



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2024 – 08:05 PM EST

PDB ID : 1Y2X  
Title : Crystal structure of the tetragonal form of the common edible mushroom (*Agaricus bisporus*) lectin in complex with T-antigen and N-acetylglucosamine  
Authors : Carrizo, M.E.; Capaldi, S.; Perduca, M.; Irazoqui, F.J.; Nores, G.A.; Monaco, H.L.  
Deposited on : 2004-11-23  
Resolution : 2.36 Å(reported)

This is a Full wwPDB X-ray Structure 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/XrayValidationReportHelp>

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:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

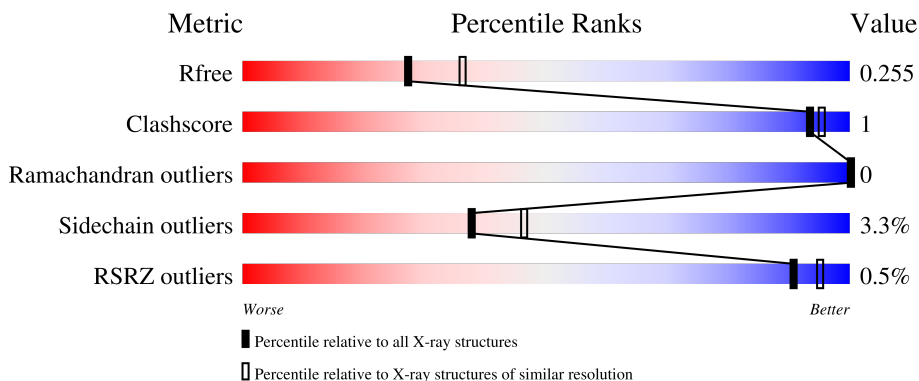
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.36 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.



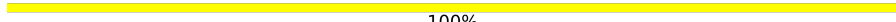
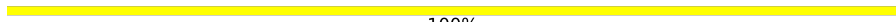

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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 electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	142	 93% 7%
1	B	142	 92% 8%
1	C	142	 90% 10%
1	D	142	 92% 8%
2	E	2	 100%

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Mol	Chain	Length	Quality of chain
2	F	2	 100%
2	G	2	 100%
2	H	2	 100%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NGA	E	1	X	-	-	-
2	NGA	F	1	X	-	-	-
2	NGA	G	1	X	-	-	-
2	NGA	H	1	X	-	-	-
3	NAG	A	144	X	-	-	-
3	NAG	B	1144	X	-	-	-
3	NAG	C	2144	X	-	-	-
3	NAG	D	3144	X	-	-	-

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 4790 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 lectin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	142	1135	713	198	222	2	0	0	0
1	B	142	1135	713	198	222	2	0	0	0
1	C	142	1135	713	198	222	2	0	0	0
1	D	142	1135	713	198	222	2	0	0	0

There are 44 discrepancies between the modelled and reference sequences:

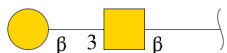
Chain	Residue	Modelled	Actual	Comment	Reference
A	64	SER	ILE	SEE REMARK 999	GB 606960
A	134	ASP	-	SEE REMARK 999	GB 606960
A	135	ASN	-	SEE REMARK 999	GB 606960
A	136	LEU	-	SEE REMARK 999	GB 606960
A	137	LYS	-	SEE REMARK 999	GB 606960
A	138	ALA	-	SEE REMARK 999	GB 606960
A	139	ASN	-	SEE REMARK 999	GB 606960
A	140	LEU	-	SEE REMARK 999	GB 606960
A	141	ILE	-	SEE REMARK 999	GB 606960
A	142	ILE	-	SEE REMARK 999	GB 606960
A	143	GLY	-	SEE REMARK 999	GB 606960
B	64	SER	ILE	SEE REMARK 999	GB 606960
B	134	ASP	-	SEE REMARK 999	GB 606960
B	135	ASN	-	SEE REMARK 999	GB 606960
B	136	LEU	-	SEE REMARK 999	GB 606960
B	137	LYS	-	SEE REMARK 999	GB 606960
B	138	ALA	-	SEE REMARK 999	GB 606960
B	139	ASN	-	SEE REMARK 999	GB 606960
B	140	LEU	-	SEE REMARK 999	GB 606960
B	141	ILE	-	SEE REMARK 999	GB 606960
B	142	ILE	-	SEE REMARK 999	GB 606960

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Chain	Residue	Modelled	Actual	Comment	Reference
B	143	GLY	-	SEE REMARK 999	GB 606960
C	64	SER	ILE	SEE REMARK 999	GB 606960
C	134	ASP	-	SEE REMARK 999	GB 606960
C	135	ASN	-	SEE REMARK 999	GB 606960
C	136	LEU	-	SEE REMARK 999	GB 606960
C	137	LYS	-	SEE REMARK 999	GB 606960
C	138	ALA	-	SEE REMARK 999	GB 606960
C	139	ASN	-	SEE REMARK 999	GB 606960
C	140	LEU	-	SEE REMARK 999	GB 606960
C	141	ILE	-	SEE REMARK 999	GB 606960
C	142	ILE	-	SEE REMARK 999	GB 606960
C	143	GLY	-	SEE REMARK 999	GB 606960
D	64	SER	ILE	SEE REMARK 999	GB 606960
D	134	ASP	-	SEE REMARK 999	GB 606960
D	135	ASN	-	SEE REMARK 999	GB 606960
D	136	LEU	-	SEE REMARK 999	GB 606960
D	137	LYS	-	SEE REMARK 999	GB 606960
D	138	ALA	-	SEE REMARK 999	GB 606960
D	139	ASN	-	SEE REMARK 999	GB 606960
D	140	LEU	-	SEE REMARK 999	GB 606960
D	141	ILE	-	SEE REMARK 999	GB 606960
D	142	ILE	-	SEE REMARK 999	GB 606960
D	143	GLY	-	SEE REMARK 999	GB 606960

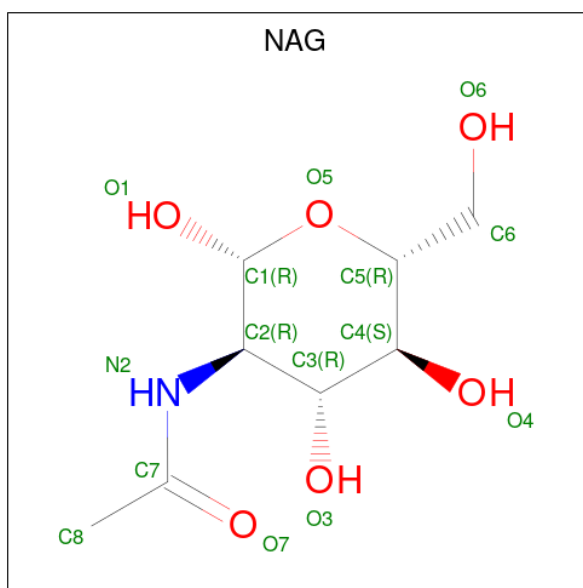
- Molecule 2 is an oligosaccharide called beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose.



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

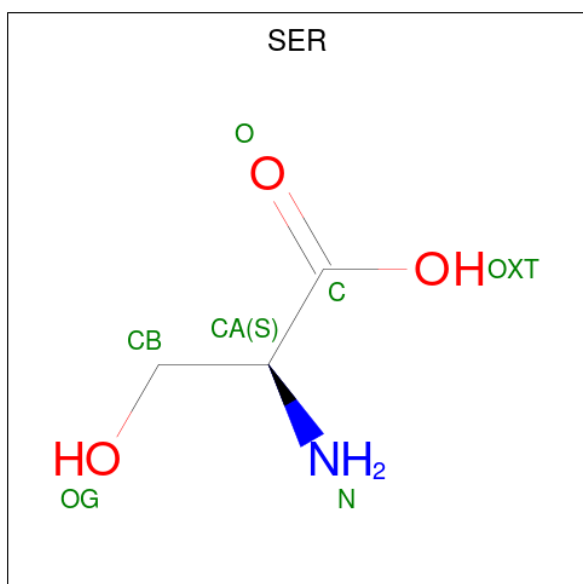
- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:

C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	Total 15	C 8	N 1	O 6	0	0
3	B	1	Total 15	C 8	N 1	O 6	0	0
3	C	1	Total 15	C 8	N 1	O 6	0	0
3	D	1	Total 15	C 8	N 1	O 6	0	0

- Molecule 4 is SERINE (three-letter code: SER) (formula: C<sub>3</sub>H<sub>7</sub>NO<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			7	3	1	3		
4	B	1	Total	C	N	O	0	0
			7	3	1	3		
4	C	1	Total	C	N	O	0	0
			7	3	1	3		
4	D	1	Total	C	N	O	0	0
			7	3	1	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	17	Total	O	0	0
			17	17		
5	B	16	Total	O	0	0
			16	16		
5	C	11	Total	O	0	0
			11	11		
5	D	18	Total	O	0	0
			18	18		

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron 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 dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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: lectin

Chain A:  93% 7%

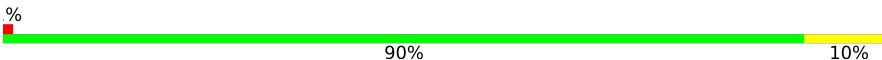


- Molecule 1: lectin

Chain B:  92% 8%



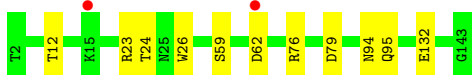
- Molecule 1: lectin

Chain C:  90% 10% %



- Molecule 1: lectin

Chain D:  92% 8% %



- Molecule 2: beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose

Chain E:  100%



- Molecule 2: beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose

Chain F:  100%



NGA1  
GAL2

- Molecule 2: beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose

Chain G:

100%

NGA1  
GAL2

- Molecule 2: beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose

Chain H:

100%

NGA1  
GAL2

## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	85.67Å 85.67Å 257.07Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.36 30.09 – 2.36	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.00-2.36) 99.9 (30.09-2.36)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	6.41 (at 2.36Å)	Xtrriage
Refinement program	REFMAC 5.1.24	Depositor
R, $R_{free}$	0.228 , 0.252 0.231 , 0.255	Depositor DCC
$R_{free}$ test set	2028 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.0	Xtrriage
Anisotropy	0.484	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 22.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	4790	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.54% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 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: GAL, NGA, 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	0.44	0/1159	0.69	2/1573 (0.1%)
1	B	0.44	0/1159	0.67	2/1573 (0.1%)
1	C	0.42	0/1159	0.69	4/1573 (0.3%)
1	D	0.43	0/1159	0.68	2/1573 (0.1%)
All	All	0.43	0/4636	0.68	10/6292 (0.2%)

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	134	ASP	CB-CG-OD2	7.12	124.70	118.30
1	A	62	ASP	CB-CG-OD2	5.97	123.67	118.30
1	D	62	ASP	CB-CG-OD2	5.95	123.65	118.30
1	B	62	ASP	CB-CG-OD2	5.84	123.55	118.30
1	C	62	ASP	CB-CG-OD2	5.67	123.40	118.30
1	D	79	ASP	CB-CG-OD2	5.47	123.22	118.30
1	C	79	ASP	CB-CG-OD2	5.25	123.02	118.30
1	A	134	ASP	CB-CG-OD2	5.20	122.98	118.30
1	C	35	ASP	CB-CG-OD2	5.04	122.84	118.30
1	B	35	ASP	CB-CG-OD2	5.03	122.83	118.30

There are no chirality outliers.

There are no planarity outliers.

### 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	1135	0	1089	4	0
1	B	1135	0	1089	5	0
1	C	1135	0	1089	5	0
1	D	1135	0	1089	4	0
2	E	25	0	22	0	0
2	F	25	0	22	0	0
2	G	25	0	22	0	0
2	H	25	0	22	0	0
3	A	15	0	15	0	0
3	B	15	0	15	0	0
3	C	15	0	15	0	0
3	D	15	0	15	0	0
4	A	7	0	3	0	0
4	B	7	0	3	0	0
4	C	7	0	3	0	0
4	D	7	0	3	0	0
5	A	17	0	0	0	0
5	B	16	0	0	0	0
5	C	11	0	0	0	0
5	D	18	0	0	0	0
All	All	4790	0	4516	13	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 1.

All (13) 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:A:26:TRP:CZ3	1:A:95:GLN:HG2	2.30	0.66
1:D:26:TRP:CZ3	1:D:95:GLN:HB2	2.34	0.62
1:A:26:TRP:HZ3	1:A:95:GLN:HG2	1.66	0.61
1:B:85:THR:H	1:B:88:GLN:HE21	1.57	0.53
1:A:12:THR:HA	1:C:12:THR:HA	1.93	0.51
1:C:23:ARG:HG2	1:D:23:ARG:HG2	1.92	0.50
1:A:23:ARG:HG2	1:B:23:ARG:HG2	1.93	0.50
1:B:12:THR:HA	1:D:12:THR:HA	1.97	0.46
1:C:67:ALA:HB1	1:C:126:ILE:HD11	1.98	0.45
1:B:85:THR:H	1:B:88:GLN:NE2	2.15	0.45
1:C:24:THR:HG22	1:D:24:THR:HG22	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:80:ILE:HD11	1:C:126:ILE:HG13	2.01	0.42
1:B:69:PHE:CD1	1:B:69:PHE:N	2.88	0.41

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 X-ray entries followed by that with respect to entries of similar resolution.

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	140/142 (99%)	135 (96%)	5 (4%)	0	100	100
1	B	140/142 (99%)	136 (97%)	4 (3%)	0	100	100
1	C	140/142 (99%)	136 (97%)	4 (3%)	0	100	100
1	D	140/142 (99%)	137 (98%)	3 (2%)	0	100	100
All	All	560/568 (99%)	544 (97%)	16 (3%)	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 X-ray entries followed by that with respect to entries of similar resolution.

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	121/121 (100%)	117 (97%)	4 (3%)	38	46
1	B	121/121 (100%)	117 (97%)	4 (3%)	38	46
1	C	121/121 (100%)	117 (97%)	4 (3%)	38	46

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	121/121 (100%)	117 (97%)	4 (3%)	38	46
All	All	484/484 (100%)	468 (97%)	16 (3%)	38	46

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	ARG
1	A	94	ASN
1	A	102	ILE
1	A	127	GLU
1	B	11	GLN
1	B	76	ARG
1	B	94	ASN
1	B	127	GLU
1	C	15	LYS
1	C	76	ARG
1	C	94	ASN
1	C	102	ILE
1	D	59	SER
1	D	76	ARG
1	D	94	ASN
1	D	132	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	ASN
1	A	95	GLN
1	A	139	ASN
1	B	88	GLN
1	B	95	GLN
1	B	105	GLN
1	B	109	ASN
1	B	139	ASN
1	C	72	HIS
1	C	139	ASN
1	D	88	GLN
1	D	94	ASN
1	D	109	ASN
1	D	139	ASN

### 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](#)

8 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
2	NGA	E	1	2,4	14,14,15	0.38	0	17,19,21	3.51	8 (47%)
2	GAL	E	2	2	11,11,12	0.58	0	15,15,17	0.88	1 (6%)
2	NGA	F	1	2,4	14,14,15	0.34	0	17,19,21	3.50	10 (58%)
2	GAL	F	2	2	11,11,12	0.53	0	15,15,17	0.92	1 (6%)
2	NGA	G	1	2,4	14,14,15	0.35	0	17,19,21	3.52	9 (52%)
2	GAL	G	2	2	11,11,12	0.59	0	15,15,17	1.06	1 (6%)
2	NGA	H	1	2,4	14,14,15	0.58	0	17,19,21	3.54	10 (58%)
2	GAL	H	2	2	11,11,12	0.61	0	15,15,17	0.85	1 (6%)

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
2	NGA	E	1	2,4	1/1/5/7	2/6/23/26	0/1/1/1
2	GAL	E	2	2	-	0/2/19/22	0/1/1/1
2	NGA	F	1	2,4	1/1/5/7	2/6/23/26	0/1/1/1
2	GAL	F	2	2	-	0/2/19/22	0/1/1/1
2	NGA	G	1	2,4	1/1/5/7	1/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GAL	G	2	2	-	1/2/19/22	0/1/1/1
2	NGA	H	1	2,4	1/1/5/7	2/6/23/26	0/1/1/1
2	GAL	H	2	2	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1	NGA	C1-O5-C5	9.20	124.66	112.19
2	E	1	NGA	C1-O5-C5	8.86	124.20	112.19
2	F	1	NGA	C1-O5-C5	8.69	123.97	112.19
2	G	1	NGA	C1-O5-C5	8.39	123.56	112.19
2	E	1	NGA	C3-C4-C5	5.68	120.37	110.24
2	E	1	NGA	O5-C1-C2	5.49	119.96	111.29
2	G	1	NGA	C3-C4-C5	5.26	119.62	110.24
2	G	1	NGA	O5-C1-C2	5.21	119.52	111.29
2	H	1	NGA	C3-C4-C5	4.78	118.76	110.24
2	F	1	NGA	O5-C1-C2	4.61	118.56	111.29
2	H	1	NGA	O5-C1-C2	4.55	118.47	111.29
2	F	1	NGA	C3-C4-C5	4.54	118.33	110.24
2	F	1	NGA	O4-C4-C3	-4.32	100.36	110.35
2	G	1	NGA	O4-C4-C3	-4.22	100.59	110.35
2	F	1	NGA	C4-C3-C2	4.19	117.16	111.02
2	G	1	NGA	C4-C3-C2	4.08	117.00	111.02
2	H	1	NGA	C4-C3-C2	4.02	116.91	111.02
2	E	1	NGA	O4-C4-C3	-3.88	101.39	110.35
2	E	1	NGA	C4-C3-C2	3.72	116.47	111.02
2	H	1	NGA	O4-C4-C3	-3.67	101.86	110.35
2	G	1	NGA	O3-C3-C2	3.47	116.65	109.47
2	F	1	NGA	C2-N2-C7	-3.46	117.98	122.90
2	G	1	NGA	C2-N2-C7	-3.46	117.98	122.90
2	E	1	NGA	O4-C4-C5	-3.40	100.86	109.30
2	F	1	NGA	O5-C5-C4	3.34	118.95	110.83
2	H	1	NGA	O3-C3-C2	3.29	116.27	109.47
2	G	1	NGA	O5-C5-C4	3.22	118.66	110.83
2	H	1	NGA	O5-C5-C4	3.12	118.41	110.83
2	E	1	NGA	O3-C3-C2	3.12	115.91	109.47
2	H	1	NGA	O5-C5-C6	3.05	111.98	107.20
2	G	2	GAL	C1-O5-C5	3.03	116.30	112.19
2	E	1	NGA	O5-C5-C4	2.90	117.88	110.83
2	H	1	NGA	C1-C2-N2	2.90	115.44	110.49
2	F	1	NGA	O3-C3-C4	2.83	116.89	110.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1	NGA	O3-C3-C4	2.73	116.66	110.35
2	G	1	NGA	C1-C2-N2	2.66	115.03	110.49
2	F	1	NGA	C1-C2-N2	2.55	114.85	110.49
2	F	2	GAL	O5-C5-C6	2.45	111.05	107.20
2	F	1	NGA	O5-C5-C6	2.21	110.68	107.20
2	H	2	GAL	C1-O5-C5	2.21	115.19	112.19
2	E	2	GAL	C1-O5-C5	2.01	114.92	112.19

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	E	1	NGA	C1
2	F	1	NGA	C1
2	G	1	NGA	C1
2	H	1	NGA	C1

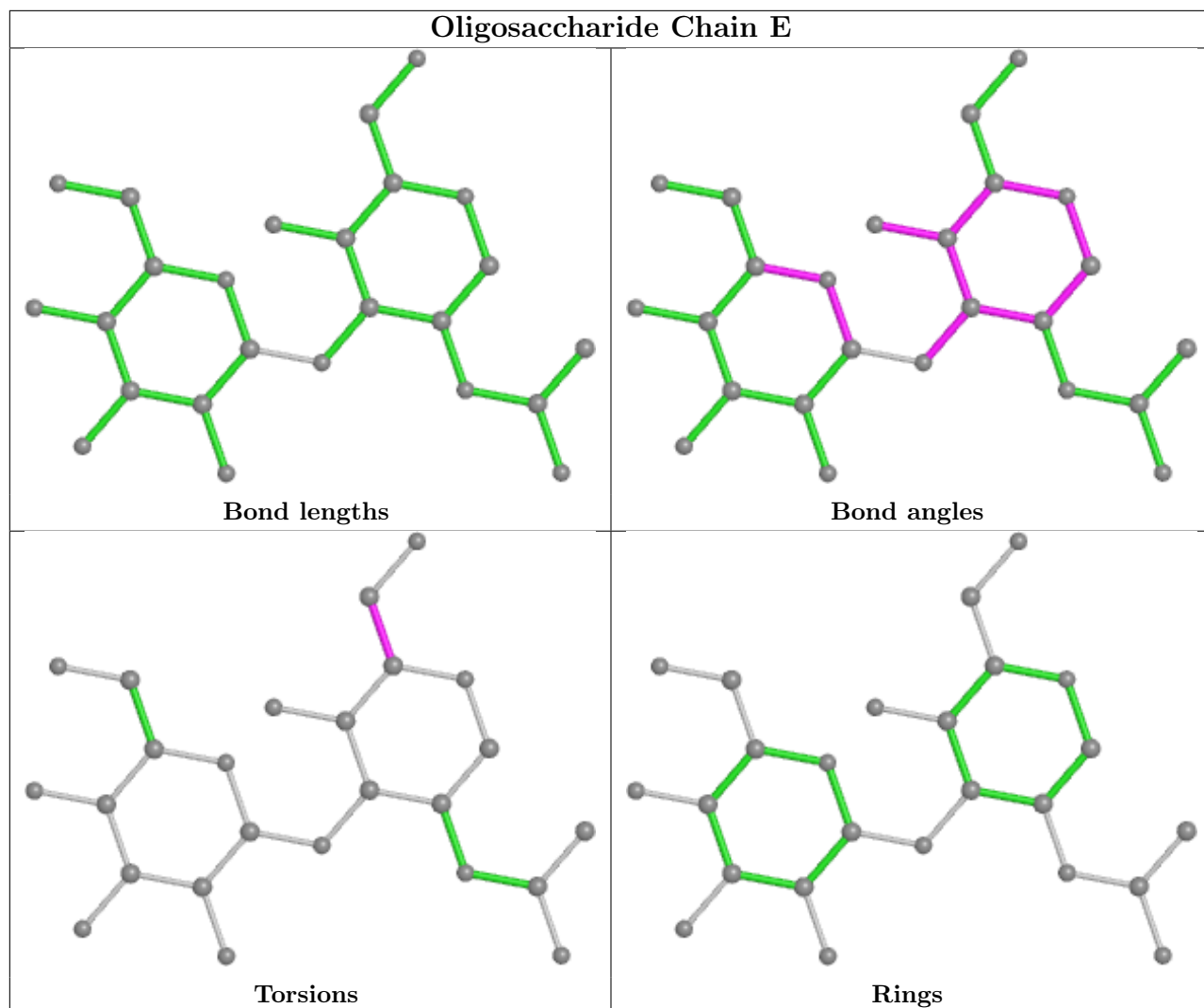
All (9) torsion outliers are listed below:

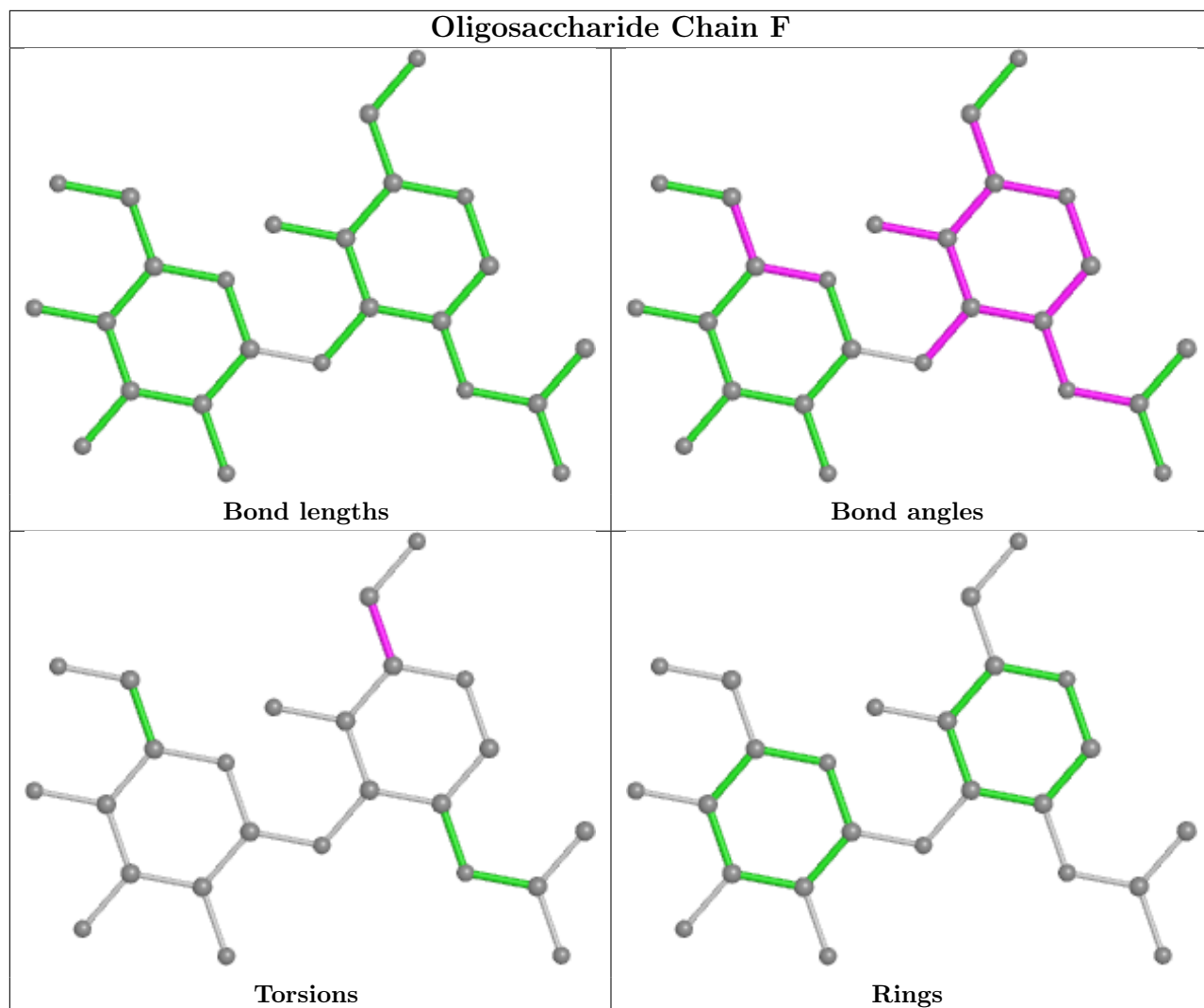
Mol	Chain	Res	Type	Atoms
2	G	1	NGA	O5-C5-C6-O6
2	E	1	NGA	O5-C5-C6-O6
2	F	1	NGA	O5-C5-C6-O6
2	H	1	NGA	O5-C5-C6-O6
2	E	1	NGA	C4-C5-C6-O6
2	H	2	GAL	C4-C5-C6-O6
2	F	1	NGA	C4-C5-C6-O6
2	H	1	NGA	C4-C5-C6-O6
2	G	2	GAL	C4-C5-C6-O6

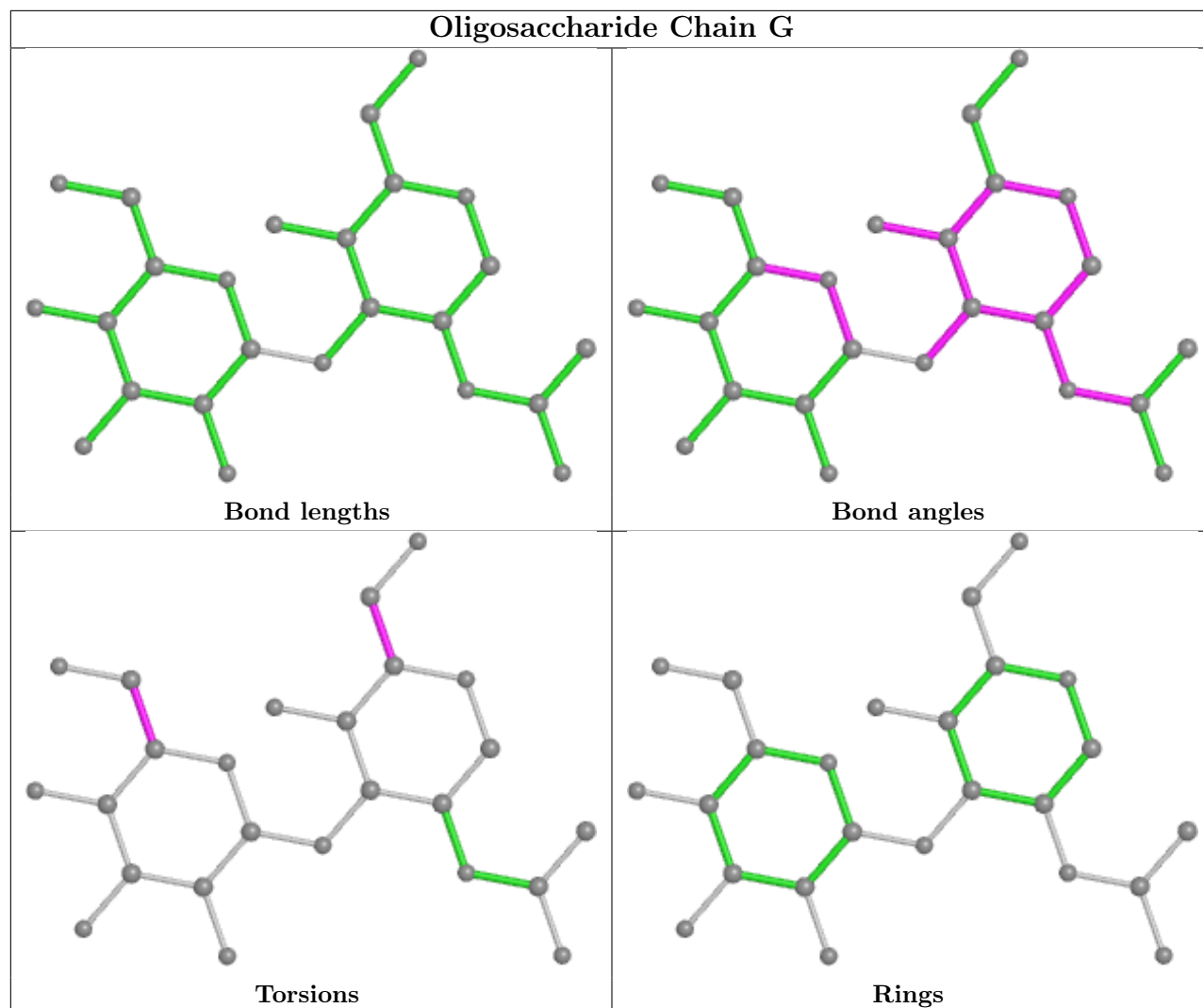
There are no ring outliers.

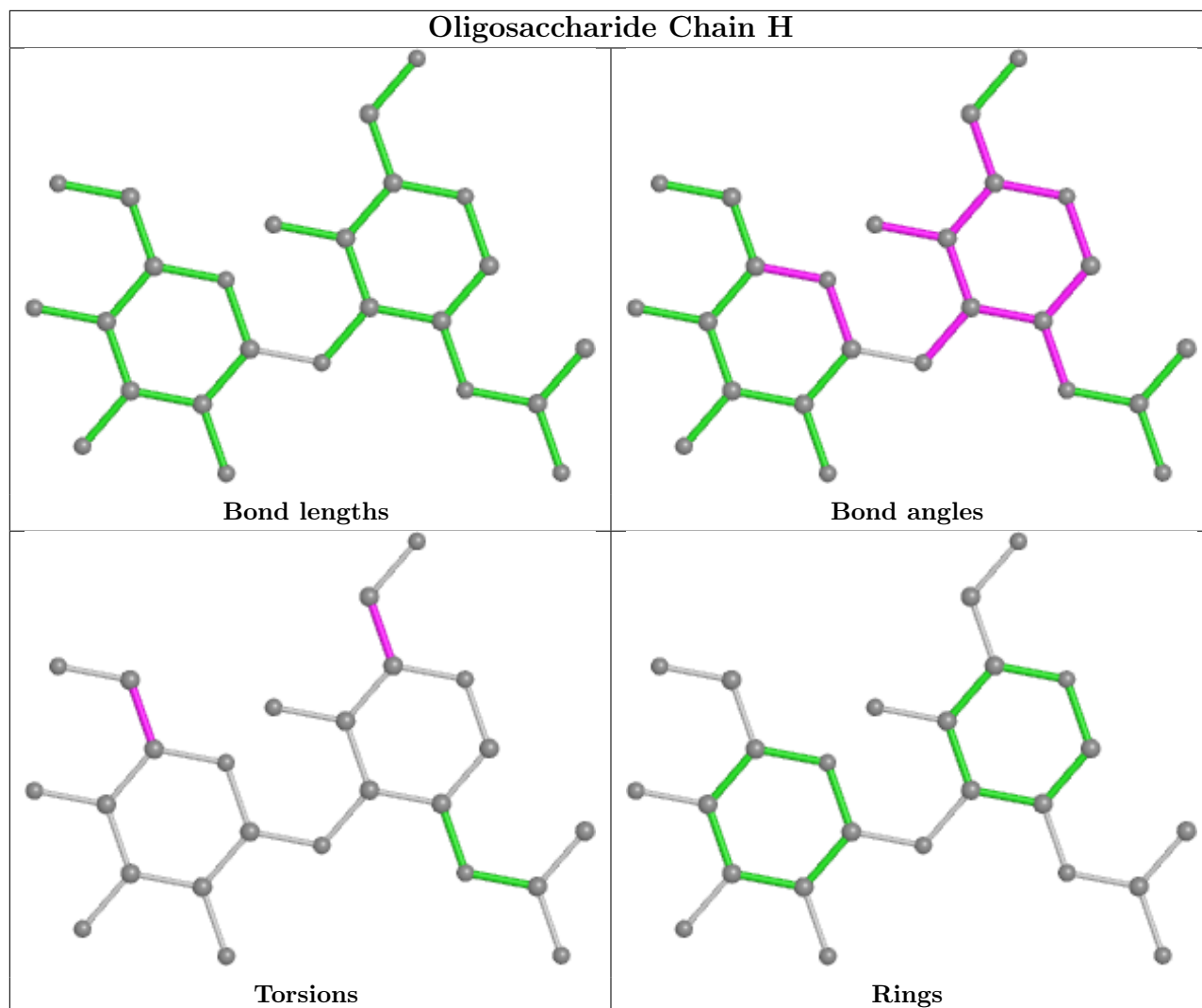
No monomer is involved in short contacts.

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](#)

8 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$
4	SER	C	147	2	5,6,6	1.05	1 (20%)	5,7,7	1.92	2 (40%)
3	NAG	A	144	-	15,15,15	0.41	0	21,21,21	0.61	0
3	NAG	B	1144	-	15,15,15	0.46	0	21,21,21	0.98	3 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	SER	B	147	2	5,6,6	0.90	0	5,7,7	1.57	2 (40%)
4	SER	A	147	2	5,6,6	0.95	0	5,7,7	1.27	1 (20%)
4	SER	D	147	2	5,6,6	0.96	0	5,7,7	0.95	0
3	NAG	C	2144	-	15,15,15	0.60	0	21,21,21	2.11	5 (23%)
3	NAG	D	3144	-	15,15,15	0.42	0	21,21,21	0.64	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
4	SER	C	147	2	-	2/6/6/6	-
3	NAG	A	144	-	1/1/6/7	0/6/26/26	0/1/1/1
3	NAG	B	1144	-	1/1/6/7	0/6/26/26	0/1/1/1
4	SER	B	147	2	-	2/6/6/6	-
4	SER	A	147	2	-	2/6/6/6	-
4	SER	D	147	2	-	0/6/6/6	-
3	NAG	C	2144	-	1/1/6/7	0/6/26/26	0/1/1/1
3	NAG	D	3144	-	1/1/6/7	0/6/26/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	147	SER	OXT-C	-2.09	1.23	1.30

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2144	NAG	O5-C1-C2	6.65	116.20	109.52
3	C	2144	NAG	C1-O5-C5	3.97	121.16	113.66
4	C	147	SER	OXT-C-O	-3.35	116.48	124.09
3	C	2144	NAG	C1-C2-N2	3.16	114.39	110.73
4	B	147	SER	OXT-C-O	-2.52	118.37	124.09
3	C	2144	NAG	C1-C2-C3	2.36	113.77	110.54
4	C	147	SER	OXT-C-CA	2.30	121.21	113.38
3	C	2144	NAG	O5-C5-C4	2.29	113.85	109.69
4	A	147	SER	OXT-C-O	-2.27	118.94	124.09
4	B	147	SER	OXT-C-CA	2.24	121.03	113.38
3	B	1144	NAG	O5-C1-C2	2.20	111.73	109.52
3	B	1144	NAG	C1-O5-C5	2.08	117.58	113.66

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Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
3	B	1144	NAG	C1-C2-C3	2.03	113.31	110.54

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	144	NAG	C1
3	B	1144	NAG	C1
3	C	2144	NAG	C1
3	D	3144	NAG	C1

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	147	SER	N-CA-CB-OG
4	C	147	SER	N-CA-CB-OG
4	A	147	SER	C-CA-CB-OG
4	B	147	SER	OXT-C-CA-N
4	C	147	SER	C-CA-CB-OG
4	B	147	SER	O-C-CA-N

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	142/142 (100%)	-0.05	0 100 100	21, 25, 32, 36	0
1	B	142/142 (100%)	-0.12	0 100 100	20, 25, 31, 35	0
1	C	142/142 (100%)	-0.03	1 (0%) 87 92	21, 27, 33, 38	0
1	D	142/142 (100%)	-0.19	2 (1%) 75 83	21, 25, 32, 36	0
All	All	568/568 (100%)	-0.10	3 (0%) 91 95	20, 25, 32, 38	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	15	LYS	2.2
1	C	2	THR	2.0
1	D	62	ASP	2.0

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	NGA	E	1	14/15	0.90	0.15	27,29,32,33	0
2	NGA	F	1	14/15	0.92	0.15	25,29,32,32	0
2	NGA	G	1	14/15	0.92	0.13	38,39,41,41	0
2	GAL	G	2	11/12	0.92	0.14	37,38,39,40	0

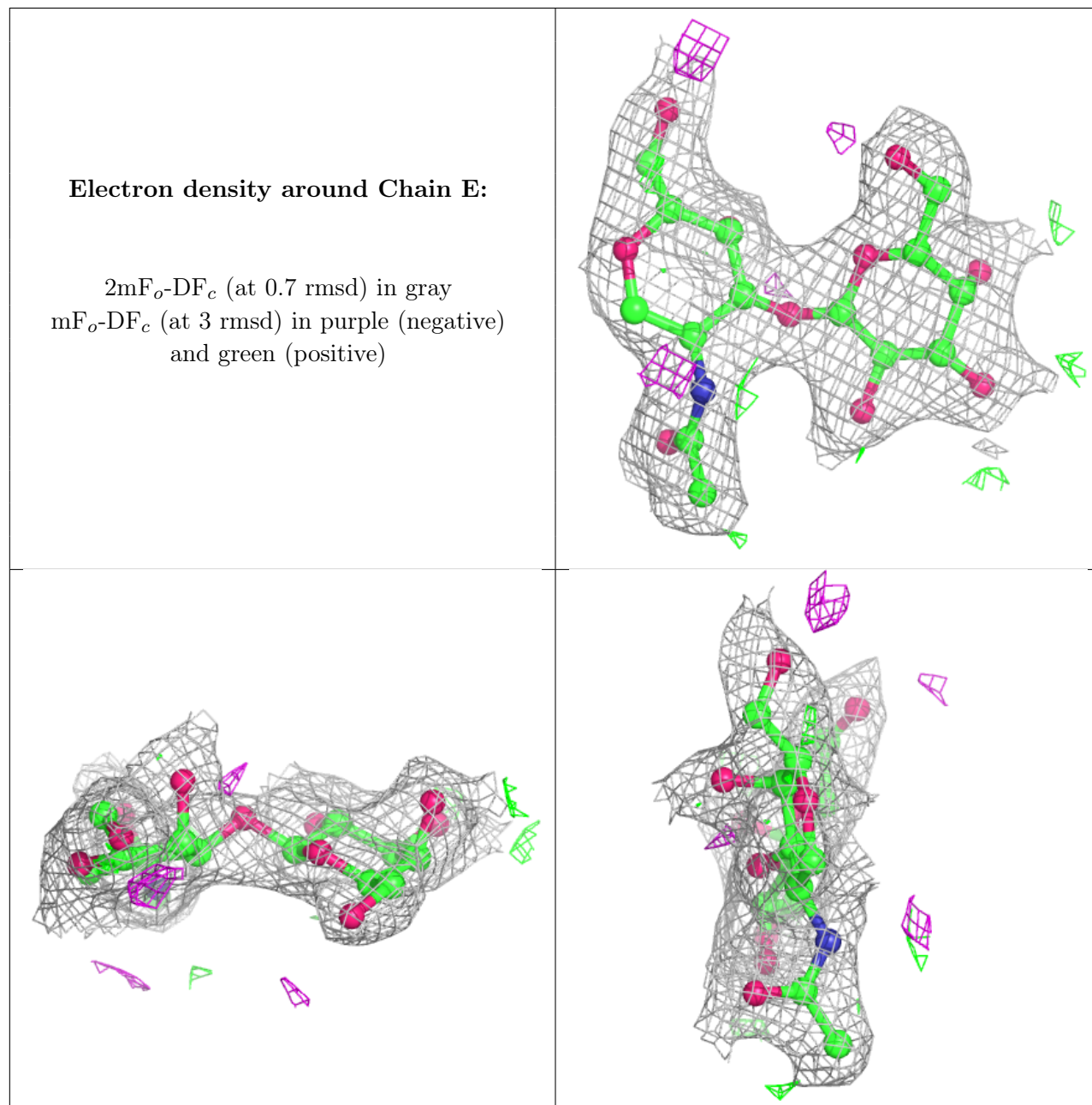
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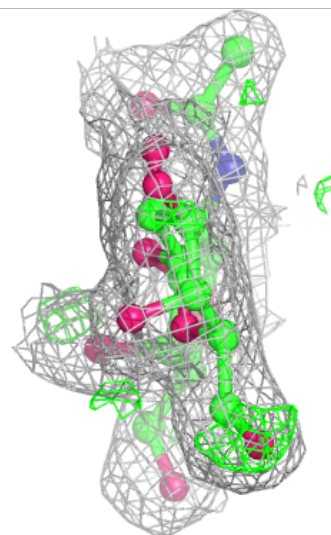
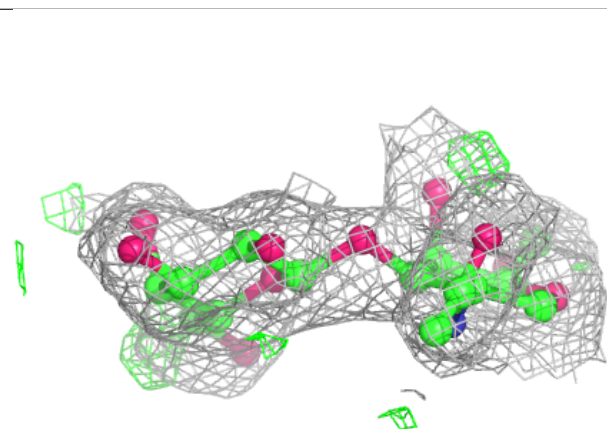
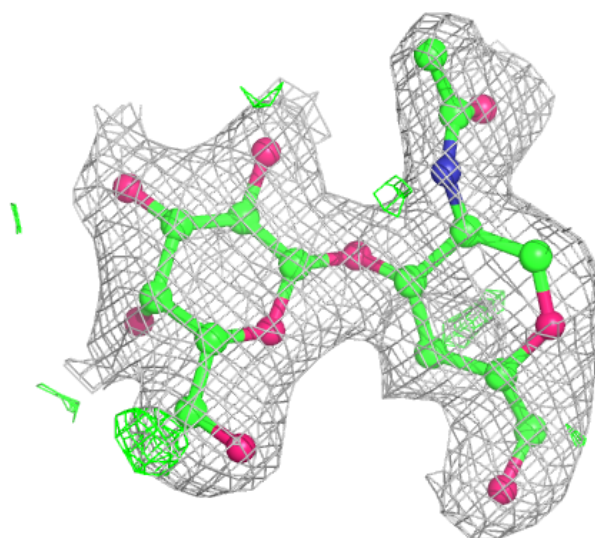
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NGA	H	1	14/15	0.93	0.17	29,33,35,36	0
2	GAL	H	2	11/12	0.94	0.14	29,30,33,35	0
2	GAL	E	2	11/12	0.95	0.13	26,28,30,31	0
2	GAL	F	2	11/12	0.95	0.12	26,28,29,32	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



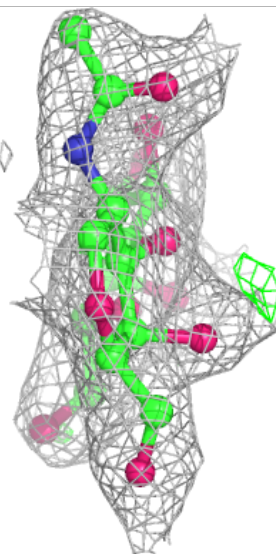
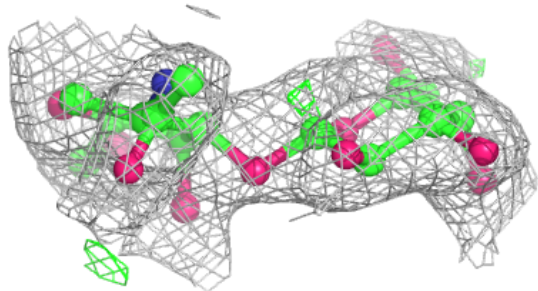
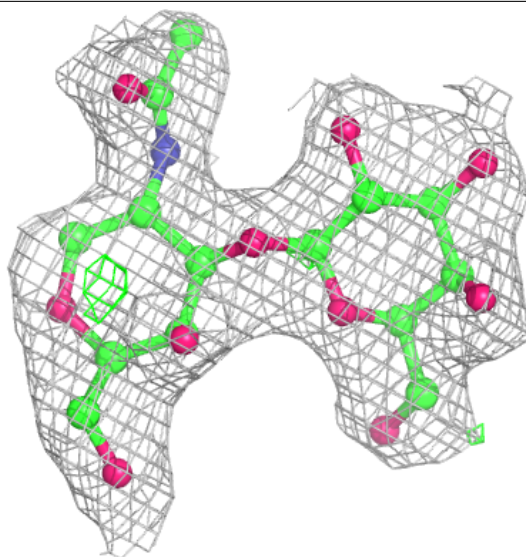
**Electron density around Chain F:**

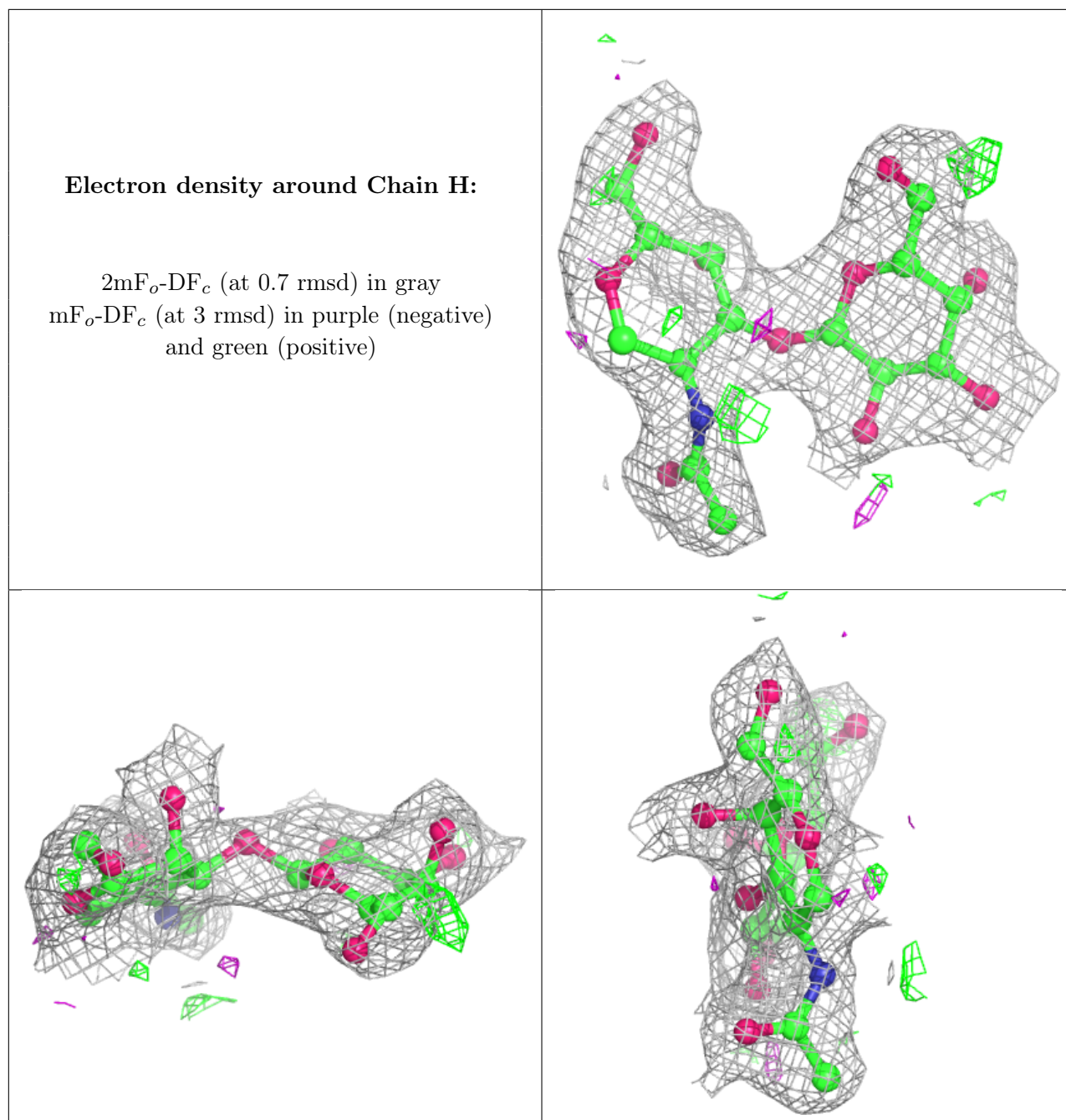
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around Chain G:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	SER	A	147	7/7	0.35	0.39	39,41,42,42	0
4	SER	D	147	7/7	0.62	0.40	42,45,45,45	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	SER	B	147	7/7	0.80	0.25	38,41,41,41	0
4	SER	C	147	7/7	0.85	0.29	47,49,50,50	0
3	NAG	A	144	15/15	0.92	0.14	26,28,29,31	0
3	NAG	B	1144	15/15	0.93	0.14	25,29,30,33	0
3	NAG	C	2144	15/15	0.93	0.16	27,28,29,30	0
3	NAG	D	3144	15/15	0.96	0.12	22,24,25,26	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.