



## wwPDB EM Validation Summary Report ⓘ

Mar 8, 2026 – 01:00 PM UTC

PDB ID : 9DRX / pdb\_00009drx  
EMDB ID : EMD-47132  
Title : Human GABAA receptor of beta2-alpha1-beta2-alpha1-gamma2 subtype in complex with GABA plus Lamotrigine  
Authors : Zhou, J.; Hibbs, R.E.; Noviello, C.M.  
Deposited on : 2024-09-26  
Resolution : 2.95 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

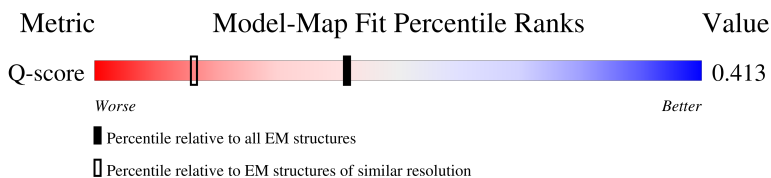
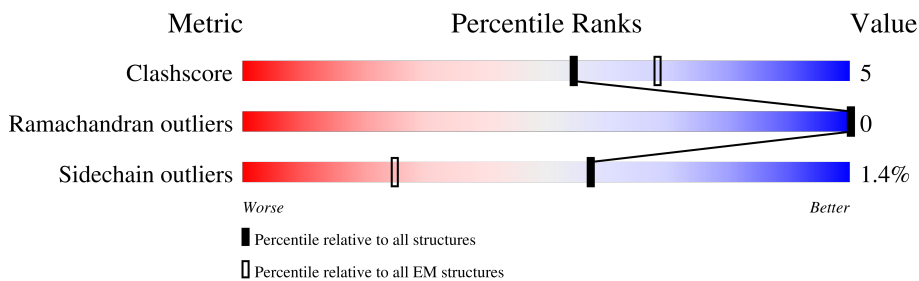
EMDB validation analysis : 0.0.1.dev132  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 1 Overall quality at a glance i

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

The reported resolution of this entry is 2.95 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	13114 ( 2.45 - 3.45 )

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	364	
1	C	364	
2	B	358	
2	D	358	

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Mol	Chain	Length	Quality of chain
3	E	417	 16% 70% 9% 20%
4	I	213	 10% 44% 5% 51%
4	L	213	 5% 41% 8% 50%
5	J	454	 5% 22% 74%
5	K	454	 6% 22% 74%
6	F	3	 33% 67%
7	G	3	 33% 33% 33%
7	M	3	 33% 67%
8	H	9	 11% 56% 44%
9	N	2	 50% 50%

## 2 Entry composition i

There are 12 unique types of molecules in this entry. The entry contains 17398 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 Gamma-aminobutyric acid receptor subunit beta-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	334	2732	1791	440	485	16	0	0
1	C	334	2732	1791	440	485	16	0	0

There are 62 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	308	SER	-	linker	UNP P47870
A	309	GLN	-	linker	UNP P47870
A	310	PRO	-	linker	UNP P47870
A	311	ALA	-	linker	UNP P47870
A	312	ARG	-	linker	UNP P47870
A	313	ALA	-	linker	UNP P47870
A	314	ALA	-	linker	UNP P47870
A	315	ALA	-	linker	UNP P47870
A	342	VAL	-	expression tag	UNP P47870
A	343	ASP	-	expression tag	UNP P47870
A	344	GLY	-	expression tag	UNP P47870
A	345	SER	-	expression tag	UNP P47870
A	346	GLY	-	expression tag	UNP P47870
A	347	ALA	-	expression tag	UNP P47870
A	348	THR	-	expression tag	UNP P47870
A	349	ASN	-	expression tag	UNP P47870
A	350	PHE	-	expression tag	UNP P47870
A	351	SER	-	expression tag	UNP P47870
A	352	LEU	-	expression tag	UNP P47870
A	353	LEU	-	expression tag	UNP P47870
A	354	LYS	-	expression tag	UNP P47870
A	355	GLN	-	expression tag	UNP P47870
A	356	ALA	-	expression tag	UNP P47870
A	357	GLY	-	expression tag	UNP P47870
A	358	ASP	-	expression tag	UNP P47870
A	359	VAL	-	expression tag	UNP P47870

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Chain	Residue	Modelled	Actual	Comment	Reference
A	360	GLU	-	expression tag	UNP P47870
A	361	GLU	-	expression tag	UNP P47870
A	362	ASN	-	expression tag	UNP P47870
A	363	PRO	-	expression tag	UNP P47870
A	364	GLY	-	expression tag	UNP P47870
C	308	SER	-	linker	UNP P47870
C	309	GLN	-	linker	UNP P47870
C	310	PRO	-	linker	UNP P47870
C	311	ALA	-	linker	UNP P47870
C	312	ARG	-	linker	UNP P47870
C	313	ALA	-	linker	UNP P47870
C	314	ALA	-	linker	UNP P47870
C	315	ALA	-	linker	UNP P47870
C	342	VAL	-	expression tag	UNP P47870
C	343	ASP	-	expression tag	UNP P47870
C	344	GLY	-	expression tag	UNP P47870
C	345	SER	-	expression tag	UNP P47870
C	346	GLY	-	expression tag	UNP P47870
C	347	ALA	-	expression tag	UNP P47870
C	348	THR	-	expression tag	UNP P47870
C	349	ASN	-	expression tag	UNP P47870
C	350	PHE	-	expression tag	UNP P47870
C	351	SER	-	expression tag	UNP P47870
C	352	LEU	-	expression tag	UNP P47870
C	353	LEU	-	expression tag	UNP P47870
C	354	LYS	-	expression tag	UNP P47870
C	355	GLN	-	expression tag	UNP P47870
C	356	ALA	-	expression tag	UNP P47870
C	357	GLY	-	expression tag	UNP P47870
C	358	ASP	-	expression tag	UNP P47870
C	359	VAL	-	expression tag	UNP P47870
C	360	GLU	-	expression tag	UNP P47870
C	361	GLU	-	expression tag	UNP P47870
C	362	ASN	-	expression tag	UNP P47870
C	363	PRO	-	expression tag	UNP P47870
C	364	GLY	-	expression tag	UNP P47870

- Molecule 2 is a protein called Gamma-aminobutyric acid receptor subunit alpha-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	338	2730	1763	461	490	16	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	D	338	2730	1763	461	490	16	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	313	SER	-	linker	UNP P14867
B	314	GLN	-	linker	UNP P14867
B	315	PRO	-	linker	UNP P14867
B	316	ALA	-	linker	UNP P14867
B	317	ARG	-	linker	UNP P14867
B	318	ALA	-	linker	UNP P14867
B	319	ALA	-	linker	UNP P14867
D	313	SER	-	linker	UNP P14867
D	314	GLN	-	linker	UNP P14867
D	315	PRO	-	linker	UNP P14867
D	316	ALA	-	linker	UNP P14867
D	317	ARG	-	linker	UNP P14867
D	318	ALA	-	linker	UNP P14867
D	319	ALA	-	linker	UNP P14867

- Molecule 3 is a protein called Gamma-aminobutyric acid receptor subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	E	333	2729	1781	448	485	15	0	0

There are 67 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	-36	TRP	-	expression tag	UNP P18507
E	-35	SER	-	expression tag	UNP P18507
E	-34	HIS	-	expression tag	UNP P18507
E	-33	PRO	-	expression tag	UNP P18507
E	-32	GLN	-	expression tag	UNP P18507
E	-31	PHE	-	expression tag	UNP P18507
E	-30	GLU	-	expression tag	UNP P18507
E	-29	LYS	-	expression tag	UNP P18507
E	-28	GLY	-	expression tag	UNP P18507
E	-27	GLY	-	expression tag	UNP P18507
E	-26	GLY	-	expression tag	UNP P18507
E	-25	SER	-	expression tag	UNP P18507

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-24	GLY	-	expression tag	UNP P18507
E	-23	GLY	-	expression tag	UNP P18507
E	-22	GLY	-	expression tag	UNP P18507
E	-21	SER	-	expression tag	UNP P18507
E	-20	GLY	-	expression tag	UNP P18507
E	-19	GLY	-	expression tag	UNP P18507
E	-18	SER	-	expression tag	UNP P18507
E	-17	SER	-	expression tag	UNP P18507
E	-16	ALA	-	expression tag	UNP P18507
E	-15	TRP	-	expression tag	UNP P18507
E	-14	SER	-	expression tag	UNP P18507
E	-13	HIS	-	expression tag	UNP P18507
E	-12	PRO	-	expression tag	UNP P18507
E	-11	GLN	-	expression tag	UNP P18507
E	-10	PHE	-	expression tag	UNP P18507
E	-9	GLU	-	expression tag	UNP P18507
E	-8	LYS	-	expression tag	UNP P18507
E	-7	LEU	-	expression tag	UNP P18507
E	-6	GLU	-	expression tag	UNP P18507
E	-5	VAL	-	expression tag	UNP P18507
E	-4	LEU	-	expression tag	UNP P18507
E	-3	PHE	-	expression tag	UNP P18507
E	-2	GLN	-	expression tag	UNP P18507
E	-1	GLY	-	expression tag	UNP P18507
E	0	PRO	-	expression tag	UNP P18507
E	323	SER	-	linker	UNP P18507
E	324	GLN	-	linker	UNP P18507
E	325	PRO	-	linker	UNP P18507
E	326	ALA	-	linker	UNP P18507
E	327	ARG	-	linker	UNP P18507
E	328	ALA	-	linker	UNP P18507
E	329	ALA	-	linker	UNP P18507
E	358	SER	-	expression tag	UNP P18507
E	359	ARG	-	expression tag	UNP P18507
E	360	GLY	-	expression tag	UNP P18507
E	361	SER	-	expression tag	UNP P18507
E	362	GLY	-	expression tag	UNP P18507
E	363	ALA	-	expression tag	UNP P18507
E	364	THR	-	expression tag	UNP P18507
E	365	ASN	-	expression tag	UNP P18507
E	366	PHE	-	expression tag	UNP P18507
E	367	SER	-	expression tag	UNP P18507

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Chain	Residue	Modelled	Actual	Comment	Reference
E	368	LEU	-	expression tag	UNP P18507
E	369	LEU	-	expression tag	UNP P18507
E	370	LYS	-	expression tag	UNP P18507
E	371	GLN	-	expression tag	UNP P18507
E	372	ALA	-	expression tag	UNP P18507
E	373	GLY	-	expression tag	UNP P18507
E	374	ASP	-	expression tag	UNP P18507
E	375	VAL	-	expression tag	UNP P18507
E	376	GLU	-	expression tag	UNP P18507
E	377	GLU	-	expression tag	UNP P18507
E	378	ASN	-	expression tag	UNP P18507
E	379	PRO	-	expression tag	UNP P18507
E	380	GLY	-	expression tag	UNP P18507

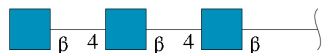
- Molecule 4 is a protein called Kappa Fab 1F4 Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	I	105	802	504	130	163	5	0	0
4	L	106	811	510	132	164	5	0	0

- Molecule 5 is a protein called IgG2b Fab 1F4 Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	J	116	907	574	151	178	4	0	0
5	K	117	914	578	152	180	4	0	0

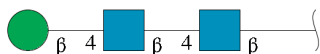
- Molecule 6 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
6	F	3	42	24	3	15	0	0

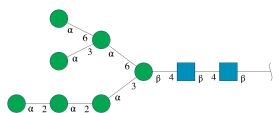
- Molecule 7 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-b

eta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
7	G	3	Total	C	N	O	0	0
			39	22	2	15		
7	M	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 8 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
8	H	9	Total	C	N	O	0	0
			105	58	2	45		

- Molecule 9 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



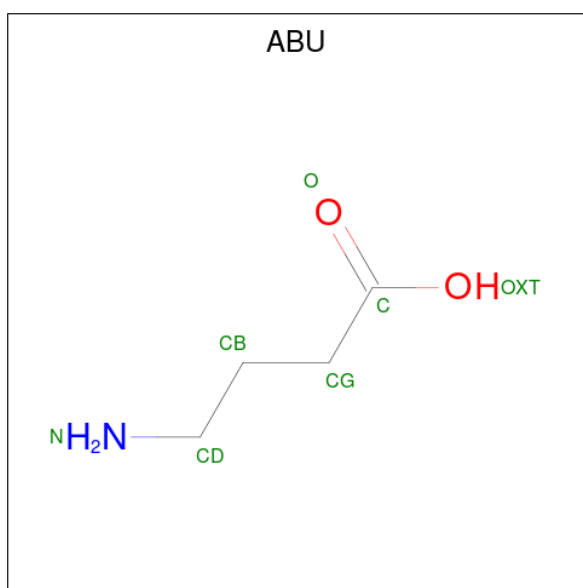
Mol	Chain	Residues	Atoms				AltConf	Trace
9	N	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 10 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



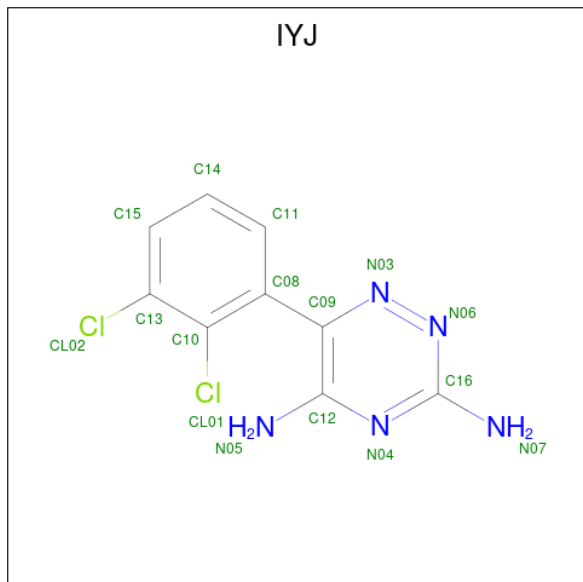
Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
10	A	1	14	8	1	5	0
10	C	1	14	8	1	5	0

- Molecule 11 is GAMMA-AMINO-BUTANOIC ACID (CCD ID: ABU) (formula:  $C_4H_9NO_2$ ).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
11	A	1	7	4	1	2	0
11	D	1	7	4	1	2	0

- Molecule 12 is (6M)-6-(2,3-dichlorophenyl)-1,2,4-triazine-3,5-diamine (CCD ID: IYJ) (formula: C<sub>9</sub>H<sub>7</sub>Cl<sub>2</sub>N<sub>5</sub>) (labeled as "Ligand of Interest" by depositor).

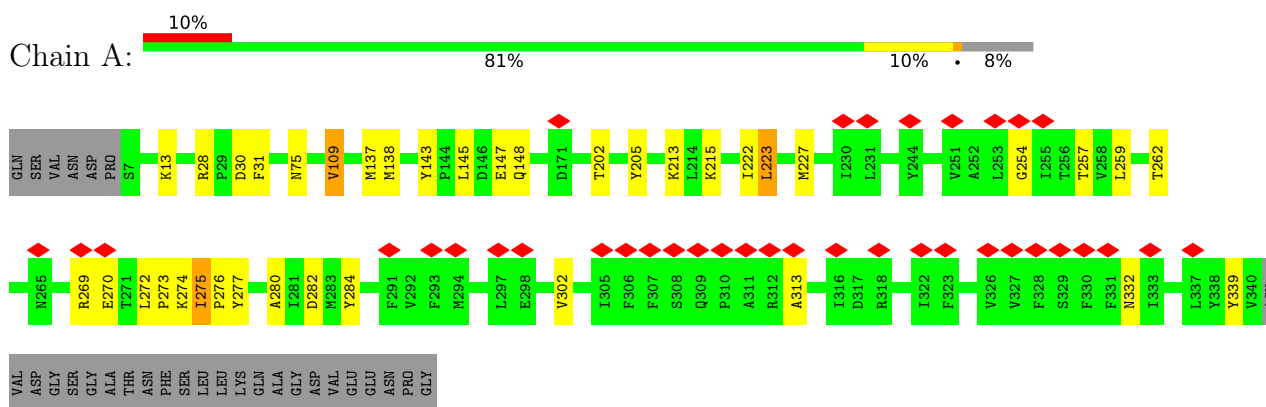


Mol	Chain	Residues	Atoms				AltConf
			Total	C	Cl	N	
12	D	1	16	9	2	5	0

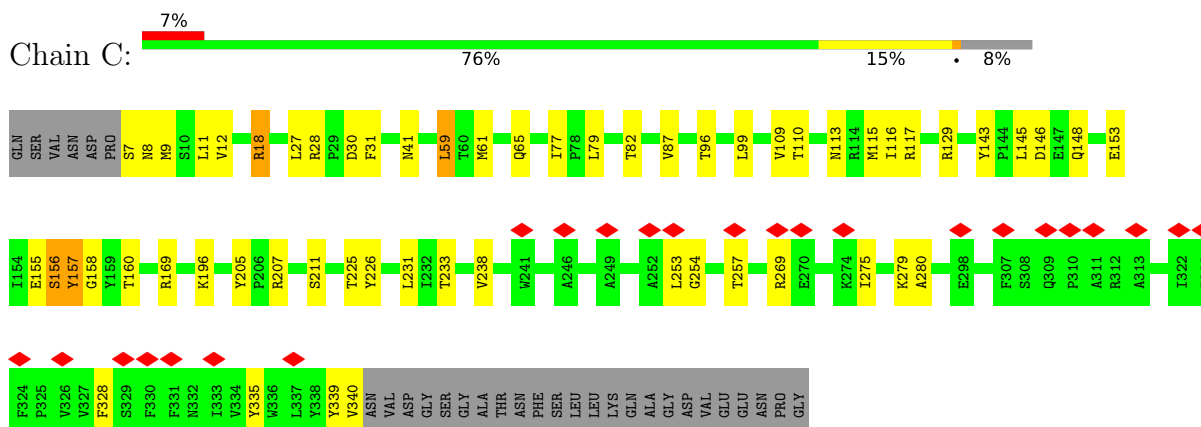
### 3 Residue-property plots

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.

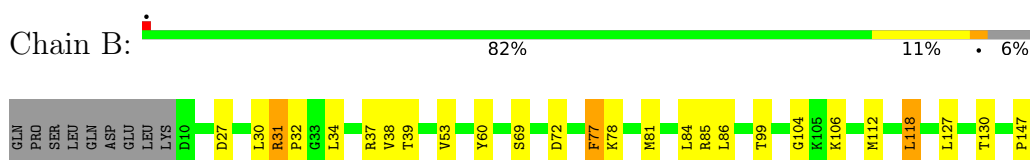
- Molecule 1: Gamma-aminobutyric acid receptor subunit beta-2



- Molecule 1: Gamma-aminobutyric acid receptor subunit beta-2



- Molecule 2: Gamma-aminobutyric acid receptor subunit alpha-1

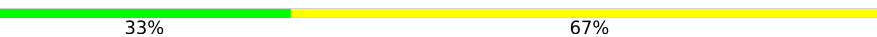






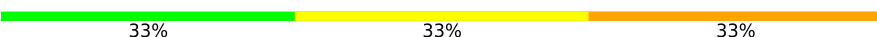
THR  
SER  
LYS  
TRP  
GLU  
LYS  
THR  
ASP  
SER  
PHE  
SER  
CYS  
ASN  
VAL  
ARG  
HIS  
GLU  
GLY  
LEU  
LYS  
ASN  
TYR  
LEU  
LYS  
LYS  
THR  
ILE  
SER  
ARG  
SER  
PRO  
GLY  
LYS

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

Chain F:  33% 67%

MAG1  
MAG2  
MAG3

- Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  33% 33% 33%

MAG1  
MAG2  
MAG3

- Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M:  33% 67%

MAG1  
MAG2  
MAG3

- Molecule 8: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  11% 56% 44%

MAG1  
MAG2  
MAG3  
MAN4  
MAN5  
MAN6  
MAN7  
MAN8  
MAN9

- Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain N:  50% 50%

MAG1  
MAG2

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	124678	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.596	Depositor
Minimum map value	-0.308	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.075	Depositor
Map size ( $\text{\AA}$ )	239.36, 239.36, 239.36	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.935, 0.935, 0.935	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, ABU, MAN, IYJ, 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	0.34	0/2804	0.65	4/3818 (0.1%)
1	C	0.41	1/2804 (0.0%)	0.73	3/3818 (0.1%)
2	B	0.38	0/2799	0.75	5/3805 (0.1%)
2	D	0.34	0/2799	0.66	3/3805 (0.1%)
3	E	0.39	0/2805	0.77	4/3822 (0.1%)
4	I	0.27	0/820	0.65	0/1112
4	L	0.32	0/829	0.68	1/1123 (0.1%)
5	J	0.32	0/928	0.67	0/1260
5	K	0.33	0/935	0.64	0/1270
All	All	0.36	1/17523 (0.0%)	0.70	20/23833 (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
1	C	0	1
2	B	0	3
All	All	0	4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	156	SER	CA-CB	-5.84	1.44	1.53

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	124	ILE	CA-C-N	7.64	135.45	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	124	ILE	C-N-CA	7.64	135.45	121.70
2	B	112	MET	CA-C-N	7.38	134.99	121.70
2	B	112	MET	C-N-CA	7.38	134.99	121.70
1	A	109	VAL	CA-C-N	6.71	133.77	121.70

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	221	ARG	Sidechain
2	B	31	ARG	Sidechain
2	B	37	ARG	Sidechain
1	C	18	ARG	Sidechain

## 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	2732	0	2741	23	0
1	C	2732	0	2741	48	0
2	B	2730	0	2724	36	0
2	D	2730	0	2724	26	0
3	E	2729	0	2714	27	0
4	I	802	0	771	8	0
4	L	811	0	784	9	0
5	J	907	0	877	9	0
5	K	914	0	884	10	0
6	F	42	0	37	0	0
7	G	39	0	34	2	0
7	M	39	0	34	2	0
8	H	105	0	88	1	0
9	N	28	0	25	1	0
10	A	14	0	13	0	0
10	C	14	0	13	0	0
11	A	7	0	0	1	0
11	D	7	0	0	1	0
12	D	16	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	17398	0	17204	175	0

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

The worst 5 of 175 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)
1:C:11:LEU:HB3	1:C:77:ILE:HD12	1.54	0.88
1:A:109:VAL:HG11	3:E:119:ALA:HB3	1.58	0.85
1:C:59:LEU:HD11	1:C:61:MET:HE2	1.65	0.76
2:D:204:GLN:HG2	2:D:209:GLU:OE2	1.85	0.76
3:E:287:LEU:HD21	3:E:296:MET:HE2	1.68	0.76

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	332/364 (91%)	316 (95%)	16 (5%)	0	100	100
1	C	332/364 (91%)	316 (95%)	16 (5%)	0	100	100
2	B	336/358 (94%)	323 (96%)	13 (4%)	0	100	100
2	D	336/358 (94%)	327 (97%)	9 (3%)	0	100	100
3	E	331/417 (79%)	314 (95%)	17 (5%)	0	100	100
4	I	103/213 (48%)	95 (92%)	8 (8%)	0	100	100
4	L	104/213 (49%)	98 (94%)	6 (6%)	0	100	100
5	J	114/454 (25%)	110 (96%)	4 (4%)	0	100	100
5	K	115/454 (25%)	107 (93%)	8 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	2103/3195 (66%)	2006 (95%)	97 (5%)	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	302/326 (93%)	298 (99%)	4 (1%)	61	78
1	C	302/326 (93%)	298 (99%)	4 (1%)	61	78
2	B	300/319 (94%)	296 (99%)	4 (1%)	61	78
2	D	300/319 (94%)	297 (99%)	3 (1%)	68	82
3	E	305/372 (82%)	301 (99%)	4 (1%)	61	78
4	I	89/188 (47%)	88 (99%)	1 (1%)	65	80
4	L	90/188 (48%)	87 (97%)	3 (3%)	33	58
5	J	97/407 (24%)	95 (98%)	2 (2%)	47	69
5	K	98/407 (24%)	96 (98%)	2 (2%)	48	71
All	All	1883/2852 (66%)	1856 (99%)	27 (1%)	57	77

5 of 27 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	338	LEU
3	E	60	ASN
4	L	47	LEU
3	E	57	MET
3	E	223	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
3	E	60	ASN
3	E	80	GLN
4	L	42	GLN
3	E	157	ASN
3	E	239	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](#)

20 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	$\# Z  > 2$
6	NAG	F	1	2,6	14,14,15	0.38	0	17,19,21	0.96	1 (5%)
6	NAG	F	2	6	14,14,15	0.25	0	17,19,21	0.52	0
6	NAG	F	3	6	14,14,15	0.38	0	17,19,21	0.76	1 (5%)
7	NAG	G	1	1,7	14,14,15	0.56	0	17,19,21	0.69	1 (5%)
7	NAG	G	2	7	14,14,15	0.31	0	17,19,21	0.40	0
7	BMA	G	3	7	11,11,12	0.53	0	15,15,17	0.75	0
8	NAG	H	1	8,2	14,14,15	0.22	0	17,19,21	0.54	0
8	NAG	H	2	8	14,14,15	0.15	0	17,19,21	0.48	0
8	BMA	H	3	8	11,11,12	0.45	0	15,15,17	0.69	0
8	MAN	H	4	8	11,11,12	0.51	0	15,15,17	1.06	2 (13%)
8	MAN	H	5	8	11,11,12	0.62	0	15,15,17	0.93	1 (6%)
8	MAN	H	6	8	11,11,12	0.55	0	15,15,17	0.98	2 (13%)
8	MAN	H	7	8	11,11,12	0.56	0	15,15,17	0.54	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
8	MAN	H	8	8	11,11,12	0.33	0	15,15,17	0.56	0
8	MAN	H	9	8	11,11,12	0.29	0	15,15,17	0.44	0
7	NAG	M	1	1,7	14,14,15	0.58	0	17,19,21	1.08	1 (5%)
7	NAG	M	2	7	14,14,15	0.29	0	17,19,21	1.70	3 (17%)
7	BMA	M	3	7	11,11,12	0.43	0	15,15,17	0.72	0
9	NAG	N	1	3,9	14,14,15	0.37	0	17,19,21	0.54	0
9	NAG	N	2	9	14,14,15	0.39	0	17,19,21	0.41	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	F	1	2,6	-	4/6/23/26	0/1/1/1
6	NAG	F	2	6	-	2/6/23/26	0/1/1/1
6	NAG	F	3	6	-	2/6/23/26	0/1/1/1
7	NAG	G	1	1,7	-	4/6/23/26	0/1/1/1
7	NAG	G	2	7	-	0/6/23/26	0/1/1/1
7	BMA	G	3	7	-	1/2/19/22	0/1/1/1
8	NAG	H	1	8,2	-	2/6/23/26	0/1/1/1
8	NAG	H	2	8	-	0/6/23/26	0/1/1/1
8	BMA	H	3	8	-	0/2/19/22	0/1/1/1
8	MAN	H	4	8	-	0/2/19/22	0/1/1/1
8	MAN	H	5	8	-	1/2/19/22	0/1/1/1
8	MAN	H	6	8	-	0/2/19/22	0/1/1/1
8	MAN	H	7	8	-	0/2/19/22	0/1/1/1
8	MAN	H	8	8	-	1/2/19/22	0/1/1/1
8	MAN	H	9	8	-	1/2/19/22	0/1/1/1
7	NAG	M	1	1,7	-	4/6/23/26	0/1/1/1
7	NAG	M	2	7	-	6/6/23/26	0/1/1/1
7	BMA	M	3	7	-	1/2/19/22	0/1/1/1
9	NAG	N	1	3,9	-	0/6/23/26	0/1/1/1
9	NAG	N	2	9	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	M	2	NAG	C2-N2-C7	5.52	130.29	122.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	F	1	NAG	C2-N2-C7	3.42	127.48	122.90
7	M	1	NAG	C1-O5-C5	3.06	116.28	112.19
8	H	4	MAN	C1-O5-C5	2.82	115.96	112.19
7	M	2	NAG	C1-C2-N2	2.79	114.82	110.43

There are no chirality outliers.

5 of 29 torsion outliers are listed below:

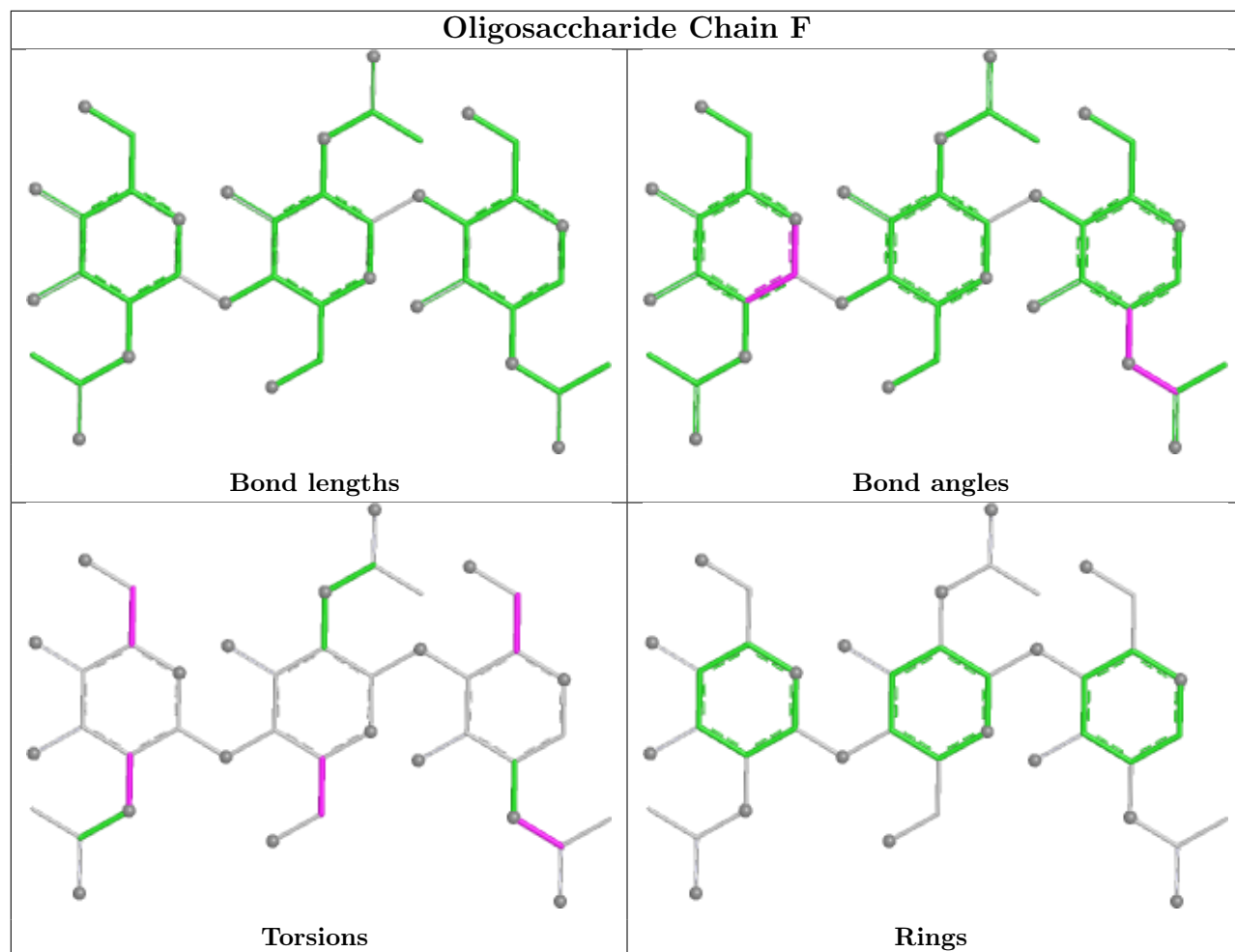
Mol	Chain	Res	Type	Atoms
7	G	1	NAG	C4-C5-C6-O6
6	F	1	NAG	O5-C5-C6-O6
6	F	2	NAG	C4-C5-C6-O6
7	G	1	NAG	O5-C5-C6-O6
6	F	2	NAG	O5-C5-C6-O6

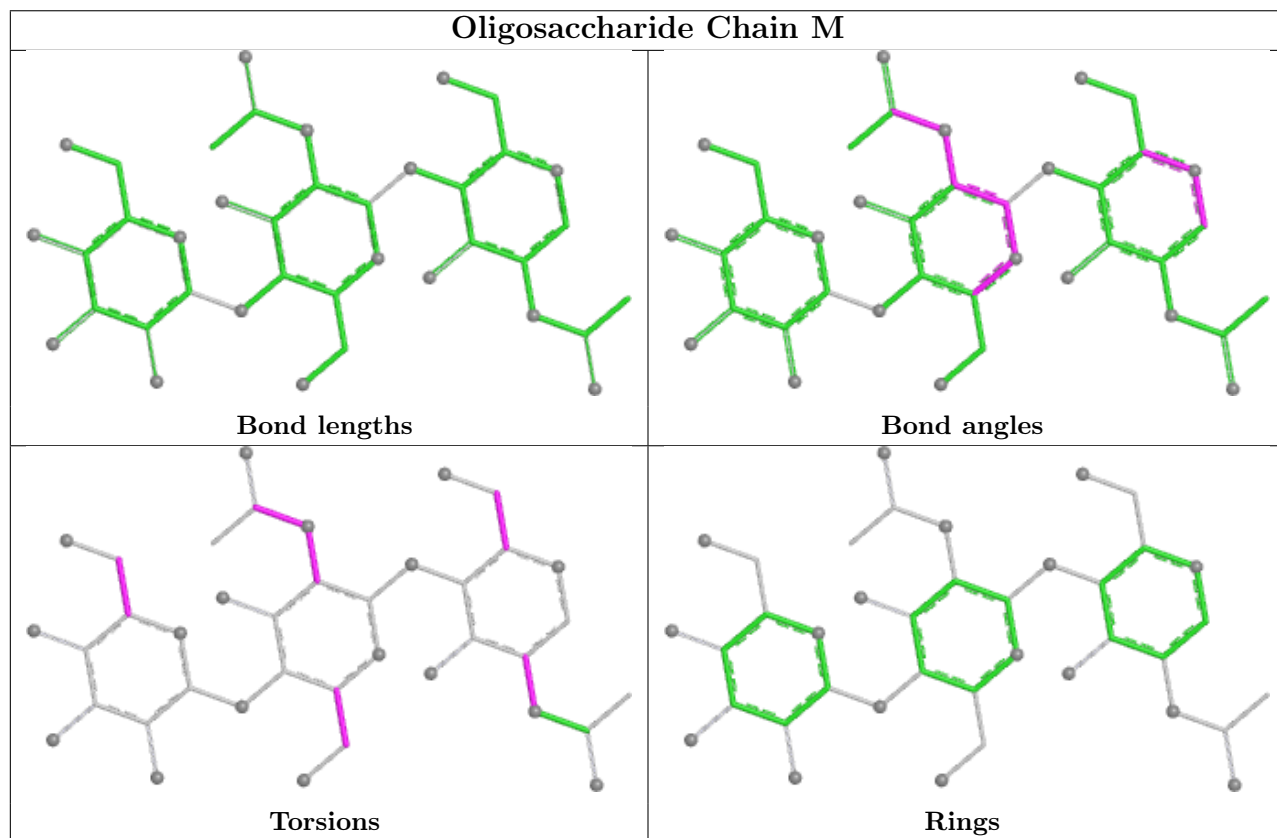
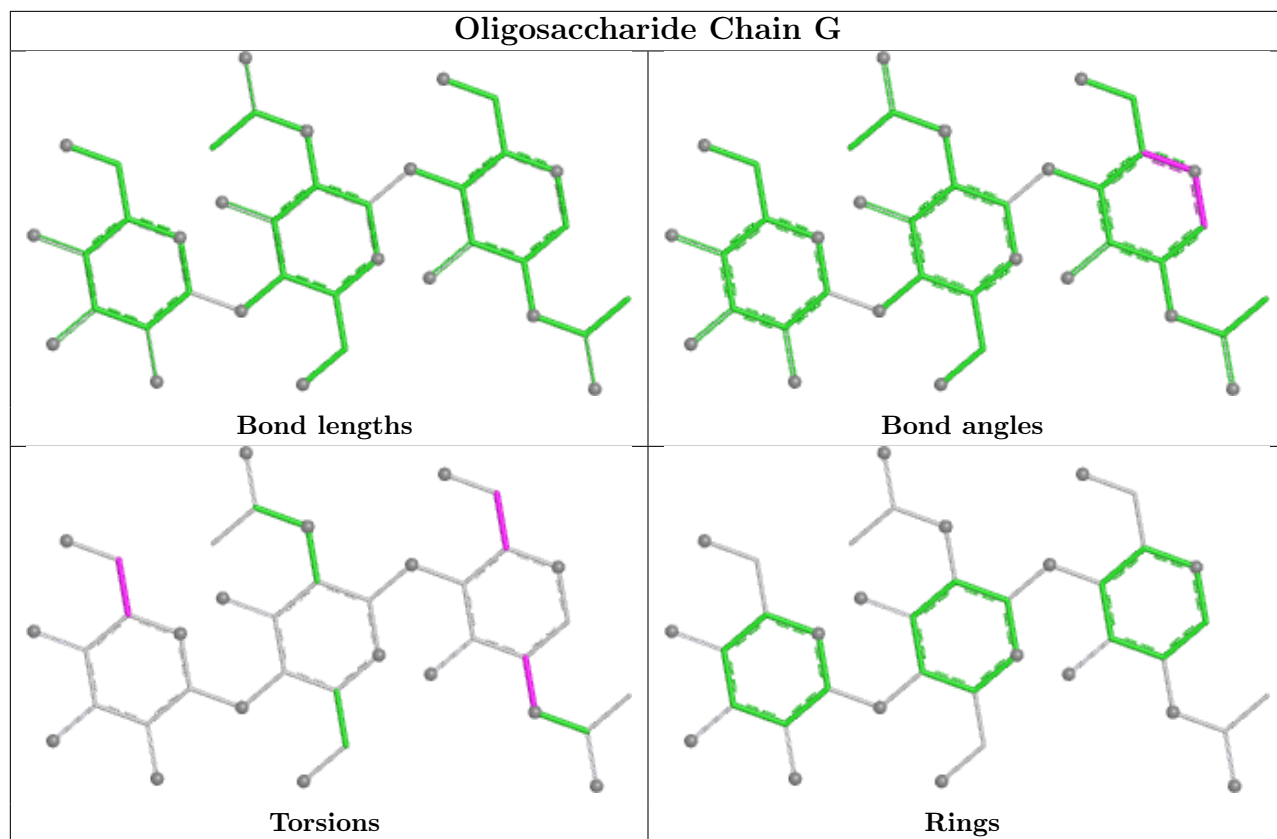
There are no ring outliers.

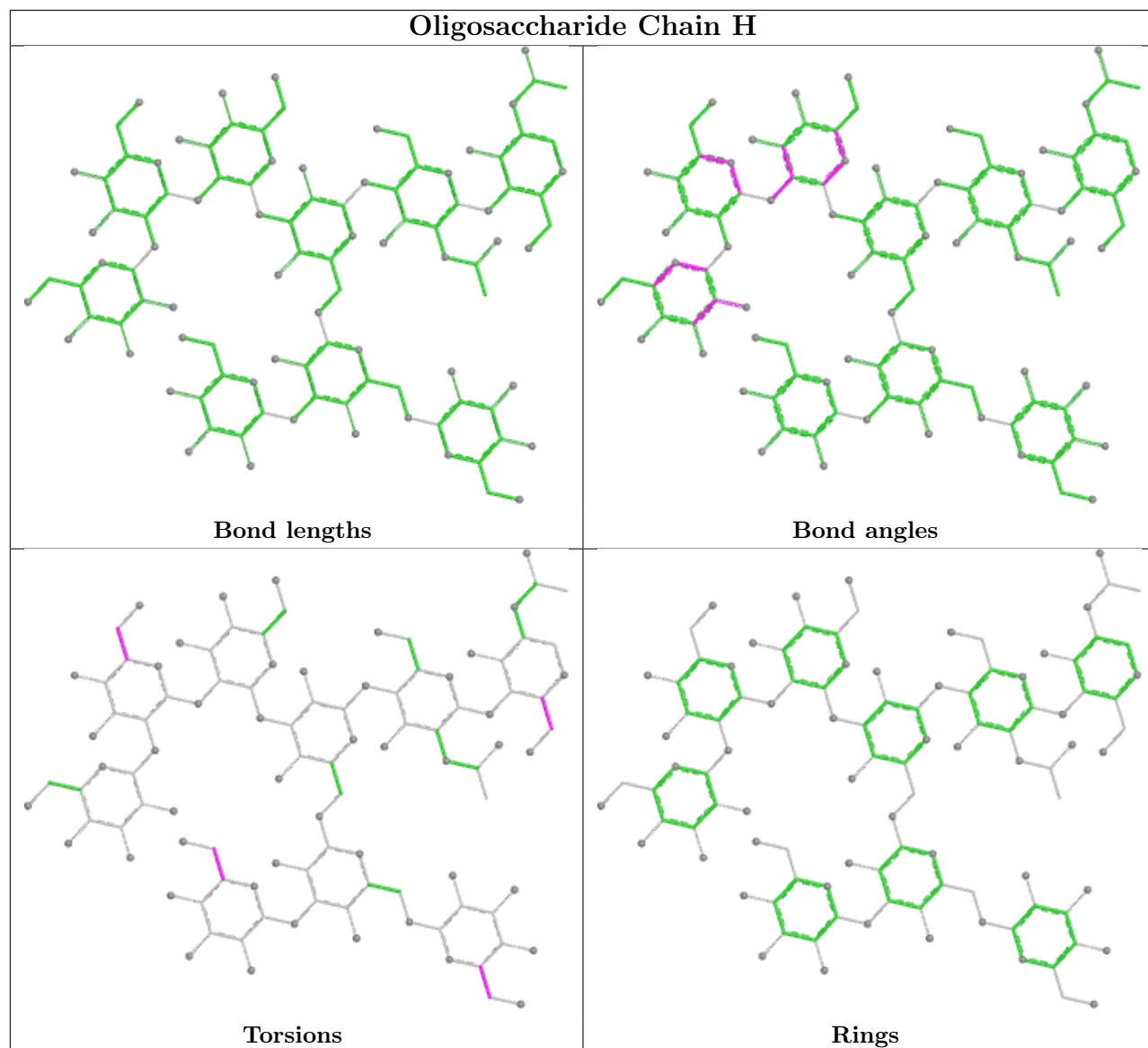
6 monomers are involved in 6 short contacts:

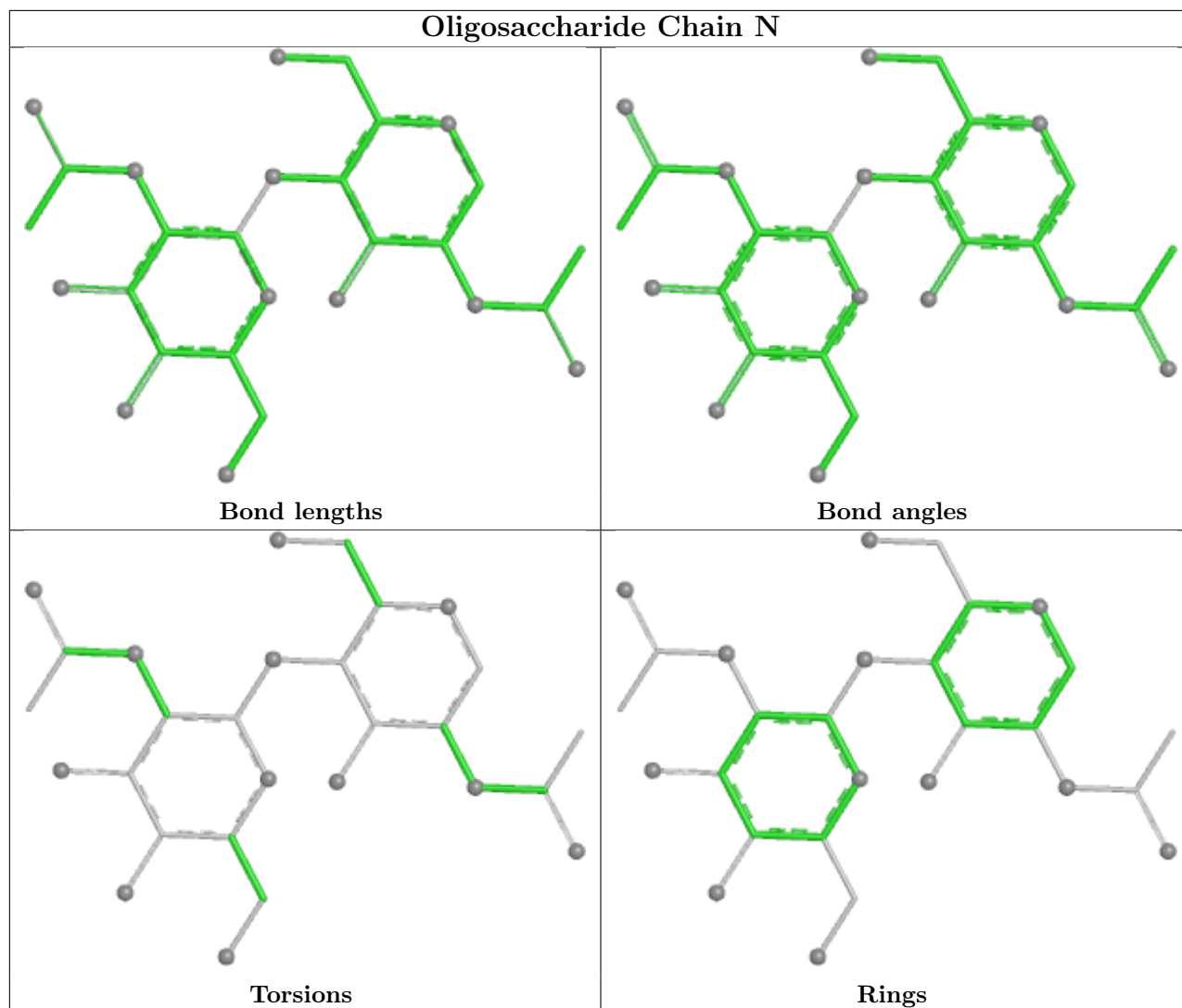
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	H	7	MAN	1	0
7	G	2	NAG	1	0
7	G	1	NAG	2	0
9	N	2	NAG	1	0
7	M	1	NAG	1	0
7	M	2	NAG	1	0

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









## 5.6 Ligand geometry [i](#)

5 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	$\# Z  > 2$
11	ABU	D	401	-	6,6,6	0.92	0	6,6,6	0.93	0
11	ABU	A	402	-	6,6,6	0.90	0	6,6,6	1.01	0
10	NAG	A	401	1	14,14,15	0.19	0	17,19,21	0.49	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
12	IYJ	D	402	-	17,17,17	0.32	0	24,24,24	0.43	0
10	NAG	C	401	1	14,14,15	0.34	0	17,19,21	0.37	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
11	ABU	D	401	-	-	2/4/4/4	-
11	ABU	A	402	-	-	0/4/4/4	-
10	NAG	A	401	1	-	0/6/23/26	0/1/1/1
12	IYJ	D	402	-	-	0/4/4/4	0/2/2/2
10	NAG	C	401	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	D	401	ABU	OXT-C-CG-CB
11	D	401	ABU	O-C-CG-CB

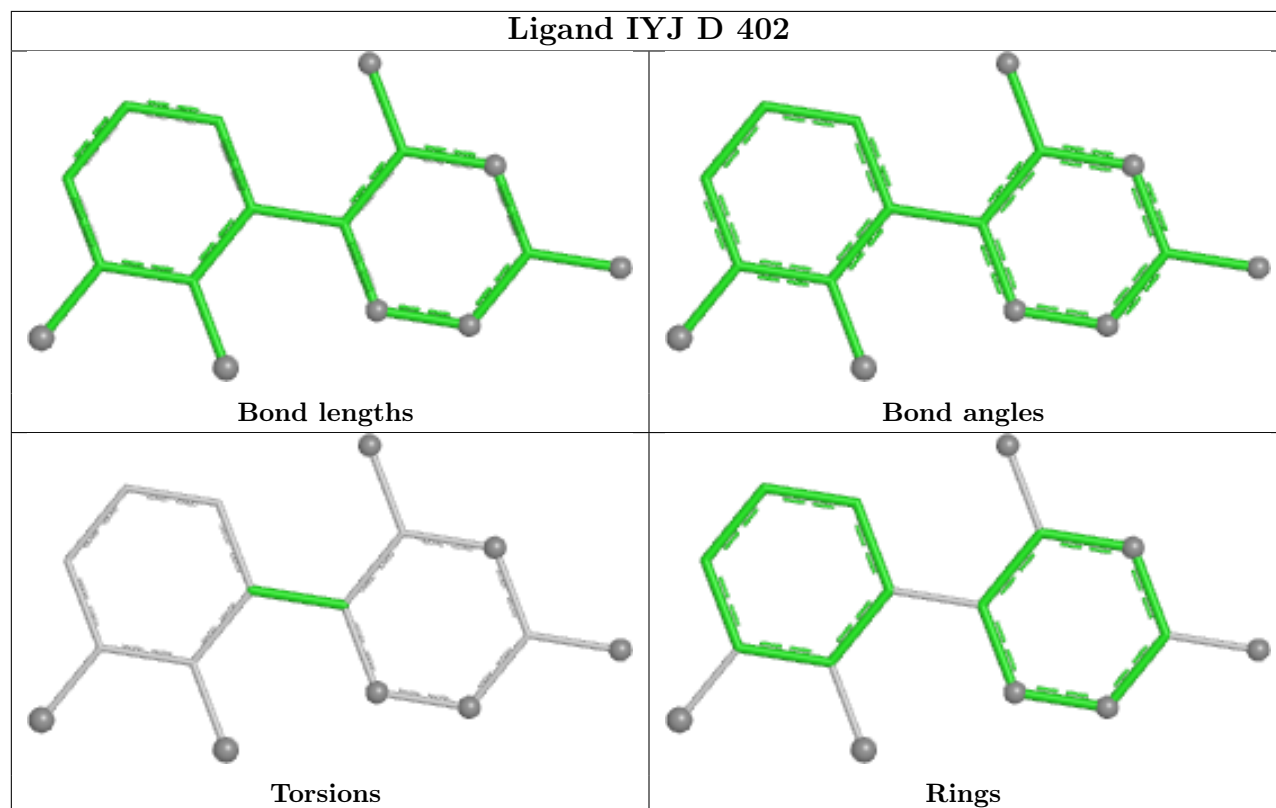
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	D	401	ABU	1	0
11	A	402	ABU	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

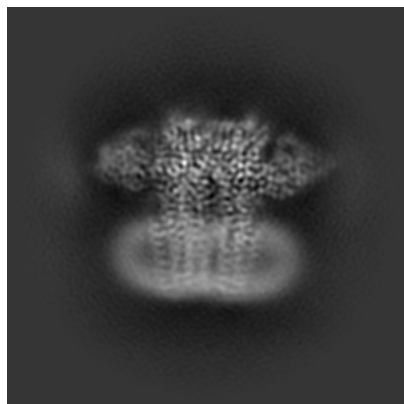
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47132. These allow visual inspection of the internal detail of the map and identification of artifacts.

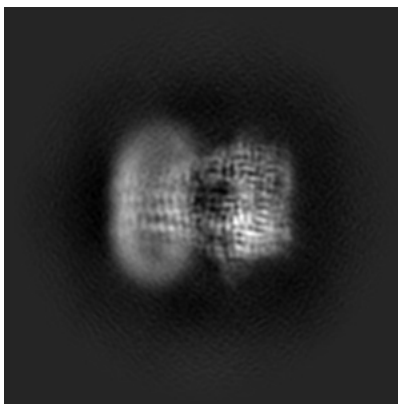
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

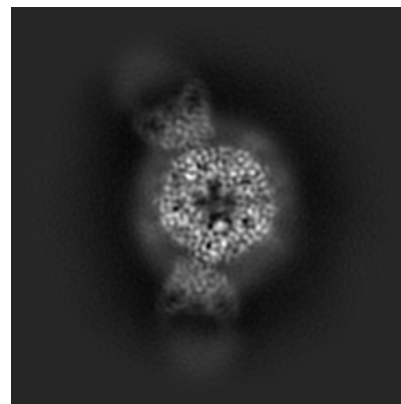
#### 6.1.1 Primary map



X

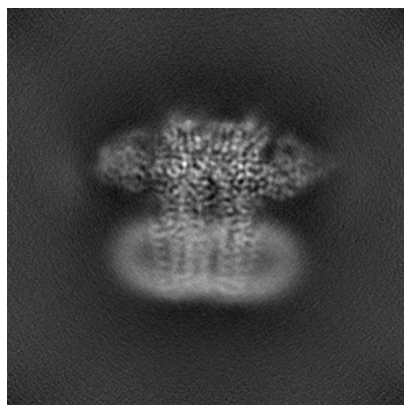


Y

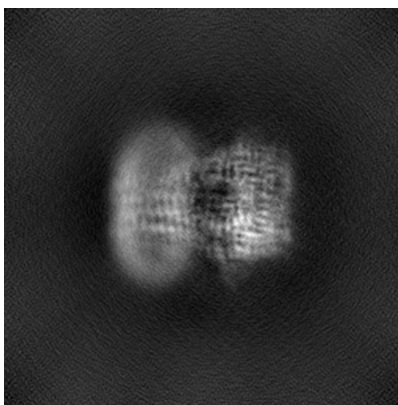


Z

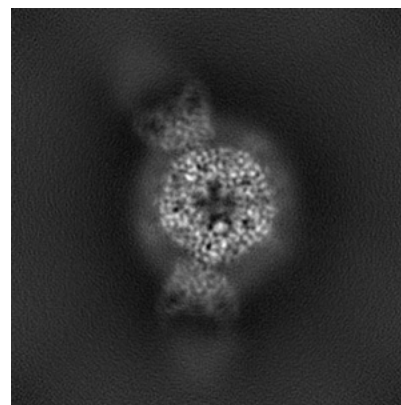
#### 6.1.2 Raw map



X



Y

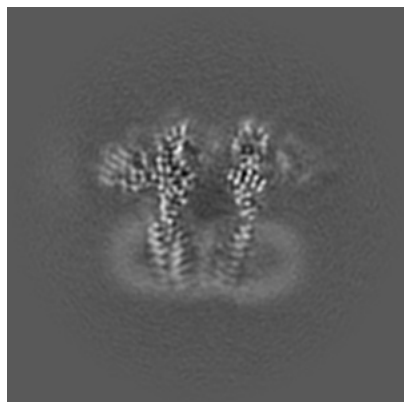


Z

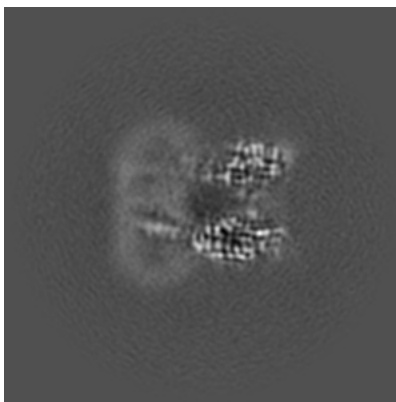
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

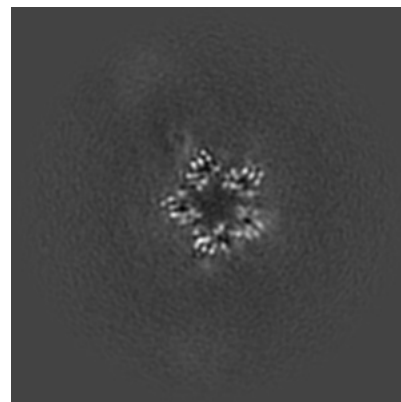
### 6.2.1 Primary map



X Index: 128

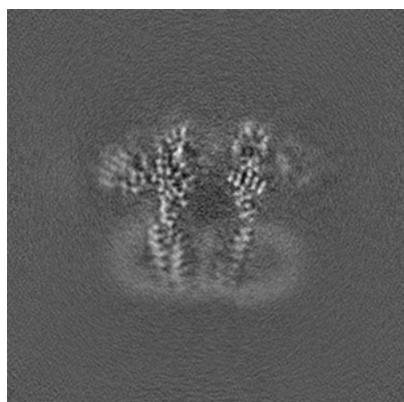


Y Index: 128

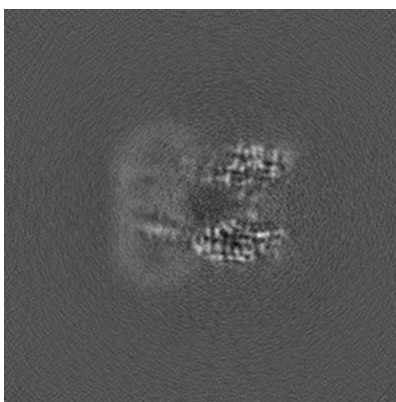


Z Index: 128

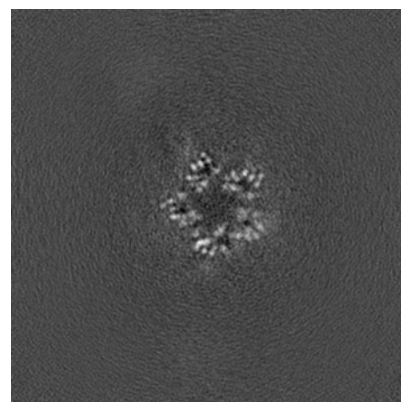
### 6.2.2 Raw map



X Index: 128



Y Index: 128

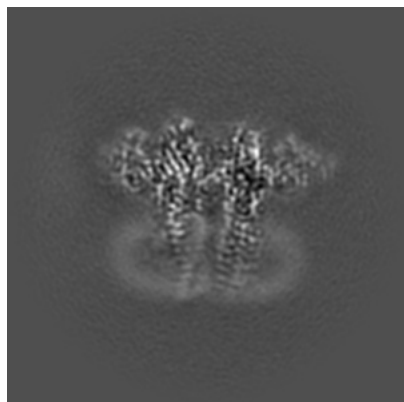


Z Index: 128

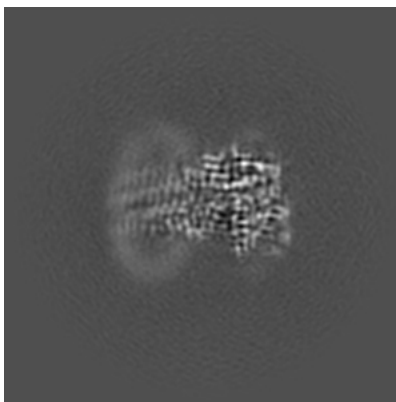
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

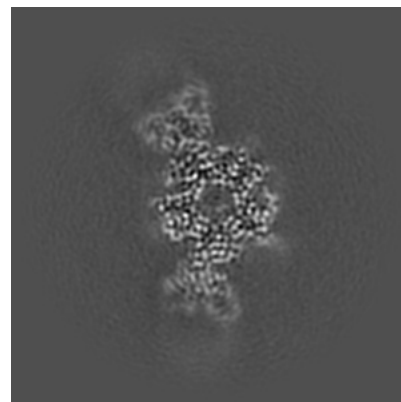
### 6.3.1 Primary map



X Index: 120

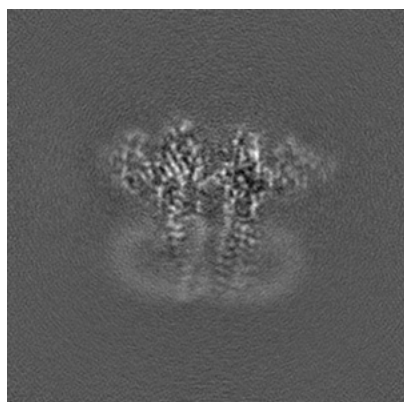


Y Index: 149

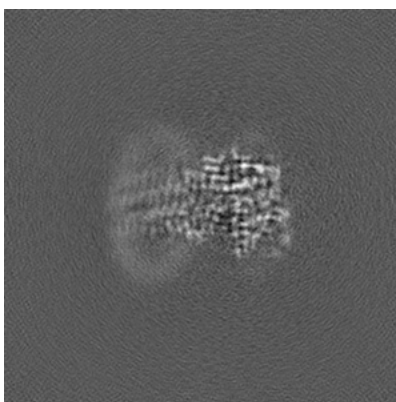


Z Index: 151

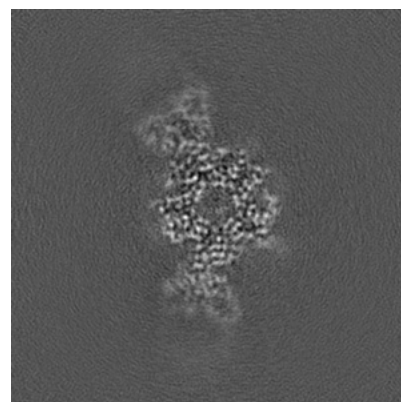
### 6.3.2 Raw map



X Index: 120



Y Index: 149

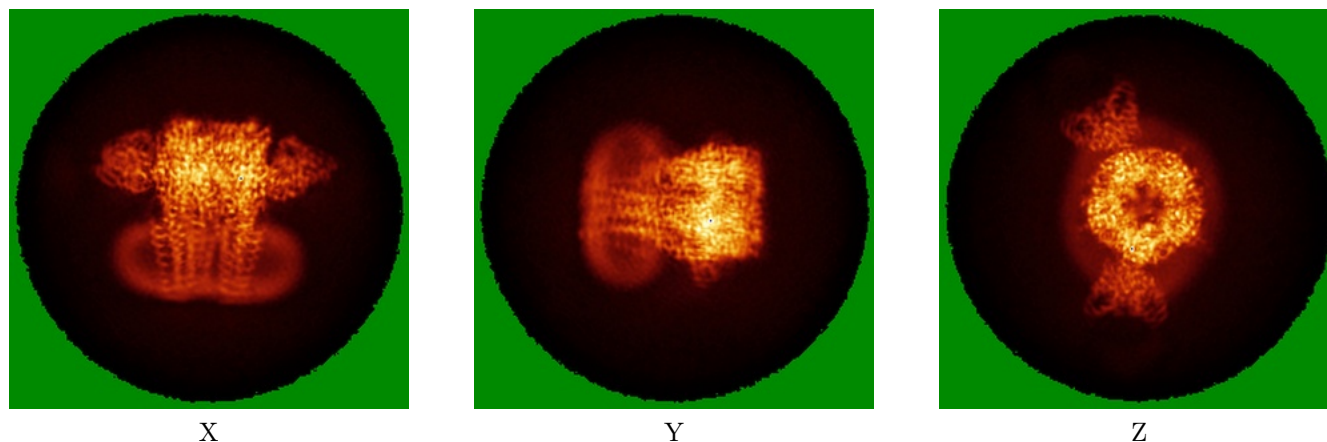


Z Index: 151

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

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

### 6.4.1 Primary map

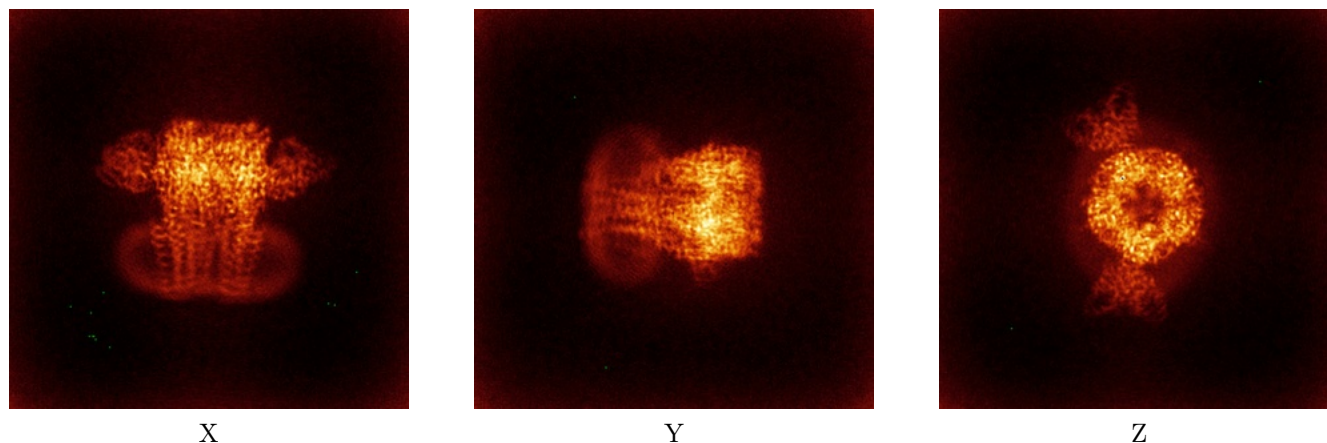


X

Y

Z

### 6.4.2 Raw map



X

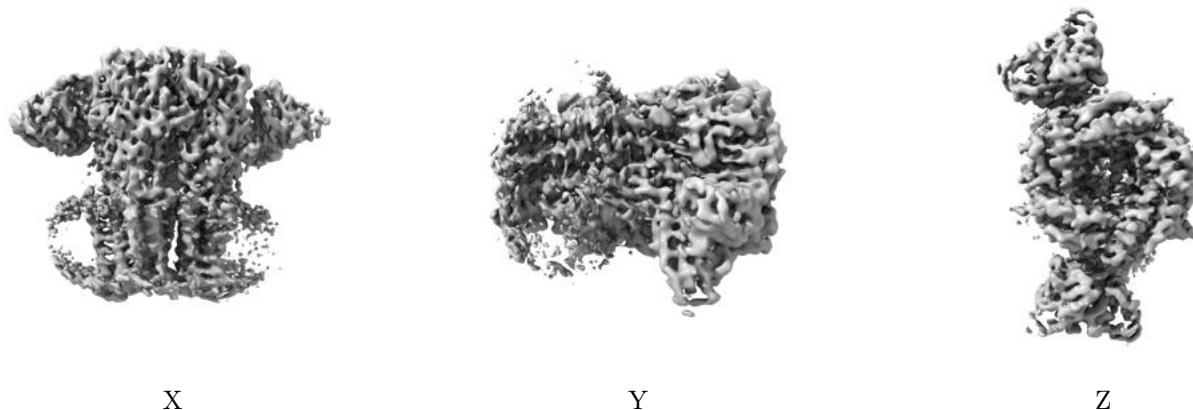
Y

Z

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

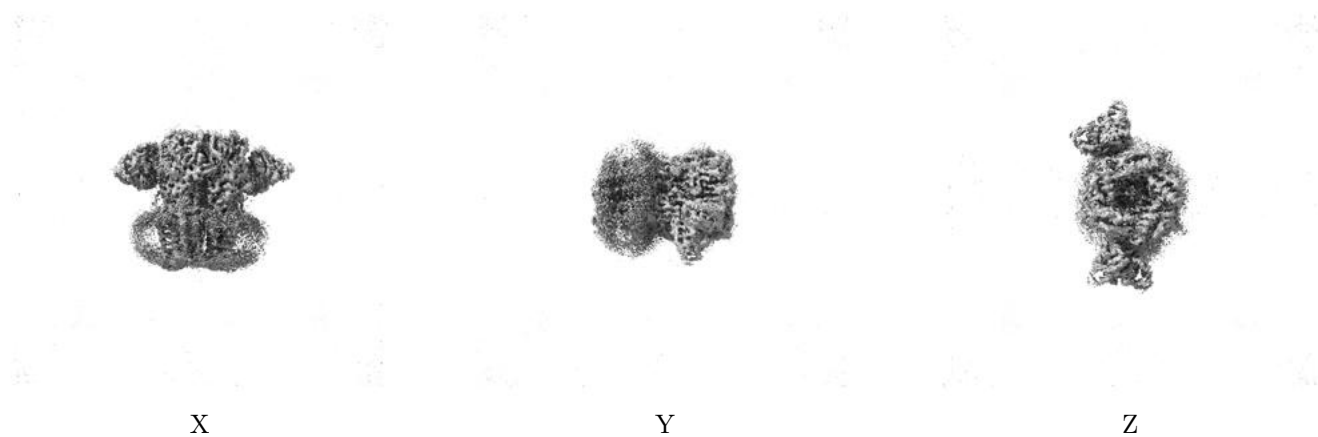
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.075. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

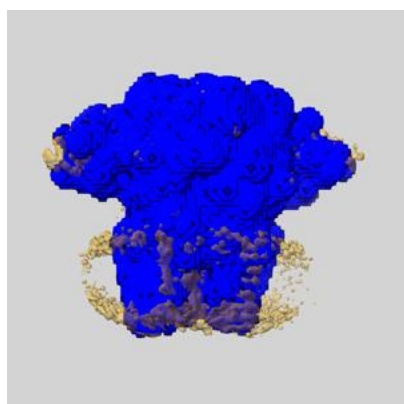
## 6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

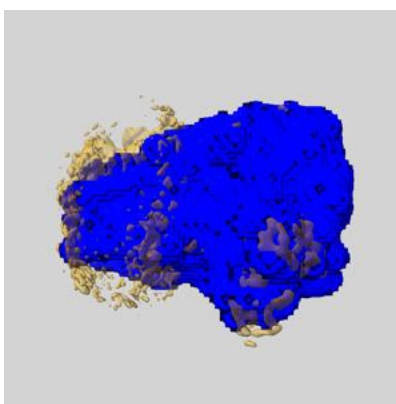
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

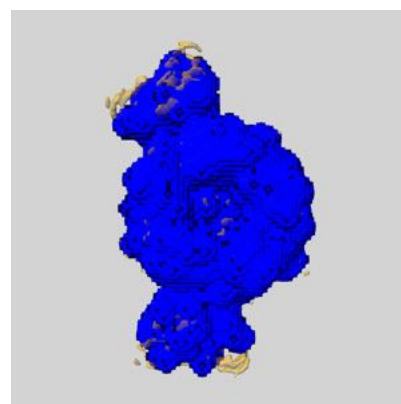
### 6.6.1 emd\_47132\_msk\_1.map [i](#)



X



Y

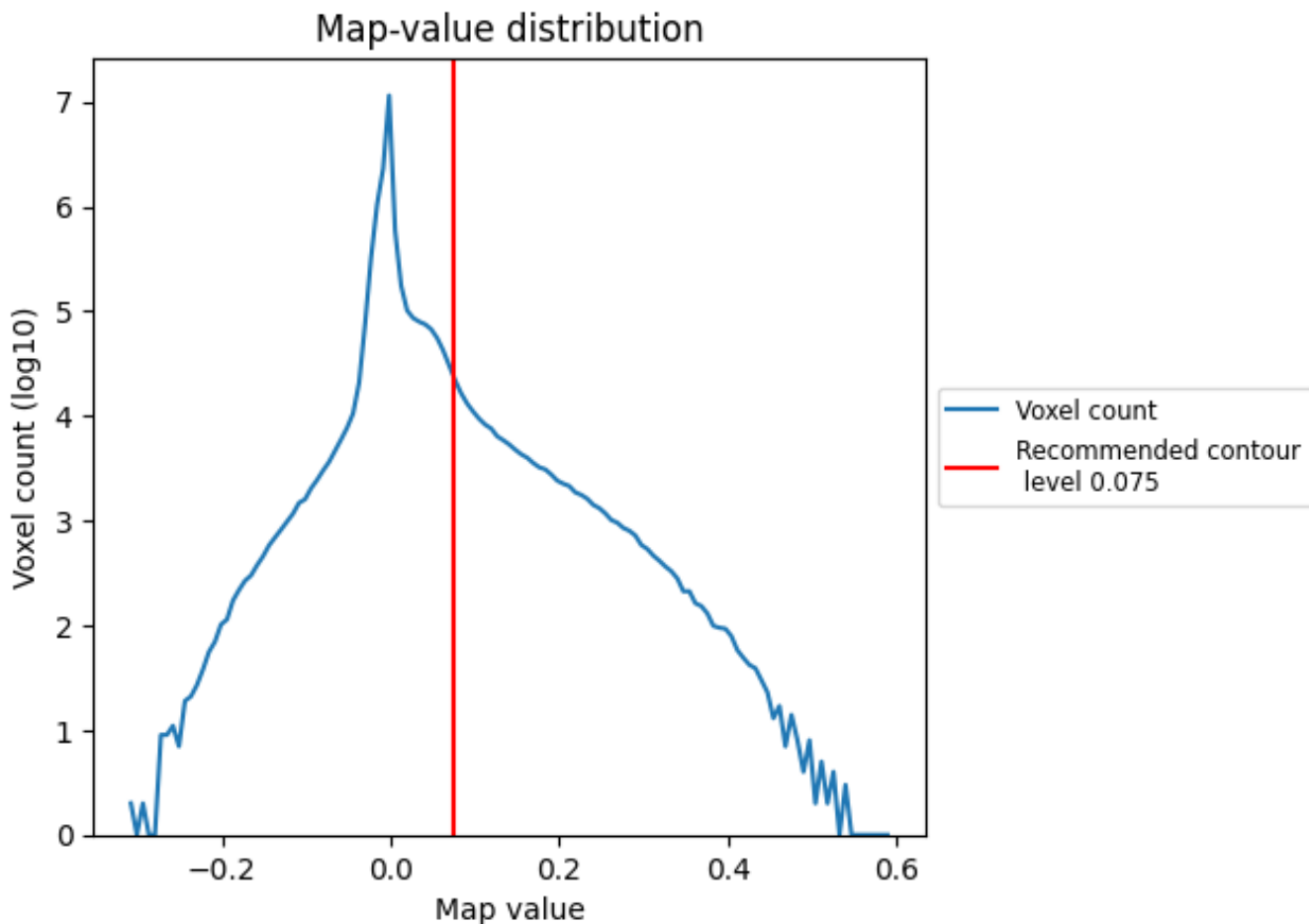


Z

## 7 Map analysis [i](#)

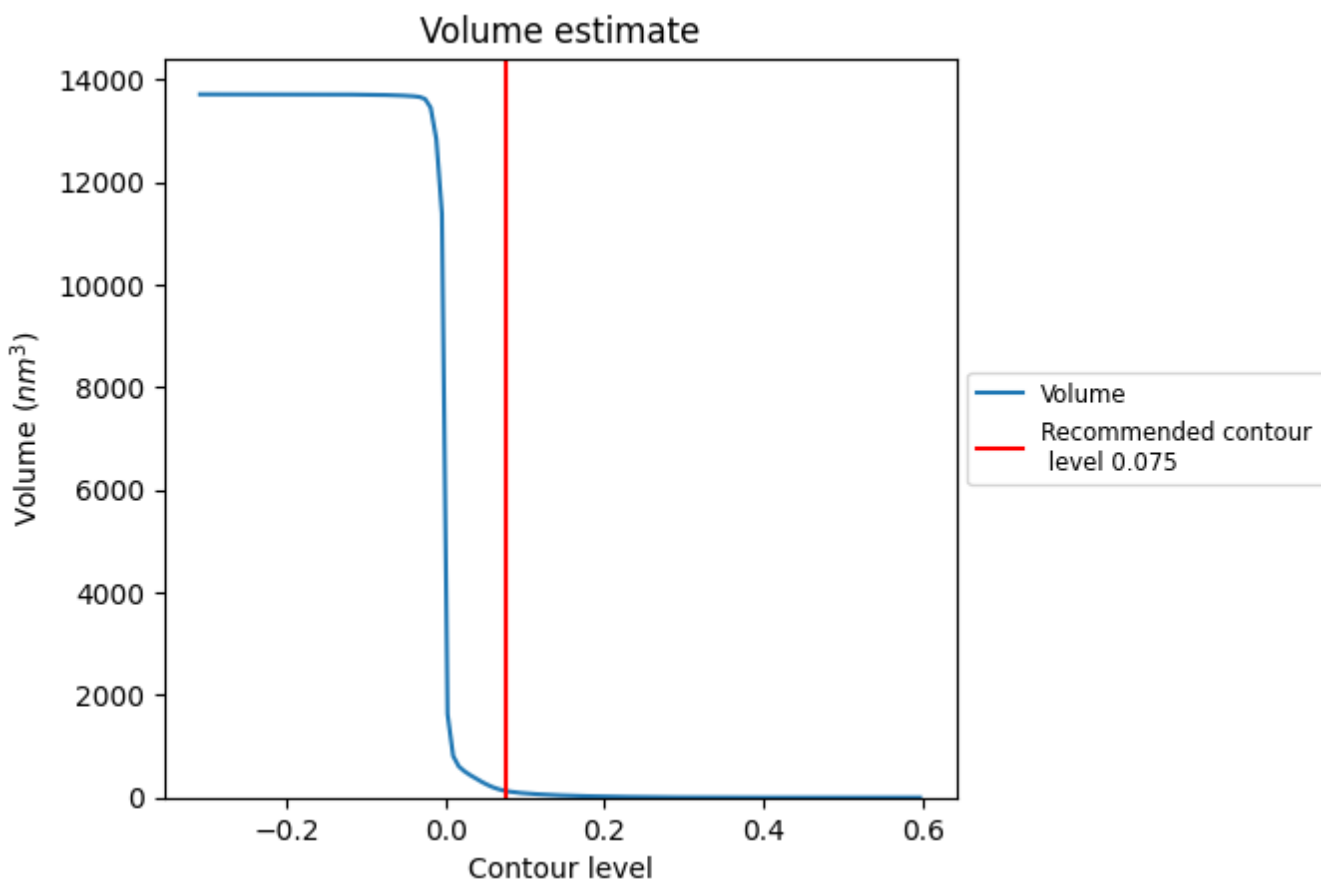
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

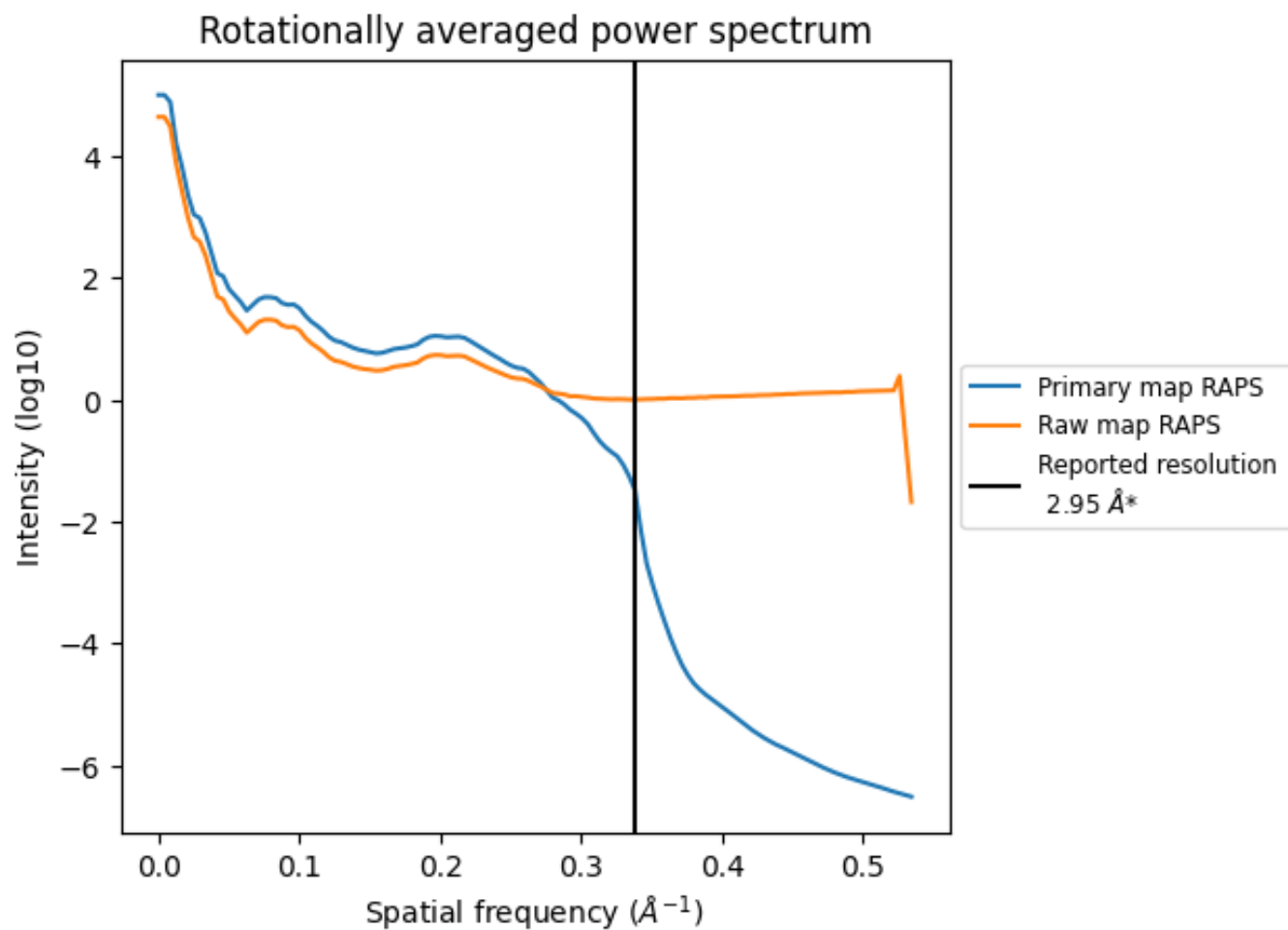
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 132 nm<sup>3</sup>; this corresponds to an approximate mass of 120 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

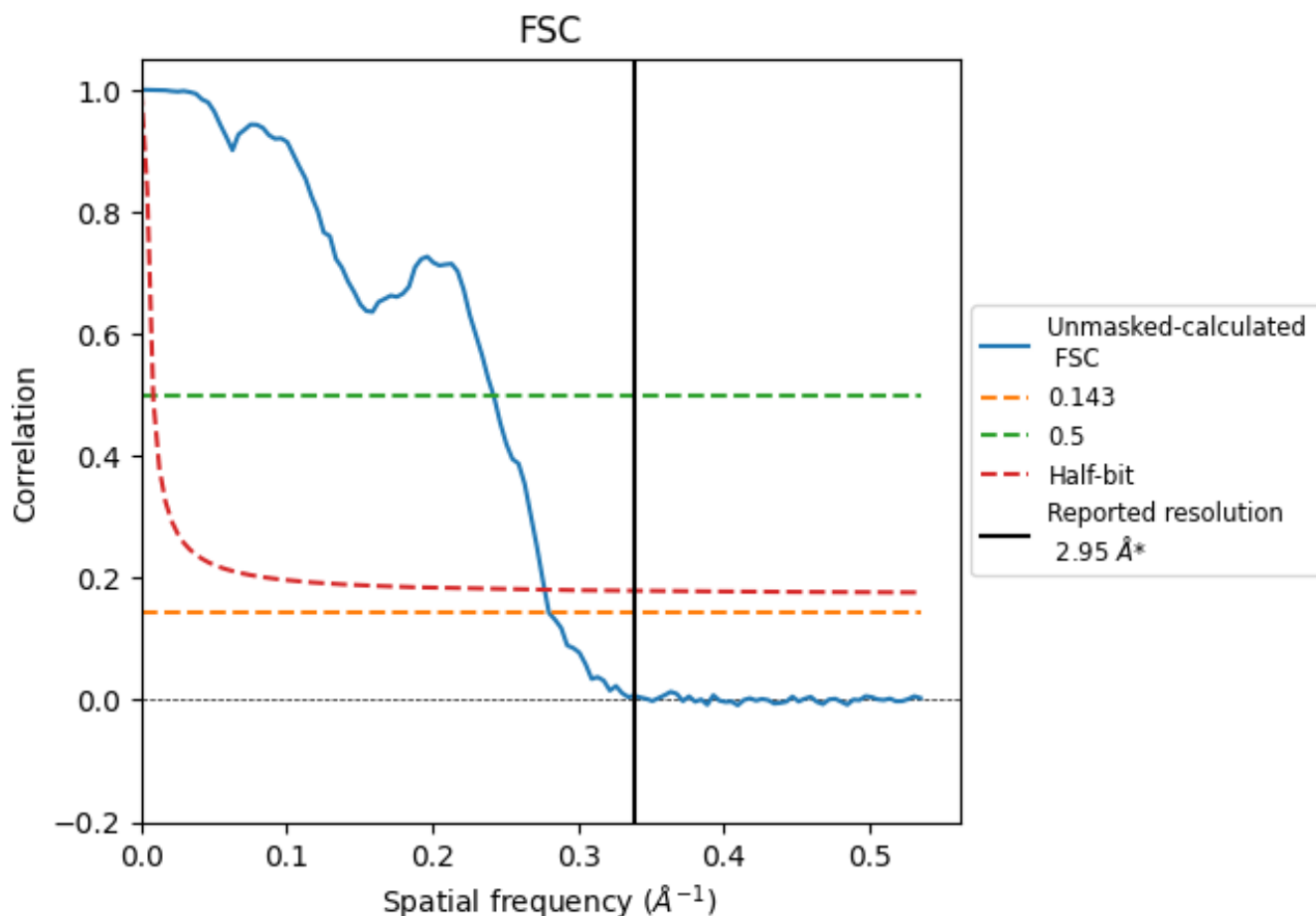


\*Reported resolution corresponds to spatial frequency of 0.339 Å<sup>-1</sup>

## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.339 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

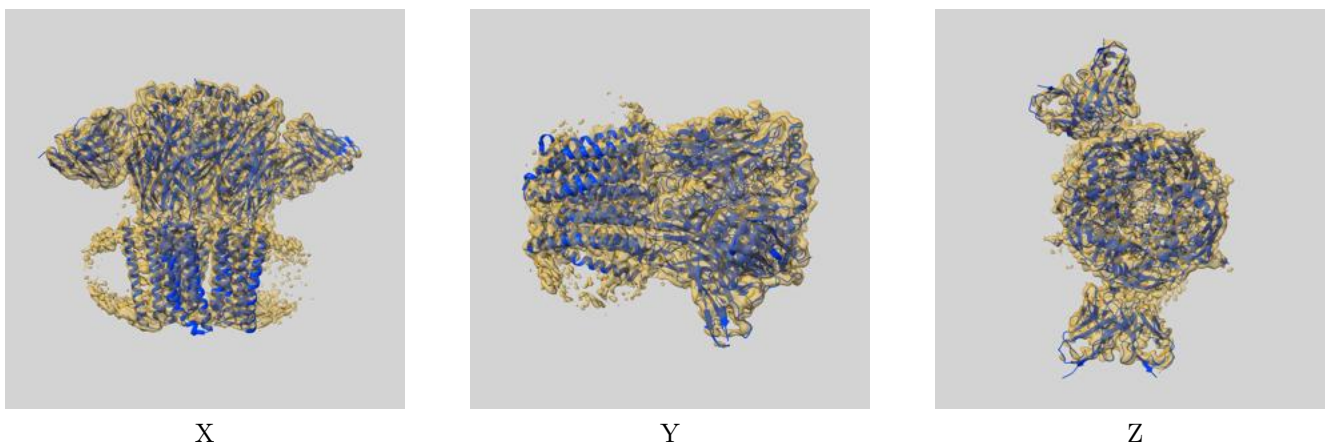
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.95	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.57	4.14	3.61

\*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 3.57 differs from the reported value 2.95 by more than 10 %

## 9 Map-model fit [i](#)

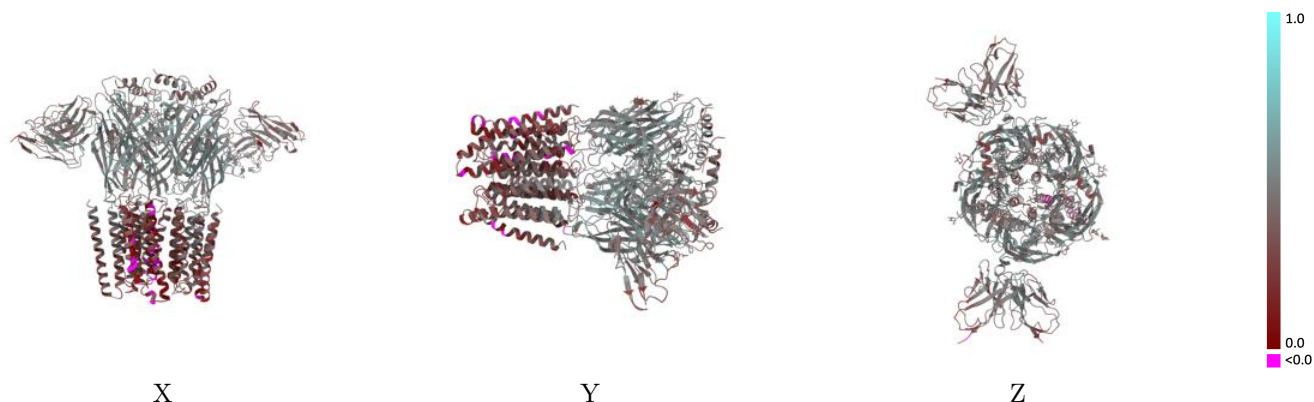
This section contains information regarding the fit between EMDB map EMD-47132 and PDB model 9DRX. Per-residue inclusion information can be found in section [3](#) on page [12](#).

### 9.1 Map-model overlay [i](#)



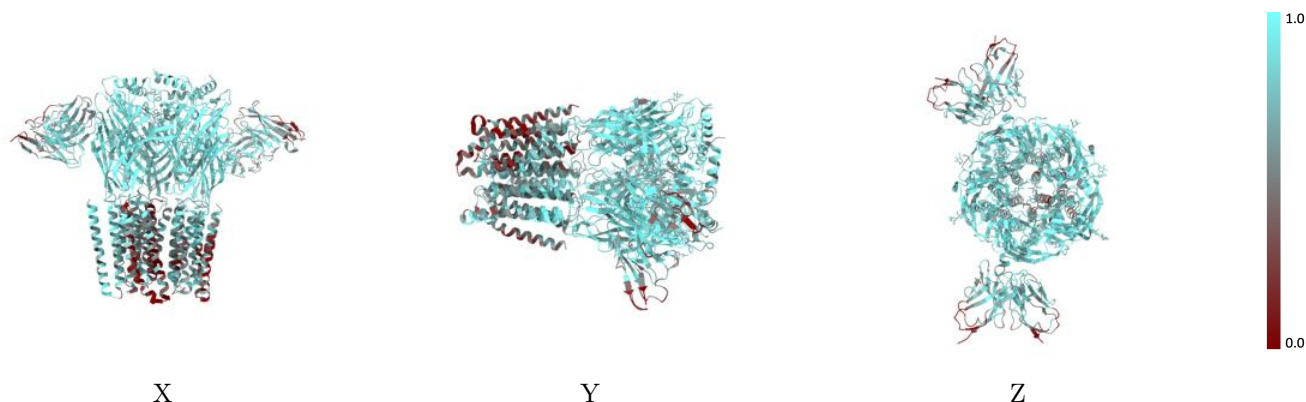
The images above show the 3D surface view of the map at the recommended contour level 0.075 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



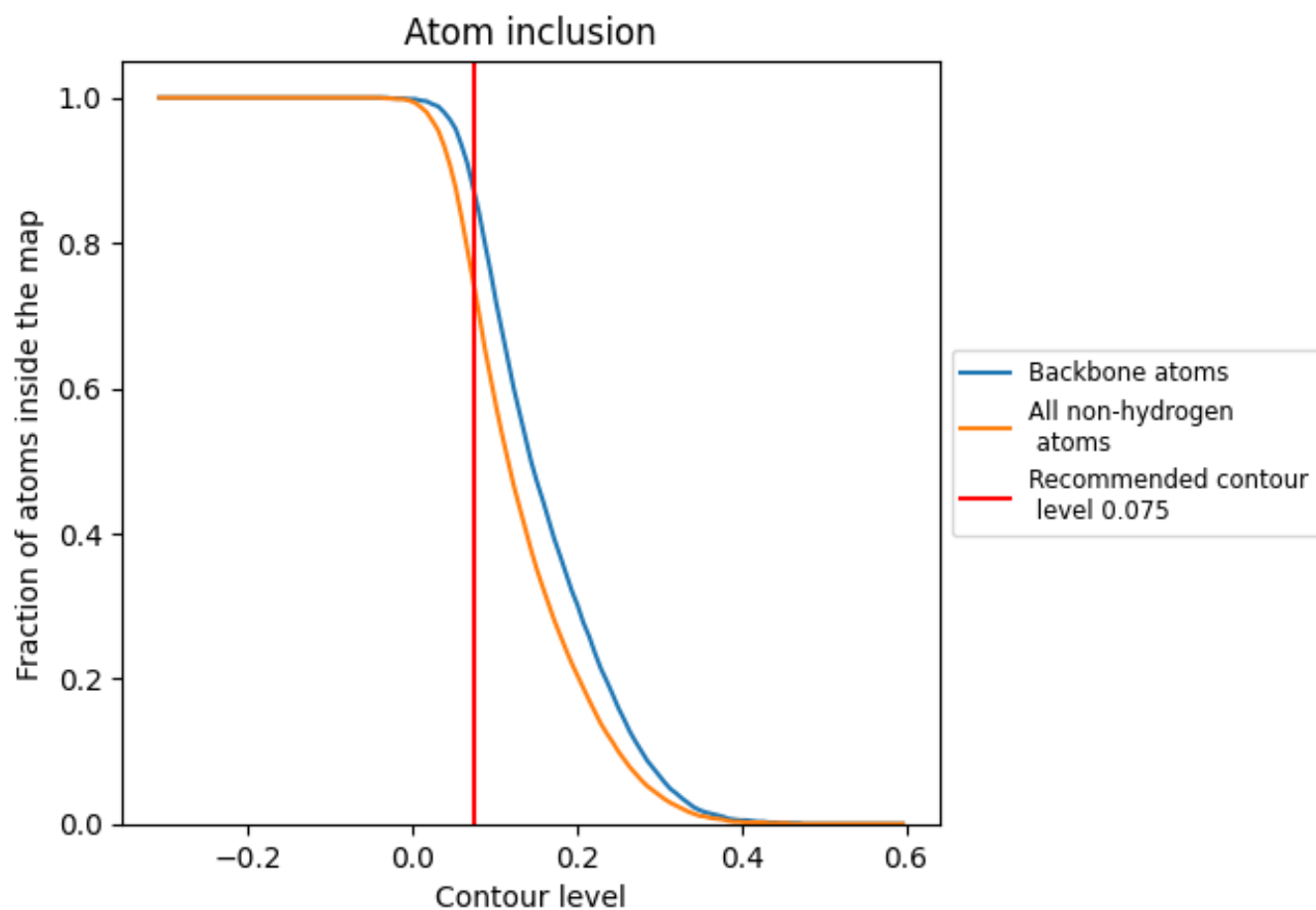
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.075).































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 87% of all backbone atoms, 74% 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 (0.075) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7380	 0.4130
A	 0.7420	 0.4140
B	 0.8110	 0.4420
C	 0.7620	 0.3980
D	 0.8220	 0.4460
E	 0.6710	 0.3550
F	 0.7380	 0.5120
G	 0.8970	 0.4940
H	 0.6480	 0.4280
I	 0.6510	 0.4230
J	 0.6310	 0.4040
K	 0.6160	 0.4030
L	 0.6870	 0.4420
M	 0.8210	 0.4360
N	 0.7140	 0.3400

