



## Full wwPDB EM Validation Report ⓘ

Aug 12, 2023 – 07:43 am BST

PDB ID : 8C8T  
EMDB ID : EMD-16493  
Title : cryo-EM structure of BG505 SOSIP.664 HIV-1 Env trimer in complex with bNAbs EPTC112 and 3BNC117  
Authors : Baquero, E.; Molinos-Albert, L.; Mouquet, H.  
Deposited on : 2023-01-21  
Resolution : 3.20 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](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.dev50  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

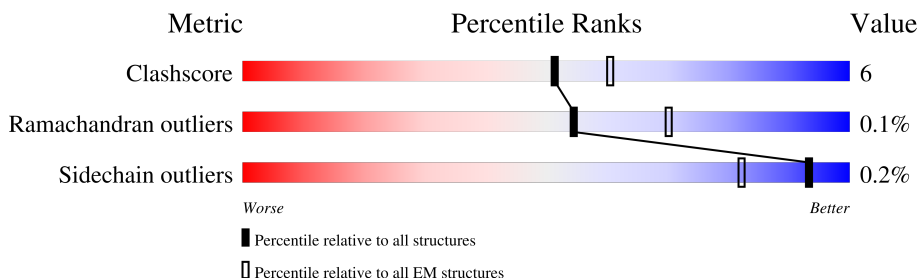
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.20 Å.

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



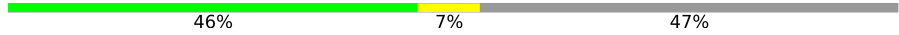
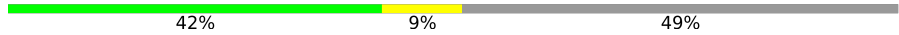



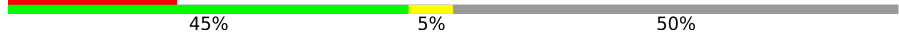
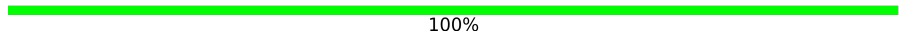




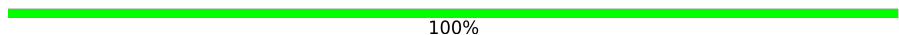
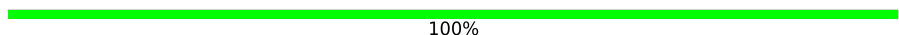
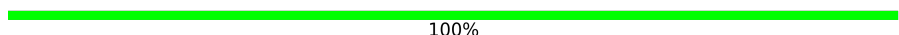




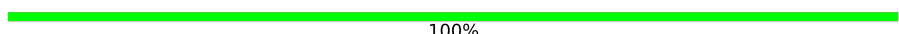

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	469	
1	F	469	
1	G	469	
2	B	145	
2	I	145	
2	J	145	
3	C	233	
3	H	233	

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Mol	Chain	Length	Quality of chain
4	R	226	
4	S	226	
5	T	206	
5	U	206	
6	D	216	
6	K	216	
7	E	2	
7	M	2	
7	N	2	
7	O	2	
7	P	2	
7	Q	2	
7	W	2	
7	Y	2	
7	Z	2	
7	a	2	
7	b	2	
8	L	3	
8	X	3	
9	V	4	

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 19762 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 Envelope glycoprotein gp160.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	420	Total 3254	C 2060	N 574	O 592	S 28	0	0
1	F	426	Total 3277	C 2070	N 575	O 604	S 28	0	0
1	G	422	Total 3246	C 2057	N 571	O 591	S 27	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	332	ASN	THR	conflict	UNP Q2N0S5
A	501	CYS	ALA	conflict	UNP Q2N0S5
F	332	ASN	THR	conflict	UNP Q2N0S5
F	501	CYS	ALA	conflict	UNP Q2N0S5
G	332	ASN	THR	conflict	UNP Q2N0S5
G	501	CYS	ALA	conflict	UNP Q2N0S5

- Molecule 2 is a protein called Gp41 Bg505 T332n Sosip.664.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	117	Total 918	C 581	N 160	O 171	S 6	0	0
2	I	118	Total 906	C 578	N 160	O 163	S 5	0	0
2	J	116	Total 879	C 559	N 150	O 164	S 6	0	0

- Molecule 3 is a protein called IgG EPTC112 Fab fragment heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	119	Total 897	C 573	N 151	O 170	S 3	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	H	119	891	570	151	167	3	0	0

- Molecule 4 is a protein called IgG 3BNC117 Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	R	120	938	595	170	170	3	0	0
4	S	116	894	570	158	163	3	0	0

- Molecule 5 is a protein called IgG 3BNC117 Fab Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	T	95	680	436	112	129	3	0	0
5	U	98	664	422	113	126	3	0	0

- Molecule 6 is a protein called IgG EPTC112 Fab Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	D	108	773	479	125	167	2	0	0
6	K	108	773	479	125	167	2	0	0

- Molecule 7 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
			Total	C	N	O		
7	E	2	28	16	2	10	0	0
7	M	2	28	16	2	10	0	0
7	N	2	28	16	2	10	0	0

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Mol	Chain	Residues	Atoms				AltConf	Trace
7	O	2	Total	C	N	O	0	0
			28	16	2	10		
7	P	2	Total	C	N	O	0	0
			28	16	2	10		
7	Q	2	Total	C	N	O	0	0
			28	16	2	10		
7	W	2	Total	C	N	O	0	0
			28	16	2	10		
7	Y	2	Total	C	N	O	0	0
			28	16	2	10		
7	Z	2	Total	C	N	O	0	0
			28	16	2	10		
7	a	2	Total	C	N	O	0	0
			28	16	2	10		
7	b	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 8 is an oligosaccharide called 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	L	3	Total	C	N	O	0	0
			39	22	2	15		
8	X	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 9 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-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
9	V	4	Total	C	N	O	0	0
			50	28	2	20		

- Molecule 10 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: 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	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	A	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0

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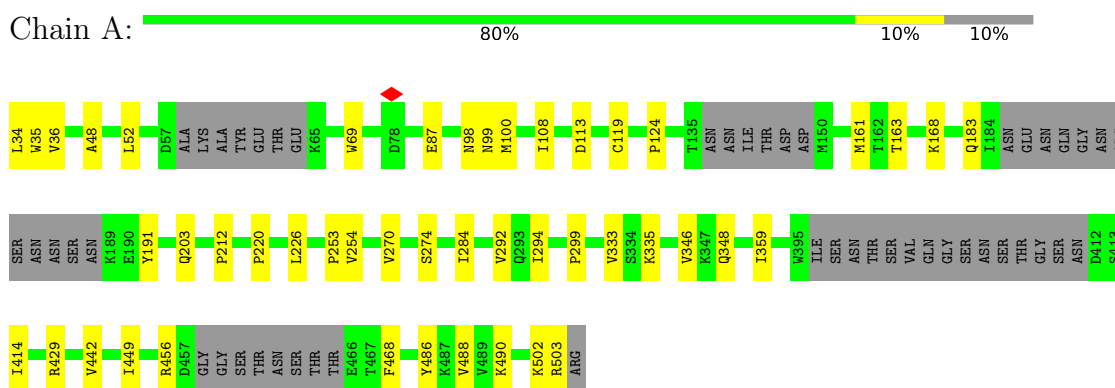
Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
10	F	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0
10	F	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	G	1	Total 14	8	1	5	0
10	T	1	Total 14	8	1	5	0



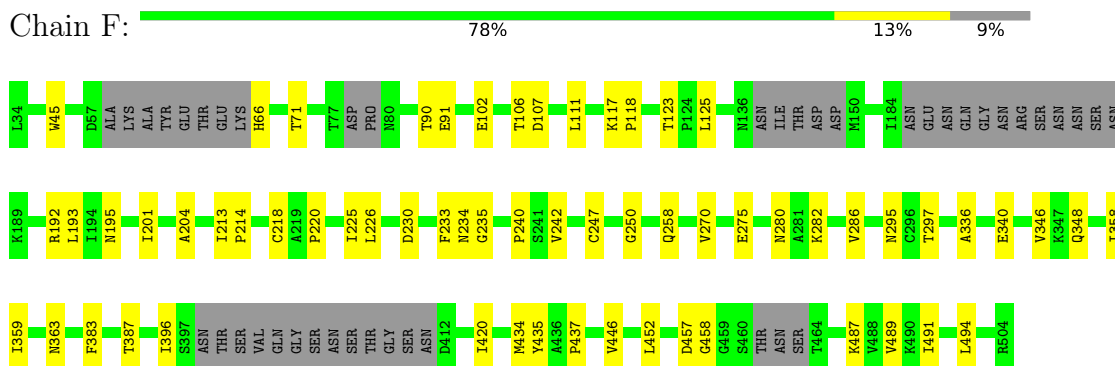
### 3 Residue-property plots

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.

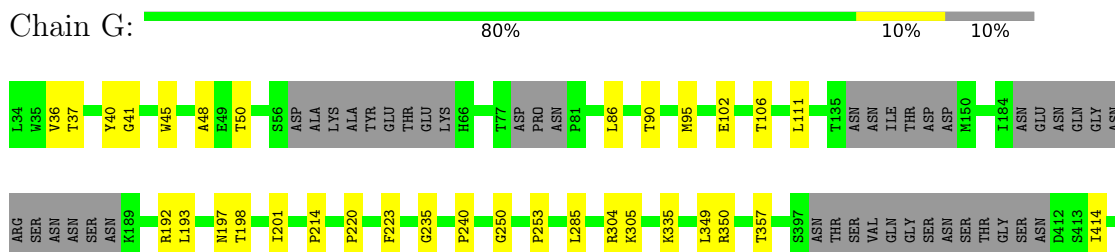
- Molecule 1: Envelope glycoprotein gp160



- Molecule 1: Envelope glycoprotein gp160

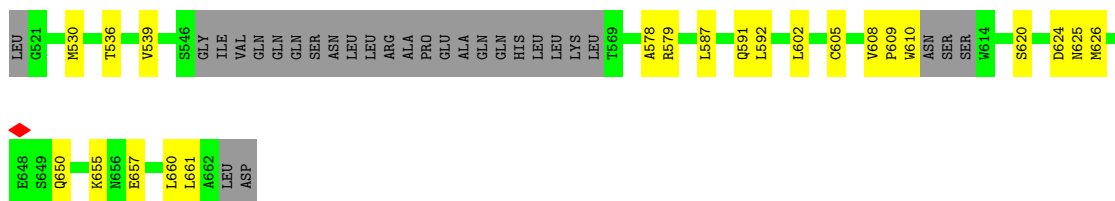


- Molecule 1: Envelope glycoprotein gp160

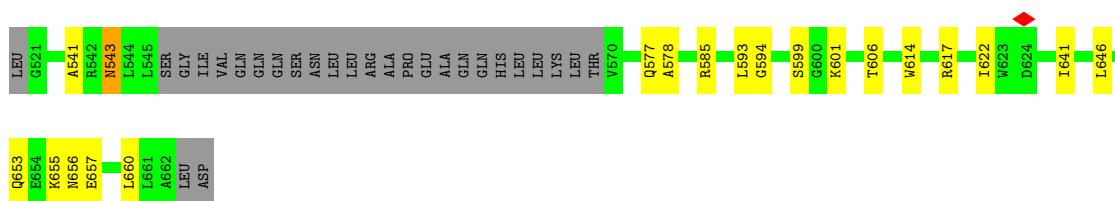




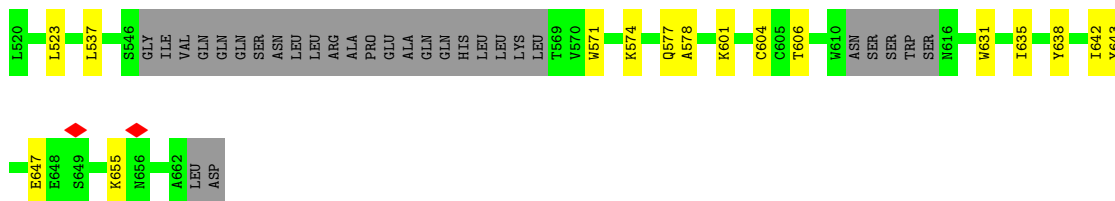
• Molecule 2: Gp41 Bg505 T332n Sosip.664



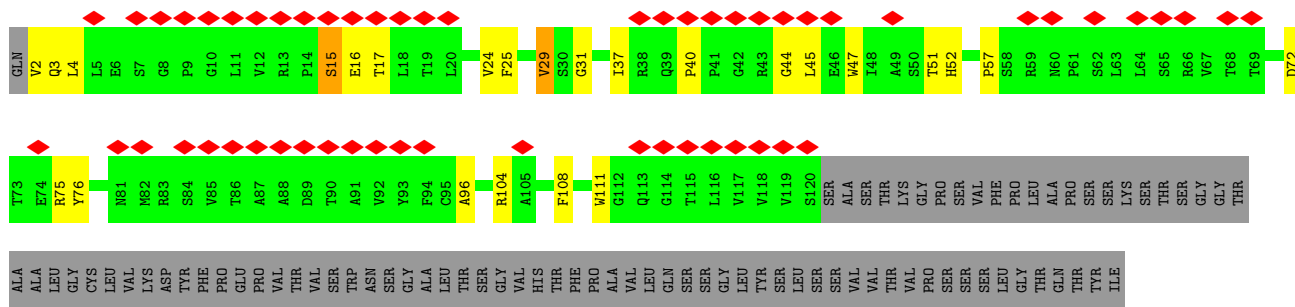
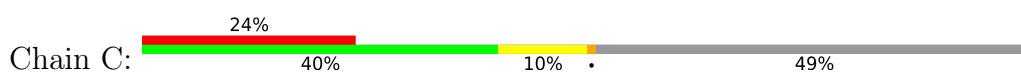
• Molecule 2: Gp41 Bg505 T332n Sosip.664



• Molecule 2: Gp41 Bg505 T332n Sosip.664



• Molecule 3: IgG EPTC112 Fab fragment heavy chain







Chain E:  100%

  
MAG1  
MAG2

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

Chain M:  50% 50%

  
MAG1  
MAG2

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

Chain N:  50% 50%

  
MAG1  
MAG2

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

Chain O:  50% 50%

  
MAG1  
MAG2

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

Chain P:  50% 50%

  
MAG1  
MAG2

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

Chain Q:  100%

  
MAG1  
MAG2

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

Chain W:  100%

  
MAG1  
MAG2

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

Chain Y:  100%



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

Chain Z:  50% 50%



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

Chain a:  50% 50%



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

Chain b:  50% 50%



- Molecule 8: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain L:  67% 33%




- Molecule 8: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain X:  100%



- Molecule 9: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain V:  25% 75% 25%



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	251591	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 ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	4.013	Depositor
Minimum map value	-2.374	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.080	Depositor
Recommended contour level	0.4	Depositor
Map size (Å)	344.0, 344.0, 344.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86, 0.86, 0.86	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: MAN, BMA, 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	0.25	0/3324	0.50	0/4520
1	F	0.26	0/3343	0.52	0/4543
1	G	0.25	0/3313	0.50	0/4500
2	B	0.26	0/934	0.45	0/1267
2	I	0.24	0/923	0.45	0/1255
2	J	0.25	0/893	0.46	0/1212
3	C	0.26	0/924	0.55	0/1269
3	H	0.26	0/918	0.54	0/1261
4	R	0.25	0/967	0.53	0/1321
4	S	0.25	0/921	0.51	0/1258
5	T	0.27	0/697	0.54	0/957
5	U	0.26	0/679	0.53	0/932
6	D	0.25	0/790	0.51	0/1079
6	K	0.25	0/790	0.49	0/1079
All	All	0.25	0/19416	0.51	0/26453

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	F	0	1
3	C	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	15	SER	Peptide
1	F	123	THR	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	3254	0	3169	29	0
1	F	3277	0	3169	37	0
1	G	3246	0	3159	33	0
2	B	918	0	884	18	0
2	I	906	0	873	14	0
2	J	879	0	836	14	0
3	C	897	0	830	16	0
3	H	891	0	819	22	0
4	R	938	0	855	9	0
4	S	894	0	805	14	0
5	T	680	0	591	4	0
5	U	664	0	547	10	0
6	D	773	0	729	13	0
6	K	773	0	729	7	0
7	E	28	0	25	0	0
7	M	28	0	25	1	0
7	N	28	0	25	2	0
7	O	28	0	25	2	0
7	P	28	0	25	0	0
7	Q	28	0	25	0	0
7	W	28	0	24	0	0
7	Y	28	0	25	0	0
7	Z	28	0	25	0	0
7	a	28	0	25	0	0
7	b	28	0	25	0	0
8	L	39	0	34	1	0
8	X	39	0	34	0	0
9	V	50	0	43	0	0
10	A	140	0	130	3	0
10	F	98	0	91	2	0
10	G	84	0	78	1	0
10	T	14	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	19762	0	18692	220	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.

All (220) 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)
3:C:29:VAL:HG11	3:C:76:TYR:HA	1.69	0.75
3:C:47:TRP:NE1	6:D:98:LEU:O	2.21	0.74
1:F:218:CYS:HA	1:F:247:CYS:HB3	1.70	0.73
1:A:294:ILE:HG22	1:A:333:VAL:HG22	1.71	0.72
1:F:204:ALA:HB3	1:F:437:PRO:HD3	1.72	0.71
5:T:6:GLN:NE2	5:T:88:CYS:SG	2.66	0.69
1:G:457:ASP:OD2	1:G:469:ARG:NH1	2.27	0.68
4:S:67:ARG:NH2	4:S:94:ASP:OD2	2.26	0.68
1:G:201:ILE:HD11	1:G:435:TYR:HB2	1.74	0.68
3:H:29:VAL:HG11	3:H:76:TYR:HA	1.74	0.68
6:D:51:ASP:O	6:D:53:THR:N	2.26	0.67
2:B:655:LYS:HE3	2:I:601:LYS:HA	1.75	0.67
1:G:350:ARG:NH1	1:G:357:THR:O	2.28	0.66
1:G:37:THR:OG1	2:J:604:CYS:O	2.14	0.66
6:K:52:VAL:HG21	6:K:67:LYS:HB2	1.77	0.66
4:S:34:ILE:HG13	4:S:83:PHE:HE2	1.62	0.65
6:K:5:GLN:NE2	6:K:89:CYS:SG	2.70	0.65
1:F:234:ASN:OD1	1:F:235:GLY:N	2.31	0.64
1:G:36:VAL:O	2:J:606:THR:OG1	2.17	0.63
4:S:39:GLN:HB3	4:S:45:LEU:HD23	1.81	0.62
1:A:220:PRO:HB3	2:B:578:ALA:HB1	1.81	0.62
1:F:225:ILE:HD12	1:F:247:CYS:HA	1.80	0.62
1:G:220:PRO:HB3	2:J:578:ALA:HB1	1.81	0.61
3:C:15:SER:OG	3:C:16:GLU:OE1	2.18	0.61
1:G:457:ASP:OD2	4:S:65:GLN:NE2	2.34	0.60
2:B:657:GLU:O	2:B:661:LEU:N	2.34	0.60
3:H:103:TRP:CZ3	7:N:2:NAG:H5	2.35	0.60
1:G:428:GLN:NE2	1:G:473:GLY:O	2.34	0.60
3:C:3:GLN:HG2	3:C:25:PHE:HB2	1.82	0.60
1:F:195:ASN:HD21	1:F:201:ILE:HD11	1.67	0.60
1:A:274:SER:HB3	1:A:284:ILE:HA	1.83	0.60
3:H:18:LEU:HG	3:H:85:VAL:HG11	1.84	0.59
3:H:47:TRP:NE1	6:K:98:LEU:O	2.30	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:220:PRO:HB3	2:I:578:ALA:HB1	1.84	0.57
10:F:606:NAG:H3	10:F:606:NAG:H83	1.87	0.57
1:G:253:PRO:HA	1:G:479:TRP:HH2	1.70	0.57
3:C:37:ILE:HD11	3:C:111:TRP:CH2	2.40	0.57
7:N:2:NAG:H83	7:N:2:NAG:H3	1.87	0.57
1:A:299:PRO:HA	1:A:442:VAL:HG13	1.88	0.56
3:H:92:VAL:HG12	3:H:116:LEU:HA	1.87	0.56
1:F:275:GLU:HB3	1:F:282:LYS:HD3	1.88	0.56
3:H:38:ARG:HD2	3:H:91:ALA:HB3	1.88	0.56
4:R:104:ARG:NH2	4:R:109:ASP:OD2	2.39	0.56
6:D:36:TRP:HB2	6:D:49:ILE:HB	1.88	0.56
6:D:39:GLN:HB3	6:D:45:PRO:HB3	1.88	0.56
10:G:601:NAG:H3	10:G:601:NAG:H83	1.88	0.55
1:A:36:VAL:HG12	2:B:610:TRP:HE3	1.71	0.55
10:A:603:NAG:H83	10:A:603:NAG:H3	1.88	0.55
5:U:48:ILE:HG22	5:U:51:GLY:H	1.71	0.55
1:G:223:PHE:CE1	1:G:490:LYS:HG2	2.41	0.55
4:R:49:GLY:HA3	4:R:59:ASN:O	2.07	0.55
3:C:104:ARG:HH12	6:D:33:TYR:HE1	1.54	0.55
10:F:601:NAG:H3	10:F:601:NAG:H83	1.89	0.55
3:C:16:GLU:OE1	3:C:16:GLU:N	2.40	0.55
1:F:90:THR:HG22	1:F:240:PRO:HA	1.88	0.55
1:A:335:LYS:HD3	1:A:414:ILE:HD11	1.90	0.54
1:F:107:ASP:O	1:F:111:LEU:HG	2.07	0.54
2:B:620:SER:O	2:B:624:ASP:CB	2.55	0.54
2:B:602:LEU:H	2:J:655:LYS:HE3	1.72	0.54
1:F:280:ASN:HD22	1:F:458:GLY:HA3	1.72	0.54
1:G:429:ARG:NH1	1:G:432:GLN:OE1	2.41	0.54
1:A:212:PRO:HB3	1:A:253:PRO:HD2	1.89	0.54
1:F:91:GLU:HB3	1:F:242:VAL:HG21	1.89	0.54
3:C:51:THR:HA	3:C:57:PRO:HB3	1.90	0.54
4:R:101:ALA:HB1	4:R:110:PHE:HB3	1.90	0.54
1:A:226:LEU:O	1:A:486:TYR:HA	2.08	0.53
1:A:87:GLU:HB2	10:A:601:NAG:H82	1.90	0.53
1:G:469:ARG:NH1	4:S:65:GLN:HE22	2.07	0.53
2:I:617:ARG:HB2	2:I:622:ILE:HD11	1.89	0.53
2:J:638:TYR:O	2:J:642:ILE:HG13	2.08	0.53
4:S:95:THR:HB	4:S:121:VAL:HG22	1.91	0.53
1:G:50:THR:HG21	1:G:223:PHE:CZ	2.43	0.52
1:F:491:ILE:O	2:I:585:ARG:NH2	2.42	0.52
1:G:45:TRP:HB2	1:G:489:VAL:HB	1.90	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:653:GLN:O	2:I:657:GLU:HG2	2.09	0.52
5:U:34:ASN:HB2	5:U:89:GLN:HG3	1.90	0.52
7:M:1:NAG:H83	7:M:1:NAG:H3	1.90	0.52
1:F:297:THR:HG21	7:O:1:NAG:H81	1.92	0.52
1:G:456:ARG:HB2	1:G:468:PHE:CE2	2.44	0.52
6:D:5:GLN:NE2	6:D:89:CYS:SG	2.82	0.52
2:I:606:THR:HG21	2:I:646:LEU:HD23	1.93	0.51
6:D:52:VAL:HG23	6:D:53:THR:HG23	1.93	0.51
2:I:656:ASN:O	2:I:660:LEU:HG	2.09	0.51
1:A:98:ASN:OD1	1:A:99:ASN:N	2.43	0.51
3:H:37:ILE:HA	3:H:47:TRP:HA	1.92	0.51
1:F:102:GLU:O	1:F:106:THR:HG23	2.11	0.51
1:A:183:GLN:HG2	1:A:191:TYR:CE1	2.46	0.51
1:F:336:ALA:O	1:F:340:GLU:HG3	2.10	0.51
1:F:434:MET:HG2	1:F:435:TYR:O	2.10	0.51
6:D:48:ILE:HG22	6:D:49:ILE:HG12	1.93	0.51
7:O:1:NAG:H3	7:O:1:NAG:H83	1.91	0.51
1:F:125:LEU:HD23	1:F:193:LEU:HD11	1.92	0.51
1:F:346:VAL:HG13	1:F:359:ILE:HG13	1.92	0.50
1:G:111:LEU:HD11	2:J:571:TRP:CH2	2.46	0.50
3:C:16:GLU:HG2	3:C:17:THR:N	2.26	0.50
1:G:48:ALA:HB3	1:G:490:LYS:HG3	1.92	0.50
1:G:90:THR:HG22	1:G:240:PRO:HA	1.94	0.50
3:H:47:TRP:HZ2	6:K:97:THR:HG23	1.77	0.50
1:F:218:CYS:HA	1:F:247:CYS:CB	2.41	0.50
1:A:270:VAL:HB	1:A:348:GLN:HG3	1.94	0.50
3:C:2:VAL:HA	3:C:25:PHE:O	2.11	0.50
3:H:101:SER:HB2	3:H:103:TRP:CD1	2.47	0.50
1:G:335:LYS:HD3	1:G:414:ILE:HD11	1.93	0.49
3:H:2:VAL:HG21	3:H:97:ARG:HD3	1.95	0.49
2:B:536:THR:O	2:B:539:VAL:HG22	2.13	0.49
3:H:117:VAL:HG12	3:H:117:VAL:O	2.13	0.49
1:G:285:LEU:HD23	1:G:453:ILE:HG12	1.95	0.49
5:U:38:GLN:O	5:U:85:THR:OG1	2.27	0.49
4:S:38:ARG:HA	4:S:97:VAL:O	2.13	0.48
2:B:657:GLU:HA	2:B:660:LEU:HD12	1.94	0.48
1:F:66:HIS:O	1:F:66:HIS:ND1	2.44	0.48
1:A:69:TRP:HE1	1:A:108:ILE:HG23	1.79	0.48
6:K:39:GLN:HG2	6:K:88:TYR:HE1	1.79	0.48
3:H:29:VAL:HG12	3:H:76:TYR:HD1	1.79	0.47
3:H:52:HIS:HD1	3:H:55:LEU:HB2	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:71:ILE:HG22	3:H:78:VAL:HG22	1.96	0.47
5:U:47:LEU:HB3	5:U:48:ILE:HD12	1.96	0.47
1:F:230:ASP:HB3	1:F:233:PHE:HB2	1.95	0.47
1:G:45:TRP:HA	1:G:490:LYS:O	2.14	0.47
5:T:48:ILE:HD12	5:T:73:LEU:HD13	1.96	0.47
1:A:98:ASN:OD1	1:A:100:MET:HG2	2.13	0.47
3:H:2:VAL:HA	3:H:25:PHE:O	2.14	0.47
4:S:47:TRP:CZ2	4:S:49:GLY:HA2	2.50	0.47
1:A:52:LEU:HD11	1:A:488:VAL:HG21	1.96	0.47
1:F:192:ARG:NH1	1:F:193:LEU:O	2.48	0.47
2:I:594:GLY:HA2	2:I:599:SER:HB2	1.97	0.47
2:B:625:ASN:OD1	2:B:626:MET:N	2.48	0.47
4:S:34:ILE:HG13	4:S:83:PHE:CE2	2.45	0.47
1:A:36:VAL:HG12	2:B:610:TRP:CE3	2.50	0.46
1:G:192:ARG:NH1	1:G:193:LEU:O	2.48	0.46
1:A:113:ASP:CG	1:A:429:ARG:HH12	2.18	0.46
1:A:503:ARG:HD3	2:B:605:CYS:O	2.15	0.46
1:F:363:ASN:OD1	1:F:363:ASN:N	2.47	0.46
1:A:48:ALA:HB2	1:A:490:LYS:HE2	1.96	0.46
4:S:29:ILE:HD13	4:S:81:PHE:HB2	1.96	0.46
4:R:95:THR:HG22	4:R:120:THR:HA	1.98	0.46
1:A:35:TRP:CD1	2:B:609:PRO:HA	2.50	0.46
6:D:95:ARG:HE	6:D:95:ARG:N	2.14	0.46
1:G:253:PRO:HA	1:G:479:TRP:CH2	2.49	0.46
1:G:349:LEU:HD21	1:G:468:PHE:CZ	2.50	0.46
1:G:304:ARG:HG2	1:G:305:LYS:N	2.31	0.45
5:U:35:TRP:HB2	5:U:48:ILE:HB	1.98	0.45
1:G:41:GLY:O	2:J:537:LEU:HD22	2.16	0.45
6:D:95:ARG:HE	6:D:95:ARG:H	1.63	0.45
1:A:35:TRP:CZ3	1:A:502:LYS:HD2	2.52	0.45
1:F:45:TRP:HB2	1:F:489:VAL:HB	1.98	0.45
5:T:15:VAL:HA	5:T:78:LEU:HD22	1.98	0.45
2:I:614:TRP:HE1	2:I:641:ILE:HD11	1.81	0.45
2:B:591:GLN:NE2	2:I:541:ALA:O	2.49	0.45
4:R:39:GLN:HB2	4:R:45:LEU:HD23	1.99	0.45
3:H:39:GLN:O	3:H:91:ALA:HB1	2.16	0.45
3:H:108:PHE:O	3:H:111:TRP:NE1	2.49	0.45
2:J:643:TYR:O	2:J:647:GLU:HG3	2.16	0.44
4:S:35:HIS:CE1	4:S:50:TRP:HB3	2.52	0.44
4:S:45:LEU:HB2	5:U:98:VAL:HG11	1.99	0.44
5:U:34:ASN:O	5:U:88:CYS:HA	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:4:LEU:HD23	3:C:24:VAL:HG22	1.99	0.44
1:F:457:ASP:OD2	4:R:65:GLN:NE2	2.50	0.44
2:J:571:TRP:CD1	2:J:574:LYS:HD2	2.51	0.44
3:C:31:GLY:C	3:C:52:HIS:HE2	2.21	0.44
1:F:494:LEU:HD21	2:I:593:LEU:HD13	1.98	0.44
1:G:40:TYR:O	1:G:493:PRO:HB2	2.17	0.44
3:H:44:GLY:O	3:H:45:LEU:HB2	2.18	0.44
1:F:270:VAL:HB	1:F:348:GLN:HG3	1.99	0.44
1:F:286:VAL:HB	1:F:452:LEU:HB2	2.00	0.44
4:R:61:PRO:HG2	4:R:64:PHE:HD2	1.83	0.43
6:D:46:LYS:HB3	6:D:46:LYS:HE3	1.78	0.43
1:A:346:VAL:HG13	1:A:359:ILE:HD12	2.00	0.43
5:T:55:GLU:O	5:T:58:VAL:HG12	2.17	0.43
5:U:8:PRO:HG2	5:U:22:THR:H	1.83	0.43
1:A:456:ARG:HB3	1:A:468:PHE:CE1	2.52	0.43
2:B:530:MET:HG3	2:B:626:MET:O	2.18	0.43
1:F:226:LEU:HB2	1:F:487:LYS:HG2	2.01	0.43
1:G:102:GLU:O	1:G:106:THR:HG23	2.18	0.43
3:H:28:ARG:O	3:H:29:VAL:HG12	2.17	0.43
2:I:543:ASN:O	2:I:543:ASN:ND2	2.35	0.43
4:S:16:ALA:O	4:S:90:LEU:HD23	2.19	0.43
1:A:163:THR:OG1	1:A:168:LYS:O	2.35	0.43
1:F:117:LYS:HB2	1:F:118:PRO:HD3	2.00	0.43
6:D:1:SER:O	6:D:1:SER:OG	2.37	0.43
10:A:610:NAG:H81	8:L:1:NAG:H62	2.01	0.43
1:F:295:ASN:OD1	1:F:446:VAL:HG13	2.19	0.43
1:G:95:MET:SD	1:G:235:GLY:HA2	2.59	0.42
1:G:214:PRO:HB3	1:G:250:GLY:HA3	2.01	0.42
1:F:214:PRO:HB3	1:F:250:GLY:HA3	2.01	0.42
6:K:3:LEU:HD23	6:K:21:CYS:SG	2.59	0.42
2:J:635:ILE:HG22	2:J:635:ILE:O	2.18	0.42
3:H:20:LEU:HD23	3:H:20:LEU:HA	1.93	0.42
1:A:124:PRO:HB2	1:A:161:MET:HE1	2.01	0.42
2:J:631:TRP:CD1	2:J:635:ILE:HD12	2.54	0.42
2:B:592:LEU:HD12	2:B:592:LEU:HA	1.86	0.42
1:F:71:THR:HG21	1:F:213:ILE:HD11	2.00	0.42
1:F:204:ALA:HB2	1:F:435:TYR:O	2.20	0.42
1:F:358:ILE:HG12	1:F:396:ILE:CD1	2.50	0.42
3:C:44:GLY:O	3:C:45:LEU:HB2	2.20	0.42
2:I:577:GLN:OE1	2:I:577:GLN:HA	2.18	0.42
1:A:212:PRO:HG2	1:A:254:VAL:HG12	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:96:ALA:HB1	3:C:108:PHE:HB3	2.02	0.42
1:F:258:GLN:OE1	1:F:387:THR:HG21	2.20	0.42
3:H:12:VAL:HG11	3:H:18:LEU:HD21	2.02	0.41
6:D:31:SER:OG	6:D:32:ASP:N	2.52	0.41
3:C:40:PRO:HD2	3:C:44:GLY:HA3	2.02	0.41
2:I:655:LYS:NZ	2:J:601:LYS:HA	2.35	0.41
4:S:93:ASP:N	4:S:93:ASP:OD1	2.48	0.41
3:C:72:ASP:OD2	3:C:75:ARG:NH1	2.54	0.41
1:F:383:PHE:HE1	1:F:420:ILE:HD11	1.85	0.41
1:G:485:LYS:HE3	1:G:485:LYS:HB2	1.93	0.41
4:R:61:PRO:O	4:R:65:GLN:HG2	2.21	0.41
4:R:111:ASP:OD1	4:R:112:VAL:N	2.54	0.41
1:A:34:LEU:O	1:A:35:TRP:HD1	2.04	0.41
1:A:292:VAL:HB	1:A:449:ILE:HB	2.03	0.41
1:G:86:LEU:HD22	2:J:523:LEU:O	2.21	0.41
1:A:119:CYS:HB3	1:A:203:GLN:O	2.21	0.40
3:H:47:TRP:CD1	6:K:98:LEU:HB2	2.56	0.40
2:B:608:VAL:CG1	2:B:650:GLN:HG3	2.51	0.40
1:G:197:ASN:OD1	1:G:198:THR:HG23	2.22	0.40
2:B:579:ARG:NH2	2:J:577:GLN:OE1	2.54	0.40
2:B:587:LEU:HD23	2:B:587:LEU:HA	1.95	0.40
5:U:23:CYS:SG	5:U:33:LEU:HD11	2.62	0.40
5:U:48:ILE:HG23	5:U:53:LYS:O	2.20	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	408/469 (87%)	393 (96%)	15 (4%)	0	100 100
1	F	412/469 (88%)	400 (97%)	12 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	408/469 (87%)	398 (98%)	10 (2%)	0	100	100
2	B	111/145 (77%)	108 (97%)	3 (3%)	0	100	100
2	I	114/145 (79%)	111 (97%)	3 (3%)	0	100	100
2	J	110/145 (76%)	109 (99%)	1 (1%)	0	100	100
3	C	117/233 (50%)	107 (92%)	9 (8%)	1 (1%)	17	56
3	H	117/233 (50%)	107 (92%)	10 (8%)	0	100	100
4	R	118/226 (52%)	117 (99%)	1 (1%)	0	100	100
4	S	112/226 (50%)	112 (100%)	0	0	100	100
5	T	93/206 (45%)	89 (96%)	4 (4%)	0	100	100
5	U	96/206 (47%)	93 (97%)	3 (3%)	0	100	100
6	D	106/216 (49%)	104 (98%)	1 (1%)	1 (1%)	17	56
6	K	106/216 (49%)	104 (98%)	2 (2%)	0	100	100
All	All	2428/3604 (67%)	2352 (97%)	74 (3%)	2 (0%)	54	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	D	52	VAL
3	C	29	VAL

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	359/418 (86%)	359 (100%)	0	100	100
1	F	360/418 (86%)	360 (100%)	0	100	100
1	G	354/418 (85%)	354 (100%)	0	100	100
2	B	95/125 (76%)	95 (100%)	0	100	100
2	I	90/125 (72%)	89 (99%)	1 (1%)	73	88
2	J	87/125 (70%)	87 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	94/203 (46%)	94 (100%)	0	100	100
3	H	92/203 (45%)	92 (100%)	0	100	100
4	R	93/193 (48%)	92 (99%)	1 (1%)	73	88
4	S	87/193 (45%)	86 (99%)	1 (1%)	73	88
5	T	61/183 (33%)	60 (98%)	1 (2%)	62	84
5	U	53/183 (29%)	53 (100%)	0	100	100
6	D	86/181 (48%)	86 (100%)	0	100	100
6	K	86/181 (48%)	86 (100%)	0	100	100
All	All	1997/3149 (63%)	1993 (100%)	4 (0%)	93	98

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

Mol	Chain	Res	Type
2	I	543	ASN
4	R	72	ARG
4	S	72	ARG
5	T	89	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
5	T	6	GLN
5	U	89	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](#)

32 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
7	NAG	E	1	7,1	14,14,15	0.40	0	17,19,21	0.48	0
7	NAG	E	2	7	14,14,15	0.20	0	17,19,21	0.39	0
8	NAG	L	1	8,1	14,14,15	0.22	0	17,19,21	0.44	0
8	NAG	L	2	8	14,14,15	0.17	0	17,19,21	0.41	0
8	BMA	L	3	8	11,11,12	0.54	0	15,15,17	0.73	0
7	NAG	M	1	7,1	14,14,15	0.37	0	17,19,21	1.27	2 (11%)
7	NAG	M	2	7	14,14,15	0.27	0	17,19,21	0.43	0
7	NAG	N	1	7,1	14,14,15	0.20	0	17,19,21	0.49	0
7	NAG	N	2	7	14,14,15	0.38	0	17,19,21	1.35	2 (11%)
7	NAG	O	1	7,1	14,14,15	0.37	0	17,19,21	1.28	2 (11%)
7	NAG	O	2	7	14,14,15	0.23	0	17,19,21	0.42	0
7	NAG	P	1	7,1	14,14,15	1.06	1 (7%)	17,19,21	1.00	1 (5%)
7	NAG	P	2	7	14,14,15	0.24	0	17,19,21	0.54	0
7	NAG	Q	1	7,1	14,14,15	0.25	0	17,19,21	0.54	0
7	NAG	Q	2	7	14,14,15	0.25	0	17,19,21	0.43	0
9	NAG	V	1	1,9	14,14,15	0.37	0	17,19,21	0.47	0
9	NAG	V	2	9	14,14,15	0.25	0	17,19,21	0.43	0
9	BMA	V	3	9	11,11,12	0.57	0	15,15,17	0.87	0
9	MAN	V	4	9	11,11,12	0.66	0	15,15,17	1.23	2 (13%)
7	NAG	W	1	7,1	14,14,15	0.25	0	17,19,21	0.42	0
7	NAG	W	2	7	14,14,15	0.19	0	17,19,21	0.44	0
8	NAG	X	1	8,1	14,14,15	0.24	0	17,19,21	0.50	0
8	NAG	X	2	8	14,14,15	0.18	0	17,19,21	0.43	0
8	BMA	X	3	8	11,11,12	0.56	0	15,15,17	0.73	0
7	NAG	Y	1	7,1	14,14,15	0.28	0	17,19,21	0.38	0
7	NAG	Y	2	7	14,14,15	0.19	0	17,19,21	0.46	0
7	NAG	Z	1	7,1	14,14,15	0.27	0	17,19,21	0.60	1 (5%)
7	NAG	Z	2	7	14,14,15	0.24	0	17,19,21	0.39	0
7	NAG	a	1	7,1	14,14,15	0.40	0	17,19,21	1.35	2 (11%)
7	NAG	a	2	7	14,14,15	0.24	0	17,19,21	0.42	0
7	NAG	b	1	7,1	14,14,15	0.71	1 (7%)	17,19,21	0.73	0
7	NAG	b	2	7	14,14,15	0.27	0	17,19,21	0.38	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
7	NAG	E	1	7,1	-	0/6/23/26	0/1/1/1
7	NAG	E	2	7	-	2/6/23/26	0/1/1/1
8	NAG	L	1	8,1	-	0/6/23/26	0/1/1/1
8	NAG	L	2	8	-	0/6/23/26	0/1/1/1
8	BMA	L	3	8	-	1/2/19/22	0/1/1/1
7	NAG	M	1	7,1	-	3/6/23/26	0/1/1/1
7	NAG	M	2	7	-	0/6/23/26	0/1/1/1
7	NAG	N	1	7,1	-	2/6/23/26	0/1/1/1
7	NAG	N	2	7	-	5/6/23/26	0/1/1/1
7	NAG	O	1	7,1	-	3/6/23/26	0/1/1/1
7	NAG	O	2	7	-	0/6/23/26	0/1/1/1
7	NAG	P	1	7,1	-	3/6/23/26	0/1/1/1
7	NAG	P	2	7	-	2/6/23/26	0/1/1/1
7	NAG	Q	1	7,1	-	0/6/23/26	0/1/1/1
7	NAG	Q	2	7	-	2/6/23/26	0/1/1/1
9	NAG	V	1	1,9	-	0/6/23/26	0/1/1/1
9	NAG	V	2	9	-	0/6/23/26	0/1/1/1
9	BMA	V	3	9	-	0/2/19/22	0/1/1/1
9	MAN	V	4	9	-	0/2/19/22	0/1/1/1
7	NAG	W	1	7,1	-	2/6/23/26	0/1/1/1
7	NAG	W	2	7	-	4/6/23/26	0/1/1/1
8	NAG	X	1	8,1	-	2/6/23/26	0/1/1/1
8	NAG	X	2	8	-	0/6/23/26	0/1/1/1
8	BMA	X	3	8	-	0/2/19/22	0/1/1/1
7	NAG	Y	1	7,1	-	1/6/23/26	0/1/1/1
7	NAG	Y	2	7	-	2/6/23/26	0/1/1/1
7	NAG	Z	1	7,1	-	0/6/23/26	0/1/1/1
7	NAG	Z	2	7	-	2/6/23/26	0/1/1/1
7	NAG	a	1	7,1	-	3/6/23/26	0/1/1/1
7	NAG	a	2	7	-	0/6/23/26	0/1/1/1
7	NAG	b	1	7,1	-	3/6/23/26	0/1/1/1
7	NAG	b	2	7	-	2/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	P	1	NAG	O5-C1	-3.78	1.37	1.43
7	b	1	NAG	O5-C1	-2.59	1.39	1.43

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	N	2	NAG	C2-N2-C7	4.52	129.35	122.90
7	a	1	NAG	C2-N2-C7	4.43	129.21	122.90
7	O	1	NAG	C2-N2-C7	4.37	129.12	122.90
7	M	1	NAG	C2-N2-C7	4.33	129.07	122.90
9	V	4	MAN	C1-O5-C5	3.54	116.99	112.19
7	P	1	NAG	C3-C4-C5	2.58	114.84	110.24
9	V	4	MAN	O2-C2-C3	-2.26	105.62	110.14
7	N	2	NAG	C1-C2-N2	2.23	114.29	110.49
7	a	1	NAG	C1-C2-N2	2.19	114.23	110.49
7	O	1	NAG	C1-C2-N2	2.13	114.13	110.49
7	M	1	NAG	C1-C2-N2	2.06	114.01	110.49
7	Z	1	NAG	C1-O5-C5	2.01	114.92	112.19

There are no chirality outliers.

All (44) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	Y	2	NAG	C4-C5-C6-O6
7	P	1	NAG	O5-C5-C6-O6
7	P	2	NAG	C4-C5-C6-O6
7	Z	2	NAG	C4-C5-C6-O6
7	Q	2	NAG	O5-C5-C6-O6
7	Y	2	NAG	O5-C5-C6-O6
7	b	2	NAG	O5-C5-C6-O6
7	P	1	NAG	C4-C5-C6-O6
7	P	2	NAG	O5-C5-C6-O6
7	Z	2	NAG	O5-C5-C6-O6
7	M	1	NAG	C8-C7-N2-C2
7	M	1	NAG	O7-C7-N2-C2
7	N	2	NAG	C8-C7-N2-C2
7	N	2	NAG	O7-C7-N2-C2
7	O	1	NAG	C8-C7-N2-C2
7	O	1	NAG	O7-C7-N2-C2
7	W	2	NAG	C8-C7-N2-C2
7	W	2	NAG	O7-C7-N2-C2
7	a	1	NAG	C8-C7-N2-C2

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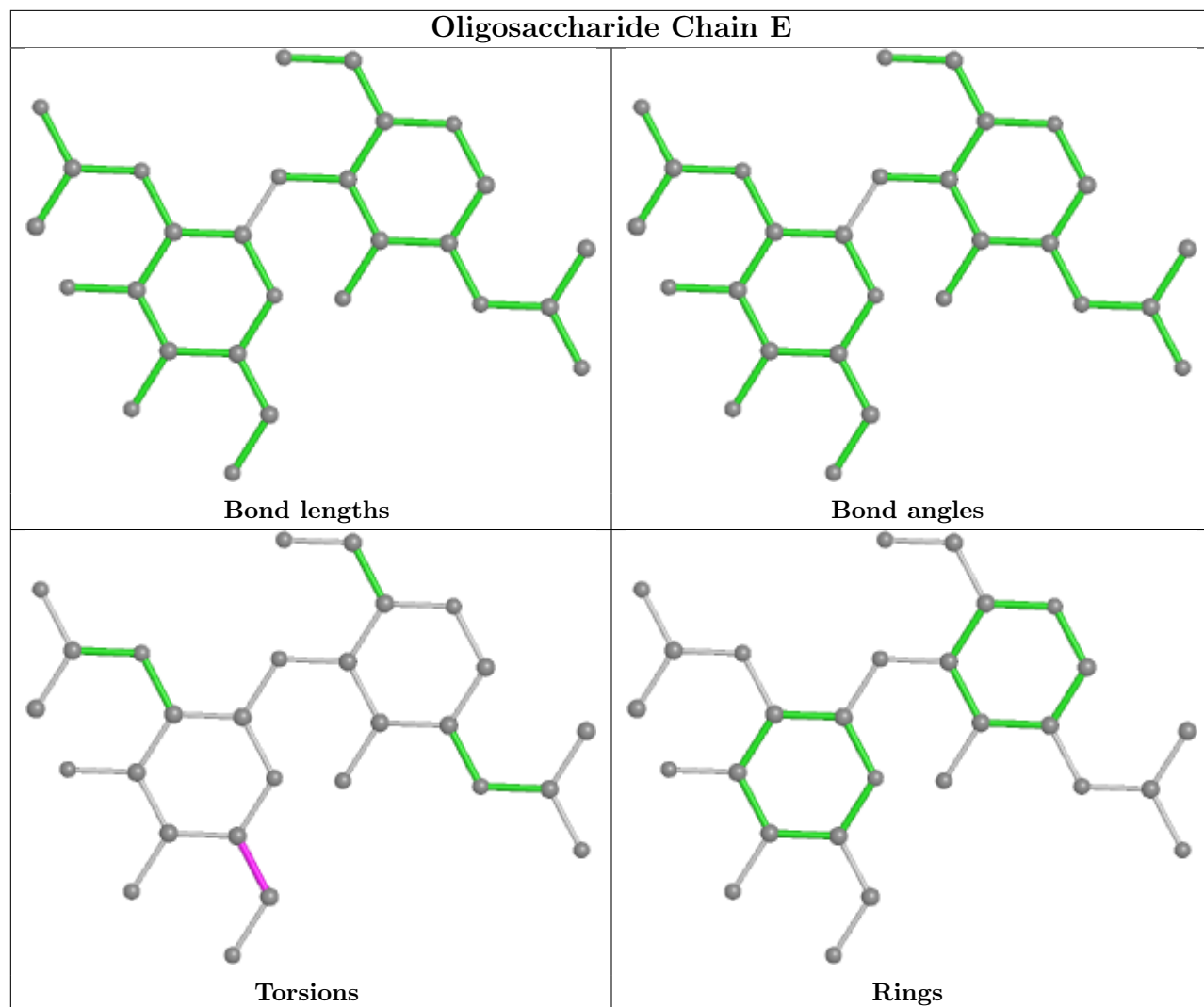
Mol	Chain	Res	Type	Atoms
7	a	1	NAG	O7-C7-N2-C2
8	X	1	NAG	O5-C5-C6-O6
7	b	1	NAG	O5-C5-C6-O6
7	W	2	NAG	O5-C5-C6-O6
7	b	1	NAG	C4-C5-C6-O6
7	N	2	NAG	C4-C5-C6-O6
7	Q	2	NAG	C4-C5-C6-O6
7	W	2	NAG	C4-C5-C6-O6
7	E	2	NAG	C4-C5-C6-O6
7	Y	1	NAG	O5-C5-C6-O6
7	N	2	NAG	O5-C5-C6-O6
7	b	2	NAG	C4-C5-C6-O6
8	L	3	BMA	O5-C5-C6-O6
7	N	1	NAG	C4-C5-C6-O6
7	P	1	NAG	C1-C2-N2-C7
7	E	2	NAG	O5-C5-C6-O6
7	W	1	NAG	C4-C5-C6-O6
7	W	1	NAG	O5-C5-C6-O6
8	X	1	NAG	C4-C5-C6-O6
7	N	2	NAG	C3-C2-N2-C7
7	O	1	NAG	C3-C2-N2-C7
7	N	1	NAG	O5-C5-C6-O6
7	M	1	NAG	C3-C2-N2-C7
7	a	1	NAG	C3-C2-N2-C7
7	b	1	NAG	C3-C2-N2-C7

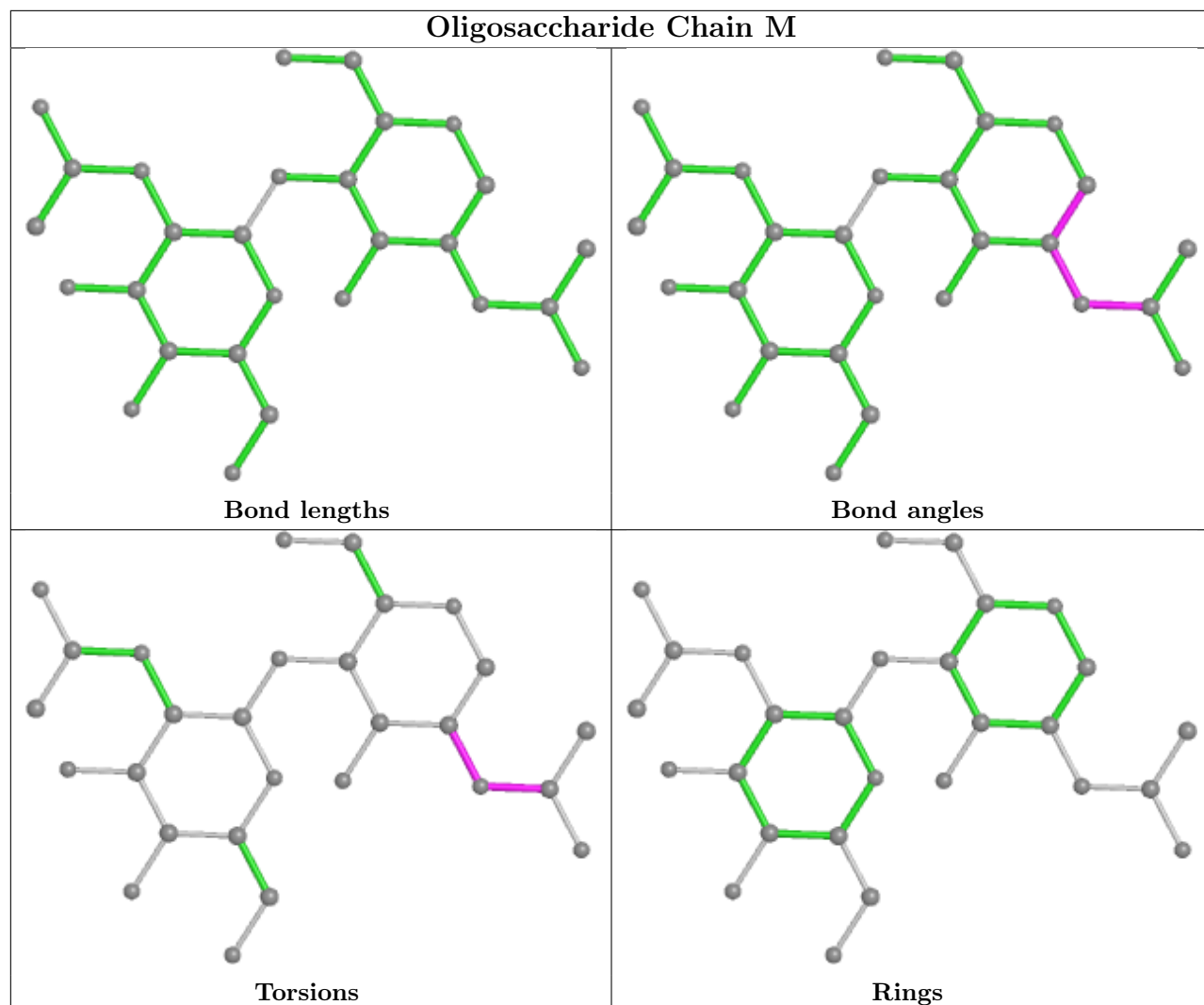
There are no ring outliers.

4 monomers are involved in 6 short contacts:

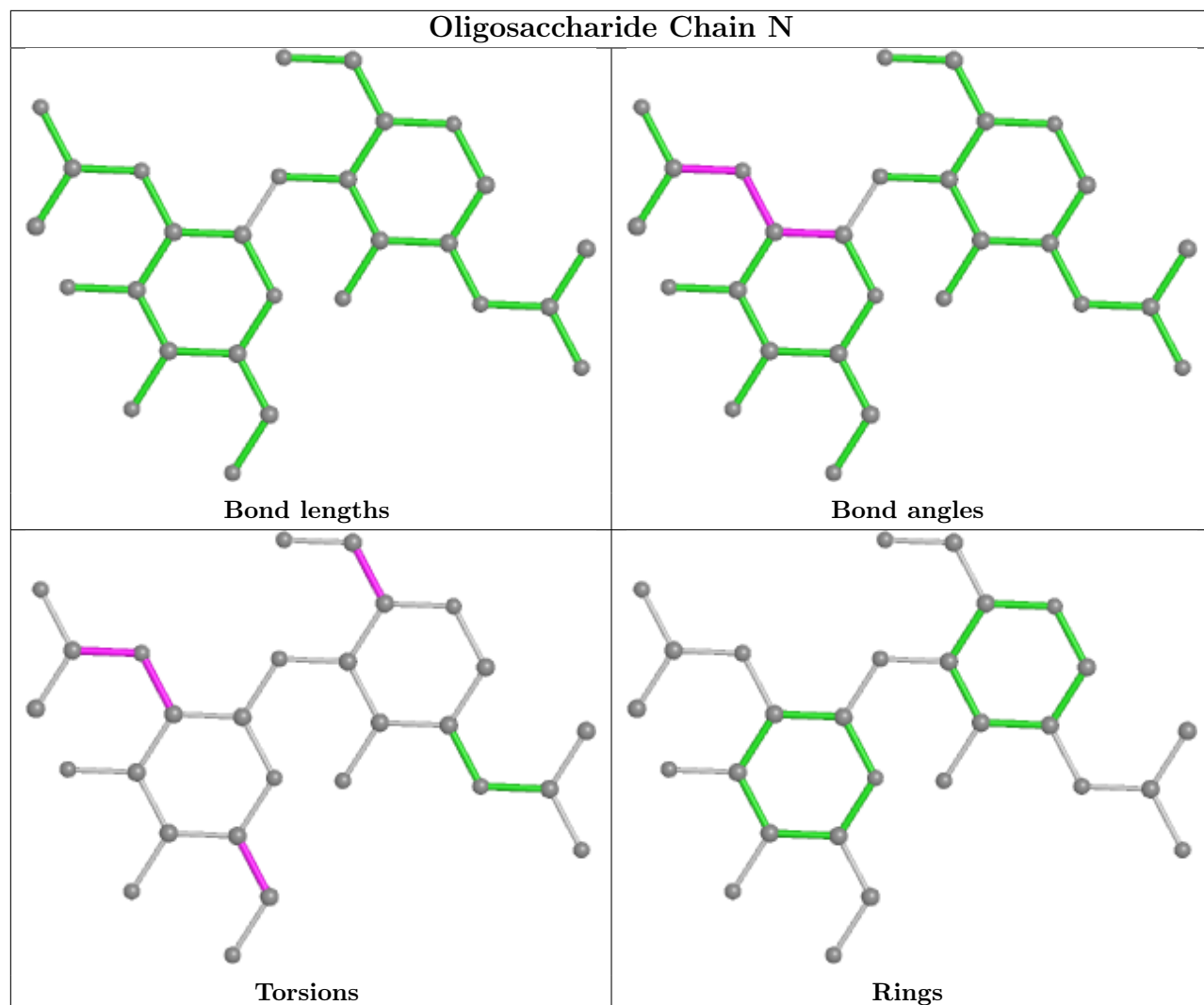
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	M	1	NAG	1	0
8	L	1	NAG	1	0
7	O	1	NAG	2	0
7	N	2	NAG	2	0

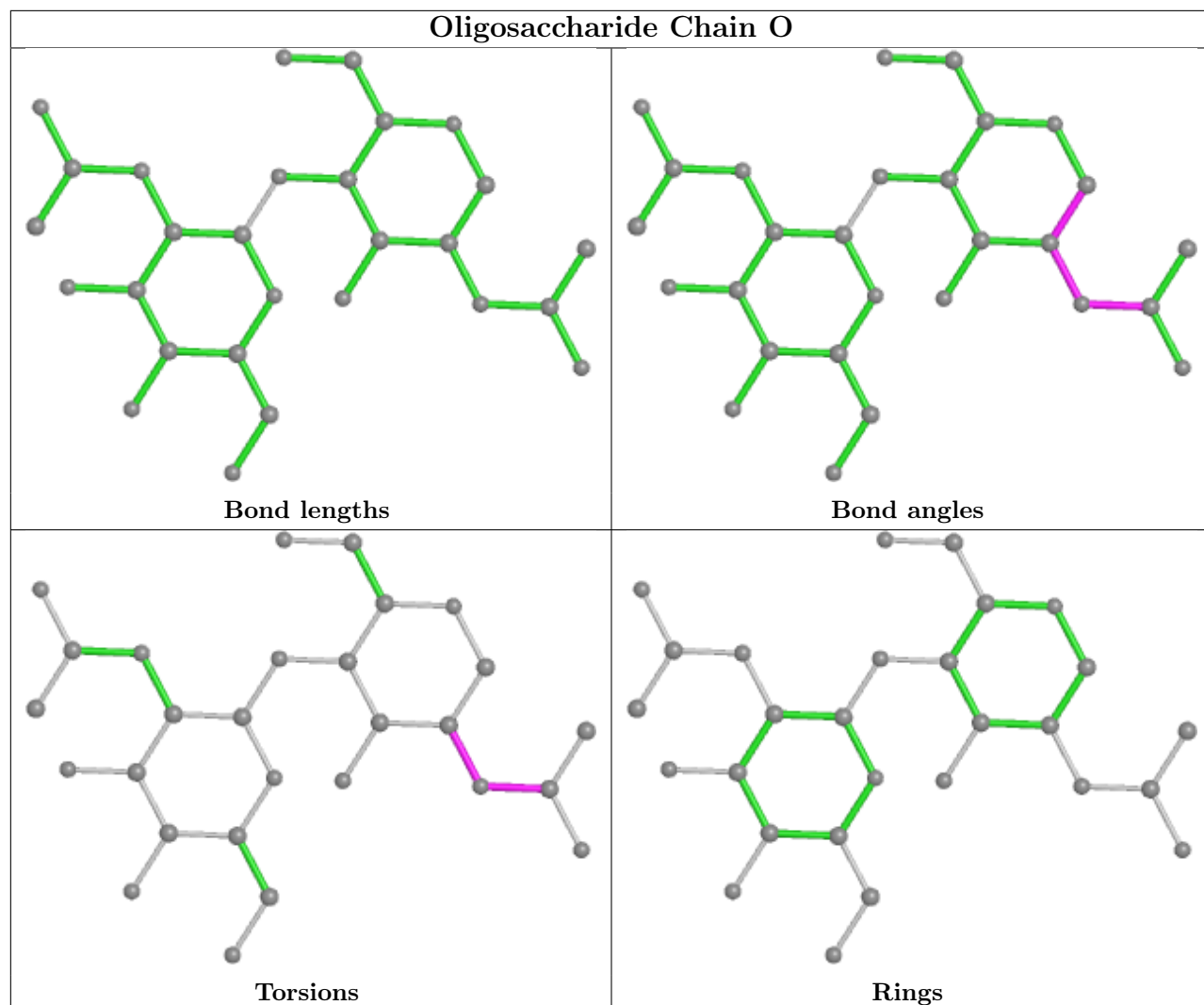
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

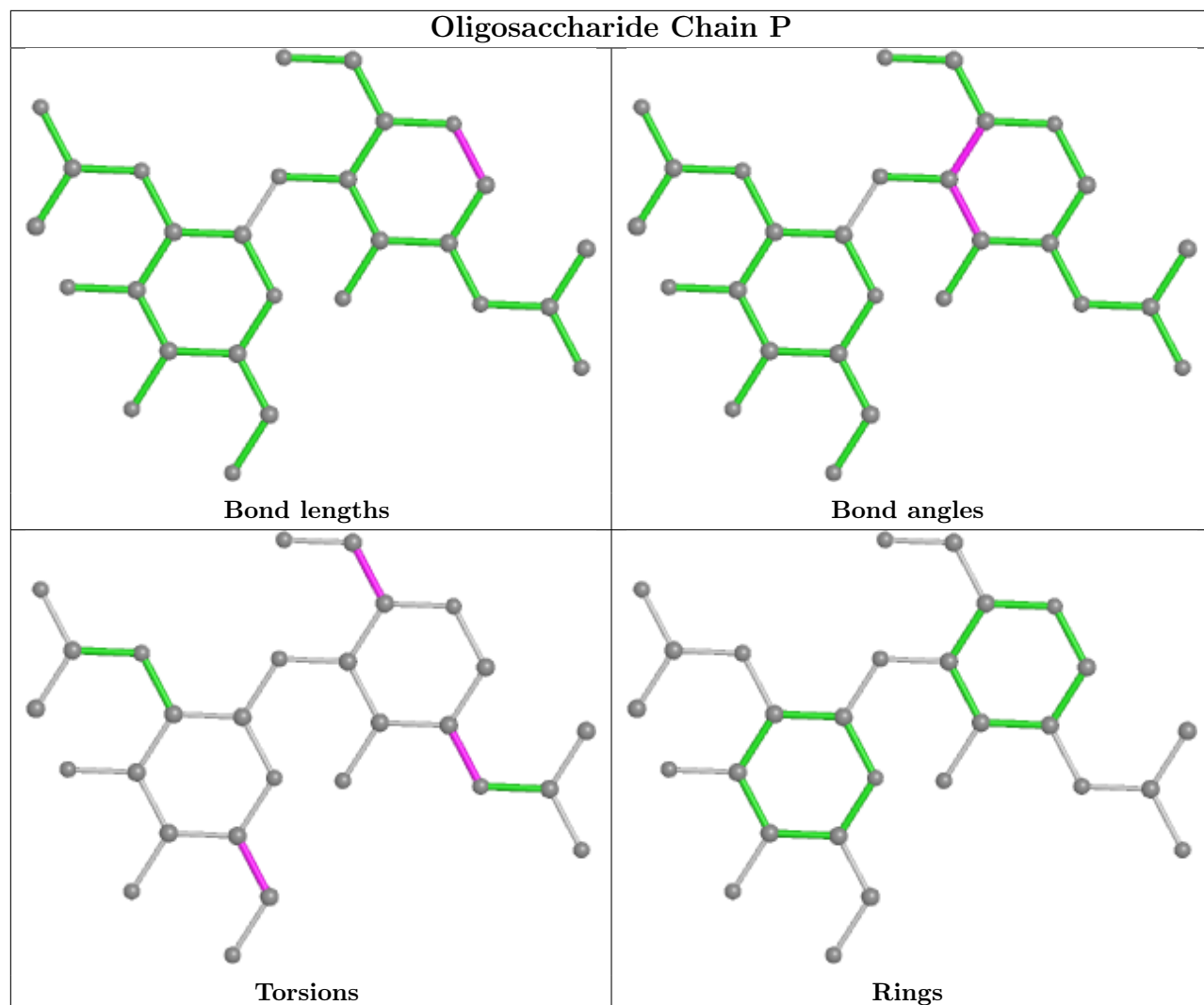


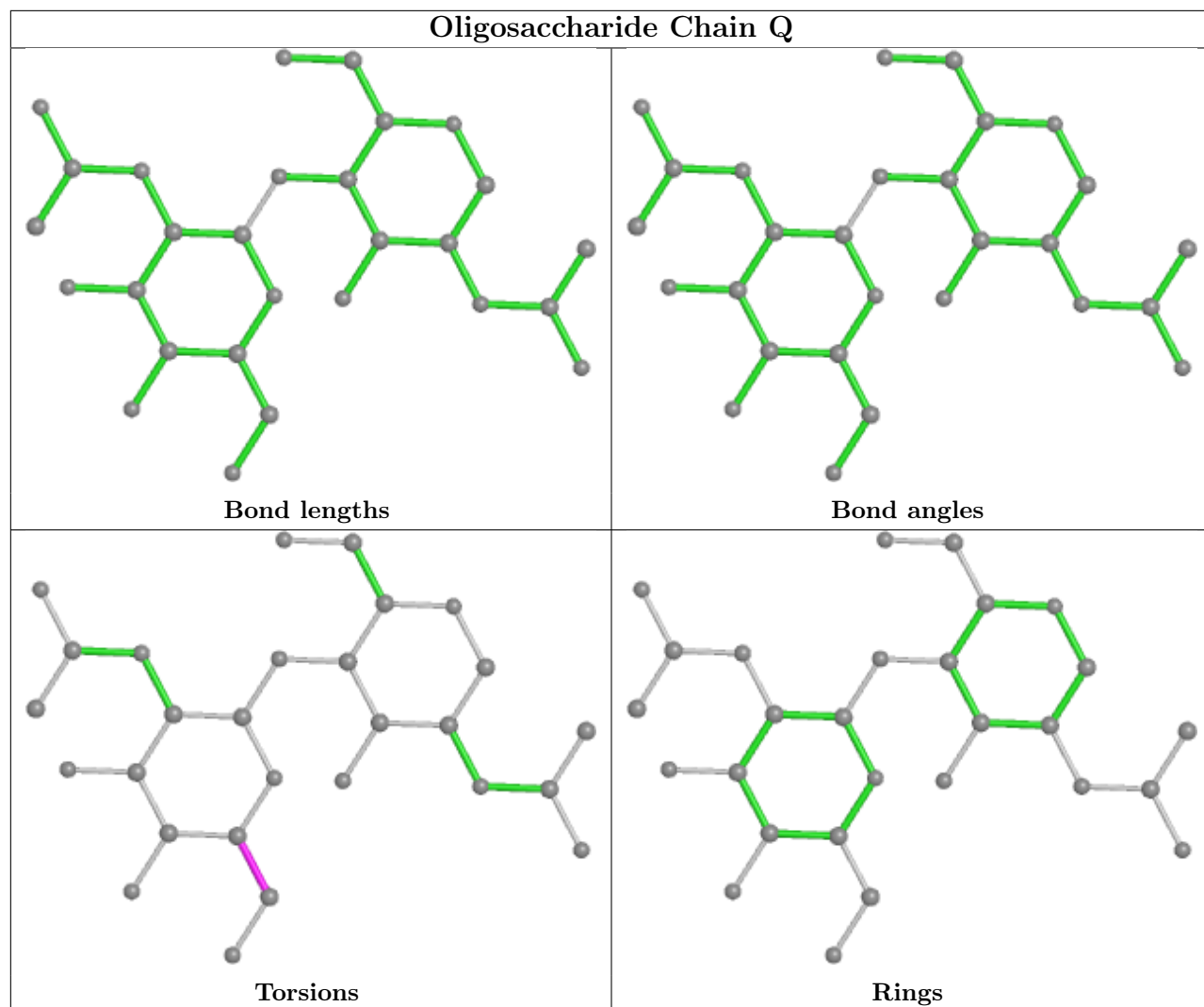


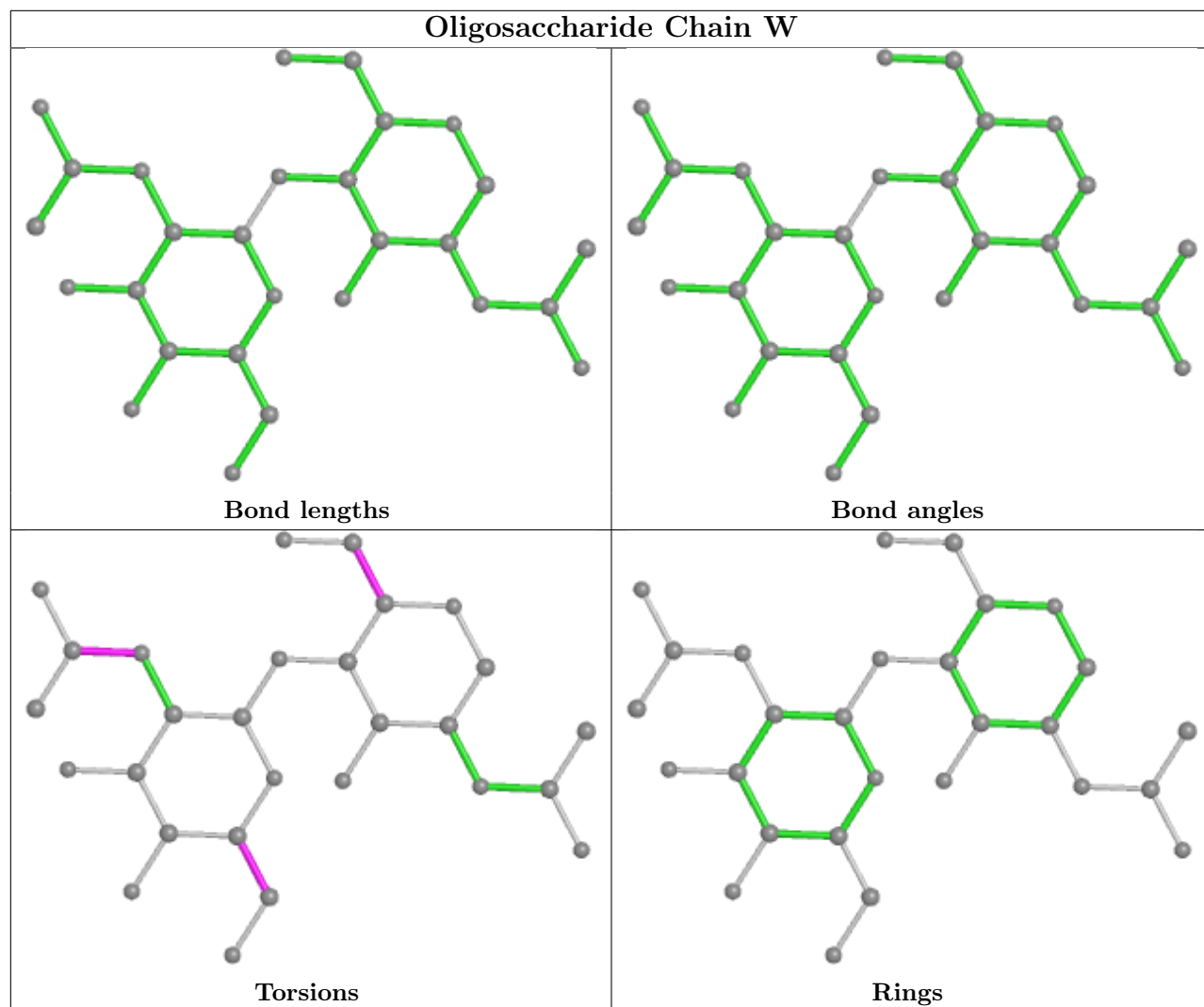


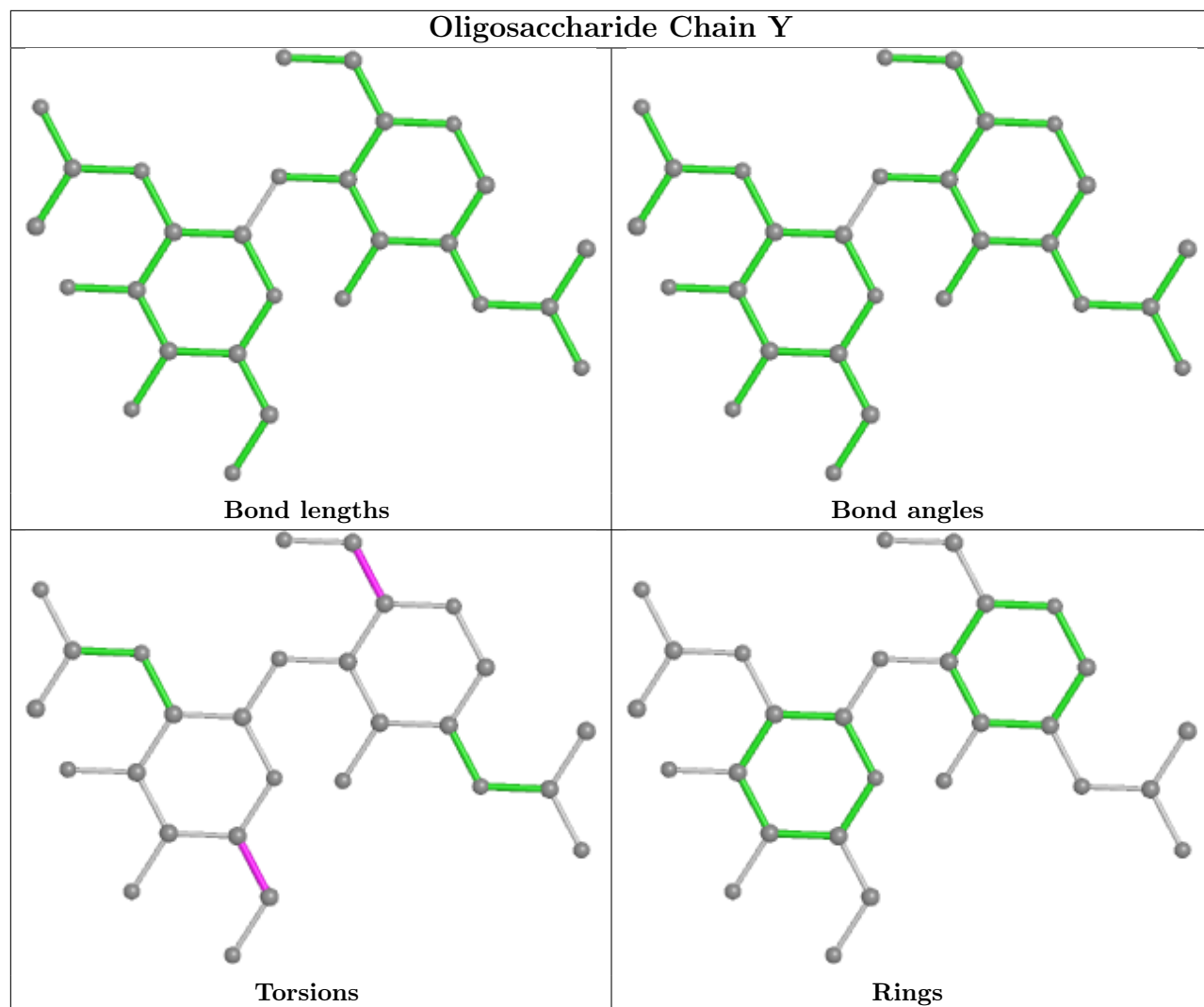


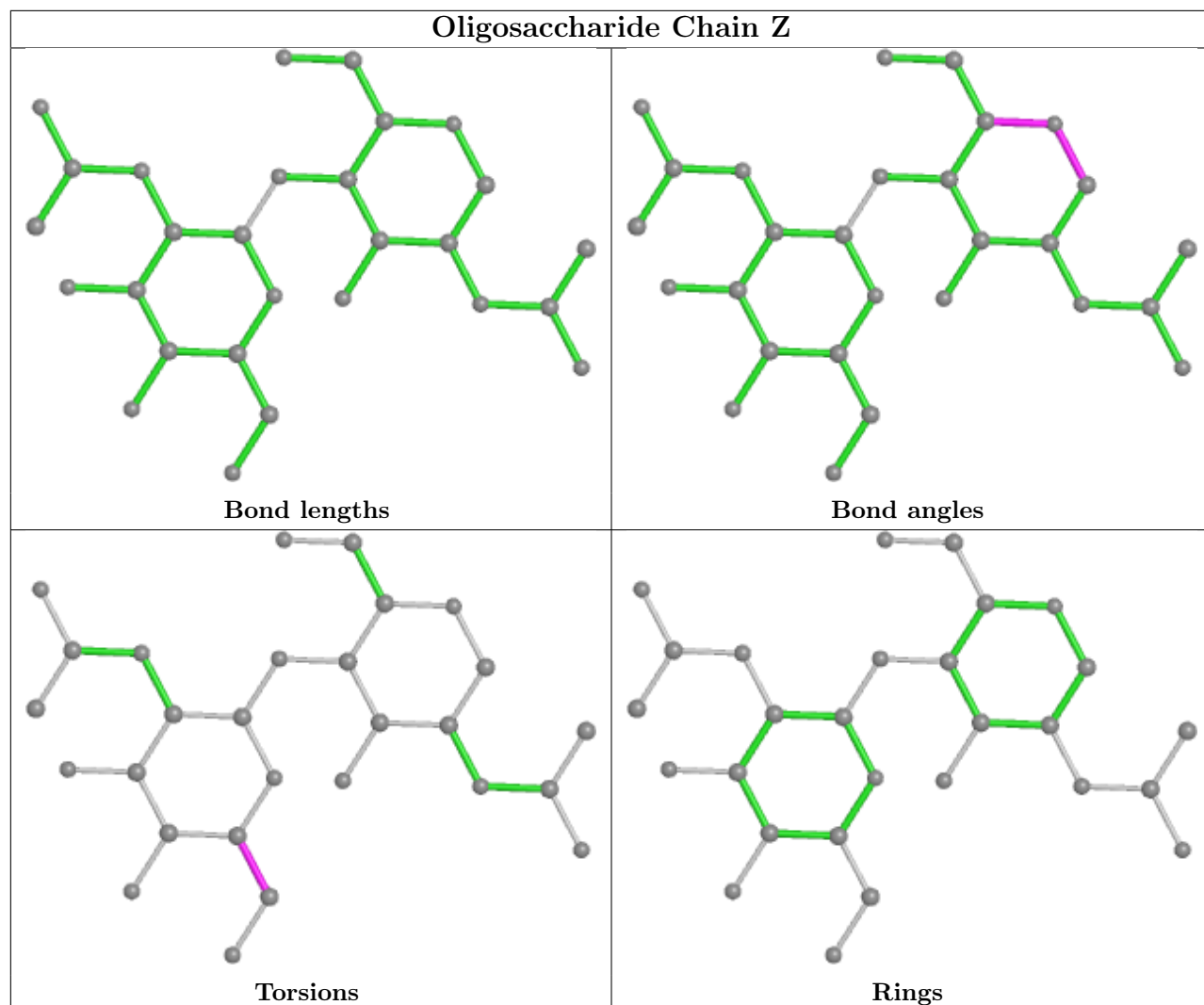


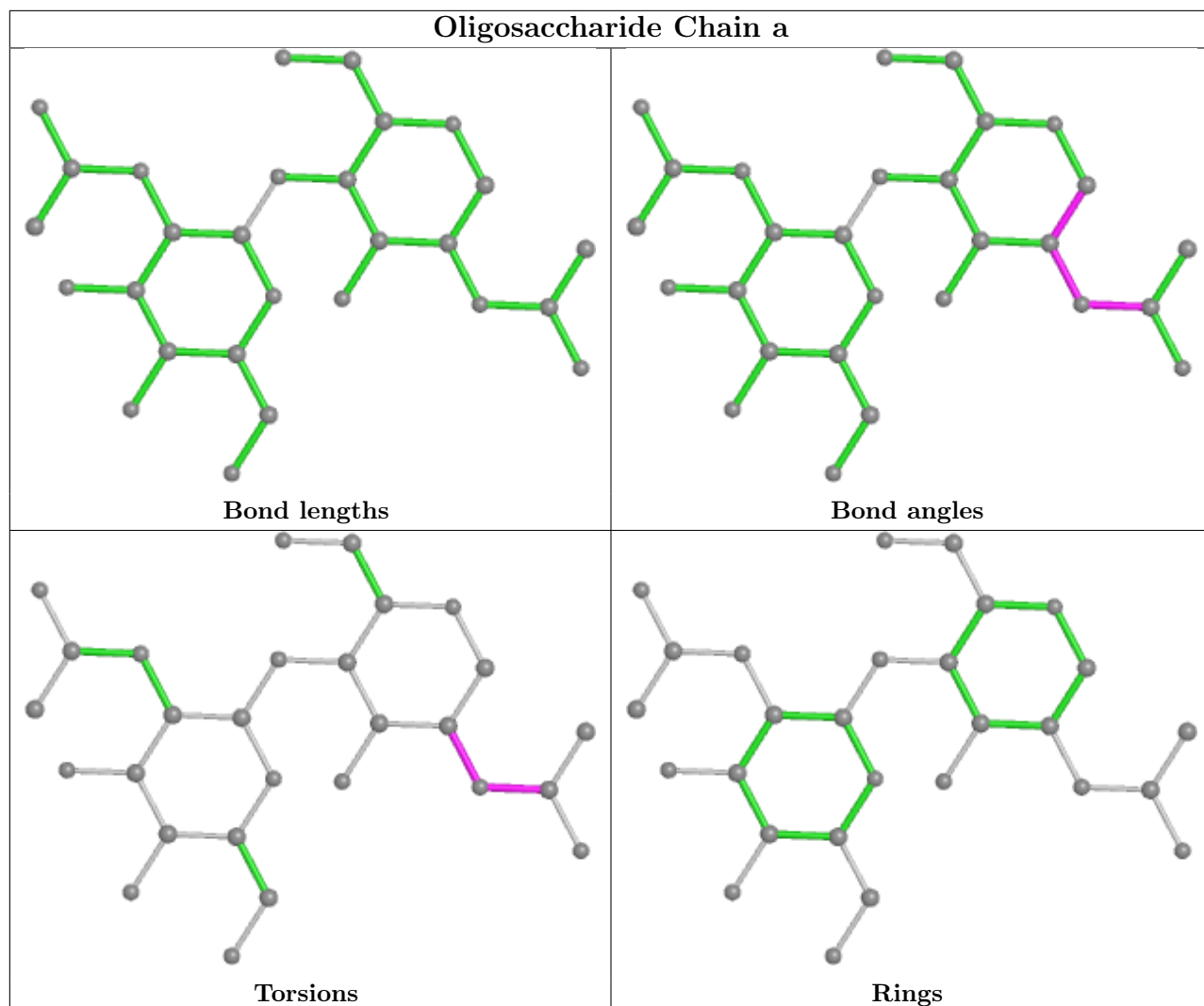




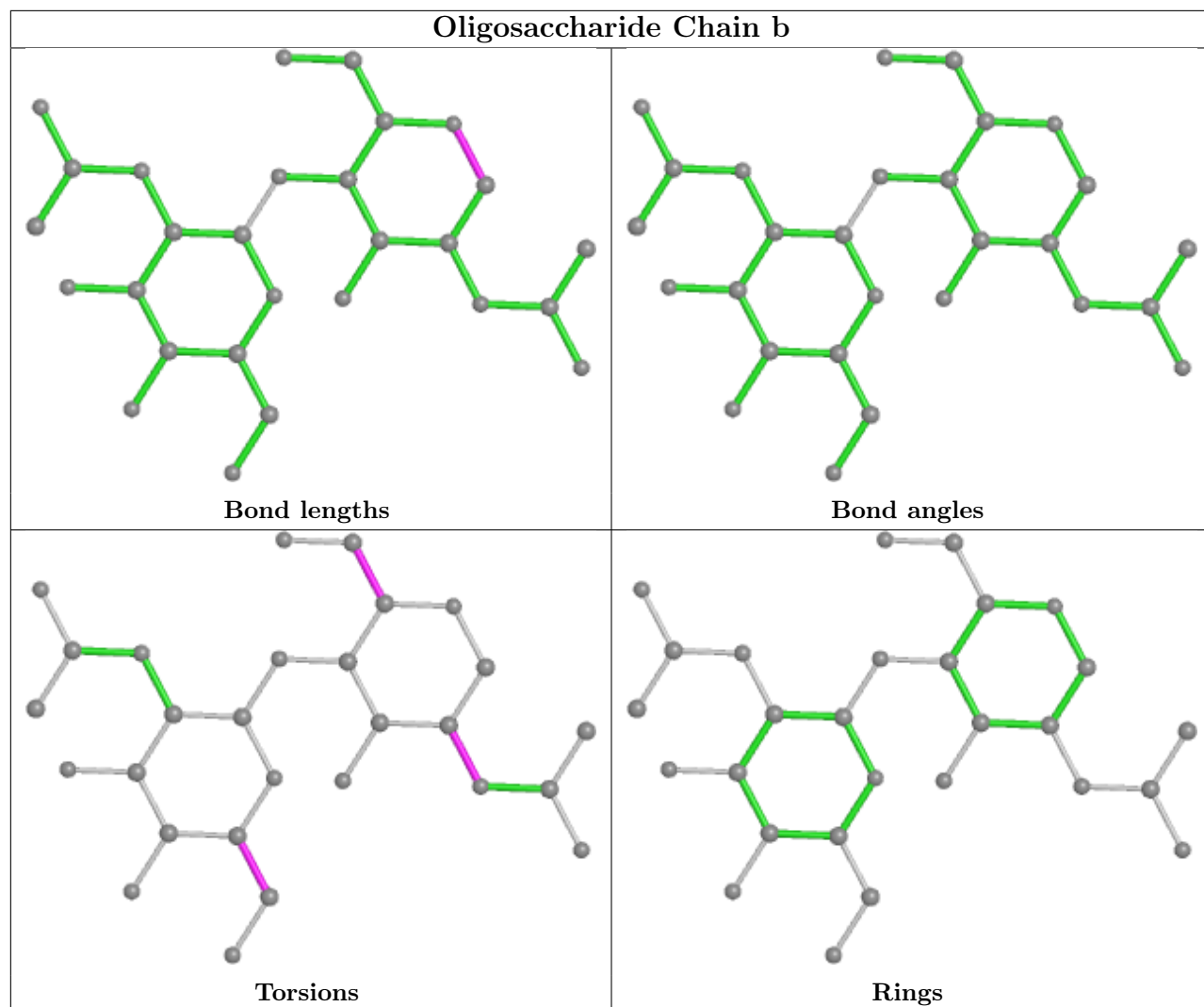


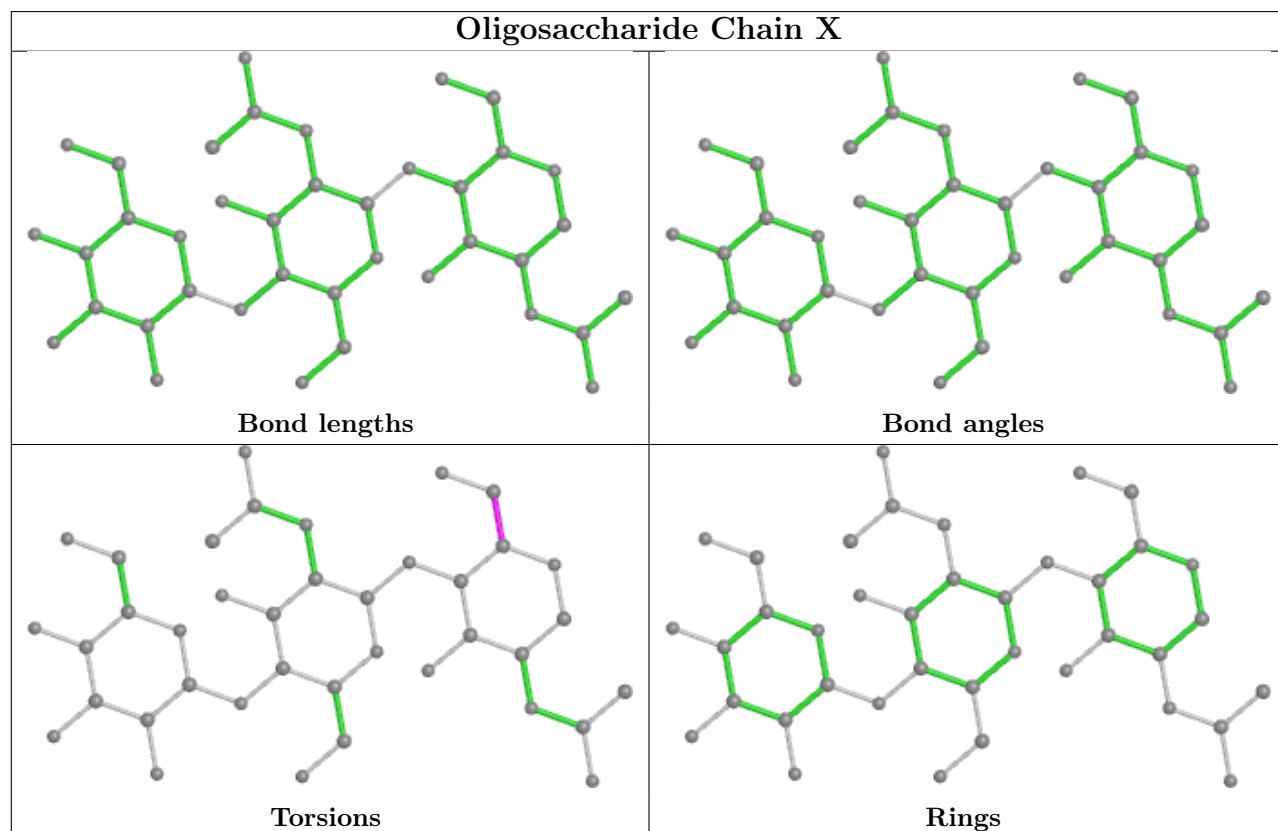
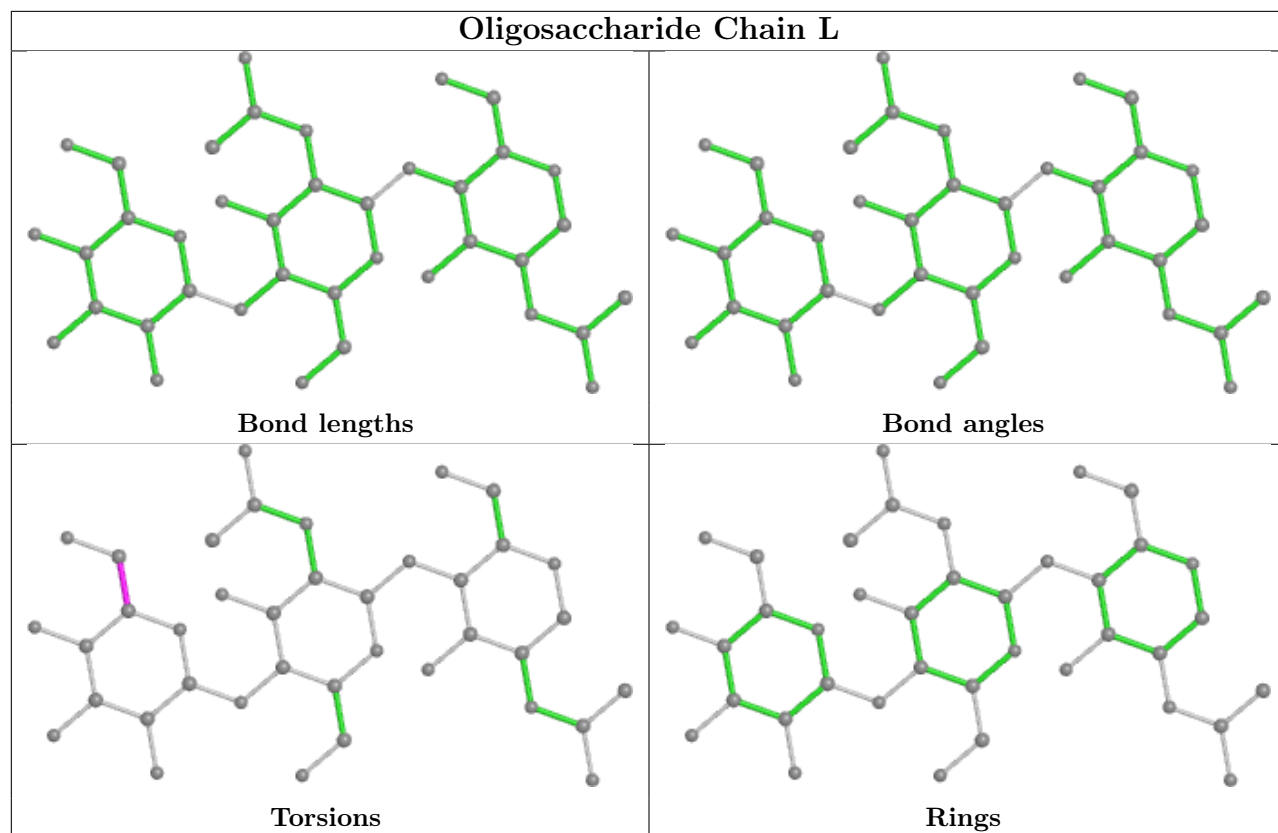


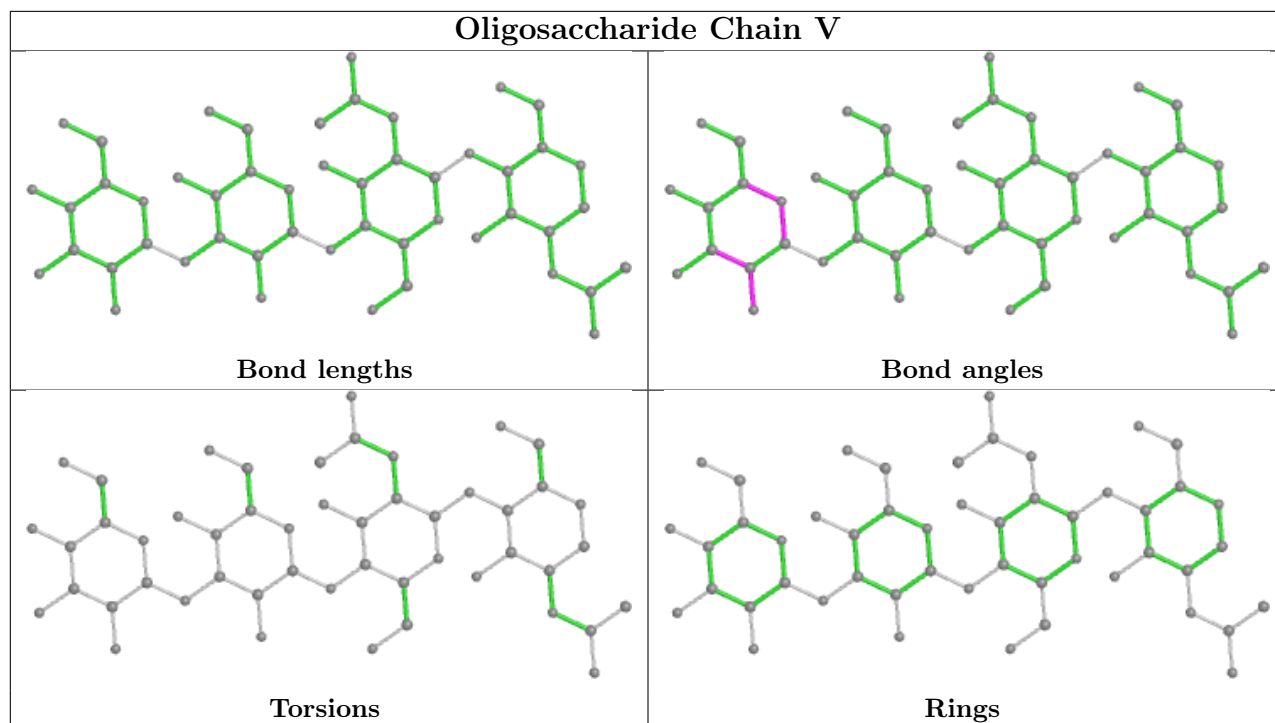












## 5.6 Ligand geometry [i](#)

24 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
10	NAG	A	610	1	14,14,15	0.25	0	17,19,21	0.47	0
10	NAG	G	601	1	14,14,15	0.42	0	17,19,21	1.28	1 (5%)
10	NAG	A	604	1	14,14,15	0.22	0	17,19,21	0.42	0
10	NAG	A	602	1	14,14,15	0.26	0	17,19,21	0.49	0
10	NAG	G	604	1	14,14,15	0.17	0	17,19,21	0.48	0
10	NAG	F	606	1	14,14,15	0.48	0	17,19,21	1.26	1 (5%)
10	NAG	A	601	1	14,14,15	0.21	0	17,19,21	0.44	0
10	NAG	F	604	1	14,14,15	0.19	0	17,19,21	0.42	0
10	NAG	G	602	1	14,14,15	0.26	0	17,19,21	0.46	0
10	NAG	A	603	1	14,14,15	0.46	0	17,19,21	1.29	1 (5%)
10	NAG	G	603	1	14,14,15	0.20	0	17,19,21	0.43	0
10	NAG	F	602	1	14,14,15	0.26	0	17,19,21	0.48	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
10	NAG	A	607	1	14,14,15	0.23	0	17,19,21	0.47	0
10	NAG	F	601	1	14,14,15	0.40	0	17,19,21	1.26	2 (11%)
10	NAG	A	608	1	14,14,15	0.26	0	17,19,21	0.50	0
10	NAG	F	607	1	14,14,15	0.29	0	17,19,21	0.39	0
10	NAG	A	605	1	14,14,15	0.20	0	17,19,21	0.41	0
10	NAG	T	301	5	14,14,15	1.05	2 (14%)	17,19,21	0.93	1 (5%)
10	NAG	F	603	1	14,14,15	0.28	0	17,19,21	0.46	0
10	NAG	G	606	1	14,14,15	0.19	0	17,19,21	0.43	0
10	NAG	A	609	1	14,14,15	0.24	0	17,19,21	0.48	0
10	NAG	G	605	1	14,14,15	0.27	0	17,19,21	0.43	0
10	NAG	A	606	1	14,14,15	0.21	0	17,19,21	0.42	0
10	NAG	F	605	1	14,14,15	0.33	0	17,19,21	0.59	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	NAG	A	610	1	-	2/6/23/26	0/1/1/1
10	NAG	G	601	1	-	3/6/23/26	0/1/1/1
10	NAG	A	604	1	-	2/6/23/26	0/1/1/1
10	NAG	A	602	1	-	4/6/23/26	0/1/1/1
10	NAG	G	604	1	-	0/6/23/26	0/1/1/1
10	NAG	F	606	1	-	5/6/23/26	0/1/1/1
10	NAG	A	601	1	-	2/6/23/26	0/1/1/1
10	NAG	F	604	1	-	2/6/23/26	0/1/1/1
10	NAG	G	602	1	-	0/6/23/26	0/1/1/1
10	NAG	A	603	1	-	5/6/23/26	0/1/1/1
10	NAG	G	603	1	-	0/6/23/26	0/1/1/1
10	NAG	F	602	1	-	2/6/23/26	0/1/1/1
10	NAG	A	607	1	-	1/6/23/26	0/1/1/1
10	NAG	F	601	1	-	3/6/23/26	0/1/1/1
10	NAG	A	608	1	-	0/6/23/26	0/1/1/1
10	NAG	F	607	1	-	0/6/23/26	0/1/1/1
10	NAG	A	605	1	-	2/6/23/26	0/1/1/1
10	NAG	T	301	5	-	0/6/23/26	0/1/1/1
10	NAG	F	603	1	-	0/6/23/26	0/1/1/1
10	NAG	G	606	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	NAG	A	609	1	-	1/6/23/26	0/1/1/1
10	NAG	G	605	1	-	0/6/23/26	0/1/1/1
10	NAG	A	606	1	-	2/6/23/26	0/1/1/1
10	NAG	F	605	1	-	2/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	T	301	NAG	O5-C1	3.07	1.48	1.43
10	T	301	NAG	C1-C2	2.29	1.55	1.52

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	G	601	NAG	C2-N2-C7	4.35	129.09	122.90
10	F	601	NAG	C2-N2-C7	4.34	129.09	122.90
10	A	603	NAG	C2-N2-C7	4.31	129.04	122.90
10	F	606	NAG	C2-N2-C7	4.26	128.97	122.90
10	T	301	NAG	C1-O5-C5	3.52	116.97	112.19
10	F	605	NAG	C1-O5-C5	2.05	114.96	112.19
10	F	601	NAG	C1-C2-N2	2.02	113.94	110.49

There are no chirality outliers.

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	F	606	NAG	O5-C5-C6-O6
10	A	602	NAG	O5-C5-C6-O6
10	A	605	NAG	O5-C5-C6-O6
10	F	602	NAG	O5-C5-C6-O6
10	A	606	NAG	C4-C5-C6-O6
10	A	603	NAG	O5-C5-C6-O6
10	A	606	NAG	O5-C5-C6-O6
10	F	606	NAG	C4-C5-C6-O6
10	A	602	NAG	C4-C5-C6-O6
10	A	610	NAG	C4-C5-C6-O6
10	A	605	NAG	C4-C5-C6-O6
10	A	603	NAG	C4-C5-C6-O6
10	F	605	NAG	O5-C5-C6-O6
10	A	602	NAG	C8-C7-N2-C2
10	A	602	NAG	O7-C7-N2-C2

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*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
10	A	603	NAG	C8-C7-N2-C2
10	A	603	NAG	O7-C7-N2-C2
10	F	601	NAG	C8-C7-N2-C2
10	F	601	NAG	O7-C7-N2-C2
10	F	606	NAG	C8-C7-N2-C2
10	F	606	NAG	O7-C7-N2-C2
10	G	601	NAG	C8-C7-N2-C2
10	G	601	NAG	O7-C7-N2-C2
10	A	610	NAG	O5-C5-C6-O6
10	A	604	NAG	O5-C5-C6-O6
10	F	605	NAG	C4-C5-C6-O6
10	F	602	NAG	C4-C5-C6-O6
10	G	606	NAG	O5-C5-C6-O6
10	A	604	NAG	C4-C5-C6-O6
10	G	606	NAG	C4-C5-C6-O6
10	F	604	NAG	C4-C5-C6-O6
10	F	604	NAG	O5-C5-C6-O6
10	A	609	NAG	O5-C5-C6-O6
10	A	601	NAG	C4-C5-C6-O6
10	A	607	NAG	C4-C5-C6-O6
10	A	601	NAG	O5-C5-C6-O6
10	A	603	NAG	C3-C2-N2-C7
10	F	601	NAG	C3-C2-N2-C7
10	F	606	NAG	C3-C2-N2-C7
10	G	601	NAG	C3-C2-N2-C7

There are no ring outliers.

6 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	A	610	NAG	1	0
10	G	601	NAG	1	0
10	F	606	NAG	1	0
10	A	601	NAG	1	0
10	A	603	NAG	1	0
10	F	601	NAG	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

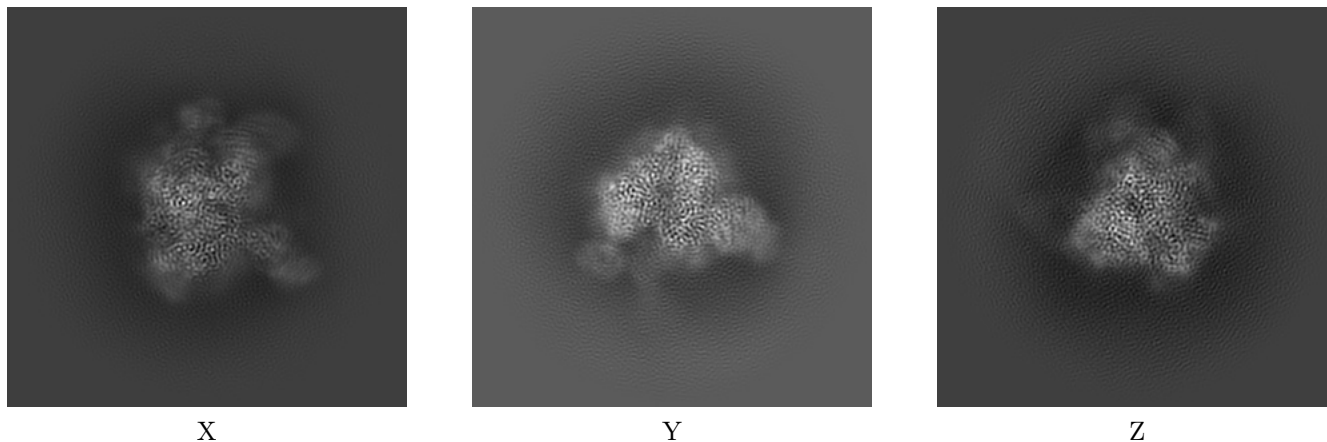
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16493. These allow visual inspection of the internal detail of the map and identification of artifacts.

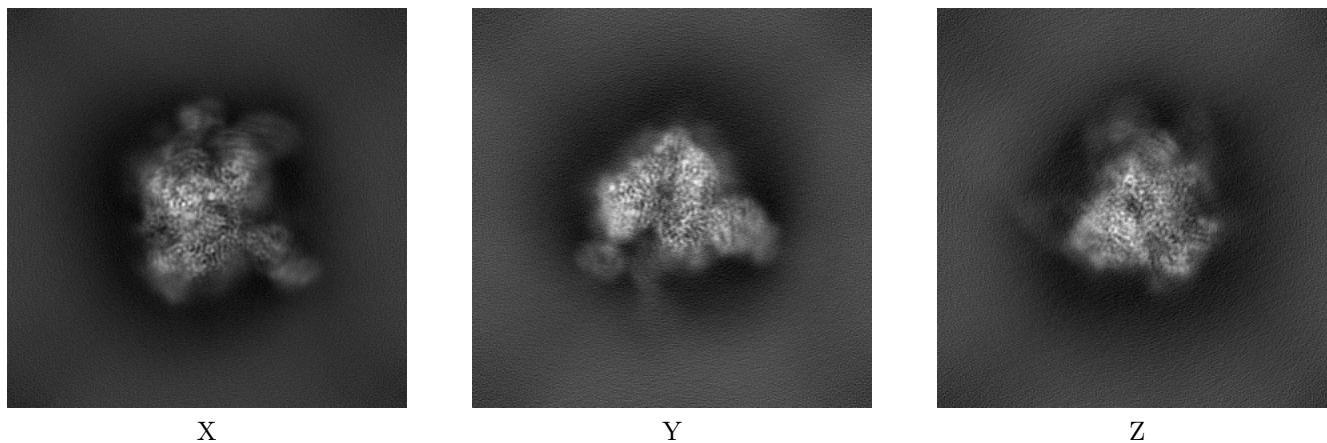
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

#### 6.1.1 Primary map



#### 6.1.2 Raw map

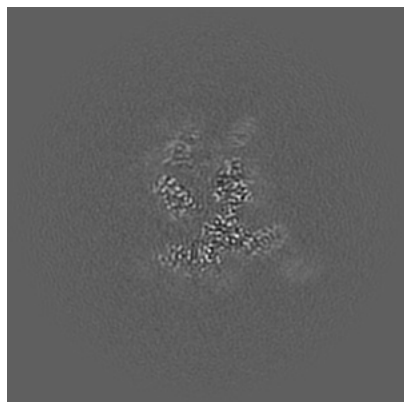


The images above show the map projected in three orthogonal directions.

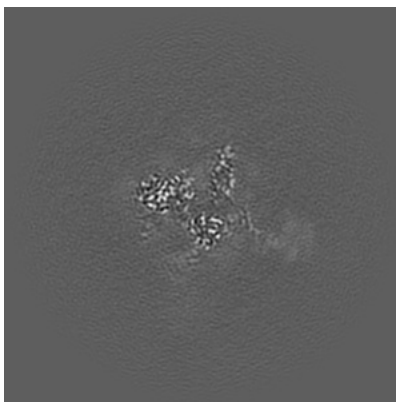


## 6.2 Central slices [i](#)

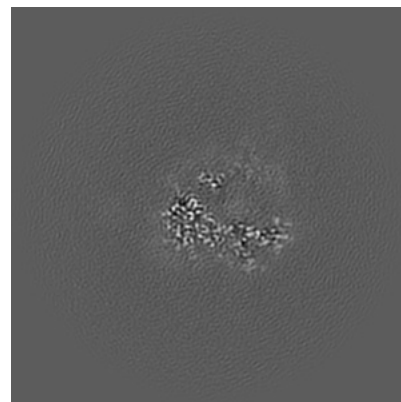
### 6.2.1 Primary map



X Index: 200

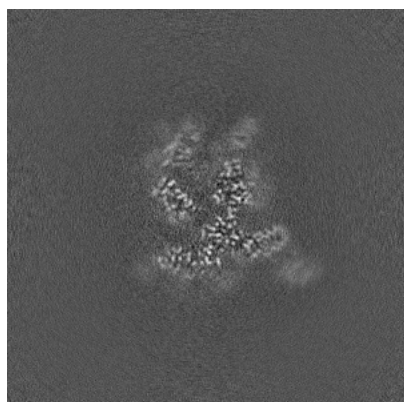


Y Index: 200

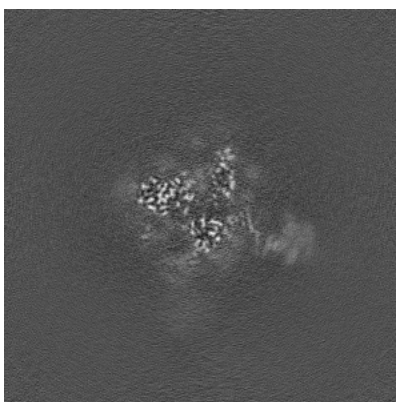


Z Index: 200

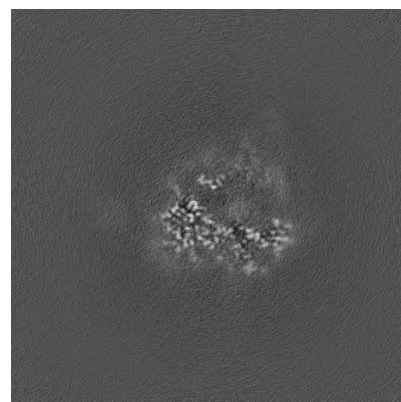
### 6.2.2 Raw map



X Index: 200



Y Index: 200

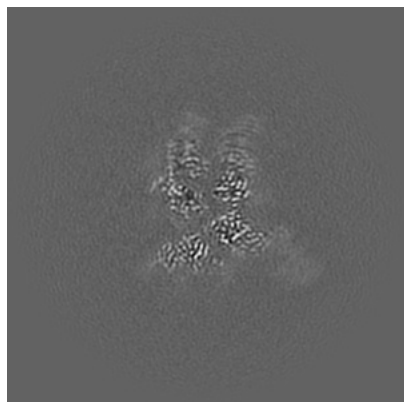


Z Index: 200

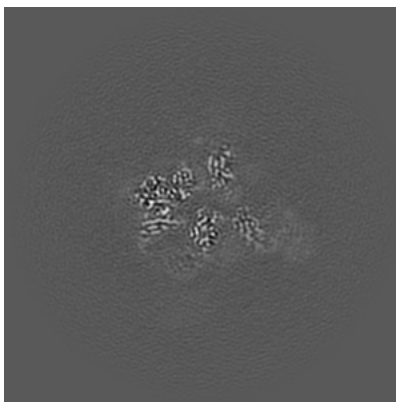
The images above show central slices of the map in three orthogonal directions.

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

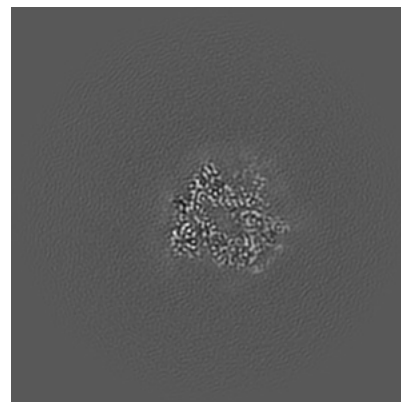
### 6.3.1 Primary map



X Index: 194

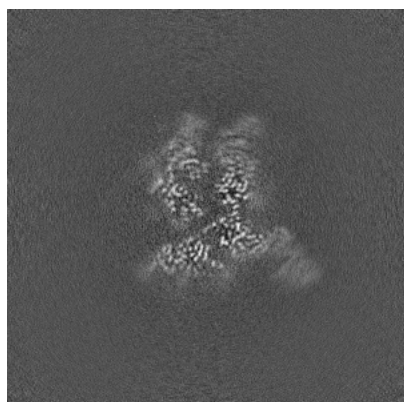


Y Index: 194

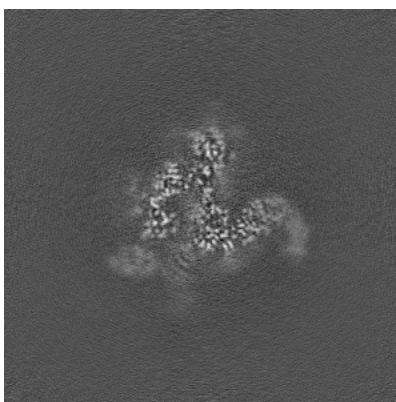


Z Index: 212

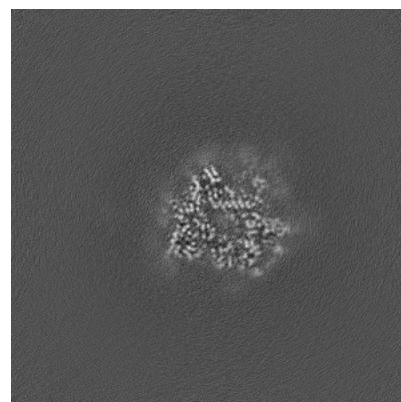
### 6.3.2 Raw map



X Index: 195



Y Index: 177

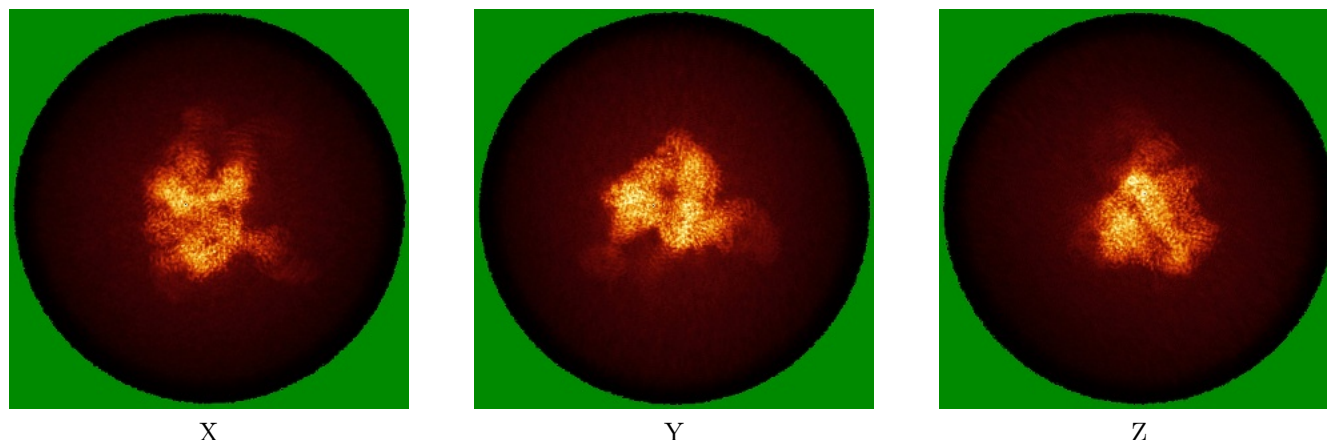


Z Index: 211

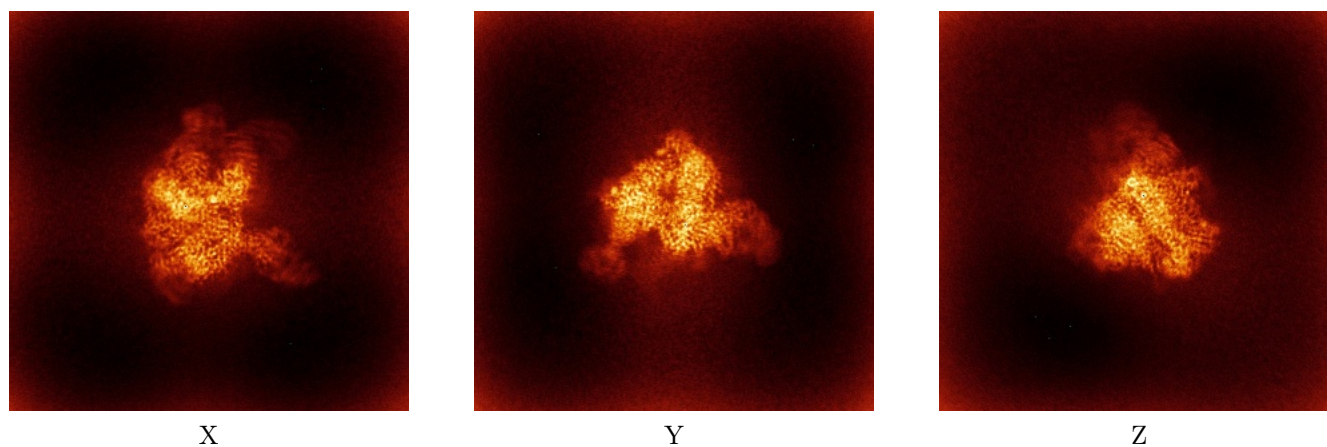
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



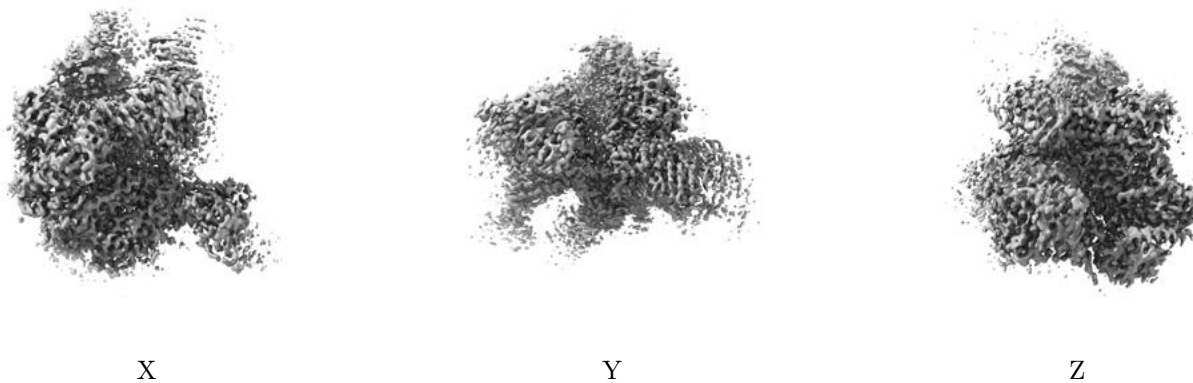
### 6.4.2 Raw map



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.

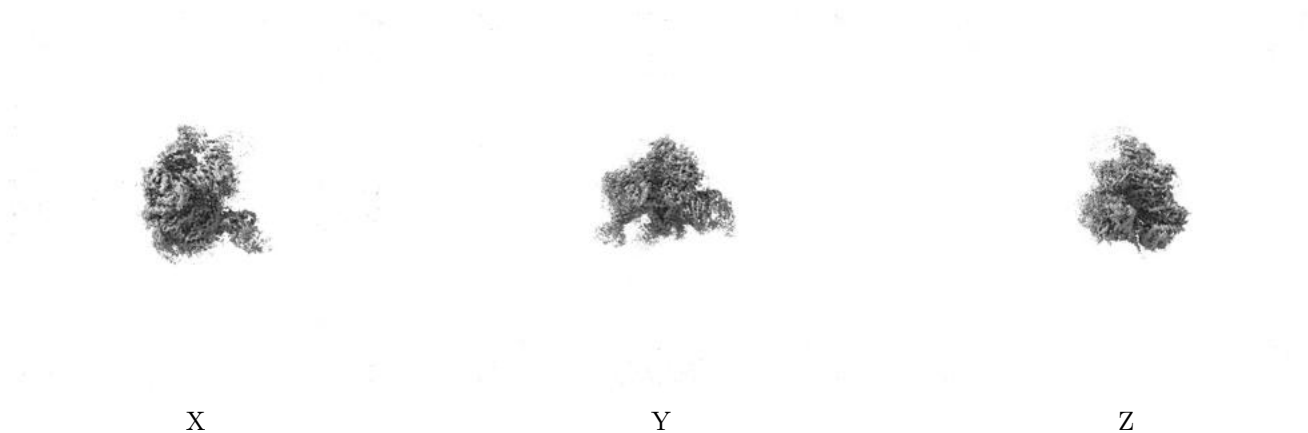
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.4. 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.

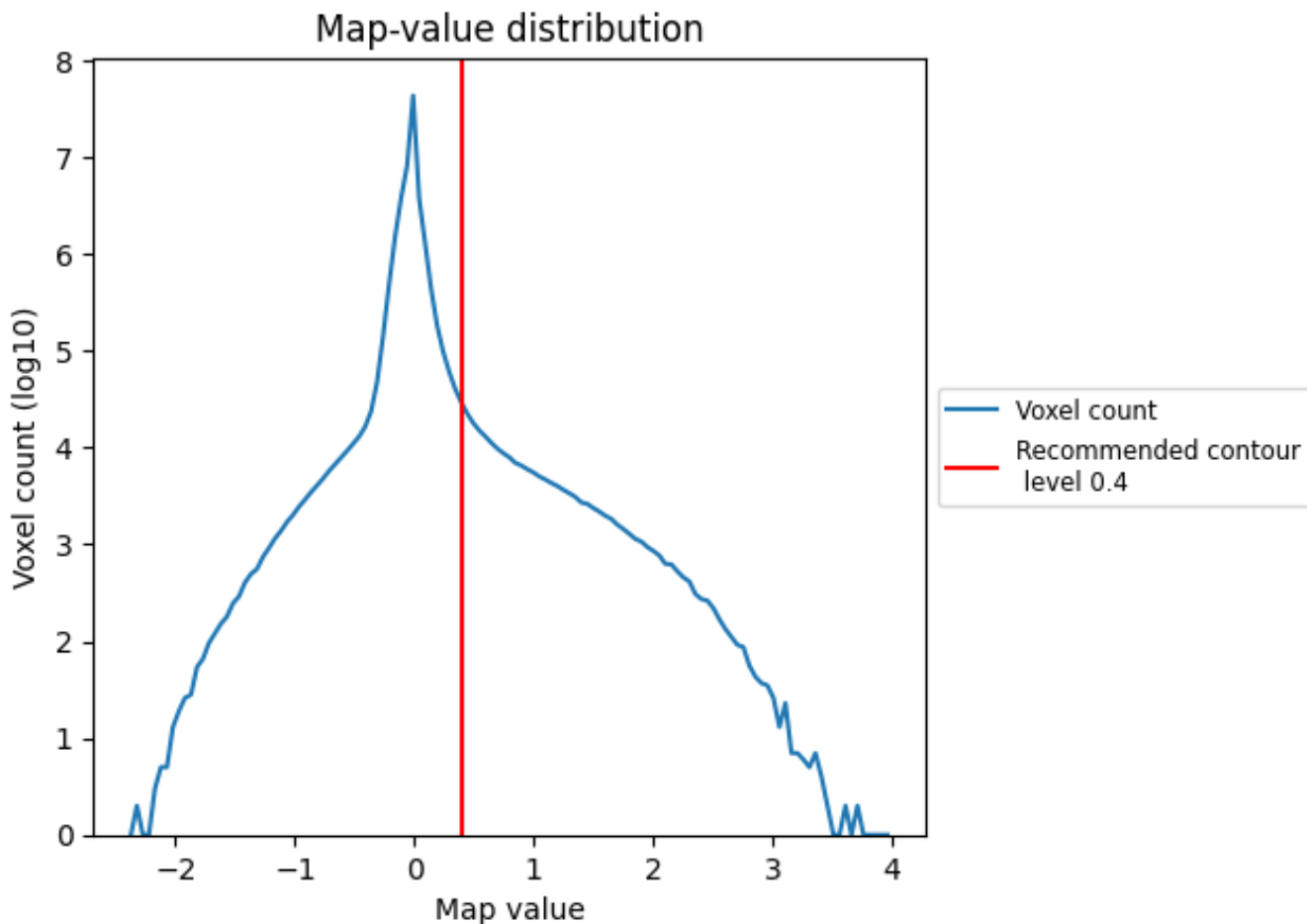
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

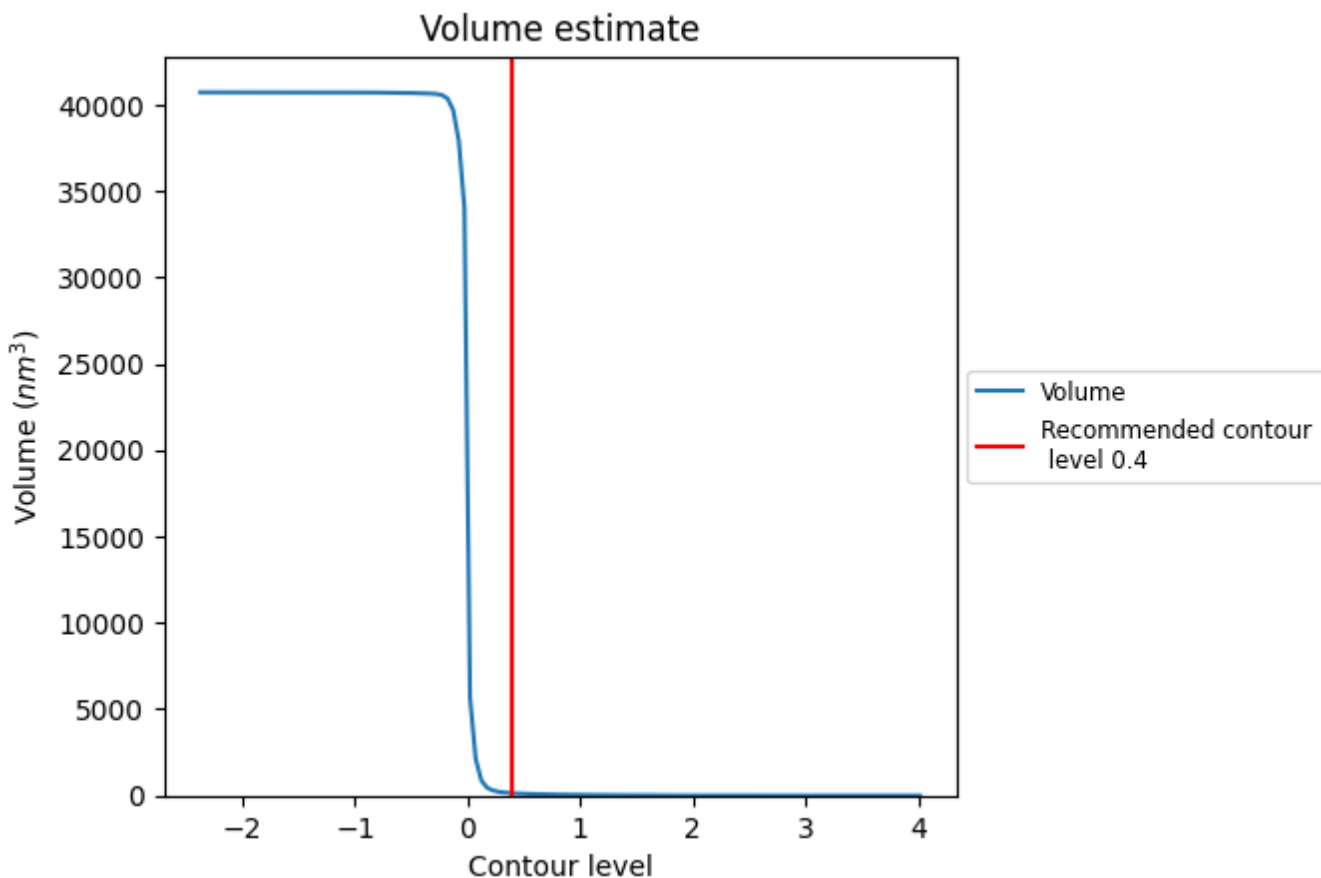
This section contains the results of statistical analysis of the map.

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



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

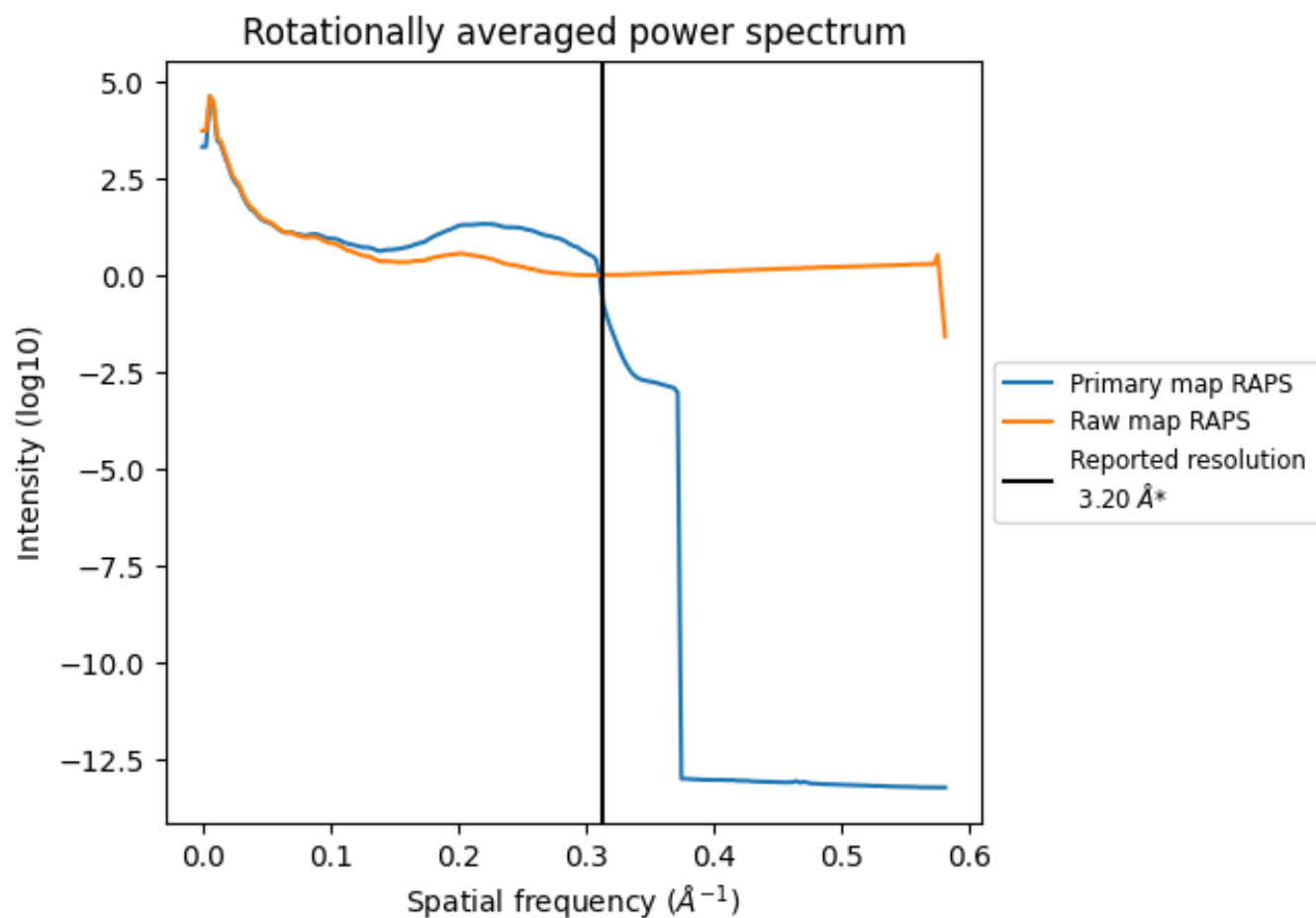
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 136 nm<sup>3</sup>; this corresponds to an approximate mass of 122 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum [i](#)



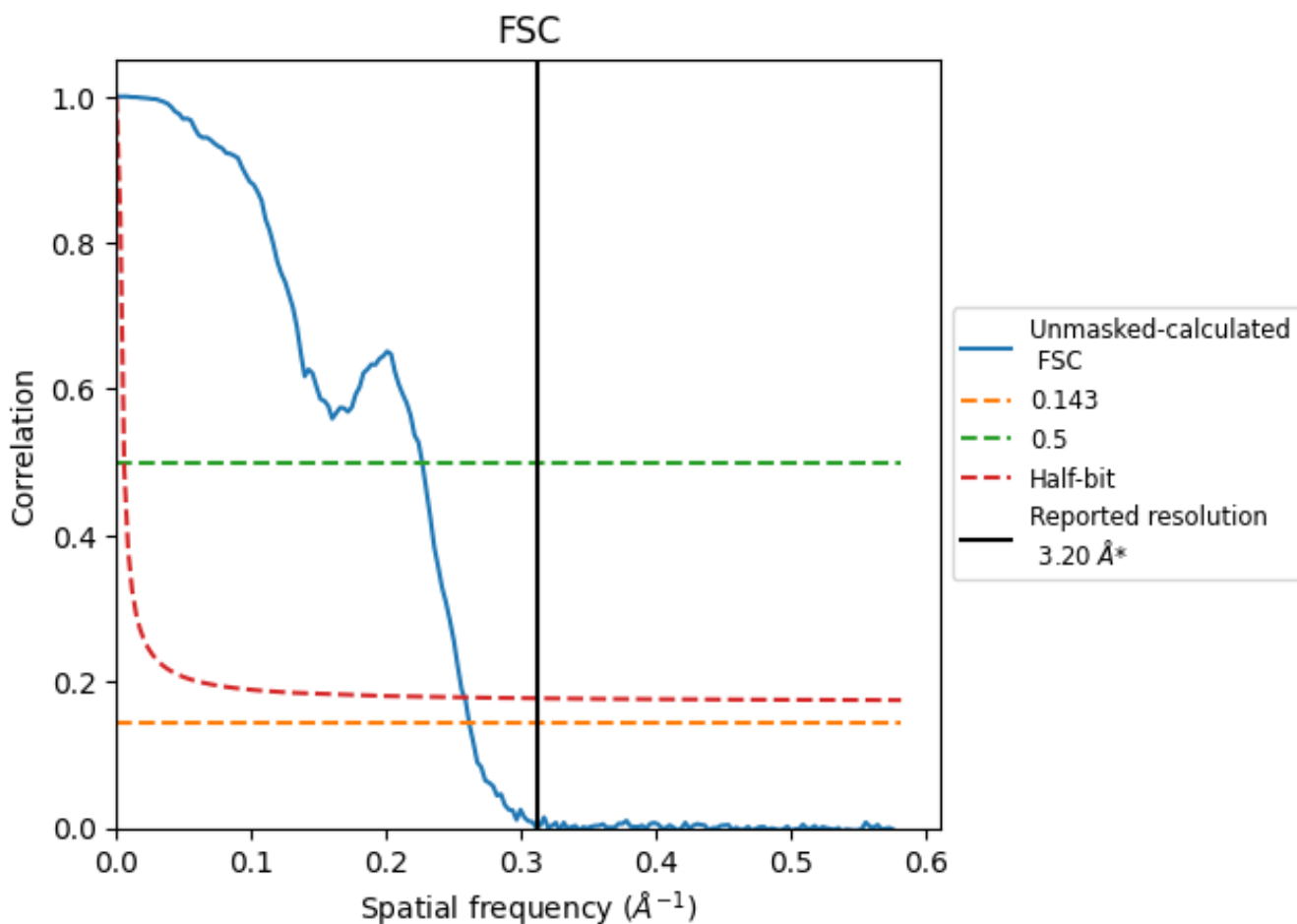
\*Reported resolution corresponds to spatial frequency of  $0.312 \text{ \AA}^{-1}$



## 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 0.312 Å<sup>-1</sup>



## 8.2 Resolution estimates [i](#)

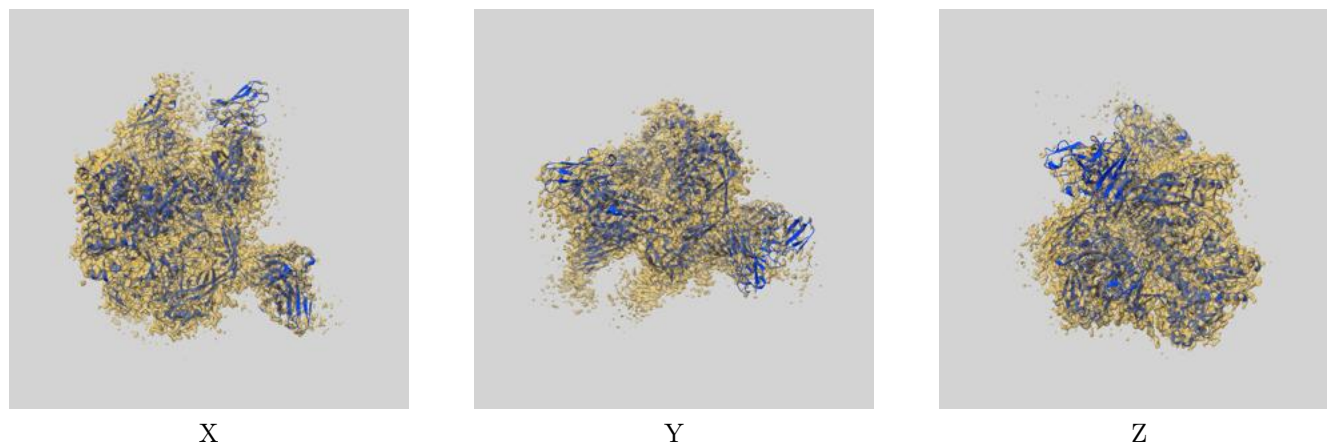
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.83	4.41	3.88

\*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 3.83 differs from the reported value 3.2 by more than 10 %

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

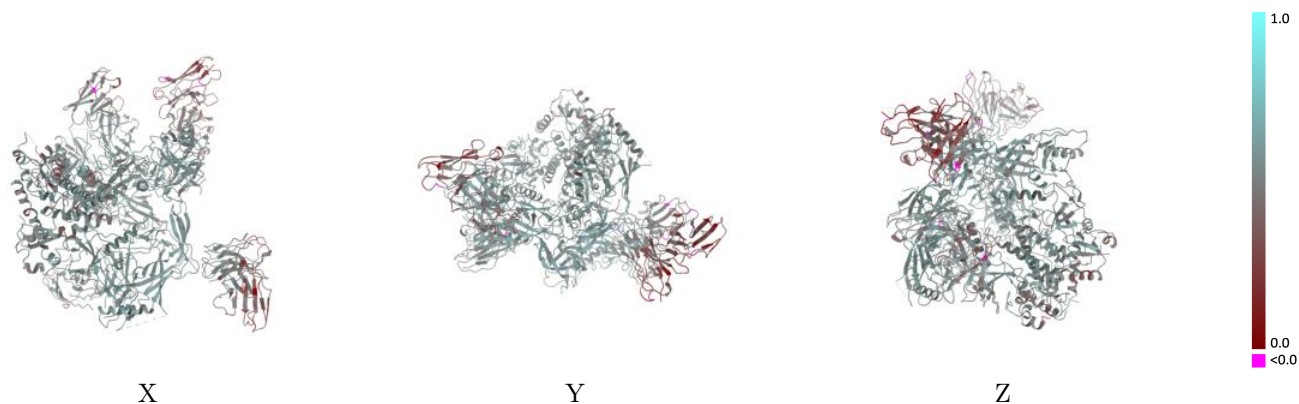
This section contains information regarding the fit between EMDB map EMD-16493 and PDB model 8C8T. Per-residue inclusion information can be found in section 3 on page 9.

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



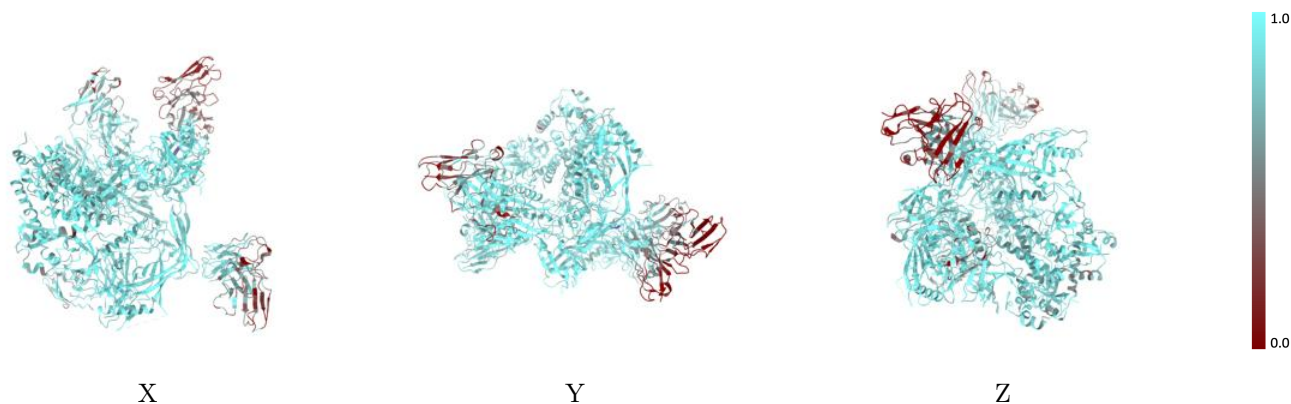
The images above show the 3D surface view of the map at the recommended contour level 0.4 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



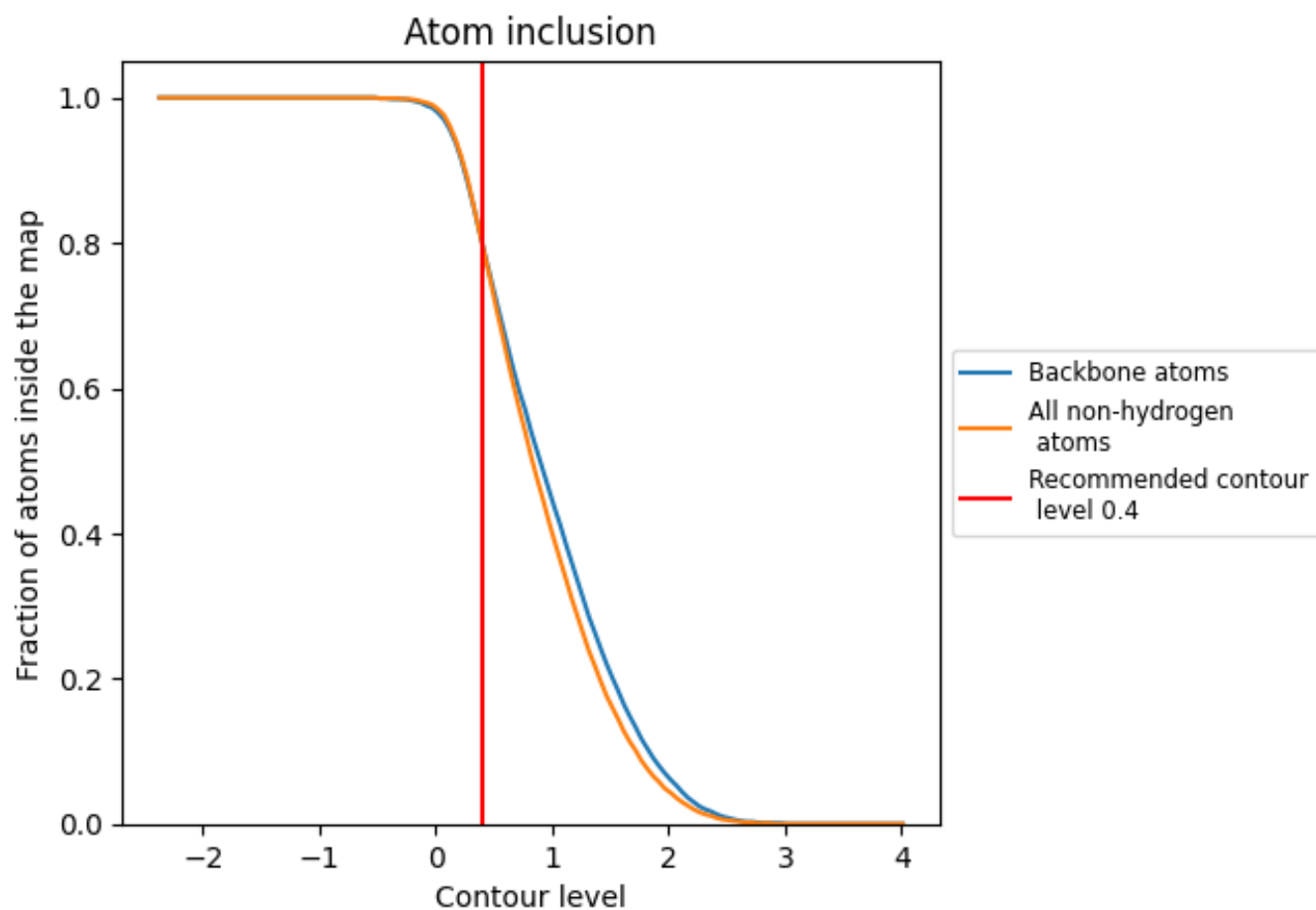
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.4).



























































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 80% 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 (0.4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7980	 0.5110
A	 0.8820	 0.5410
B	 0.8400	 0.5120
C	 0.4700	 0.3720
D	 0.1840	 0.3160
E	 0.9640	 0.5490
F	 0.9040	 0.5600
G	 0.8950	 0.5550
H	 0.6990	 0.4550
I	 0.8730	 0.5280
J	 0.8360	 0.5080
K	 0.4700	 0.3860
L	 0.8720	 0.5360
M	 0.6070	 0.4730
N	 0.8570	 0.4520
O	 0.7860	 0.4810
P	 0.8210	 0.4950
Q	 0.8210	 0.5450
R	 0.8660	 0.5480
S	 0.8390	 0.5280
T	 0.7900	 0.4990
U	 0.6750	 0.4420
V	 0.7600	 0.5120
W	 0.7860	 0.4830
X	 0.9230	 0.5460
Y	 0.8570	 0.5170
Z	 0.7860	 0.5210
a	 0.8210	 0.5210
b	 0.6430	 0.3780

