Full wwPDB EM Validation Report ⓘ

May 4, 2025 – 02:06 PM EDT

PDB ID	:	7NAQ / pdb_00007naq
EMDB ID	:	EMD-24278
Title	:	Human PA200-20S proteasome complex
Authors	:	Zhao, J.; Makhija, S.; Huang, B.; Cheng, Y.
Deposited on	:	2021-06-22
Resolution	:	3.20 Å(reported)

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:

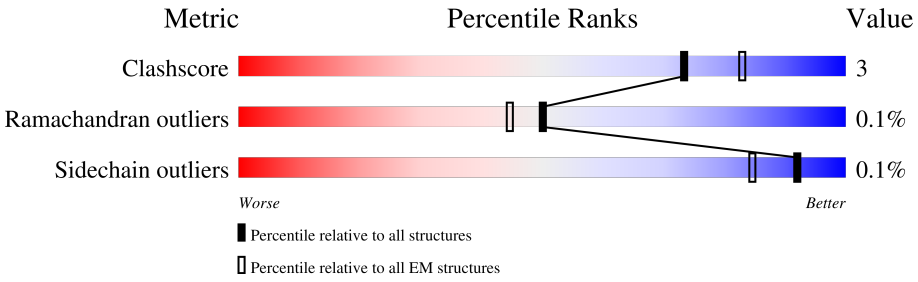
EMDB validation analysis	:	0.0.1.dev118
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.20 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)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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

Mol	Chain	Length	Quality of chain
1	A	234	88% 5% 7%
1	O	234	90% 9%
2	B	261	85% 13%
2	P	261	89% 6% 5%
3	C	248	87% 9%
3	Q	248	90% 7%
4	D	241	92% 5%
4	R	241	93% 5%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
5	E	263	82% 9% 9%
5	S	263	84% 6% 10%
6	F	255	85% 10%
6	T	255	89% 5% 6%
7	G	246	93%
7	U	246	93% 6%
8	H	277	71% 8% 21%
8	V	277	70% 10% 20%
9	I	205	91% 9%
9	W	205	92% 8%
10	J	201	95%
10	X	201	89% 9%
11	K	263	71% 5% 24%
11	Y	263	69% 7% 24%
12	L	241	80% 8% 12%
12	Z	241	82% 6% 12%
13	M	264	75% 7% 18%
13	a	264	74% 8% 18%
14	N	239	77% 8% 15%
14	b	239	79% 6% 15%
15	c	1843	9% 89% 8%

2 Entry composition (i)

There are 16 unique types of molecules in this entry. The entry contains 59084 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 Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	217	Total	C	N	O	S	0	0
			1568	1022	281	260	5		
1	O	230	Total	C	N	O	S	0	0
			1677	1093	292	288	4		

- Molecule 2 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	228	Total	C	N	O	S	0	0
			1603	1028	288	283	4		
2	P	249	Total	C	N	O	S	0	0
			1790	1149	318	316	7		

- Molecule 3 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	225	Total	C	N	O	S	0	0
			1596	1019	295	280	2		
3	Q	239	Total	C	N	O	S	0	0
			1686	1079	308	294	5		

- Molecule 4 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	229	Total	C	N	O	S	0	0
			1616	1039	283	285	9		
4	R	235	Total	C	N	O	S	0	0
			1648	1054	289	296	9		

- Molecule 5 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	240	Total	C	N	O	S	0	0
			1806	1147	333	315	11		
5	S	237	Total	C	N	O	S	0	0
			1738	1109	323	299	7		

- Molecule 6 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	244	Total	C	N	O	S	0	0
			1800	1156	317	319	8		
6	T	240	Total	C	N	O	S	0	0
			1773	1138	313	313	9		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	238	Total	C	N	O	S	0	0
			1742	1123	301	306	12		
7	U	244	Total	C	N	O	S	0	0
			1792	1149	311	321	11		

- Molecule 8 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	220	Total	C	N	O	S	0	0
			1598	1017	273	298	10		
8	V	221	Total	C	N	O	S	0	0
			1604	1015	274	305	10		

- Molecule 9 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	204	Total	C	N	O	S	0	0
			1548	996	264	270	18		
9	W	204	Total	C	N	O	S	0	0
			1528	982	260	268	18		

- Molecule 10 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	196	Total	C	N	O	S	0	0
			1519	984	263	263	9		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf	Trace
10	X	197	Total	C	N	O	S	0	0
			1514	985	264	257	8		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	201	Total	C	N	O	S	0	0
			1518	968	272	269	9		
11	Y	200	Total	C	N	O	S	0	0
			1509	965	269	268	7		

- Molecule 12 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	213	Total	C	N	O	S	0	0
			1582	1015	276	281	10		
12	Z	213	Total	C	N	O	S	0	0
			1582	1016	277	279	10		

- Molecule 13 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	216	Total	C	N	O	S	0	0
			1642	1045	290	296	11		
13	a	216	Total	C	N	O	S	0	0
			1635	1043	289	293	10		

- 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
			1432	914	255	254	9		
14	b	203	Total	C	N	O	S	0	0
			1468	929	259	269	11		

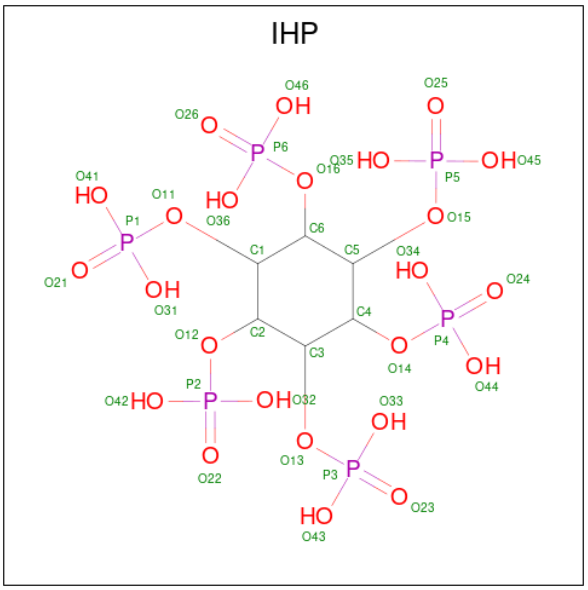
- Molecule 15 is a protein called Proteasome activator complex subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	c	1799	Total	C	N	O	S	0	0
			13534	8844	2378	2261	51		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
c	821	ILE	LEU	conflict	UNP Q14997
c	822	LEU	ILE	conflict	UNP Q14997

- Molecule 16 is INOSITOL HEXAKISPHOSPHATE (CCD ID: IHP) (formula: $C_6H_{18}O_{24}P_6$).



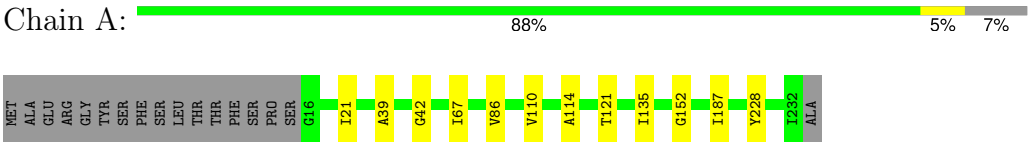
Mol	Chain	Residues	Atoms				AltConf
			Total	C	O	P	
16	c	1	36	6	24	6	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

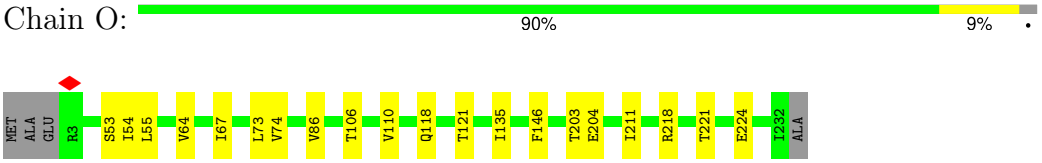
• Molecule 1: Proteasome subunit alpha type-2

Chain A:



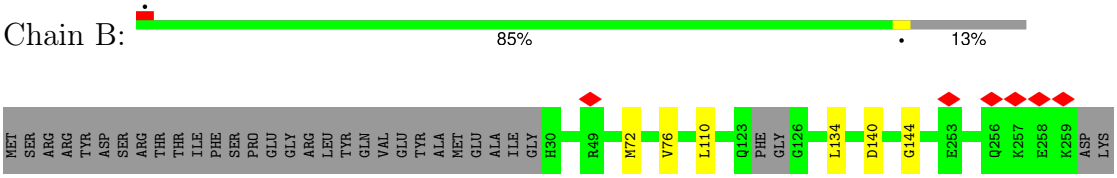
• Molecule 1: Proteasome subunit alpha type-2

Chain O:



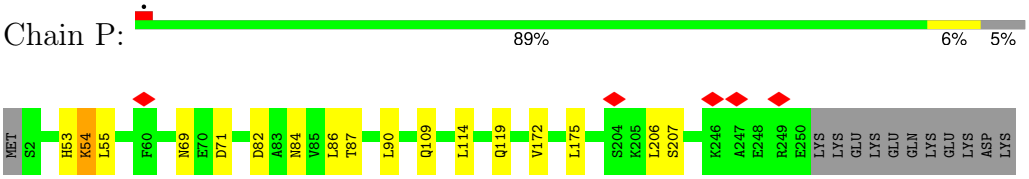
• Molecule 2: Proteasome subunit alpha type-4

Chain B:



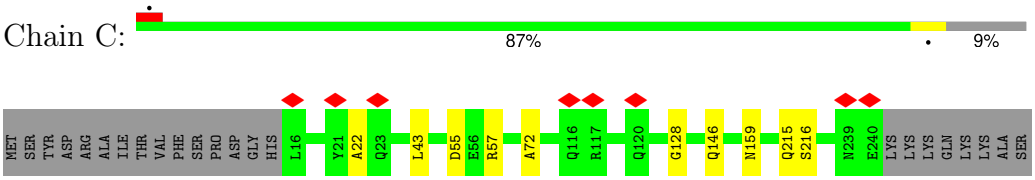
• Molecule 2: Proteasome subunit alpha type-4

Chain P:



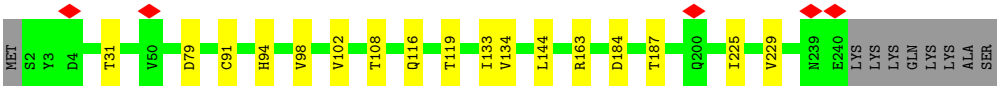
• Molecule 3: Proteasome subunit alpha type-7

Chain C:



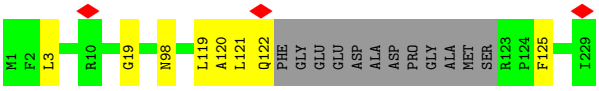
• Molecule 3: Proteasome subunit alpha type-7

Chain Q:



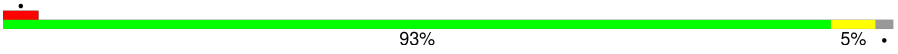
• Molecule 4: Proteasome subunit alpha type-5

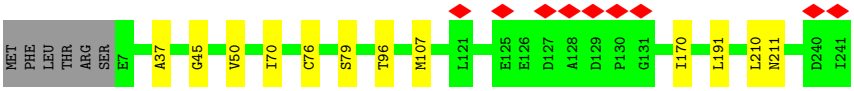
Chain D:



• Molecule 4: Proteasome subunit alpha type-5

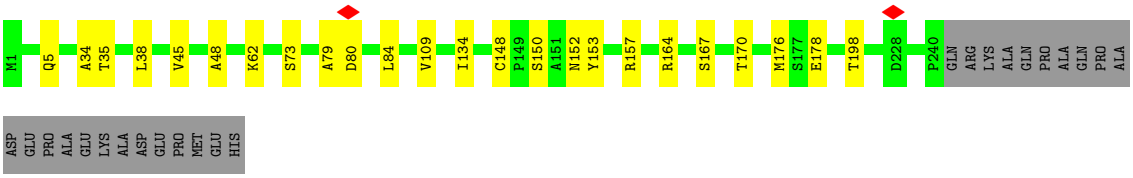
Chain R:





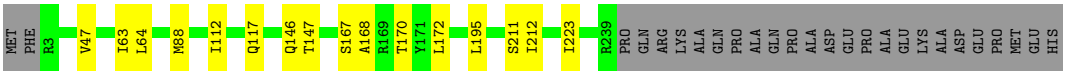
• Molecule 5: Proteasome subunit alpha type-1

Chain E:



• Molecule 5: Proteasome subunit alpha type-1

Chain S:

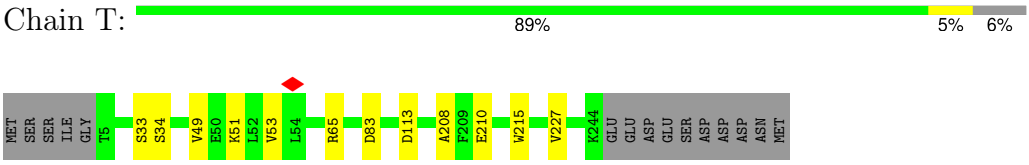


• Molecule 6: Proteasome subunit alpha type-3

Chain F:

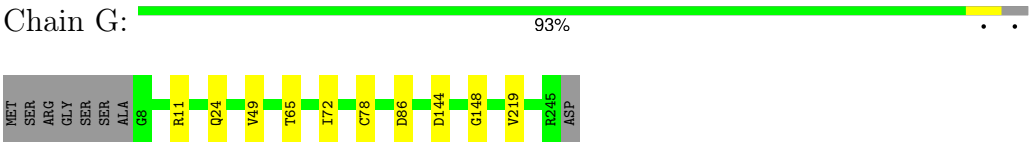
• Molecule 6: Proteasome subunit alpha type-3

Chain T:



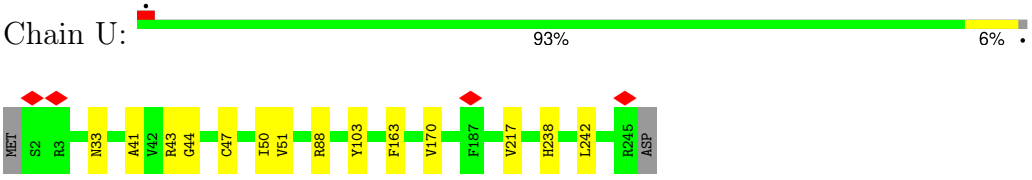
• Molecule 7: Proteasome subunit alpha type-6

Chain G:



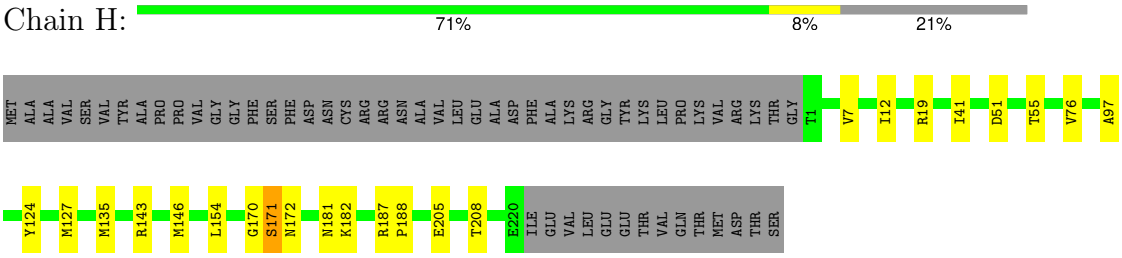
• Molecule 7: Proteasome subunit alpha type-6

Chain U:



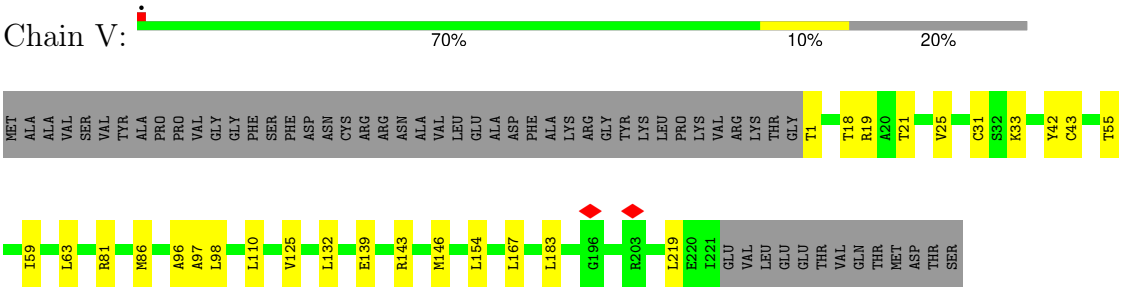
• Molecule 8: Proteasome subunit beta type-7

Chain H:



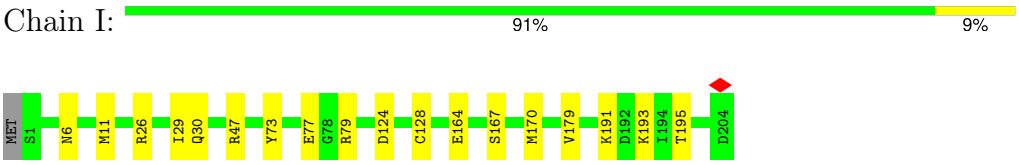
• Molecule 8: Proteasome subunit beta type-7

Chain V:



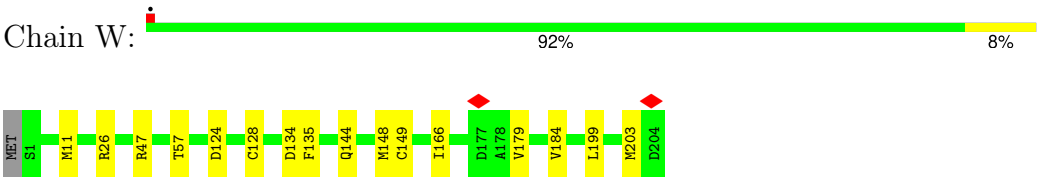
• Molecule 9: Proteasome subunit beta type-3

Chain I:



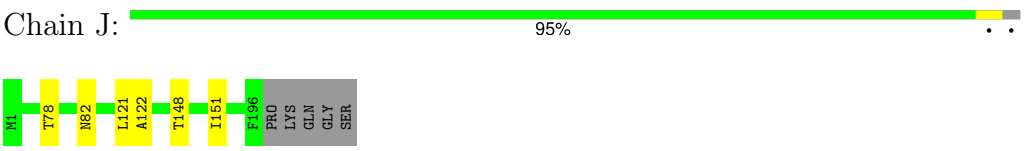
• Molecule 9: Proteasome subunit beta type-3

Chain W:



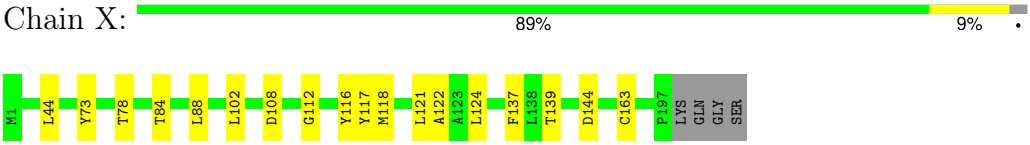
• Molecule 10: Proteasome subunit beta type-2

Chain J:



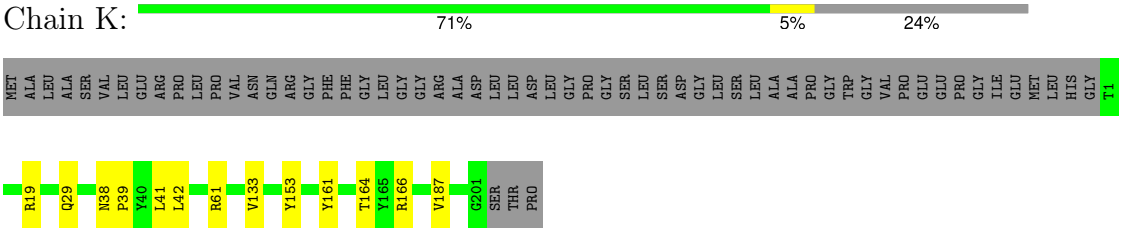
• Molecule 10: Proteasome subunit beta type-2

Chain X:



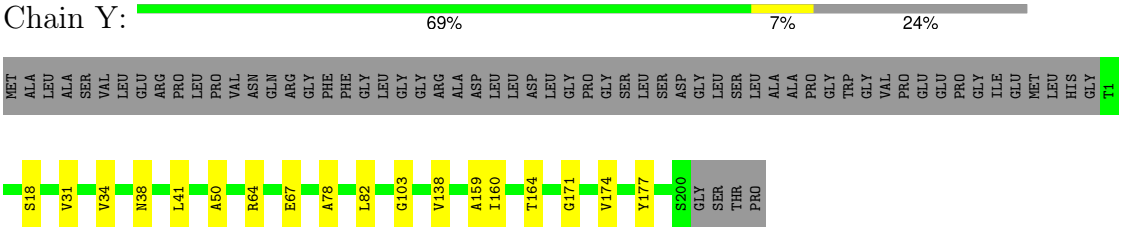
• Molecule 11: Proteasome subunit beta type-5

Chain K:



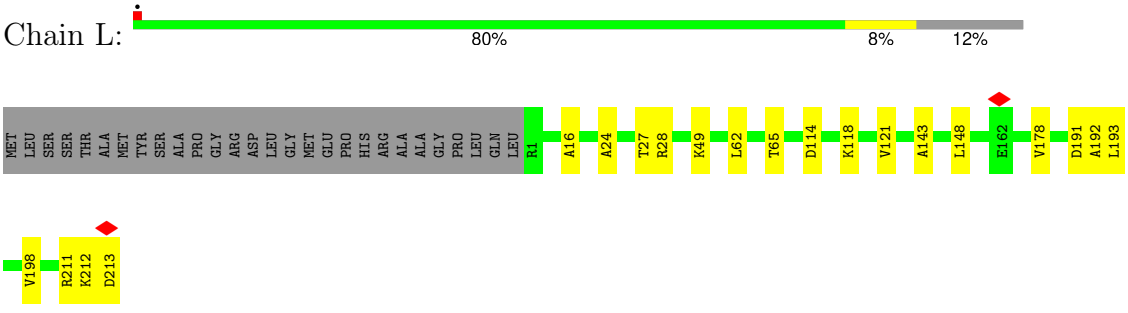
• Molecule 11: Proteasome subunit beta type-5

Chain Y:



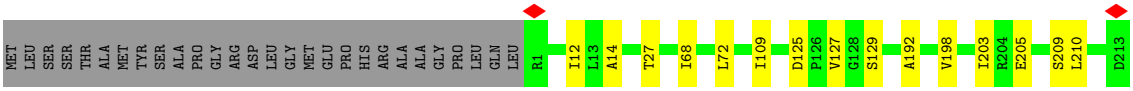
• Molecule 12: Proteasome subunit beta type-1

Chain L:



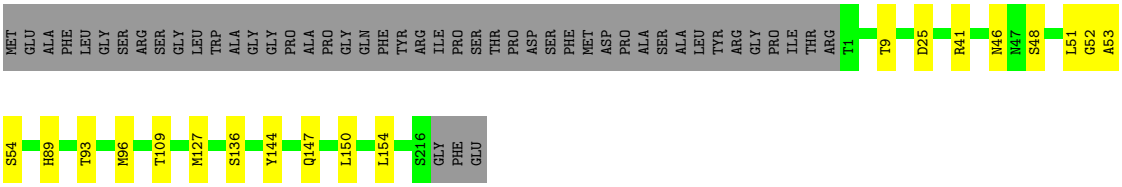
• Molecule 12: Proteasome subunit beta type-1

Chain Z:



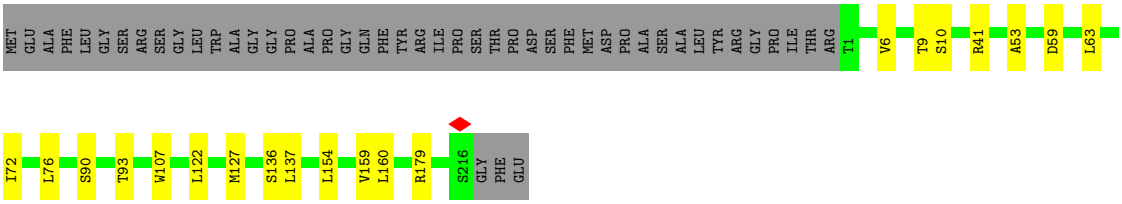
• Molecule 13: Proteasome subunit beta type-4

Chain M:



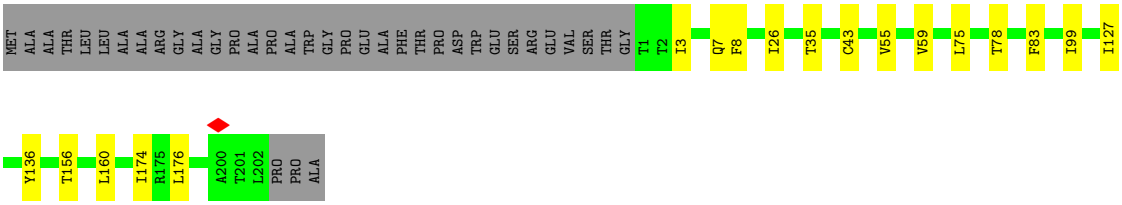
• Molecule 13: Proteasome subunit beta type-4

Chain a:



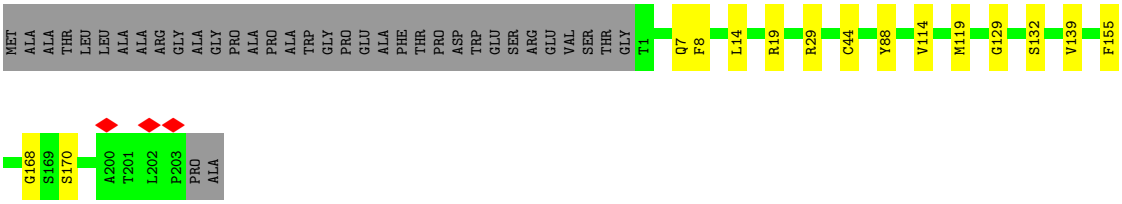
• Molecule 14: Proteasome subunit beta type-6

Chain N:



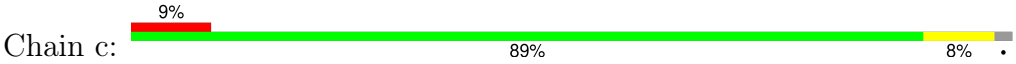
• Molecule 14: Proteasome subunit beta type-6

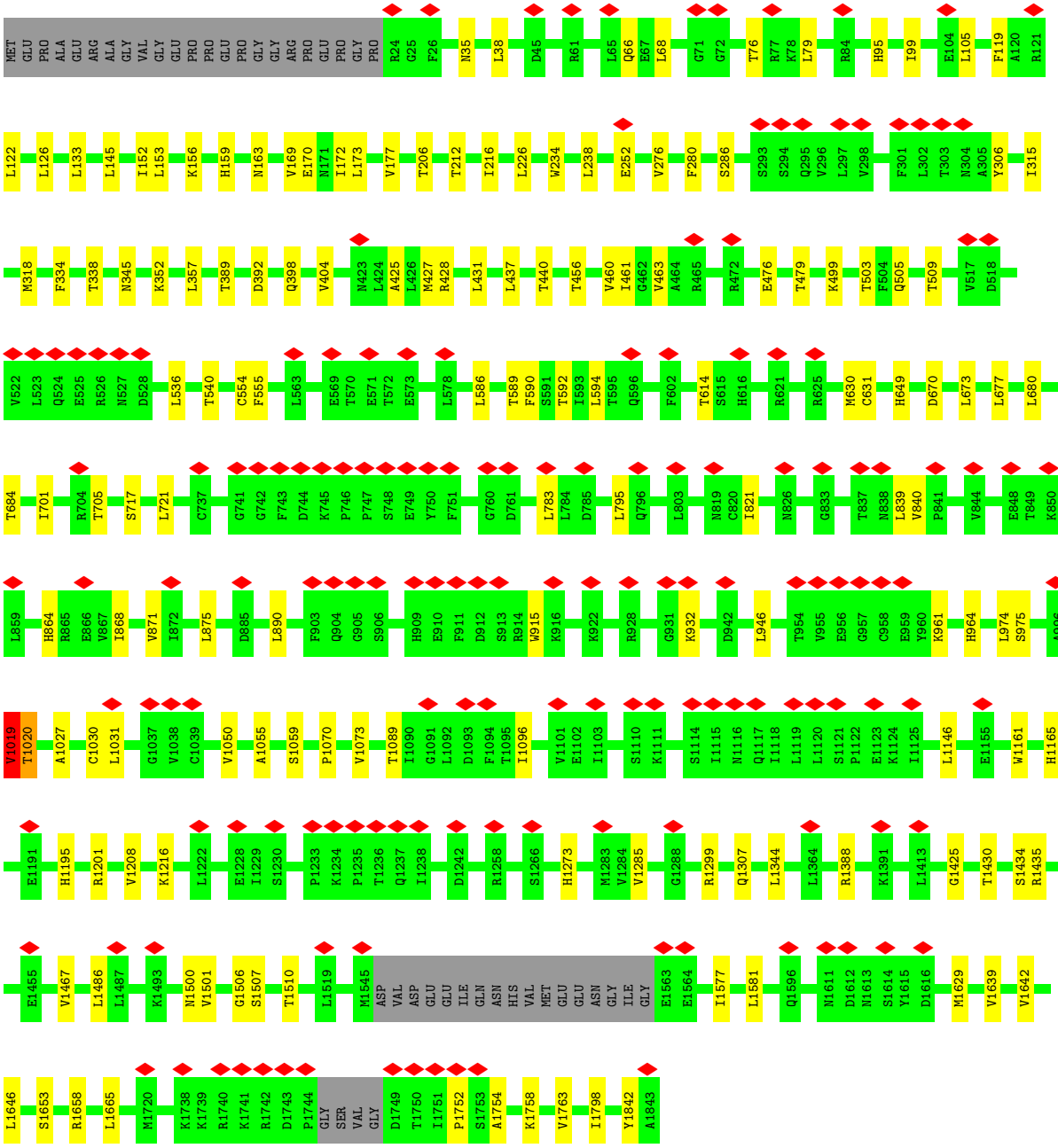
Chain b:



• Molecule 15: Proteasome activator complex subunit 4

Chain c:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	50767	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	24.703	Depositor
Minimum map value	-14.370	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	4	Depositor
Map size (Å)	388.992, 388.992, 388.992	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.2156, 1.2156, 1.2156	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: IHP

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	0.51	0/1603	0.44	0/2186
1	O	0.51	0/1716	0.51	0/2342
2	B	0.46	0/1623	0.43	0/2208
2	P	0.42	0/1820	0.46	1/2480 (0.0%)
3	C	0.44	0/1616	0.49	0/2201
3	Q	0.40	0/1711	0.42	0/2340
4	D	0.44	0/1641	0.45	0/2234
4	R	0.39	0/1675	0.41	0/2284
5	E	0.49	0/1842	0.45	0/2501
5	S	0.43	0/1772	0.44	0/2414
6	F	0.48	0/1835	0.47	0/2489
6	T	0.44	0/1808	0.43	0/2454
7	G	0.50	0/1775	0.44	0/2420
7	U	0.45	0/1825	0.43	0/2484
8	H	0.55	0/1625	0.51	1/2212 (0.0%)
8	V	0.52	0/1630	0.49	0/2217
9	I	0.54	0/1577	0.47	0/2130
9	W	0.55	0/1557	0.47	0/2111
10	J	0.54	0/1551	0.46	0/2106
10	X	0.56	0/1547	0.46	0/2102
11	K	0.54	0/1549	0.45	0/2098
11	Y	0.51	0/1540	0.44	0/2089
12	L	0.53	0/1612	0.47	0/2180
12	Z	0.53	0/1612	0.48	0/2180
13	M	0.55	0/1675	0.48	0/2274
13	a	0.55	0/1668	0.46	0/2268
14	N	0.57	0/1458	0.44	0/1985
14	b	0.55	0/1495	0.43	0/2031
15	c	0.33	0/13872	0.48	0/18979
All	All	0.47	0/60230	0.46	2/81999 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
2	P	0	1
15	c	0	4
All	All	0	5

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	P	54	LYS	N-CA-C	-5.45	105.74	112.72
8	H	171	SER	N-CA-CB	-5.19	108.25	114.17

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	P	53	HIS	Peptide
15	c	1019	VAL	Peptide
15	c	1175	LEU	Peptide
15	c	670	ASP	Peptide
15	c	932	LYS	Peptide

5.2 Too-close contacts (i)

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	1568	0	1504	7	0
1	O	1677	0	1603	15	0
2	B	1603	0	1515	3	0
2	P	1790	0	1691	11	0
3	C	1596	0	1504	5	0
3	Q	1686	0	1587	10	0
4	D	1616	0	1532	8	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	R	1648	0	1549	9	0
5	E	1806	0	1749	16	0
5	S	1738	0	1650	10	0
6	F	1800	0	1714	23	0
6	T	1773	0	1676	8	0
7	G	1742	0	1684	7	0
7	U	1792	0	1722	8	0
8	H	1598	0	1567	13	0
8	V	1604	0	1579	19	0
9	I	1548	0	1564	10	0
9	W	1528	0	1504	14	0
10	J	1519	0	1495	3	0
10	X	1514	0	1494	12	0
11	K	1518	0	1458	10	0
11	Y	1509	0	1435	10	0
12	L	1582	0	1547	13	0
12	Z	1582	0	1552	9	0
13	M	1642	0	1593	11	0
13	a	1635	0	1575	14	0
14	N	1432	0	1369	10	0
14	b	1468	0	1417	11	0
15	c	13534	0	13005	91	0
16	c	36	0	6	1	0
All	All	59084	0	56840	361	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 3.

All (361) 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)
8:V:21:THR:OG1	8:V:25:VAL:O	1.99	0.80
5:S:117:GLN:NE2	6:T:83:ASP:OD1	2.15	0.80
14:N:35:THR:OG1	14:N:43:CYS:SG	2.40	0.79
15:c:79:LEU:HD23	15:c:122:LEU:HD21	1.64	0.78
15:c:252:GLU:OE2	15:c:306:TYR:OH	2.01	0.77
14:N:26:ILE:O	13:a:179:ARG:NH2	2.17	0.76
15:c:821:ILE:HD11	15:c:868:ILE:HD13	1.68	0.75
14:N:75:LEU:O	14:N:78:THR:OG1	2.03	0.74
3:C:146:GLN:OE1	3:C:159:ASN:ND2	2.21	0.73
15:c:975:SER:OG	15:c:1030:CYS:SG	2.47	0.73

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:c:1216:LYS:NZ	16:c:1901:IHP:O23	2.22	0.71
12:L:24:ALA:HB1	12:L:193:LEU:HD11	1.72	0.70
5:E:148:CYS:SG	5:E:150:SER:OG	2.49	0.69
2:P:86:LEU:HD12	2:P:114:LEU:HD11	1.74	0.69
5:S:47:VAL:HG12	5:S:195:LEU:HD22	1.75	0.68
8:H:205:GLU:O	8:H:208:THR:OG1	2.09	0.68
11:Y:38:ASN:OD1	11:Y:41:LEU:N	2.27	0.68
15:c:1208:VAL:HG23	15:c:1344:LEU:HD13	1.76	0.68
15:c:1195:HIS:O	15:c:1201:ARG:NH2	2.27	0.67
1:A:110:VAL:HG22	1:A:135:ILE:HD13	1.76	0.66
3:C:55:ASP:OD2	3:C:57:ARG:NH1	2.28	0.66
9:W:26:ARG:NE	9:W:179:VAL:O	2.28	0.66
11:Y:64:ARG:NH1	11:Y:67:GLU:OE2	2.29	0.65
12:Z:125:ASP:OD1	12:Z:129:SER:N	2.29	0.65
14:N:7:GLN:NE2	14:N:8:PHE:O	2.30	0.65
9:W:57:THR:OG1	10:X:121:LEU:O	2.13	0.64
1:O:106:THR:O	1:O:110:VAL:HG23	1.97	0.64
4:R:37:ALA:HB2	4:R:50:VAL:HG23	1.80	0.64
5:S:146:GLN:NE2	5:S:147:THR:O	2.30	0.64
1:O:203:THR:OG1	1:O:204:GLU:OE1	2.16	0.63
13:M:96:MET:HE3	13:M:127:MET:HA	1.80	0.63
15:c:536:LEU:O	15:c:540:THR:HG23	1.98	0.63
12:L:28:ARG:NH2	12:L:191:ASP:OD1	2.32	0.63
13:M:89:HIS:O	13:M:93:THR:HG23	1.98	0.63
9:I:11:MET:SD	9:I:170:MET:HE2	2.39	0.62
8:H:41:ILE:HD12	8:H:76:VAL:HG22	1.81	0.62
3:Q:94:HIS:O	3:Q:98:VAL:HG22	1.99	0.62
15:c:1653:SER:O	15:c:1658:ARG:NH2	2.33	0.62
1:O:110:VAL:HG22	1:O:135:ILE:HD13	1.82	0.62
8:H:171:SER:O	8:H:172:ASN:ND2	2.32	0.62
4:D:119:LEU:O	4:D:122:GLN:N	2.32	0.62
5:S:167:SER:O	5:S:170:THR:OG1	2.18	0.61
15:c:177:VAL:HG11	15:c:216:ILE:HG22	1.82	0.61
9:I:29:ILE:HG22	9:I:30:GLN:H	1.66	0.60
15:c:586:LEU:HD21	15:c:630:MET:HE3	1.81	0.60
15:c:1507:SER:O	15:c:1510:THR:OG1	2.14	0.60
15:c:680:LEU:O	15:c:684:THR:OG1	2.19	0.60
8:H:146:MET:HE1	8:H:154:LEU:HD22	1.84	0.59
4:D:120:ALA:HB1	4:D:125:PHE:CE2	2.37	0.59
8:H:7:VAL:HG12	8:H:12:ILE:HG22	1.85	0.59
2:P:119:GLN:NE2	3:Q:79:ASP:OD1	2.35	0.59

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:a:122:LEU:HG	13:a:137:LEU:HD23	1.85	0.59
15:c:890:LEU:HD21	15:c:974:LEU:HD12	1.86	0.58
2:P:90:LEU:HG	2:P:114:LEU:HD13	1.84	0.58
15:c:163:ASN:O	15:c:1089:THR:HG23	2.02	0.58
13:M:46:ASN:OD1	13:M:48:SER:N	2.37	0.58
5:E:167:SER:O	5:E:170:THR:OG1	2.17	0.57
13:M:136:SER:OG	13:M:147:GLN:OE1	2.21	0.57
15:c:961:LYS:O	15:c:964:HIS:N	2.37	0.57
15:c:1055:ALA:O	15:c:1059:SER:OG	2.22	0.57
3:Q:31:THR:OG1	3:Q:163:ARG:O	2.13	0.57
14:b:139:VAL:HG23	14:b:155:PHE:HZ	1.68	0.57
9:I:193:LYS:NZ	9:I:195:THR:OG1	2.38	0.57
3:C:215:GLN:NE2	3:C:216:SER:O	2.37	0.57
7:U:43:ARG:NH1	7:U:163:PHE:O	2.38	0.56
15:c:631:CYS:CB	15:c:683:ILE:HD11	2.35	0.56
6:F:159:GLY:H	7:G:65:THR:HG21	1.71	0.56
14:b:139:VAL:HG23	14:b:155:PHE:CZ	2.41	0.56
3:Q:116:GLN:O	3:Q:119:THR:OG1	2.21	0.56
4:D:3:LEU:HD23	15:c:345:ASN:HB3	1.87	0.56
5:E:35:THR:HG21	5:E:73:SER:CB	2.36	0.56
13:M:144:TYR:HB3	8:V:132:LEU:HD12	1.88	0.56
15:c:701:ILE:O	15:c:705:THR:HG22	2.05	0.56
15:c:1050:VAL:HA	15:c:1146:LEU:HD12	1.88	0.56
3:Q:94:HIS:ND1	3:Q:102:VAL:HG22	2.20	0.56
13:a:136:SER:O	13:a:137:LEU:HD22	2.06	0.56
6:F:69:VAL:HG23	6:F:73:VAL:HG13	1.87	0.56
13:a:90:SER:O	13:a:93:THR:OG1	2.21	0.55
8:H:181:ASN:OD1	8:H:182:LYS:N	2.40	0.55
7:U:51:VAL:HG12	7:U:217:VAL:HG22	1.89	0.55
15:c:280:PHE:CZ	15:c:315:ILE:HD12	2.42	0.55
15:c:915:TRP:CE3	15:c:946:LEU:HD23	2.42	0.55
5:E:157:ARG:NH2	5:E:176:MET:SD	2.81	0.54
10:J:78:THR:O	10:J:82:ASN:ND2	2.37	0.54
6:F:215:TRP:CZ3	6:F:227:VAL:HG13	2.43	0.54
8:H:41:ILE:CD1	8:H:76:VAL:HG22	2.37	0.54
15:c:68:LEU:HD11	15:c:1096:ILE:HG13	1.90	0.54
5:E:34:ALA:O	5:E:62:LYS:NZ	2.41	0.54
9:W:148:MET:HE2	9:W:148:MET:N	2.23	0.54
15:c:425:ALA:CB	15:c:463:VAL:HG23	2.38	0.54
6:F:87:LEU:HD13	6:F:135:PHE:CE1	2.43	0.53
6:T:51:LYS:O	6:T:210:GLU:N	2.41	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:X:44:LEU:HD11	10:X:102:LEU:HD12	1.90	0.53
6:F:189:ILE:O	6:F:193:VAL:HG23	2.07	0.53
4:D:121:LEU:HD22	5:E:79:ALA:HB1	1.90	0.53
5:E:157:ARG:NH2	6:F:56:LYS:O	2.41	0.53
8:V:18:THR:OG1	8:V:31:CYS:N	2.41	0.53
11:Y:160:ILE:HG21	11:Y:174:VAL:HG23	1.90	0.53
13:M:41:ARG:NH1	13:M:53:ALA:O	2.42	0.53
14:b:19:ARG:NH2	14:b:168:GLY:O	2.41	0.52
13:a:9:THR:O	13:a:41:ARG:NH2	2.41	0.52
12:L:62:LEU:O	12:L:65:THR:OG1	2.25	0.52
10:X:139:THR:HG23	10:X:163:CYS:HB3	1.92	0.52
5:S:63:ILE:HG21	5:S:223:ILE:HD13	1.91	0.52
7:G:49:VAL:HG12	7:G:219:VAL:HG12	1.92	0.52
3:Q:184:ASP:O	3:Q:187:THR:OG1	2.24	0.52
9:W:11:MET:HE1	9:W:149:CYS:SG	2.50	0.51
4:D:98:ASN:OD1	11:K:61:ARG:NH2	2.41	0.51
15:c:1299:ARG:NE	15:c:1307:GLN:OE1	2.43	0.51
15:c:1425:GLY:HA2	15:c:1467:VAL:HG12	1.93	0.51
8:V:19:ARG:NH2	8:V:167:LEU:O	2.44	0.51
14:b:129:GLY:O	14:b:132:SER:OG	2.28	0.51
6:F:69:VAL:CG2	6:F:73:VAL:HG13	2.41	0.51
3:Q:108:THR:HG22	3:Q:133:ILE:HD13	1.93	0.51
1:O:204:GLU:OE1	1:O:204:GLU:N	2.42	0.51
9:W:134:ASP:OD1	9:W:135:PHE:N	2.43	0.51
8:V:43:CYS:SG	8:V:98:LEU:HD12	2.51	0.50
12:L:143:ALA:HB1	9:W:144:GLN:OE1	2.11	0.50
12:L:148:LEU:HD23	12:L:178:VAL:HG22	1.92	0.50
14:N:3:ILE:HD12	14:N:99:ILE:HD12	1.94	0.50
15:c:1506:GLY:O	15:c:1510:THR:HG23	2.11	0.50
9:I:26:ARG:NH2	9:I:179:VAL:O	2.43	0.50
6:F:6:GLY:HA2	6:F:9:LEU:HD13	1.94	0.50
12:L:49:LYS:O	12:L:198:VAL:HG11	2.10	0.50
6:F:152:ASP:OD1	6:F:156:VAL:HG12	2.11	0.50
1:O:118:GLN:O	1:O:121:THR:OG1	2.29	0.50
5:S:63:ILE:C	5:S:64:LEU:HD22	2.37	0.50
4:D:3:LEU:O	15:c:345:ASN:ND2	2.45	0.50
11:Y:164:THR:HG22	11:Y:171:GLY:N	2.27	0.50
5:E:152:ASN:OD1	5:E:153:TYR:N	2.45	0.50
14:N:59:VAL:HG11	14:N:83:PHE:CZ	2.47	0.50
15:c:169:VAL:HG22	15:c:173:LEU:HD23	1.94	0.50
15:c:286:SER:O	15:c:352:LYS:NZ	2.42	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:34:SER:CB	6:F:52:LEU:HD23	2.42	0.49
9:I:164:GLU:O	9:I:167:SER:OG	2.30	0.49
15:c:99:ILE:HD11	15:c:126:LEU:HB3	1.94	0.49
15:c:463:VAL:HG22	15:c:463:VAL:O	2.12	0.49
15:c:1425:GLY:CA	15:c:1467:VAL:HG12	2.42	0.49
8:V:146:MET:HE1	8:V:154:LEU:HD22	1.94	0.49
12:Z:12:ILE:HD12	12:Z:109:ILE:HD12	1.94	0.49
5:S:88:MET:HE3	5:S:112:ILE:HD11	1.94	0.49
6:T:215:TRP:CE3	6:T:227:VAL:HG22	2.47	0.49
11:Y:34:VAL:HG11	11:Y:177:TYR:CE1	2.47	0.49
12:Z:27:THR:OG1	12:Z:192:ALA:HB3	2.12	0.49
15:c:589:THR:O	15:c:592:THR:OG1	2.27	0.49
6:F:186:CYS:O	6:F:190:VAL:HG23	2.12	0.49
9:W:203:MET:SD	9:W:203:MET:N	2.85	0.49
11:K:41:LEU:O	11:K:42:LEU:HD22	2.13	0.49
13:M:144:TYR:CB	8:V:132:LEU:HD12	2.43	0.49
14:N:55:VAL:O	14:N:59:VAL:HG12	2.13	0.49
15:c:1050:VAL:HG12	15:c:1146:LEU:HB2	1.95	0.48
1:O:67:ILE:HD11	1:O:73:LEU:CD1	2.43	0.48
7:U:238:HIS:O	7:U:242:LEU:HD23	2.14	0.48
14:b:7:GLN:NE2	14:b:8:PHE:O	2.46	0.48
15:c:66:GLN:HA	15:c:1096:ILE:HD12	1.95	0.48
13:M:9:THR:OG1	13:M:25:ASP:OD2	2.28	0.48
15:c:1486:LEU:HD23	15:c:1486:LEU:O	2.12	0.48
7:U:103:TYR:O	8:V:81:ARG:NH2	2.47	0.48
2:P:82:ASP:O	2:P:86:LEU:HD23	2.14	0.48
12:Z:198:VAL:HG22	12:Z:203:ILE:HD12	1.96	0.48
9:I:124:ASP:OD1	9:I:128:CYS:N	2.44	0.48
1:O:211:ILE:HD11	1:O:218:ARG:NH2	2.29	0.48
13:a:136:SER:HB2	13:a:154:LEU:HD11	1.96	0.48
15:c:95:HIS:ND1	15:c:133:LEU:HD21	2.29	0.47
15:c:1019:VAL:HG23	15:c:1020:THR:H	1.79	0.47
6:F:36:ALA:HB1	6:F:49:VAL:HG12	1.96	0.47
6:F:120:HIS:NE2	7:G:86:ASP:OD1	2.48	0.47
12:L:27:THR:OG1	12:L:192:ALA:HB3	2.13	0.47
15:c:1388:ARG:NH1	15:c:1430:THR:O	2.43	0.47
9:I:6:ASN:O	9:I:26:ARG:NH2	2.46	0.47
1:O:221:THR:HG23	1:O:224:GLU:H	1.78	0.47
15:c:590:PHE:O	15:c:594:LEU:HD23	2.14	0.47
15:c:1161:TRP:O	15:c:1165:HIS:ND1	2.47	0.47
2:P:54:LYS:O	2:P:55:LEU:HD22	2.14	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:c:156:LYS:O	15:c:159:HIS:ND1	2.47	0.47
7:G:144:ASP:O	7:G:148:GLY:N	2.44	0.47
9:W:11:MET:HE2	9:W:166:ILE:CD1	2.44	0.47
15:c:437:LEU:HA	15:c:440:THR:HG22	1.97	0.47
15:c:276:VAL:HG22	15:c:318:MET:CE	2.44	0.47
6:F:213:LEU:HB3	6:F:227:VAL:HG21	1.96	0.47
13:a:6:VAL:HG11	14:b:119:MET:SD	2.55	0.47
1:A:21:ILE:HD11	1:A:121:THR:OG1	2.14	0.46
8:V:219:LEU:HD13	9:W:47:ARG:HE	1.79	0.46
15:c:1019:VAL:HG23	15:c:1020:THR:N	2.29	0.46
11:K:153:TYR:CE2	11:K:187:VAL:HG21	2.50	0.46
1:O:64:VAL:HG22	1:O:74:VAL:HG22	1.98	0.46
3:Q:91:CYS:HA	3:Q:102:VAL:HG21	1.97	0.46
5:S:211:SER:HB3	5:S:223:ILE:HD11	1.98	0.46
8:V:59:ILE:O	8:V:63:LEU:HD23	2.15	0.46
6:F:36:ALA:CB	6:F:49:VAL:HG12	2.46	0.46
15:c:398:GLN:OE1	15:c:431:LEU:HD12	2.16	0.46
15:c:1019:VAL:O	15:c:1020:THR:HG23	2.15	0.46
6:F:215:TRP:CE3	6:F:227:VAL:HG22	2.50	0.46
6:T:53:VAL:HG12	6:T:208:ALA:O	2.16	0.46
14:N:156:THR:O	14:N:160:LEU:HD23	2.16	0.46
15:c:389:THR:HG23	15:c:392:ASP:H	1.80	0.46
5:E:178:GLU:OE1	5:E:178:GLU:N	2.49	0.46
5:E:80:ASP:O	5:E:84:LEU:HD23	2.16	0.46
6:F:124:LEU:HD23	6:F:124:LEU:H	1.81	0.46
4:R:79:SER:HB3	4:R:170:ILE:HD12	1.97	0.46
15:c:871:VAL:HG22	15:c:875:LEU:HD23	1.98	0.46
1:O:110:VAL:HG22	1:O:135:ILE:CD1	2.46	0.45
12:Z:68:ILE:O	12:Z:72:LEU:HD23	2.16	0.45
15:c:614:THR:HG23	15:c:649:HIS:NE2	2.32	0.45
11:K:166:ARG:NE	10:X:144:ASP:OD2	2.49	0.45
15:c:427:MET:O	15:c:428:ARG:NH1	2.49	0.45
12:L:211:ARG:NH1	12:L:213:ASP:OD2	2.50	0.45
1:O:211:ILE:HD11	1:O:218:ARG:CZ	2.46	0.45
15:c:505:GLN:O	15:c:509:THR:HG23	2.16	0.45
8:H:51:ASP:O	8:H:55:THR:HG22	2.16	0.45
10:X:108:ASP:O	10:X:112:GLY:N	2.48	0.45
15:c:705:THR:HG23	15:c:717:SER:OG	2.16	0.45
1:A:110:VAL:HG22	1:A:135:ILE:CD1	2.44	0.45
4:R:70:ILE:HD11	4:R:76:CYS:SG	2.57	0.45
15:c:673:LEU:O	15:c:677:LEU:HD23	2.16	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:19:GLY:O	15:c:1842:TYR:OH	2.34	0.45
3:Q:225:ILE:O	3:Q:229:VAL:HG13	2.17	0.45
1:A:114:ALA:HB1	1:A:152:GLY:O	2.17	0.45
2:B:76:VAL:HG22	2:B:134:LEU:HD22	1.98	0.45
8:H:19:ARG:HE	8:H:170:GLY:HA3	1.82	0.45
2:P:109:GLN:NE2	10:X:73:TYR:OH	2.50	0.45
5:S:168:ALA:O	5:S:172:LEU:HD23	2.17	0.45
9:W:124:ASP:OD1	9:W:128:CYS:N	2.42	0.45
15:c:334:PHE:O	15:c:338:THR:HG23	2.17	0.45
15:c:357:LEU:HD11	15:c:404:VAL:CG2	2.47	0.45
15:c:1577:ILE:O	15:c:1581:LEU:HD23	2.17	0.45
15:c:76:THR:HG23	15:c:122:LEU:HD22	1.99	0.45
6:F:70:ASP:HB3	6:F:73:VAL:HG12	1.99	0.44
4:R:96:THR:HA	4:R:107:MET:HE2	1.99	0.44
8:V:110:LEU:HD21	8:V:125:VAL:HG22	2.00	0.44
13:a:136:SER:C	13:a:137:LEU:HD22	2.42	0.44
13:a:159:VAL:C	13:a:160:LEU:HD12	2.42	0.44
8:H:143:ARG:HG2	8:H:146:MET:HE3	1.99	0.44
13:M:150:LEU:O	13:M:154:LEU:HD23	2.17	0.44
14:N:127:ILE:HD11	14:N:136:TYR:CD1	2.53	0.44
1:O:53:SER:O	1:O:55:LEU:N	2.51	0.44
1:O:110:VAL:HG21	1:O:146:PHE:CD2	2.52	0.44
12:Z:205:GLU:N	12:Z:205:GLU:OE1	2.50	0.44
15:c:226:LEU:H	15:c:226:LEU:HD23	1.82	0.44
6:F:159:GLY:N	7:G:65:THR:HG21	2.33	0.44
2:P:206:LEU:HD23	2:P:207:SER:N	2.33	0.44
15:c:172:ILE:HD12	15:c:172:ILE:H	1.82	0.44
15:c:476:GLU:O	15:c:479:THR:OG1	2.33	0.44
6:T:113:ASP:OD2	7:U:88:ARG:NH2	2.46	0.44
12:Z:14:ALA:CB	12:Z:109:ILE:HG21	2.48	0.44
14:b:14:LEU:HD23	14:b:44:CYS:SG	2.58	0.44
15:c:234:TRP:CE3	15:c:238:LEU:HD12	2.52	0.44
15:c:461:ILE:HG23	15:c:509:THR:HG21	2.00	0.44
6:F:39:ILE:HD12	6:F:193:VAL:HG22	2.00	0.44
13:M:51:LEU:HD12	13:M:52:GLY:N	2.32	0.44
5:E:35:THR:OG1	5:E:62:LYS:NZ	2.35	0.43
4:R:45:GLY:CA	4:R:191:LEU:HD21	2.47	0.43
15:c:152:ILE:HG23	15:c:153:LEU:HD22	2.00	0.43
12:Z:209:SER:C	12:Z:210:LEU:HD12	2.42	0.43
11:K:133:VAL:HG21	10:X:137:PHE:HB3	2.00	0.43
7:U:44:GLY:N	7:U:47:CYS:O	2.46	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:c:456:THR:O	15:c:460:VAL:HG23	2.18	0.43
15:c:1500:ASN:OD1	15:c:1501:VAL:N	2.51	0.43
11:K:38:ASN:HB2	11:K:39:PRO:HD2	2.00	0.43
12:L:16:ALA:HB2	12:L:121:VAL:HG23	2.00	0.43
8:V:55:THR:HG23	8:V:86:MET:CE	2.49	0.43
10:X:78:THR:HG22	10:X:116:TYR:OH	2.18	0.43
14:N:174:ILE:HG22	14:N:176:LEU:CD2	2.48	0.43
7:U:41:ALA:HB2	7:U:50:ILE:HD13	2.01	0.43
15:c:1646:LEU:HD23	15:c:1665:LEU:HD12	2.00	0.43
2:B:140:ASP:O	2:B:144:GLY:N	2.46	0.43
12:L:28:ARG:NH2	12:L:212:LYS:O	2.52	0.43
10:X:84:THR:HG23	10:X:118:MET:HE1	2.01	0.43
15:c:839:LEU:O	15:c:840:VAL:HG13	2.19	0.43
15:c:864:HIS:O	15:c:868:ILE:HD12	2.19	0.43
11:K:153:TYR:CZ	11:K:187:VAL:HG21	2.54	0.43
10:X:117:TYR:O	10:X:124:LEU:HD12	2.19	0.43
15:c:721:LEU:HD11	15:c:783:LEU:HD21	2.01	0.43
1:A:187:ILE:HD13	1:A:228:TYR:CZ	2.54	0.43
2:B:72:MET:HE2	2:B:110:LEU:HD23	2.00	0.43
12:L:148:LEU:HB2	9:W:148:MET:HE1	2.01	0.43
15:c:1070:PRO:HA	15:c:1073:VAL:HG12	2.00	0.43
2:P:172:VAL:HA	2:P:175:LEU:HD12	2.00	0.42
4:R:210:LEU:HD23	4:R:211:ASN:N	2.33	0.42
8:H:97:ALA:HB1	8:H:127:MET:CE	2.49	0.42
4:R:45:GLY:C	4:R:191:LEU:HD21	2.44	0.42
11:Y:50:ALA:HB2	12:Z:127:VAL:HG13	2.01	0.42
15:c:1639:VAL:HA	15:c:1642:VAL:HG12	2.01	0.42
12:L:28:ARG:NE	12:L:191:ASP:OD2	2.47	0.42
3:Q:134:VAL:HG12	3:Q:144:LEU:HA	2.02	0.42
6:F:215:TRP:HZ3	6:F:227:VAL:HG13	1.83	0.42
7:G:72:ILE:HD11	7:G:78:CYS:SG	2.59	0.42
8:H:124:TYR:HE1	8:H:135:MET:HE3	1.84	0.42
8:V:97:ALA:C	8:V:98:LEU:HD22	2.43	0.42
5:E:5:GLN:HG3	6:F:9:LEU:HD11	2.01	0.42
4:R:79:SER:CB	4:R:170:ILE:HD12	2.50	0.42
15:c:554:CYS:SG	15:c:555:PHE:N	2.93	0.42
1:O:73:LEU:HD12	1:O:86:VAL:HG22	2.01	0.42
14:b:19:ARG:NH1	14:b:170:SER:O	2.53	0.42
15:c:1754:ALA:O	15:c:1758:LYS:NZ	2.48	0.42
11:K:161:TYR:O	11:K:164:THR:OG1	2.31	0.42
4:R:37:ALA:HB3	4:R:170:ILE:HD11	2.01	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:c:1027:ALA:O	15:c:1031:LEU:HD23	2.20	0.42
6:T:33:SER:OG	6:T:34:SER:N	2.52	0.42
15:c:460:VAL:HA	15:c:463:VAL:HG12	2.02	0.42
15:c:1285:VAL:HG12	15:c:1285:VAL:O	2.20	0.42
2:P:84:ASN:O	2:P:87:THR:OG1	2.34	0.42
2:P:86:LEU:CD1	2:P:114:LEU:HD11	2.45	0.42
13:a:72:ILE:O	13:a:76:LEU:HD13	2.20	0.42
15:c:1581:LEU:HD12	15:c:1629:MET:HE2	2.02	0.42
15:c:105:LEU:HD22	15:c:119:PHE:CD2	2.55	0.42
15:c:212:THR:HG22	15:c:216:ILE:HD12	2.02	0.42
15:c:1434:SER:O	15:c:1435:ARG:NH1	2.53	0.42
10:J:148:THR:H	10:J:151:ILE:HD11	1.84	0.41
8:V:219:LEU:HD13	9:W:47:ARG:NE	2.35	0.41
14:b:114:VAL:HG23	14:b:114:VAL:O	2.20	0.41
13:a:59:ASP:OD1	14:b:88:TYR:OH	2.32	0.41
1:O:67:ILE:HD11	1:O:73:LEU:HD12	2.02	0.41
6:T:49:VAL:HG11	6:T:65:ARG:HB2	2.02	0.41
10:X:44:LEU:CD1	10:X:102:LEU:HD12	2.50	0.41
5:E:35:THR:HG23	5:E:48:ALA:HB2	2.01	0.41
11:K:19:ARG:HE	11:K:29:GLN:HE22	1.68	0.41
6:T:215:TRP:HE3	6:T:227:VAL:HG22	1.85	0.41
8:V:1:THR:HG23	8:V:33:LYS:NZ	2.35	0.41
15:c:79:LEU:CD2	15:c:122:LEU:HD21	2.44	0.41
15:c:1763:VAL:HG21	15:c:1798:ILE:HG23	2.02	0.41
10:J:121:LEU:O	10:J:122:ALA:HB3	2.21	0.41
1:A:39:ALA:HB3	1:A:42:GLY:O	2.21	0.41
5:E:109:VAL:HG12	5:E:134:ILE:HD13	2.03	0.41
8:V:96:ALA:HB1	8:V:98:LEU:HD21	2.02	0.41
11:Y:18:SER:O	11:Y:31:VAL:HG12	2.21	0.41
11:Y:41:LEU:HD13	11:Y:103:GLY:HA3	2.03	0.41
15:c:145:LEU:HD12	15:c:177:VAL:HG22	2.02	0.41
15:c:206:THR:HG21	15:c:1273:HIS:CG	2.55	0.41
10:X:88:LEU:HG	10:X:122:ALA:HB2	2.01	0.41
11:Y:138:VAL:HG11	11:Y:159:ALA:HA	2.02	0.41
15:c:35:ASN:HA	15:c:38:LEU:HD12	2.02	0.41
3:C:22:ALA:HB1	3:C:128:GLY:HA2	2.02	0.41
11:K:38:ASN:OD1	11:K:41:LEU:N	2.54	0.41
8:V:42:TYR:CE1	8:V:183:LEU:HD11	2.56	0.41
9:W:11:MET:HE2	9:W:166:ILE:HD11	2.02	0.41
15:c:169:VAL:HG13	15:c:170:GLU:N	2.35	0.41
5:E:38:LEU:HD23	5:E:45:VAL:HG23	2.03	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:187:ARG:HB3	8:H:188:PRO:HD3	2.02	0.41
9:I:47:ARG:NH2	9:I:191:LYS:O	2.53	0.41
2:P:69:ASN:OD1	2:P:71:ASP:N	2.47	0.41
8:V:143:ARG:H	8:V:146:MET:HE3	1.86	0.41
6:F:152:ASP:CG	6:F:156:VAL:HG12	2.46	0.41
9:I:77:GLU:O	9:I:79:ARG:N	2.53	0.41
12:L:114:ASP:OD1	12:L:118:LYS:N	2.54	0.41
13:M:54:SER:O	13:M:109:THR:N	2.49	0.41
11:Y:78:ALA:O	11:Y:82:LEU:HD13	2.21	0.41
5:S:212:ILE:O	5:S:223:ILE:HD12	2.20	0.40
5:E:164:ARG:O	5:E:198:THR:HG22	2.22	0.40
7:U:33:ASN:OD1	7:U:170:VAL:HG12	2.22	0.40
13:a:41:ARG:NH1	13:a:53:ALA:O	2.54	0.40
15:c:499:LYS:O	15:c:503:THR:HG23	2.20	0.40
3:C:43:LEU:HD11	3:C:72:ALA:HB2	2.03	0.40
4:D:120:ALA:HB1	4:D:125:PHE:CD2	2.57	0.40
9:W:184:VAL:HG13	9:W:199:LEU:HD12	2.03	0.40
13:a:9:THR:OG1	13:a:10:SER:N	2.54	0.40
13:a:107:TRP:CD1	13:a:127:MET:HE1	2.56	0.40
1:A:67:ILE:CD1	1:A:86:VAL:HG23	2.51	0.40
7:G:11:ARG:O	7:G:24:GLN:NE2	2.49	0.40
9:I:73:TYR:OH	9:I:79:ARG:NH2	2.55	0.40
8:V:139:GLU:OE1	14:b:29:ARG:NE	2.55	0.40

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	215/234 (92%)	214 (100%)	1 (0%)	0	100	100
1	O	228/234 (97%)	225 (99%)	2 (1%)	1 (0%)	30	64

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	224/261 (86%)	222 (99%)	2 (1%)	0	100	100
2	P	247/261 (95%)	241 (98%)	6 (2%)	0	100	100
3	C	221/248 (89%)	211 (96%)	10 (4%)	0	100	100
3	Q	235/248 (95%)	233 (99%)	2 (1%)	0	100	100
4	D	224/241 (93%)	222 (99%)	2 (1%)	0	100	100
4	R	233/241 (97%)	232 (100%)	1 (0%)	0	100	100
5	E	238/263 (90%)	233 (98%)	5 (2%)	0	100	100
5	S	235/263 (89%)	234 (100%)	1 (0%)	0	100	100
6	F	242/255 (95%)	237 (98%)	4 (2%)	1 (0%)	30	64
6	T	238/255 (93%)	238 (100%)	0	0	100	100
7	G	236/246 (96%)	232 (98%)	4 (2%)	0	100	100
7	U	242/246 (98%)	242 (100%)	0	0	100	100
8	H	218/277 (79%)	214 (98%)	4 (2%)	0	100	100
8	V	219/277 (79%)	215 (98%)	4 (2%)	0	100	100
9	I	202/205 (98%)	193 (96%)	9 (4%)	0	100	100
9	W	202/205 (98%)	194 (96%)	8 (4%)	0	100	100
10	J	194/201 (96%)	191 (98%)	3 (2%)	0	100	100
10	X	195/201 (97%)	191 (98%)	4 (2%)	0	100	100
11	K	199/263 (76%)	198 (100%)	1 (0%)	0	100	100
11	Y	198/263 (75%)	196 (99%)	2 (1%)	0	100	100
12	L	211/241 (88%)	209 (99%)	2 (1%)	0	100	100
12	Z	211/241 (88%)	209 (99%)	2 (1%)	0	100	100
13	M	214/264 (81%)	211 (99%)	3 (1%)	0	100	100
13	a	214/264 (81%)	212 (99%)	2 (1%)	0	100	100
14	N	200/239 (84%)	199 (100%)	1 (0%)	0	100	100
14	b	201/239 (84%)	201 (100%)	0	0	100	100
15	c	1793/1843 (97%)	1743 (97%)	48 (3%)	2 (0%)	48	80
All	All	7929/8719 (91%)	7792 (98%)	133 (2%)	4 (0%)	50	80

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	O	54	ILE

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
15	c	1019	VAL
15	c	1752	PRO
6	F	227	VAL

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	134/191 (70%)	134 (100%)	0	100	100
1	O	148/191 (78%)	148 (100%)	0	100	100
2	B	133/221 (60%)	133 (100%)	0	100	100
2	P	156/221 (71%)	156 (100%)	0	100	100
3	C	134/211 (64%)	134 (100%)	0	100	100
3	Q	146/211 (69%)	146 (100%)	0	100	100
4	D	145/203 (71%)	145 (100%)	0	100	100
4	R	147/203 (72%)	147 (100%)	0	100	100
5	E	175/224 (78%)	175 (100%)	0	100	100
5	S	158/224 (70%)	158 (100%)	0	100	100
6	F	163/212 (77%)	162 (99%)	1 (1%)	84	92
6	T	160/212 (76%)	160 (100%)	0	100	100
7	G	165/210 (79%)	165 (100%)	0	100	100
7	U	169/210 (80%)	169 (100%)	0	100	100
8	H	158/228 (69%)	158 (100%)	0	100	100
8	V	163/228 (72%)	163 (100%)	0	100	100
9	I	158/174 (91%)	158 (100%)	0	100	100
9	W	151/174 (87%)	151 (100%)	0	100	100
10	J	148/171 (86%)	148 (100%)	0	100	100
10	X	145/171 (85%)	145 (100%)	0	100	100
11	K	137/202 (68%)	137 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
11	Y	133/202 (66%)	133 (100%)	0	100 100
12	L	153/199 (77%)	153 (100%)	0	100 100
12	Z	153/199 (77%)	153 (100%)	0	100 100
13	M	160/215 (74%)	160 (100%)	0	100 100
13	a	156/215 (73%)	155 (99%)	1 (1%)	84 92
14	N	126/181 (70%)	126 (100%)	0	100 100
14	b	139/181 (77%)	139 (100%)	0	100 100
15	c	1291/1673 (77%)	1289 (100%)	2 (0%)	92 97
All	All	5504/7357 (75%)	5500 (100%)	4 (0%)	92 98

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	F	179	LEU
13	a	63	LEU
15	c	795	LEU
15	c	1020	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (61) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	51	GLN
1	A	62	HIS
1	A	101	GLN
1	A	168	ASN
2	B	102	GLN
2	B	240	HIS
3	C	94	HIS
3	C	154	HIS
4	D	99	HIS
4	D	174	HIS
5	E	166	GLN
6	F	63	ASN
6	F	110	HIS
9	I	172	ASN
10	J	63	ASN
10	J	168	GLN
10	J	186	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
11	K	85	ASN
11	K	191	ASN
12	L	58	HIS
12	L	151	ASN
13	M	108	ASN
13	M	188	GLN
2	P	109	GLN
2	P	146	GLN
2	P	166	ASN
2	P	240	HIS
3	Q	122	ASN
4	R	41	GLN
5	S	8	ASN
6	T	97	ASN
8	V	30	ASN
8	V	80	ASN
8	V	116	HIS
8	V	172	ASN
9	W	64	GLN
9	W	161	HIS
9	W	172	ASN
10	X	27	GLN
10	X	61	GLN
10	X	168	GLN
12	Z	152	GLN
13	a	213	HIS
14	b	77	HIS
14	b	110	GLN
15	c	29	GLN
15	c	596	GLN
15	c	707	HIS
15	c	723	HIS
15	c	877	ASN
15	c	878	HIS
15	c	984	ASN
15	c	1023	GLN
15	c	1142	ASN
15	c	1145	ASN
15	c	1156	GLN
15	c	1366	HIS
15	c	1474	GLN
15	c	1496	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
15	c	1521	ASN
15	c	1714	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is 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	$\#\|Z\| > 2$
16	IHP	c	1901	-	36,36,36	0.83	0	60,60,60	1.40	7 (11%)

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
16	IHP	c	1901	-	-	3/30/54/54	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	c	1901	IHP	C6-C5-C4	3.36	117.79	110.43
16	c	1901	IHP	C5-C6-C1	3.16	117.37	110.43
16	c	1901	IHP	O15-C5-C4	2.73	114.57	108.76
16	c	1901	IHP	P6-O16-C6	-2.46	116.86	123.43
16	c	1901	IHP	P5-O15-C5	2.35	129.72	123.43
16	c	1901	IHP	C6-C1-C2	2.28	115.42	110.43
16	c	1901	IHP	O16-C6-C5	2.24	113.52	108.76

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
16	c	1901	IHP	C4-C5-O15-P5
16	c	1901	IHP	C6-C5-O15-P5
16	c	1901	IHP	C1-O11-P1-O21

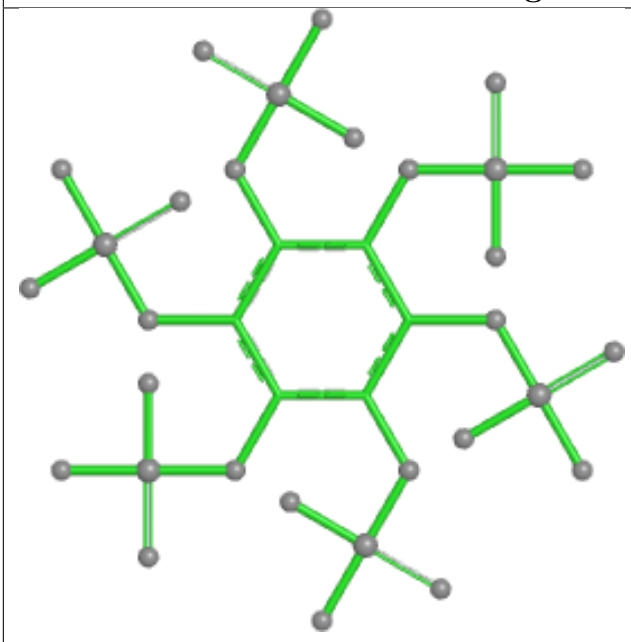
There are no ring outliers.

1 monomer is involved in 1 short contact:

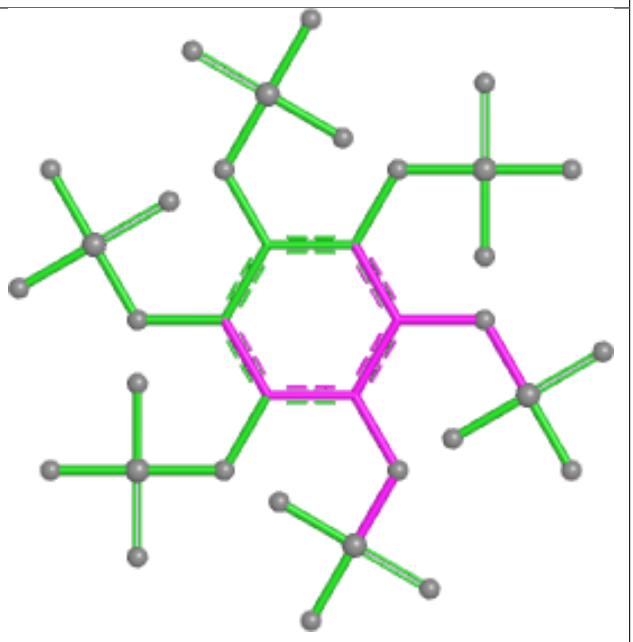
Mol	Chain	Res	Type	Clashes	Symm-Clashes
16	c	1901	IHP	1	0

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 then 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.

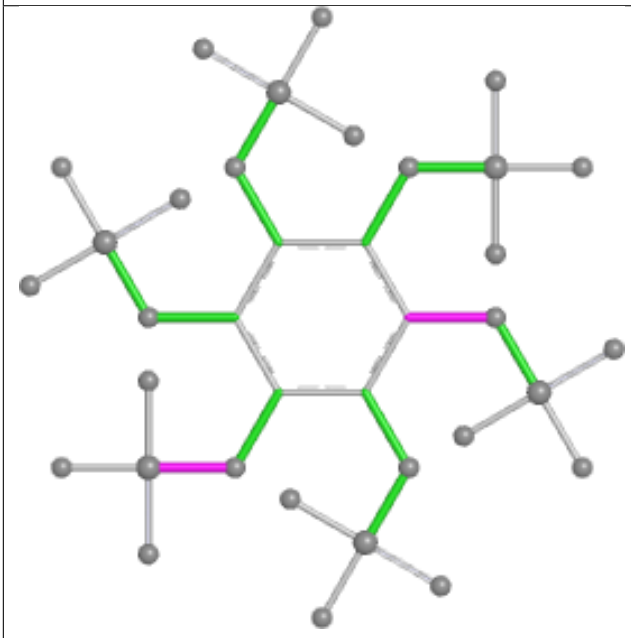
Ligand IHP c 1901



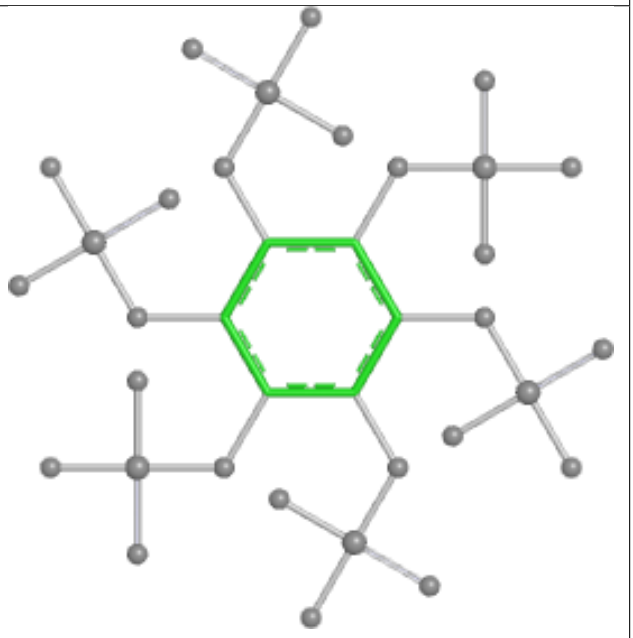
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
3	C	1
3	Q	1
4	D	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	116:GLN	C	117:ARG	N	3.61
1	Q	199:VAL	C	200:GLN	N	3.56
1	D	121:LEU	C	122:GLN	N	3.06

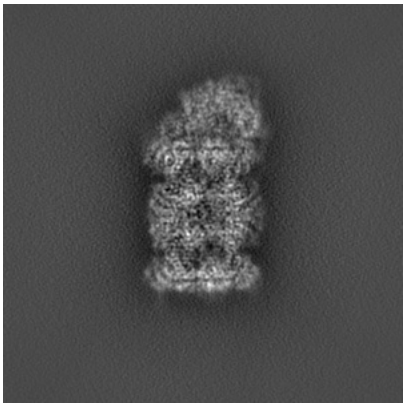
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-24278. These allow visual inspection of the internal detail of the map and identification of artifacts.

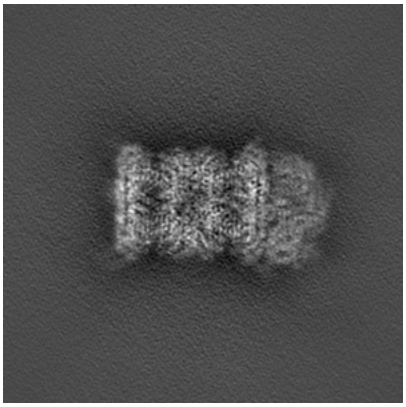
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

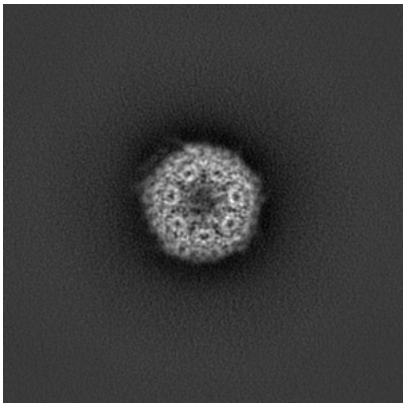
6.1.1 Primary map



X



Y

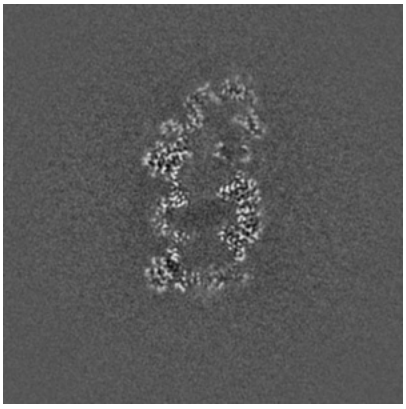


Z

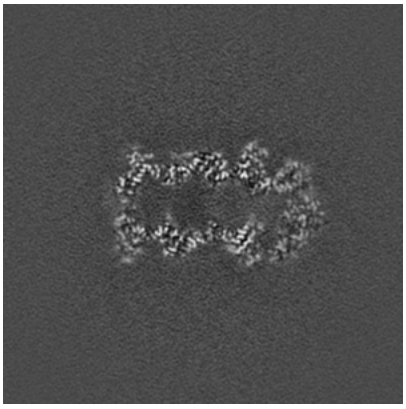
The images above show the map projected in three orthogonal directions.

6.2 Central slices

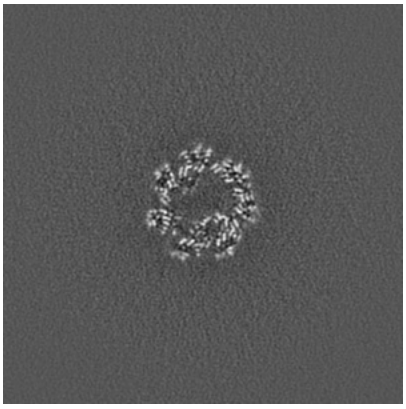
6.2.1 Primary map



X Index: 160



Y Index: 160

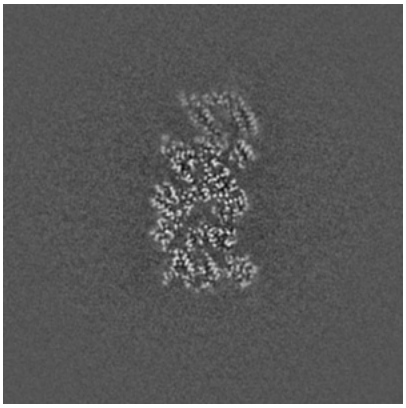


Z Index: 160

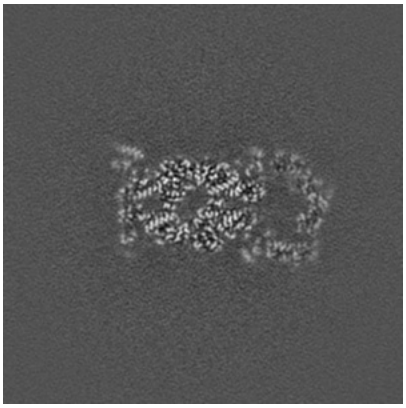
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

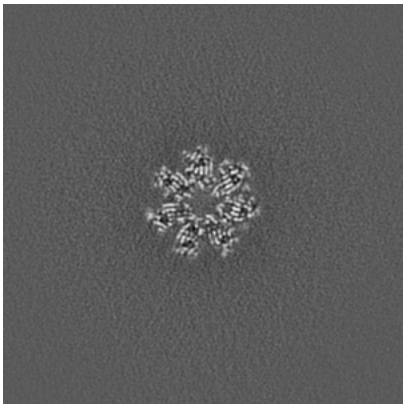
6.3.1 Primary map



X Index: 180



Y Index: 179

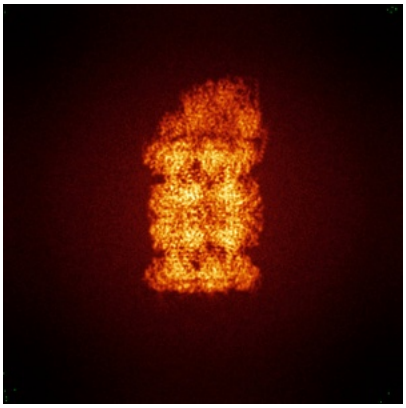


Z Index: 166

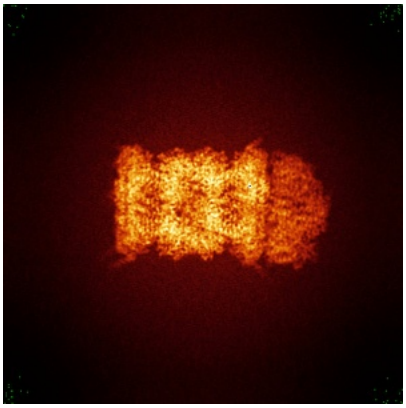
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

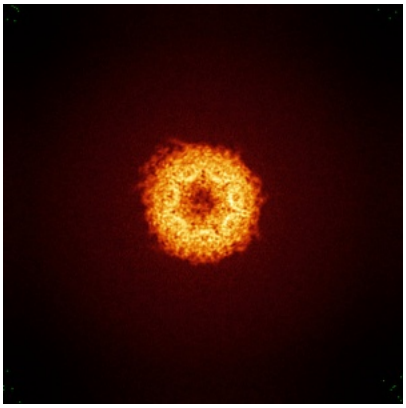
6.4.1 Primary map



X



Y

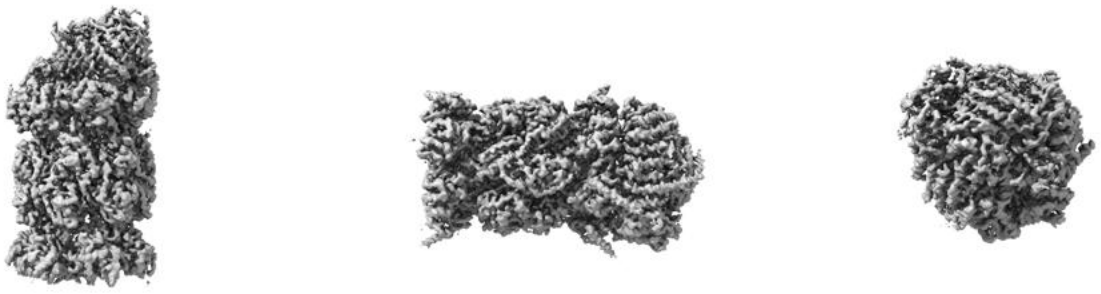


Z

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



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 4.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

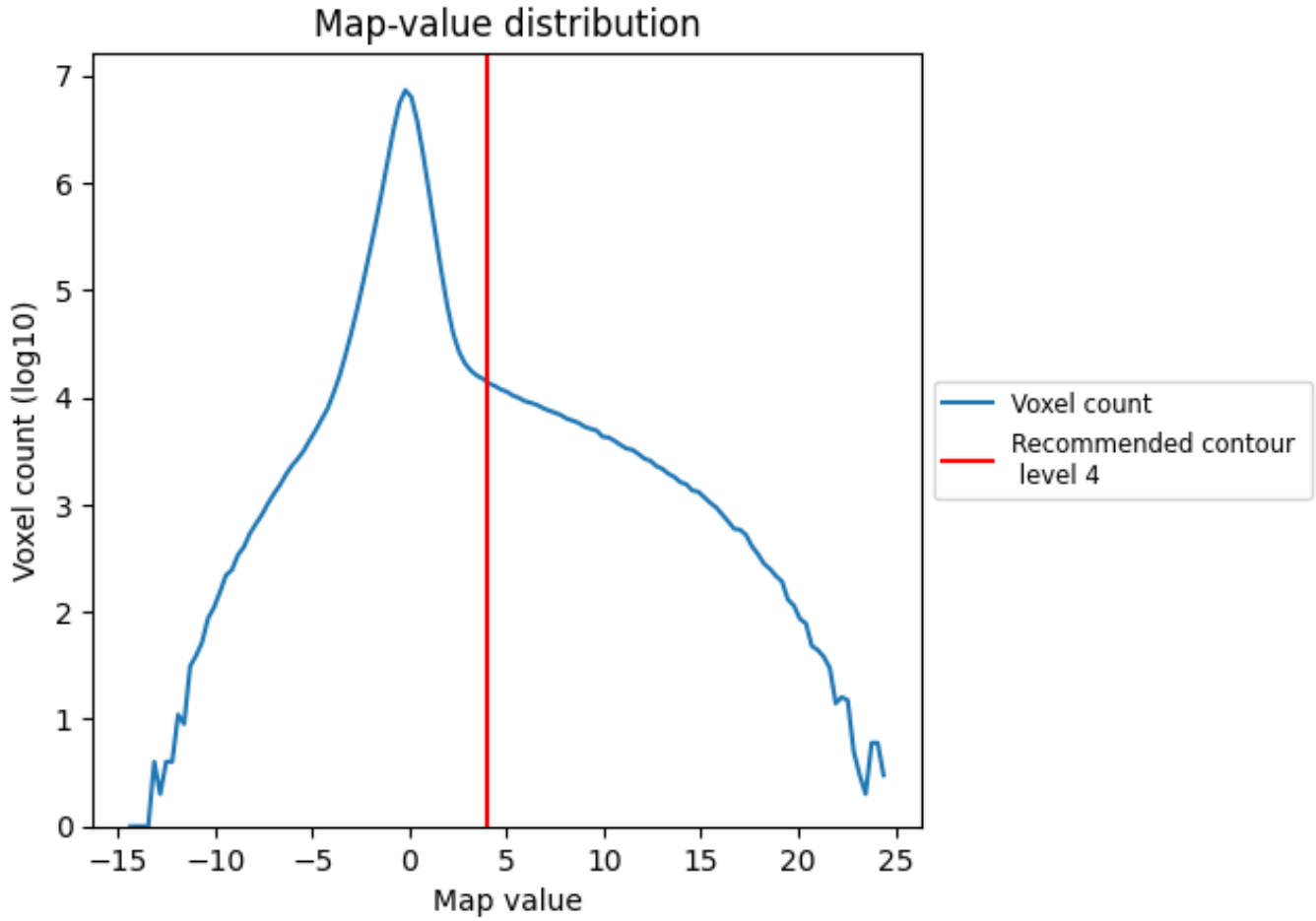
6.6 Mask visualisation (i)

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

7 Map analysis

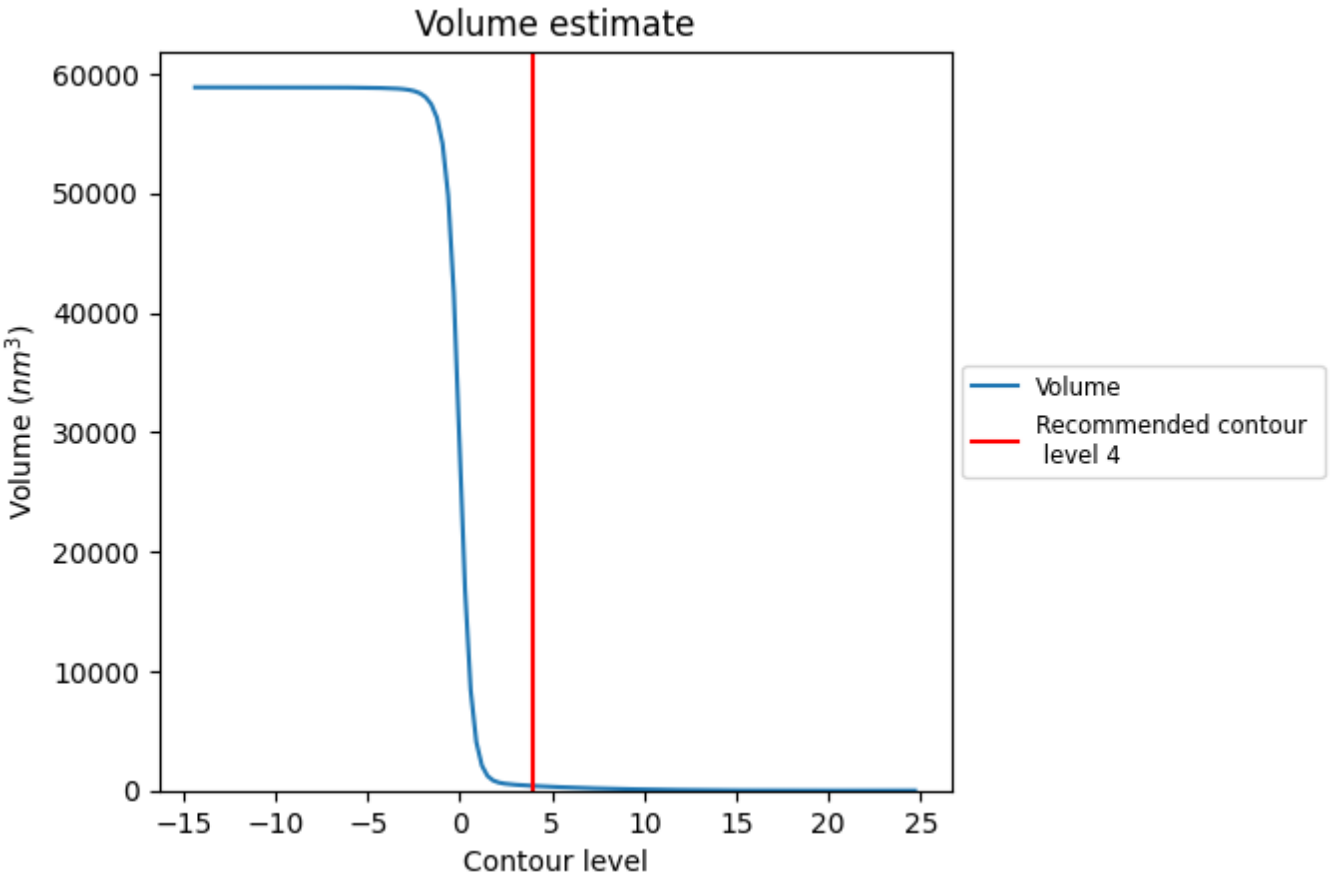
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

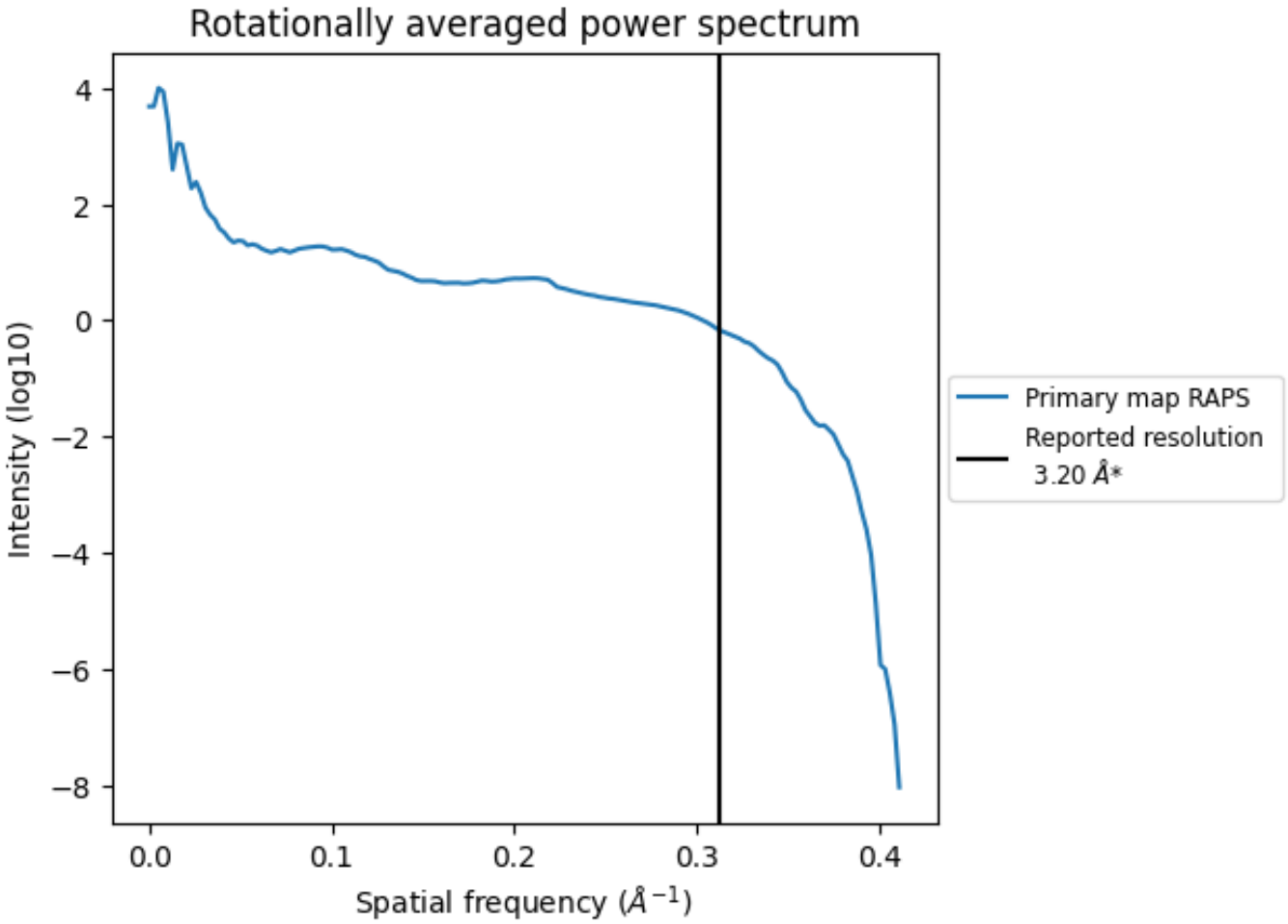
7.2 Volume estimate (i)



The volume at the recommended contour level is 390 nm^3; this corresponds to an approximate mass of 352 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)

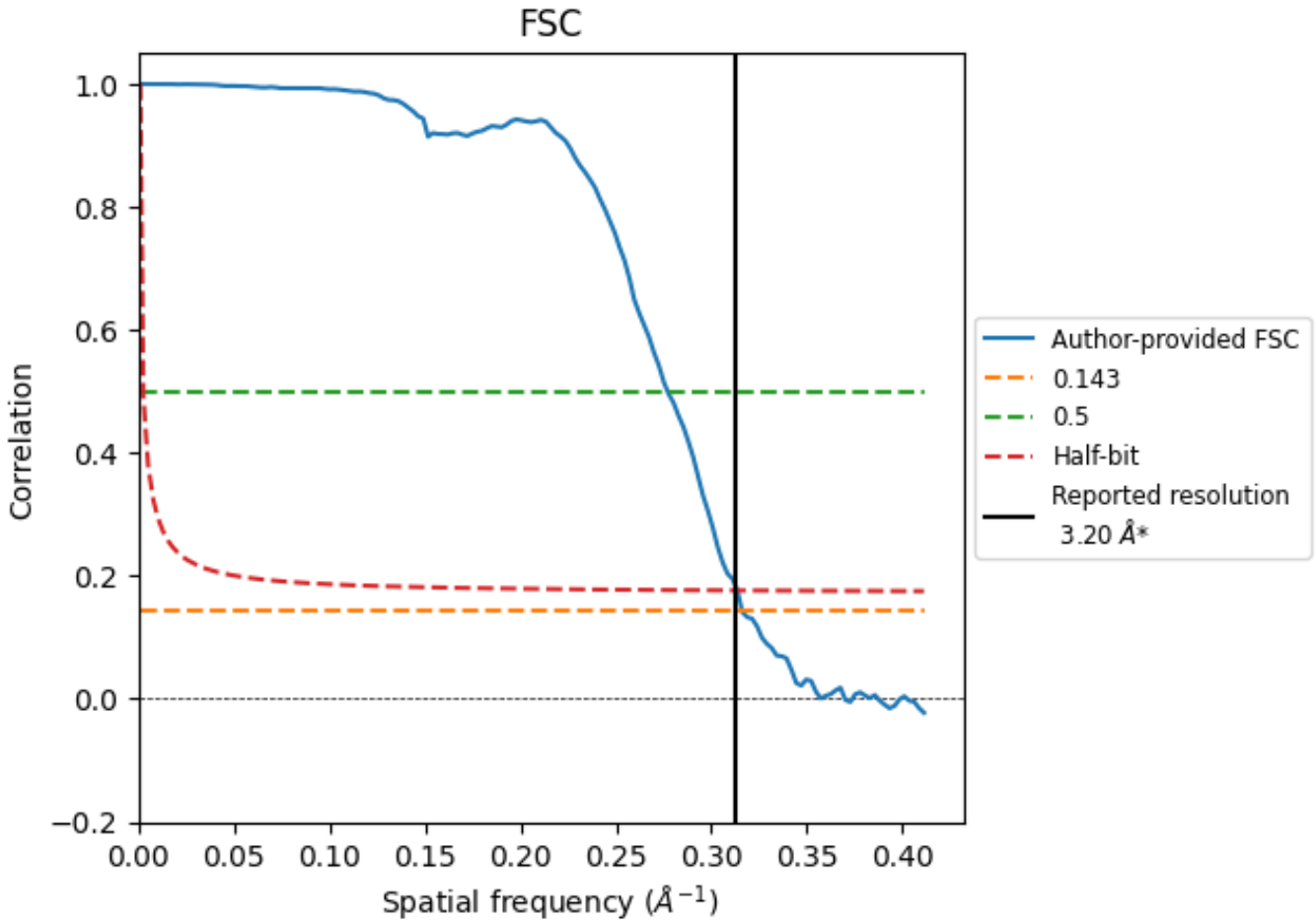


*Reported resolution corresponds to spatial frequency of 0.312 Å^{-1}

8 Fourier-Shell correlation

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.312 Å^{-1}

8.2 Resolution estimates (i)

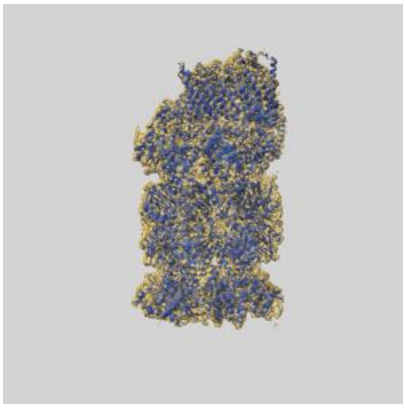
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	3.16	3.61	3.19
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

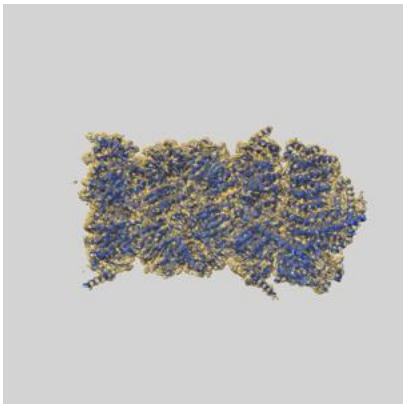
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-24278 and PDB model 7NAQ. Per-residue inclusion information can be found in section 3 on page 8.

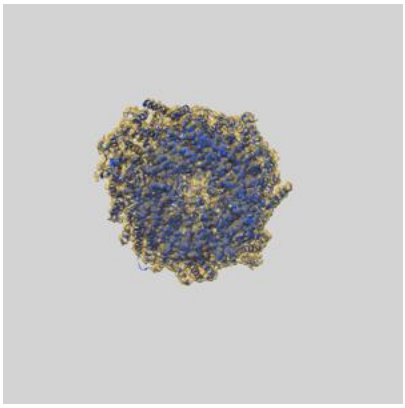
9.1 Map-model overlay



X



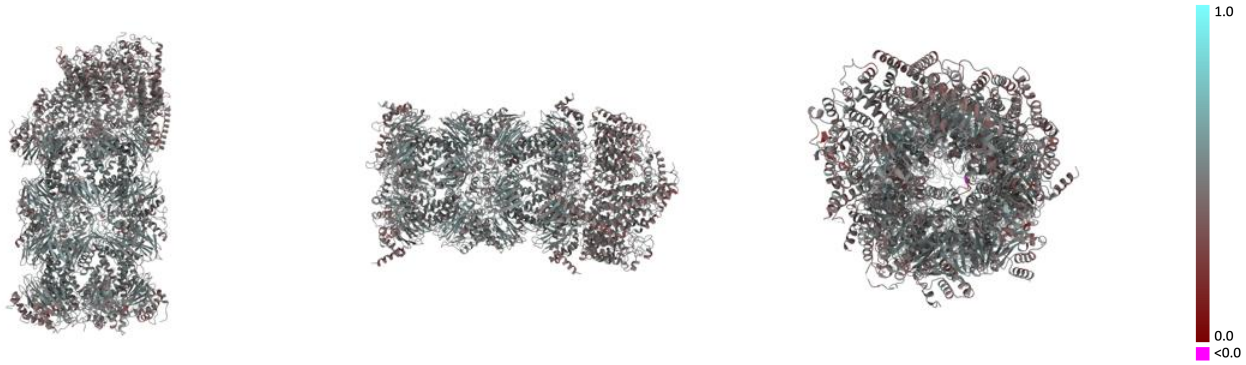
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

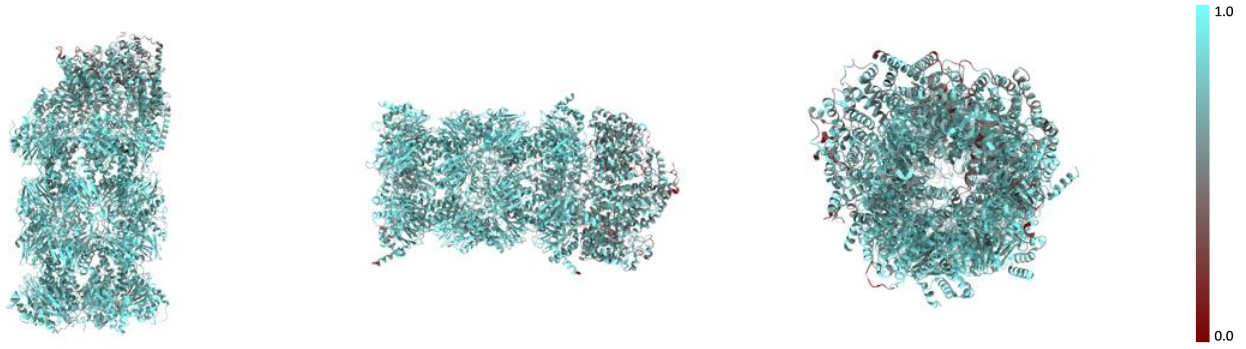
9.2 Q-score mapped to coordinate model



X Y Z

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

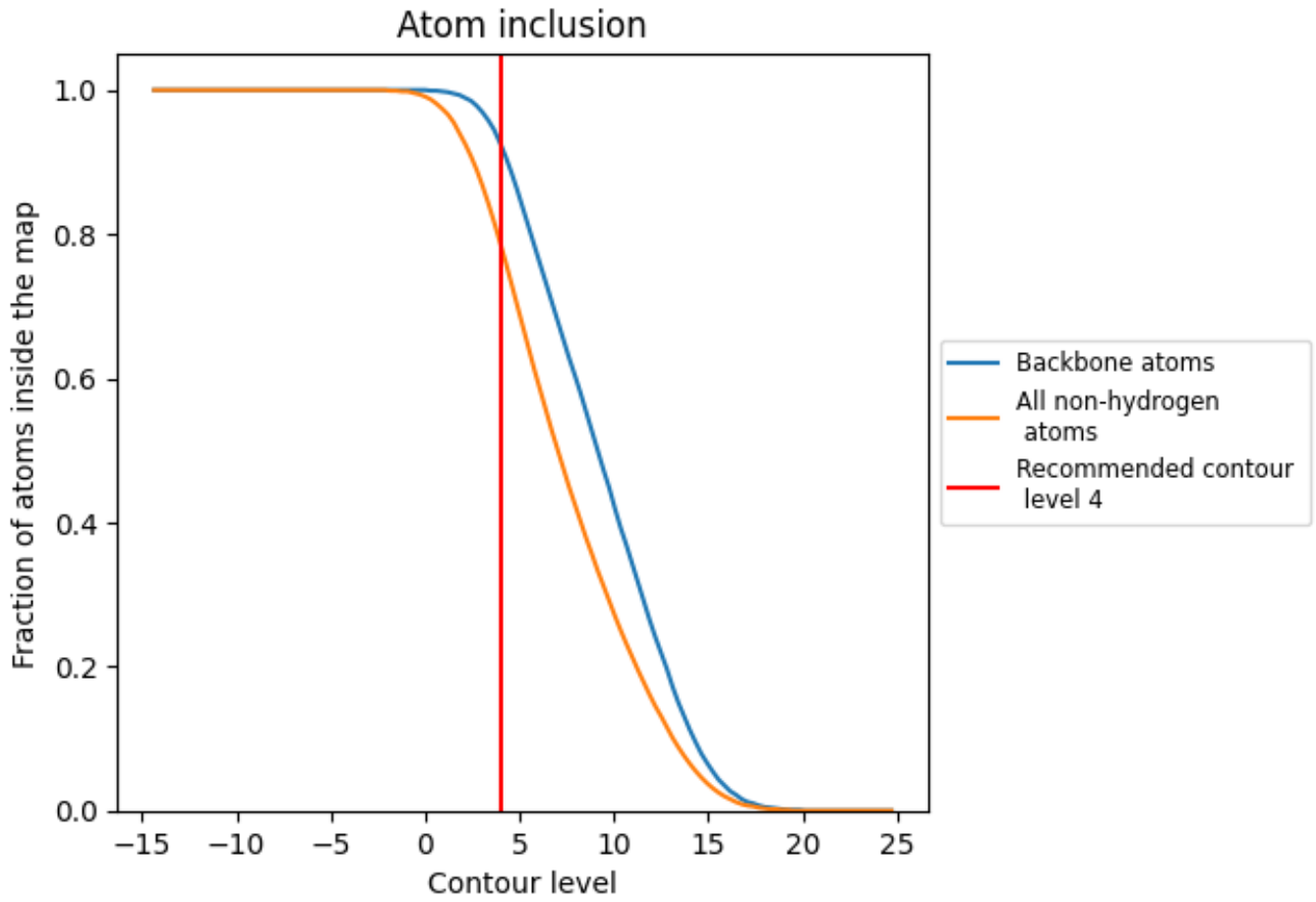
9.3 Atom inclusion mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (4).

9.4 Atom inclusion (i)



At the recommended contour level, 92% of all backbone atoms, 78% 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 (4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7850	0.4830
A	0.8440	0.4950
B	0.7830	0.4770
C	0.7780	0.4650
D	0.7990	0.4840
E	0.8200	0.4890
F	0.8360	0.4920
G	0.8230	0.4900
H	0.8320	0.4990
I	0.8130	0.5090
J	0.8370	0.5110
K	0.8580	0.5050
L	0.8170	0.5040
M	0.8570	0.5120
N	0.8850	0.5200
O	0.8160	0.4900
P	0.7940	0.4780
Q	0.7960	0.4720
R	0.7710	0.4770
S	0.8180	0.4820
T	0.8110	0.4770
U	0.7910	0.4810
V	0.8170	0.4920
W	0.8240	0.5100
X	0.8390	0.5090
Y	0.8490	0.5030
Z	0.8270	0.5050
a	0.8500	0.5120
b	0.8520	0.5150
c	0.6630	0.4460