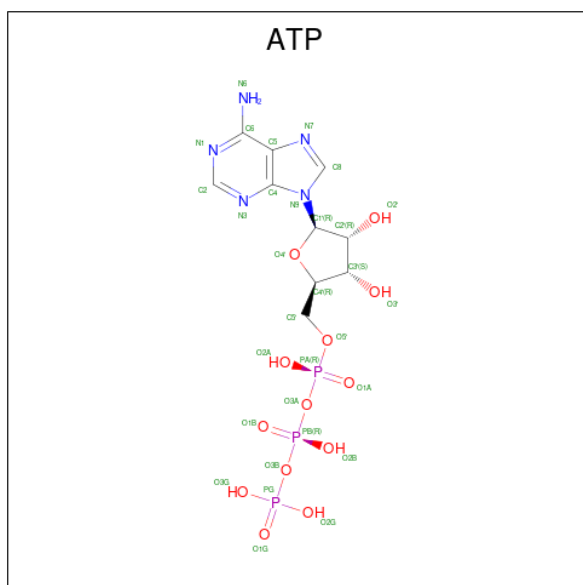
- Molecule 32 is a protein called Ubiquitin carboxyl-terminal hydrolase 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	x	81	Total	C	N	O	S	0	0
			626	402	101	117	6		

- Molecule 33 is a protein called 26S proteasome complex subunit DSS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	e	50	Total	C	N	O		0	0
			425	260	65	100			

- Molecule 34 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



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

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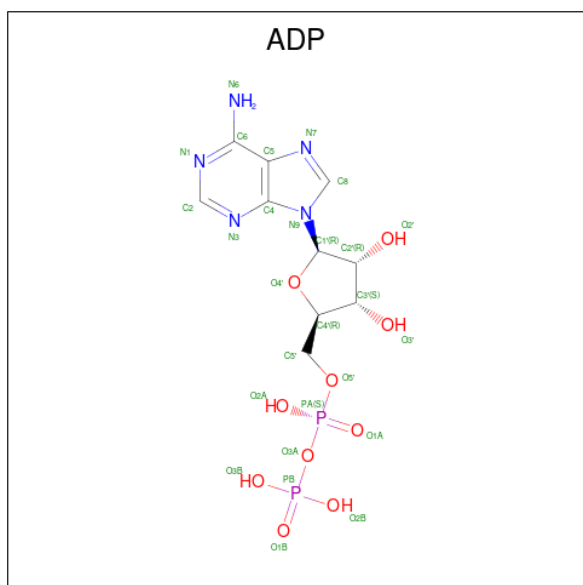
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Mol	Chain	Residues	Atoms					AltConf
34	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
34	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
34	E	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 35 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
35	A	1	Total	Mg	0
			1	1	
35	B	1	Total	Mg	0
			1	1	
35	C	1	Total	Mg	0
			1	1	
35	D	1	Total	Mg	0
			1	1	
35	E	1	Total	Mg	0
			1	1	
35	F	1	Total	Mg	0
			1	1	

- Molecule 36 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



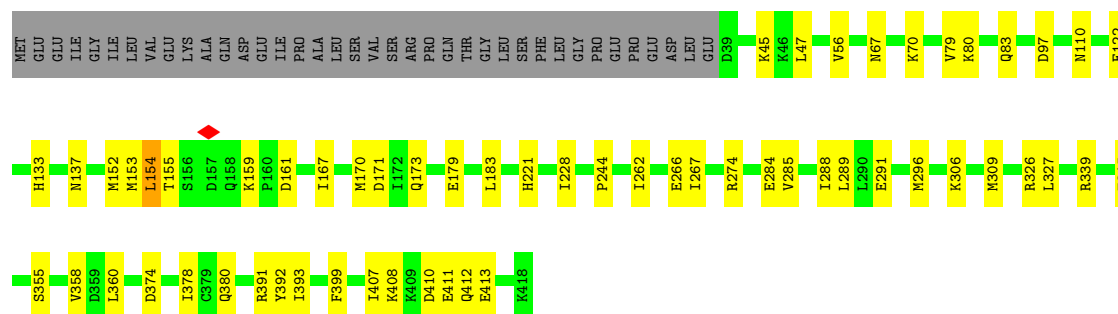
Mol	Chain	Residues	Atoms					AltConf
36	C	1	Total	C	N	O	P	0
			27	10	5	10	2	
36	F	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 37 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
37	c	1	Total	Zn	0
			1	1	

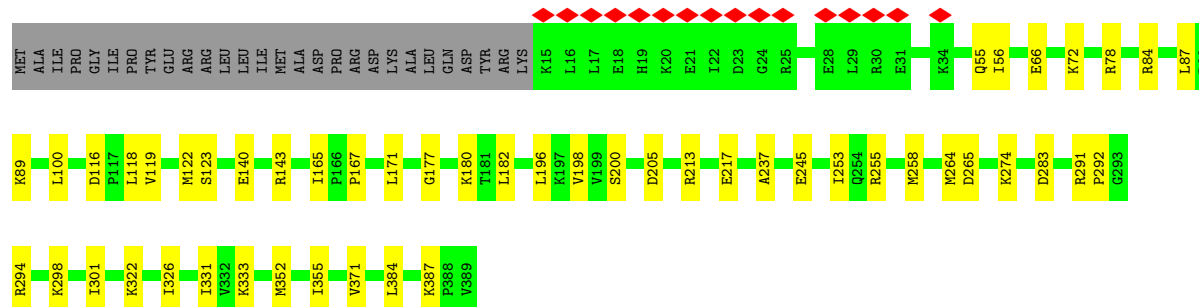
- Molecule 4: 26S protease regulatory subunit 6B

Chain D:  77% 14% 9%



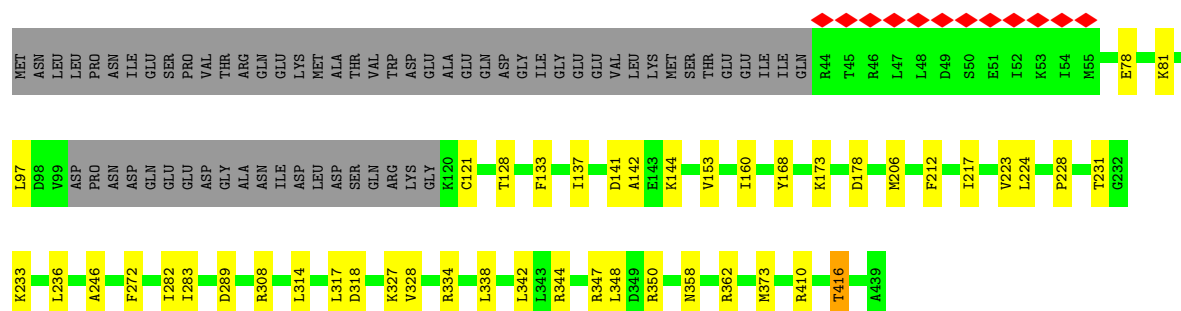
- Molecule 5: 26S proteasome regulatory subunit 10B

Chain E:  80% 13% 7%



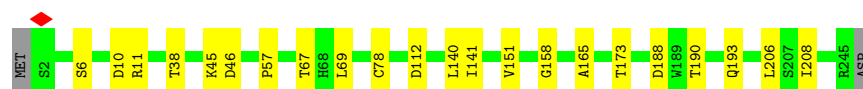
- Molecule 6: 26S protease regulatory subunit 6A

Chain F:  75% 10% 14%



- Molecule 7: Proteasome subunit alpha type-6

Chain G:  90% 9% 1%



- Molecule 7: Proteasome subunit alpha type-6

Chain g:  90% 9%



- Molecule 8: Proteasome subunit alpha type-2

Chain H:  92% 7%



- Molecule 8: Proteasome subunit alpha type-2

Chain h:  87% 12%



- Molecule 9: Proteasome subunit alpha type-4

Chain I:  89% 7%



- Molecule 9: Proteasome subunit alpha type-4

Chain i:  88% 8%



- Molecule 10: Proteasome subunit alpha type-7

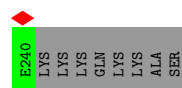
Chain J:  87% 9%



- Molecule 10: Proteasome subunit alpha type-7

Chain j:  85% 12%





- Molecule 11: Proteasome subunit alpha type-5

Chain K: 88% 9%



- Molecule 11: Proteasome subunit alpha type-5

Chain k: 91% 6%



- Molecule 12: Isoform Long of Proteasome subunit alpha type-1

Chain L: 82% 6% 12%



- Molecule 12: Isoform Long of Proteasome subunit alpha type-1

Chain l: 84% 12%



- Molecule 13: Proteasome subunit alpha type-3

Chain M: 86% 8% 6%



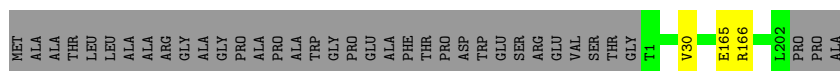
- Molecule 13: Proteasome subunit alpha type-3

Chain m: 89% 5% 6%



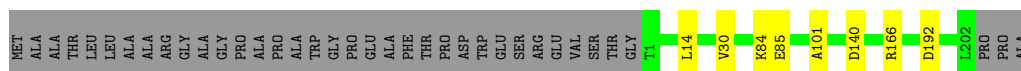
- Molecule 14: Proteasome subunit beta type-6

Chain N:  83% 15%



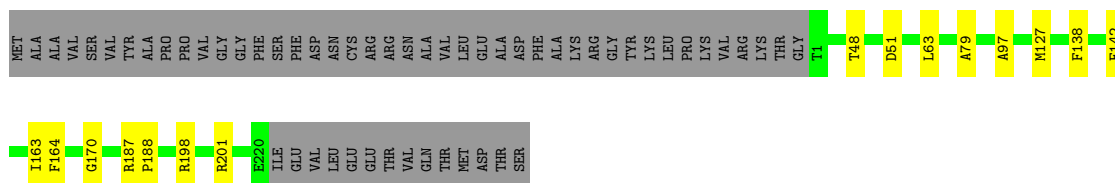
• Molecule 14: Proteasome subunit beta type-6

Chain n:  81% 15%



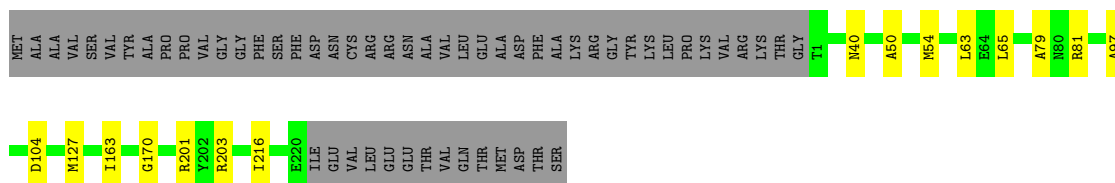
• Molecule 15: Proteasome subunit beta type-7

Chain O:  74% 5% 21%



• Molecule 15: Proteasome subunit beta type-7

Chain o:  74% 5% 21%



• Molecule 16: Proteasome subunit beta type-3

Chain P:  90% 10%



• Molecule 16: Proteasome subunit beta type-3

Chain p:  88% 11%

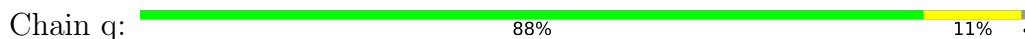


• Molecule 17: Proteasome subunit beta type-2

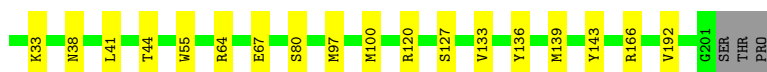
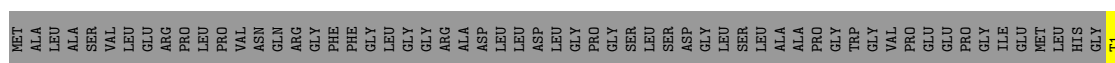
Chain Q:  88% 11%



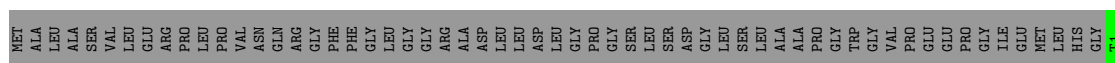
- Molecule 17: Proteasome subunit beta type-2



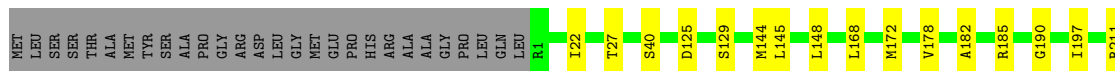
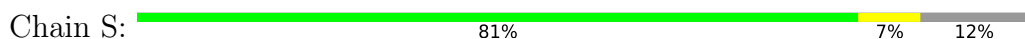
- Molecule 18: Proteasome subunit beta type-5



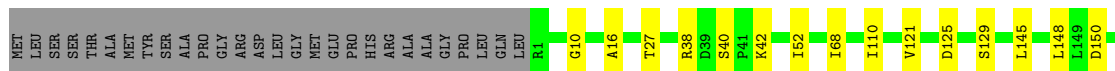
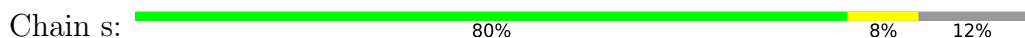
- Molecule 18: Proteasome subunit beta type-5



- Molecule 19: Proteasome subunit beta type-1

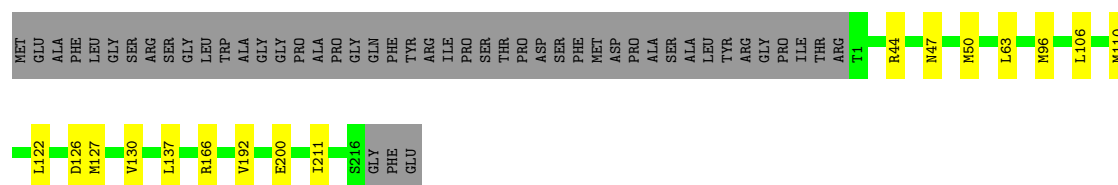


- Molecule 19: Proteasome subunit beta type-1



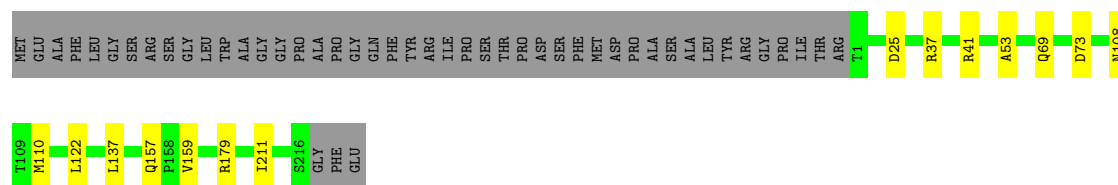
- Molecule 20: Proteasome subunit beta type-4

Chain T:  76% 6% 18%



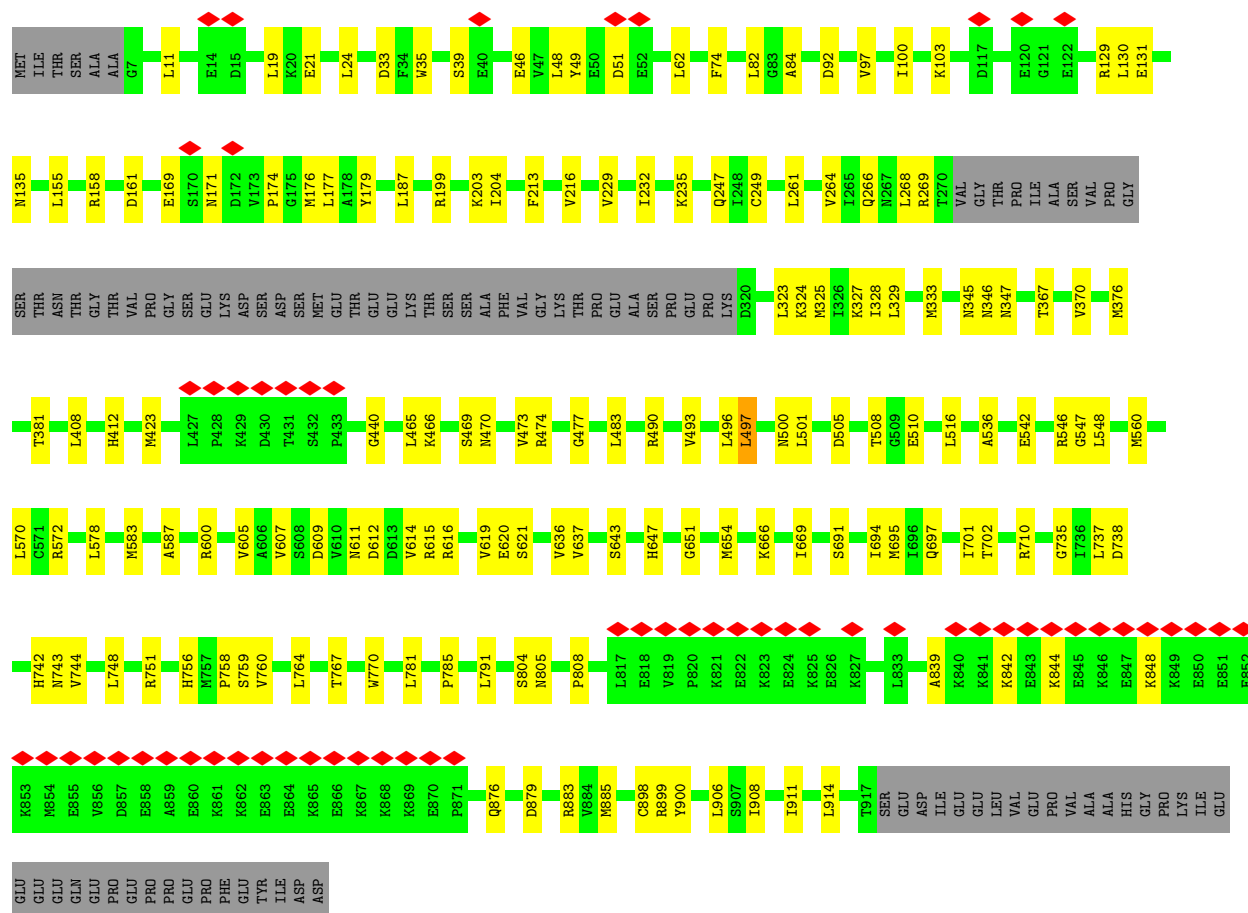
- Molecule 20: Proteasome subunit beta type-4

Chain t:  77% 5% 18%

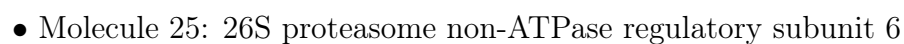


- Molecule 21: 26S proteasome non-ATPase regulatory subunit 1

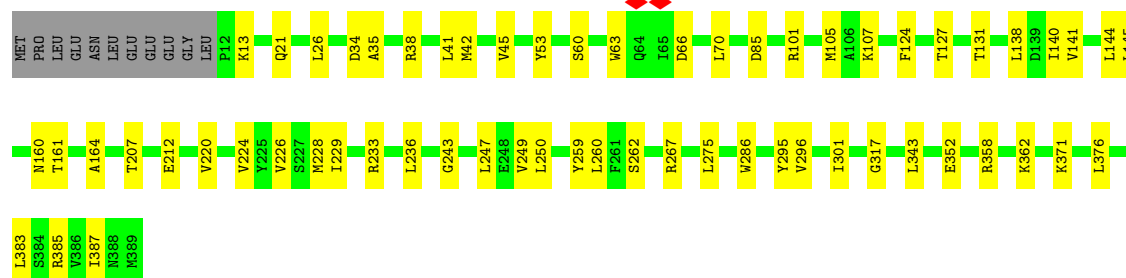
Chain U:  6% 74% 16% 10%



- Molecule 22: 26S proteasome non-ATPase regulatory subunit 3

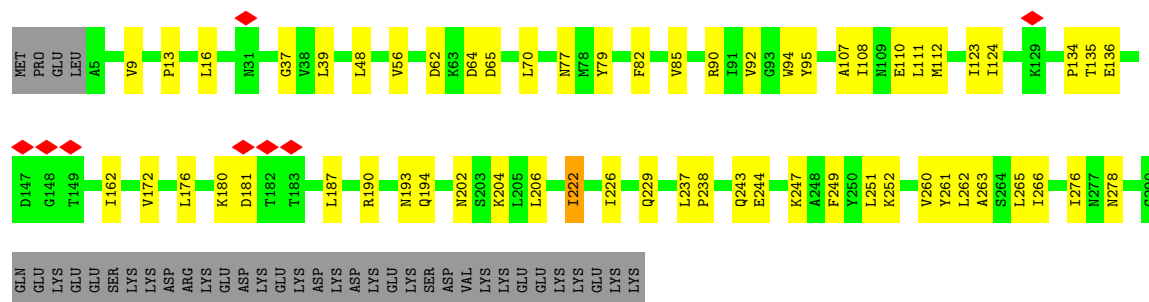


Chain Y:  81% 16%



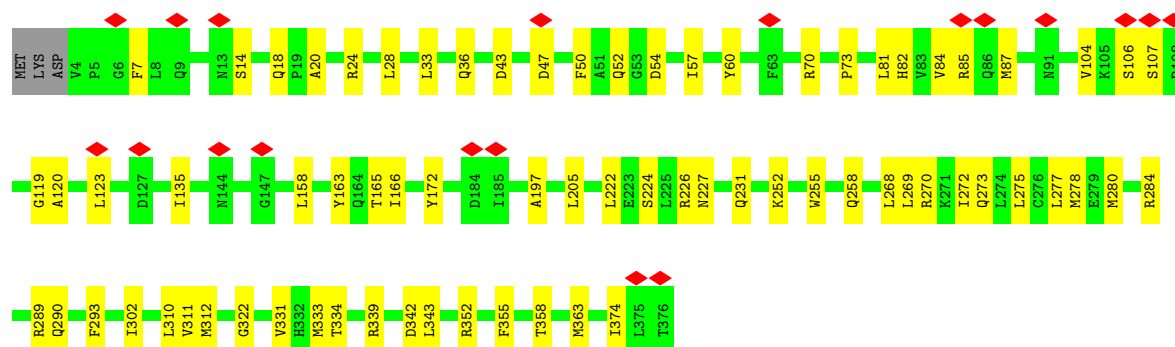
- Molecule 26: 26S proteasome non-ATPase regulatory subunit 7

Chain Z:  70% 18% 12%



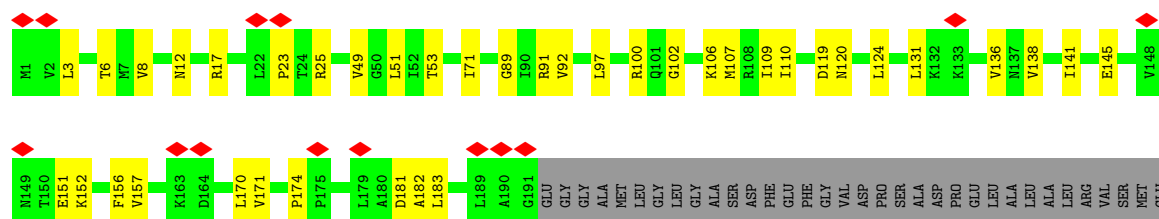
- Molecule 27: 26S proteasome non-ATPase regulatory subunit 13

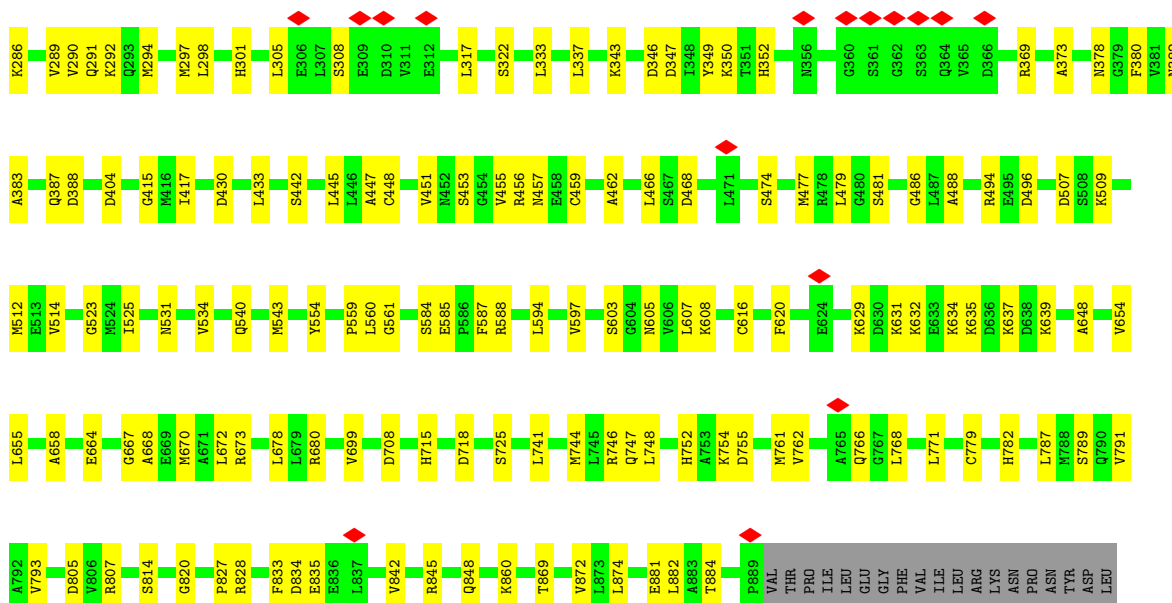
Chain a:  5% 80% 19%



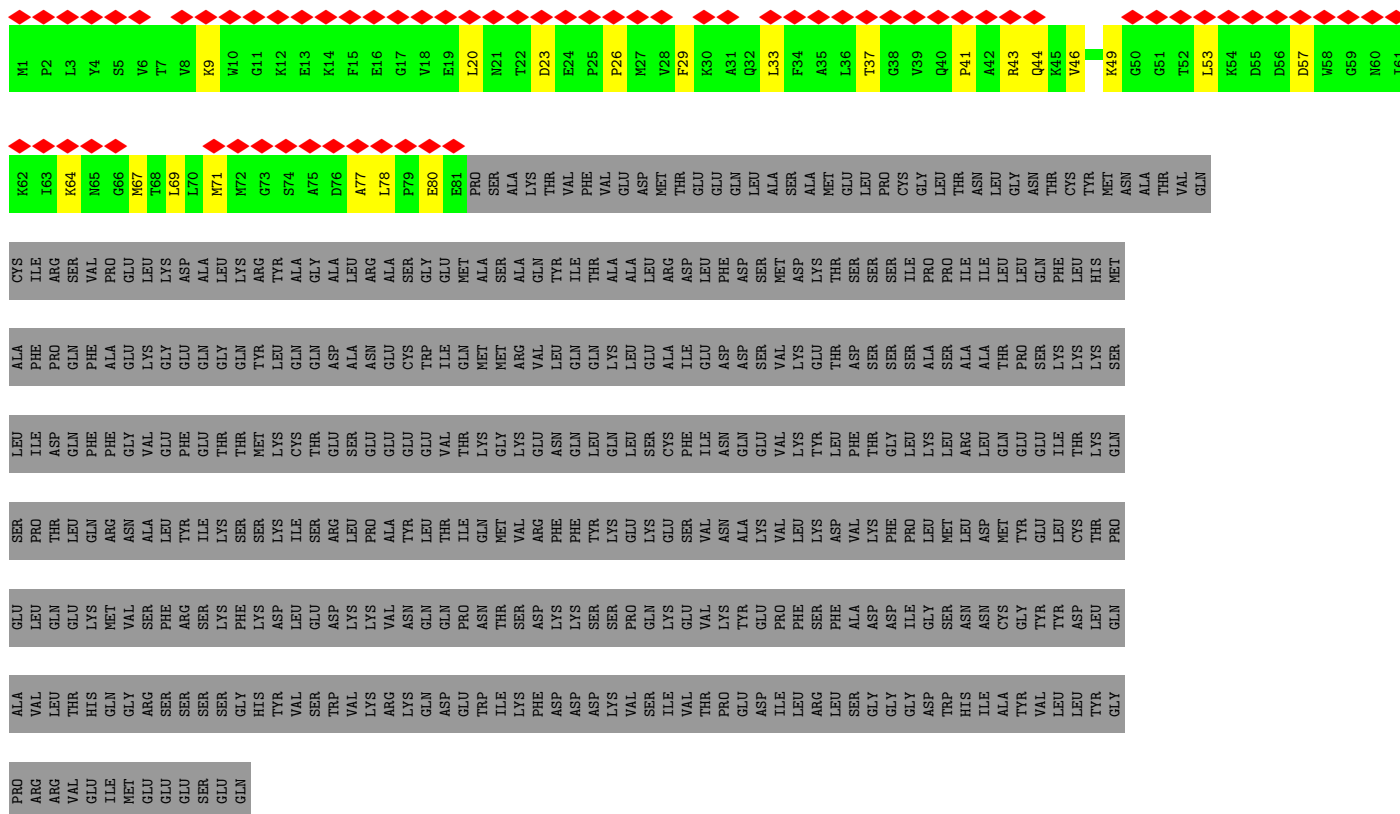
- Molecule 28: 26S proteasome non-ATPase regulatory subunit 4

Chain b:  40% 10% 49%





• Molecule 32: Ubiquitin carboxyl-terminal hydrolase 14



• Molecule 33: 26S proteasome complex subunit DSS1





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	367235	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	400	Depositor
Maximum defocus (nm)	5000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.031	Depositor
Minimum map value	-0.003	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.006	Depositor
Map size ($\text{\AA}$)	438.4, 438.4, 438.4	wwPDB
Map dimensions	640, 640, 640	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.685, 0.685, 0.685	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.18	0/3294	0.50	0/4447
2	B	0.17	0/3086	0.46	0/4164
3	C	0.18	0/3007	0.48	2/4045 (0.0%)
4	D	0.19	0/3089	0.49	0/4168
5	E	0.18	0/2904	0.46	0/3924
6	F	0.17	0/2896	0.43	0/3912
7	G	0.16	0/1923	0.39	0/2601
7	g	0.15	0/1914	0.41	0/2590
8	H	0.16	0/1844	0.38	0/2499
8	h	0.14	0/1844	0.35	0/2497
9	I	0.15	0/1991	0.38	0/2685
9	i	0.16	0/1985	0.40	0/2677
10	J	0.17	0/1906	0.44	0/2573
10	j	0.15	0/1887	0.40	0/2549
11	K	0.15	0/1804	0.37	0/2436
11	k	0.13	0/1809	0.33	0/2444
12	L	0.14	0/1901	0.35	0/2570
12	l	0.14	0/1896	0.37	0/2565
13	M	0.14	0/1911	0.36	0/2573
13	m	0.13	0/1916	0.31	0/2580
14	N	0.13	0/1540	0.31	0/2085
14	n	0.13	0/1536	0.30	0/2080
15	O	0.14	0/1676	0.37	0/2271
15	o	0.13	0/1686	0.34	0/2282
16	P	0.15	0/1616	0.40	0/2180
16	p	0.15	0/1620	0.40	0/2184
17	Q	0.13	0/1621	0.34	0/2194
17	q	0.13	0/1621	0.33	0/2194
18	R	0.14	0/1590	0.33	0/2147
18	r	0.13	0/1590	0.31	0/2147
19	S	0.16	0/1671	0.40	2/2252 (0.1%)
19	s	0.17	0/1684	0.44	2/2268 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
20	T	0.13	0/1716	0.35	0/2323
20	t	0.14	0/1720	0.34	0/2328
21	U	0.18	0/6864	0.48	0/9271
22	V	0.17	0/3824	0.42	0/5170
23	W	0.23	1/3683 (0.0%)	0.59	2/4952 (0.0%)
24	X	0.18	0/3053	0.44	0/4115
25	Y	0.20	0/3173	0.52	0/4273
26	Z	0.18	0/2324	0.50	1/3150 (0.0%)
27	a	0.19	0/3053	0.51	0/4133
28	b	0.21	0/1478	0.54	0/2001
29	c	0.22	0/2302	0.58	0/3110
30	d	0.22	0/2162	0.52	0/2919
31	f	0.21	0/6980	0.56	2/9433 (0.0%)
32	x	0.20	0/638	0.55	0/859
33	e	0.22	0/437	0.61	0/595
All	All	0.17	1/107665 (0.0%)	0.45	11/145415 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
23	W	307	LYS	CA-C	5.35	1.59	1.52

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
31	f	872	VAL	N-CA-C	-6.81	106.86	113.53
3	C	241	HIS	CA-C-N	5.64	130.47	121.62
3	C	241	HIS	C-N-CA	5.64	130.47	121.62
23	W	116	THR	CA-C-N	5.57	132.18	121.54
23	W	116	THR	C-N-CA	5.57	132.18	121.54

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3240	0	3286	41	0
2	B	3042	0	3100	32	0
3	C	2968	0	3067	31	0
4	D	3039	0	3075	48	0
5	E	2860	0	2827	36	0
6	F	2858	0	2853	37	0
7	G	1889	0	1885	16	0
7	g	1880	0	1875	15	0
8	H	1805	0	1784	12	0
8	h	1805	0	1798	20	0
9	I	1958	0	1960	10	0
9	i	1955	0	1955	13	0
10	J	1880	0	1892	17	0
10	j	1861	0	1865	19	0
11	K	1777	0	1762	12	0
11	k	1782	0	1766	10	0
12	L	1866	0	1852	11	0
12	l	1861	0	1839	8	0
13	M	1876	0	1861	15	0
13	m	1881	0	1868	8	0
14	N	1514	0	1487	3	0
14	n	1510	0	1483	6	0
15	O	1649	0	1659	8	0
15	o	1659	0	1681	11	0
16	P	1587	0	1598	14	0
16	p	1591	0	1609	15	0
17	Q	1588	0	1584	18	0
17	q	1588	0	1584	16	0
18	R	1559	0	1523	12	0
18	r	1559	0	1523	14	0
19	S	1641	0	1639	10	0
19	s	1654	0	1656	12	0
20	T	1683	0	1662	10	0
20	t	1687	0	1666	9	0
21	U	6748	0	6813	96	0
22	V	3754	0	3749	40	0
23	W	3635	0	3762	74	0
24	X	3009	0	3113	34	0
25	Y	3115	0	3120	37	0
26	Z	2281	0	2312	43	0
27	a	2995	0	3012	48	0
28	b	1458	0	1505	23	0
29	c	2260	0	2276	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
30	d	2116	0	2146	37	0
31	f	6866	0	6866	139	0
32	x	626	0	642	12	0
33	e	425	0	328	3	0
34	A	31	0	12	0	0
34	B	31	0	12	0	0
34	D	31	0	12	0	0
34	E	31	0	12	1	0
35	A	1	0	0	0	0
35	B	1	0	0	0	0
35	C	1	0	0	0	0
35	D	1	0	0	0	0
35	E	1	0	0	0	0
35	F	1	0	0	0	0
36	C	27	0	12	1	0
36	F	27	0	12	0	0
37	c	1	0	0	0	0
All	All	106025	0	106240	1069	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

The worst 5 of 1069 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
21:U:35:TRP:O	21:U:39:SER:HB2	1.82	0.79
31:f:462:ALA:O	31:f:466:LEU:HB2	1.85	0.75
5:E:198:VAL:HG12	5:E:200:SER:H	1.54	0.72
29:c:75:MET:SD	29:c:92:GLN:NE2	2.64	0.70
20:T:96:MET:HE2	20:T:110:MET:HE1	1.75	0.68

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	411/433 (95%)	367 (89%)	44 (11%)	0	100	100
2	B	386/440 (88%)	357 (92%)	29 (8%)	0	100	100
3	C	377/398 (95%)	344 (91%)	33 (9%)	0	100	100
4	D	378/418 (90%)	347 (92%)	31 (8%)	0	100	100
5	E	373/403 (93%)	347 (93%)	26 (7%)	0	100	100
6	F	372/439 (85%)	346 (93%)	26 (7%)	0	100	100
7	G	242/246 (98%)	233 (96%)	9 (4%)	0	100	100
7	g	242/246 (98%)	232 (96%)	10 (4%)	0	100	100
8	H	230/234 (98%)	220 (96%)	10 (4%)	0	100	100
8	h	230/234 (98%)	218 (95%)	12 (5%)	0	100	100
9	I	249/261 (95%)	242 (97%)	7 (3%)	0	100	100
9	i	248/261 (95%)	243 (98%)	5 (2%)	0	100	100
10	J	237/248 (96%)	227 (96%)	10 (4%)	0	100	100
10	j	237/248 (96%)	223 (94%)	14 (6%)	0	100	100
11	K	232/241 (96%)	222 (96%)	9 (4%)	1 (0%)	30	65
11	k	232/241 (96%)	224 (97%)	8 (3%)	0	100	100
12	L	236/269 (88%)	232 (98%)	4 (2%)	0	100	100
12	l	236/269 (88%)	226 (96%)	10 (4%)	0	100	100
13	M	238/255 (93%)	235 (99%)	3 (1%)	0	100	100
13	m	238/255 (93%)	235 (99%)	3 (1%)	0	100	100
14	N	200/239 (84%)	195 (98%)	5 (2%)	0	100	100
14	n	200/239 (84%)	196 (98%)	4 (2%)	0	100	100
15	O	218/277 (79%)	212 (97%)	6 (3%)	0	100	100
15	o	218/277 (79%)	213 (98%)	5 (2%)	0	100	100
16	P	202/205 (98%)	194 (96%)	8 (4%)	0	100	100
16	p	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
17	Q	197/201 (98%)	191 (97%)	6 (3%)	0	100	100
17	q	197/201 (98%)	193 (98%)	4 (2%)	0	100	100
18	R	199/263 (76%)	193 (97%)	6 (3%)	0	100	100
18	r	199/263 (76%)	192 (96%)	7 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	S	211/241 (88%)	204 (97%)	7 (3%)	0	100	100
19	s	211/241 (88%)	204 (97%)	7 (3%)	0	100	100
20	T	214/264 (81%)	208 (97%)	6 (3%)	0	100	100
20	t	214/264 (81%)	206 (96%)	8 (4%)	0	100	100
21	U	858/953 (90%)	808 (94%)	49 (6%)	1 (0%)	48	80
22	V	470/534 (88%)	456 (97%)	13 (3%)	1 (0%)	43	76
23	W	444/456 (97%)	408 (92%)	33 (7%)	3 (1%)	18	53
24	X	378/422 (90%)	360 (95%)	18 (5%)	0	100	100
25	Y	376/389 (97%)	350 (93%)	26 (7%)	0	100	100
26	Z	284/324 (88%)	259 (91%)	24 (8%)	1 (0%)	30	65
27	a	371/376 (99%)	345 (93%)	26 (7%)	0	100	100
28	b	189/377 (50%)	178 (94%)	10 (5%)	1 (0%)	24	60
29	c	285/310 (92%)	254 (89%)	30 (10%)	1 (0%)	30	65
30	d	255/350 (73%)	224 (88%)	31 (12%)	0	100	100
31	f	887/908 (98%)	772 (87%)	115 (13%)	0	100	100
32	x	79/494 (16%)	68 (86%)	11 (14%)	0	100	100
33	e	48/70 (69%)	40 (83%)	8 (17%)	0	100	100
All	All	13430/15382 (87%)	12638 (94%)	783 (6%)	9 (0%)	49	80

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
22	V	224	LEU
23	W	132	THR
23	W	117	ASP
23	W	137	TYR
26	Z	222	ILE

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	A	352/372 (95%)	350 (99%)	2 (1%)	78	88
2	B	341/385 (89%)	340 (100%)	1 (0%)	86	91
3	C	325/346 (94%)	323 (99%)	2 (1%)	78	88
4	D	333/366 (91%)	331 (99%)	2 (1%)	78	88
5	E	298/353 (84%)	295 (99%)	3 (1%)	68	84
6	F	296/379 (78%)	295 (100%)	1 (0%)	86	91
7	G	205/210 (98%)	205 (100%)	0	100	100
7	g	202/210 (96%)	202 (100%)	0	100	100
8	H	188/191 (98%)	188 (100%)	0	100	100
8	h	188/191 (98%)	188 (100%)	0	100	100
9	I	207/221 (94%)	205 (99%)	2 (1%)	68	84
9	i	206/221 (93%)	206 (100%)	0	100	100
10	J	201/211 (95%)	201 (100%)	0	100	100
10	j	196/211 (93%)	196 (100%)	0	100	100
11	K	193/203 (95%)	193 (100%)	0	100	100
11	k	195/203 (96%)	195 (100%)	0	100	100
12	L	202/230 (88%)	202 (100%)	0	100	100
12	l	201/230 (87%)	201 (100%)	0	100	100
13	M	196/212 (92%)	196 (100%)	0	100	100
13	m	198/212 (93%)	198 (100%)	0	100	100
14	N	157/181 (87%)	157 (100%)	0	100	100
14	n	156/181 (86%)	156 (100%)	0	100	100
15	O	179/228 (78%)	179 (100%)	0	100	100
15	o	181/228 (79%)	181 (100%)	0	100	100
16	P	172/174 (99%)	172 (100%)	0	100	100
16	p	173/174 (99%)	173 (100%)	0	100	100
17	Q	168/171 (98%)	168 (100%)	0	100	100
17	q	168/171 (98%)	168 (100%)	0	100	100
18	R	156/202 (77%)	156 (100%)	0	100	100
18	r	156/202 (77%)	156 (100%)	0	100	100
19	S	175/199 (88%)	175 (100%)	0	100	100
19	s	178/199 (89%)	178 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
20	T	178/215 (83%)	178 (100%)	0	100	100
20	t	179/215 (83%)	179 (100%)	0	100	100
21	U	738/816 (90%)	736 (100%)	2 (0%)	86	91
22	V	391/460 (85%)	390 (100%)	1 (0%)	86	91
23	W	410/416 (99%)	409 (100%)	1 (0%)	87	92
24	X	327/362 (90%)	327 (100%)	0	100	100
25	Y	334/344 (97%)	334 (100%)	0	100	100
26	Z	257/295 (87%)	257 (100%)	0	100	100
27	a	333/336 (99%)	333 (100%)	0	100	100
28	b	167/312 (54%)	167 (100%)	0	100	100
29	c	252/268 (94%)	252 (100%)	0	100	100
30	d	231/294 (79%)	231 (100%)	0	100	100
31	f	745/763 (98%)	745 (100%)	0	100	100
32	x	68/439 (16%)	68 (100%)	0	100	100
33	e	44/63 (70%)	44 (100%)	0	100	100
All	All	11396/13065 (87%)	11379 (100%)	17 (0%)	87	93

5 of 17 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
21	U	497	LEU
23	W	26	GLN
5	E	283	ASP
5	E	384	LEU
5	E	387	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 107 such sidechains are listed below:

Mol	Chain	Res	Type
25	Y	273	GLN
29	c	92	GLN
31	f	382	ASN
25	Y	302	HIS
27	a	164	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 13 ligands modelled in this entry, 7 are monoatomic - leaving 6 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
36	ADP	C	501	35	28,29,29	1.40	4 (14%)	43,45,45	1.87	8 (18%)
34	ATP	E	501	35	32,33,33	1.38	4 (12%)	48,52,52	1.81	7 (14%)
34	ATP	A	501	35	32,33,33	0.36	0	48,52,52	0.30	0
34	ATP	B	501	35	32,33,33	0.37	0	48,52,52	0.30	0
36	ADP	F	501	35	28,29,29	1.43	3 (10%)	43,45,45	1.99	8 (18%)
34	ATP	D	501	35	32,33,33	0.39	0	48,52,52	0.30	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
36	ADP	C	501	35	-	5/16/32/32	0/3/3/3
34	ATP	E	501	35	-	3/22/38/38	0/3/3/3
34	ATP	A	501	35	-	0/22/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
34	ATP	B	501	35	-	5/22/38/38	0/3/3/3
36	ADP	F	501	35	-	3/16/32/32	0/3/3/3
34	ATP	D	501	35	-	2/22/38/38	0/3/3/3

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
36	F	501	ADP	C5-C4	4.77	1.47	1.39
36	C	501	ADP	C5-C4	4.64	1.47	1.39
34	E	501	ATP	C5-C4	4.64	1.47	1.39
36	F	501	ADP	C5-C6	2.77	1.48	1.41
36	F	501	ADP	C5-N7	-2.61	1.34	1.39

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
36	F	501	ADP	C5-C4-N3	-6.69	117.51	126.72
36	C	501	ADP	C5-C4-N3	-6.15	118.24	126.72
34	E	501	ATP	C5-C4-N3	-6.09	118.33	126.72
36	F	501	ADP	N3-C4-N9	5.28	136.15	127.17
36	C	501	ADP	N3-C4-N9	4.92	135.53	127.17

There are no chirality outliers.

5 of 18 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
34	B	501	ATP	C5'-O5'-PA-O1A
34	B	501	ATP	C5'-O5'-PA-O3A
34	E	501	ATP	O4'-C4'-C5'-O5'
36	C	501	ADP	C5'-O5'-PA-O1A
36	C	501	ADP	C5'-O5'-PA-O2A

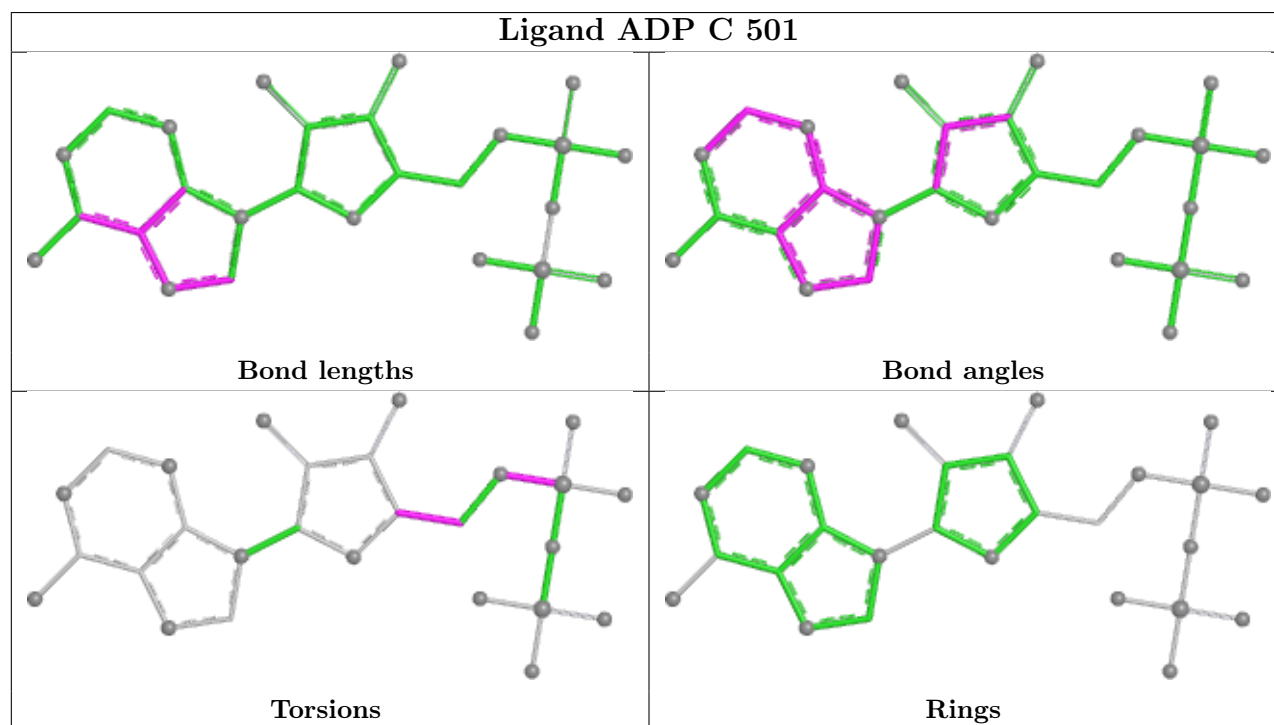
There are no ring outliers.

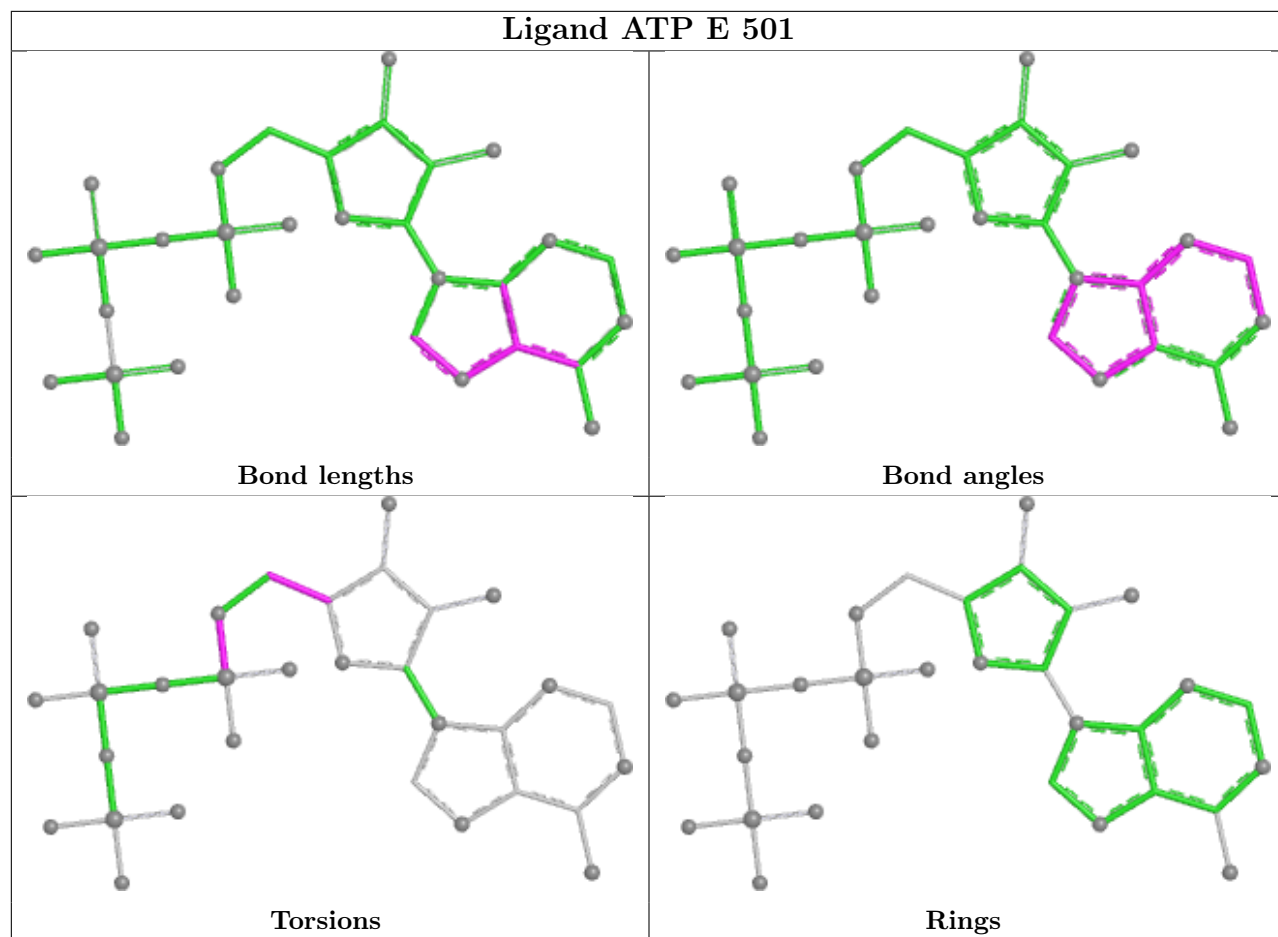
2 monomers are involved in 2 short contacts:

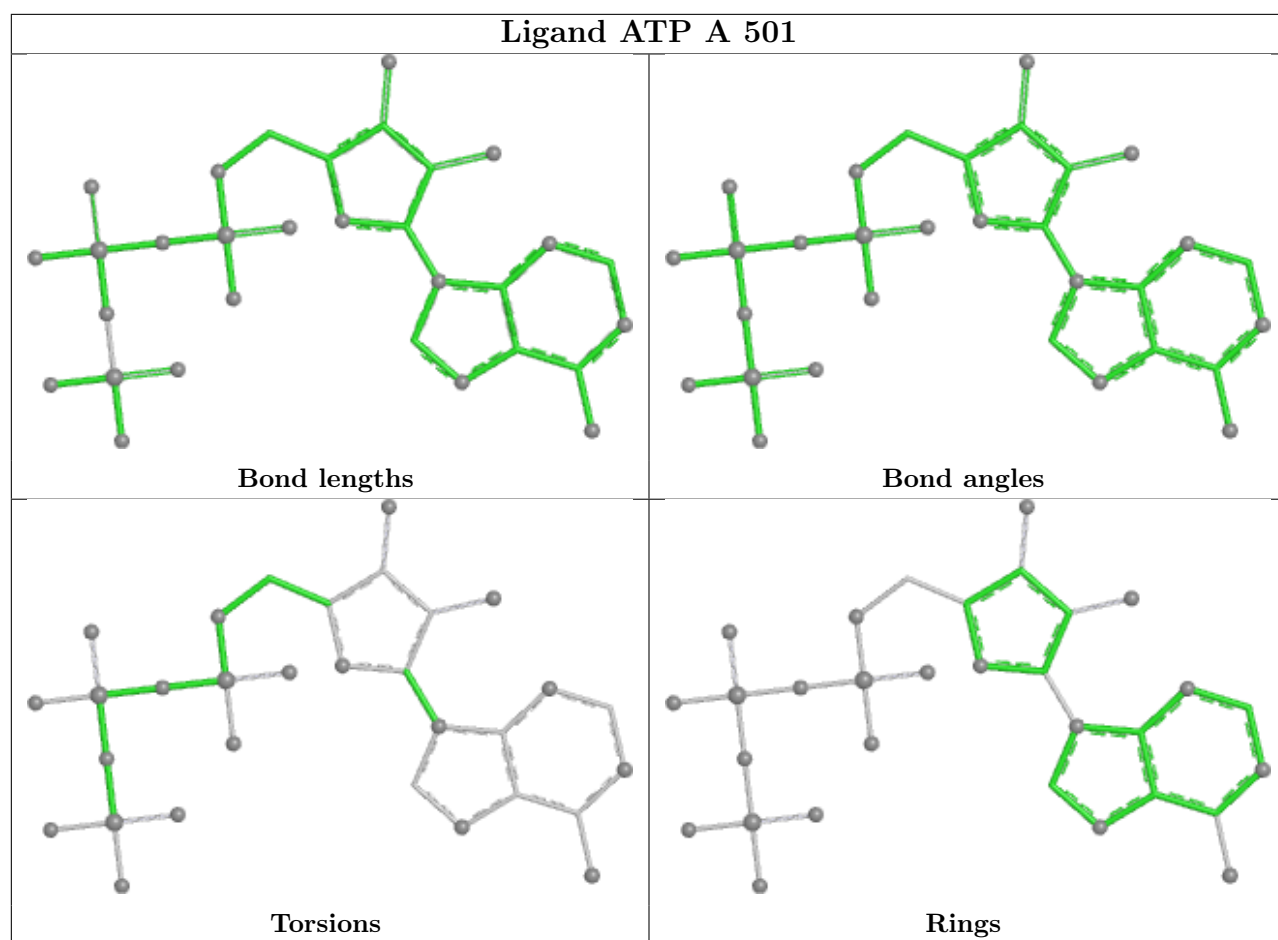
Mol	Chain	Res	Type	Clashes	Symm-Clashes
36	C	501	ADP	1	0
34	E	501	ATP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

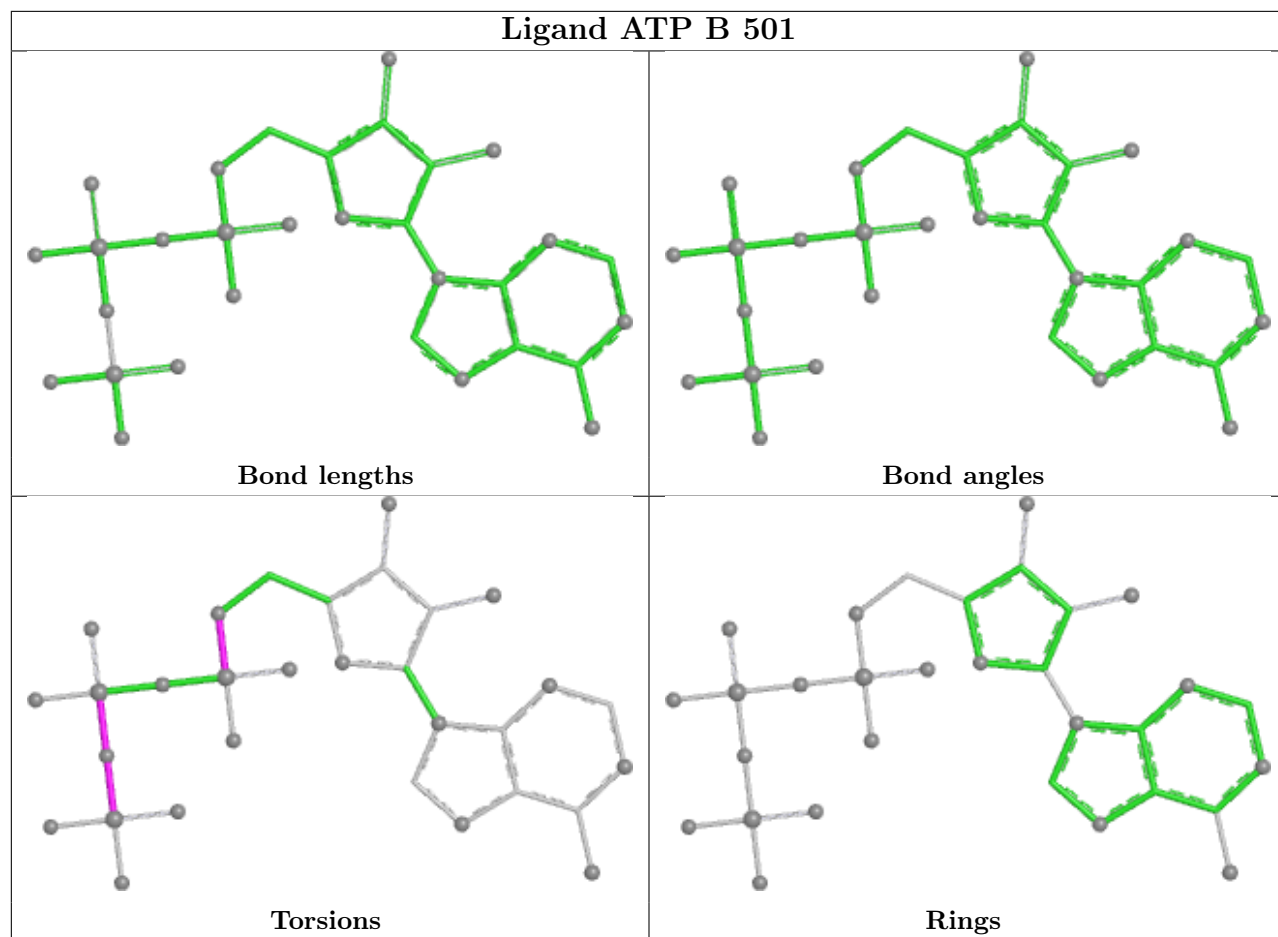
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 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.



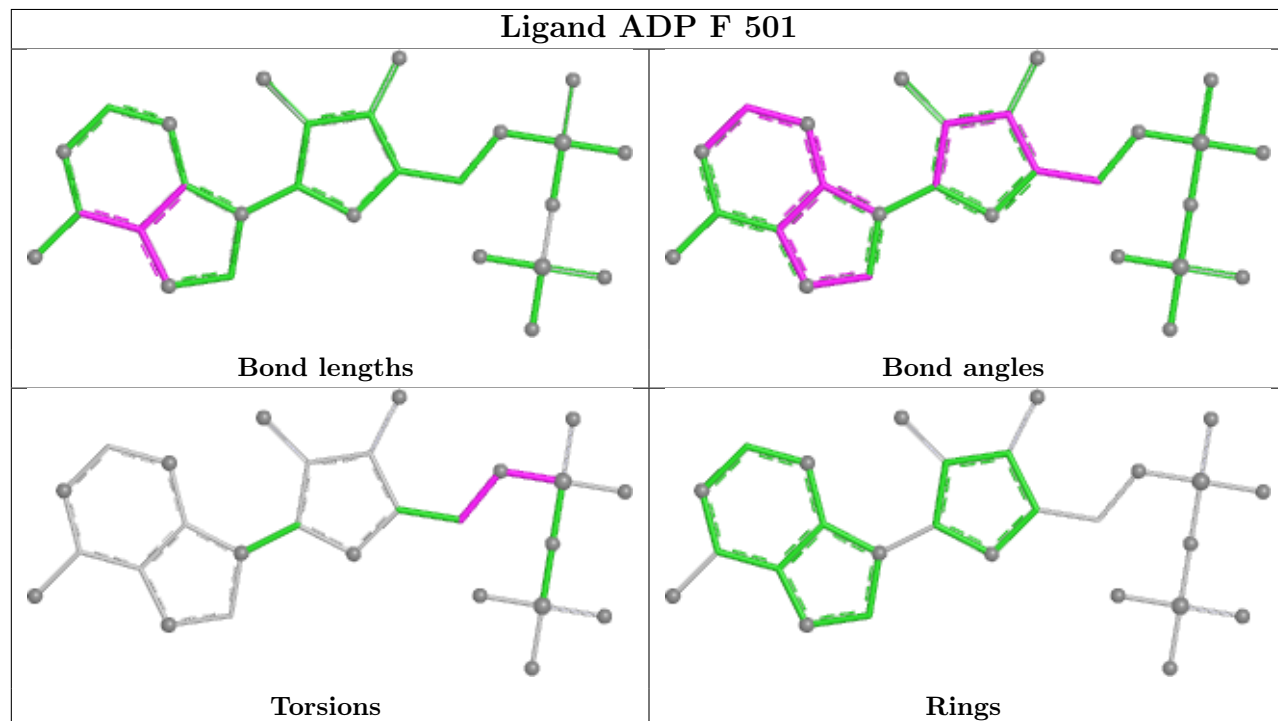


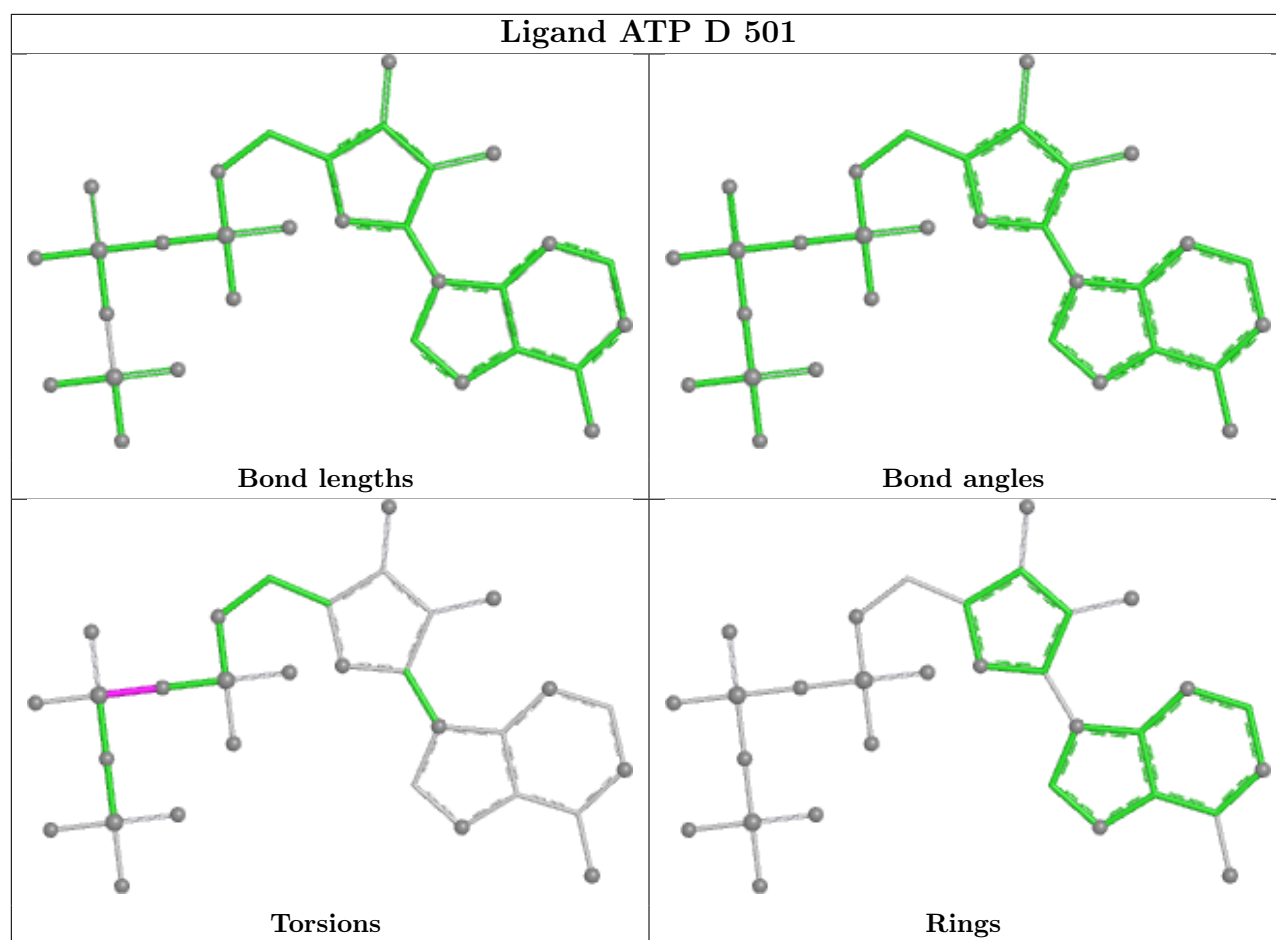


Ligand ATP B 501



Ligand ADP F 501





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.

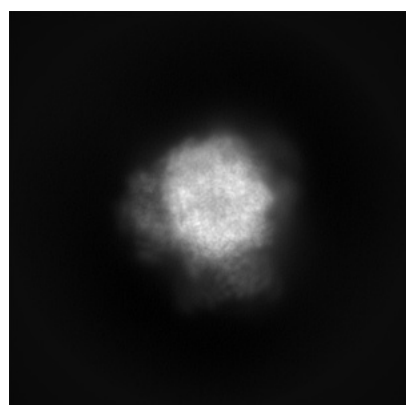
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-32272. These allow visual inspection of the internal detail of the map and identification of artifacts.

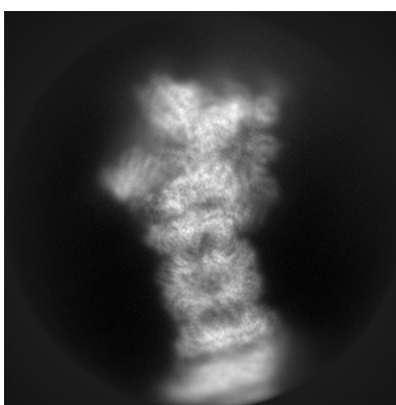
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

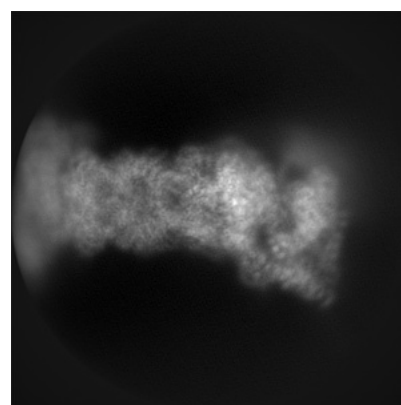
6.1.1 Primary map



X



Y

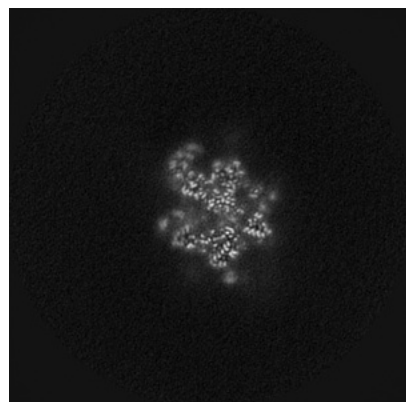


Z

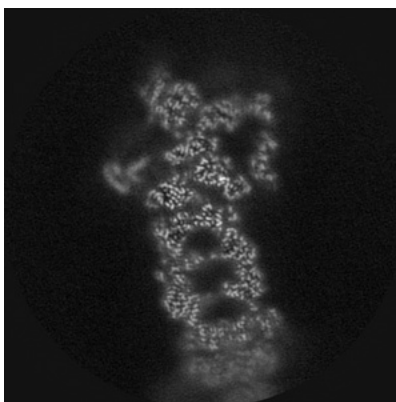
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

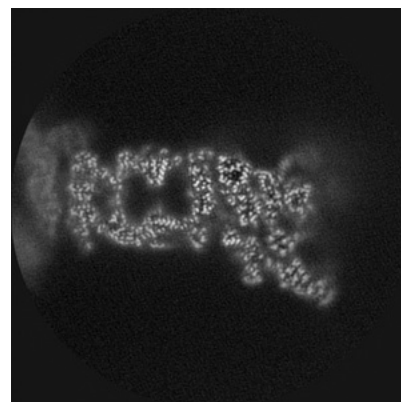
6.2.1 Primary map



X Index: 320



Y Index: 320

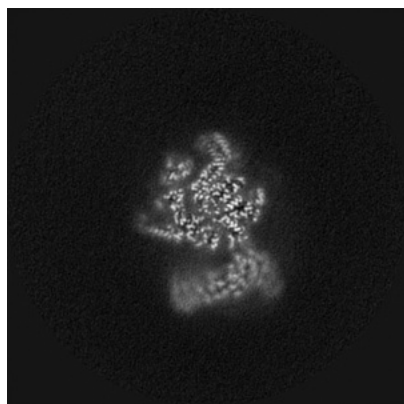


Z Index: 320

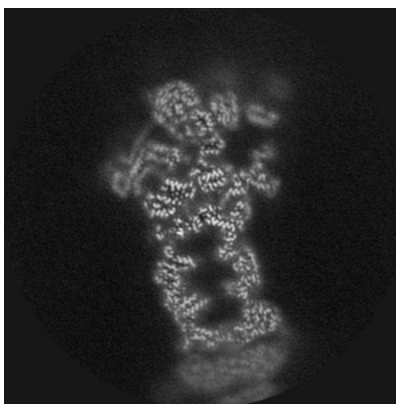
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

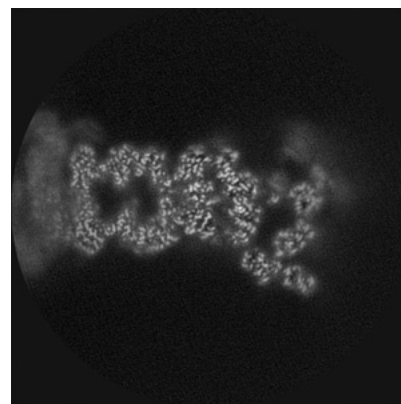
6.3.1 Primary map



X Index: 362



Y Index: 334

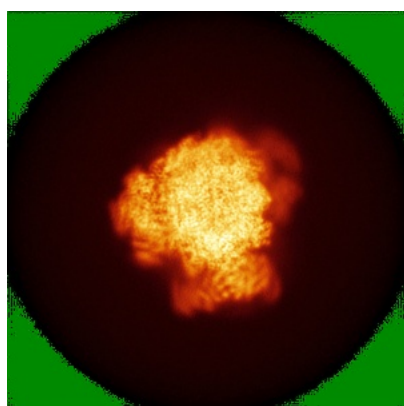


Z Index: 349

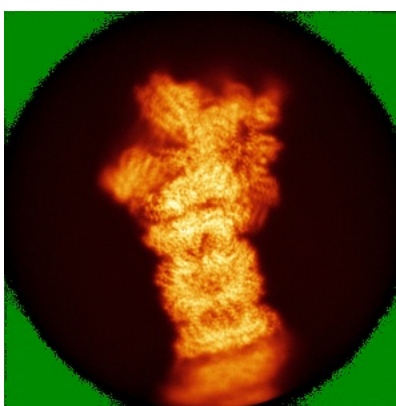
The images above show the largest variance slices of the map in three orthogonal directions.

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

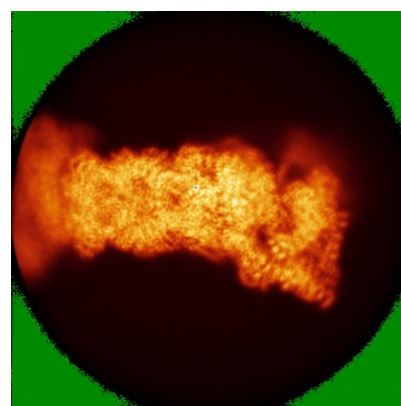
6.4.1 Primary map



X



Y

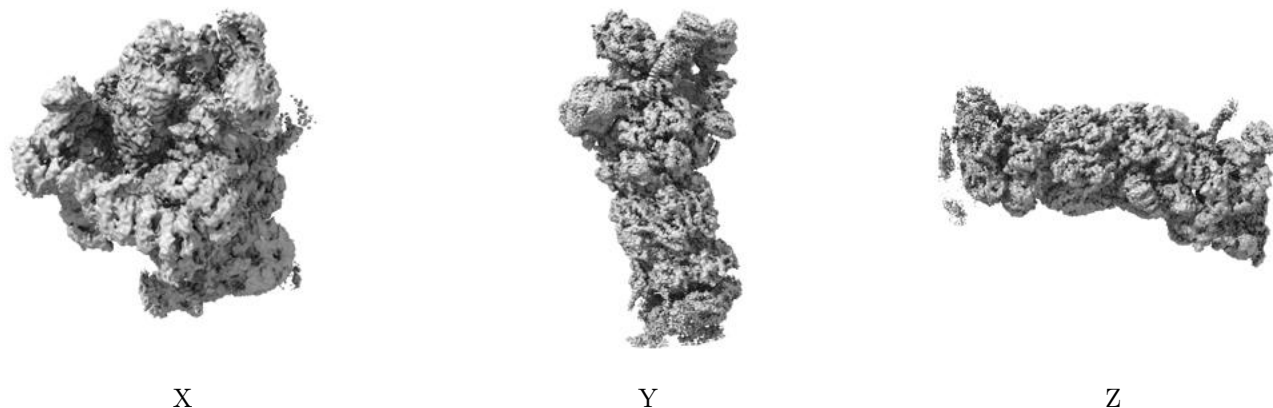


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.006. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

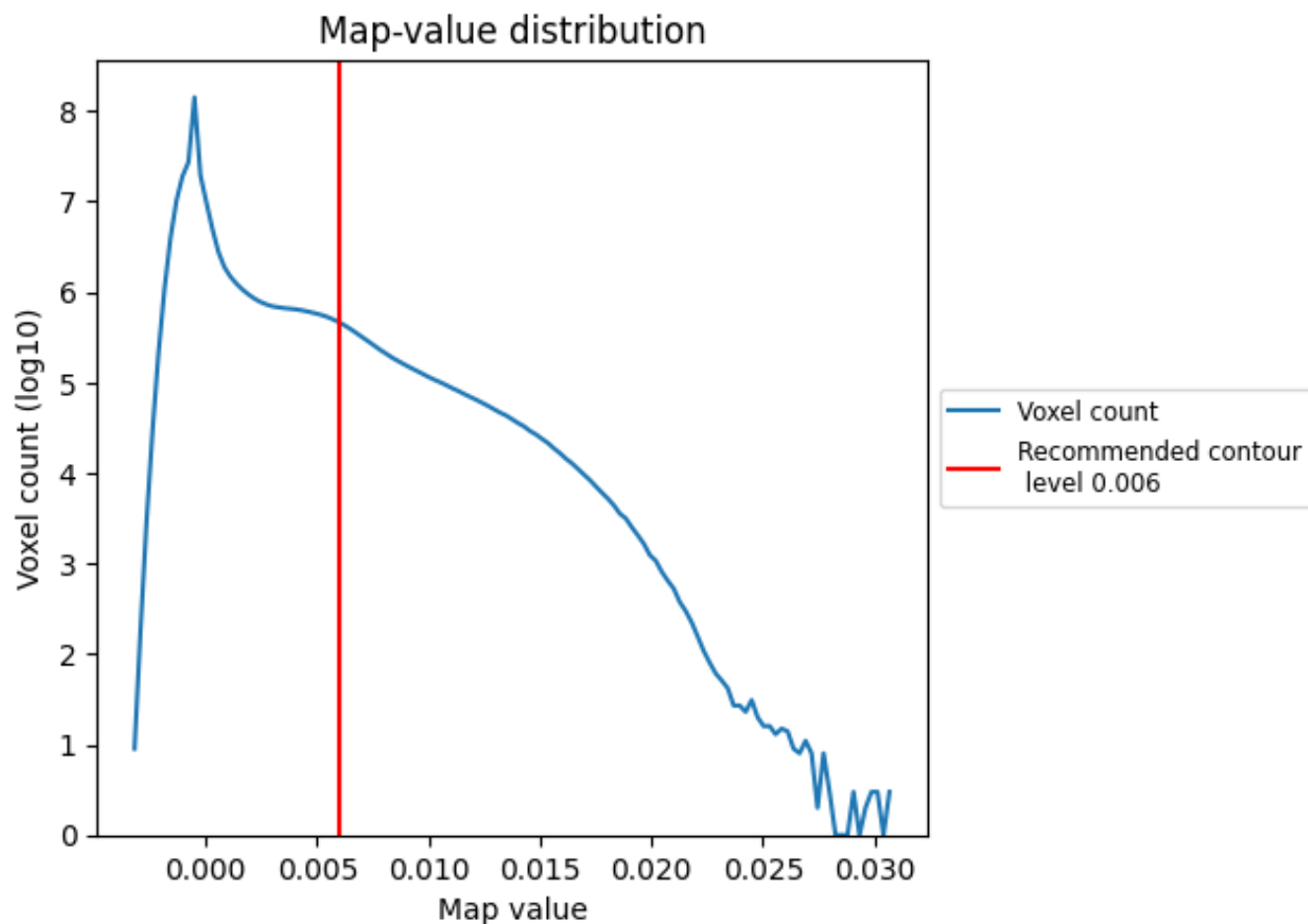
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

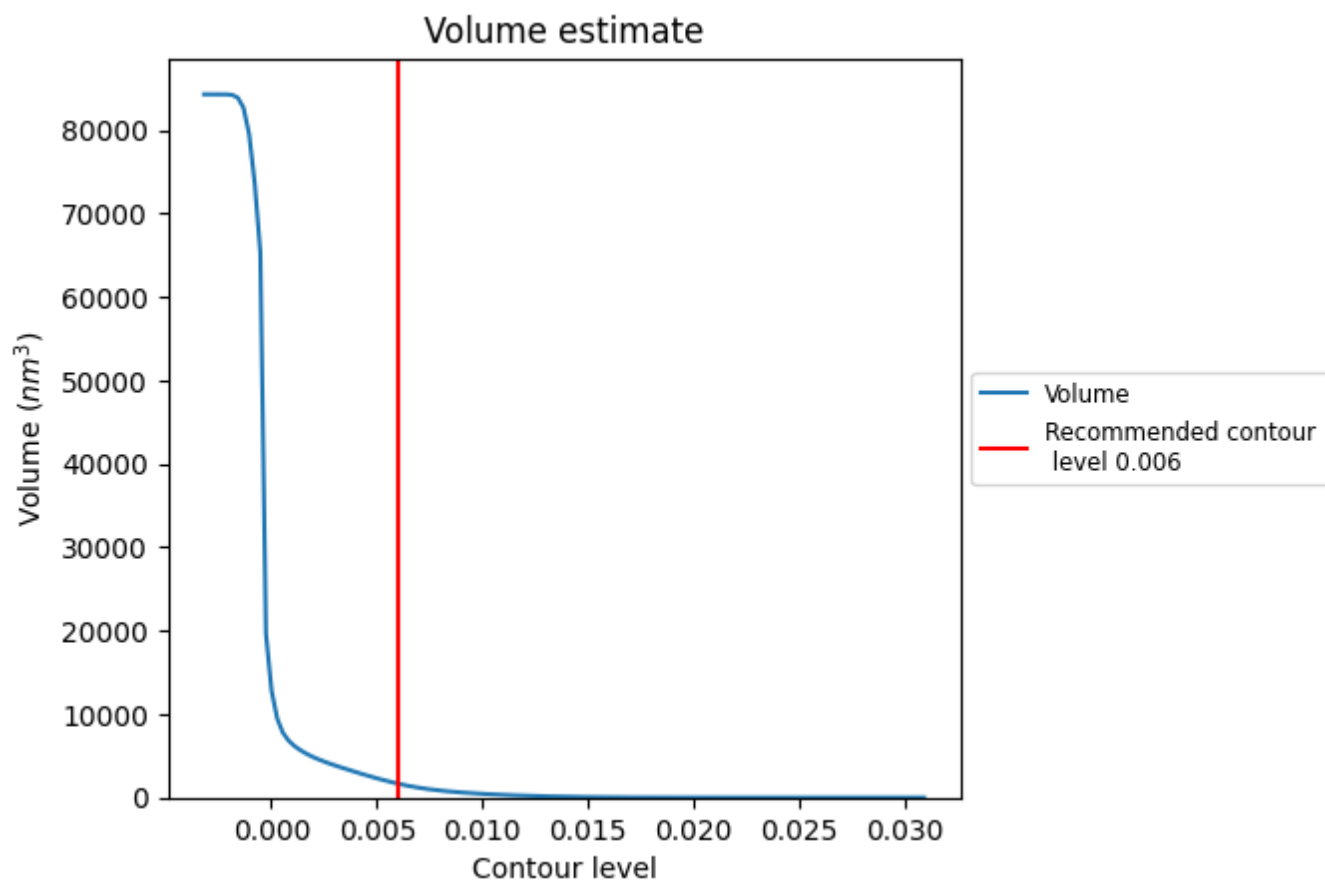
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

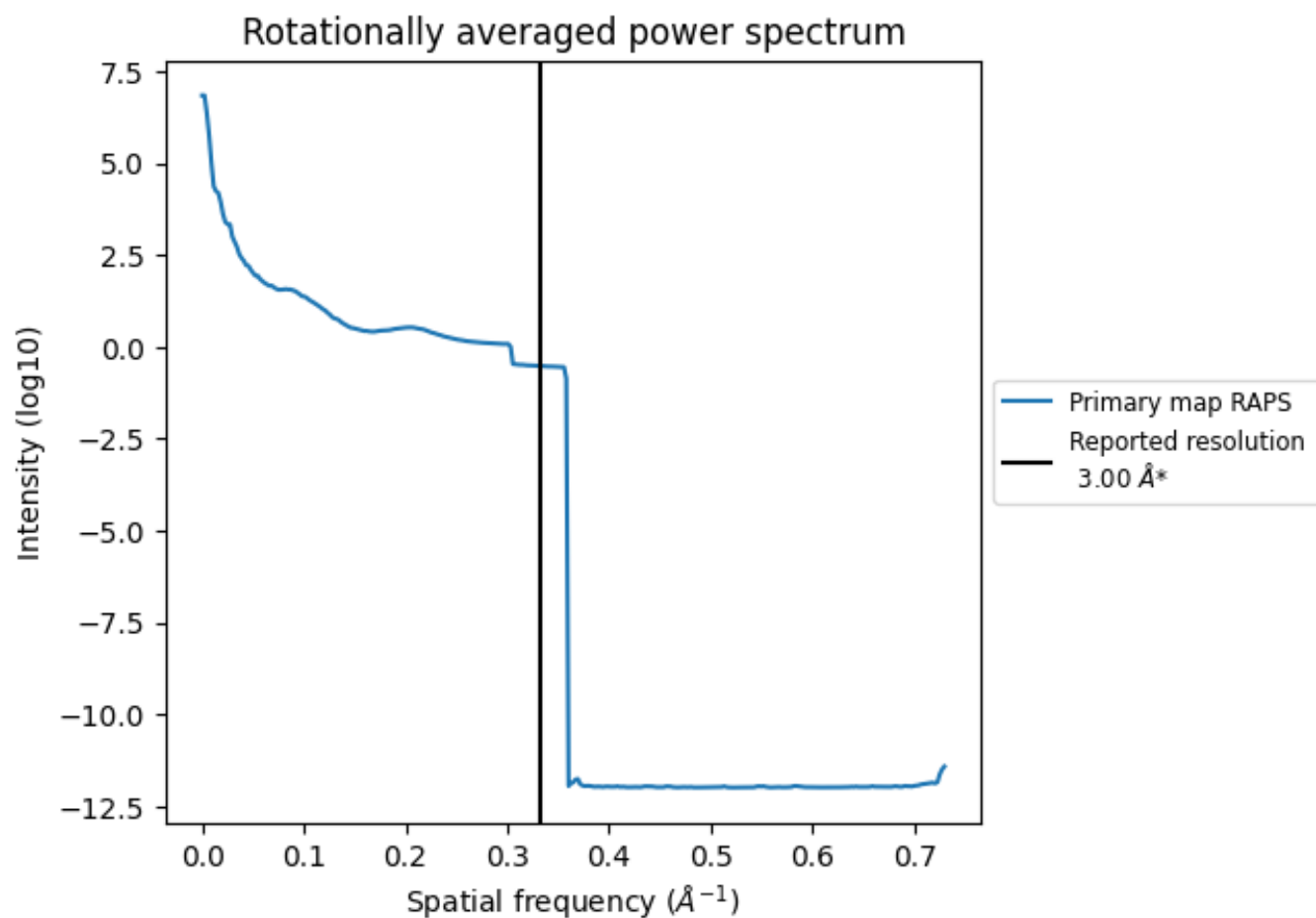
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1666 nm³; this corresponds to an approximate mass of 1505 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.333 $\text{\AA}^{-1}$

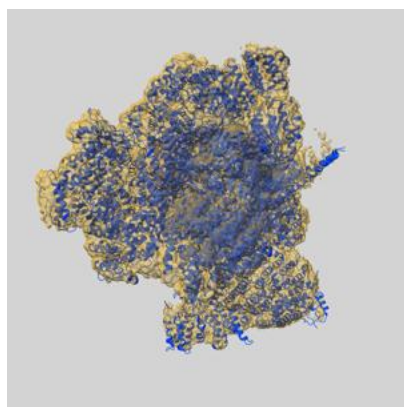
8 Fourier-Shell correlation

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

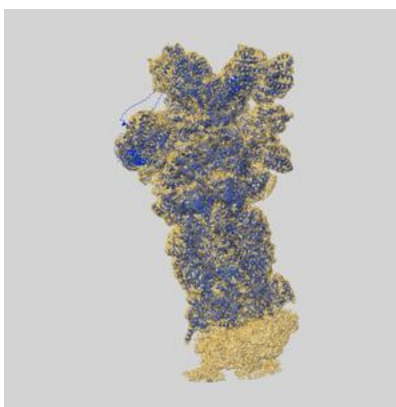
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-32272 and PDB model 7W37. Per-residue inclusion information can be found in section [3](#) on page [13](#).

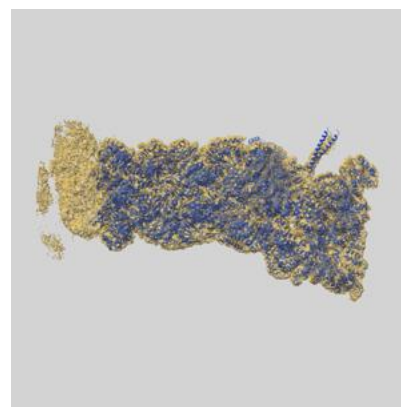
9.1 Map-model overlay [i](#)



X



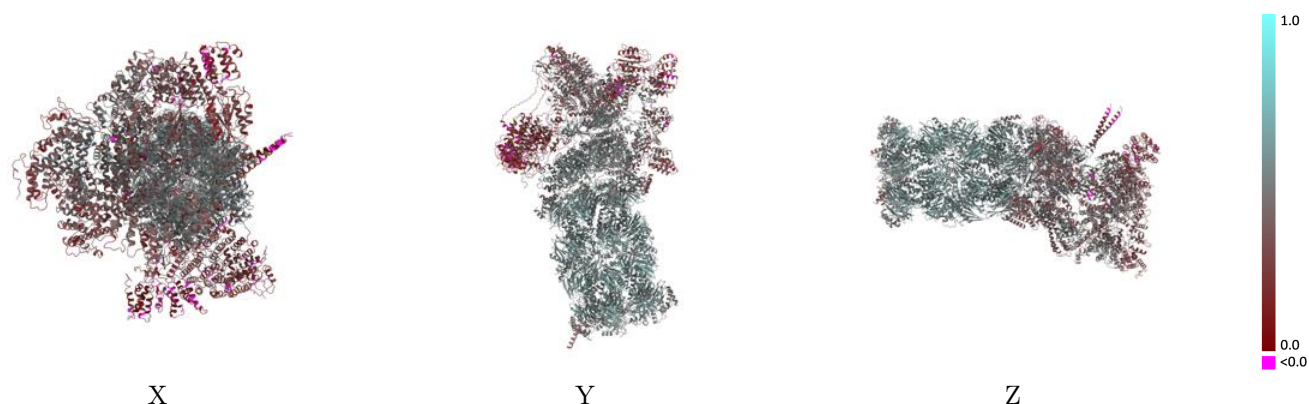
Y



Z

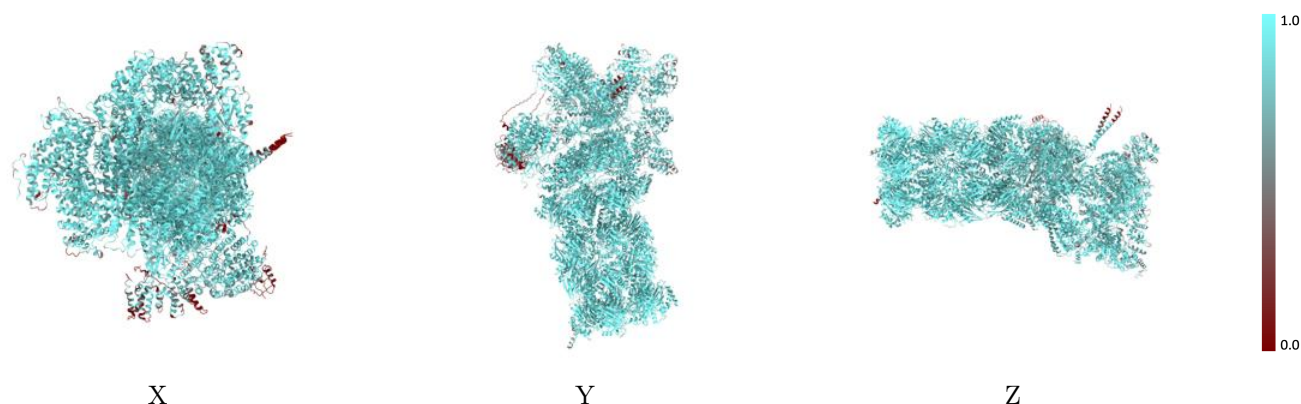
The images above show the 3D surface view of the map at the recommended contour level 0.006 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



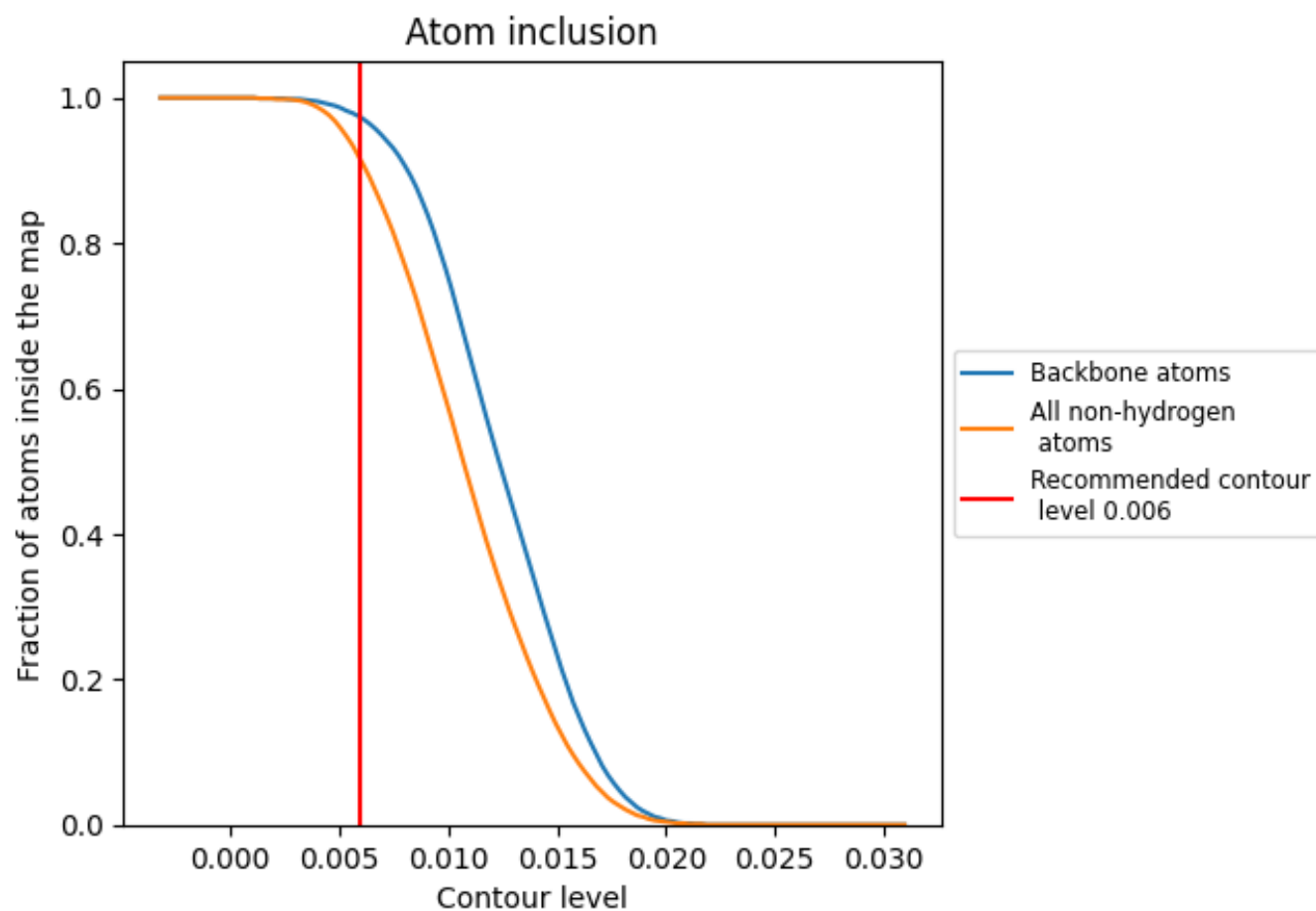
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.006).

9.4 Atom inclusion ⓘ



At the recommended contour level, 97% of all backbone atoms, 91% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.006) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9140	 0.4440
A	 0.9210	 0.4430
B	 0.9390	 0.4520
C	 0.9460	 0.4590
D	 0.9530	 0.4620
E	 0.9360	 0.4590
F	 0.9280	 0.4660
G	 0.9670	 0.5270
H	 0.9750	 0.5280
I	 0.9620	 0.5130
J	 0.9550	 0.4910
K	 0.9590	 0.5270
L	 0.9740	 0.5440
M	 0.9700	 0.5280
N	 0.9790	 0.5560
O	 0.9780	 0.5460
P	 0.9840	 0.5470
Q	 0.9780	 0.5460
R	 0.9850	 0.5390
S	 0.9790	 0.5430
T	 0.9760	 0.5580
U	 0.8460	 0.3550
V	 0.8880	 0.3710
W	 0.8230	 0.3310
X	 0.8900	 0.3890
Y	 0.9230	 0.4240
Z	 0.8910	 0.3420
a	 0.8210	 0.3010
b	 0.8000	 0.2600
c	 0.9190	 0.4140
d	 0.7870	 0.2950
e	 0.7920	 0.3520
f	 0.8120	 0.2170
g	 0.9610	 0.5250
h	 0.9660	 0.5320



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Chain	Atom inclusion	Q-score
i	 0.9330	 0.4990
j	 0.9130	 0.4630
k	 0.9410	 0.5130
l	 0.9670	 0.5350
m	 0.9500	 0.5270
n	 0.9820	 0.5670
o	 0.9760	 0.5520
p	 0.9870	 0.5540
q	 0.9810	 0.5500
r	 0.9840	 0.5520
s	 0.9720	 0.5520
t	 0.9720	 0.5600
x	 0.1340	 0.1550