



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 27, 2024 – 04:35 pm BST

PDB ID : 9EZL
Title : Crystal structure of trehalose synthase mutant N253H from *Deinococcus radiodurans*
Authors : Ye, L.C.; Chen, S.C.
Deposited on : 2024-04-12
Resolution : 2.97 Å (reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/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>.

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

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.002 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.38.2

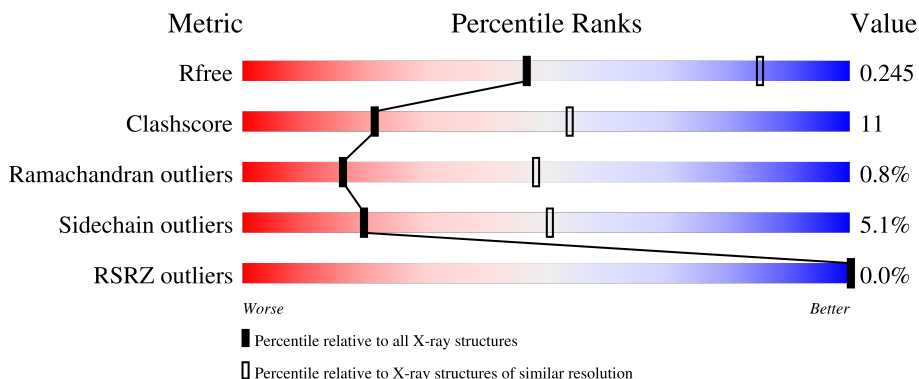
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.97 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}	164625	3360 (3.00-2.96)
Clashscore	180529	3751 (3.00-2.96)
Ramachandran outliers	177936	3628 (3.00-2.96)
Sidechain outliers	177891	3631 (3.00-2.96)
RSRZ outliers	164620	3372 (3.00-2.96)

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 ≥ 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	571	 70% 25% . .
1	B	571	 74% 20% . .
1	C	571	 70% 25% . .
1	D	571	 70% 25% . .
1	E	571	 71% 24% . .

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Mol	Chain	Length	Quality of chain
1	F	571	 64% 29% . .
1	G	571	 67% 26% . .
1	H	571	 68% 26% . .

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 35385 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 maltose alpha-D-glucosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	548	4406	2820	752	818	16	0	0	0
1	B	548	4406	2820	752	818	16	0	0	0
1	C	548	4406	2820	752	818	16	0	0	0
1	D	548	4406	2820	752	818	16	0	0	0
1	E	548	4406	2820	752	818	16	0	0	0
1	F	548	4406	2820	752	818	16	0	0	0
1	G	548	4406	2820	752	818	16	0	0	0
1	H	548	4406	2820	752	818	16	0	0	0

There are 192 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP I3NX86
A	0	VAL	-	expression tag	UNP I3NX86
A	1	PRO	-	expression tag	UNP I3NX86
A	97	TRP	ARG	engineered mutation	UNP I3NX86
A	253	HIS	ASN	engineered mutation	UNP I3NX86
A	313	ILE	THR	engineered mutation	UNP I3NX86
A	380	VAL	ILE	engineered mutation	UNP I3NX86
A	553	SER	-	expression tag	UNP I3NX86
A	554	ARG	-	expression tag	UNP I3NX86
A	555	VAL	-	expression tag	UNP I3NX86
A	556	ASP	-	expression tag	UNP I3NX86
A	557	LYS	-	expression tag	UNP I3NX86
A	558	LEU	-	expression tag	UNP I3NX86

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Chain	Residue	Modelled	Actual	Comment	Reference
A	559	ALA	-	expression tag	UNP I3NX86
A	560	ALA	-	expression tag	UNP I3NX86
A	561	ALA	-	expression tag	UNP I3NX86
A	562	LEU	-	expression tag	UNP I3NX86
A	563	GLU	-	expression tag	UNP I3NX86
A	564	HIS	-	expression tag	UNP I3NX86
A	565	HIS	-	expression tag	UNP I3NX86
A	566	HIS	-	expression tag	UNP I3NX86
A	567	HIS	-	expression tag	UNP I3NX86
A	568	HIS	-	expression tag	UNP I3NX86
A	569	HIS	-	expression tag	UNP I3NX86
B	-1	MET	-	initiating methionine	UNP I3NX86
B	0	VAL	-	expression tag	UNP I3NX86
B	1	PRO	-	expression tag	UNP I3NX86
B	97	TRP	ARG	engineered mutation	UNP I3NX86
B	253	HIS	ASN	engineered mutation	UNP I3NX86
B	313	ILE	THR	engineered mutation	UNP I3NX86
B	380	VAL	ILE	engineered mutation	UNP I3NX86
B	553	SER	-	expression tag	UNP I3NX86
B	554	ARG	-	expression tag	UNP I3NX86
B	555	VAL	-	expression tag	UNP I3NX86
B	556	ASP	-	expression tag	UNP I3NX86
B	557	LYS	-	expression tag	UNP I3NX86
B	558	LEU	-	expression tag	UNP I3NX86
B	559	ALA	-	expression tag	UNP I3NX86
B	560	ALA	-	expression tag	UNP I3NX86
B	561	ALA	-	expression tag	UNP I3NX86
B	562	LEU	-	expression tag	UNP I3NX86
B	563	GLU	-	expression tag	UNP I3NX86
B	564	HIS	-	expression tag	UNP I3NX86
B	565	HIS	-	expression tag	UNP I3NX86
B	566	HIS	-	expression tag	UNP I3NX86
B	567	HIS	-	expression tag	UNP I3NX86
B	568	HIS	-	expression tag	UNP I3NX86
B	569	HIS	-	expression tag	UNP I3NX86
C	-1	MET	-	initiating methionine	UNP I3NX86
C	0	VAL	-	expression tag	UNP I3NX86
C	1	PRO	-	expression tag	UNP I3NX86
C	97	TRP	ARG	engineered mutation	UNP I3NX86
C	253	HIS	ASN	engineered mutation	UNP I3NX86
C	313	ILE	THR	engineered mutation	UNP I3NX86
C	380	VAL	ILE	engineered mutation	UNP I3NX86

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Chain	Residue	Modelled	Actual	Comment	Reference
C	553	SER	-	expression tag	UNP I3NX86
C	554	ARG	-	expression tag	UNP I3NX86
C	555	VAL	-	expression tag	UNP I3NX86
C	556	ASP	-	expression tag	UNP I3NX86
C	557	LYS	-	expression tag	UNP I3NX86
C	558	LEU	-	expression tag	UNP I3NX86
C	559	ALA	-	expression tag	UNP I3NX86
C	560	ALA	-	expression tag	UNP I3NX86
C	561	ALA	-	expression tag	UNP I3NX86
C	562	LEU	-	expression tag	UNP I3NX86
C	563	GLU	-	expression tag	UNP I3NX86
C	564	HIS	-	expression tag	UNP I3NX86
C	565	HIS	-	expression tag	UNP I3NX86
C	566	HIS	-	expression tag	UNP I3NX86
C	567	HIS	-	expression tag	UNP I3NX86
C	568	HIS	-	expression tag	UNP I3NX86
C	569	HIS	-	expression tag	UNP I3NX86
D	-1	MET	-	initiating methionine	UNP I3NX86
D	0	VAL	-	expression tag	UNP I3NX86
D	1	PRO	-	expression tag	UNP I3NX86
D	97	TRP	ARG	engineered mutation	UNP I3NX86
D	253	HIS	ASN	engineered mutation	UNP I3NX86
D	313	ILE	THR	engineered mutation	UNP I3NX86
D	380	VAL	ILE	engineered mutation	UNP I3NX86
D	553	SER	-	expression tag	UNP I3NX86
D	554	ARG	-	expression tag	UNP I3NX86
D	555	VAL	-	expression tag	UNP I3NX86
D	556	ASP	-	expression tag	UNP I3NX86
D	557	LYS	-	expression tag	UNP I3NX86
D	558	LEU	-	expression tag	UNP I3NX86
D	559	ALA	-	expression tag	UNP I3NX86
D	560	ALA	-	expression tag	UNP I3NX86
D	561	ALA	-	expression tag	UNP I3NX86
D	562	LEU	-	expression tag	UNP I3NX86
D	563	GLU	-	expression tag	UNP I3NX86
D	564	HIS	-	expression tag	UNP I3NX86
D	565	HIS	-	expression tag	UNP I3NX86
D	566	HIS	-	expression tag	UNP I3NX86
D	567	HIS	-	expression tag	UNP I3NX86
D	568	HIS	-	expression tag	UNP I3NX86
D	569	HIS	-	expression tag	UNP I3NX86
E	-1	MET	-	initiating methionine	UNP I3NX86

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Chain	Residue	Modelled	Actual	Comment	Reference
E	0	VAL	-	expression tag	UNP I3NX86
E	1	PRO	-	expression tag	UNP I3NX86
E	97	TRP	ARG	engineered mutation	UNP I3NX86
E	253	HIS	ASN	engineered mutation	UNP I3NX86
E	313	ILE	THR	engineered mutation	UNP I3NX86
E	380	VAL	ILE	engineered mutation	UNP I3NX86
E	553	SER	-	expression tag	UNP I3NX86
E	554	ARG	-	expression tag	UNP I3NX86
E	555	VAL	-	expression tag	UNP I3NX86
E	556	ASP	-	expression tag	UNP I3NX86
E	557	LYS	-	expression tag	UNP I3NX86
E	558	LEU	-	expression tag	UNP I3NX86
E	559	ALA	-	expression tag	UNP I3NX86
E	560	ALA	-	expression tag	UNP I3NX86
E	561	ALA	-	expression tag	UNP I3NX86
E	562	LEU	-	expression tag	UNP I3NX86
E	563	GLU	-	expression tag	UNP I3NX86
E	564	HIS	-	expression tag	UNP I3NX86
E	565	HIS	-	expression tag	UNP I3NX86
E	566	HIS	-	expression tag	UNP I3NX86
E	567	HIS	-	expression tag	UNP I3NX86
E	568	HIS	-	expression tag	UNP I3NX86
E	569	HIS	-	expression tag	UNP I3NX86
F	-1	MET	-	initiating methionine	UNP I3NX86
F	0	VAL	-	expression tag	UNP I3NX86
F	1	PRO	-	expression tag	UNP I3NX86
F	97	TRP	ARG	engineered mutation	UNP I3NX86
F	253	HIS	ASN	engineered mutation	UNP I3NX86
F	313	ILE	THR	engineered mutation	UNP I3NX86
F	380	VAL	ILE	engineered mutation	UNP I3NX86
F	553	SER	-	expression tag	UNP I3NX86
F	554	ARG	-	expression tag	UNP I3NX86
F	555	VAL	-	expression tag	UNP I3NX86
F	556	ASP	-	expression tag	UNP I3NX86
F	557	LYS	-	expression tag	UNP I3NX86
F	558	LEU	-	expression tag	UNP I3NX86
F	559	ALA	-	expression tag	UNP I3NX86
F	560	ALA	-	expression tag	UNP I3NX86
F	561	ALA	-	expression tag	UNP I3NX86
F	562	LEU	-	expression tag	UNP I3NX86
F	563	GLU	-	expression tag	UNP I3NX86
F	564	HIS	-	expression tag	UNP I3NX86

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Chain	Residue	Modelled	Actual	Comment	Reference
F	565	HIS	-	expression tag	UNP I3NX86
F	566	HIS	-	expression tag	UNP I3NX86
F	567	HIS	-	expression tag	UNP I3NX86
F	568	HIS	-	expression tag	UNP I3NX86
F	569	HIS	-	expression tag	UNP I3NX86
G	-1	MET	-	initiating methionine	UNP I3NX86
G	0	VAL	-	expression tag	UNP I3NX86
G	1	PRO	-	expression tag	UNP I3NX86
G	97	TRP	ARG	engineered mutation	UNP I3NX86
G	253	HIS	ASN	engineered mutation	UNP I3NX86
G	313	ILE	THR	engineered mutation	UNP I3NX86
G	380	VAL	ILE	engineered mutation	UNP I3NX86
G	553	SER	-	expression tag	UNP I3NX86
G	554	ARG	-	expression tag	UNP I3NX86
G	555	VAL	-	expression tag	UNP I3NX86
G	556	ASP	-	expression tag	UNP I3NX86
G	557	LYS	-	expression tag	UNP I3NX86
G	558	LEU	-	expression tag	UNP I3NX86
G	559	ALA	-	expression tag	UNP I3NX86
G	560	ALA	-	expression tag	UNP I3NX86
G	561	ALA	-	expression tag	UNP I3NX86
G	562	LEU	-	expression tag	UNP I3NX86
G	563	GLU	-	expression tag	UNP I3NX86
G	564	HIS	-	expression tag	UNP I3NX86
G	565	HIS	-	expression tag	UNP I3NX86
G	566	HIS	-	expression tag	UNP I3NX86
G	567	HIS	-	expression tag	UNP I3NX86
G	568	HIS	-	expression tag	UNP I3NX86
G	569	HIS	-	expression tag	UNP I3NX86
H	-1	MET	-	initiating methionine	UNP I3NX86
H	0	VAL	-	expression tag	UNP I3NX86
H	1	PRO	-	expression tag	UNP I3NX86
H	97	TRP	ARG	engineered mutation	UNP I3NX86
H	253	HIS	ASN	engineered mutation	UNP I3NX86
H	313	ILE	THR	engineered mutation	UNP I3NX86
H	380	VAL	ILE	engineered mutation	UNP I3NX86
H	553	SER	-	expression tag	UNP I3NX86
H	554	ARG	-	expression tag	UNP I3NX86
H	555	VAL	-	expression tag	UNP I3NX86
H	556	ASP	-	expression tag	UNP I3NX86
H	557	LYS	-	expression tag	UNP I3NX86
H	558	LEU	-	expression tag	UNP I3NX86

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Chain	Residue	Modelled	Actual	Comment	Reference
H	559	ALA	-	expression tag	UNP I3NX86
H	560	ALA	-	expression tag	UNP I3NX86
H	561	ALA	-	expression tag	UNP I3NX86
H	562	LEU	-	expression tag	UNP I3NX86
H	563	GLU	-	expression tag	UNP I3NX86
H	564	HIS	-	expression tag	UNP I3NX86
H	565	HIS	-	expression tag	UNP I3NX86
H	566	HIS	-	expression tag	UNP I3NX86
H	567	HIS	-	expression tag	UNP I3NX86
H	568	HIS	-	expression tag	UNP I3NX86
H	569	HIS	-	expression tag	UNP I3NX86

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Ca 1 1	0	0
2	B	1	Total Ca 1 1	0	0
2	C	1	Total Ca 1 1	0	0
2	D	1	Total Ca 1 1	0	0
2	E	1	Total Ca 1 1	0	0
2	F	1	Total Ca 1 1	0	0
2	G	1	Total Ca 1 1	0	0
2	H	1	Total Ca 1 1	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

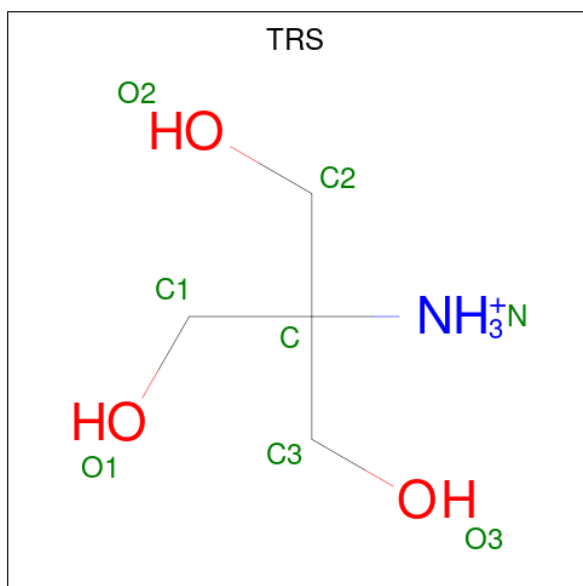
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	C	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0
3	E	1	Total Mg 1 1	0	0
3	F	1	Total Mg 1 1	0	0
3	G	1	Total Mg 1 1	0	0
3	H	1	Total Mg 1 1	0	0

- Molecule 4 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O 8 4 1 3	0	0
4	B	1	Total C N O 8 4 1 3	0	0
4	C	1	Total C N O 8 4 1 3	0	0
4	D	1	Total C N O 8 4 1 3	0	0
4	E	1	Total C N O 8 4 1 3	0	0

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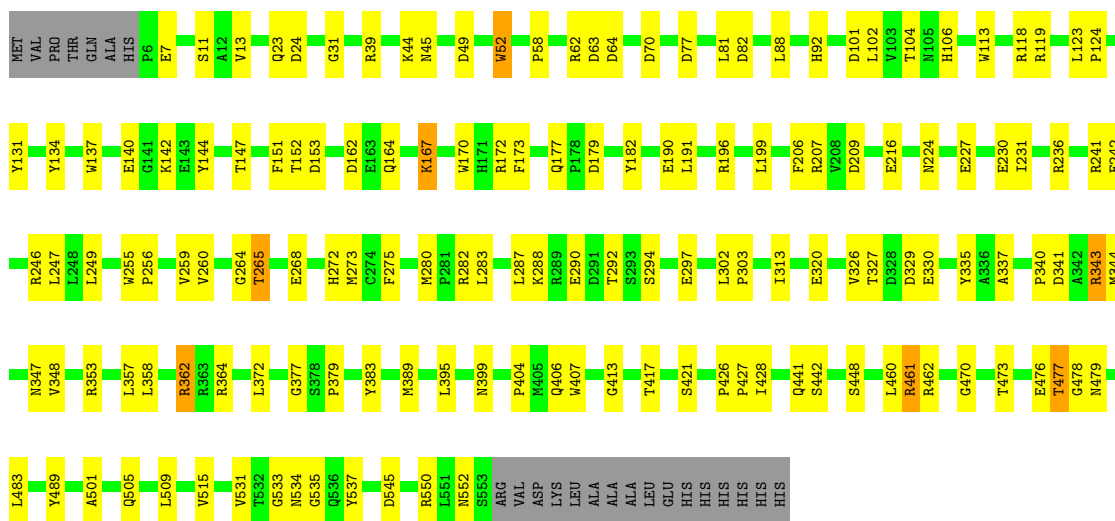
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	F	1	Total	C	N	O	0	0
			8	4	1	3		
4	G	1	Total	C	N	O	0	0
			8	4	1	3		
4	H	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	7	Total	O	0	0
			7	7		
5	B	10	Total	O	0	0
			10	10		
5	C	4	Total	O	0	0
			4	4		
5	D	6	Total	O	0	0
			6	6		
5	E	9	Total	O	0	0
			9	9		
5	F	5	Total	O	0	0
			5	5		
5	G	8	Total	O	0	0
			8	8		
5	H	8	Total	O	0	0
			8	8		

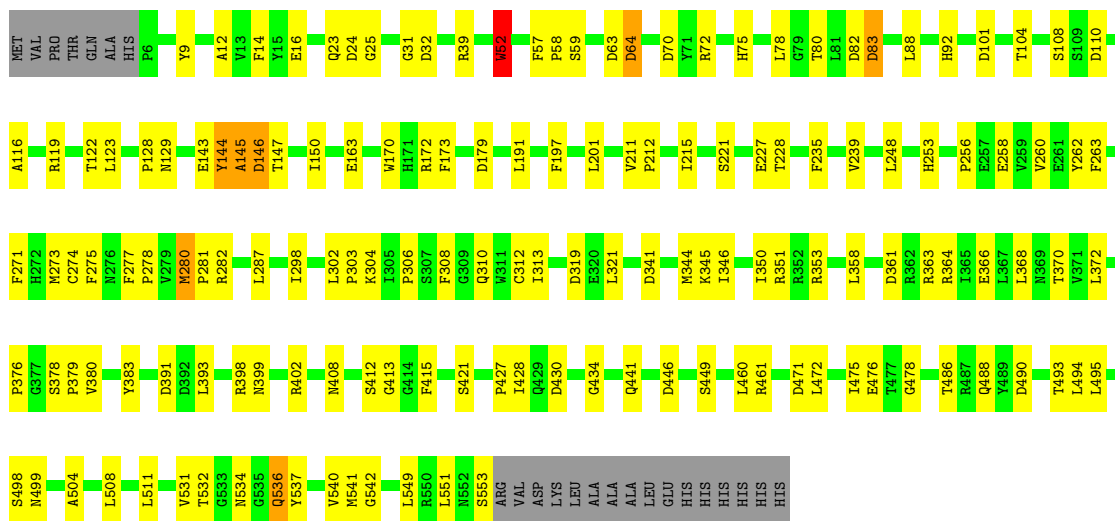
- Molecule 1: maltose alpha-D-glucosyltransferase

Chain C:  70% 25%



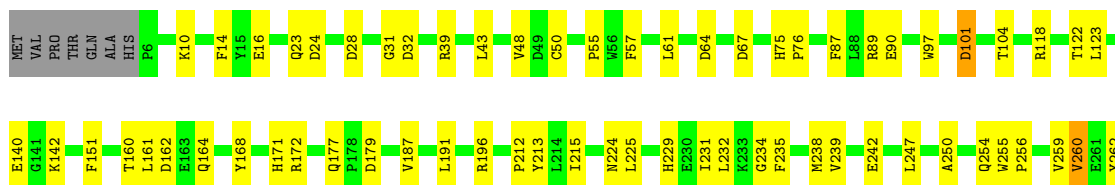
- Molecule 1: maltose alpha-D-glucosyltransferase

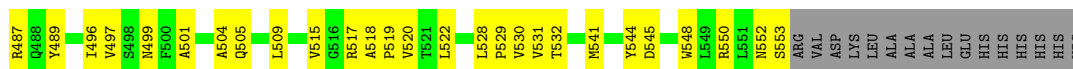
Chain D:  70% 25%



- Molecule 1: maltose alpha-D-glucosyltransferase

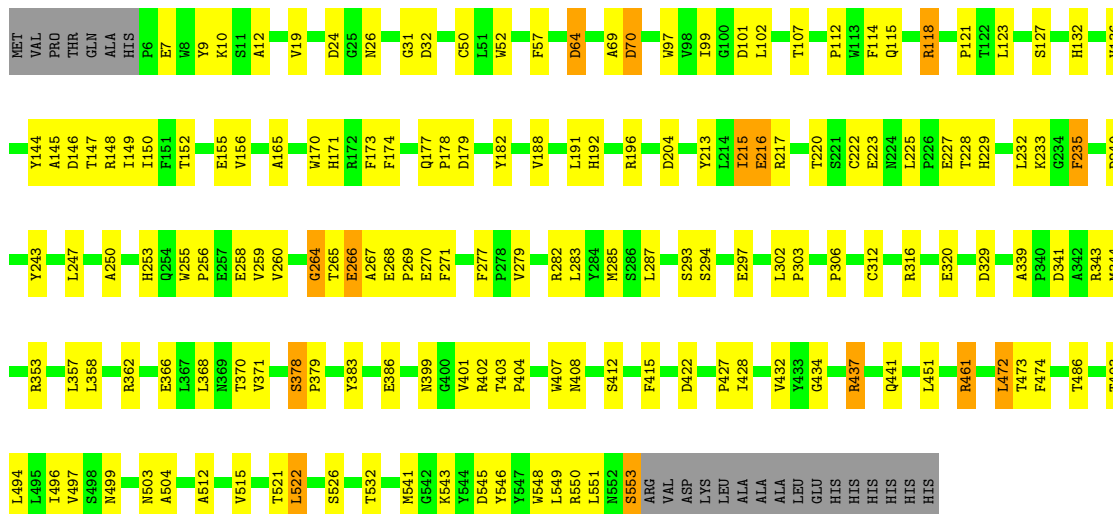
Chain E:  71% 24%





- Molecule 1: maltose alpha-D-glucosyltransferase

Chain H: 68% 26%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	96.21Å 196.26Å 131.21Å 90.00° 91.66° 90.00°	Depositor
Resolution (Å)	19.92 – 2.97 19.92 – 2.97	Depositor EDS
% Data completeness (in resolution range)	98.2 (19.92-2.97) 97.9 (19.92-2.97)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.19 (at 2.98Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.166 , 0.246 0.167 , 0.245	Depositor DCC
R_{free} test set	4948 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	57.9	Xtrriage
Anisotropy	0.040	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 42.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.056 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	35385	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.85% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: TRS, CA, MG

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	0.47	0/4540	0.68	1/6186 (0.0%)
1	B	0.50	0/4540	0.69	0/6186
1	C	0.46	0/4540	0.67	0/6186
1	D	0.46	0/4540	0.72	3/6186 (0.0%)
1	E	0.48	0/4540	0.68	0/6186
1	F	0.47	0/4540	0.68	1/6186 (0.0%)
1	G	0.47	0/4540	0.70	2/6186 (0.0%)
1	H	0.44	0/4540	0.68	1/6186 (0.0%)
All	All	0.47	0/36320	0.69	8/49488 (0.0%)

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	A	0	1
1	F	0	1
1	G	0	1
1	H	0	1
All	All	0	4

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	64	ASP	CB-CG-OD2	11.76	128.88	118.30
1	G	471	ASP	CB-CG-OD1	7.32	124.89	118.30
1	D	64	ASP	CB-CG-OD1	-6.57	112.39	118.30
1	H	522	LEU	CA-CB-CG	6.26	129.70	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	191	LEU	CB-CG-CD1	-6.05	100.72	111.00

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	475	ILE	Peptide
1	F	475	ILE	Peptide
1	G	206	PHE	Peptide
1	H	264	GLY	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	4406	0	4202	88	0
1	B	4406	0	4202	79	0
1	C	4406	0	4202	92	0
1	D	4406	0	4202	97	0
1	E	4406	0	4202	85	0
1	F	4406	0	4202	112	0
1	G	4406	0	4202	106	0
1	H	4406	0	4202	89	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	8	0	12	2	0
4	B	8	0	12	0	0
4	C	8	0	12	2	0
4	D	8	0	12	1	0
4	E	8	0	12	0	0
4	F	8	0	12	0	0
4	G	8	0	12	0	0
4	H	8	0	12	0	0
5	A	7	0	0	0	0
5	B	10	0	0	0	0
5	C	4	0	0	0	0
5	D	6	0	0	0	0
5	E	9	0	0	0	0
5	F	5	0	0	0	0
5	G	8	0	0	0	0
5	H	8	0	0	1	0
All	All	35385	0	33712	730	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 11.

The worst 5 of 730 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:G:160:THR:HG1	1:G:171:HIS:HE2	1.04	0.93
1:F:215:ILE:H	1:F:228:THR:HG22	1.36	0.90
1:E:160:THR:HG1	1:E:171:HIS:HE2	1.12	0.90
1:A:313:ILE:HG22	1:A:372:LEU:HD12	1.55	0.88
1:C:353:ARG:NH2	1:C:383:TYR:O	2.05	0.87

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	546/571 (96%)	515 (94%)	25 (5%)	6 (1%)	12	41
1	B	546/571 (96%)	503 (92%)	40 (7%)	3 (0%)	25	59
1	C	546/571 (96%)	504 (92%)	37 (7%)	5 (1%)	14	46
1	D	546/571 (96%)	496 (91%)	44 (8%)	6 (1%)	12	41
1	E	546/571 (96%)	513 (94%)	30 (6%)	3 (0%)	25	59
1	F	546/571 (96%)	498 (91%)	45 (8%)	3 (0%)	25	59
1	G	546/571 (96%)	500 (92%)	42 (8%)	4 (1%)	19	51
1	H	546/571 (96%)	500 (92%)	42 (8%)	4 (1%)	19	51
All	All	4368/4568 (96%)	4029 (92%)	305 (7%)	34 (1%)	16	48

5 of 34 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	397	ASP
1	A	477	THR
1	B	265	THR
1	D	145	ALA
1	D	146	ASP

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	465/484 (96%)	443 (95%)	22 (5%)	22	53
1	B	465/484 (96%)	443 (95%)	22 (5%)	22	53
1	C	465/484 (96%)	443 (95%)	22 (5%)	22	53
1	D	465/484 (96%)	450 (97%)	15 (3%)	34	65
1	E	465/484 (96%)	448 (96%)	17 (4%)	29	61
1	F	465/484 (96%)	434 (93%)	31 (7%)	13	41

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	465/484 (96%)	439 (94%)	26 (6%)	17	47
1	H	465/484 (96%)	431 (93%)	34 (7%)	11	37
All	All	3720/3872 (96%)	3531 (95%)	189 (5%)	20	50

5 of 189 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	280	MET
1	G	294	SER
1	F	359	ASP
1	G	101	ASP
1	G	403	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 63 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	457	GLN
1	H	132	HIS
1	E	253	HIS
1	G	536	GLN
1	H	347	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](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 24 ligands modelled in this entry, 16 are monoatomic - leaving 8 for Mogul analysis.

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	TRS	D	603	-	7,7,7	0.29	0	9,9,9	0.77	0
4	TRS	C	603	-	7,7,7	0.39	0	9,9,9	0.90	0
4	TRS	G	603	-	7,7,7	0.34	0	9,9,9	0.85	0
4	TRS	A	602	-	7,7,7	0.34	0	9,9,9	0.87	0
4	TRS	F	603	-	7,7,7	0.25	0	9,9,9	0.77	0
4	TRS	B	603	-	7,7,7	0.23	0	9,9,9	0.76	0
4	TRS	H	603	-	7,7,7	0.52	0	9,9,9	0.66	0
4	TRS	E	603	-	7,7,7	0.34	0	9,9,9	0.60	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	TRS	D	603	-	-	5/9/9/9	-
4	TRS	C	603	-	-	5/9/9/9	-
4	TRS	G	603	-	-	6/9/9/9	-
4	TRS	A	602	-	-	3/9/9/9	-
4	TRS	F	603	-	-	6/9/9/9	-
4	TRS	B	603	-	-	3/9/9/9	-
4	TRS	H	603	-	-	3/9/9/9	-
4	TRS	E	603	-	-	3/9/9/9	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 34 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	602	TRS	C2-C-C1-O1

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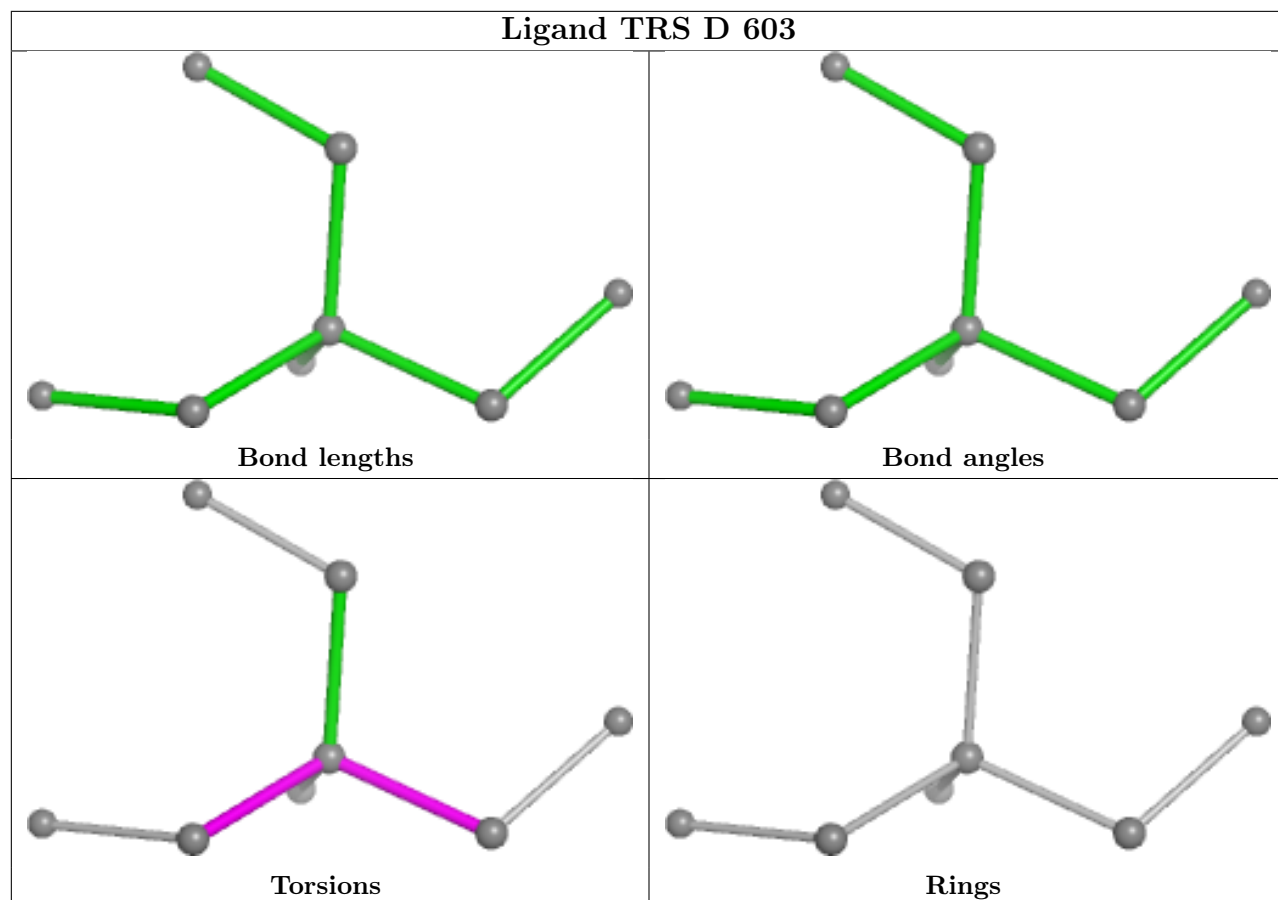
Mol	Chain	Res	Type	Atoms
4	A	602	TRS	C3-C-C1-O1
4	A	602	TRS	N-C-C1-O1
4	D	603	TRS	N-C-C2-O2
4	E	603	TRS	C2-C-C1-O1

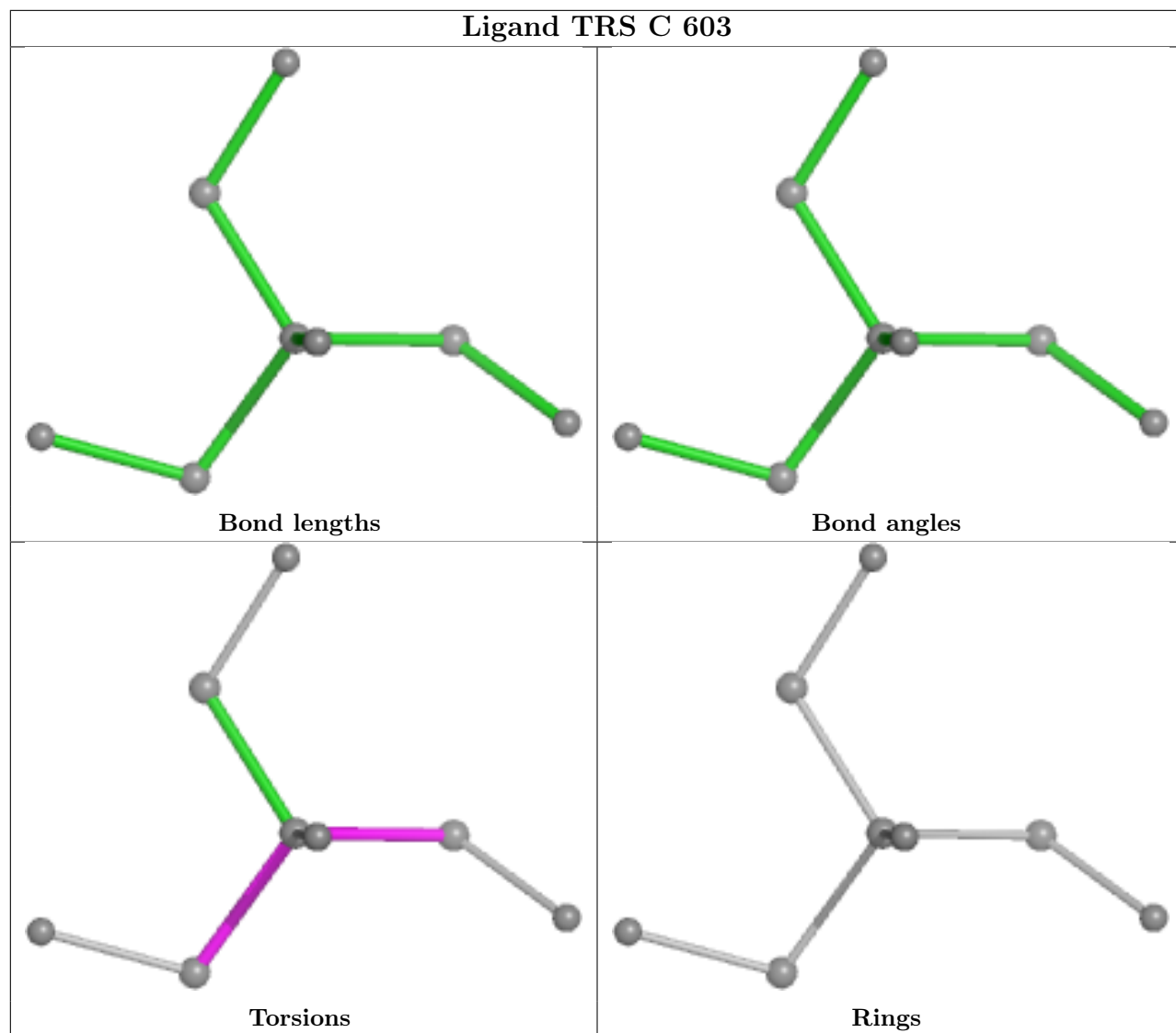
There are no ring outliers.

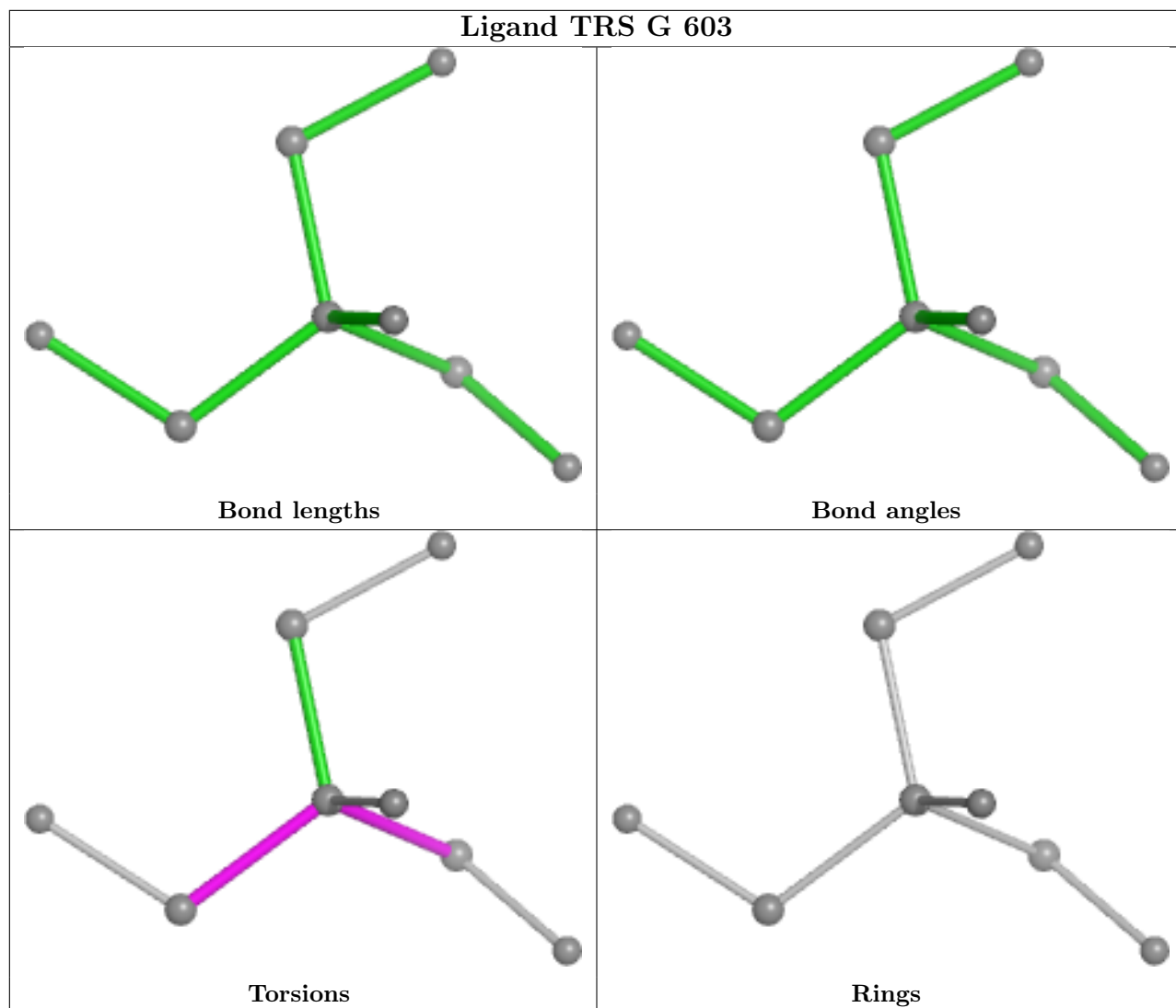
3 monomers are involved in 5 short contacts:

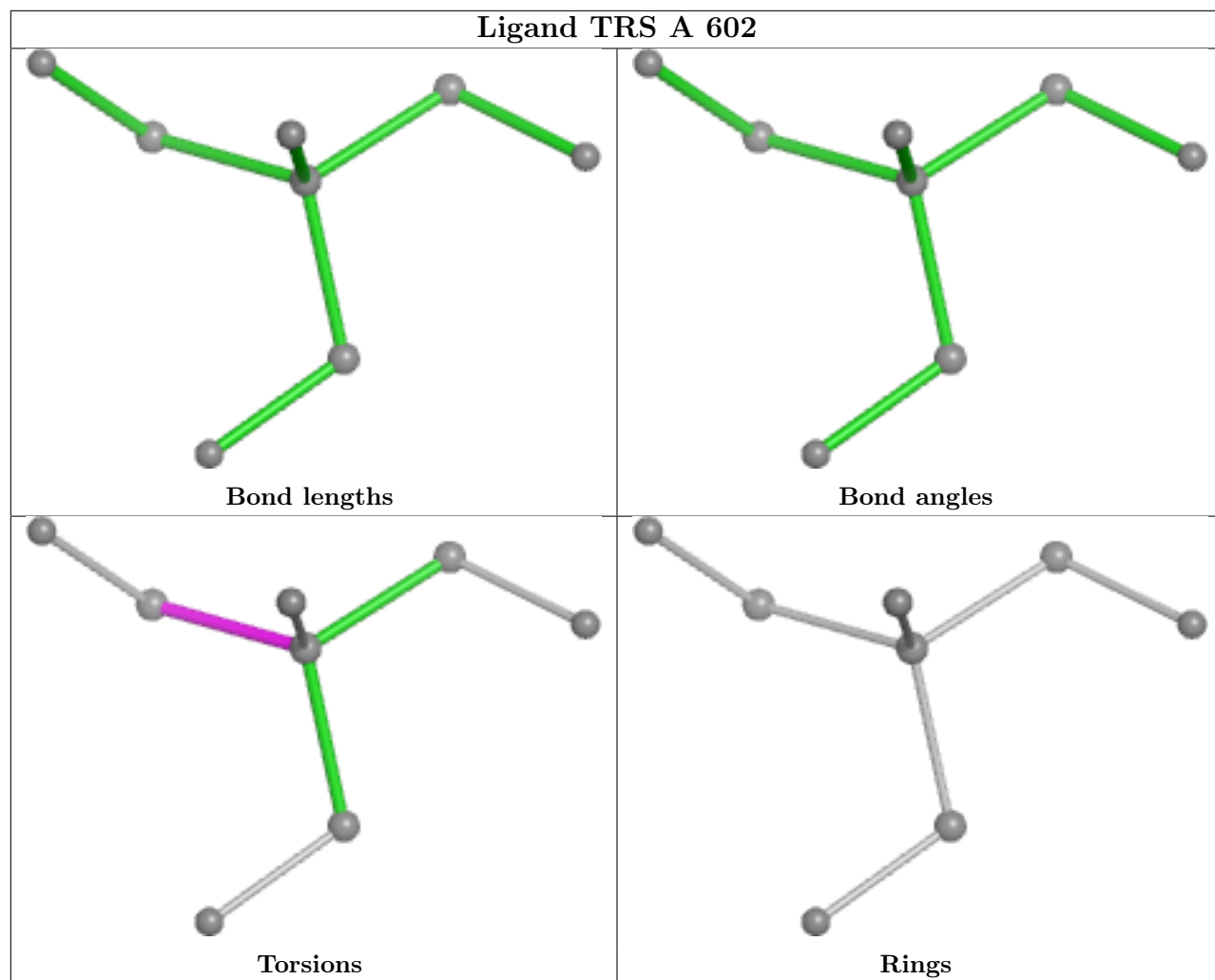
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	603	TRS	1	0
4	C	603	TRS	2	0
4	A	602	TRS	2	0

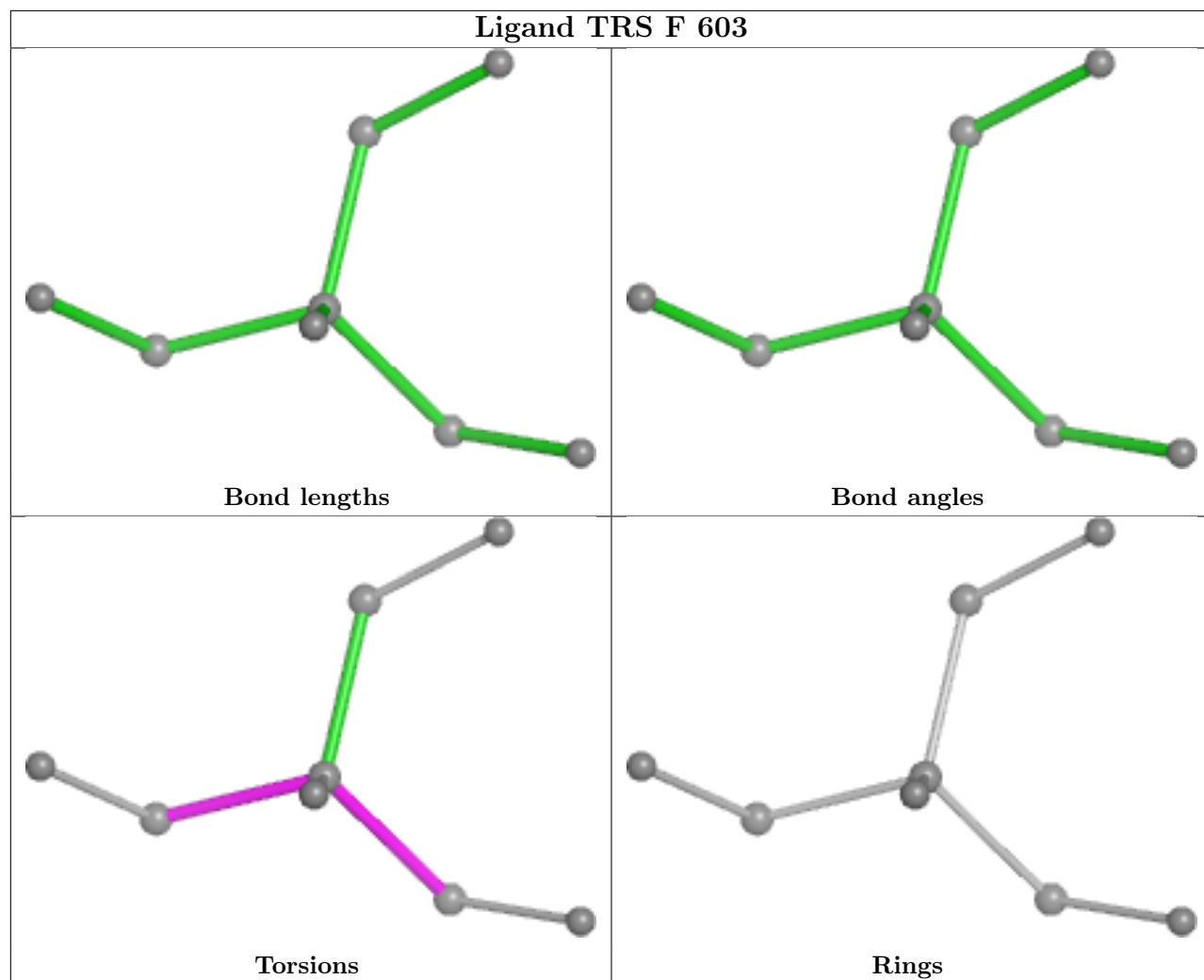
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

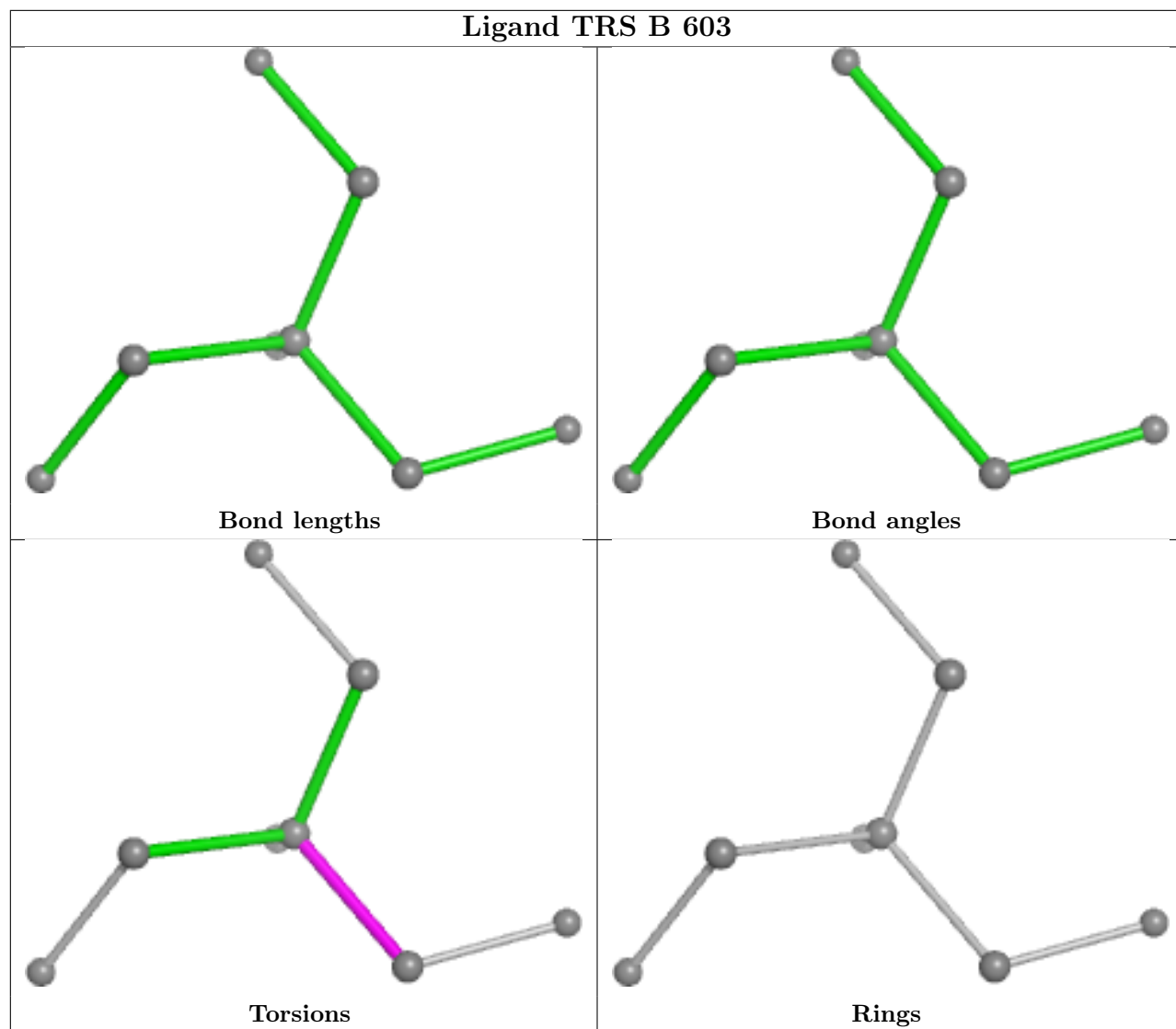


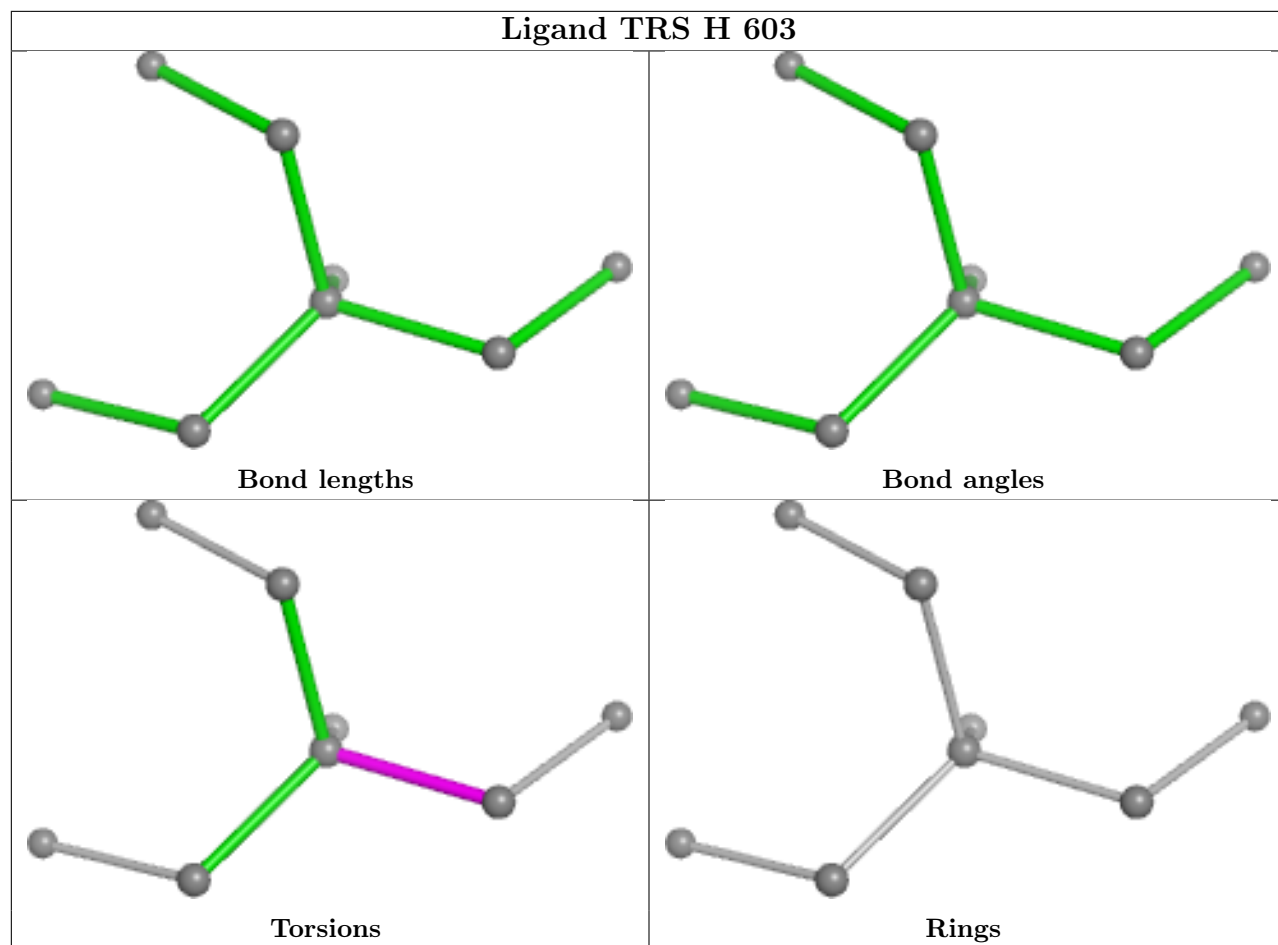


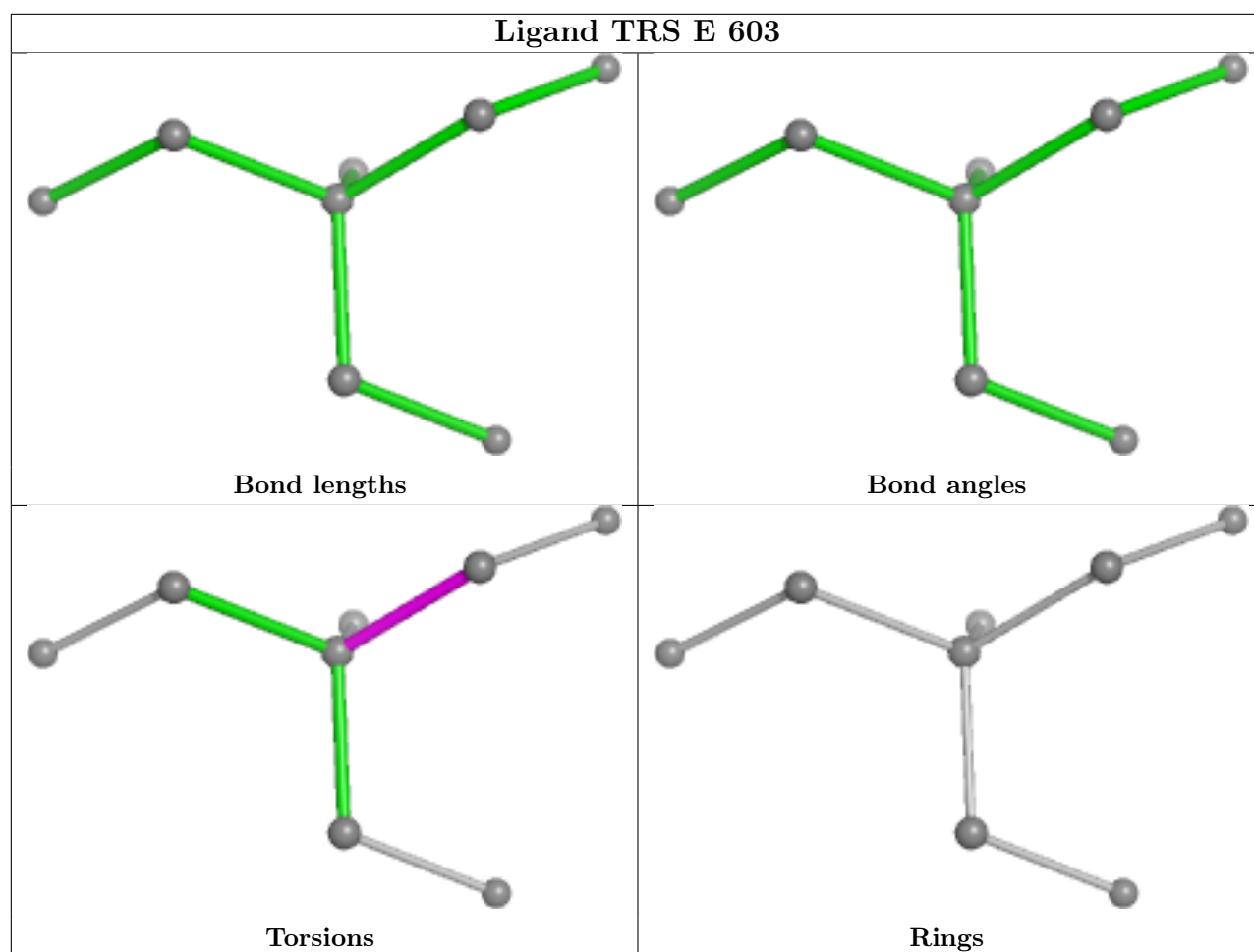












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 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, 95th 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 ²)	Q<0.9
1	A	548/571 (95%)	-0.89	0 100 100	32, 45, 62, 83	1 (0%)
1	B	548/571 (95%)	-0.91	0 100 100	28, 45, 62, 83	1 (0%)
1	C	548/571 (95%)	-0.84	0 100 100	33, 50, 66, 86	0
1	D	548/571 (95%)	-0.82	0 100 100	34, 51, 67, 88	0
1	E	548/571 (95%)	-0.90	0 100 100	26, 45, 58, 90	2 (0%)
1	F	548/571 (95%)	-0.81	0 100 100	31, 52, 70, 90	1 (0%)
1	G	548/571 (95%)	-0.83	1 (0%) 92 86	34, 49, 70, 101	1 (0%)
1	H	548/571 (95%)	-0.73	0 100 100	33, 56, 79, 94	1 (0%)
All	All	4384/4568 (95%)	-0.84	1 (0%) 100 100	26, 48, 70, 101	7 (0%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	6	PRO	2.5

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](#)

There are no monosaccharides in this entry.

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,

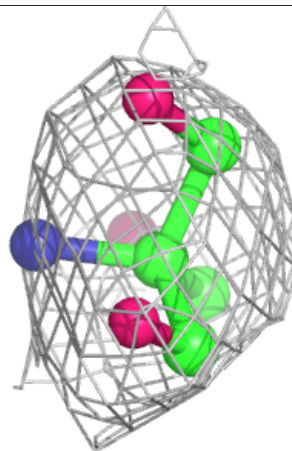
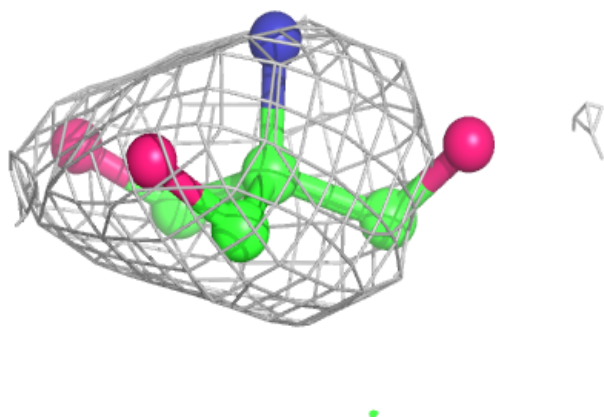
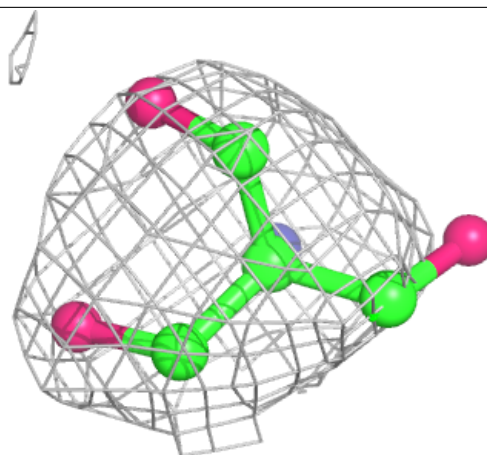
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	TRS	H	603	8/8	0.90	0.09	64,69,83,90	0
4	TRS	F	603	8/8	0.92	0.09	55,62,66,71	0
4	TRS	D	603	8/8	0.92	0.09	50,57,61,62	0
4	TRS	G	603	8/8	0.93	0.09	61,62,68,70	0
4	TRS	E	603	8/8	0.94	0.07	40,44,49,55	0
3	MG	G	602	1/1	0.94	0.07	46,46,46,46	0
4	TRS	B	603	8/8	0.95	0.06	42,51,57,64	0
4	TRS	A	602	8/8	0.96	0.05	48,50,51,61	0
3	MG	A	601	1/1	0.96	0.14	42,42,42,42	0
4	TRS	C	603	8/8	0.96	0.07	47,57,61,62	0
2	CA	H	601	1/1	0.96	0.05	70,70,70,70	0
2	CA	B	601	1/1	0.97	0.05	50,50,50,50	0
2	CA	F	601	1/1	0.97	0.04	64,64,64,64	0
3	MG	E	602	1/1	0.97	0.12	67,67,67,67	0
3	MG	F	602	1/1	0.98	0.04	40,40,40,40	0
2	CA	A	600	1/1	0.98	0.04	51,51,51,51	0
3	MG	C	602	1/1	0.98	0.07	34,34,34,34	0
3	MG	D	602	1/1	0.98	0.08	47,47,47,47	0
2	CA	D	601	1/1	0.98	0.06	60,60,60,60	0
2	CA	C	601	1/1	0.99	0.06	51,51,51,51	0
2	CA	G	601	1/1	0.99	0.06	57,57,57,57	0
2	CA	E	601	1/1	0.99	0.04	49,49,49,49	0
3	MG	H	602	1/1	0.99	0.03	43,43,43,43	0
3	MG	B	602	1/1	1.00	0.03	43,43,43,43	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

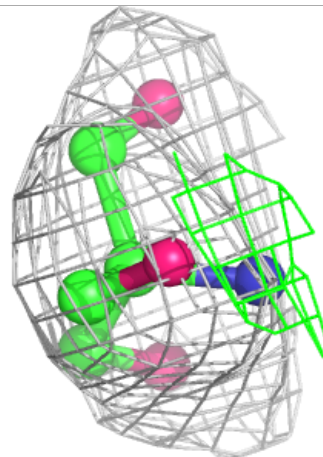
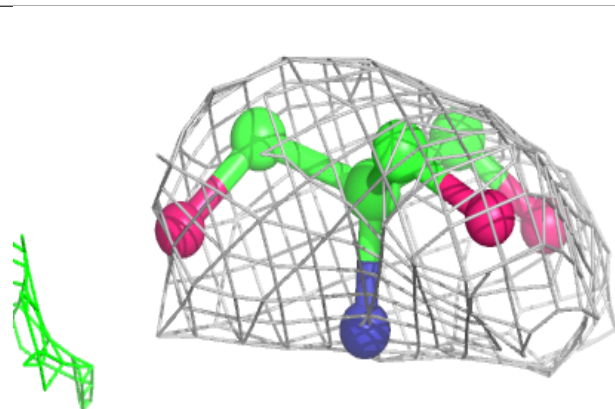
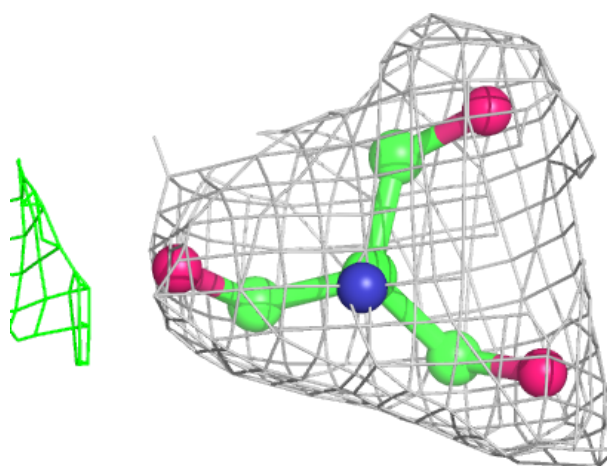
Electron density around TRS H 603:

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



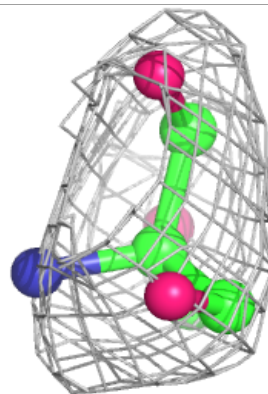
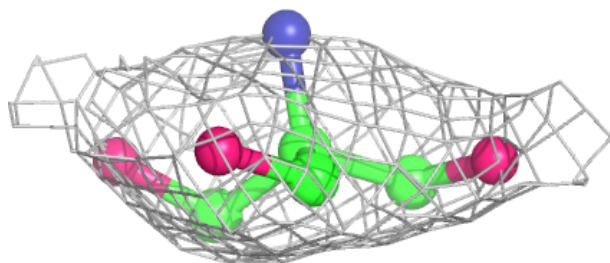
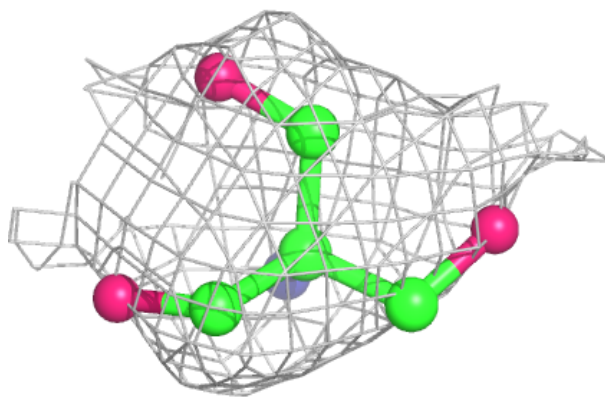
Electron density around TRS F 603:

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



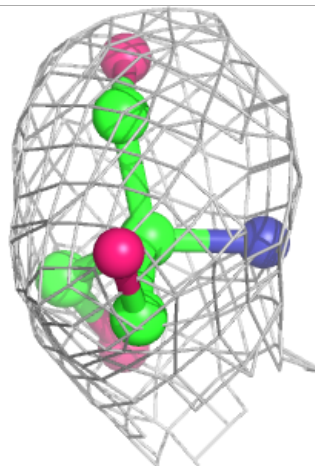
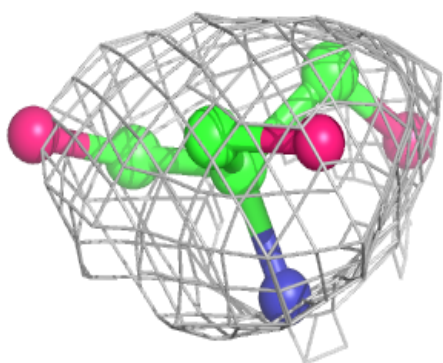
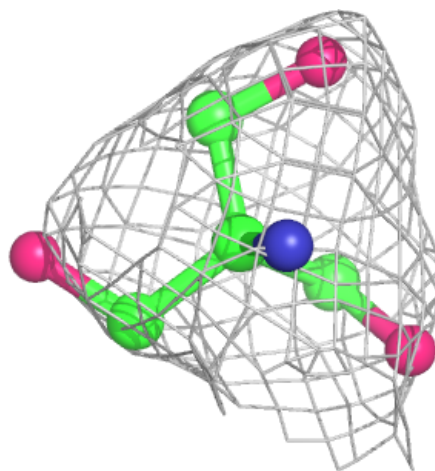
Electron density around TRS D 603:

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



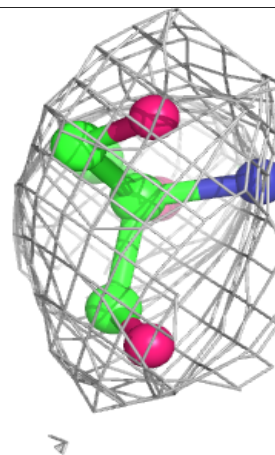
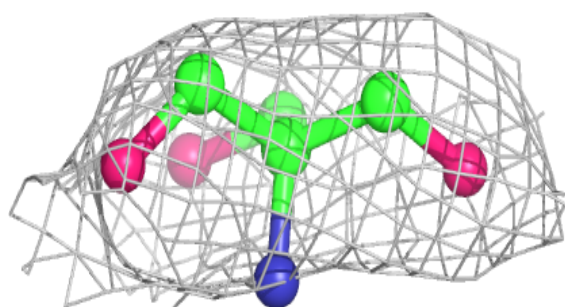
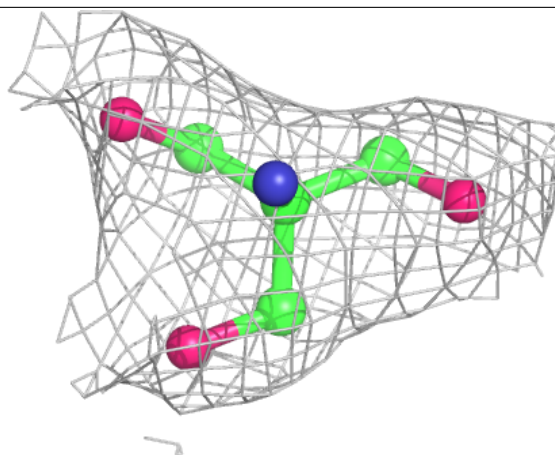
Electron density around TRS G 603:

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



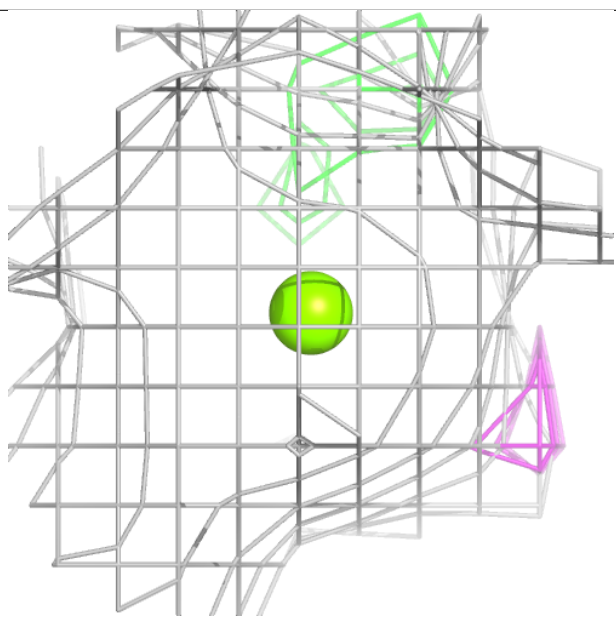
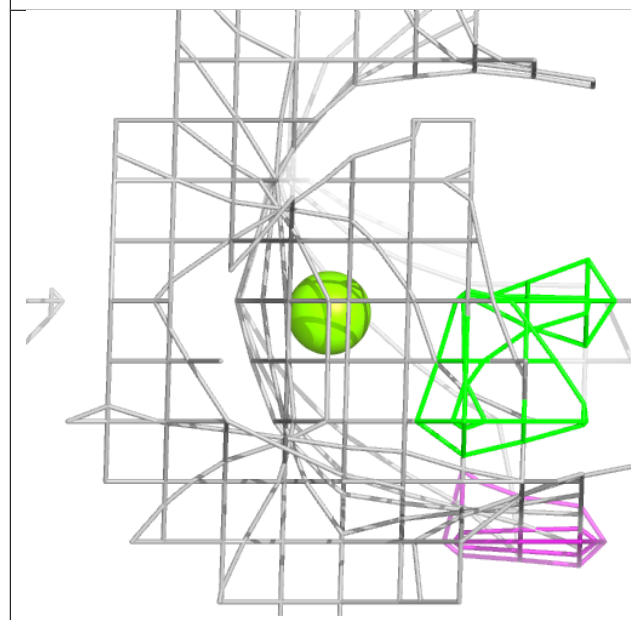
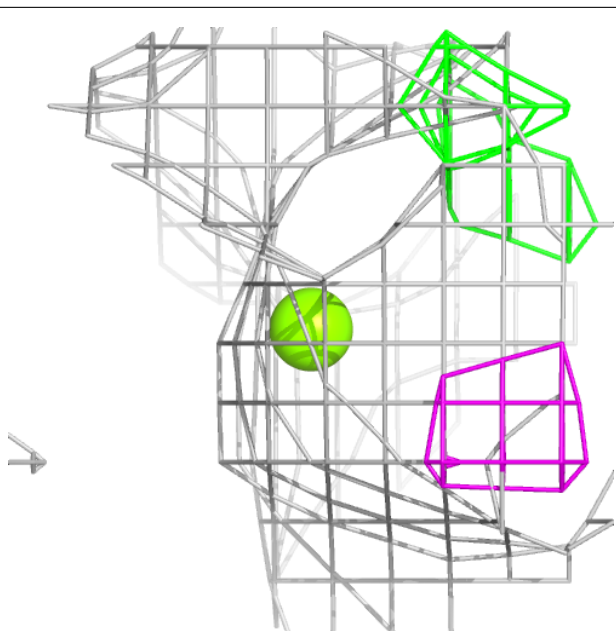
Electron density around TRS E 603:

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



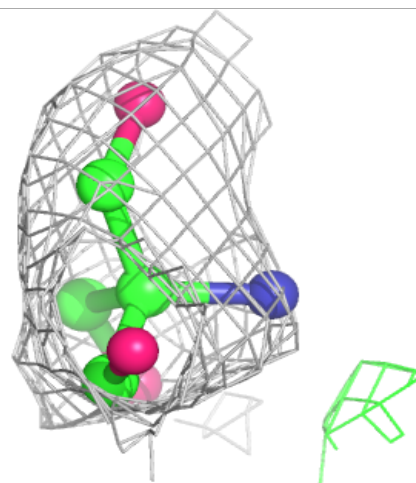
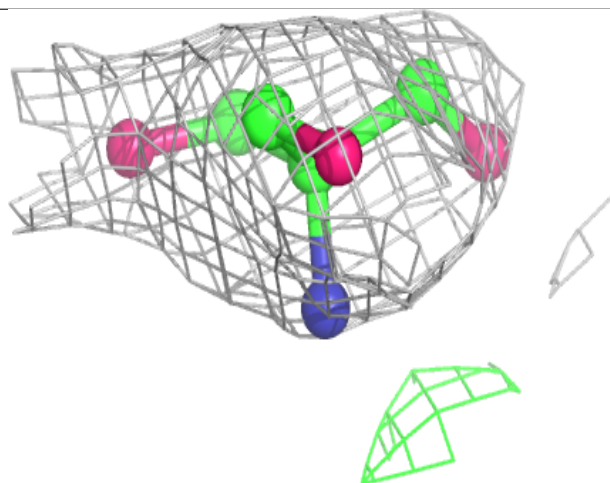
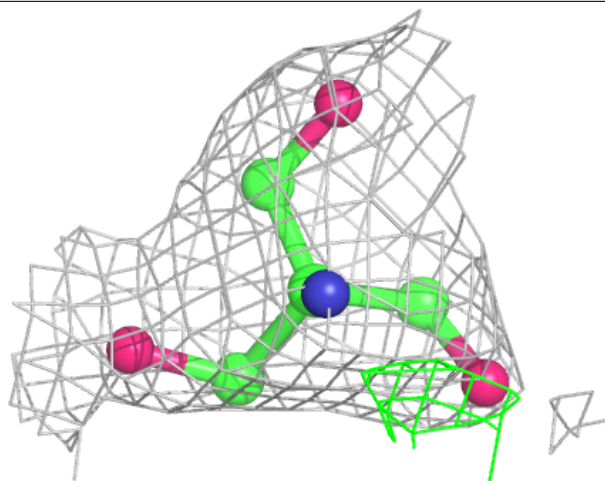
Electron density around MG G 602:

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



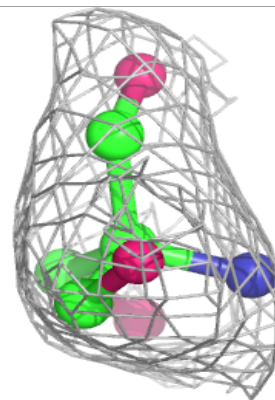
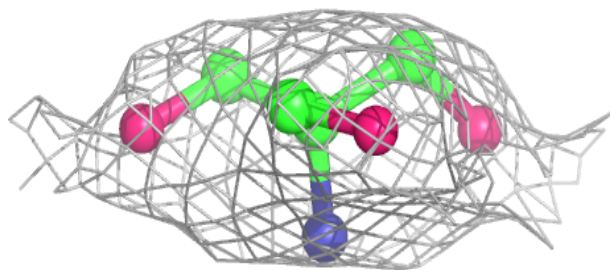
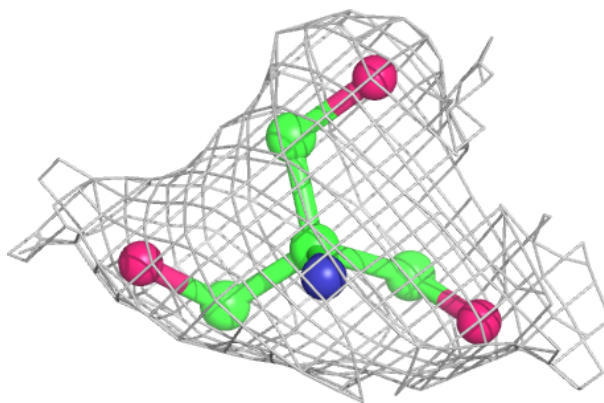
Electron density around TRS B 603:

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



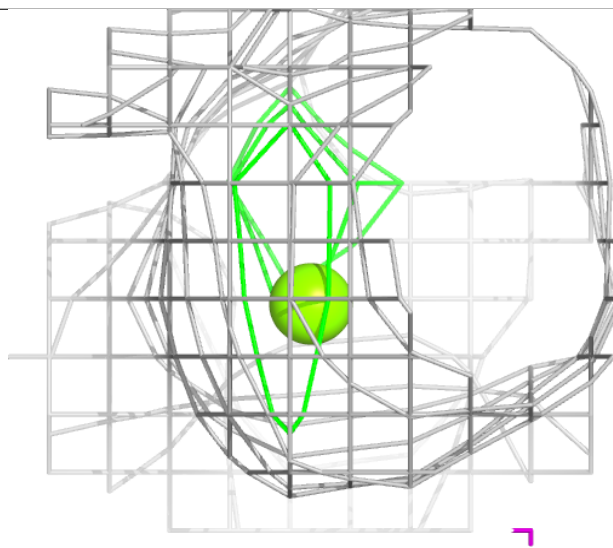
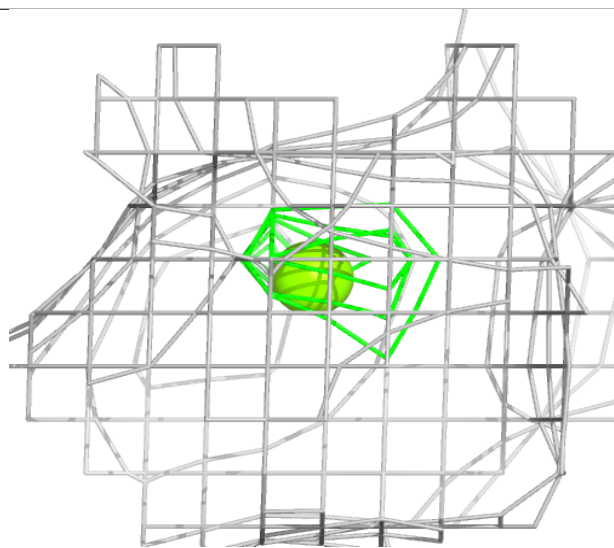
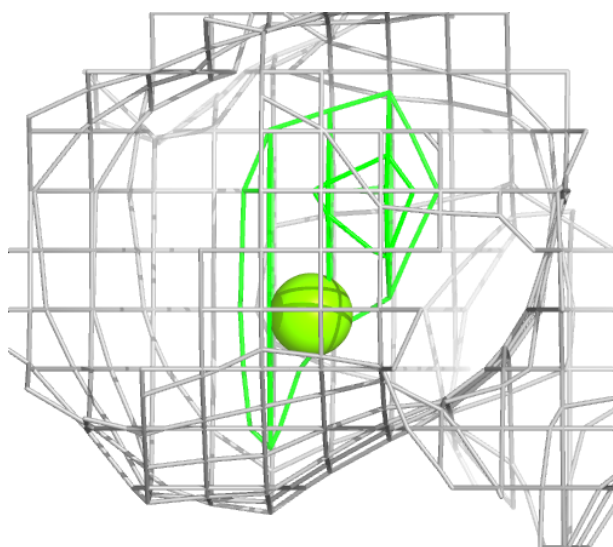
Electron density around TRS A 602:

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



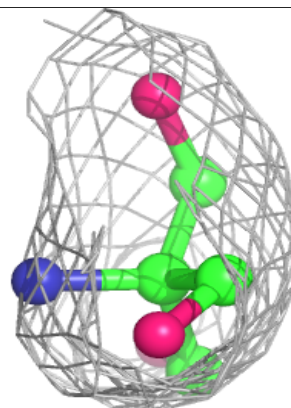
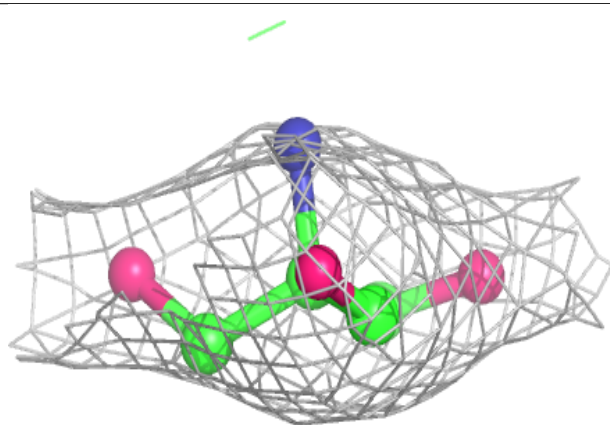
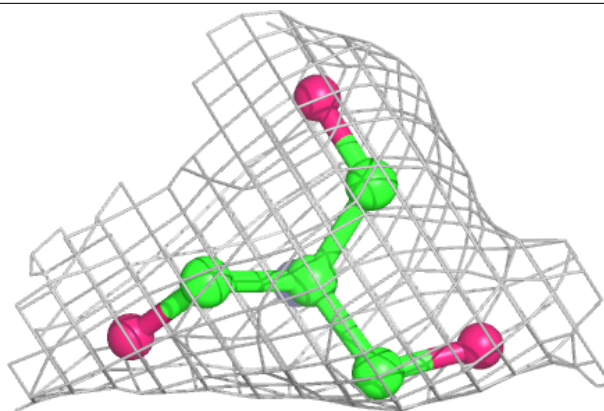
Electron density around MG A 601:

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



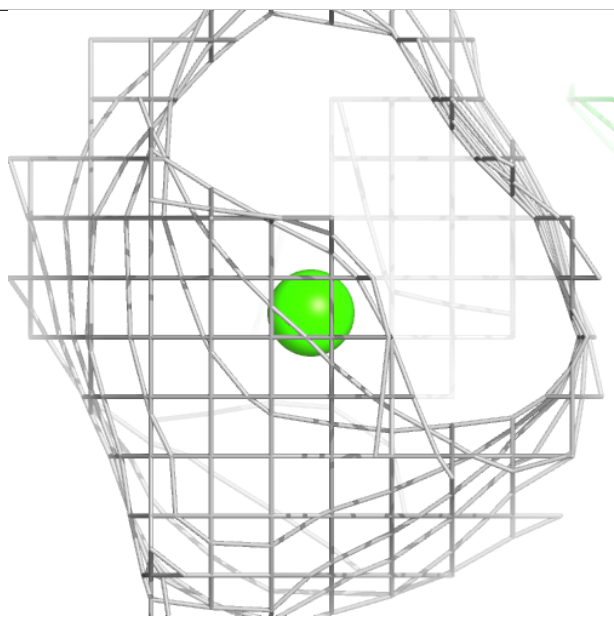
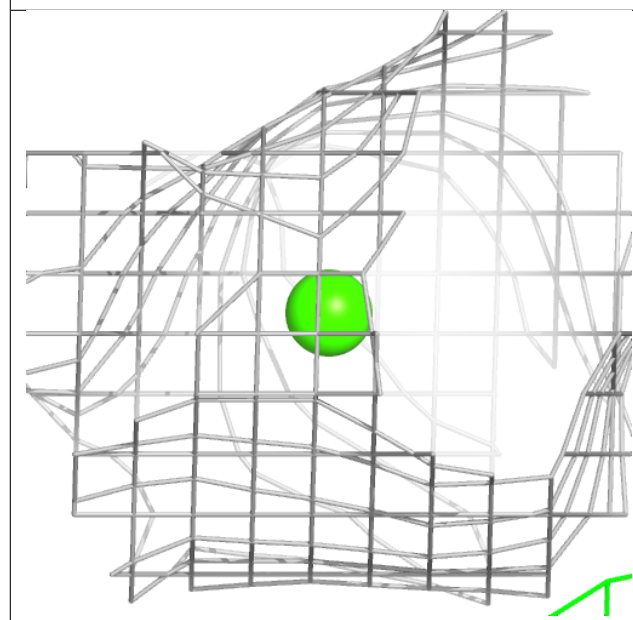
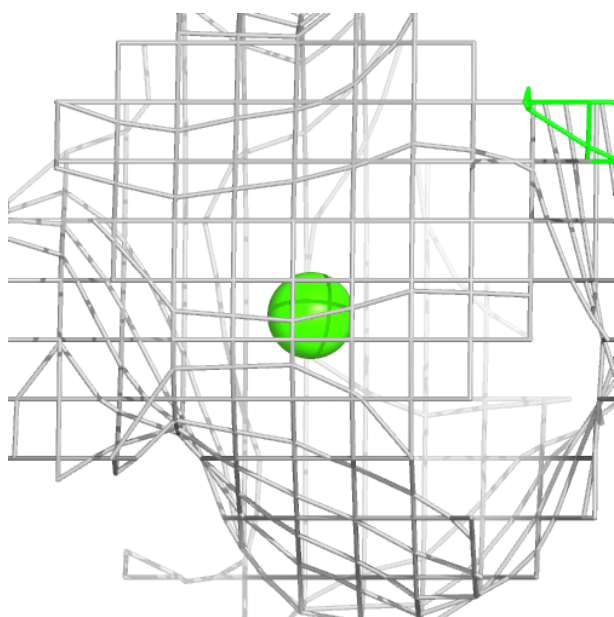
Electron density around TRS C 603:

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



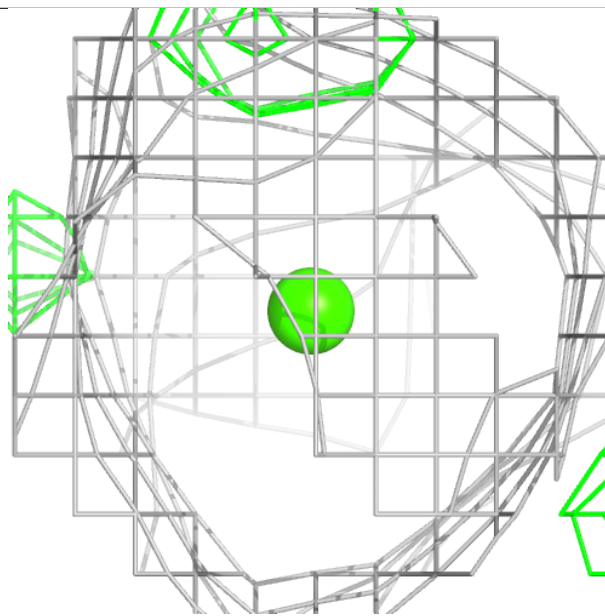
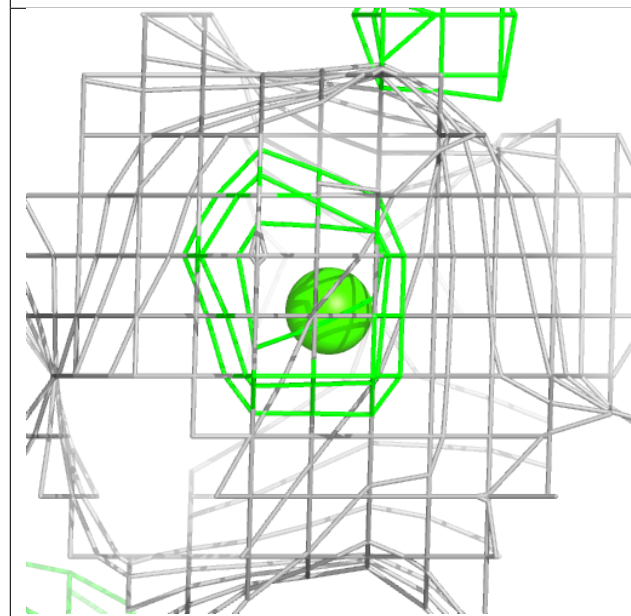
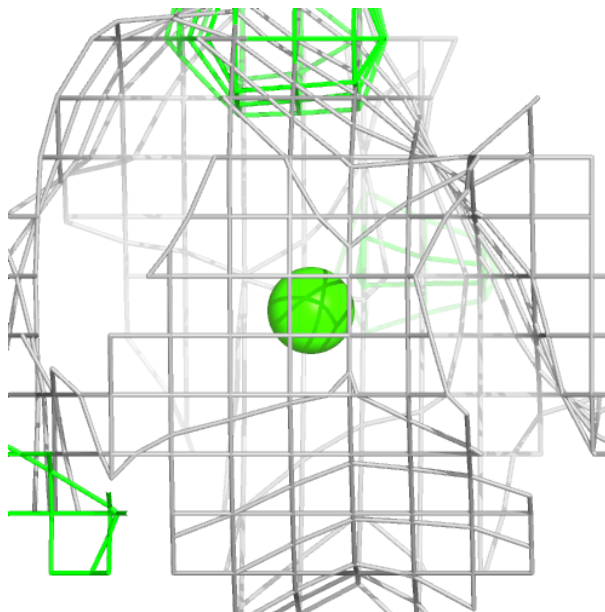
Electron density around CA H 601:

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



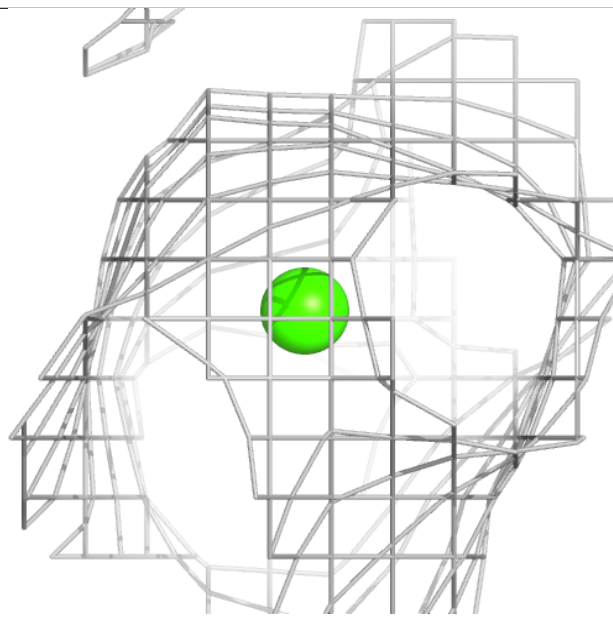
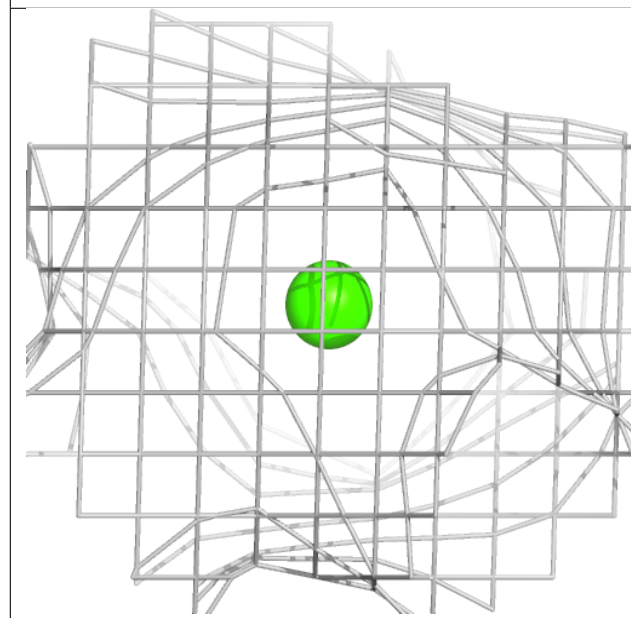
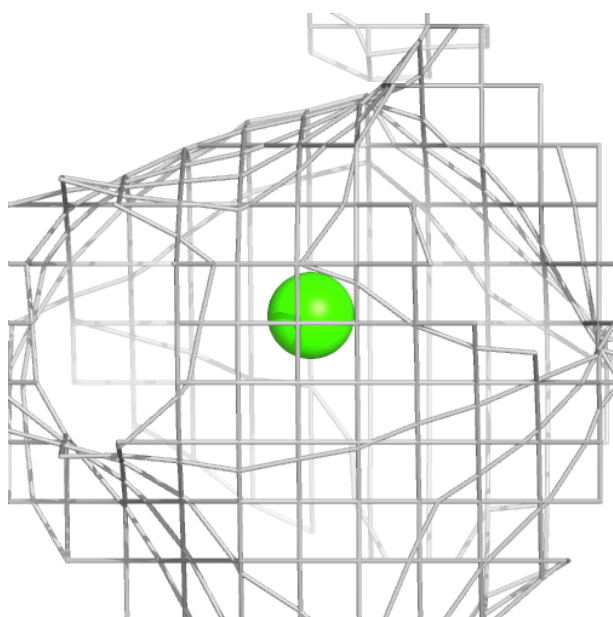
Electron density around CA B 601:

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



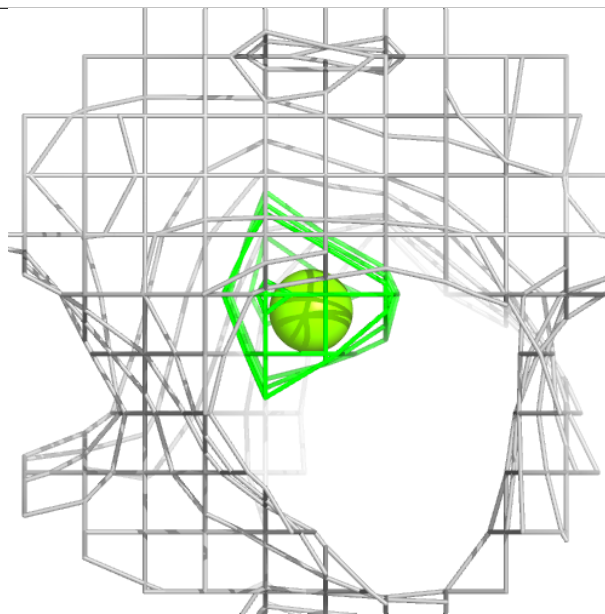
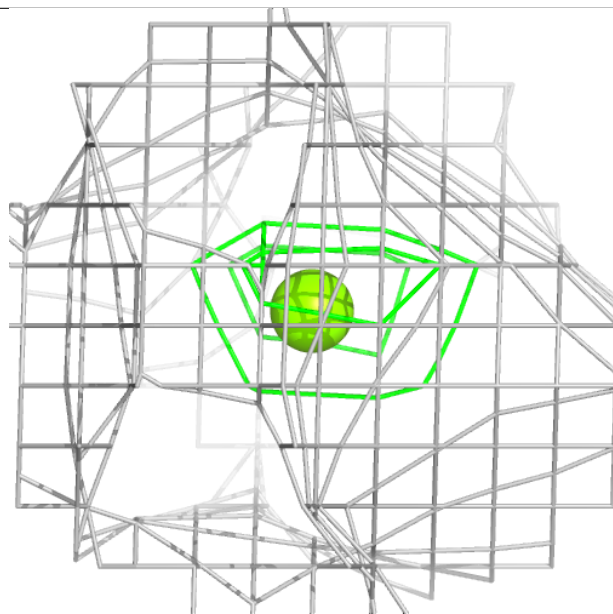
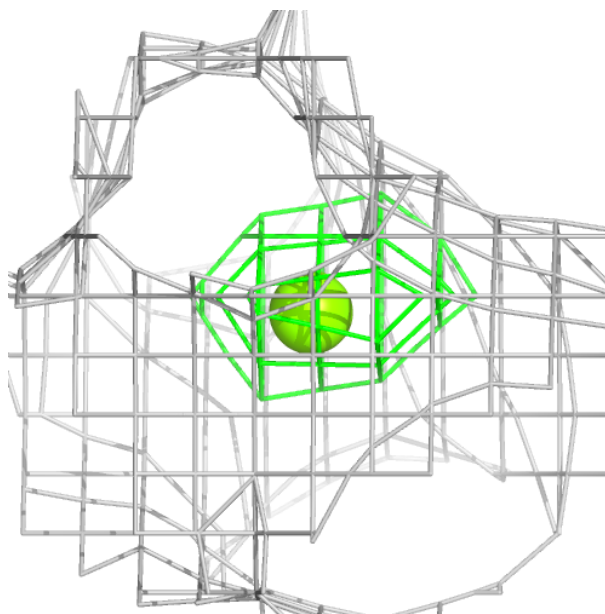
Electron density around CA F 601:

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



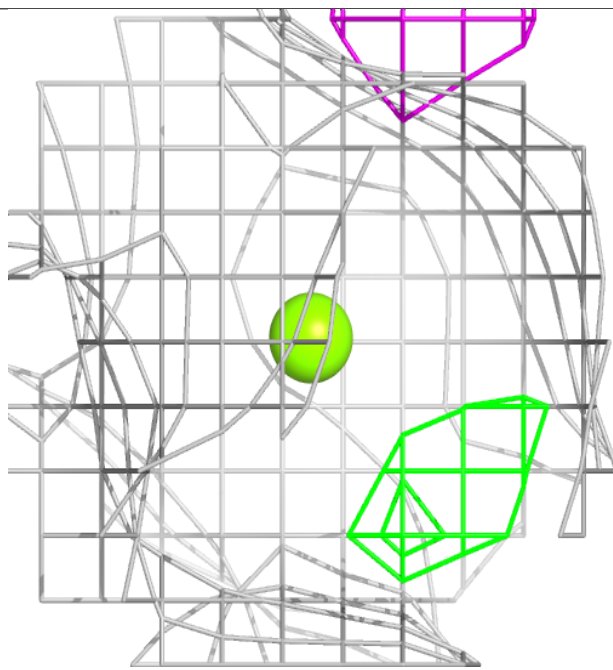
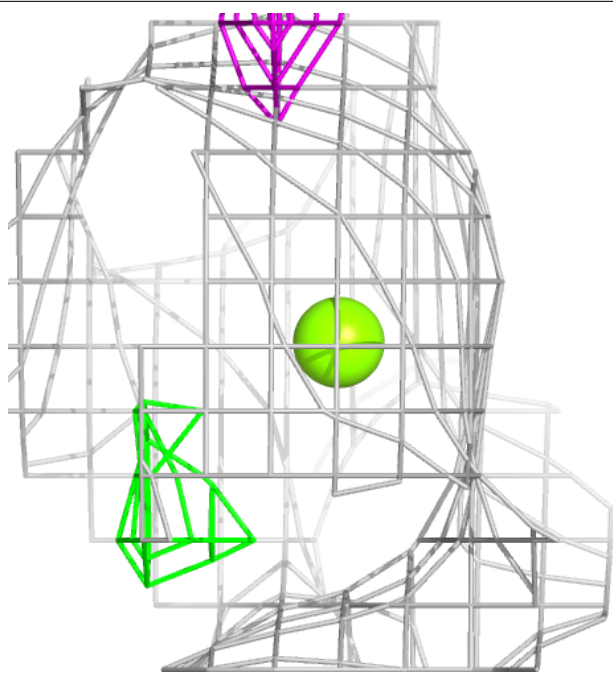
Electron density around MG E 602:

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



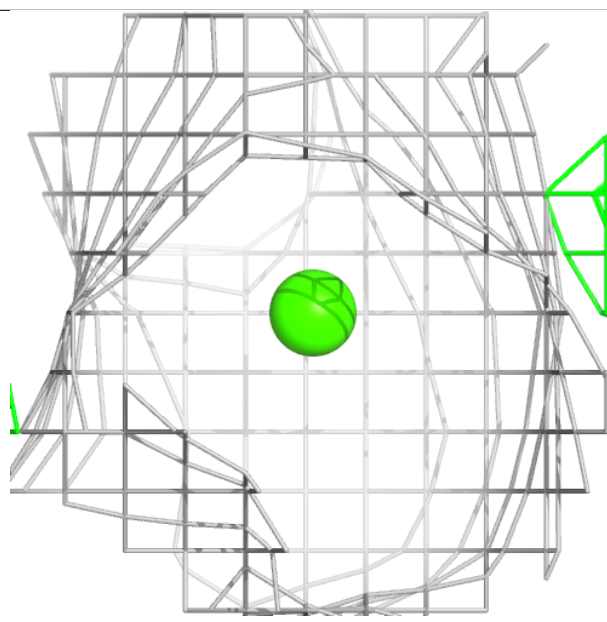
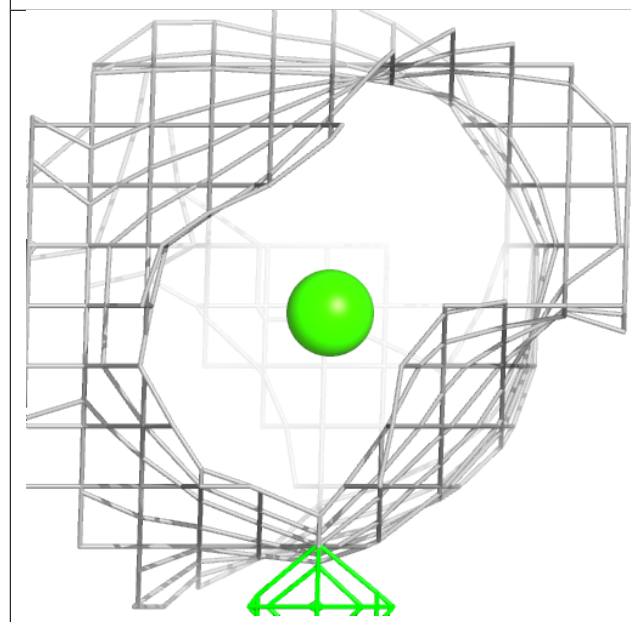
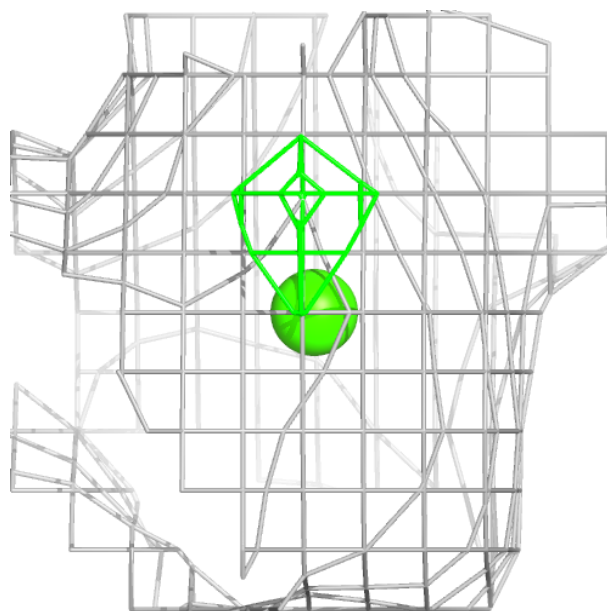
Electron density around MG F 602:

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



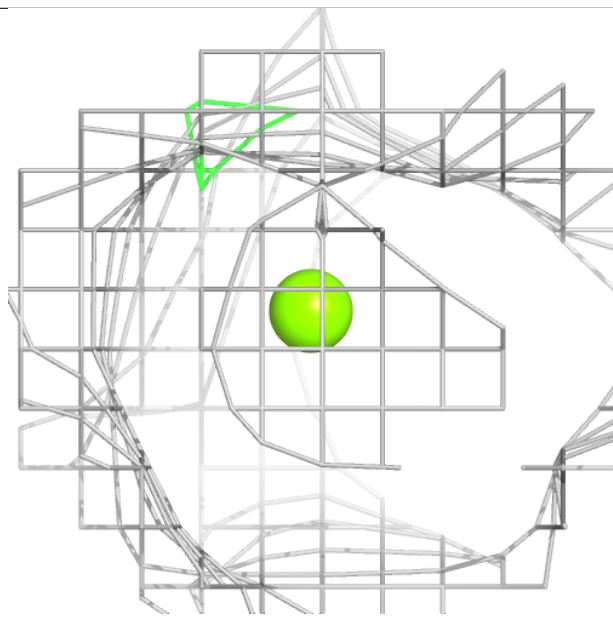
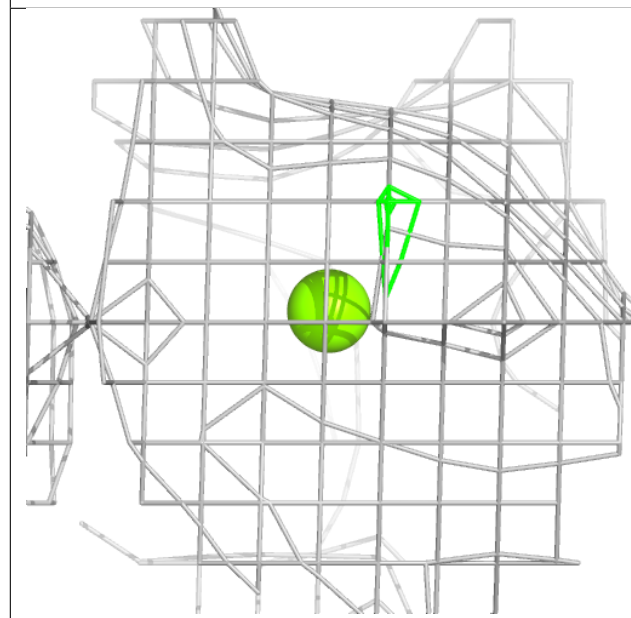
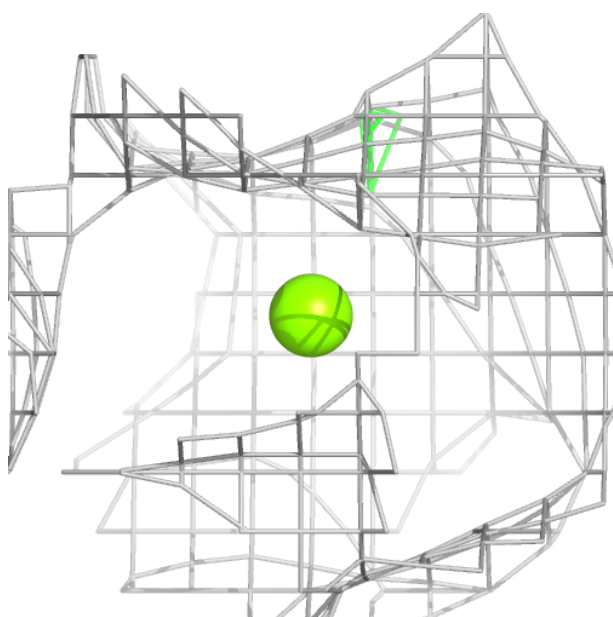
Electron density around CA A 600:

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



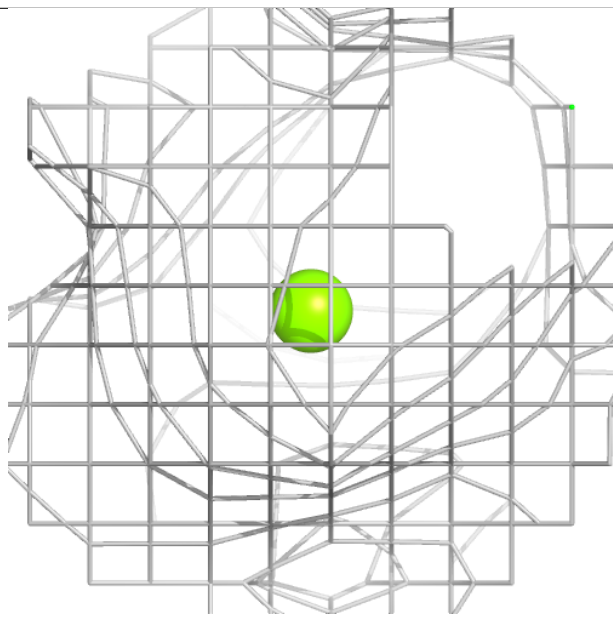
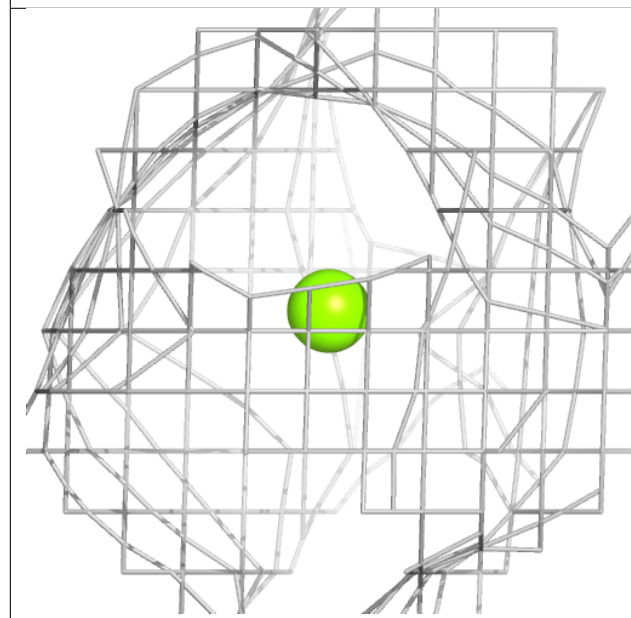
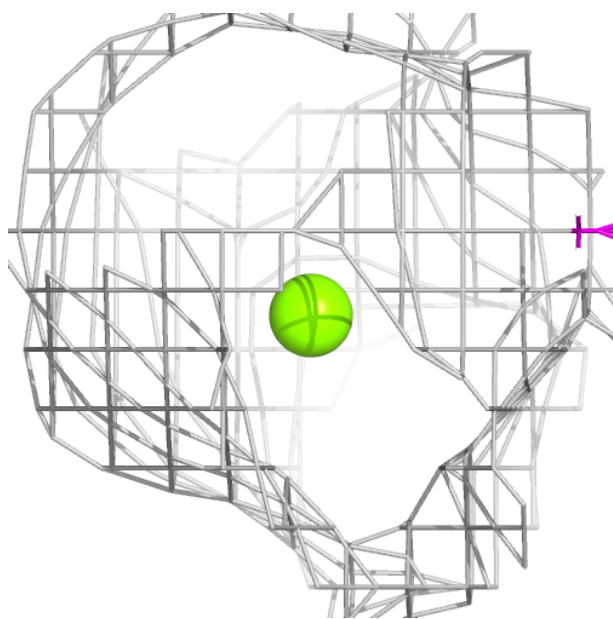
Electron density around MG C 602:

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



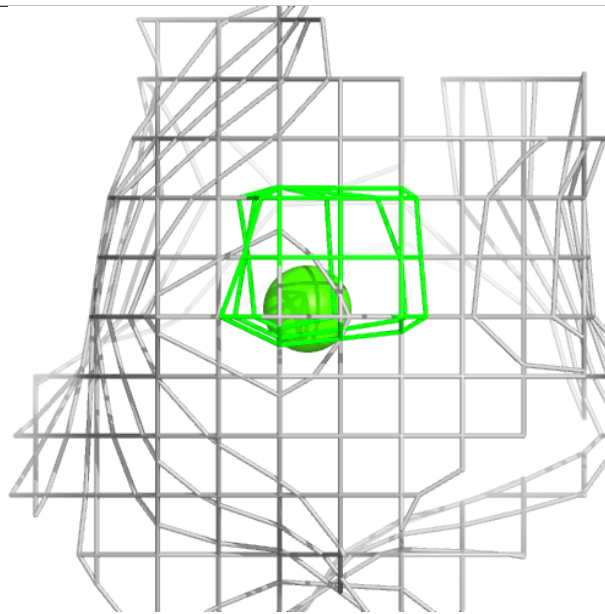
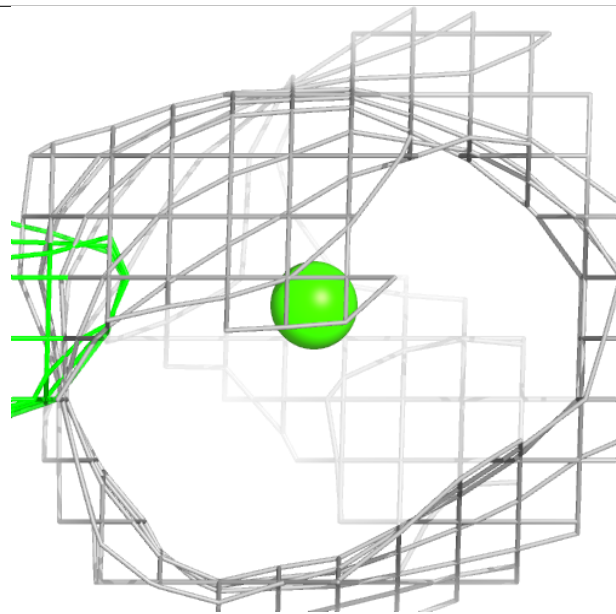
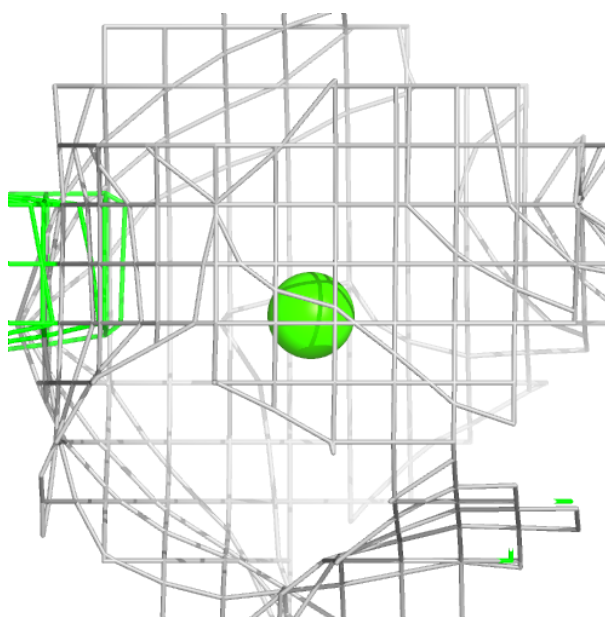
Electron density around MG D 602:

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



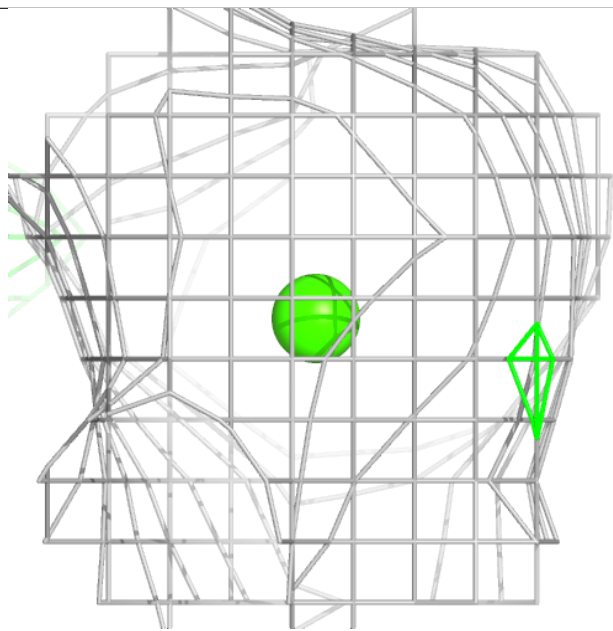
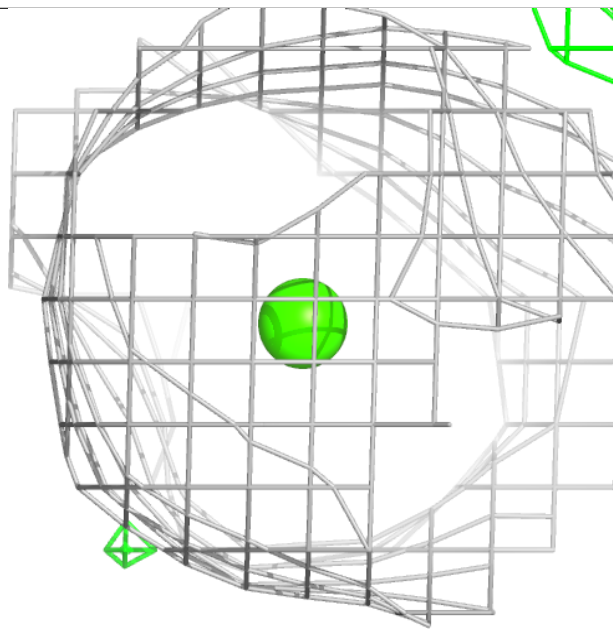
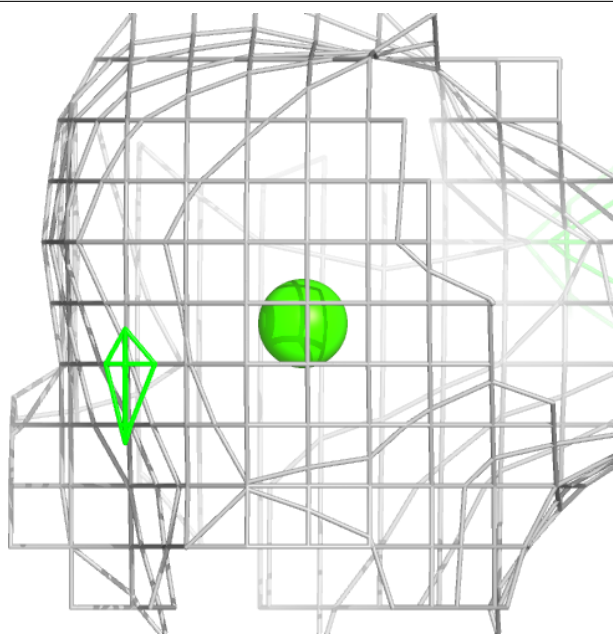
Electron density around CA D 601:

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



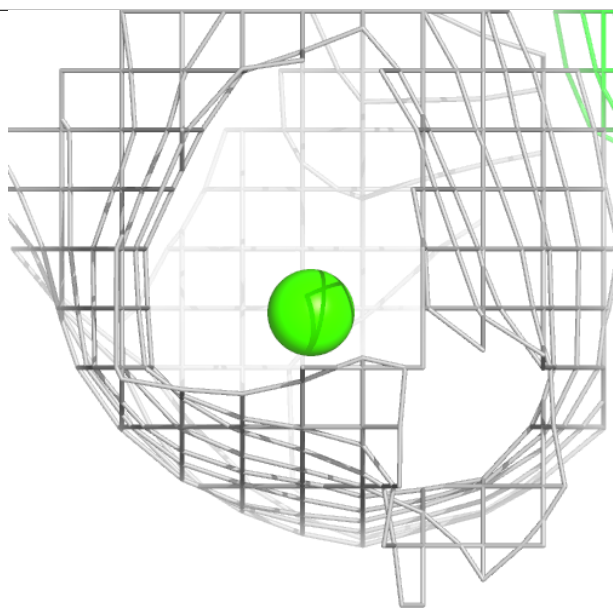
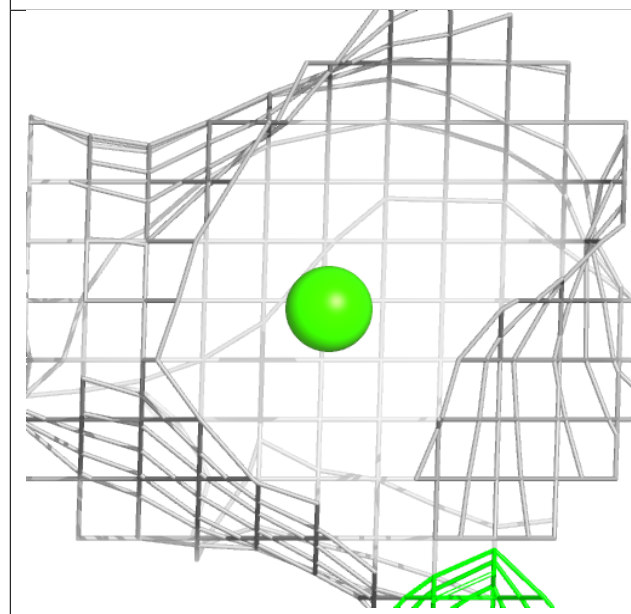
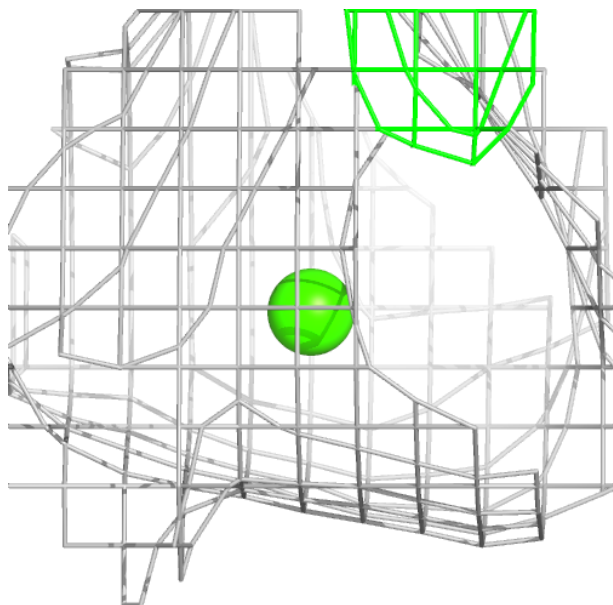
Electron density around CA C 601:

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



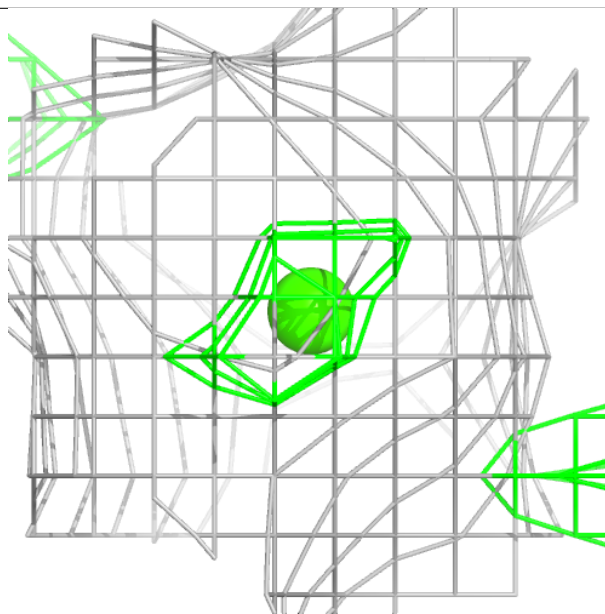
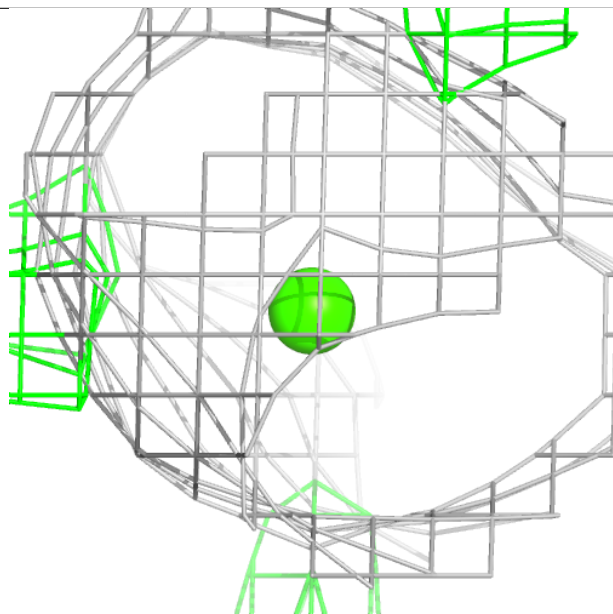
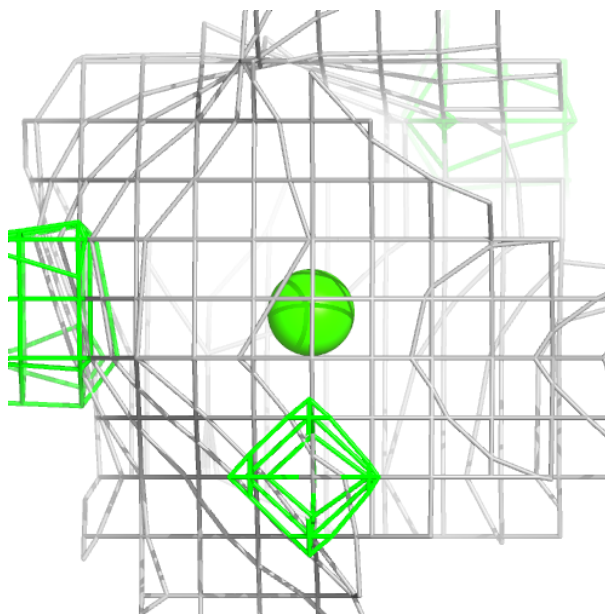
Electron density around CA G 601:

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



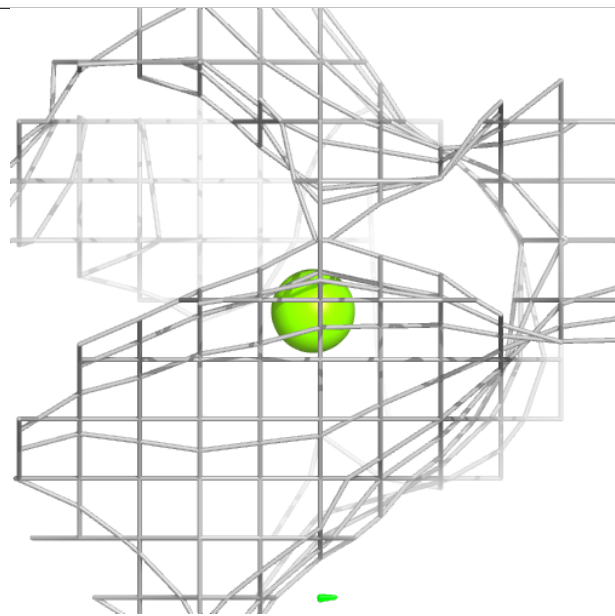
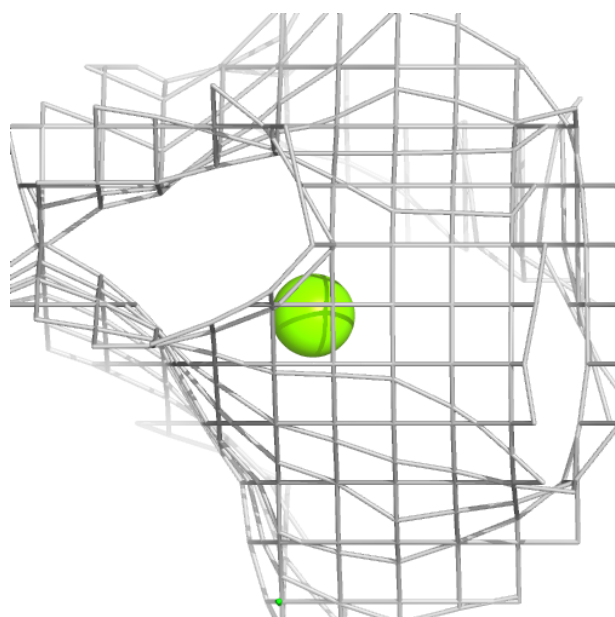
Electron density around CA E 601:

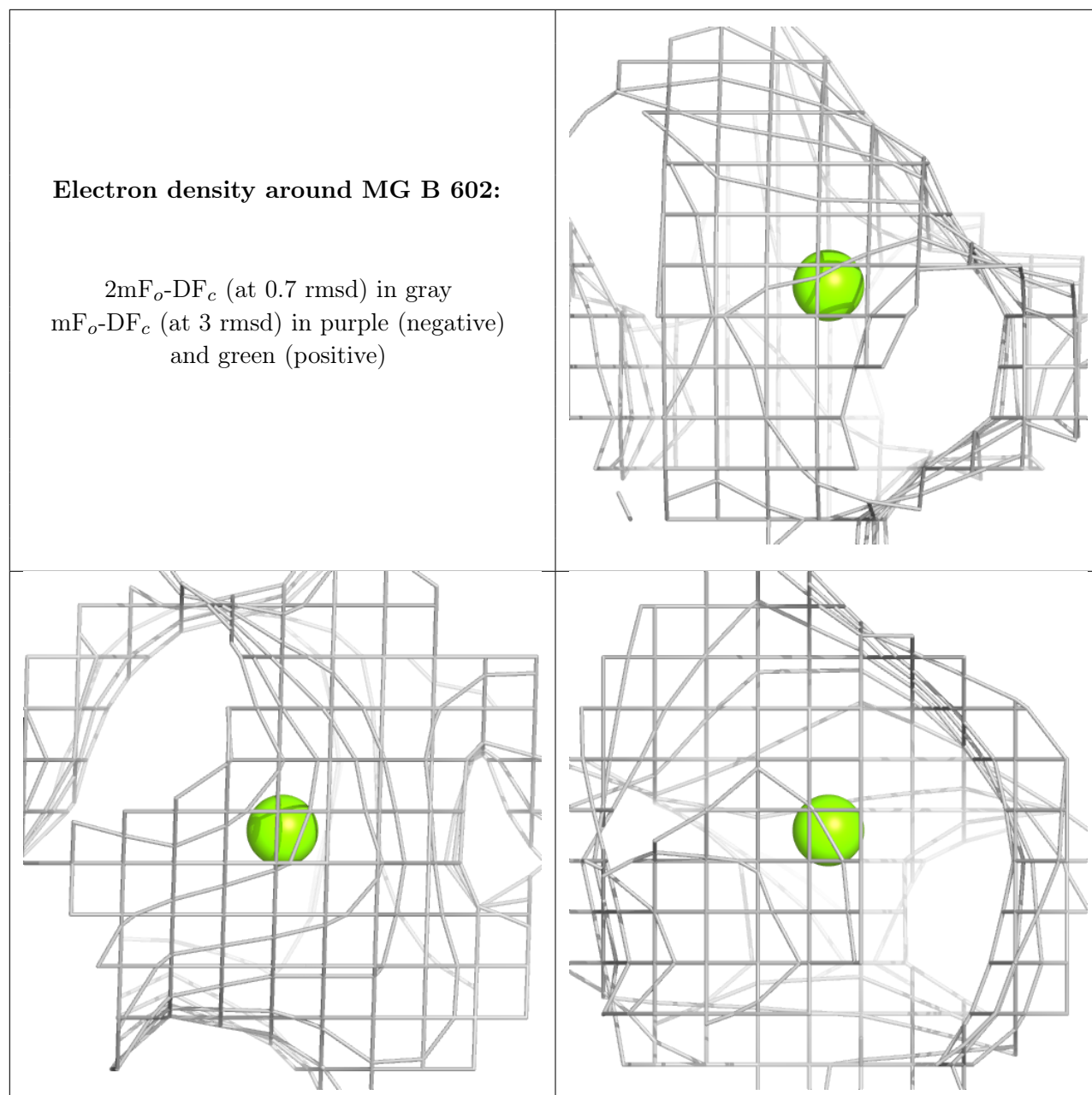
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around MG H 602:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.