wwPDB EM Validation Summary Report

May 11, 2026 – 12:25 PM JST

PDB ID	:	9X5X / pdb_00009x5x
EMDB ID	:	EMD-66600
Title	:	B/Brisbane/60/2008 HA in complex with FV2DP1-1B
Authors	:	Nguyen, V.H.T.; Ma, C.
Deposited on	:	2025-10-14
Resolution	:	2.76 Å(reported)
Based on initial model	:	6FYW

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

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

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

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

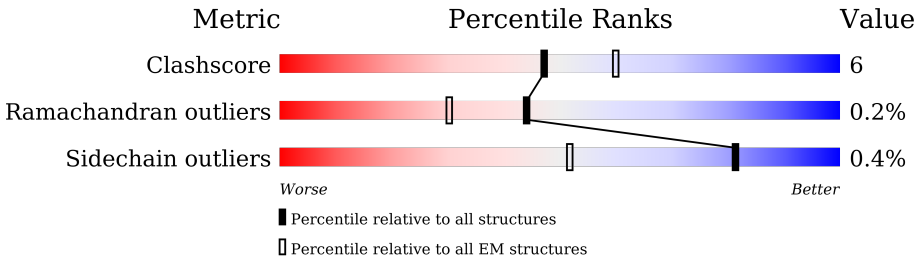
EMDB validation analysis	:	0.0.1.dev132
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

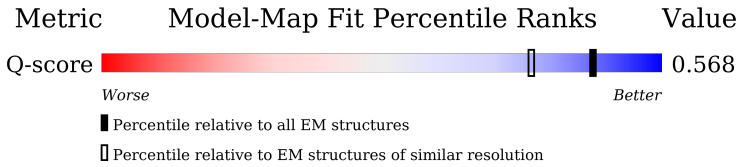
1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.76 Å.

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





Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	10642 (2.26 - 3.26)

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	362	77% 16% 7%
1	C	362	75% 17% 7%
1	E	362	76% 17% 7%
2	B	235	42% 56%

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Mol	Chain	Length	Quality of chain
2	D	235	39% 5% 56%
2	F	235	40% 56%
3	G	476	21% 5% 73%
3	H	476	21% 5% 73%
3	J	476	22% 5% 73%
4	I	232	38% 7% 54%
4	K	232	38% 7% 54%
4	L	232	38% 8% 54%
5	M	2	100%
5	N	2	50% 50%
5	O	2	50% 50%
5	P	2	100%
5	Q	2	100%
5	R	2	50% 50%
5	S	2	100%
5	T	2	100%
5	U	2	50% 50%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 15882 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 Hemagglutinin HA1 chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	336	Total	C	N	O	S	3	0
			2570	1612	458	486	14		
1	C	336	Total	C	N	O	S	3	0
			2570	1612	458	486	14		
1	E	336	Total	C	N	O	S	3	0
			2570	1612	458	486	14		

- Molecule 2 is a protein called Hemagglutinin HA2 chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	103	Total	C	N	O	S	0	0
			807	502	137	166	2		
2	D	103	Total	C	N	O	S	0	0
			807	502	137	166	2		
2	F	103	Total	C	N	O	S	0	0
			807	502	137	166	2		

There are 141 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	536	ASP	-	expression tag	UNP C0LT38
B	537	ILE	-	expression tag	UNP C0LT38
B	538	ARG	-	expression tag	UNP C0LT38
B	539	SER	-	expression tag	UNP C0LT38
B	540	LEU	-	expression tag	UNP C0LT38
B	541	VAL	-	expression tag	UNP C0LT38
B	542	PRO	-	expression tag	UNP C0LT38
B	543	ARG	-	expression tag	UNP C0LT38
B	544	GLY	-	expression tag	UNP C0LT38
B	545	SER	-	expression tag	UNP C0LT38
B	546	PRO	-	expression tag	UNP C0LT38
B	547	GLY	-	expression tag	UNP C0LT38
B	548	SER	-	expression tag	UNP C0LT38

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Chain	Residue	Modelled	Actual	Comment	Reference
B	549	GLY	-	expression tag	UNP C0LT38
B	550	TYR	-	expression tag	UNP C0LT38
B	551	ILE	-	expression tag	UNP C0LT38
B	552	PRO	-	expression tag	UNP C0LT38
B	553	GLU	-	expression tag	UNP C0LT38
B	554	ALA	-	expression tag	UNP C0LT38
B	555	PRO	-	expression tag	UNP C0LT38
B	556	ARG	-	expression tag	UNP C0LT38
B	557	ASP	-	expression tag	UNP C0LT38
B	558	GLY	-	expression tag	UNP C0LT38
B	559	GLN	-	expression tag	UNP C0LT38
B	560	ALA	-	expression tag	UNP C0LT38
B	561	TYR	-	expression tag	UNP C0LT38
B	562	VAL	-	expression tag	UNP C0LT38
B	563	ARG	-	expression tag	UNP C0LT38
B	564	LYS	-	expression tag	UNP C0LT38
B	565	ASP	-	expression tag	UNP C0LT38
B	566	GLY	-	expression tag	UNP C0LT38
B	567	GLU	-	expression tag	UNP C0LT38
B	568	TRP	-	expression tag	UNP C0LT38
B	569	VAL	-	expression tag	UNP C0LT38
B	570	LEU	-	expression tag	UNP C0LT38
B	571	LEU	-	expression tag	UNP C0LT38
B	572	SER	-	expression tag	UNP C0LT38
B	573	THR	-	expression tag	UNP C0LT38
B	574	PHE	-	expression tag	UNP C0LT38
B	575	LEU	-	expression tag	UNP C0LT38
B	576	GLY	-	expression tag	UNP C0LT38
B	577	HIS	-	expression tag	UNP C0LT38
B	578	HIS	-	expression tag	UNP C0LT38
B	579	HIS	-	expression tag	UNP C0LT38
B	580	HIS	-	expression tag	UNP C0LT38
B	581	HIS	-	expression tag	UNP C0LT38
B	582	HIS	-	expression tag	UNP C0LT38
D	536	ASP	-	expression tag	UNP C0LT38
D	537	ILE	-	expression tag	UNP C0LT38
D	538	ARG	-	expression tag	UNP C0LT38
D	539	SER	-	expression tag	UNP C0LT38
D	540	LEU	-	expression tag	UNP C0LT38
D	541	VAL	-	expression tag	UNP C0LT38
D	542	PRO	-	expression tag	UNP C0LT38
D	543	ARG	-	expression tag	UNP C0LT38

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Chain	Residue	Modelled	Actual	Comment	Reference
D	544	GLY	-	expression tag	UNP C0LT38
D	545	SER	-	expression tag	UNP C0LT38
D	546	PRO	-	expression tag	UNP C0LT38
D	547	GLY	-	expression tag	UNP C0LT38
D	548	SER	-	expression tag	UNP C0LT38
D	549	GLY	-	expression tag	UNP C0LT38
D	550	TYR	-	expression tag	UNP C0LT38
D	551	ILE	-	expression tag	UNP C0LT38
D	552	PRO	-	expression tag	UNP C0LT38
D	553	GLU	-	expression tag	UNP C0LT38
D	554	ALA	-	expression tag	UNP C0LT38
D	555	PRO	-	expression tag	UNP C0LT38
D	556	ARG	-	expression tag	UNP C0LT38
D	557	ASP	-	expression tag	UNP C0LT38
D	558	GLY	-	expression tag	UNP C0LT38
D	559	GLN	-	expression tag	UNP C0LT38
D	560	ALA	-	expression tag	UNP C0LT38
D	561	TYR	-	expression tag	UNP C0LT38
D	562	VAL	-	expression tag	UNP C0LT38
D	563	ARG	-	expression tag	UNP C0LT38
D	564	LYS	-	expression tag	UNP C0LT38
D	565	ASP	-	expression tag	UNP C0LT38
D	566	GLY	-	expression tag	UNP C0LT38
D	567	GLU	-	expression tag	UNP C0LT38
D	568	TRP	-	expression tag	UNP C0LT38
D	569	VAL	-	expression tag	UNP C0LT38
D	570	LEU	-	expression tag	UNP C0LT38
D	571	LEU	-	expression tag	UNP C0LT38
D	572	SER	-	expression tag	UNP C0LT38
D	573	THR	-	expression tag	UNP C0LT38
D	574	PHE	-	expression tag	UNP C0LT38
D	575	LEU	-	expression tag	UNP C0LT38
D	576	GLY	-	expression tag	UNP C0LT38
D	577	HIS	-	expression tag	UNP C0LT38
D	578	HIS	-	expression tag	UNP C0LT38
D	579	HIS	-	expression tag	UNP C0LT38
D	580	HIS	-	expression tag	UNP C0LT38
D	581	HIS	-	expression tag	UNP C0LT38
D	582	HIS	-	expression tag	UNP C0LT38
F	536	ASP	-	expression tag	UNP C0LT38
F	537	ILE	-	expression tag	UNP C0LT38
F	538	ARG	-	expression tag	UNP C0LT38

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Chain	Residue	Modelled	Actual	Comment	Reference
F	539	SER	-	expression tag	UNP C0LT38
F	540	LEU	-	expression tag	UNP C0LT38
F	541	VAL	-	expression tag	UNP C0LT38
F	542	PRO	-	expression tag	UNP C0LT38
F	543	ARG	-	expression tag	UNP C0LT38
F	544	GLY	-	expression tag	UNP C0LT38
F	545	SER	-	expression tag	UNP C0LT38
F	546	PRO	-	expression tag	UNP C0LT38
F	547	GLY	-	expression tag	UNP C0LT38
F	548	SER	-	expression tag	UNP C0LT38
F	549	GLY	-	expression tag	UNP C0LT38
F	550	TYR	-	expression tag	UNP C0LT38
F	551	ILE	-	expression tag	UNP C0LT38
F	552	PRO	-	expression tag	UNP C0LT38
F	553	GLU	-	expression tag	UNP C0LT38
F	554	ALA	-	expression tag	UNP C0LT38
F	555	PRO	-	expression tag	UNP C0LT38
F	556	ARG	-	expression tag	UNP C0LT38
F	557	ASP	-	expression tag	UNP C0LT38
F	558	GLY	-	expression tag	UNP C0LT38
F	559	GLN	-	expression tag	UNP C0LT38
F	560	ALA	-	expression tag	UNP C0LT38
F	561	TYR	-	expression tag	UNP C0LT38
F	562	VAL	-	expression tag	UNP C0LT38
F	563	ARG	-	expression tag	UNP C0LT38
F	564	LYS	-	expression tag	UNP C0LT38
F	565	ASP	-	expression tag	UNP C0LT38
F	566	GLY	-	expression tag	UNP C0LT38
F	567	GLU	-	expression tag	UNP C0LT38
F	568	TRP	-	expression tag	UNP C0LT38
F	569	VAL	-	expression tag	UNP C0LT38
F	570	LEU	-	expression tag	UNP C0LT38
F	571	LEU	-	expression tag	UNP C0LT38
F	572	SER	-	expression tag	UNP C0LT38
F	573	THR	-	expression tag	UNP C0LT38
F	574	PHE	-	expression tag	UNP C0LT38
F	575	LEU	-	expression tag	UNP C0LT38
F	576	GLY	-	expression tag	UNP C0LT38
F	577	HIS	-	expression tag	UNP C0LT38
F	578	HIS	-	expression tag	UNP C0LT38
F	579	HIS	-	expression tag	UNP C0LT38
F	580	HIS	-	expression tag	UNP C0LT38

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Chain	Residue	Modelled	Actual	Comment	Reference
F	581	HIS	-	expression tag	UNP C0LT38
F	582	HIS	-	expression tag	UNP C0LT38

- Molecule 3 is a protein called FV2DP1-1B heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	127	Total	C	N	O	S	0	0
			955	600	159	191	5		
3	G	127	Total	C	N	O	S	0	0
			955	600	159	191	5		
3	J	127	Total	C	N	O	S	0	0
			955	600	159	191	5		

- Molecule 4 is a protein called FV2DP1-1B light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	L	106	Total	C	N	O	S	0	0
			822	518	142	159	3		
4	I	106	Total	C	N	O	S	0	0
			822	518	142	159	3		
4	K	106	Total	C	N	O	S	0	0
			822	518	142	159	3		

- Molecule 5 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
5	M	2	Total	C	N	O	0	0
			28	16	2	10		
5	N	2	Total	C	N	O	0	0
			28	16	2	10		
5	O	2	Total	C	N	O	0	0
			28	16	2	10		
5	P	2	Total	C	N	O	0	0
			28	16	2	10		
5	Q	2	Total	C	N	O	0	0
			28	16	2	10		

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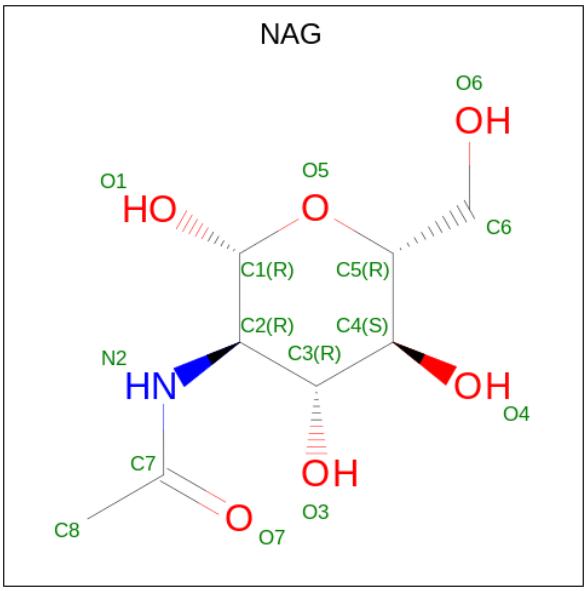
Mol	Chain	Residues	Atoms	AltConf	Trace
5	R	2	Total C N O 28 16 2 10	0	0
5	S	2	Total C N O 28 16 2 10	0	0
5	T	2	Total C N O 28 16 2 10	0	0
5	U	2	Total C N O 28 16 2 10	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms	AltConf
6	A	1	Total C N O 14 8 1 5	0
6	A	1	Total C N O 14 8 1 5	0
6	A	1	Total C N O 14 8 1 5	0
6	A	1	Total C N O 14 8 1 5	0
6	C	1	Total C N O 14 8 1 5	0
6	C	1	Total C N O 14 8 1 5	0
6	C	1	Total C N O 14 8 1 5	0

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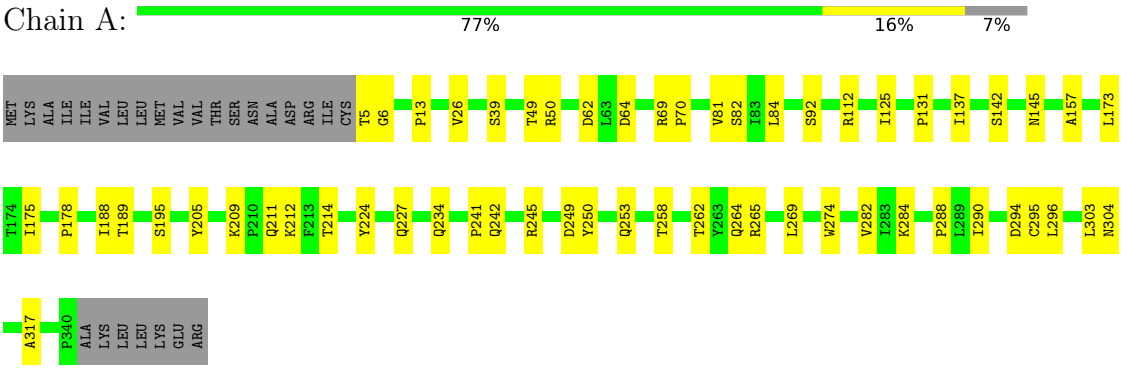
Mol	Chain	Residues	Atoms				AltConf
6	C	1	Total	C	N	O	0
			14	8	1	5	
6	E	1	Total	C	N	O	0
			14	8	1	5	
6	E	1	Total	C	N	O	0
			14	8	1	5	
6	E	1	Total	C	N	O	0
			14	8	1	5	
6	E	1	Total	C	N	O	0
			14	8	1	5	

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.

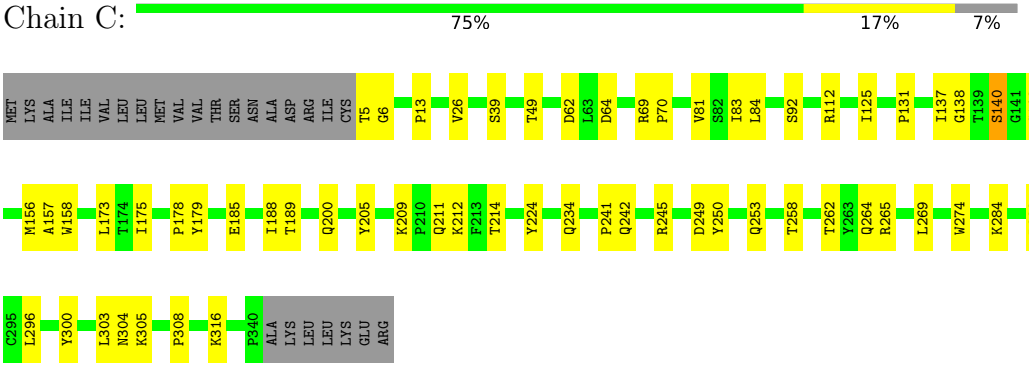
• Molecule 1: Hemagglutinin HA1 chain

Chain A:



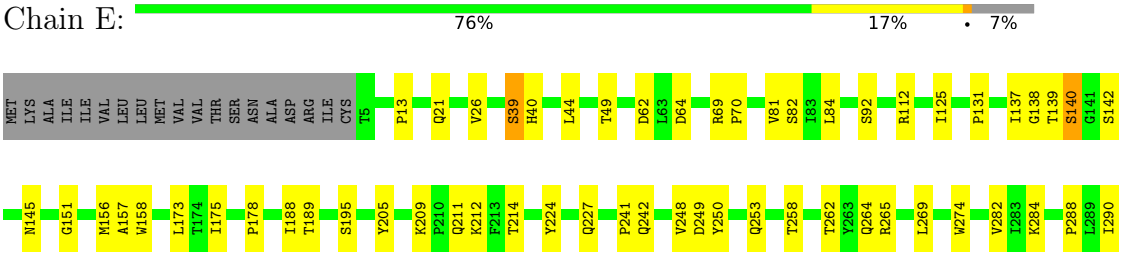
• Molecule 1: Hemagglutinin HA1 chain

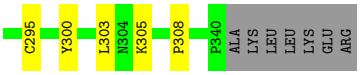
Chain C:



• Molecule 1: Hemagglutinin HA1 chain

Chain E:

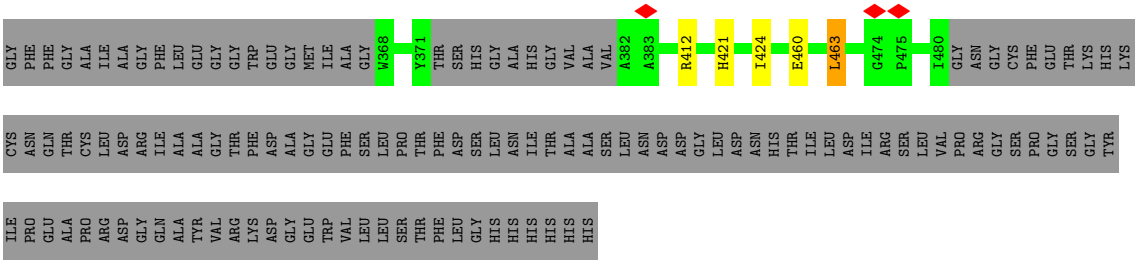




• Molecule 2: Hemagglutinin HA2 chain

Chain B:

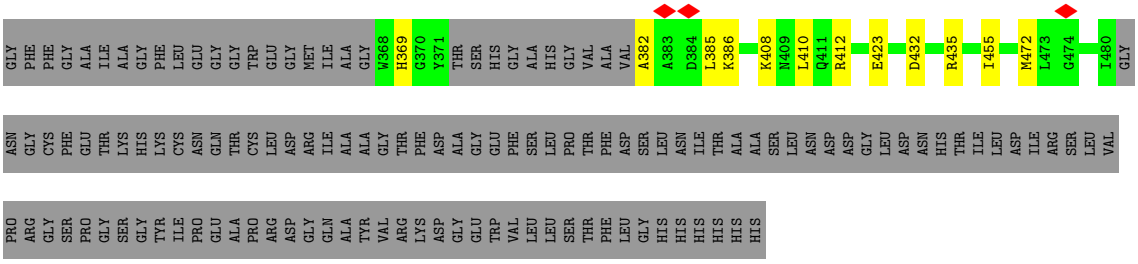




• Molecule 2: Hemagglutinin HA2 chain

Chain D:

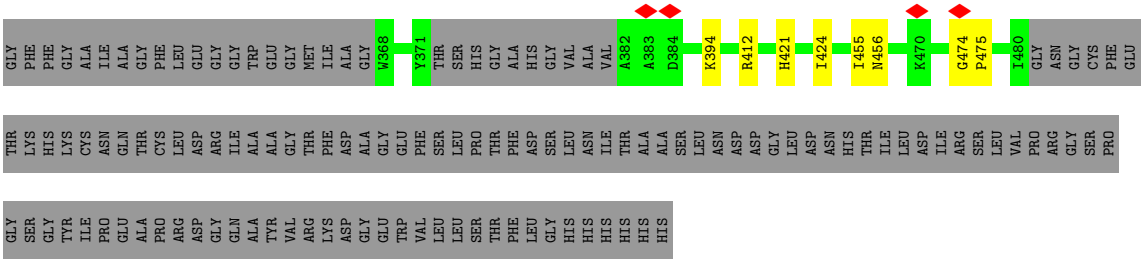




• Molecule 2: Hemagglutinin HA2 chain

Chain F:

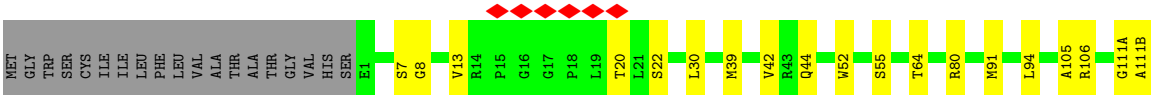


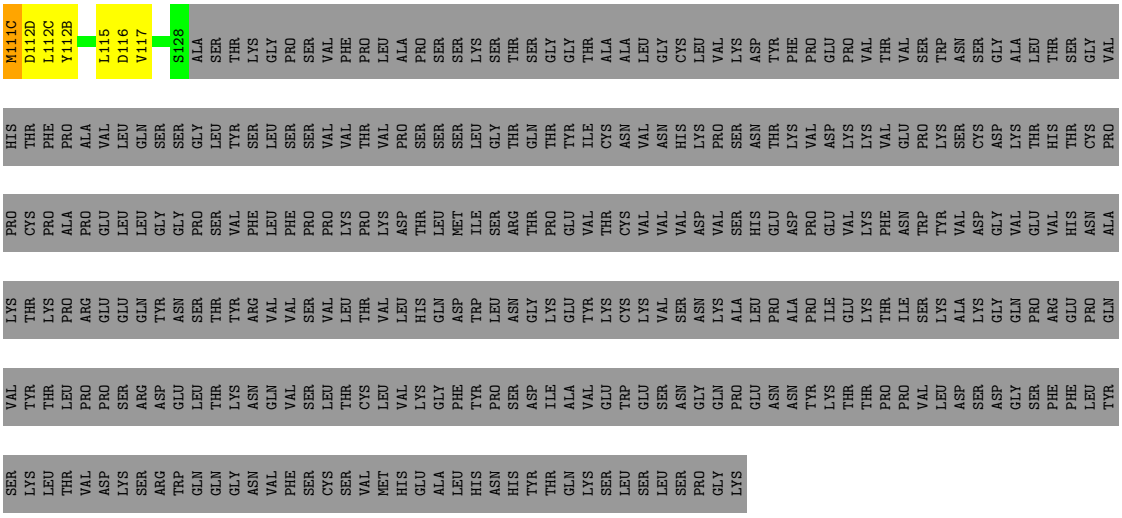


• Molecule 3: FV2DP1-1B heavy chain

Chain H:

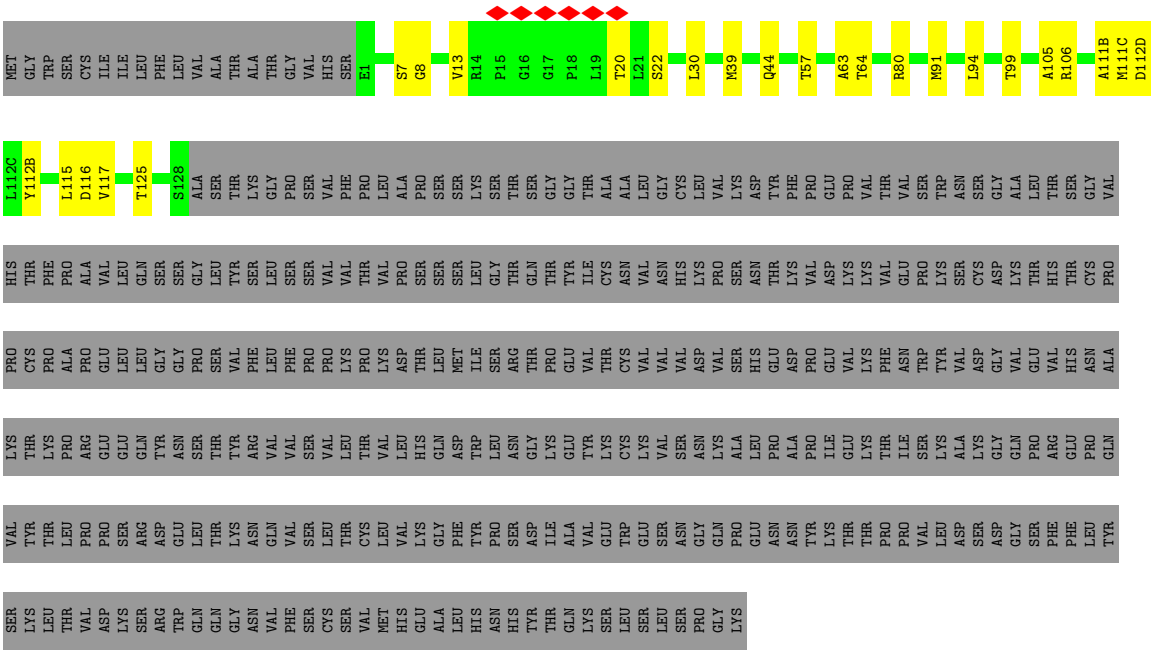






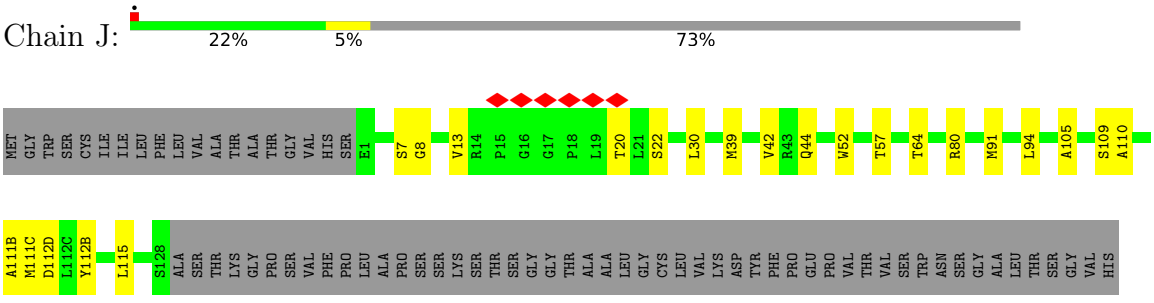
• Molecule 3: FV2DP1-1B heavy chain

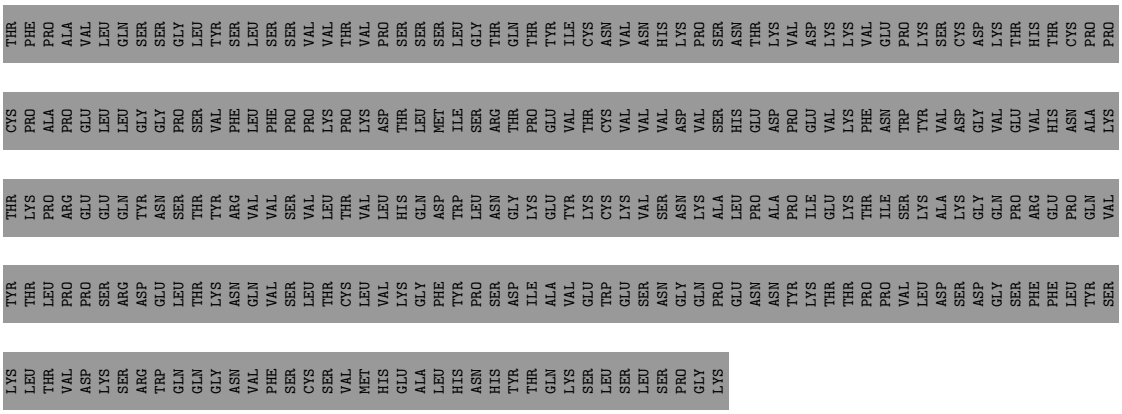
Chain G:



• Molecule 3: FV2DP1-1B heavy chain

Chain J:

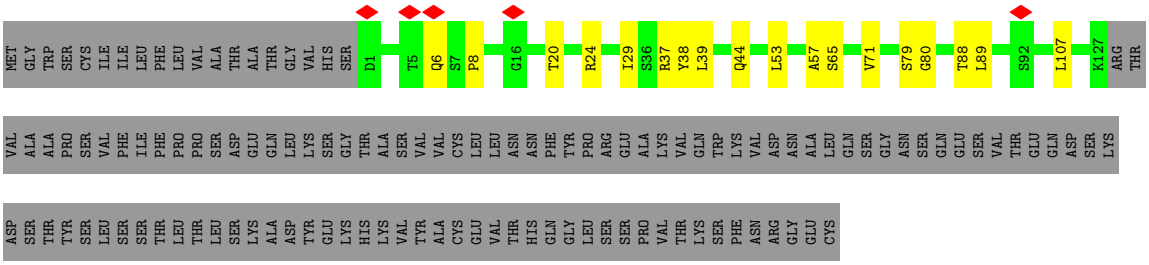




• Molecule 4: FV2DP1-1B light chain

Chain L:

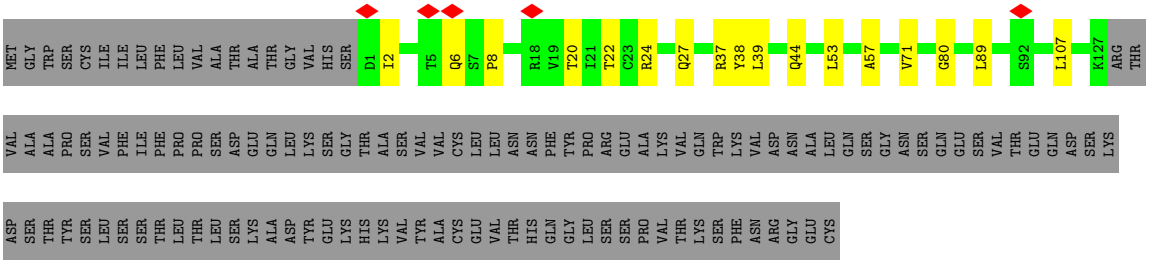




• Molecule 4: FV2DP1-1B light chain

Chain I:

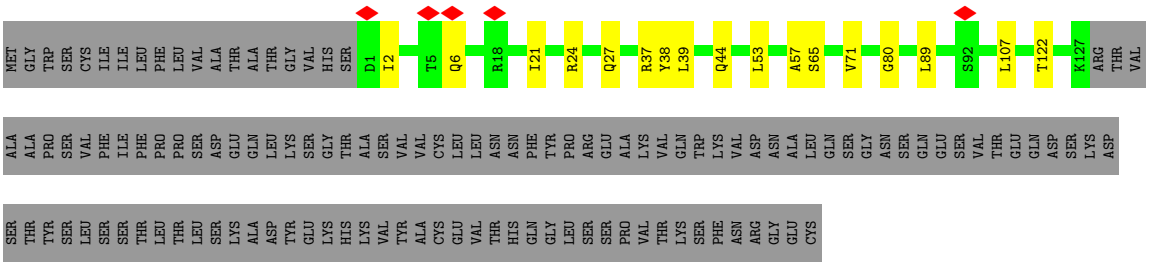




• Molecule 4: FV2DP1-1B light chain

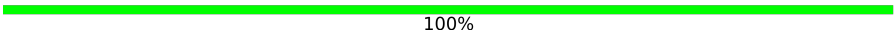
Chain K:





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

Chain M:





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

Chain N:





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

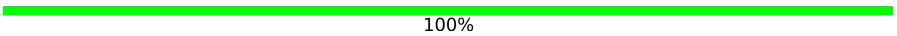
Chain O:





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

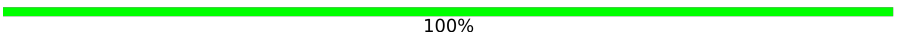
Chain P:





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

Chain Q:





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

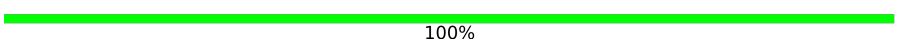
Chain R:





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

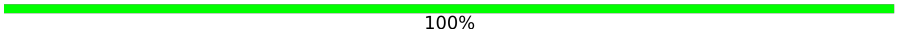
Chain S:





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

Chain T:





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

Chain U:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C3	Depositor
Number of particles used	167420	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	46.00	Depositor
Minimum defocus (nm)	400	Depositor
Maximum defocus (nm)	1400	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	4.238	Depositor
Minimum map value	-2.891	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.065	Depositor
Recommended contour level	0.19	Depositor
Map size (Å)	318.72, 318.72, 318.72	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.83, 0.83, 0.83	Depositor

5 Model quality

5.1 Standard geometry

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

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	0/2630	0.59	0/3574
1	C	0.51	0/2630	0.61	0/3574
1	E	0.51	0/2630	0.60	0/3574
2	B	0.35	0/812	0.66	0/1092
2	D	0.35	0/812	0.57	0/1092
2	F	0.34	0/812	0.56	0/1092
3	G	0.36	0/974	0.58	0/1327
3	H	0.36	0/974	0.58	0/1327
3	J	0.38	0/974	0.60	0/1327
4	I	0.31	0/841	0.65	0/1137
4	K	0.32	0/841	0.66	0/1137
4	L	0.32	0/841	0.66	0/1137
All	All	0.44	0/15771	0.61	0/21390

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
1	C	0	1
1	E	0	2
2	D	0	1
4	I	0	1
4	L	0	2
All	All	0	7

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	140	SER	Peptide
2	D	386	LYS	Peptide
1	E	139	THR	Peptide
1	E	140	SER	Peptide
4	L	8	PRO	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	2570	0	2563	33	0
1	C	2570	0	2563	37	0
1	E	2570	0	2563	37	0
2	B	807	0	818	4	0
2	D	807	0	818	8	0
2	F	807	0	818	6	0
3	G	955	0	923	15	0
3	H	955	0	923	16	0
3	J	955	0	923	14	0
4	I	822	0	805	10	0
4	K	822	0	805	11	0
4	L	822	0	805	10	0
5	M	28	0	25	0	0
5	N	28	0	25	0	0
5	O	28	0	25	1	0
5	P	28	0	25	0	0
5	Q	28	0	25	0	0
5	R	28	0	25	1	0
5	S	28	0	25	0	0
5	T	28	0	25	0	0
5	U	28	0	25	1	0
6	A	56	0	52	0	0
6	C	56	0	52	0	0
6	E	56	0	52	0	0
All	All	15882	0	15708	188	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 6.

The worst 5 of 188 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)
4:K:6:GLN:HG3	4:K:24:ARG:HB2	1.76	0.68
4:I:6:GLN:HG3	4:I:24:ARG:HB2	1.75	0.68
1:C:211:GLN:HB3	1:C:264:GLN:HB2	1.79	0.64
1:A:212:LYS:H	1:A:264:GLN:HE21	1.45	0.63
2:D:408:LYS:O	2:D:435:ARG:NH2	2.33	0.61

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	337/362 (93%)	324 (96%)	13 (4%)	0	100	100
1	C	337/362 (93%)	323 (96%)	14 (4%)	0	100	100
1	E	337/362 (93%)	323 (96%)	14 (4%)	0	100	100
2	B	99/235 (42%)	94 (95%)	5 (5%)	0	100	100
2	D	99/235 (42%)	94 (95%)	5 (5%)	0	100	100
2	F	99/235 (42%)	95 (96%)	4 (4%)	0	100	100
3	G	125/476 (26%)	112 (90%)	12 (10%)	1 (1%)	16	30
3	H	125/476 (26%)	115 (92%)	9 (7%)	1 (1%)	16	30
3	J	125/476 (26%)	112 (90%)	12 (10%)	1 (1%)	16	30
4	I	104/232 (45%)	88 (85%)	16 (15%)	0	100	100
4	K	104/232 (45%)	88 (85%)	16 (15%)	0	100	100
4	L	104/232 (45%)	88 (85%)	16 (15%)	0	100	100
All	All	1995/3915 (51%)	1856 (93%)	136 (7%)	3 (0%)	44	64

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	H	111(C)	MET
3	G	111(C)	MET
3	J	111(C)	MET

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	287/307 (94%)	285 (99%)	2 (1%)	76 86
1	C	287/307 (94%)	285 (99%)	2 (1%)	76 86
1	E	287/307 (94%)	285 (99%)	2 (1%)	76 86
2	B	91/191 (48%)	90 (99%)	1 (1%)	65 79
2	D	91/191 (48%)	91 (100%)	0	100 100
2	F	91/191 (48%)	91 (100%)	0	100 100
3	G	101/415 (24%)	100 (99%)	1 (1%)	68 81
3	H	101/415 (24%)	100 (99%)	1 (1%)	68 81
3	J	101/415 (24%)	101 (100%)	0	100 100
4	I	91/202 (45%)	91 (100%)	0	100 100
4	K	91/202 (45%)	91 (100%)	0	100 100
4	L	91/202 (45%)	91 (100%)	0	100 100
All	All	1710/3345 (51%)	1701 (100%)	9 (0%)	81 89

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	H	116	ASP
3	G	116	ASP
1	C	39[A]	SER
1	C	39[B]	SER
1	E	39[A]	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

Mol	Chain	Res	Type
3	G	92	ASN
4	I	27	GLN
4	K	68	GLN
1	C	253	GLN
1	C	242	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)

18 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	M	1	1,5	14,14,15	0.28	0	17,19,21	0.55	0
5	NAG	M	2	5	14,14,15	0.35	0	17,19,21	0.60	0
5	NAG	N	1	1,5	14,14,15	0.22	0	17,19,21	0.62	1 (5%)
5	NAG	N	2	5	14,14,15	0.27	0	17,19,21	0.46	0
5	NAG	O	1	1,5	14,14,15	0.31	0	17,19,21	0.59	0
5	NAG	O	2	5	14,14,15	0.30	0	17,19,21	0.55	0
5	NAG	P	1	1,5	14,14,15	0.28	0	17,19,21	0.58	0
5	NAG	P	2	5	14,14,15	0.32	0	17,19,21	0.62	0
5	NAG	Q	1	1,5	14,14,15	0.23	0	17,19,21	0.60	0
5	NAG	Q	2	5	14,14,15	0.29	0	17,19,21	0.45	0
5	NAG	R	1	1,5	14,14,15	0.36	0	17,19,21	0.59	0
5	NAG	R	2	5	14,14,15	0.30	0	17,19,21	0.56	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
5	NAG	S	1	1,5	14,14,15	0.27	0	17,19,21	0.56	0
5	NAG	S	2	5	14,14,15	0.38	0	17,19,21	0.59	0
5	NAG	T	1	1,5	14,14,15	0.25	0	17,19,21	0.61	0
5	NAG	T	2	5	14,14,15	0.33	0	17,19,21	0.46	0
5	NAG	U	1	1,5	14,14,15	0.31	0	17,19,21	0.57	0
5	NAG	U	2	5	14,14,15	0.29	0	17,19,21	0.54	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	M	1	1,5	-	1/6/23/26	0/1/1/1
5	NAG	M	2	5	-	0/6/23/26	0/1/1/1
5	NAG	N	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	N	2	5	-	0/6/23/26	0/1/1/1
5	NAG	O	1	1,5	-	1/6/23/26	0/1/1/1
5	NAG	O	2	5	-	2/6/23/26	0/1/1/1
5	NAG	P	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	P	2	5	-	0/6/23/26	0/1/1/1
5	NAG	Q	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	Q	2	5	-	0/6/23/26	0/1/1/1
5	NAG	R	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	R	2	5	-	2/6/23/26	0/1/1/1
5	NAG	S	1	1,5	-	1/6/23/26	0/1/1/1
5	NAG	S	2	5	-	0/6/23/26	0/1/1/1
5	NAG	T	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	T	2	5	-	0/6/23/26	0/1/1/1
5	NAG	U	1	1,5	-	1/6/23/26	0/1/1/1
5	NAG	U	2	5	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	N	1	NAG	C1-O5-C5	2.03	114.94	112.19

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	Q	1	NAG	O5-C5-C6-O6
5	Q	1	NAG	C4-C5-C6-O6
5	N	1	NAG	O5-C5-C6-O6
5	O	2	NAG	C4-C5-C6-O6
5	N	1	NAG	C4-C5-C6-O6

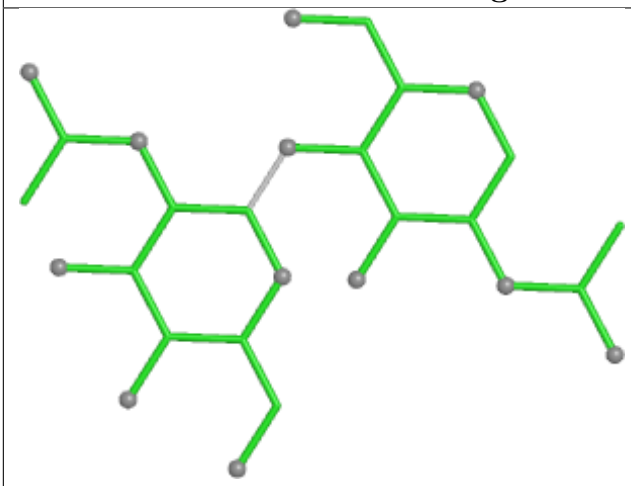
There are no ring outliers.

3 monomers are involved in 3 short contacts:

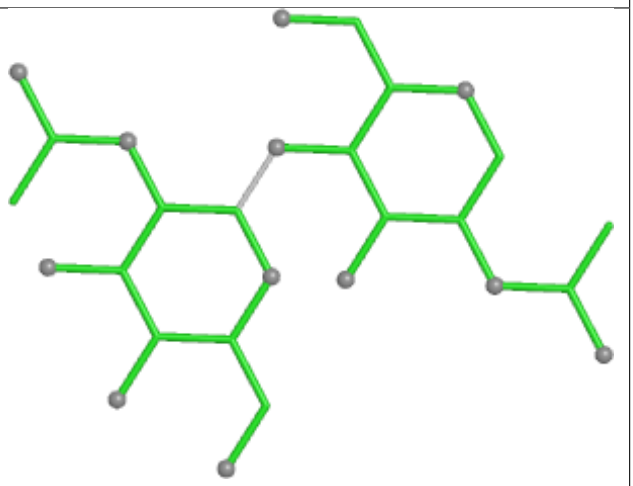
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	R	2	NAG	1	0
5	U	2	NAG	1	0
5	O	2	NAG	1	0

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

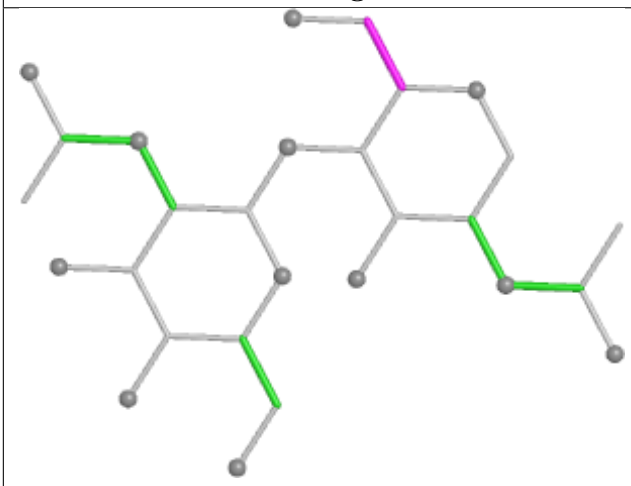
Oligosaccharide Chain M



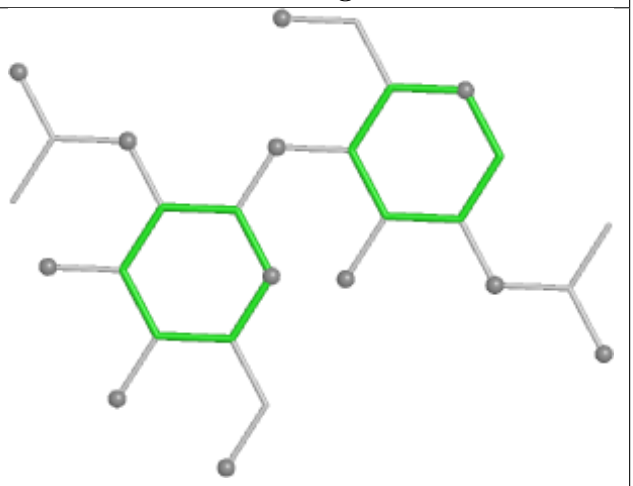
Bond lengths



Bond angles

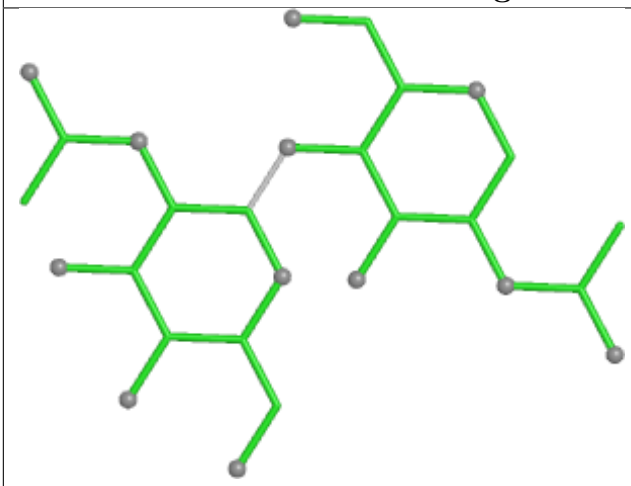


Torsions

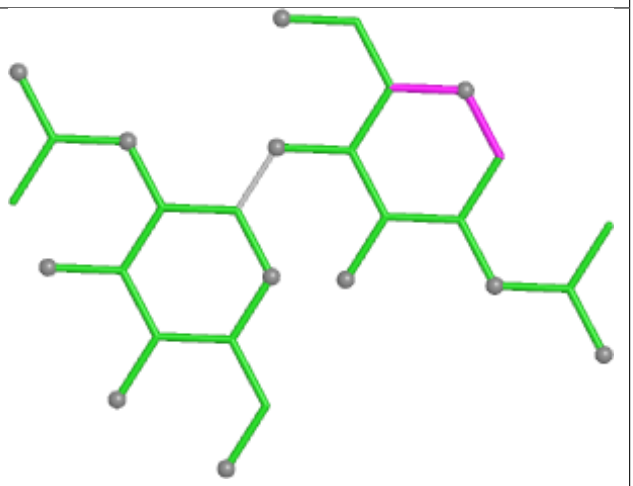


Rings

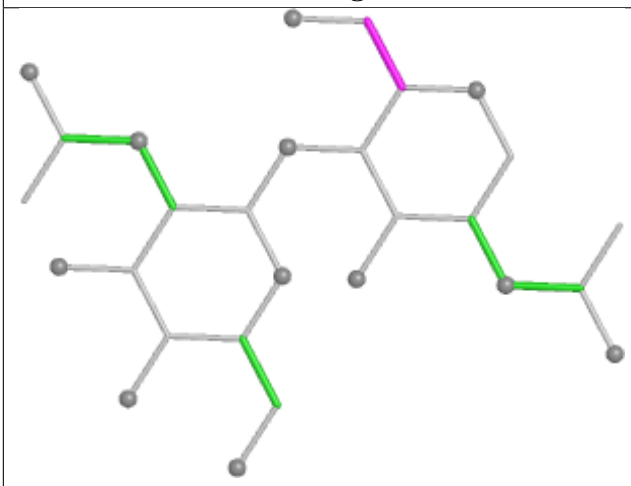
Oligosaccharide Chain N



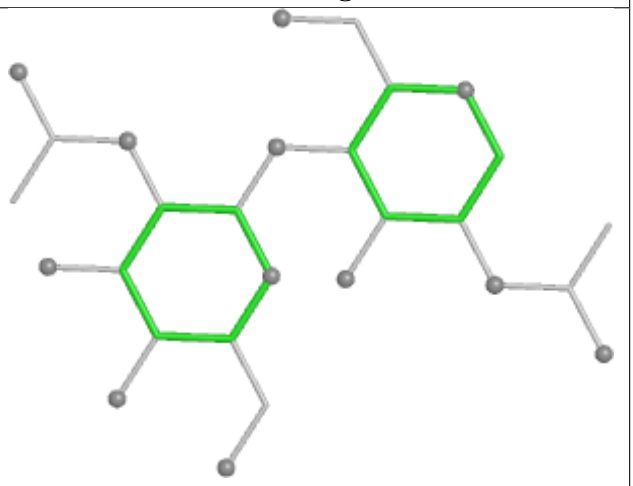
Bond lengths



Bond angles

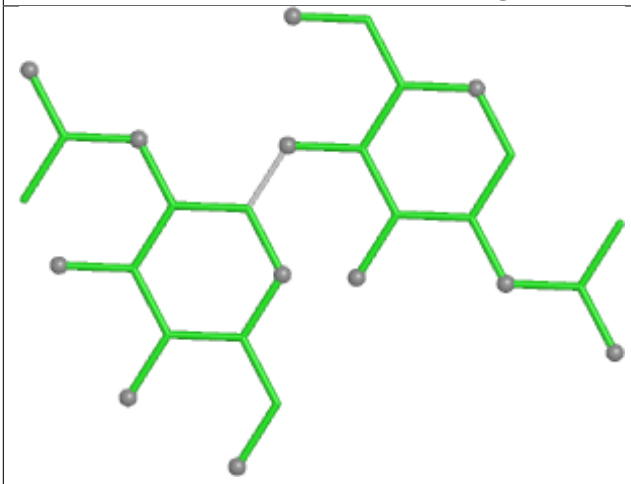


Torsions

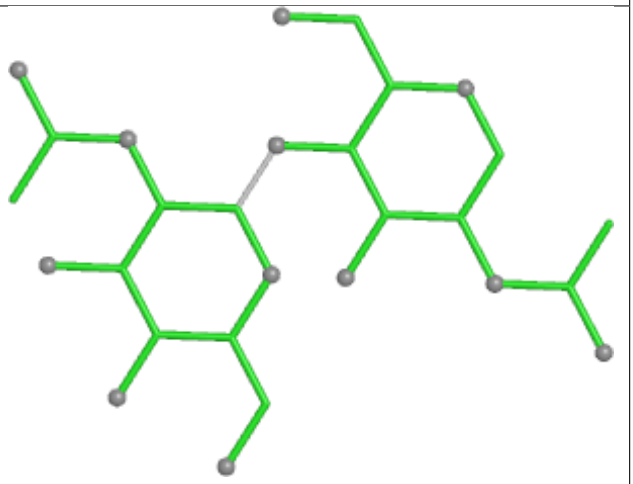


Rings

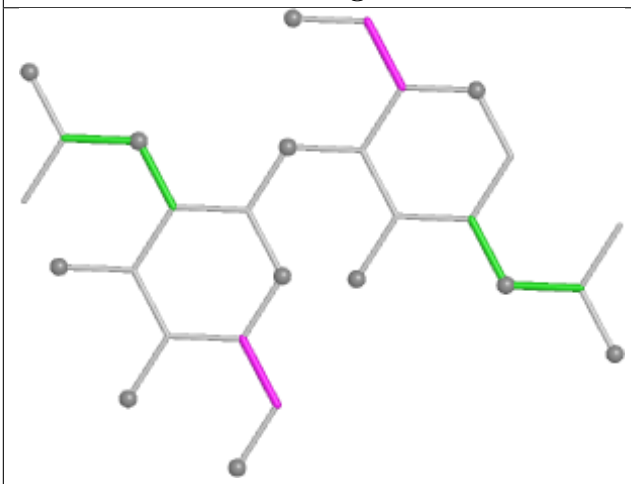
Oligosaccharide Chain O



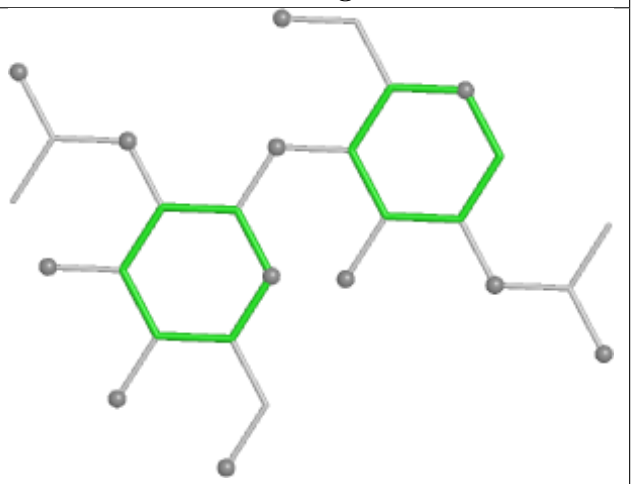
Bond lengths



Bond angles

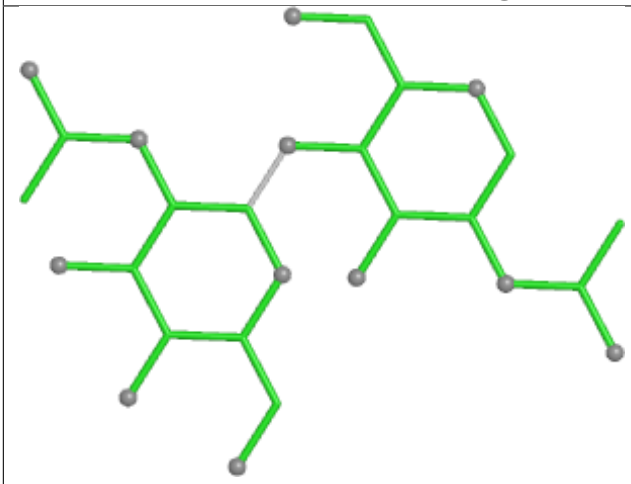


Torsions

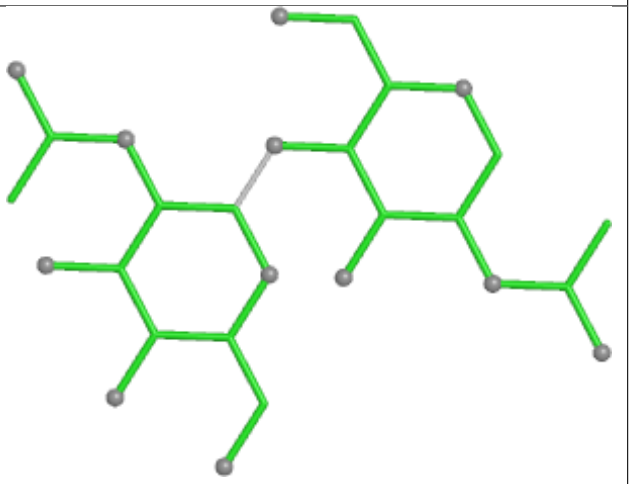


Rings

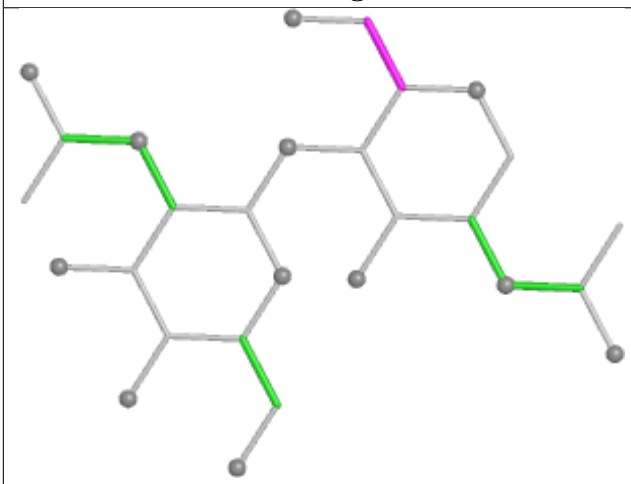
Oligosaccharide Chain P



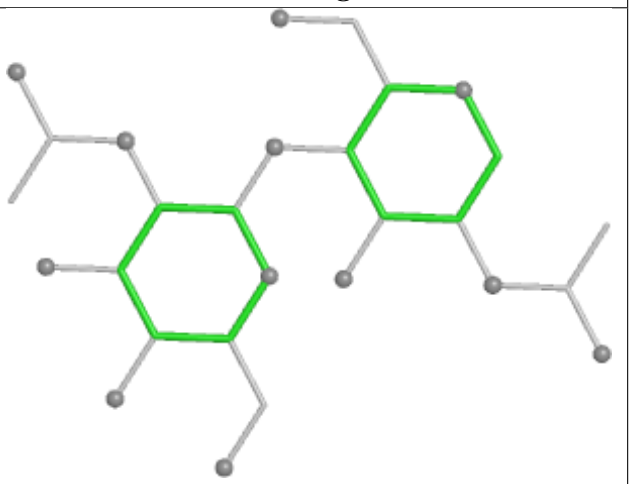
Bond lengths



Bond angles

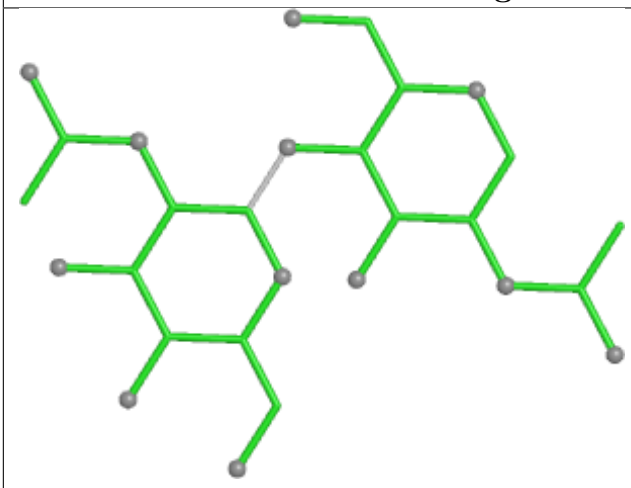


Torsions

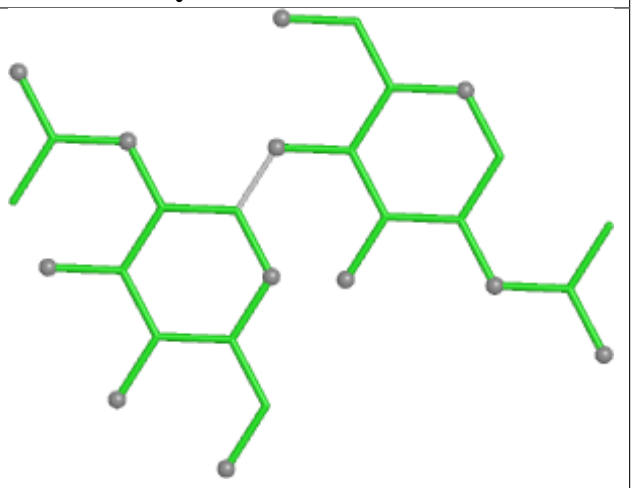


Rings

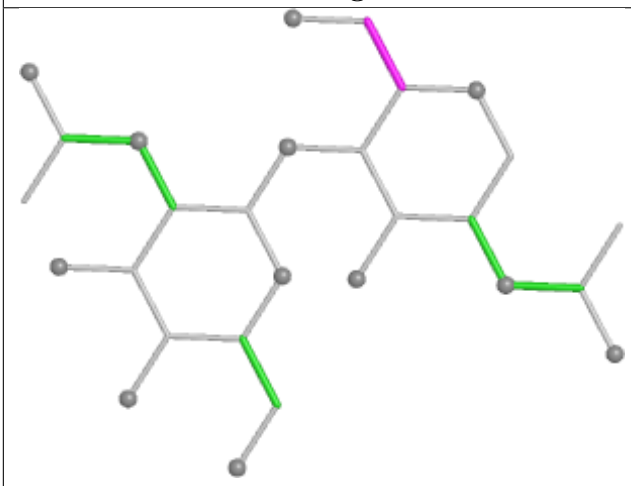
Oligosaccharide Chain Q



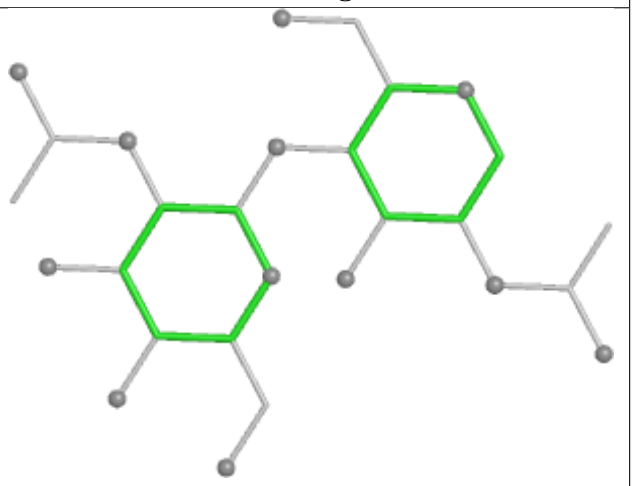
Bond lengths



Bond angles

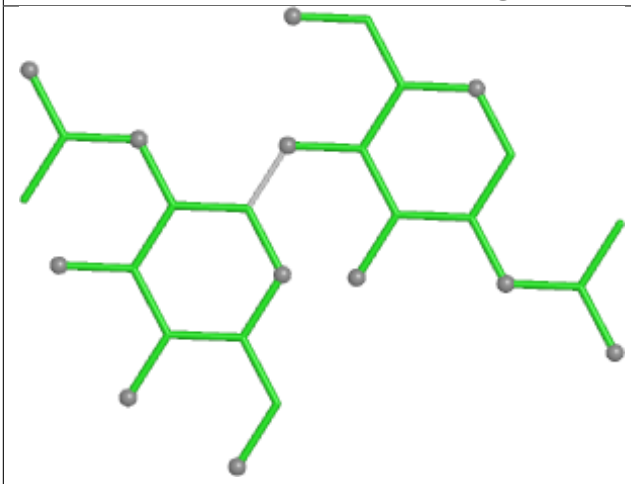


Torsions

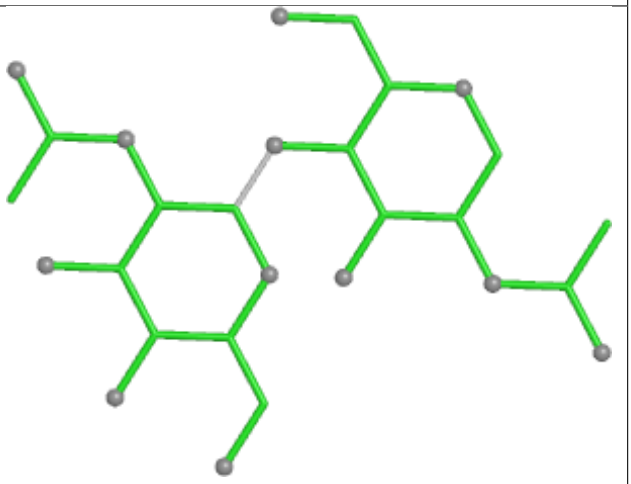


Rings

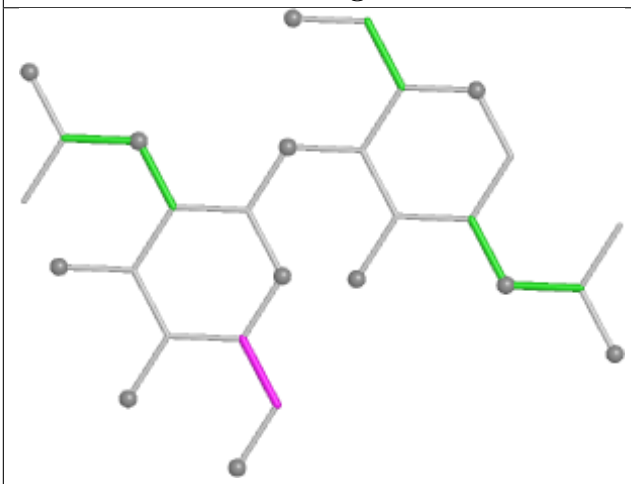
Oligosaccharide Chain R



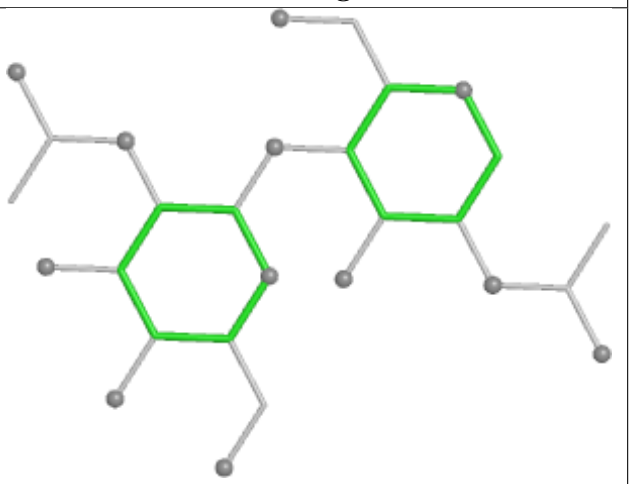
Bond lengths



Bond angles

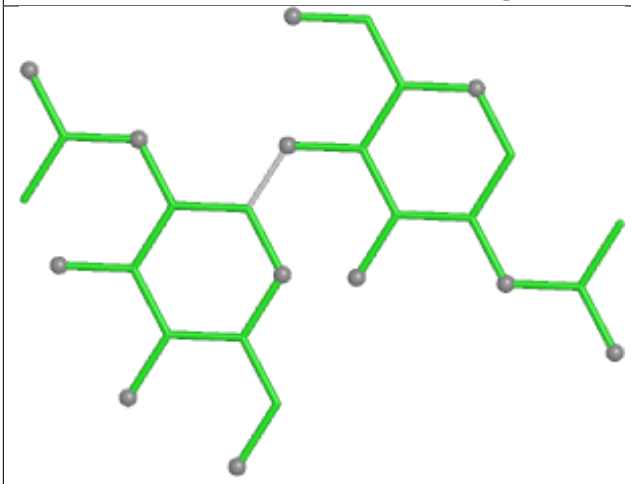


Torsions

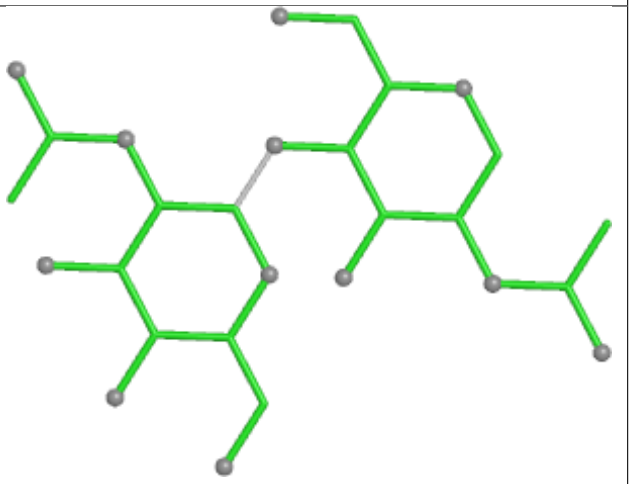


Rings

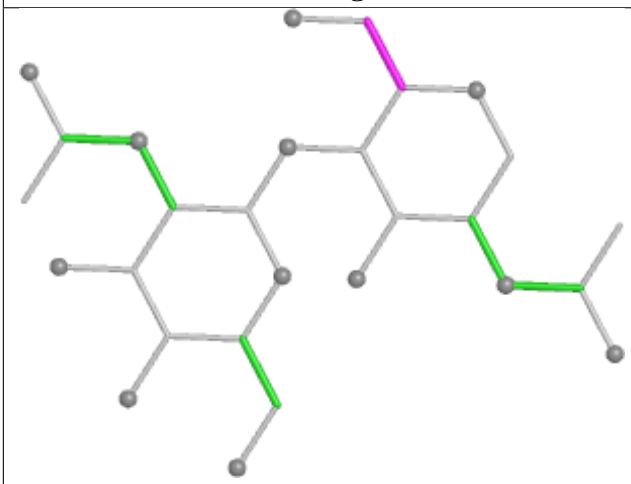
Oligosaccharide Chain S



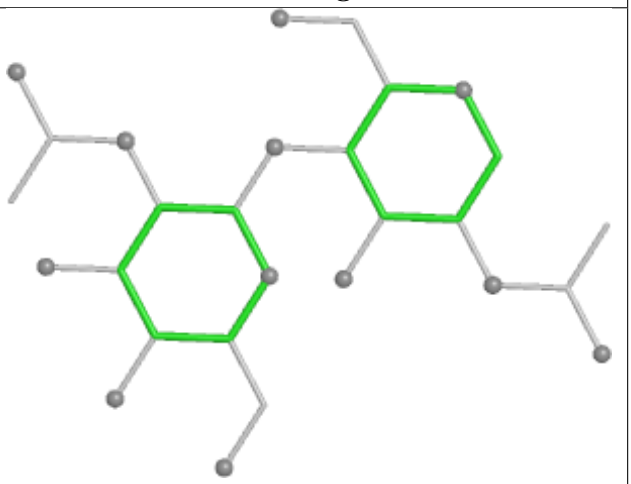
Bond lengths



Bond angles

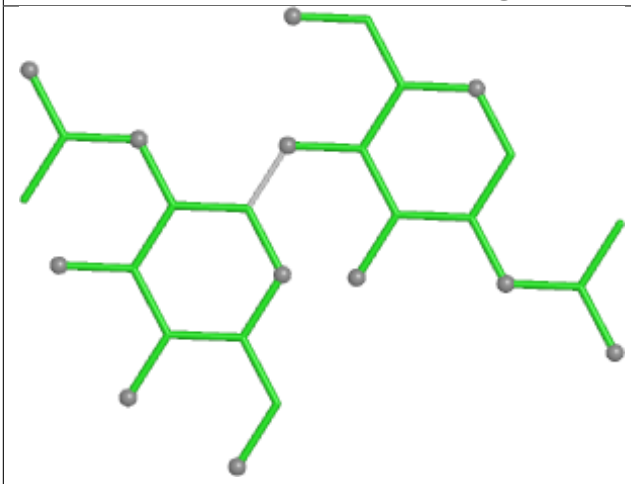


Torsions

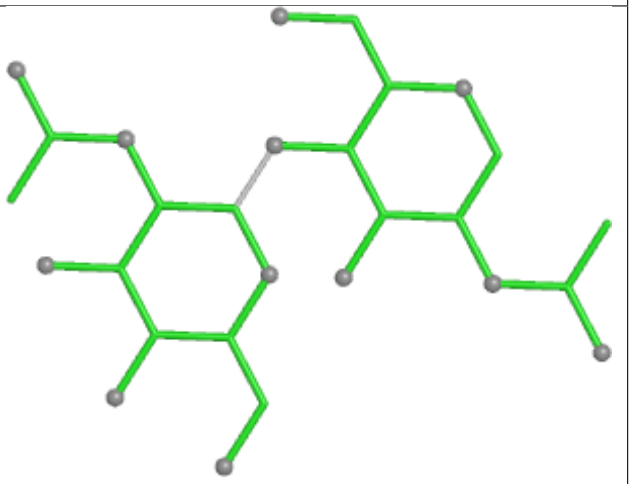


Rings

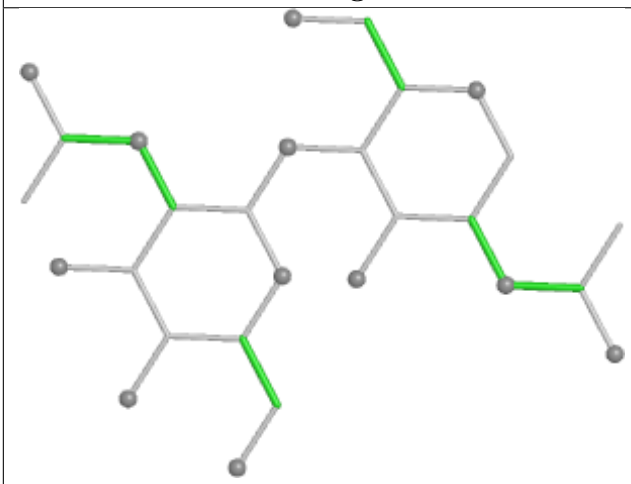
Oligosaccharide Chain T



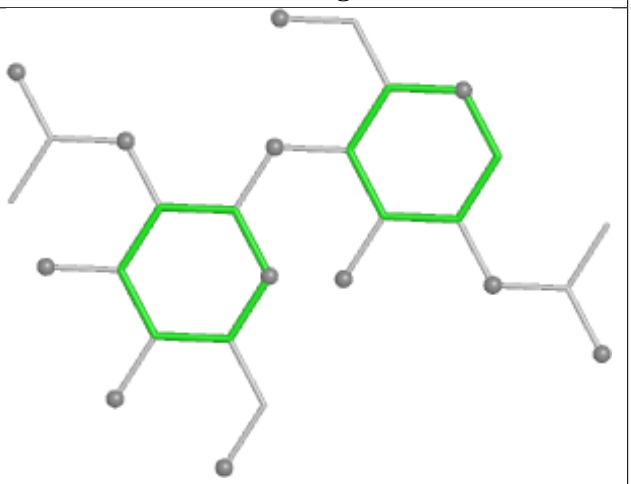
Bond lengths



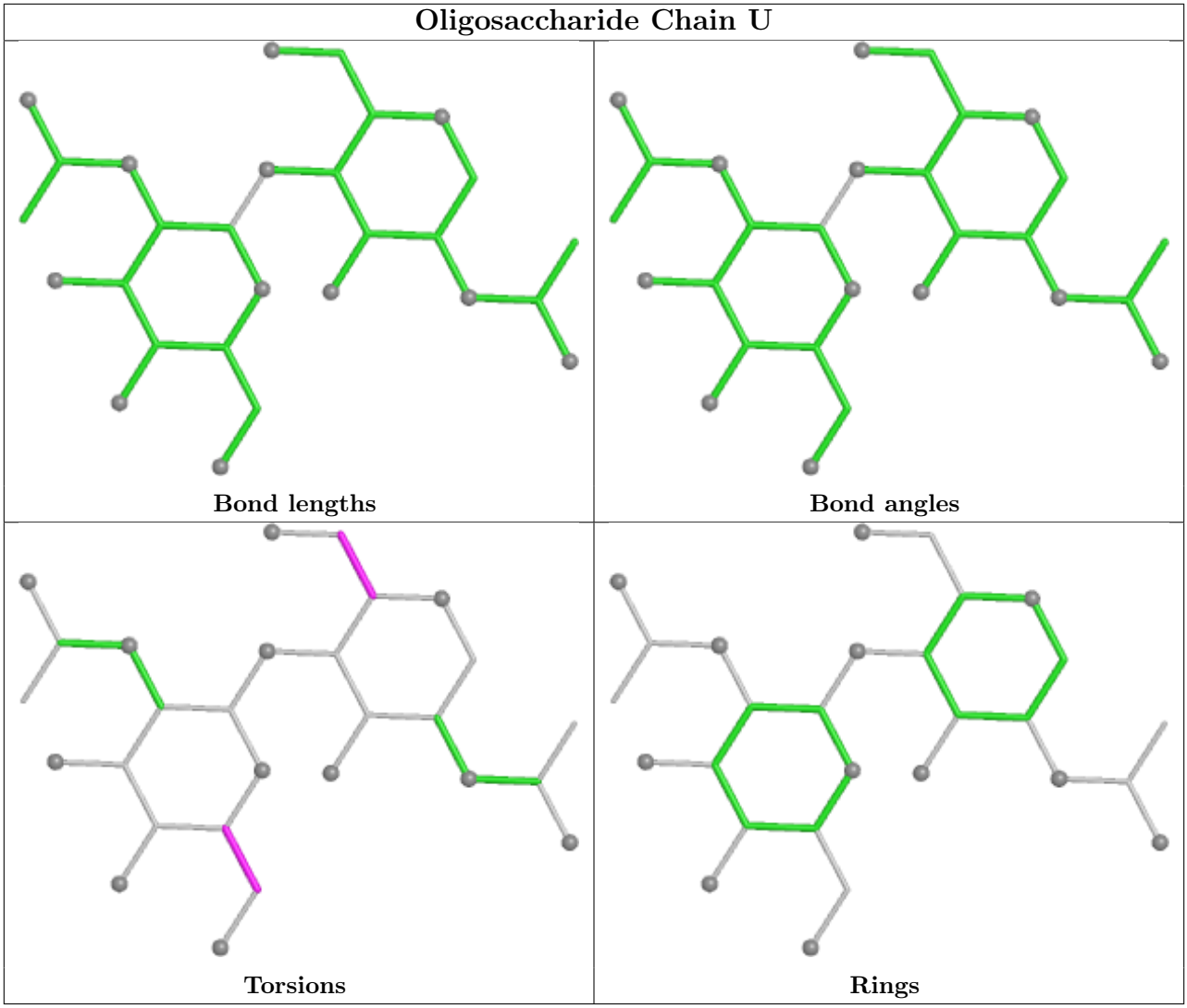
Bond angles



Torsions



Rings



5.6 Ligand geometry (i)

12 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	$\#\|Z\| > 2$
6	NAG	E	401	1	14,14,15	0.20	0	17,19,21	0.75	1 (5%)
6	NAG	A	402	1	14,14,15	0.35	0	17,19,21	0.52	0
6	NAG	A	401	1	14,14,15	0.17	0	17,19,21	0.71	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
6	NAG	E	404	1	14,14,15	0.29	0	17,19,21	0.47	0
6	NAG	C	404	1	14,14,15	0.37	0	17,19,21	0.55	0
6	NAG	C	402	1	14,14,15	0.34	0	17,19,21	0.51	0
6	NAG	C	403	1	14,14,15	0.32	0	17,19,21	0.53	0
6	NAG	A	404	1	14,14,15	0.53	0	17,19,21	0.70	1 (5%)
6	NAG	A	403	1	14,14,15	0.33	0	17,19,21	0.54	0
6	NAG	C	401	1	14,14,15	0.17	0	17,19,21	0.73	1 (5%)
6	NAG	E	403	1	14,14,15	0.36	0	17,19,21	0.52	0
6	NAG	E	402	1	14,14,15	0.36	0	17,19,21	0.53	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	NAG	E	401	1	-	4/6/23/26	0/1/1/1
6	NAG	A	402	1	-	1/6/23/26	0/1/1/1
6	NAG	A	401	1	-	4/6/23/26	0/1/1/1
6	NAG	E	404	1	-	0/6/23/26	0/1/1/1
6	NAG	C	404	1	-	0/6/23/26	0/1/1/1
6	NAG	C	402	1	-	1/6/23/26	0/1/1/1
6	NAG	C	403	1	-	2/6/23/26	0/1/1/1
6	NAG	A	404	1	-	0/6/23/26	0/1/1/1
6	NAG	A	403	1	-	2/6/23/26	0/1/1/1
6	NAG	C	401	1	-	4/6/23/26	0/1/1/1
6	NAG	E	403	1	-	2/6/23/26	0/1/1/1
6	NAG	E	402	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	404	NAG	C1-O5-C5	2.44	115.50	112.19
6	E	401	NAG	C1-O5-C5	2.40	115.44	112.19
6	C	401	NAG	C1-O5-C5	2.32	115.33	112.19
6	A	401	NAG	C1-O5-C5	2.26	115.25	112.19

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	403	NAG	O5-C5-C6-O6
6	C	403	NAG	O5-C5-C6-O6
6	C	401	NAG	O5-C5-C6-O6
6	A	401	NAG	O5-C5-C6-O6
6	A	403	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

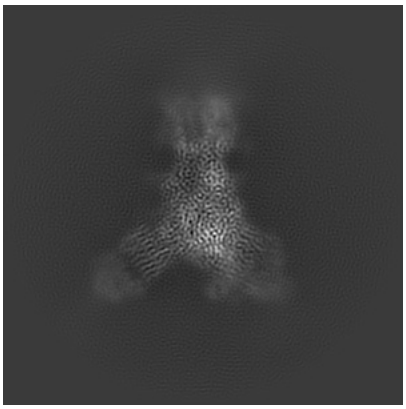
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-66600. These allow visual inspection of the internal detail of the map and identification of artifacts.

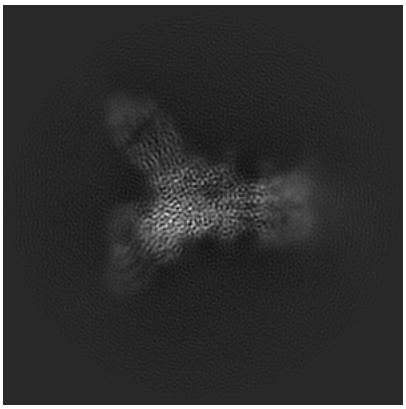
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

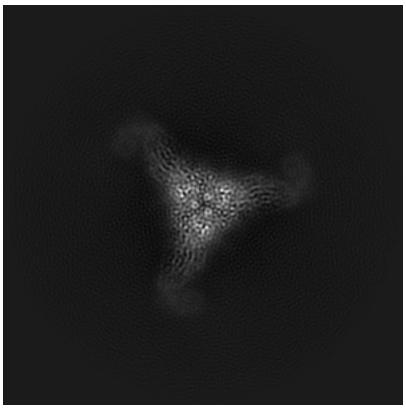
6.1.1 Primary map



X

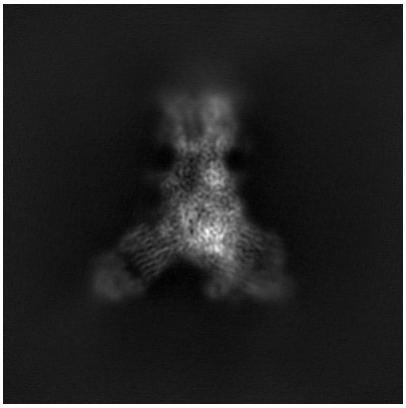


Y

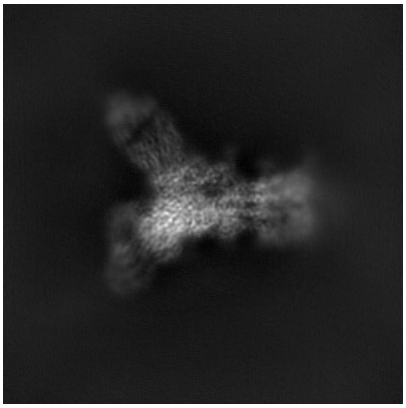


Z

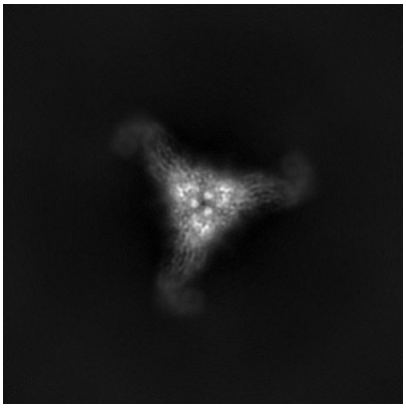
6.1.2 Raw map



X



Y

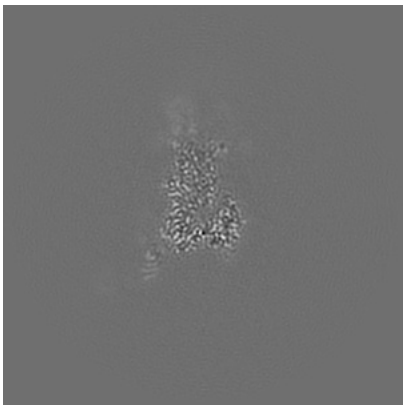


Z

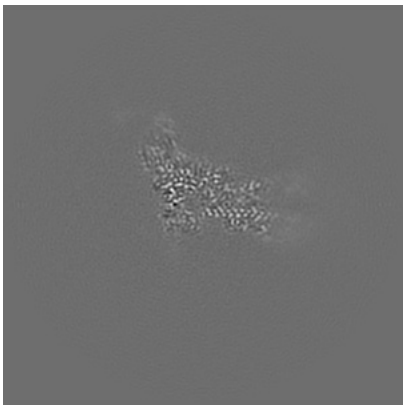
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

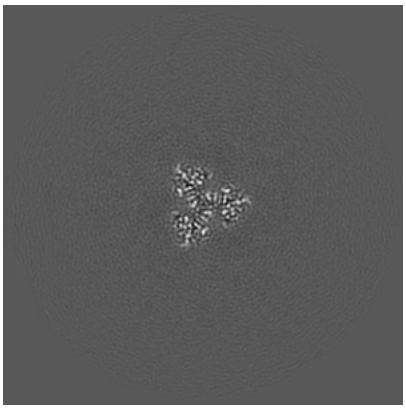
6.2.1 Primary map



X Index: 192

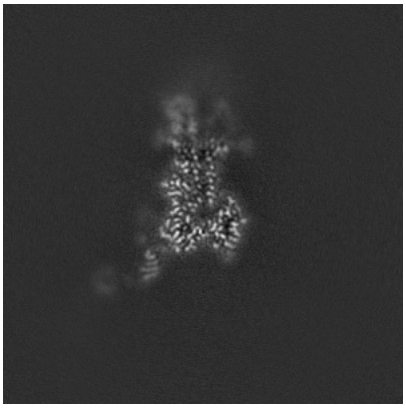


Y Index: 192

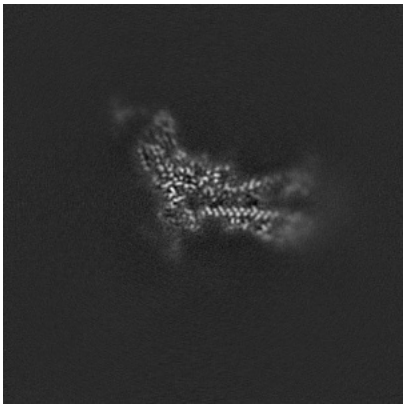


Z Index: 192

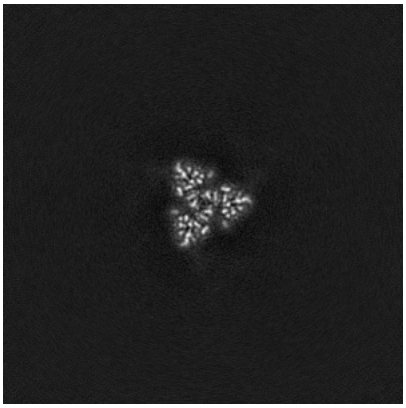
6.2.2 Raw map



X Index: 192



Y Index: 192

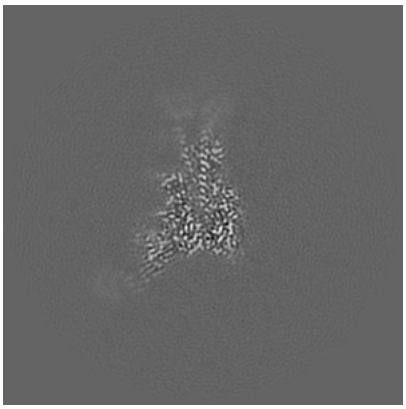


Z Index: 192

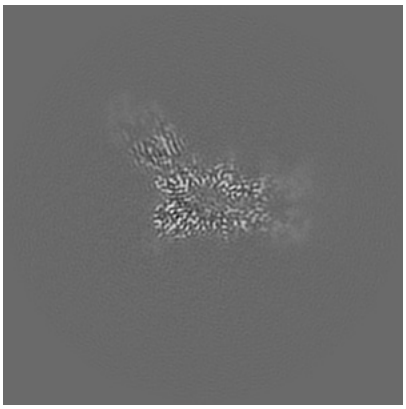
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

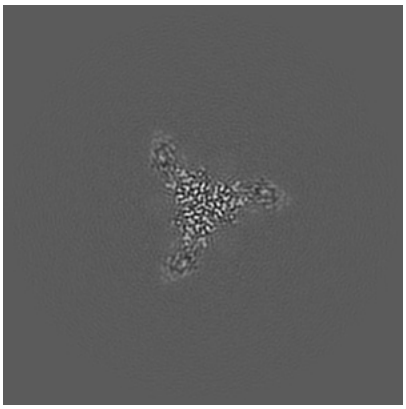
6.3.1 Primary map



X Index: 182

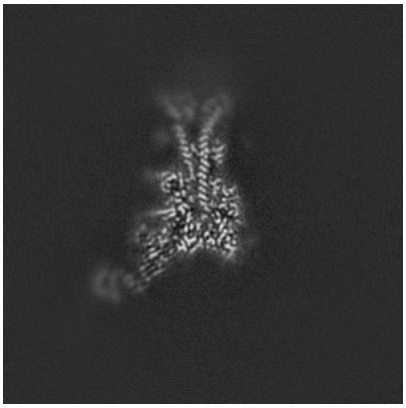


Y Index: 205

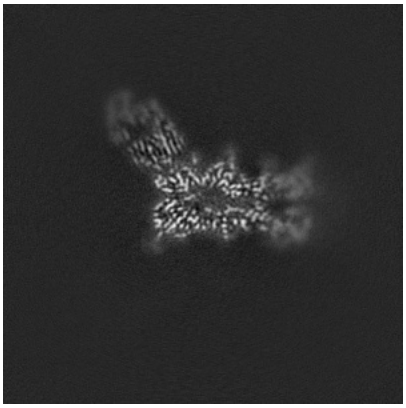


Z Index: 161

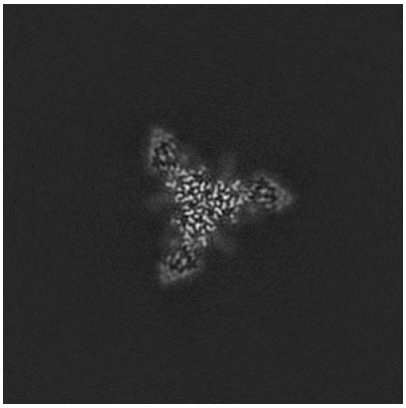
6.3.2 Raw map



X Index: 183



Y Index: 205

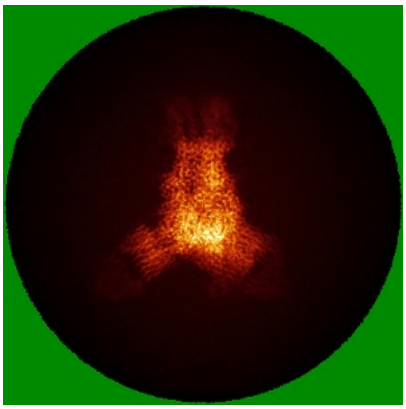


Z Index: 161

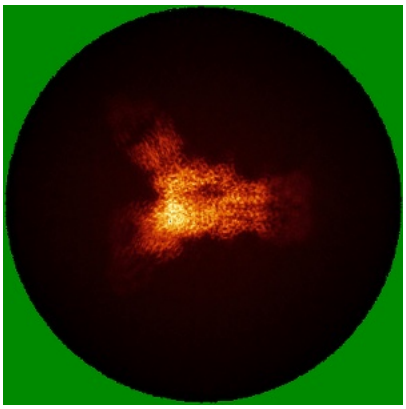
The images above show the largest variance slices of the map in three orthogonal directions.

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

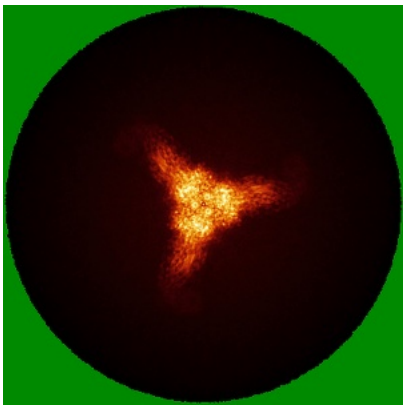
6.4.1 Primary map



X

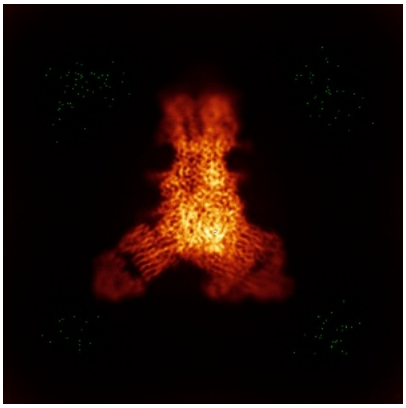


Y

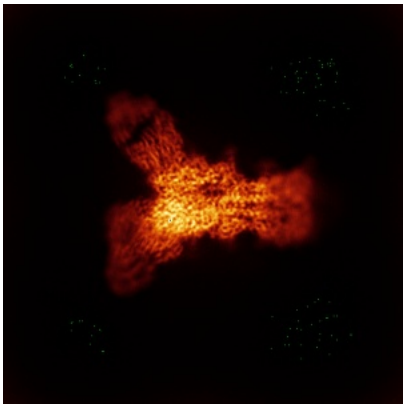


Z

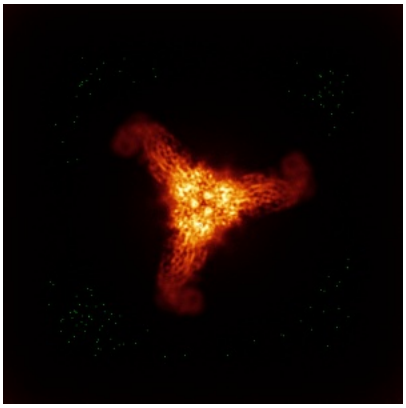
6.4.2 Raw map



X



Y



Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.19. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

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

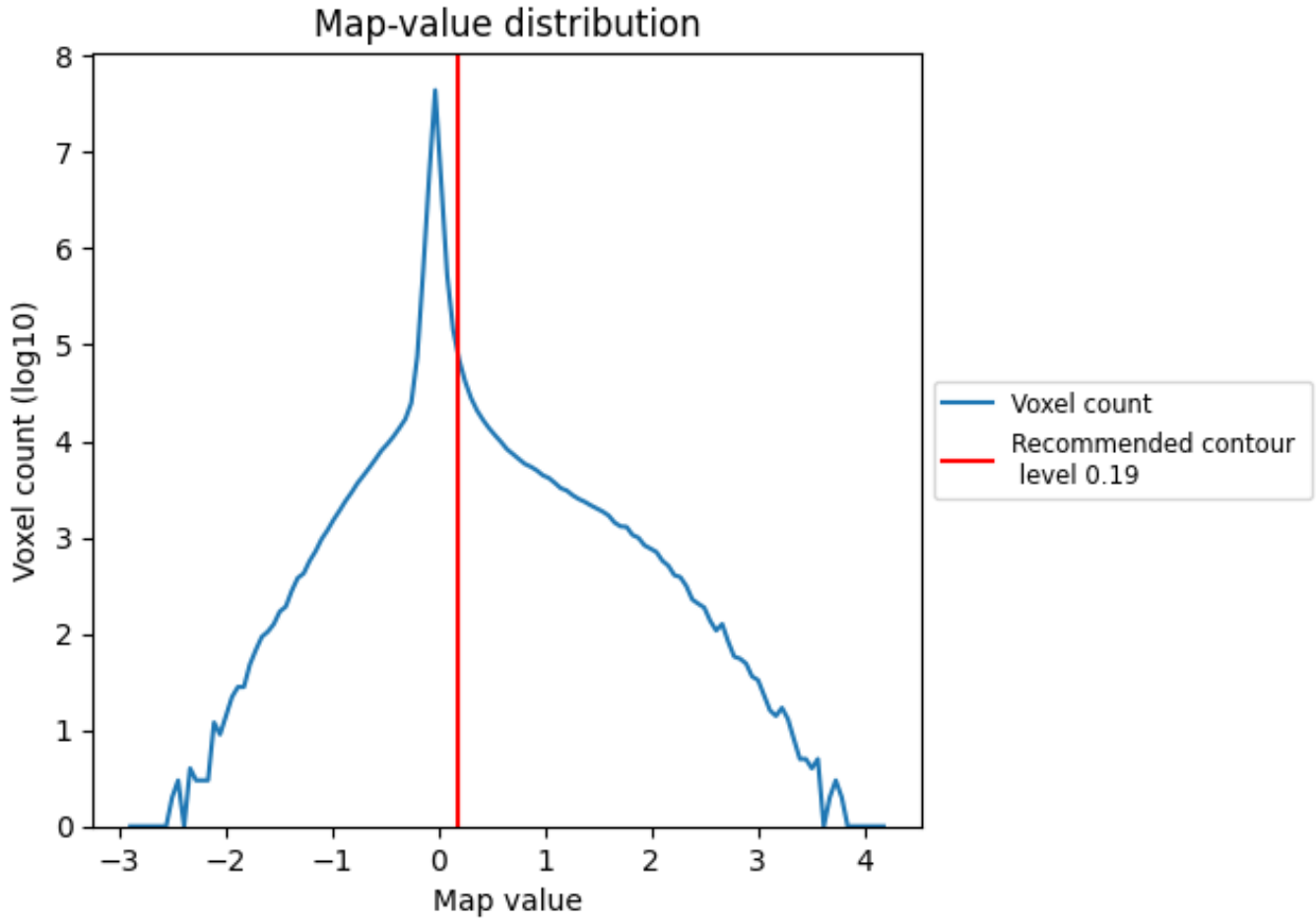
6.6 Mask visualisation (i)

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

7 Map analysis

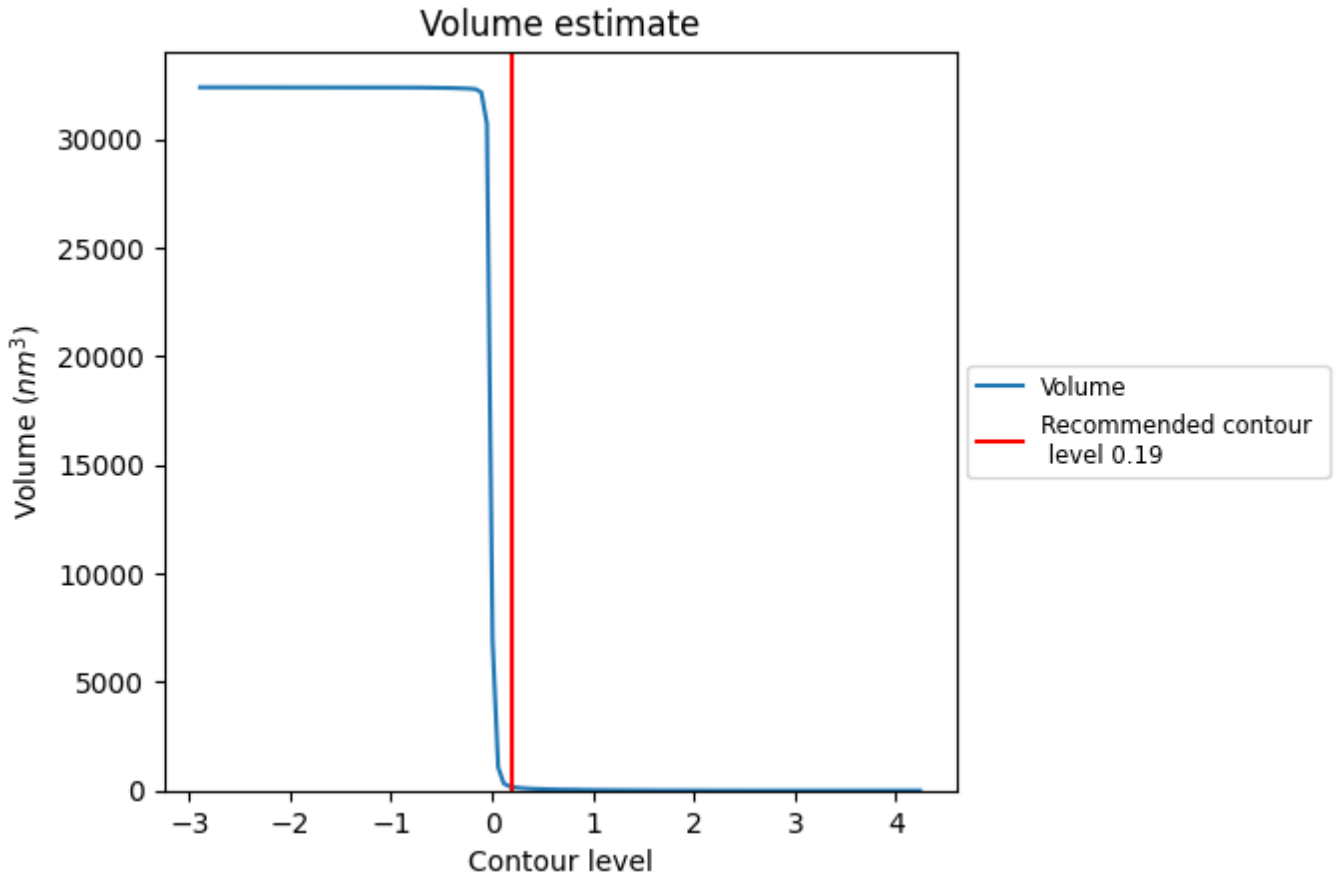
This section contains the results of statistical analysis of the map.

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.

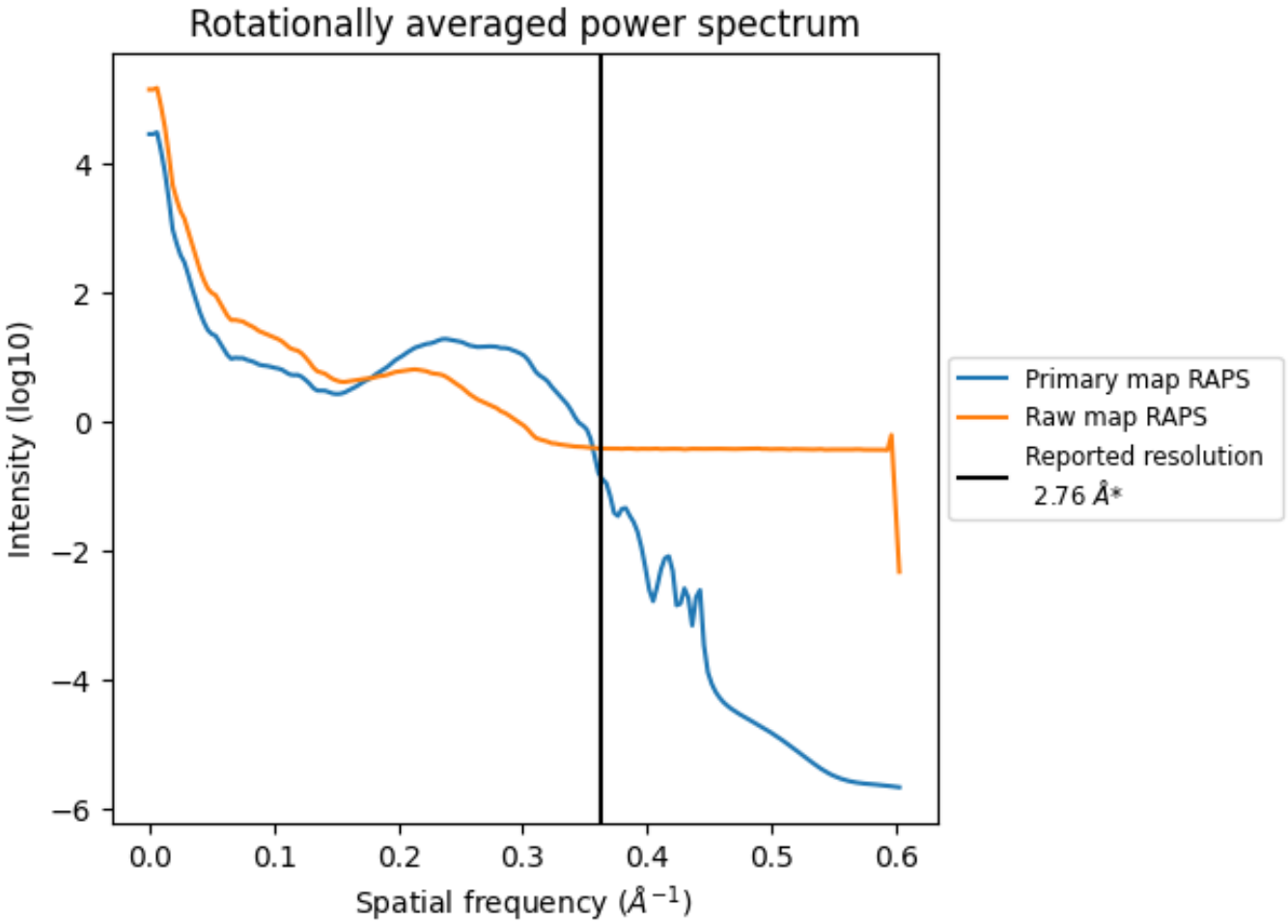
7.2 Volume estimate (i)



The volume at the recommended contour level is 180 nm^3; this corresponds to an approximate mass of 162 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)

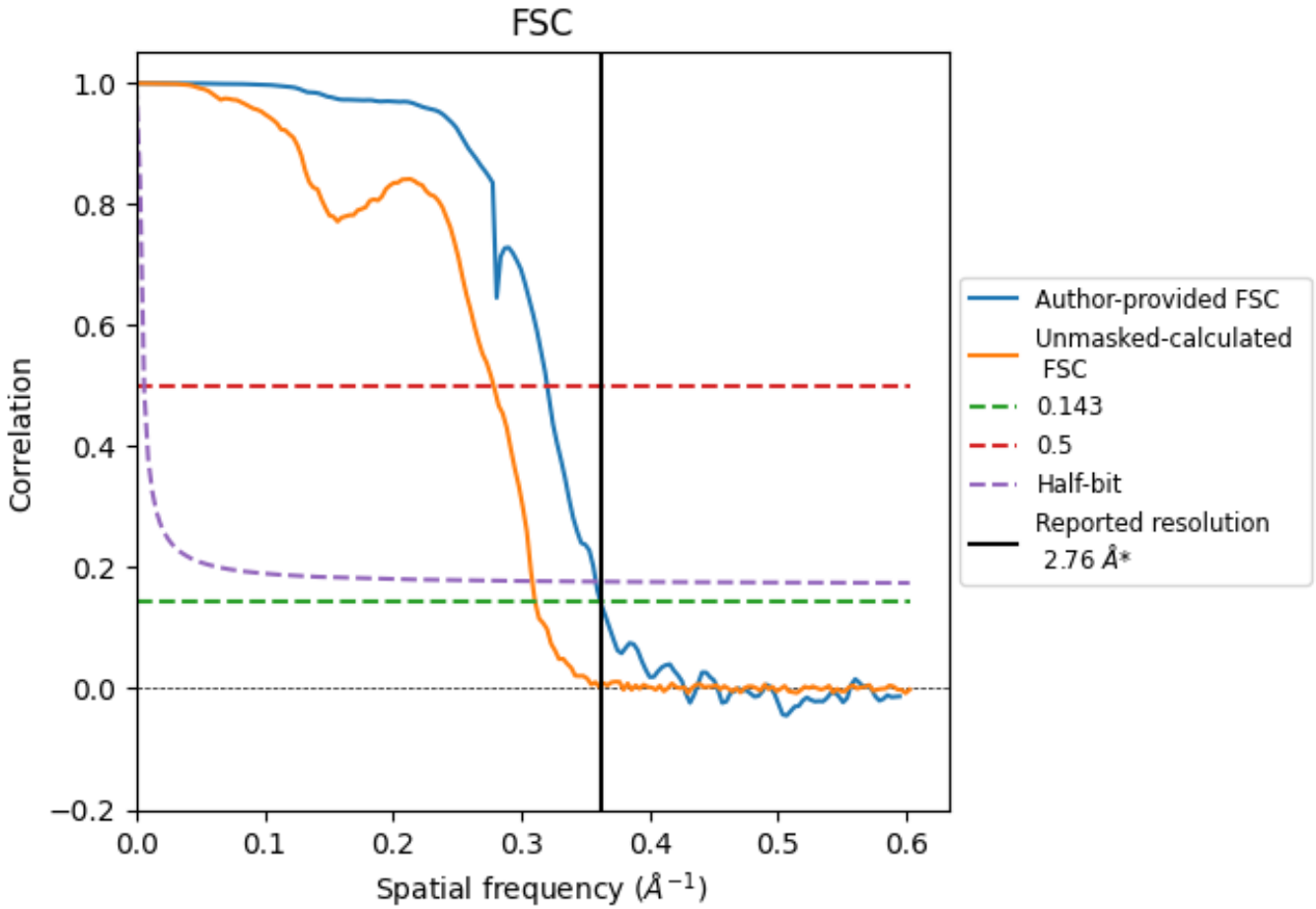


*Reported resolution corresponds to spatial frequency of 0.362 Å^{-1}

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 0.362 Å^{-1}

8.2 Resolution estimates (i)

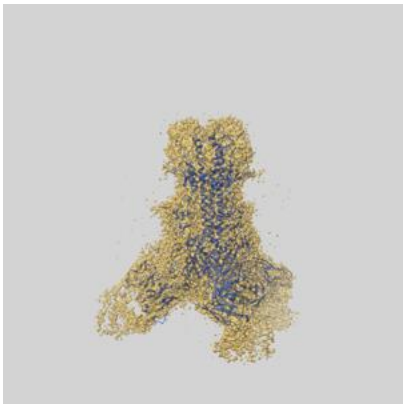
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.76	-	-
Author-provided FSC curve	2.76	3.12	2.79
Unmasked-calculated*	3.22	3.59	3.24

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.22 differs from the reported value 2.76 by more than 10 %

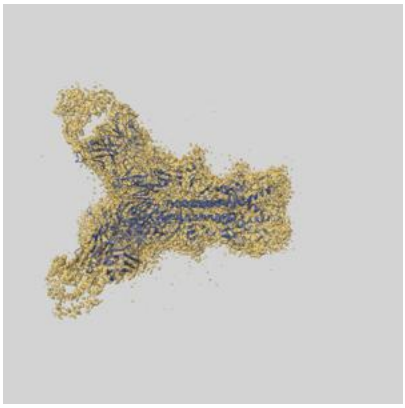
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-66600 and PDB model 9X5X. Per-residue inclusion information can be found in section 3 on page 11.

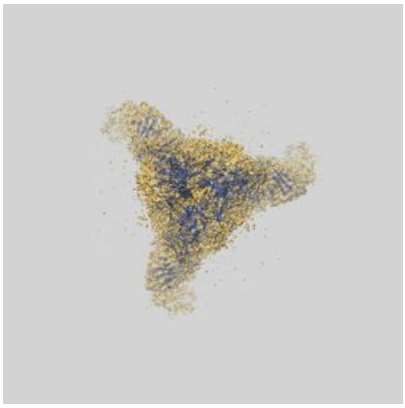
9.1 Map-model overlay



X



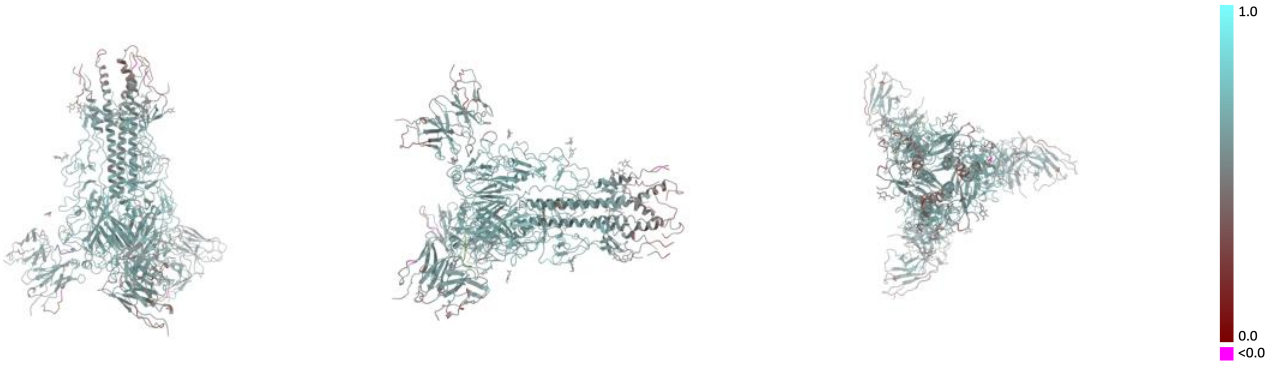
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.19 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.

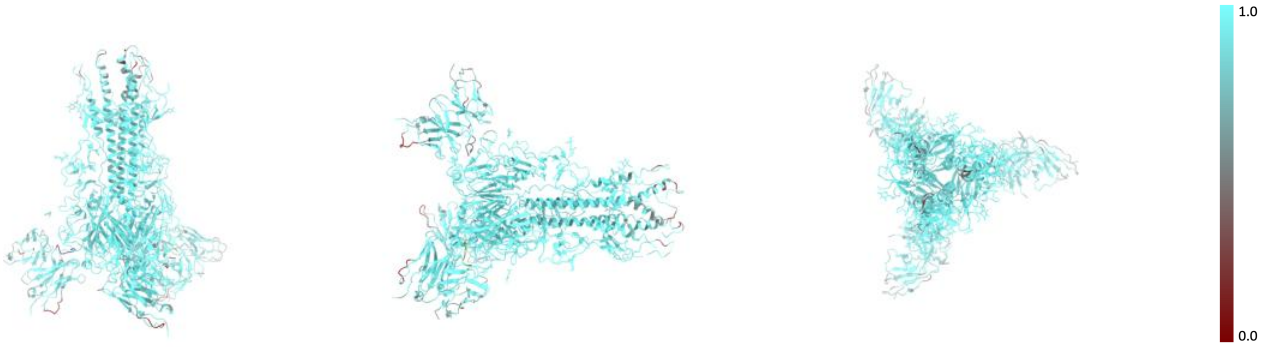
9.2 Q-score mapped to coordinate model (i)



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.

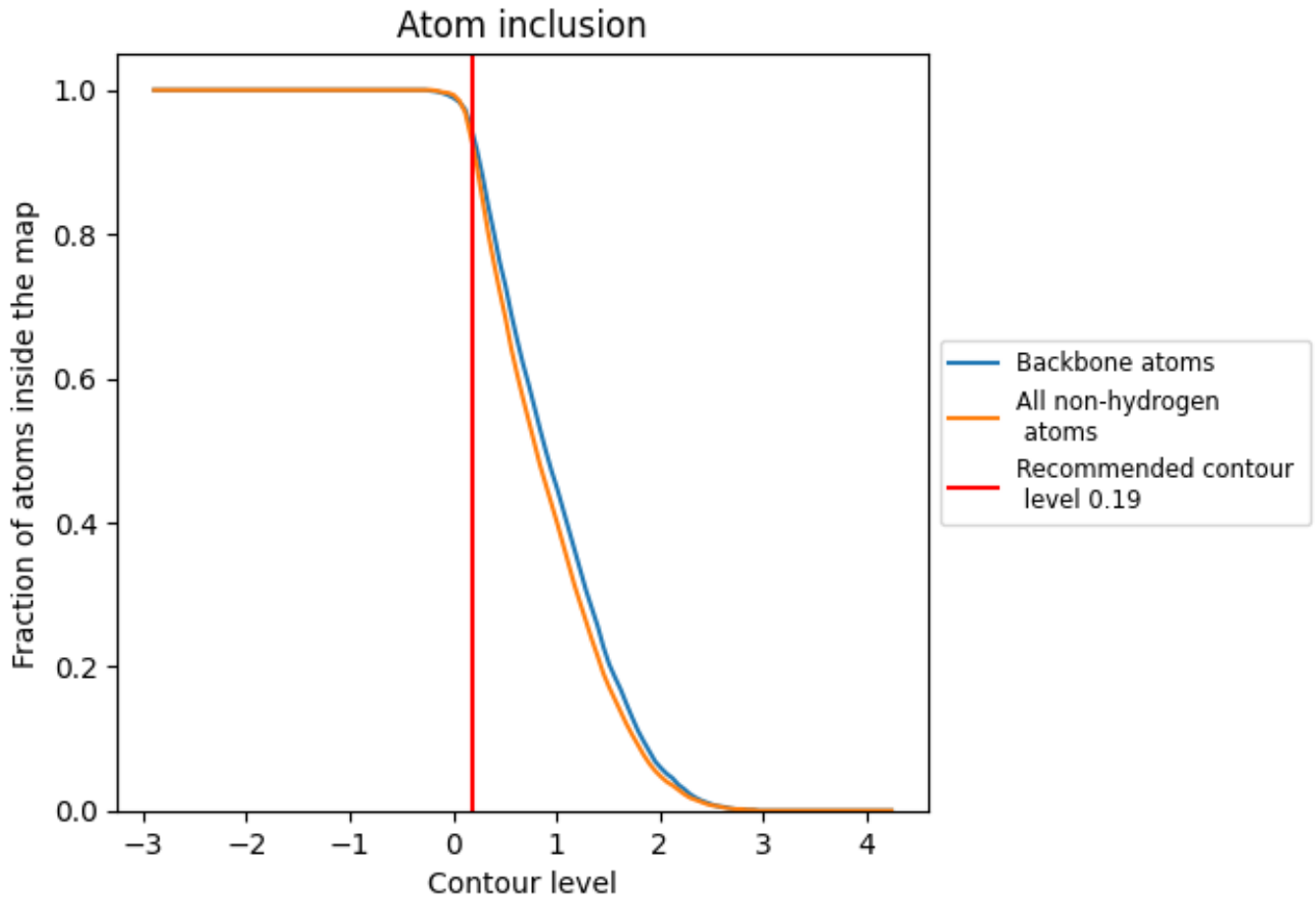
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.19).

9.4 Atom inclusion (i)



At the recommended contour level, 94% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.19) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9230	0.5680
A	0.9860	0.6140
B	0.8940	0.5230
C	0.9860	0.6150
D	0.8820	0.5270
E	0.9820	0.6140
F	0.8960	0.5270
G	0.8690	0.5380
H	0.8680	0.5400
I	0.8150	0.4970
J	0.8710	0.5390
K	0.8160	0.5000
L	0.8240	0.5060
M	0.9640	0.5210
N	0.8570	0.4860
O	0.9640	0.5120
P	0.9640	0.5240
Q	0.8930	0.5060
R	0.9640	0.5010
S	1.0000	0.5200
T	0.8930	0.5040
U	0.9640	0.4960

