wwPDB EM Validation Summary Report (i)

Nov 3, 2024 – 05:52 AM EST

PDB ID	:	6USF
EMDB ID	:	EMD-20863
Title	:	CryoEM structure of human alpha4beta2 nicotinic acetylcholine receptor with varenicline in complex with anti-BRIL synthetic antibody BAK5
Authors	:	Alvarez, F.J.D.; Mukherjee, S.; Han, S.; Ammirati, M.; Kossiakoff, A.A.
Deposited on	:	2019-10-26
Resolution	:	3.87 Å(reported)
Based on initial models	:	6CBV, 6CNJ

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

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

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

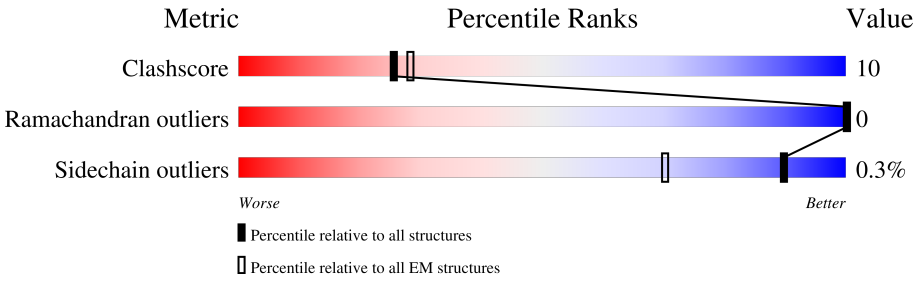
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.87 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	486	79% 16% • 5%
1	D	486	5% 78% 17% 5%
2	B	397	78% 12% • 10%
2	C	397	79% 10% 10%
2	E	397	76% 14% • 10%
3	H	229	58% 78% 18% •
3	K	229	66% 79% 21% •
4	L	215	64% 75% 22% •

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
4	M	215	73% 79% 20%
5	F	2	50% 50% 50%
5	G	2	50% 50% 50%
6	I	2	100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	NAG	F	1	-	-	X	-
5	NAG	G	1	-	-	X	-
7	NAG	C	401	-	-	X	-

2 Entry composition (i)

There are 9 unique types of molecules in this entry. The entry contains 23022 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 chimera of soluble cytochrome b562 (BRIL) and neuronal acetylcholine receptor subunit alpha-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	464	Total	C	N	O	S	0	0
			3764	2451	618	675	20		
1	D	464	Total	C	N	O	S	0	0
			3764	2451	618	675	20		

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	333	LYS	-	linker	UNP P43681
A	334	ARG	-	linker	UNP P43681
A	335	PRO	-	linker	UNP P43681
A	336	SER	-	linker	UNP P43681
A	337	VAL	-	linker	UNP P43681
A	338	VAL	-	linker	UNP P43681
A	339	ASP	-	linker	UNP P43681
A	340	THR	-	linker	UNP P43681
A	341	ASP	-	linker	UNP P43681
A	342	PHE	-	linker	UNP P43681
A	349	TRP	MET	conflict	UNP P0ABE7
A	444	ILE	-	linker	UNP P0ABE7
A	445	GLN	-	linker	UNP P0ABE7
A	?	LYS	-	linker	UNP P0ABE7
A	?	TYR	-	linker	UNP P0ABE7
D	333	LYS	-	linker	UNP P43681
D	334	ARG	-	linker	UNP P43681
D	335	PRO	-	linker	UNP P43681
D	336	SER	-	linker	UNP P43681
D	337	VAL	-	linker	UNP P43681
D	338	VAL	-	linker	UNP P43681
D	339	ASP	-	linker	UNP P43681
D	340	THR	-	linker	UNP P43681
D	341	ASP	-	linker	UNP P43681
D	342	PHE	-	linker	UNP P43681

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	349	TRP	MET	conflict	UNP P0ABE7
D	444	ILE	-	linker	UNP P0ABE7
D	445	GLN	-	linker	UNP P0ABE7
D	?	LYS	-	linker	UNP P0ABE7
D	?	TYR	-	linker	UNP P0ABE7

- Molecule 2 is a protein called Neuronal acetylcholine receptor subunit beta-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	358	Total	C	N	O	S	0	0
			2917	1915	461	522	19		
2	C	357	Total	C	N	O	S	0	0
			2908	1910	459	520	19		
2	E	357	Total	C	N	O	S	0	0
			2908	1910	459	520	19		

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	390	SER	-	expression tag	UNP P17787
B	391	ALA	-	expression tag	UNP P17787
B	392	TRP	-	expression tag	UNP P17787
B	393	SER	-	expression tag	UNP P17787
B	394	HIS	-	expression tag	UNP P17787
B	395	PRO	-	expression tag	UNP P17787
B	396	GLN	-	expression tag	UNP P17787
B	397	PHE	-	expression tag	UNP P17787
B	398	GLU	-	expression tag	UNP P17787
B	399	LYS	-	expression tag	UNP P17787
C	390	SER	-	expression tag	UNP P17787
C	391	ALA	-	expression tag	UNP P17787
C	392	TRP	-	expression tag	UNP P17787
C	393	SER	-	expression tag	UNP P17787
C	394	HIS	-	expression tag	UNP P17787
C	395	PRO	-	expression tag	UNP P17787
C	396	GLN	-	expression tag	UNP P17787
C	397	PHE	-	expression tag	UNP P17787
C	398	GLU	-	expression tag	UNP P17787
C	399	LYS	-	expression tag	UNP P17787
E	390	SER	-	expression tag	UNP P17787
E	391	ALA	-	expression tag	UNP P17787
E	392	TRP	-	expression tag	UNP P17787

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
E	393	SER	-	expression tag	UNP P17787
E	394	HIS	-	expression tag	UNP P17787
E	395	PRO	-	expression tag	UNP P17787
E	396	GLN	-	expression tag	UNP P17787
E	397	PHE	-	expression tag	UNP P17787
E	398	GLU	-	expression tag	UNP P17787
E	399	LYS	-	expression tag	UNP P17787

- Molecule 3 is a protein called Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	219	Total	C	N	O	S	1	0
			1655	1052	278	320	5		
3	K	227	Total	C	N	O	S	0	0
			1700	1078	285	332	5		

- Molecule 4 is a protein called Fab light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	L	209	Total	C	N	O	S	0	0
			1602	1006	265	326	5		
4	M	213	Total	C	N	O	S	1	0
			1627	1022	269	331	5		

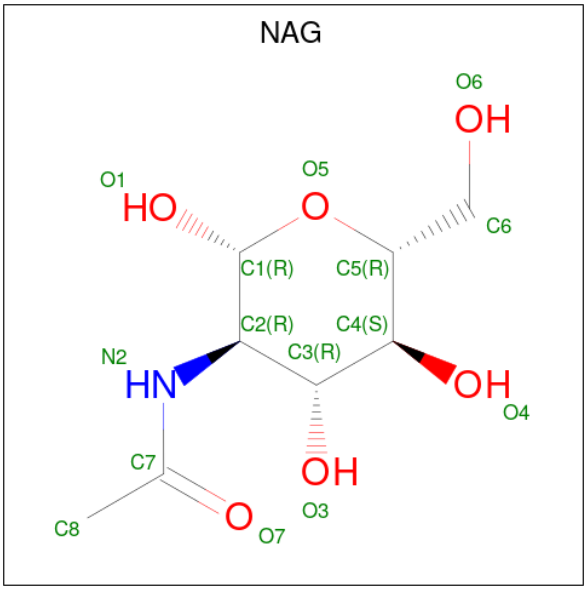
- Molecule 5 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	F	2	Total	C	N	O	0	0
			25	14	1	10		
5	G	2	Total	C	N	O	0	0
			25	14	1	10		

- Molecule 6 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

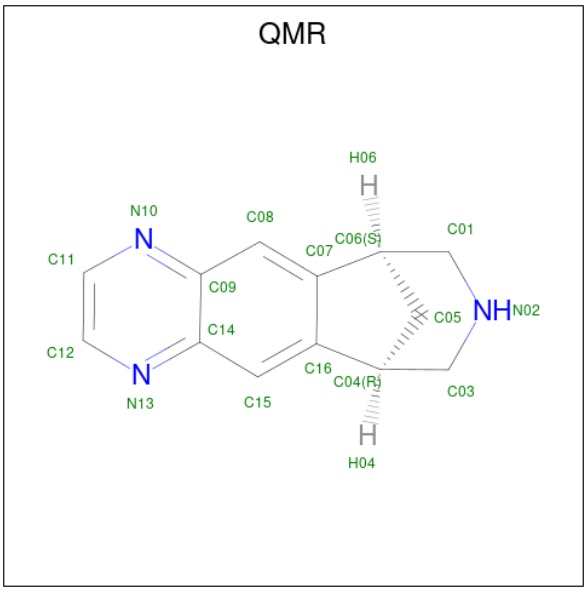
Mol	Chain	Residues	Atoms				AltConf	Trace
6	I	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



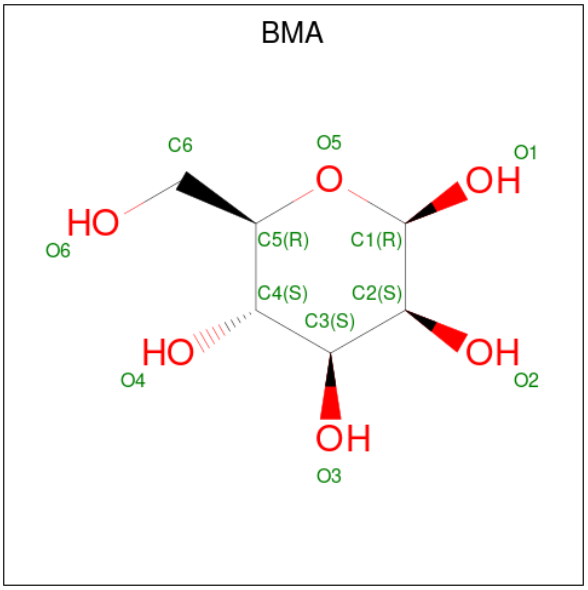
Mol	Chain	Residues	Atoms				AltConf
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	B	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	

- Molecule 8 is VARENICLINE (three-letter code: QMR) (formula: $C_{13}H_{13}N_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
8	A	1	Total C N 16 13 3	0
8	D	1	Total C N 16 13 3	0

- Molecule 9 is beta-D-mannopyranose (three-letter code: BMA) (formula: $C_6H_{12}O_6$).



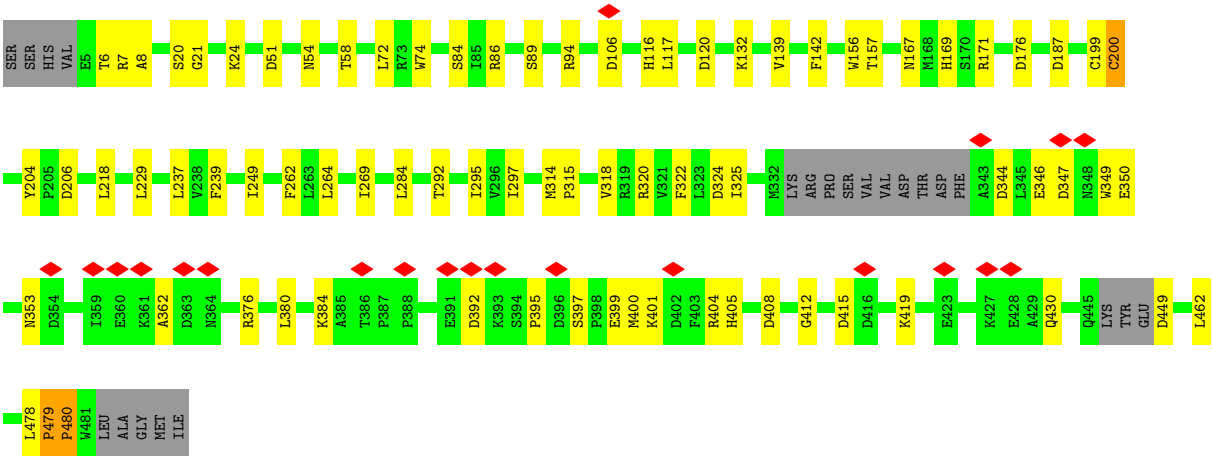
Mol	Chain	Residues	Atoms	AltConf
9	E	1	Total C O 11 6 5	0

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.

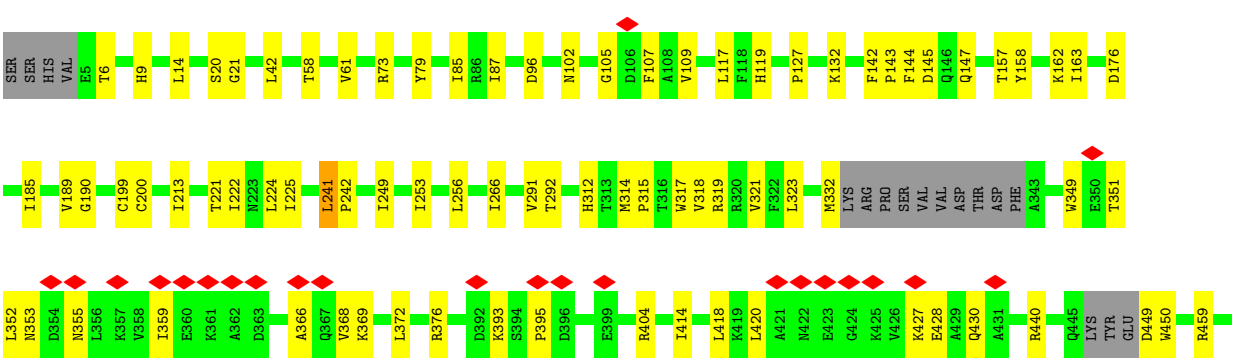
• Molecule 1: chimera of soluble cytochrome b562 (BRIL) and neuronal acetylcholine receptor subunit alpha-4

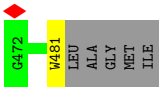
Chain A:



• Molecule 1: chimera of soluble cytochrome b562 (BRIL) and neuronal acetylcholine receptor subunit alpha-4

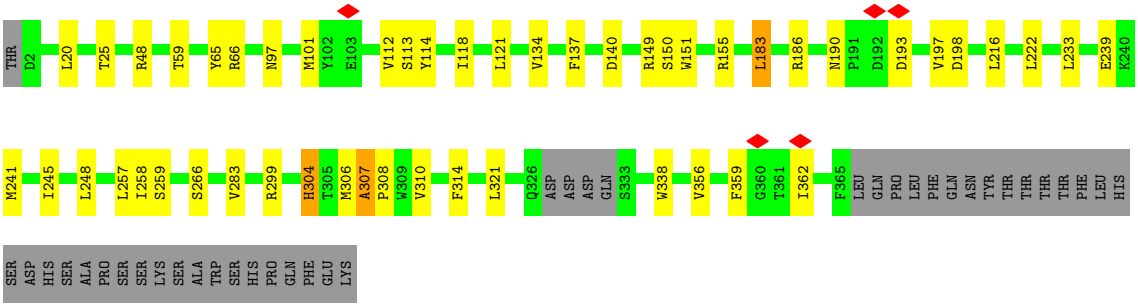
Chain D:





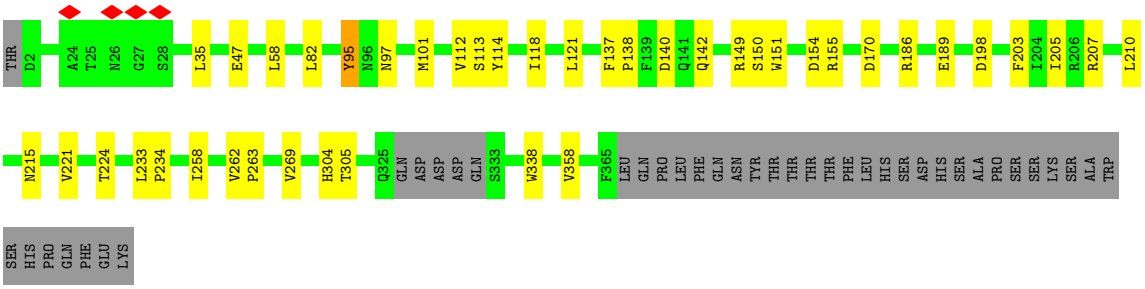
• Molecule 2: Neuronal acetylcholine receptor subunit beta-2

Chain B:



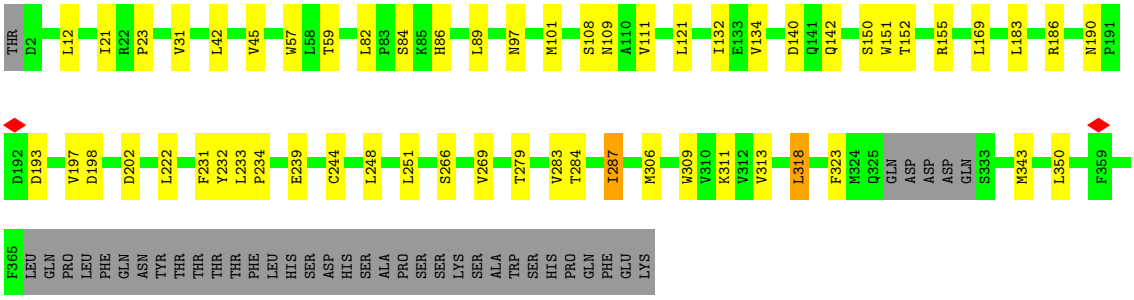
• Molecule 2: Neuronal acetylcholine receptor subunit beta-2

Chain C:



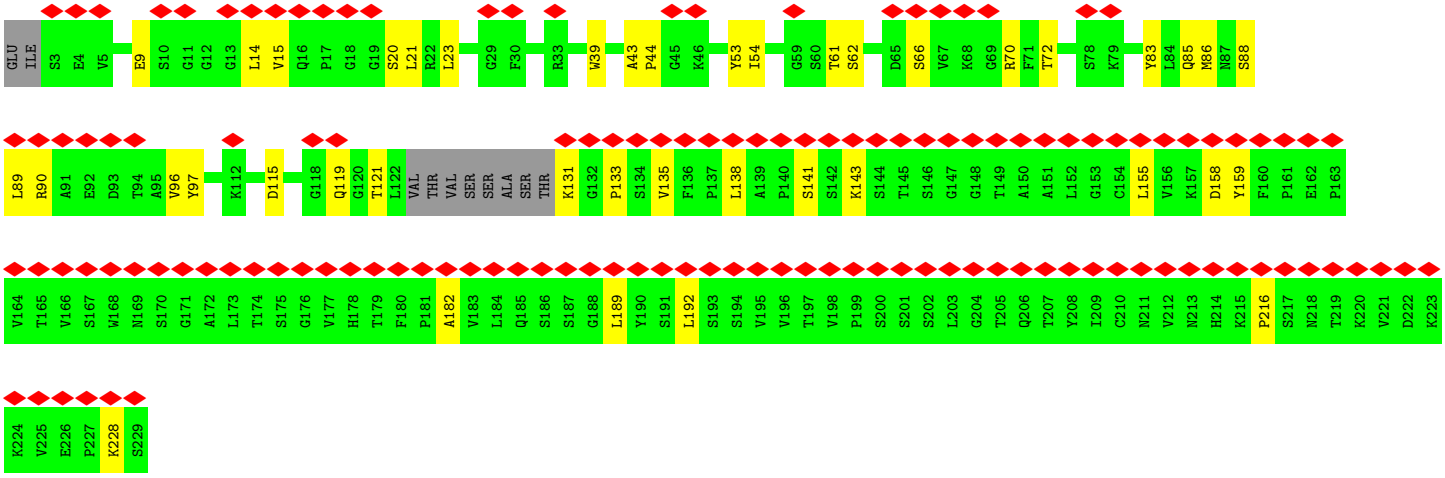
• Molecule 2: Neuronal acetylcholine receptor subunit beta-2

Chain E:



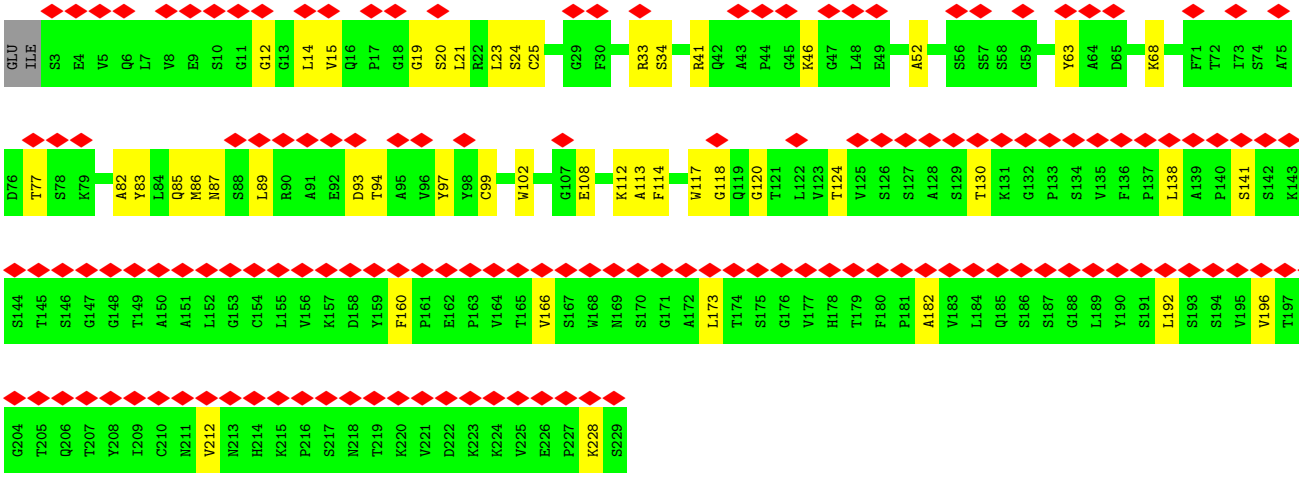
• Molecule 3: Fab heavy chain

Chain H:



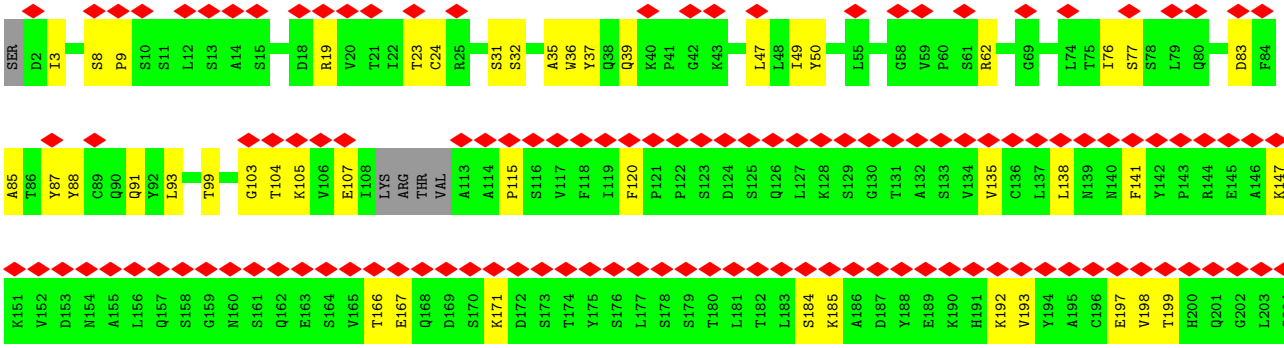
- Molecule 3: Fab heavy chain

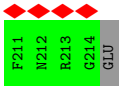
Chain K:



- Molecule 4: Fab light chain

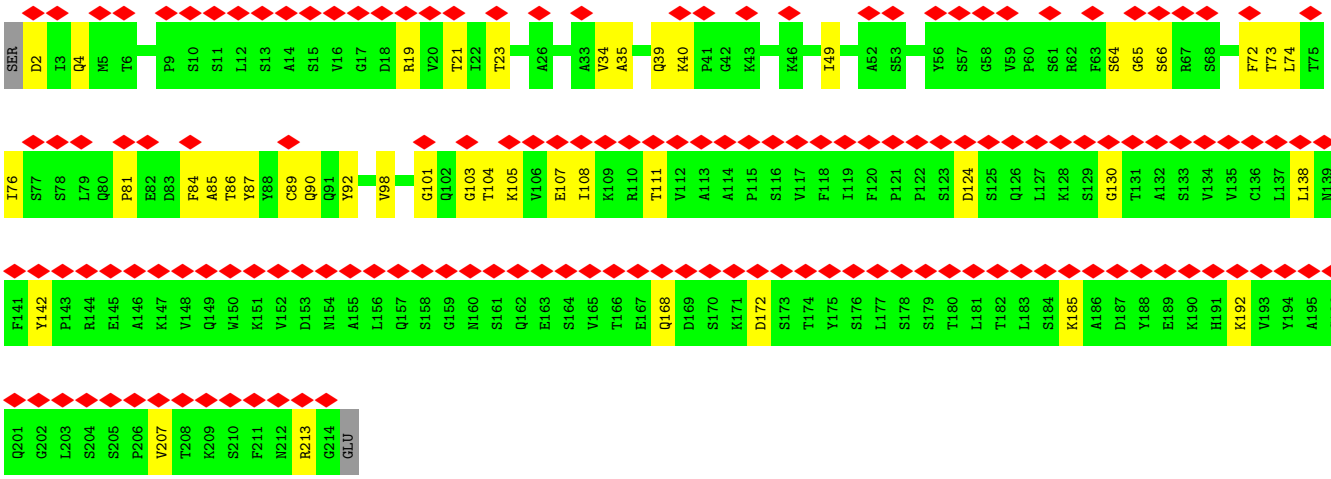
Chain L:





• Molecule 4: Fab light chain

Chain M:



• Molecule 5: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:

• Molecule 5: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:

• Molecule 6: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	285852	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	52	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.090	Depositor
Minimum map value	-0.042	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.014	Depositor
Map size (Å)	440.96, 440.96, 440.96	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.1024, 1.1024, 1.1024	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: QMR, NAG, BMA

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	0.68	2/3858 (0.1%)	0.80	7/5257 (0.1%)
1	D	0.63	0/3858	0.77	2/5257 (0.0%)
2	B	0.69	1/2996 (0.0%)	0.83	4/4089 (0.1%)
2	C	0.65	0/2987	0.79	4/4077 (0.1%)
2	E	0.70	1/2987 (0.0%)	0.85	4/4077 (0.1%)
3	H	0.42	0/1705	0.73	2/2324 (0.1%)
3	K	0.41	0/1748	0.72	2/2386 (0.1%)
4	L	0.42	0/1636	0.73	1/2221 (0.0%)
4	M	0.43	0/1667	0.79	2/2266 (0.1%)
All	All	0.61	4/23442 (0.0%)	0.79	28/31954 (0.1%)

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	B	0	1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	480	PRO	N-CA	14.03	1.71	1.47
2	B	307	ALA	C-N	8.81	1.50	1.34
2	E	244	CYS	CB-SG	-6.29	1.71	1.82
1	A	479	PRO	C-N	6.11	1.45	1.34

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	200	CYS	N-CA-C	11.93	143.22	111.00
1	A	200	CYS	N-CA-CB	-9.60	93.33	110.60
1	D	393	LYS	C-N-CA	7.71	140.98	121.70
1	A	480	PRO	CA-N-CD	-7.61	100.84	111.50
2	E	287	ILE	CG1-CB-CG2	-6.95	96.11	111.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	304	HIS	Mainchain

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	3764	0	3793	94	0
1	D	3764	0	3790	102	0
2	B	2917	0	2939	53	0
2	C	2908	0	2931	45	0
2	E	2908	0	2930	46	0
3	H	1655	0	1600	40	0
3	K	1700	0	1645	29	0
4	L	1602	0	1557	33	0
4	M	1627	0	1580	38	0
5	F	25	0	22	7	0
5	G	25	0	22	12	0
6	I	28	0	24	1	0
7	A	14	0	13	0	0
7	B	14	0	12	3	0
7	C	14	0	13	8	0
7	D	14	0	13	0	0
8	A	16	0	9	4	0
8	D	16	0	9	1	0
9	E	11	0	10	0	0
All	All	23022	0	22912	463	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 10.

The worst 5 of 463 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)
7:B:401:NAG:O4	5:F:1:NAG:C1	1.67	1.42
2:C:305:THR:HG22	1:D:332:MET:CE	1.48	1.41
7:C:401:NAG:O4	5:G:1:NAG:C1	1.70	1.39
1:A:480:PRO:N	1:A:480:PRO:CA	1.71	1.39
1:D:315:PRO:HD3	1:D:450:TRP:CZ2	1.59	1.35

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	458/486 (94%)	426 (93%)	32 (7%)	0	100	100
1	D	458/486 (94%)	430 (94%)	28 (6%)	0	100	100
2	B	354/397 (89%)	323 (91%)	31 (9%)	0	100	100
2	C	353/397 (89%)	331 (94%)	22 (6%)	0	100	100
2	E	353/397 (89%)	326 (92%)	27 (8%)	0	100	100
3	H	216/229 (94%)	203 (94%)	13 (6%)	0	100	100
3	K	225/229 (98%)	214 (95%)	11 (5%)	0	100	100
4	L	205/215 (95%)	192 (94%)	13 (6%)	0	100	100
4	M	212/215 (99%)	192 (91%)	20 (9%)	0	100	100
All	All	2834/3051 (93%)	2637 (93%)	197 (7%)	0	100	100

There are no Ramachandran outliers to report.

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	419/439 (95%)	416 (99%)	3 (1%)	81 86
1	D	419/439 (95%)	419 (100%)	0	100 100
2	B	336/373 (90%)	334 (99%)	2 (1%)	84 88
2	C	335/373 (90%)	334 (100%)	1 (0%)	91 92
2	E	335/373 (90%)	334 (100%)	1 (0%)	91 92
3	H	182/190 (96%)	182 (100%)	0	100 100
3	K	188/190 (99%)	188 (100%)	0	100 100
4	L	184/190 (97%)	184 (100%)	0	100 100
4	M	187/190 (98%)	187 (100%)	0	100 100
All	All	2585/2757 (94%)	2578 (100%)	7 (0%)	90 92

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	66	ARG
2	B	183	LEU
2	E	86	HIS
2	C	95	TYR
1	A	419	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	119	HIS
2	E	190	ASN
4	M	90	GLN
3	K	87	ASN
3	K	214	HIS

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)

6 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	NAG	F	1	5	14,14,15	0.96	1 (7%)	17,19,21	1.22	2 (11%)
5	BMA	F	2	5	11,11,12	1.43	4 (36%)	15,15,17	1.25	2 (13%)
5	NAG	G	1	5	14,14,15	1.08	1 (7%)	17,19,21	1.32	2 (11%)
5	BMA	G	2	5	11,11,12	1.22	1 (9%)	15,15,17	1.30	2 (13%)
6	NAG	I	1	6	14,14,15	1.03	1 (7%)	17,19,21	1.14	1 (5%)
6	NAG	I	2	6	14,14,15	0.66	0	17,19,21	1.25	2 (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
5	NAG	F	1	5	-	5/6/23/26	0/1/1/1
5	BMA	F	2	5	-	2/2/19/22	0/1/1/1
5	NAG	G	1	5	-	2/6/23/26	0/1/1/1
5	BMA	G	2	5	-	2/2/19/22	0/1/1/1
6	NAG	I	1	6	-	0/6/23/26	0/1/1/1
6	NAG	I	2	6	-	4/6/23/26	0/1/1/1

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	G	1	NAG	O5-C1	3.68	1.49	1.43
6	I	1	NAG	O5-C1	3.64	1.49	1.43
5	F	1	NAG	O5-C1	2.82	1.48	1.43
5	G	2	BMA	C2-C3	2.57	1.56	1.52
5	F	2	BMA	C4-C5	2.44	1.58	1.53

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

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	I	1	NAG	C1-O5-C5	4.34	118.00	112.19
5	G	1	NAG	C1-O5-C5	4.03	117.59	112.19
5	F	2	BMA	C1-O5-C5	3.44	116.80	112.19
6	I	2	NAG	C1-O5-C5	3.38	116.72	112.19
5	G	2	BMA	C1-O5-C5	3.36	116.69	112.19

There are no chirality outliers.

5 of 15 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	F	1	NAG	O5-C5-C6-O6
6	I	2	NAG	O5-C5-C6-O6
5	F	2	BMA	O5-C5-C6-O6
5	G	2	BMA	O5-C5-C6-O6
5	F	1	NAG	C4-C5-C6-O6

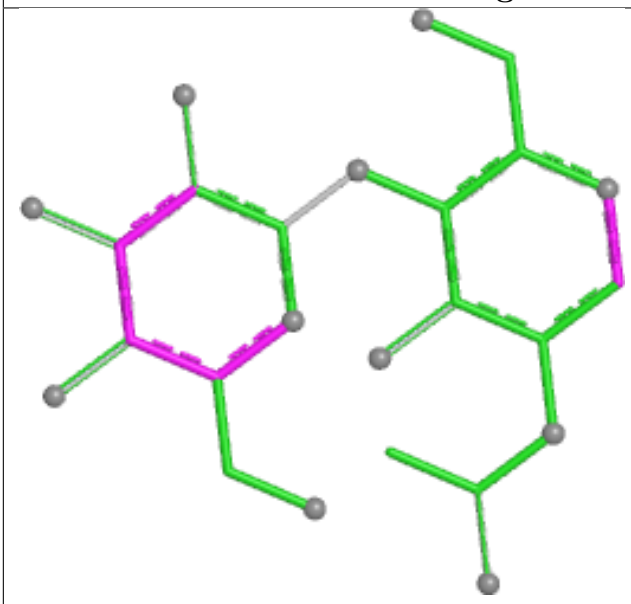
There are no ring outliers.

4 monomers are involved in 20 short contacts:

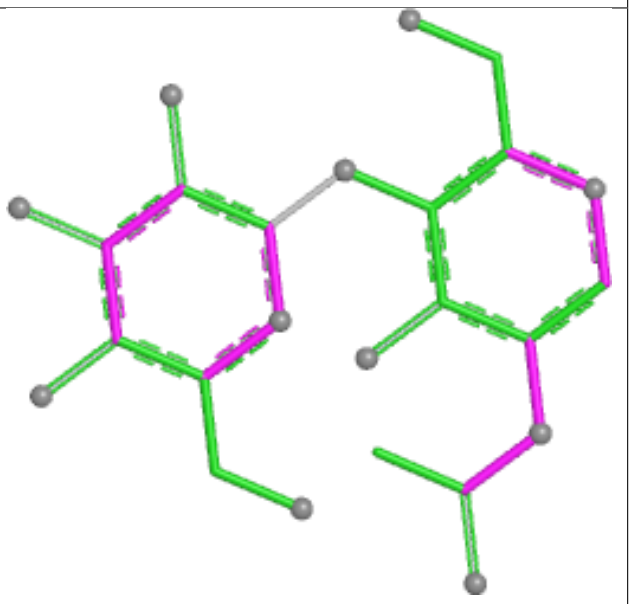
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	F	1	NAG	7	0
5	G	1	NAG	12	0
6	I	2	NAG	1	0
6	I	1	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

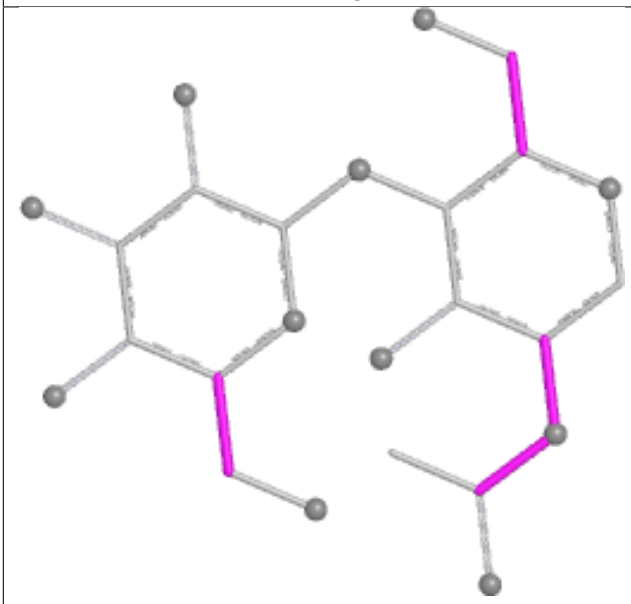
Oligosaccharide Chain F



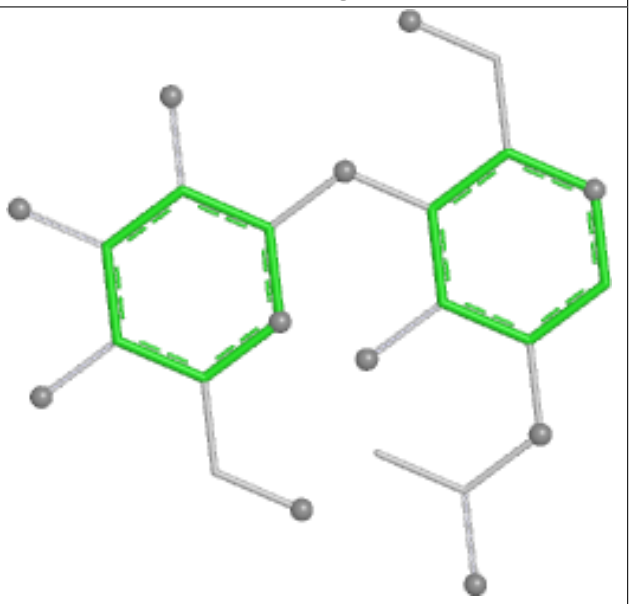
Bond lengths



Bond angles

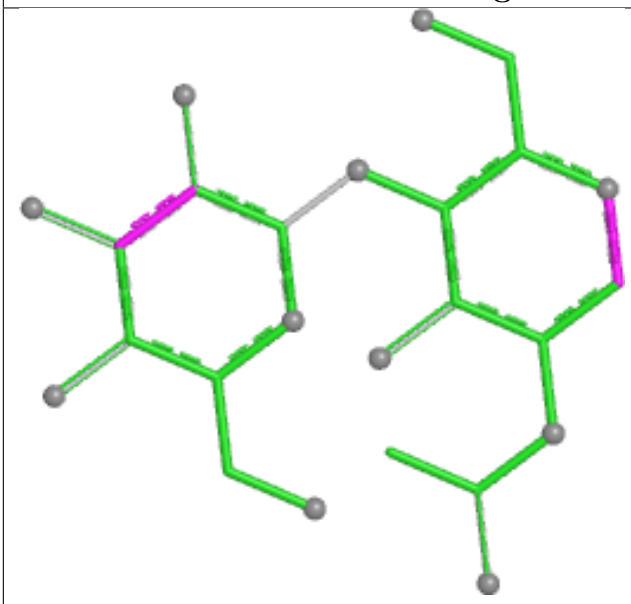


Torsions

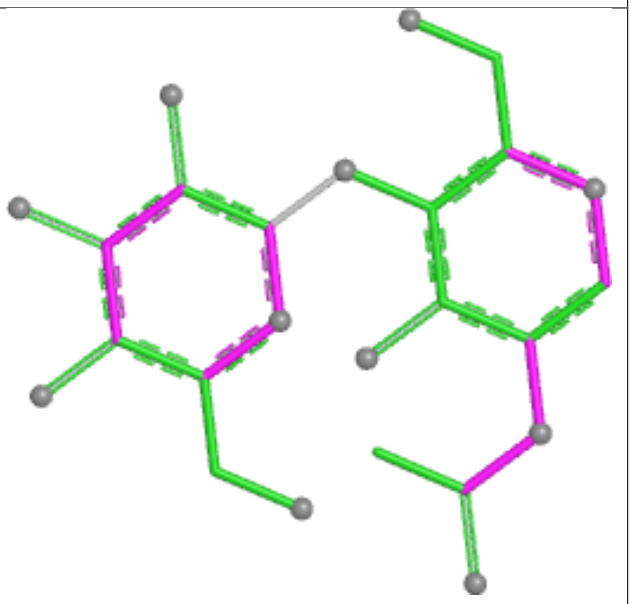


Rings

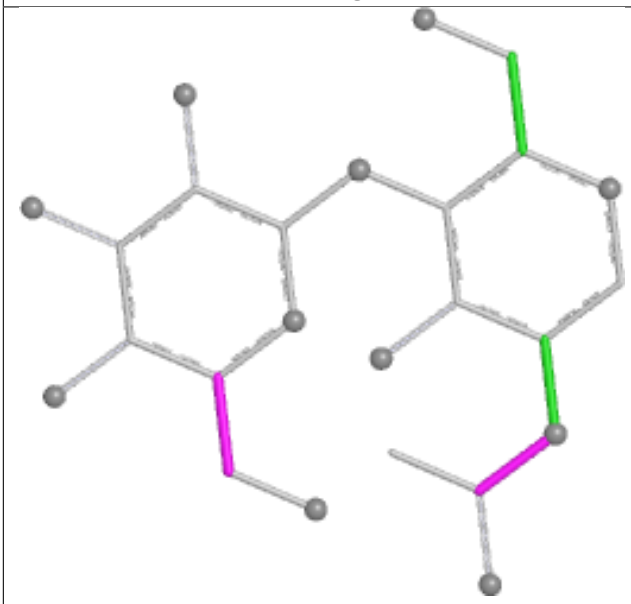
Oligosaccharide Chain G



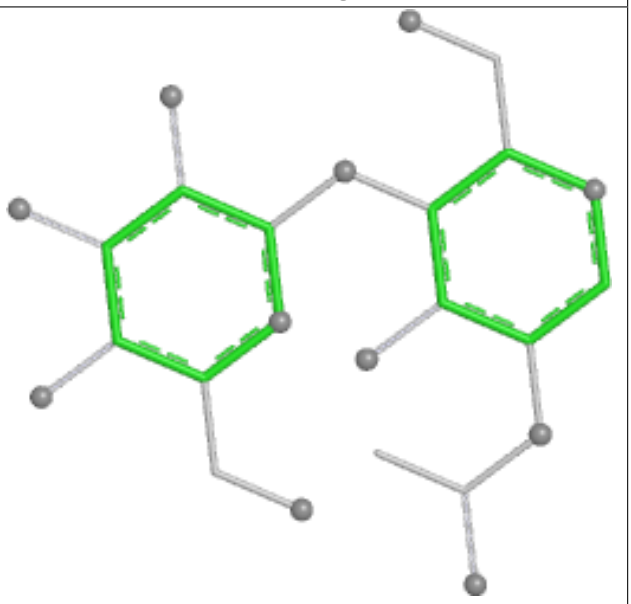
Bond lengths



Bond angles

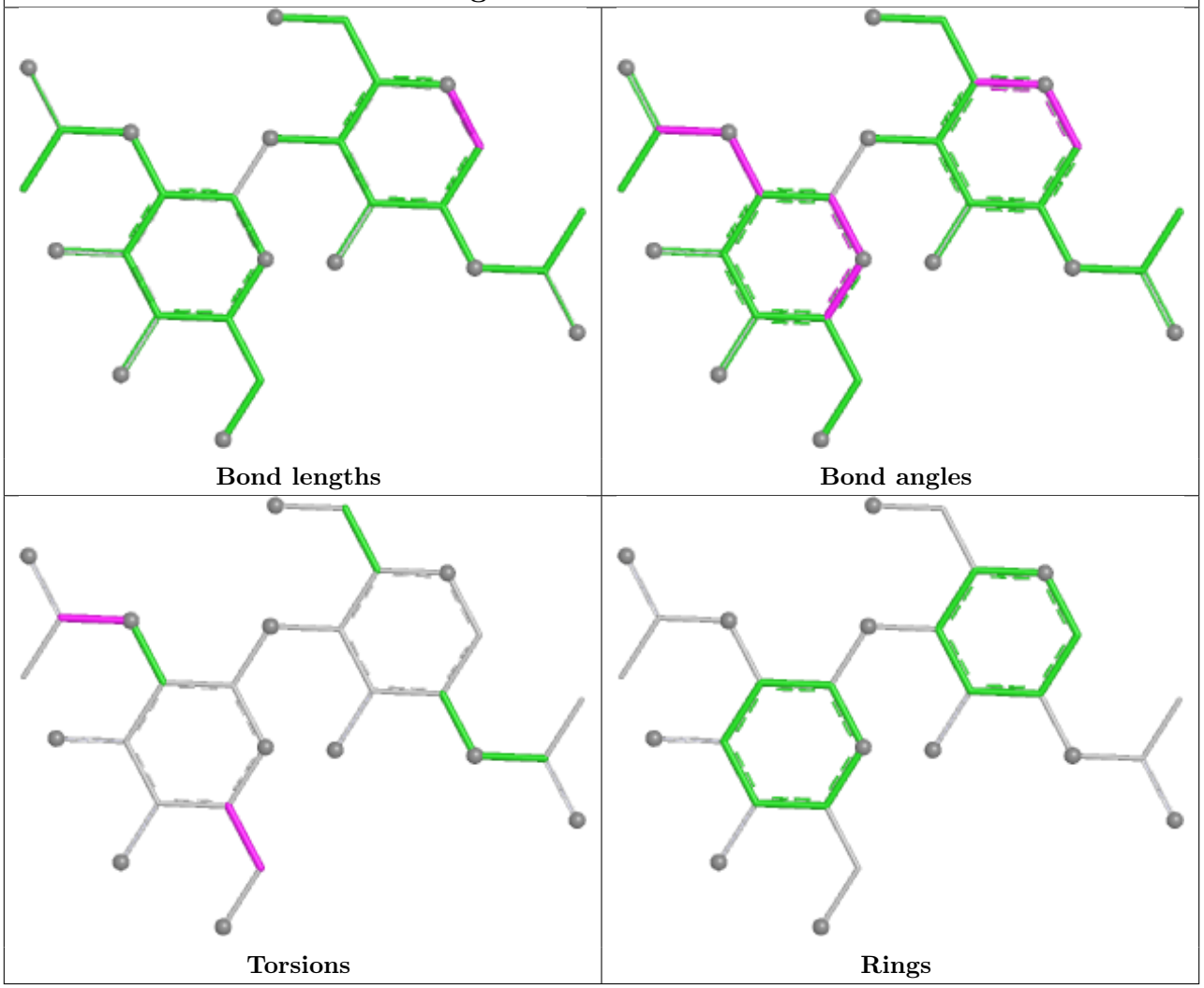


Torsions



Rings

Oligosaccharide Chain I



5.6 Ligand geometry (i)

7 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
8	QMR	D	502	-	19,19,19	4.77	13 (68%)	20,28,28	3.73	8 (40%)
7	NAG	C	401	-	14,14,15	0.93	1 (7%)	17,19,21	1.35	1 (5%)
8	QMR	A	502	-	19,19,19	4.81	14 (73%)	20,28,28	3.78	11 (55%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
7	NAG	A	501	-	14,14,15	0.73	1 (7%)	17,19,21	1.02	1 (5%)
7	NAG	D	501	-	14,14,15	0.94	1 (7%)	17,19,21	1.07	1 (5%)
9	BMA	E	403	-	11,11,12	1.31	1 (9%)	15,15,17	1.35	1 (6%)
7	NAG	B	401	2	14,14,15	0.81	1 (7%)	17,19,21	1.02	1 (5%)

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
8	QMR	D	502	-	-	-	0/5/4/4
7	NAG	C	401	-	-	0/6/23/26	0/1/1/1
8	QMR	A	502	-	-	-	0/5/4/4
7	NAG	A	501	-	-	2/6/23/26	0/1/1/1
7	NAG	D	501	-	-	0/6/23/26	0/1/1/1
9	BMA	E	403	-	-	0/2/19/22	0/1/1/1
7	NAG	B	401	2	-	0/6/23/26	0/1/1/1

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	A	502	QMR	C16-C07	9.69	1.56	1.40
8	D	502	QMR	C16-C07	9.37	1.56	1.40
8	D	502	QMR	C05-C04	-8.41	1.24	1.54
8	D	502	QMR	C05-C06	-8.40	1.24	1.54
8	A	502	QMR	C05-C04	-8.35	1.24	1.54

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	D	502	QMR	C06-C05-C04	11.27	119.75	94.17
8	A	502	QMR	C06-C05-C04	11.15	119.48	94.17
8	A	502	QMR	C03-N02-C01	6.76	119.62	111.78
8	D	502	QMR	C03-N02-C01	6.63	119.47	111.78
8	A	502	QMR	C07-C16-C04	-5.22	99.48	107.37

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	501	NAG	O5-C5-C6-O6
7	A	501	NAG	C4-C5-C6-O6

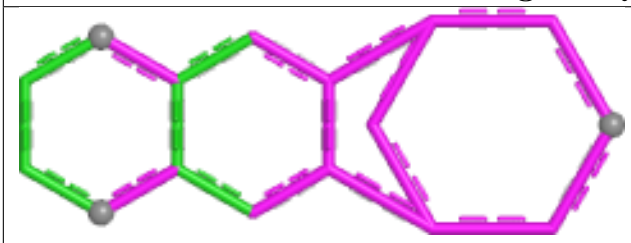
There are no ring outliers.

4 monomers are involved in 16 short contacts:

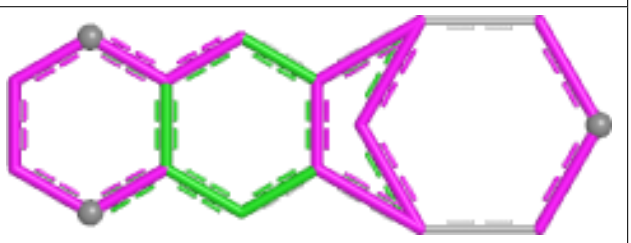
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	D	502	QMR	1	0
7	C	401	NAG	8	0
8	A	502	QMR	4	0
7	B	401	NAG	3	0

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.

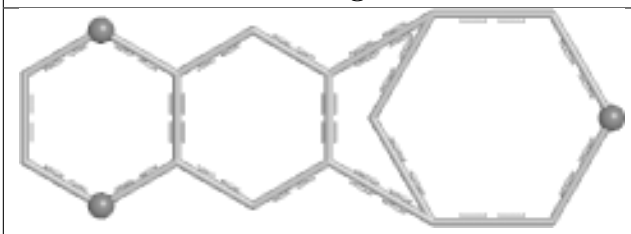
Ligand QMR D 502



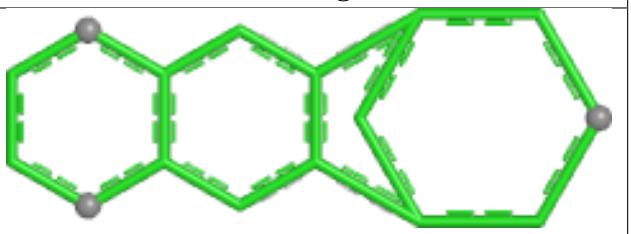
Bond lengths



Bond angles

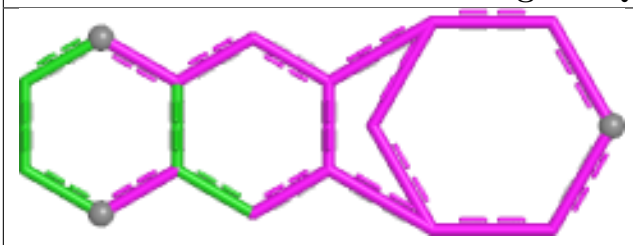


Torsions

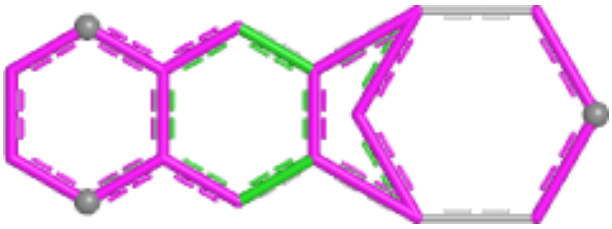


Rings

Ligand QMR A 502

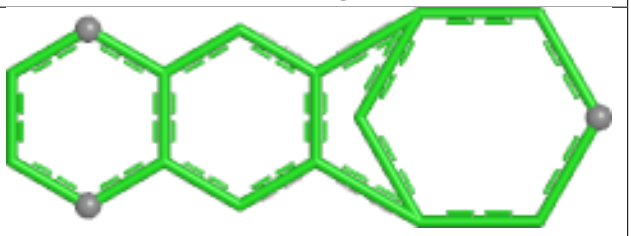


Bond lengths



Bond angles

Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

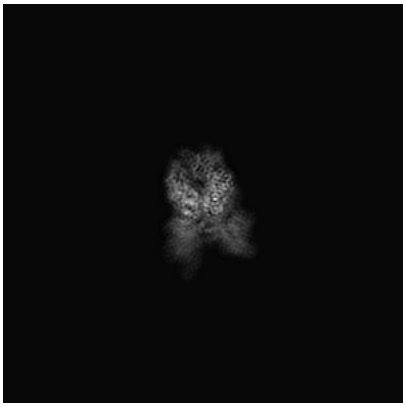
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-20863. These allow visual inspection of the internal detail of the map and identification of artifacts.

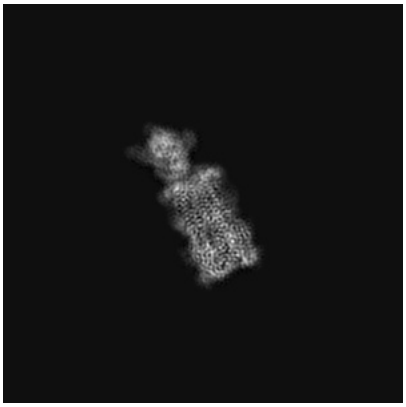
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

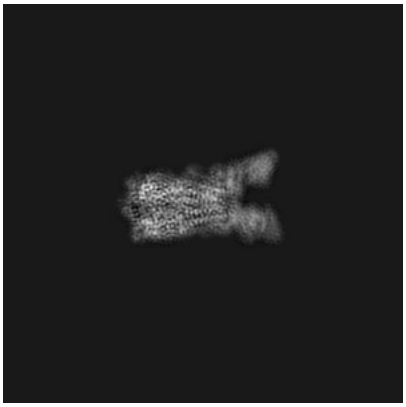
6.1.1 Primary map



X



Y

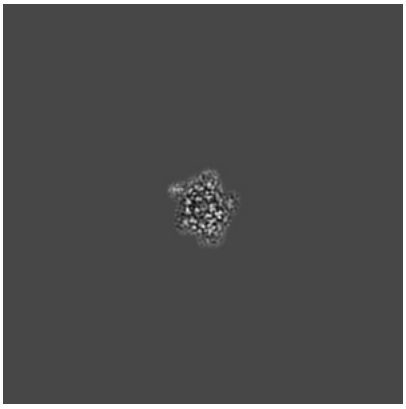


Z

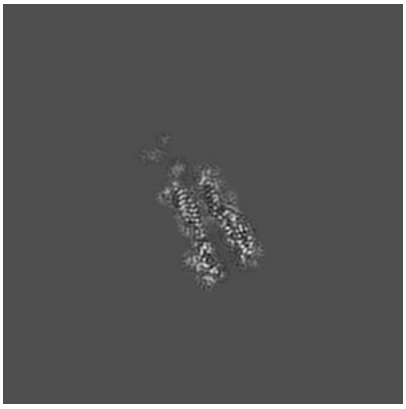
The images above show the map projected in three orthogonal directions.

6.2 Central slices

6.2.1 Primary map



X Index: 200



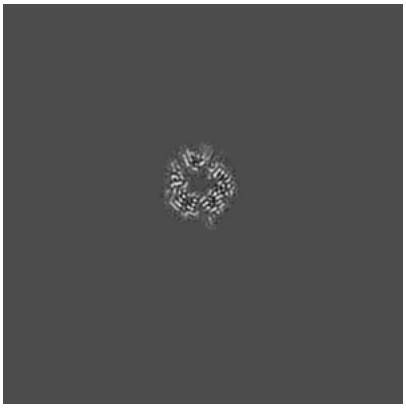
Y Index: 200

Z Index: 200

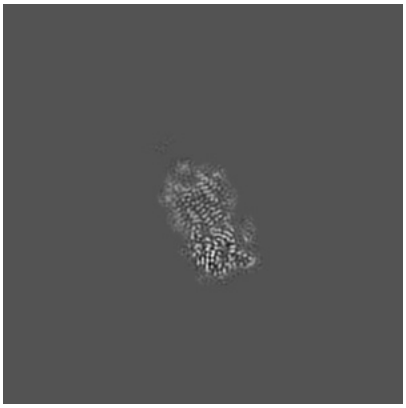
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

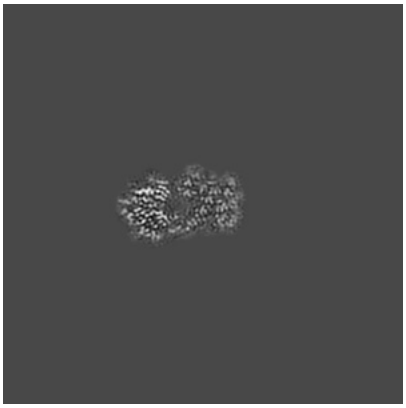
6.3.1 Primary map



X Index: 152



Y Index: 212

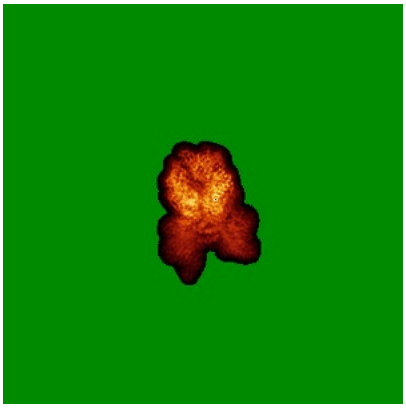


Z Index: 204

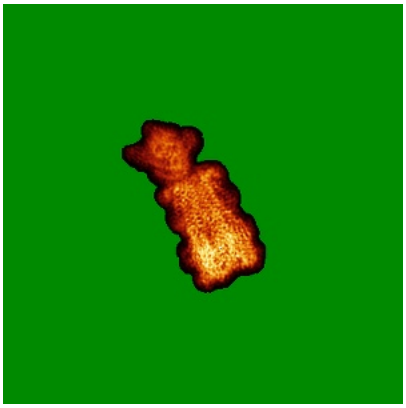
The images above show the largest variance slices of the map in three orthogonal directions.

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

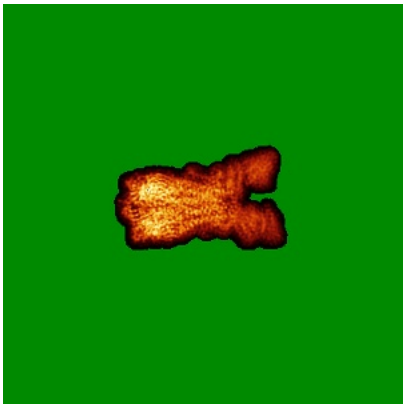
6.4.1 Primary map



X



Y

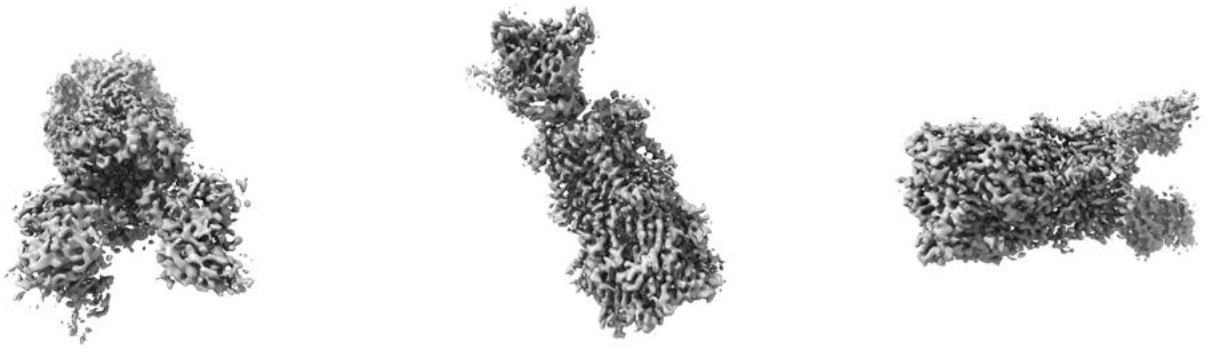


Z

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 0.014. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

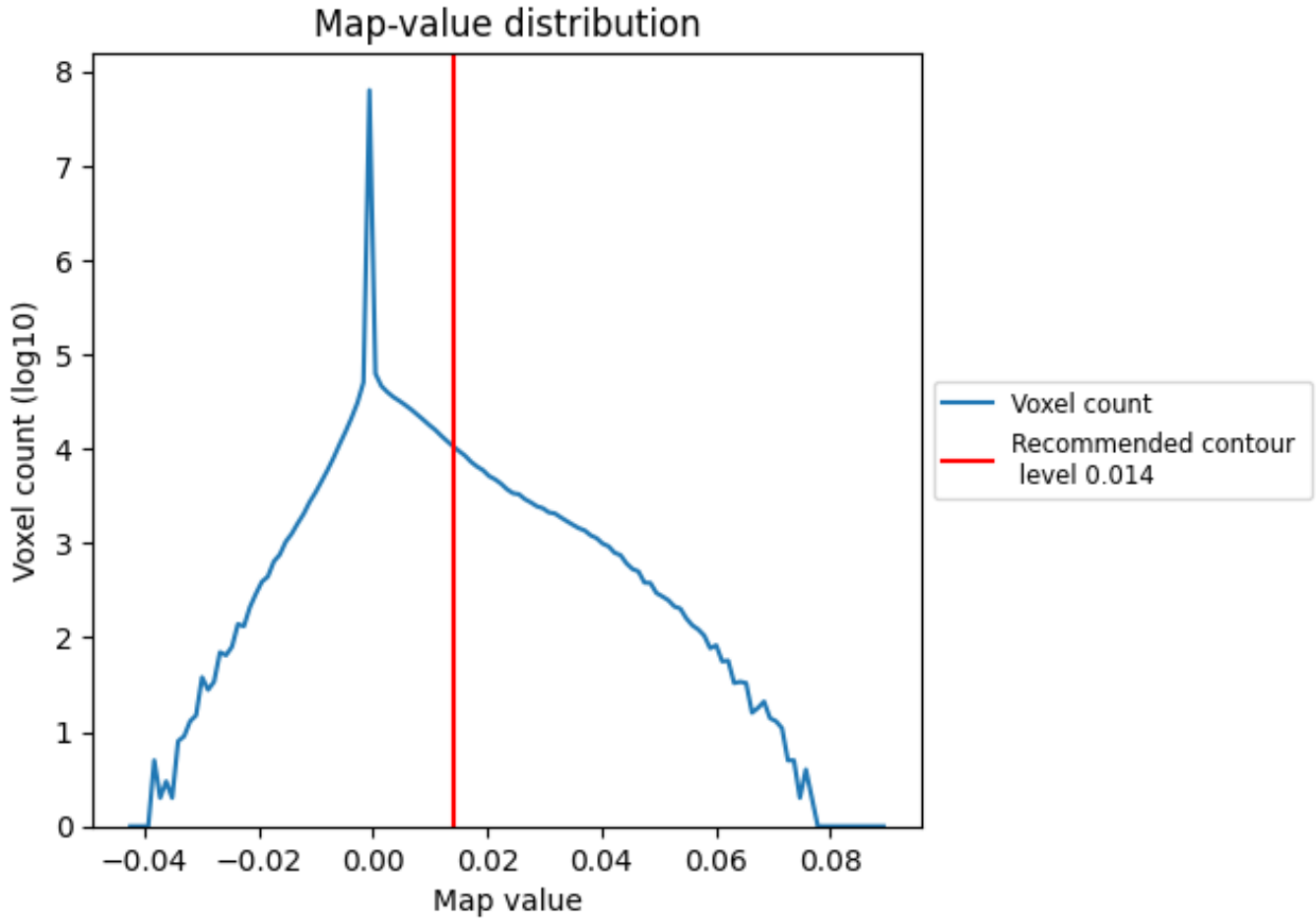
6.6 Mask visualisation (i)

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

7 Map analysis

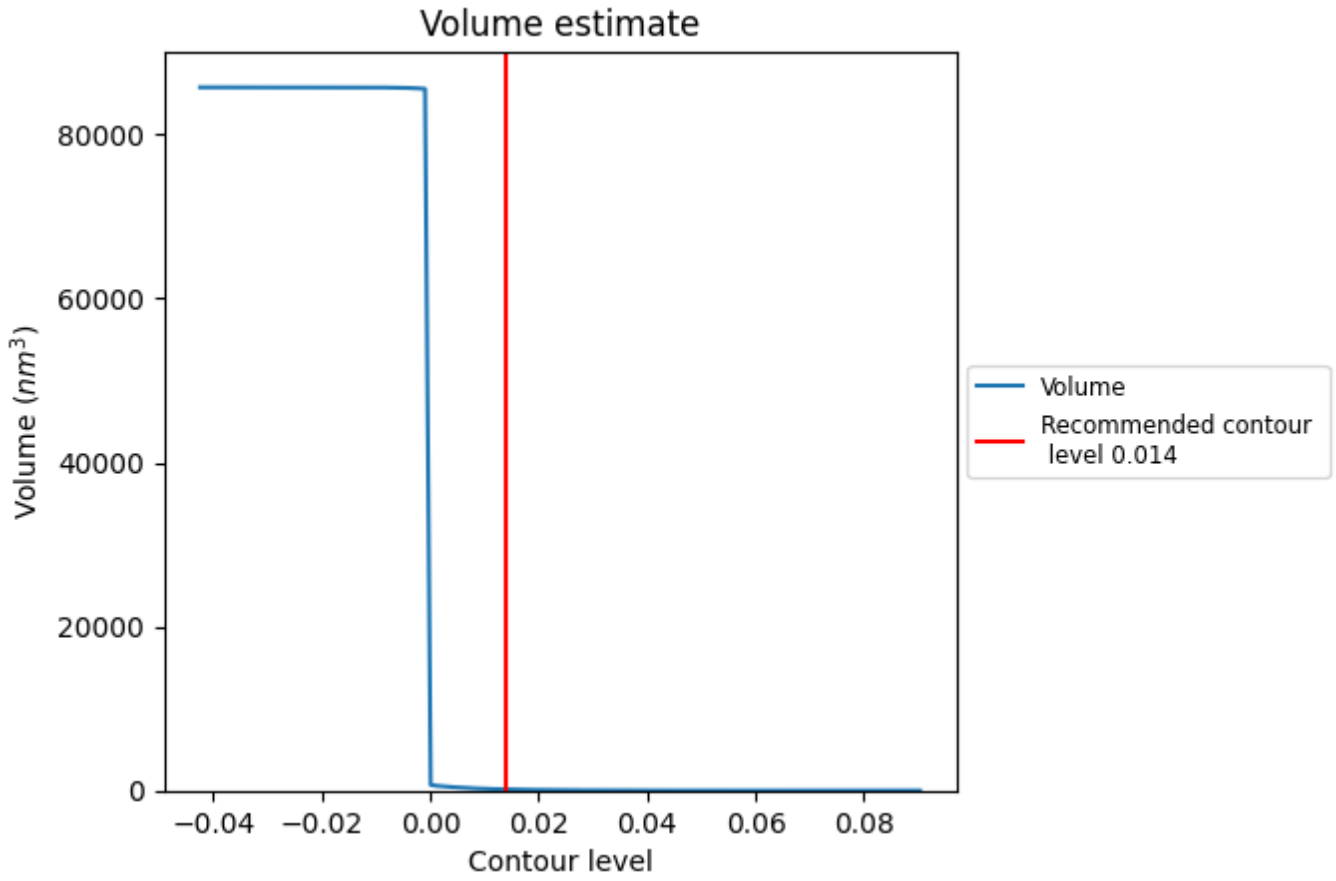
This section contains the results of statistical analysis of the map.

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.

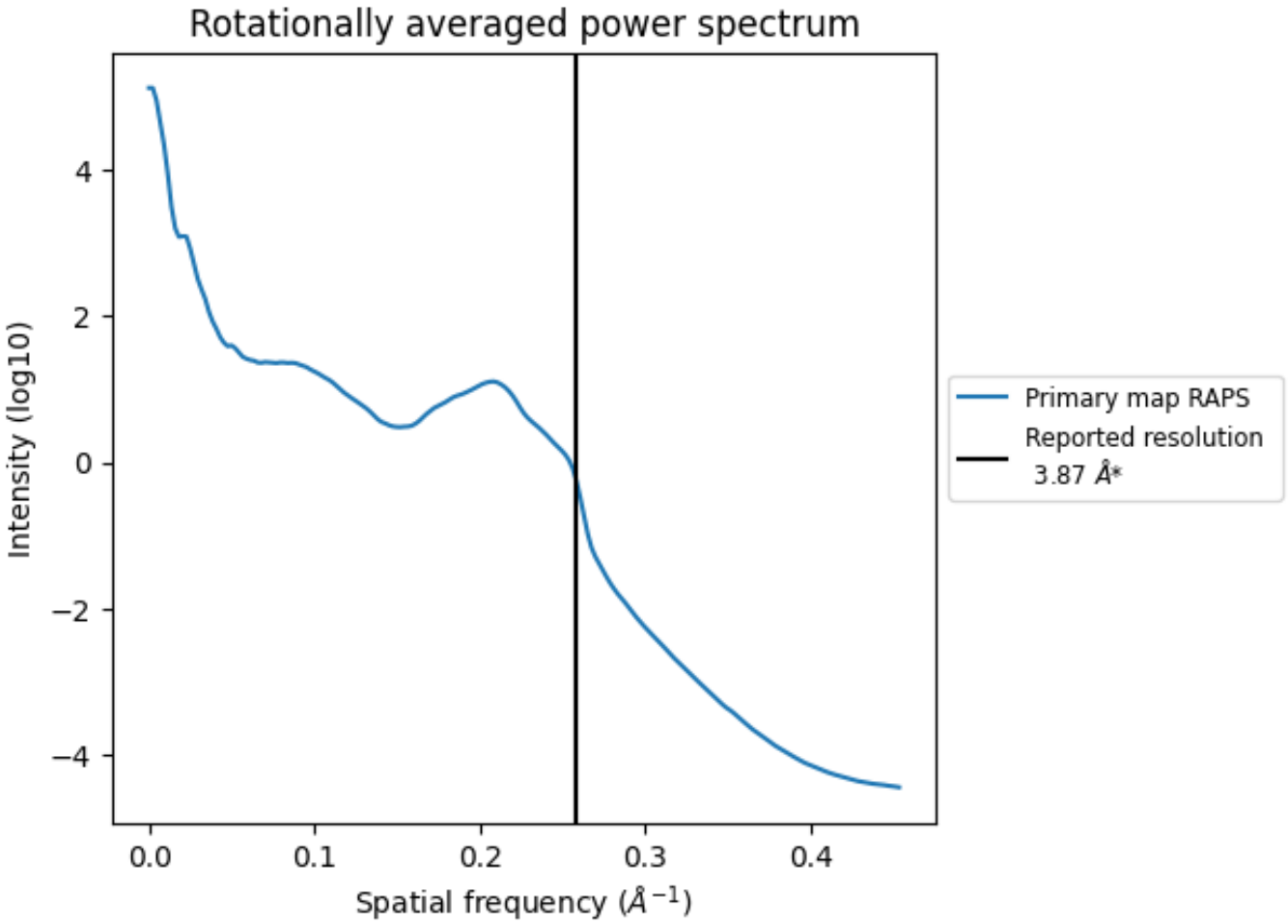
7.2 Volume estimate (i)



The volume at the recommended contour level is 143 nm^3; this corresponds to an approximate mass of 129 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)

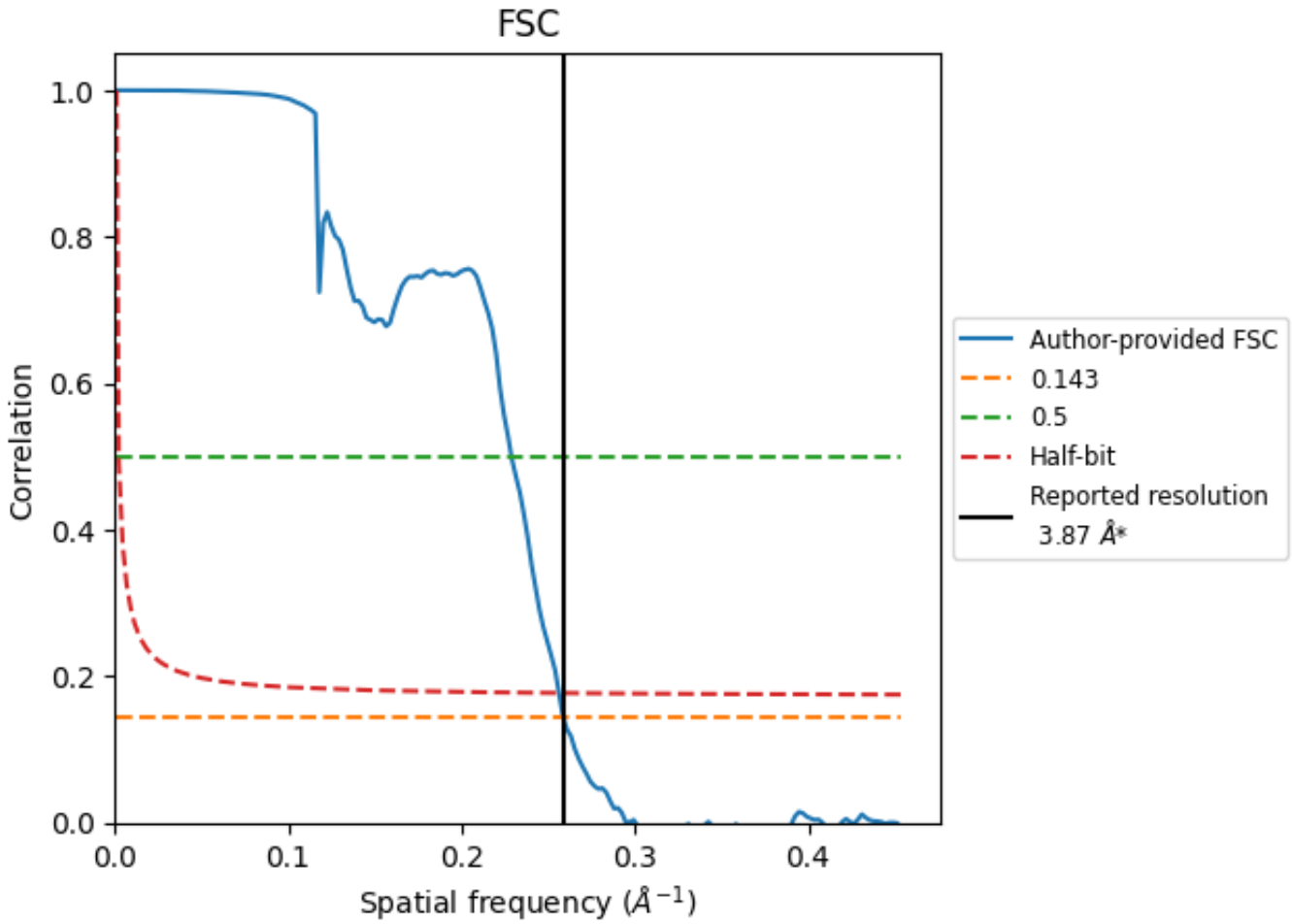


*Reported resolution corresponds to spatial frequency of 0.258 $Å^{-1}$

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 0.258 Å^{-1}

8.2 Resolution estimates (i)

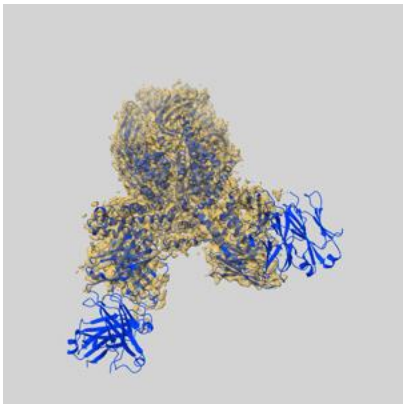
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.87	-	-
Author-provided FSC curve	3.87	4.37	3.90
Unmasked-calculated*	-	-	-

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

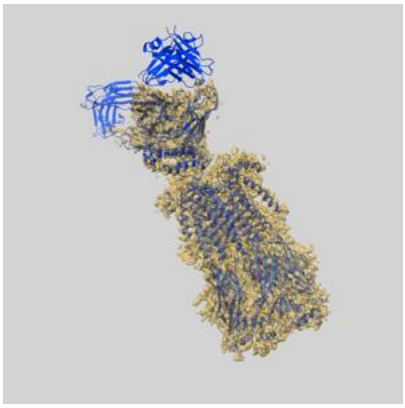
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-20863 and PDB model 6USF. Per-residue inclusion information can be found in section 3 on page 9.

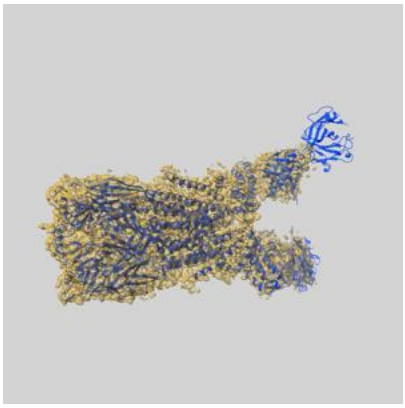
9.1 Map-model overlay



X



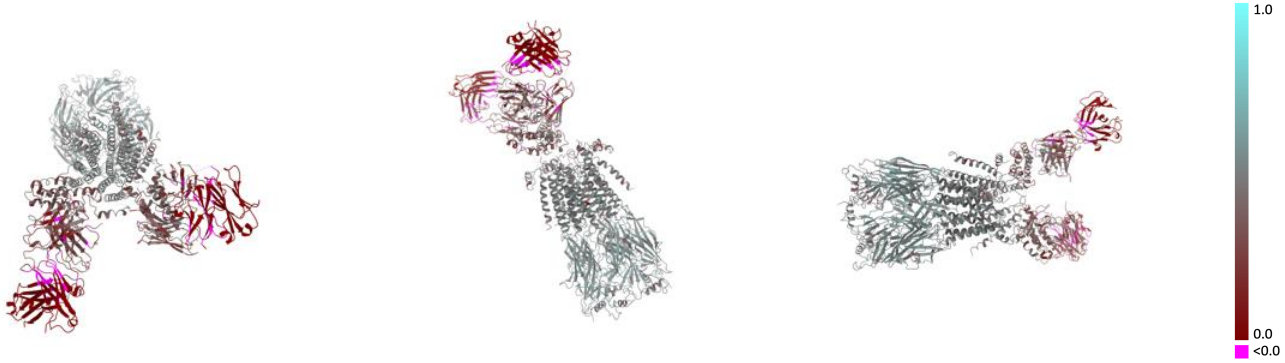
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.014 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

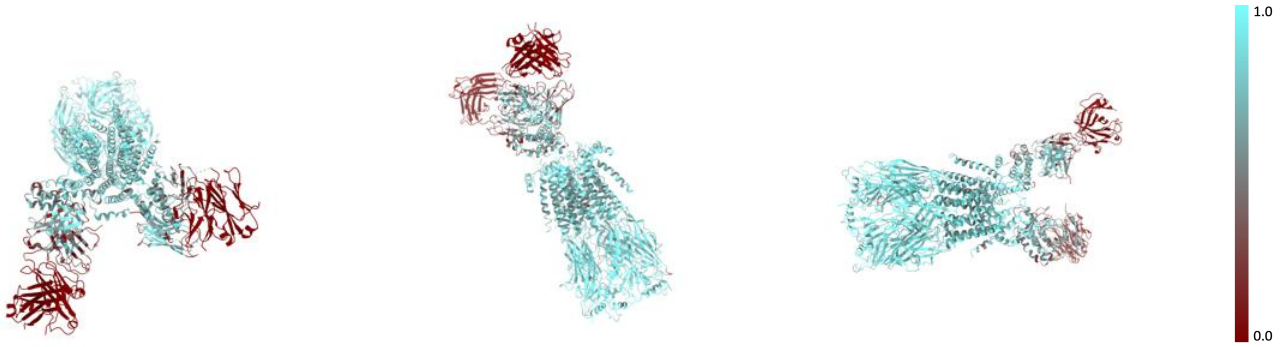
9.2 Q-score mapped to coordinate model (i)



X Y Z

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

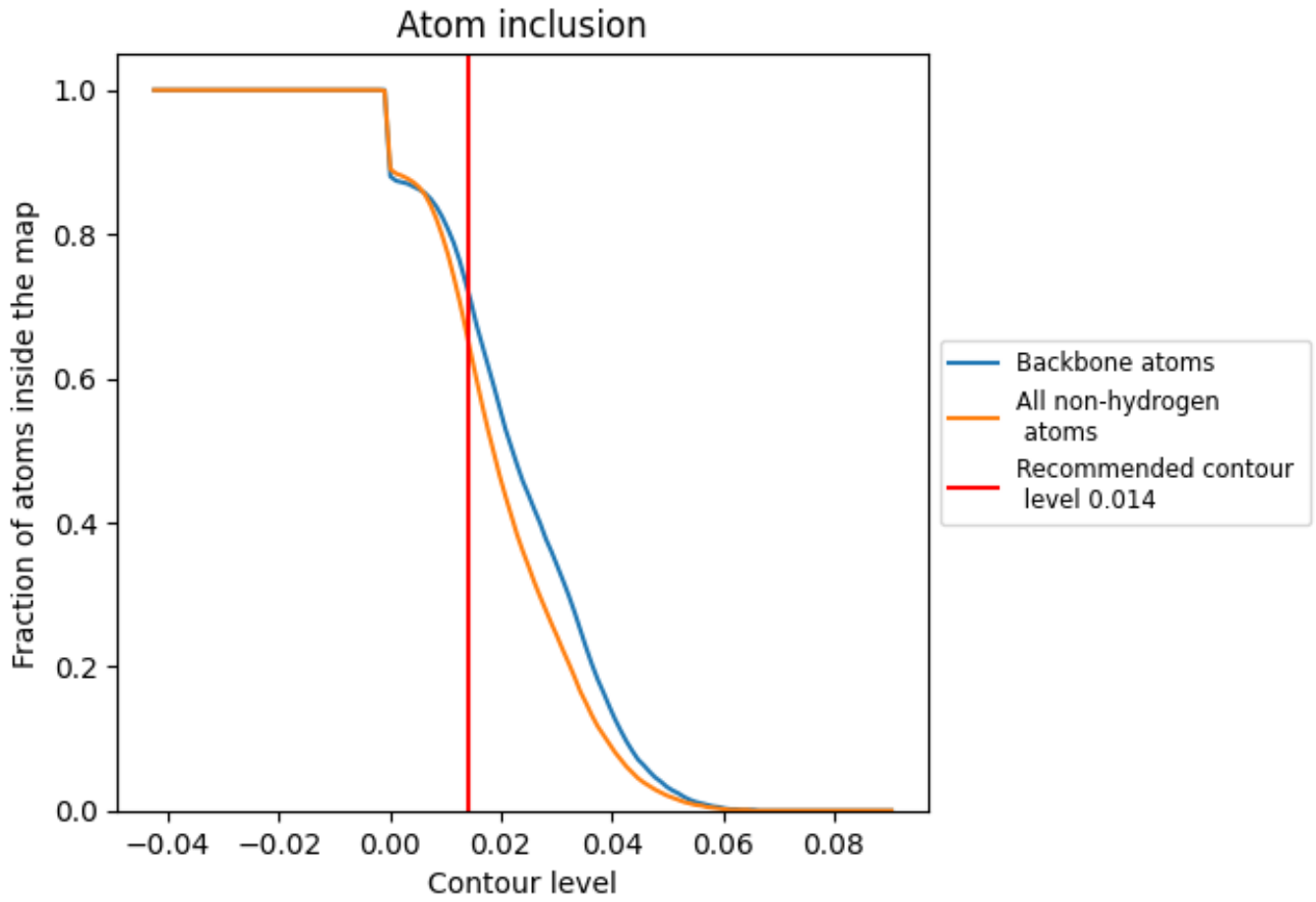
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.014).

9.4 Atom inclusion (i)



At the recommended contour level, 72% of all backbone atoms, 66% 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 (0.014) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6560	0.3940
A	0.7910	0.4730
B	0.8310	0.4960
C	0.8290	0.4950
D	0.7810	0.4700
E	0.8270	0.4980
F	0.3600	0.3360
G	0.4800	0.3400
H	0.3370	0.1890
I	0.6430	0.4420
K	0.2870	0.1620
L	0.2760	0.1650
M	0.2100	0.1530