



# wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 11, 2025 – 03:06 pm GMT

PDB ID : 9RCN / pdb\_00009rcn  
Title : Laccase (multicopper oxidase) from *Pediococcus pentosaceus* 4618 mutant  
E451L co-crystallized with Silver Nitrate (2 molecules in assymmetric unit)  
Authors : Paredes, F.; Casino, P.  
Deposited on : 2025-05-29  
Resolution : 2.50 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](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 : 4-5-2 with Phenix2.0  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.46

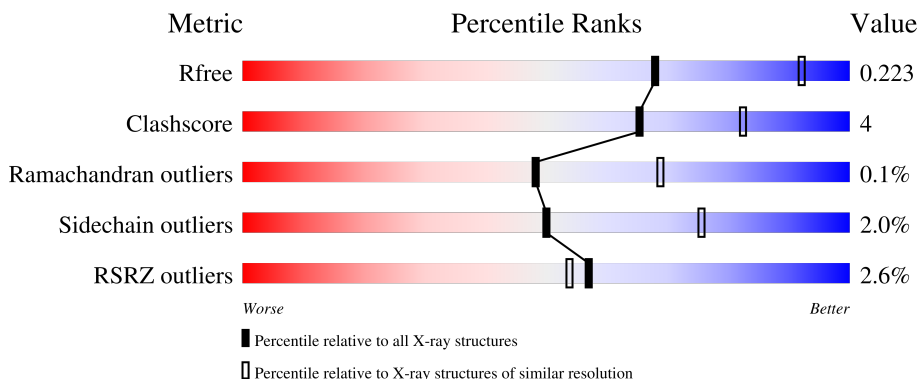
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

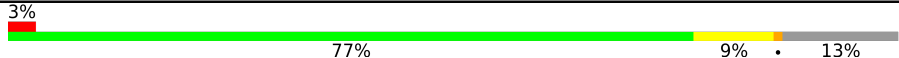
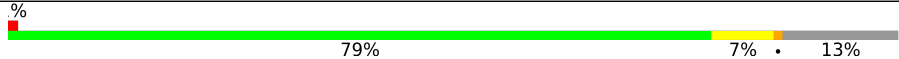
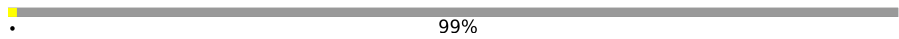
The reported resolution of this entry is 2.50 Å.

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	5504 (2.50-2.50)
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)
RSRZ outliers	164620	5504 (2.50-2.50)

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	532	 3% 77% 9% • 13%
1	C	532	 % 79% 7% • 13%
1	G	532	 • 99%

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7457 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 Multicopper oxidase domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	465	Total	C	N	O	S	0	0	0
			3676	2349	627	686	14			
1	C	462	Total	C	N	O	S	0	0	0
			3661	2340	624	683	14			
1	G	5	Total	C	N	O		0	0	0
			45	27	13	5				

There are 81 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-22	MET	-	initiating methionine	UNP A0AB73HHR8
A	-21	GLY	-	expression tag	UNP A0AB73HHR8
A	-20	SER	-	expression tag	UNP A0AB73HHR8
A	-19	SER	-	expression tag	UNP A0AB73HHR8
A	-18	HIS	-	expression tag	UNP A0AB73HHR8
A	-17	HIS	-	expression tag	UNP A0AB73HHR8
A	-16	HIS	-	expression tag	UNP A0AB73HHR8
A	-15	HIS	-	expression tag	UNP A0AB73HHR8
A	-14	HIS	-	expression tag	UNP A0AB73HHR8
A	-13	HIS	-	expression tag	UNP A0AB73HHR8
A	-12	SER	-	expression tag	UNP A0AB73HHR8
A	-11	SER	-	expression tag	UNP A0AB73HHR8
A	-10	GLY	-	expression tag	UNP A0AB73HHR8
A	-9	LEU	-	expression tag	UNP A0AB73HHR8
A	-8	VAL	-	expression tag	UNP A0AB73HHR8
A	-7	PRO	-	expression tag	UNP A0AB73HHR8
A	-6	ARG	-	expression tag	UNP A0AB73HHR8
A	-5	GLY	-	expression tag	UNP A0AB73HHR8
A	-4	SER	-	expression tag	UNP A0AB73HHR8
A	-3	HIS	-	expression tag	UNP A0AB73HHR8
A	-2	MET	-	expression tag	UNP A0AB73HHR8
A	-1	ALA	-	expression tag	UNP A0AB73HHR8
A	0	SER	-	expression tag	UNP A0AB73HHR8

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Chain	Residue	Modelled	Actual	Comment	Reference
A	12	PRO	GLN	variant	UNP A0AB73HHR8
A	241	ASN	ASP	variant	UNP A0AB73HHR8
A	253	ALA	SER	variant	UNP A0AB73HHR8
A	451	LEU	GLU	engineered mutation	UNP A0AB73HHR8
C	-22	MET	-	initiating methionine	UNP A0AB73HHR8
C	-21	GLY	-	expression tag	UNP A0AB73HHR8
C	-20	SER	-	expression tag	UNP A0AB73HHR8
C	-19	SER	-	expression tag	UNP A0AB73HHR8
C	-18	HIS	-	expression tag	UNP A0AB73HHR8
C	-17	HIS	-	expression tag	UNP A0AB73HHR8
C	-16	HIS	-	expression tag	UNP A0AB73HHR8
C	-15	HIS	-	expression tag	UNP A0AB73HHR8
C	-14	HIS	-	expression tag	UNP A0AB73HHR8
C	-13	HIS	-	expression tag	UNP A0AB73HHR8
C	-12	SER	-	expression tag	UNP A0AB73HHR8
C	-11	SER	-	expression tag	UNP A0AB73HHR8
C	-10	GLY	-	expression tag	UNP A0AB73HHR8
C	-9	LEU	-	expression tag	UNP A0AB73HHR8
C	-8	VAL	-	expression tag	UNP A0AB73HHR8
C	-7	PRO	-	expression tag	UNP A0AB73HHR8
C	-6	ARG	-	expression tag	UNP A0AB73HHR8
C	-5	GLY	-	expression tag	UNP A0AB73HHR8
C	-4	SER	-	expression tag	UNP A0AB73HHR8
C	-3	HIS	-	expression tag	UNP A0AB73HHR8
C	-2	MET	-	expression tag	UNP A0AB73HHR8
C	-1	ALA	-	expression tag	UNP A0AB73HHR8
C	0	SER	-	expression tag	UNP A0AB73HHR8
C	12	PRO	GLN	variant	UNP A0AB73HHR8
C	241	ASN	ASP	variant	UNP A0AB73HHR8
C	253	ALA	SER	variant	UNP A0AB73HHR8
C	451	LEU	GLU	engineered mutation	UNP A0AB73HHR8
G	-1	MET	-	initiating methionine	UNP A0AB73HHR8
G	0	GLY	-	expression tag	UNP A0AB73HHR8
G	1	SER	-	expression tag	UNP A0AB73HHR8
G	2	SER	-	expression tag	UNP A0AB73HHR8
G	3	HIS	-	expression tag	UNP A0AB73HHR8
G	4	HIS	-	expression tag	UNP A0AB73HHR8
G	5	HIS	-	expression tag	UNP A0AB73HHR8
G	6	HIS	-	expression tag	UNP A0AB73HHR8
G	7	HIS	-	expression tag	UNP A0AB73HHR8
G	8	HIS	-	expression tag	UNP A0AB73HHR8
G	9	SER	-	expression tag	UNP A0AB73HHR8

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Chain	Residue	Modelled	Actual	Comment	Reference
G	10	SER	-	expression tag	UNP A0AB73HHR8
G	11	GLY	-	expression tag	UNP A0AB73HHR8
G	12	LEU	-	expression tag	UNP A0AB73HHR8
G	13	VAL	-	expression tag	UNP A0AB73HHR8
G	14	PRO	-	expression tag	UNP A0AB73HHR8
G	15	ARG	-	expression tag	UNP A0AB73HHR8
G	16	GLY	-	expression tag	UNP A0AB73HHR8
G	17	SER	-	expression tag	UNP A0AB73HHR8
G	18	HIS	-	expression tag	UNP A0AB73HHR8
G	19	MET	-	expression tag	UNP A0AB73HHR8
G	20	ALA	-	expression tag	UNP A0AB73HHR8
G	21	SER	-	expression tag	UNP A0AB73HHR8
G	33	PRO	GLN	variant	UNP A0AB73HHR8
G	262	ASN	ASP	variant	UNP A0AB73HHR8
G	274	ALA	SER	variant	UNP A0AB73HHR8
G	472	LEU	GLU	engineered mutation	UNP A0AB73HHR8

- Molecule 2 is COPPER (II) ION (CCD ID: CU) (formula: Cu) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	4	Total Cu 4 4	0	0
2	C	4	Total Cu 4 4	0	0

- Molecule 3 is SILVER ION (CCD ID: AG) (formula: Ag) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Ag 2 2	0	0
3	C	1	Total Ag 1 1	0	0

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O<sub>4</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	C	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	G	1	Total	O	S	0	0
			5	4	1		

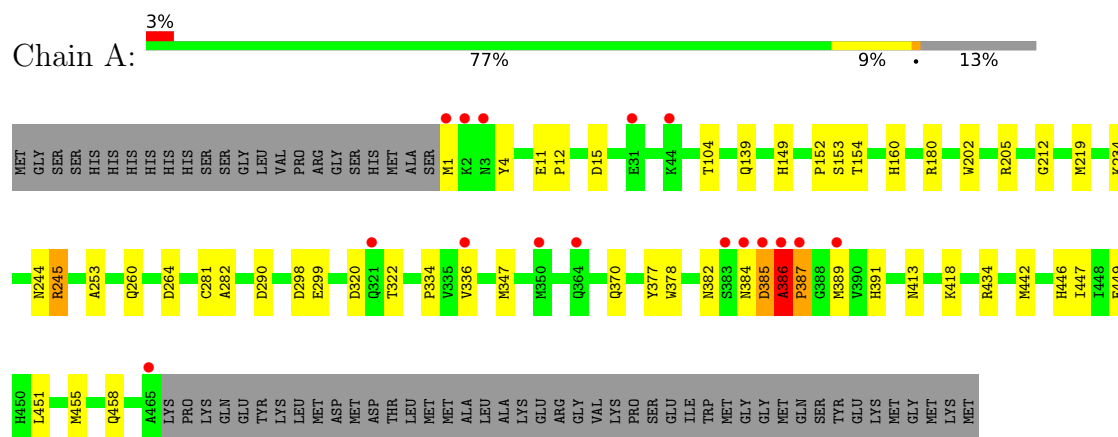
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	23	Total	O	0	0
			23	23		
5	C	26	Total	O	0	0
			26	26		

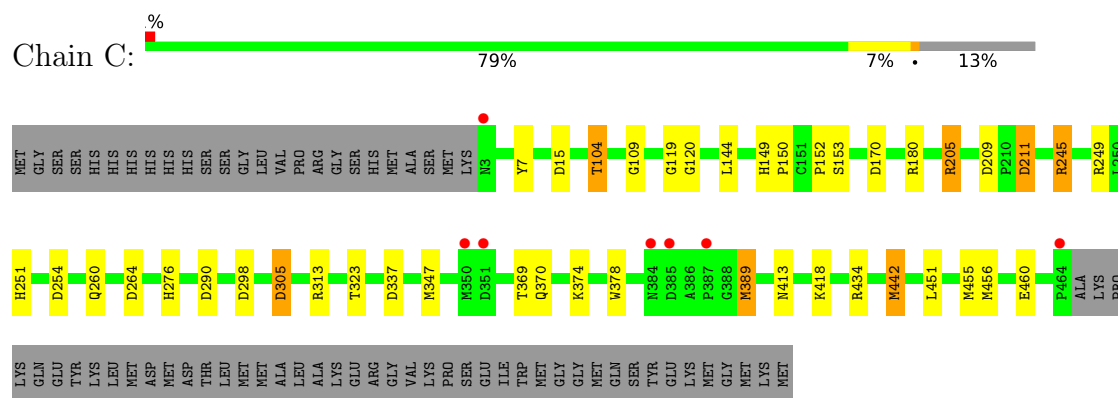
### 3 Residue-property plots

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 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.

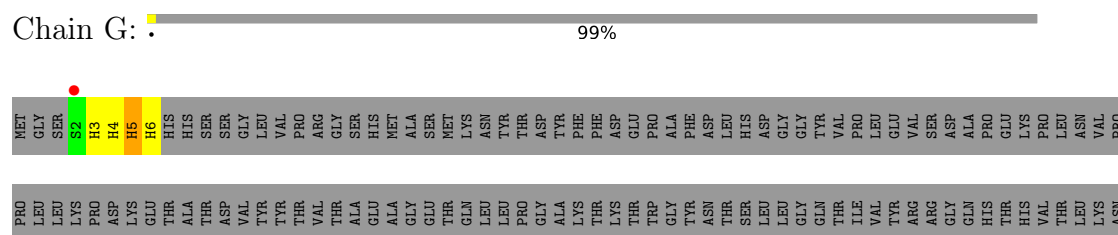
- Molecule 1: Multicopper oxidase domain-containing protein



- Molecule 1: Multicopper oxidase domain-containing protein



- Molecule 1: Multicopper oxidase domain-containing protein



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



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	119.81Å 119.81Å 174.25Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	103.76 – 2.50 103.76 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.9 (103.76-2.50) 98.9 (103.76-2.50)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.25 (at 2.52Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, $R_{free}$	0.179 , 0.218 0.191 , 0.223	Depositor DCC
$R_{free}$ test set	2536 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	55.2	Xtriage
Anisotropy	0.198	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 33.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.013 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7457	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.21% 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: SO4, AG, CU

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	0.54	1/3792 (0.0%)	0.98	9/5187 (0.2%)
1	C	0.52	0/3777	0.94	6/5166 (0.1%)
1	G	0.83	0/48	1.89	1/64 (1.6%)
All	All	0.53	1/7617 (0.0%)	0.97	16/10417 (0.2%)

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	C	0	5
All	All	0	6

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	386	ALA	CA-C	-5.36	1.46	1.52

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	447	ILE	N-CA-C	-9.23	94.87	108.54
1	G	5	HIS	CA-CB-CG	-7.86	105.94	113.80
1	A	160	HIS	CB-CA-C	-7.34	96.78	110.36
1	A	139	GLN	CB-CA-C	-6.89	98.72	109.55
1	A	386	ALA	CA-C-N	-6.49	111.73	119.84

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	180	ARG	Sidechain
1	C	180	ARG	Sidechain
1	C	205	ARG	Sidechain
1	C	245	ARG	Sidechain
1	C	249	ARG	Sidechain

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3676	0	3503	30	1
1	C	3661	0	3491	22	1
1	G	45	0	29	3	0
2	A	4	0	0	0	0
2	C	4	0	0	0	0
3	A	2	0	0	0	0
3	C	1	0	0	0	0
4	C	10	0	0	0	0
4	G	5	0	0	0	0
5	A	23	0	0	1	0
5	C	26	0	0	1	0
All	All	7457	0	7023	53	1

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 4.

The worst 5 of 53 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:347:MET:SD	5:A:709:HOH:O	2.39	0.80
1:C:260:GLN:HE22	1:C:413:ASN:HD22	1.31	0.79
1:A:384:ASN:O	1:A:385:ASP:OD1	2.03	0.77
1:A:260:GLN:HE22	1:A:413:ASN:HD22	1.37	0.72
1:A:386:ALA:HB1	1:A:387:PRO:HD2	1.73	0.71

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:299:GLU:OE2	1:C:313:ARG:NH2[6_664]	2.07	0.13

## 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	463/532 (87%)	446 (96%)	16 (4%)	1 (0%)	44	64
1	C	460/532 (86%)	444 (96%)	16 (4%)	0	100	100
1	G	3/532 (1%)	3 (100%)	0	0	100	100
All	All	926/1596 (58%)	893 (96%)	32 (4%)	1 (0%)	48	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	386	ALA

### 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	394/454 (87%)	386 (98%)	8 (2%)	50	75
1	C	394/454 (87%)	387 (98%)	7 (2%)	54	78
1	G	4/454 (1%)	3 (75%)	1 (25%)	0	1
All	All	792/1362 (58%)	776 (98%)	16 (2%)	50	75

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	442	MET
1	C	389	MET
1	C	104	THR
1	C	323	THR
1	A	458	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	315	HIS
1	C	396	HIS
1	C	458	GLN
1	C	370	GLN
1	C	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](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 11 are monoatomic - leaving 3 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	SO4	C	607	-	4,4,4	0.46	0	6,6,6	0.05	0
4	SO4	C	606	-	4,4,4	0.36	0	6,6,6	0.08	0
4	SO4	G	601	-	4,4,4	0.32	0	6,6,6	0.13	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

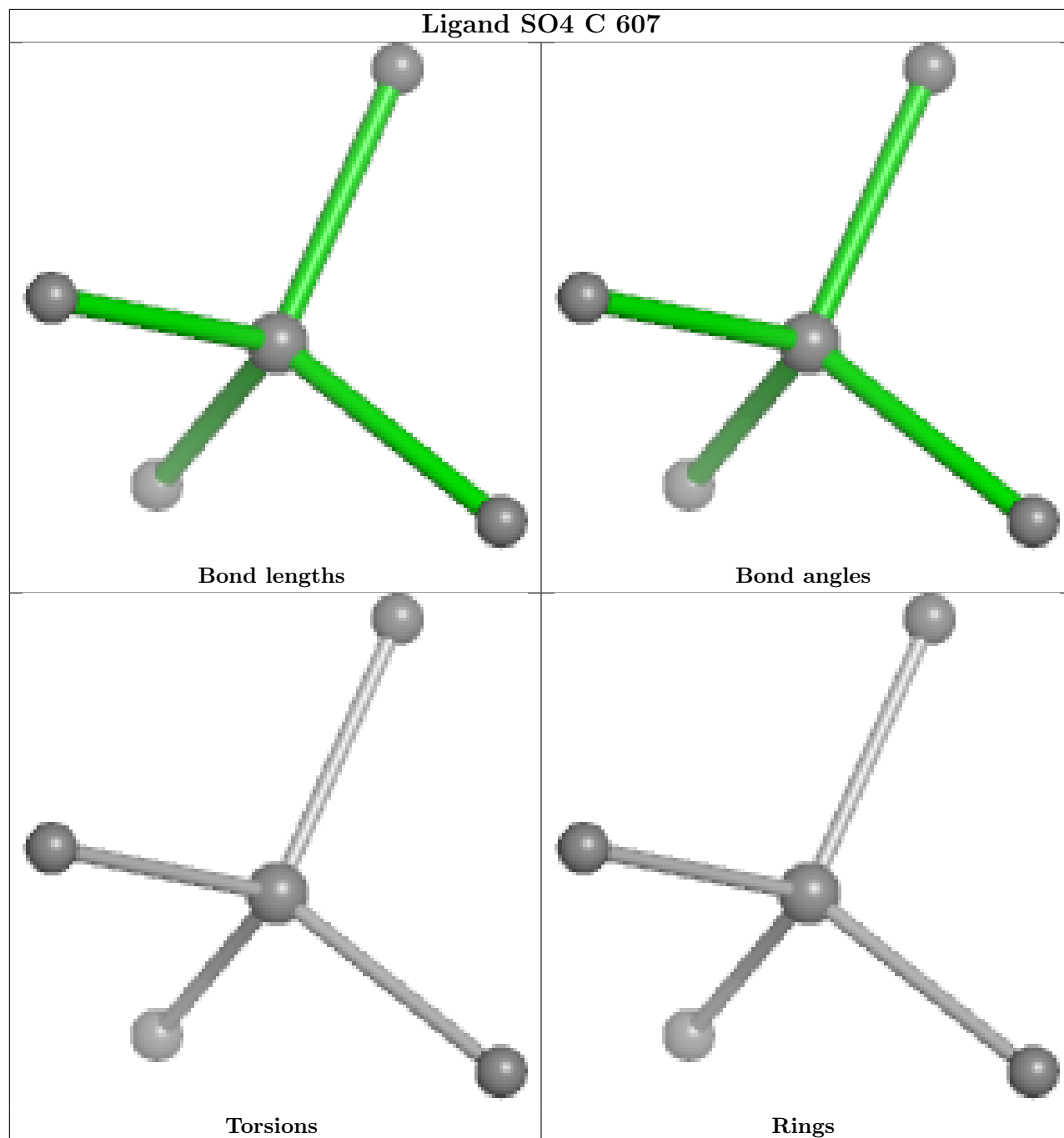
There are no torsion outliers.

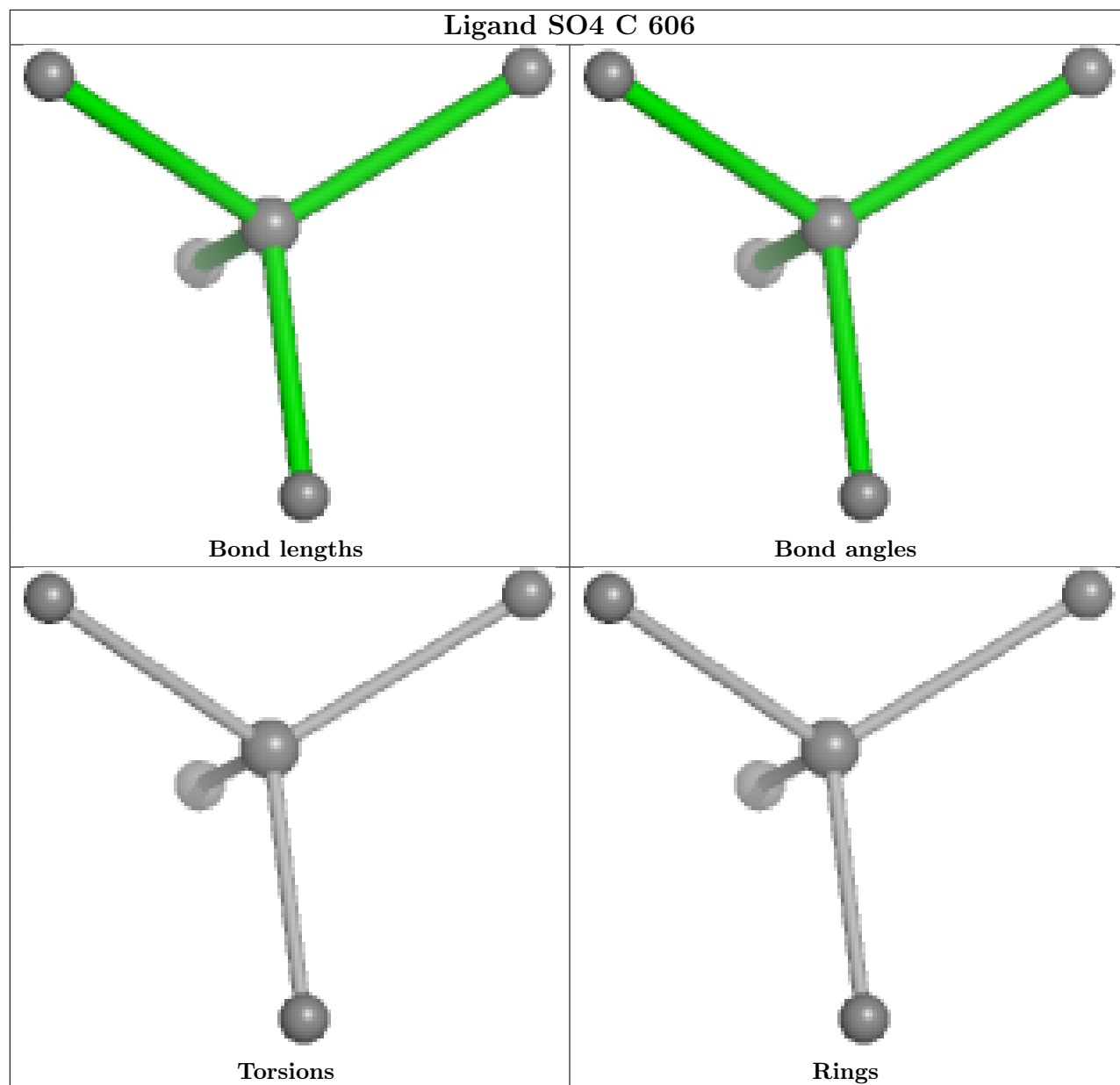
There are no ring outliers.

No monomer is involved in short contacts.

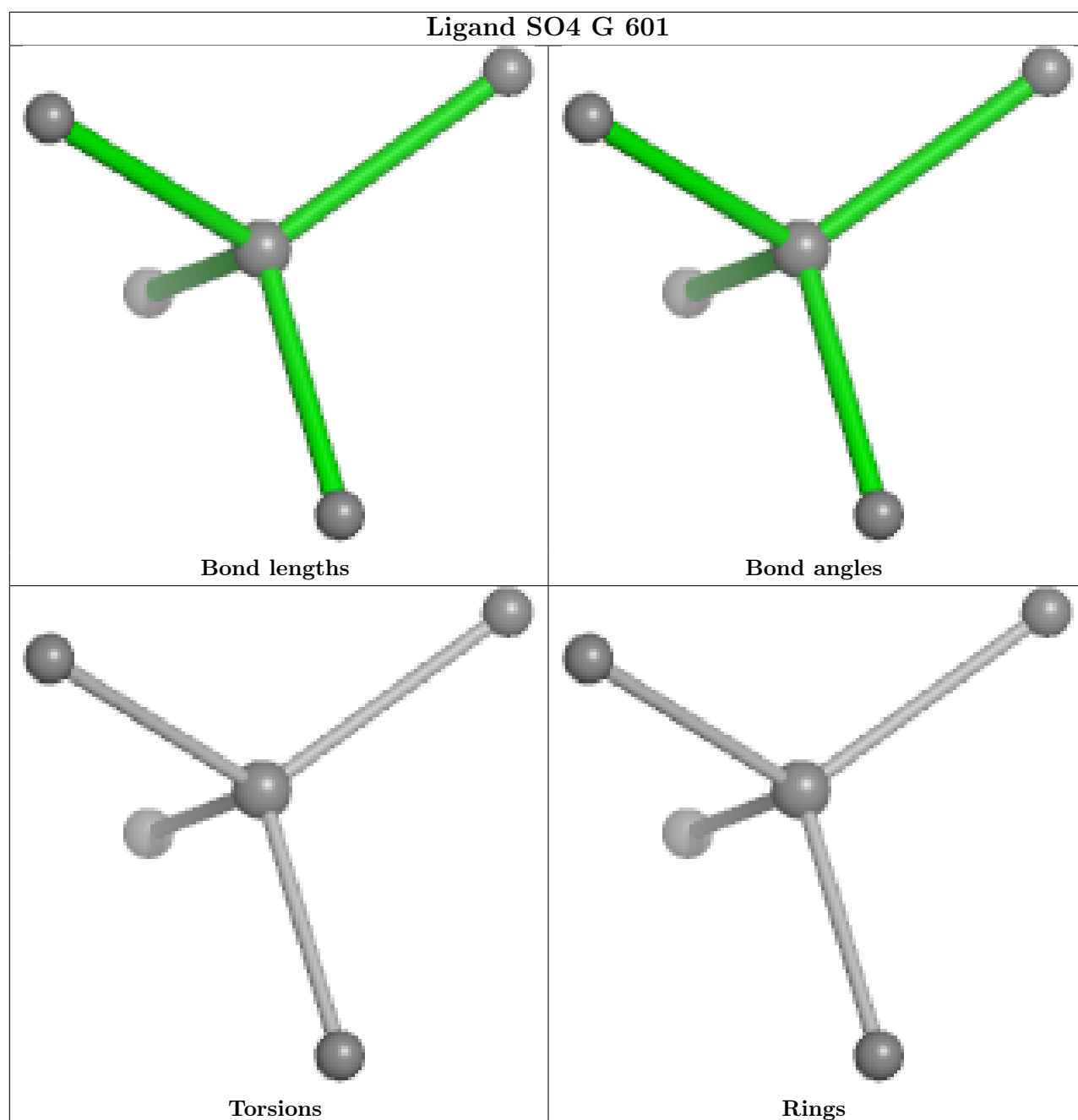
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

## Ligand SO4 C 607









## 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	465/532 (87%)	-0.06	16 (3%) 48 45	30, 54, 80, 123	0
1	C	462/532 (86%)	-0.19	7 (1%) 71 68	38, 52, 76, 107	0
1	G	5/532 (0%)	1.66	1 (20%) 3 4	64, 69, 80, 83	0
All	All	932/1596 (58%)	-0.11	24 (2%) 57 54	30, 53, 80, 123	0

The worst 5 of 24 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	3	ASN	6.0
1	A	385	ASP	5.0
1	A	465	ALA	4.4
1	A	387	PRO	4.2
1	A	1	MET	4.1

### 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 oligosaccharides in this entry.

### 6.4 Ligands [i](#)

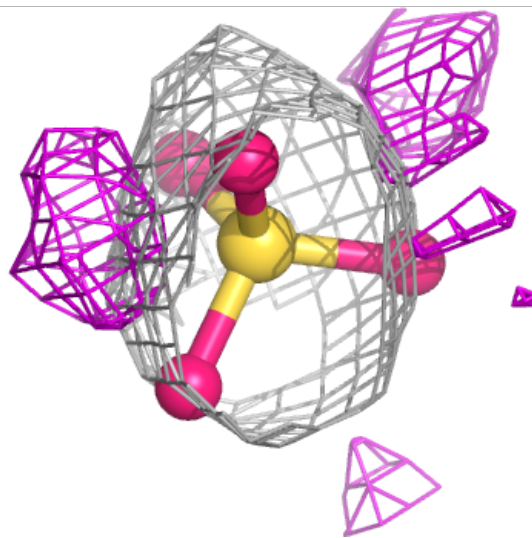
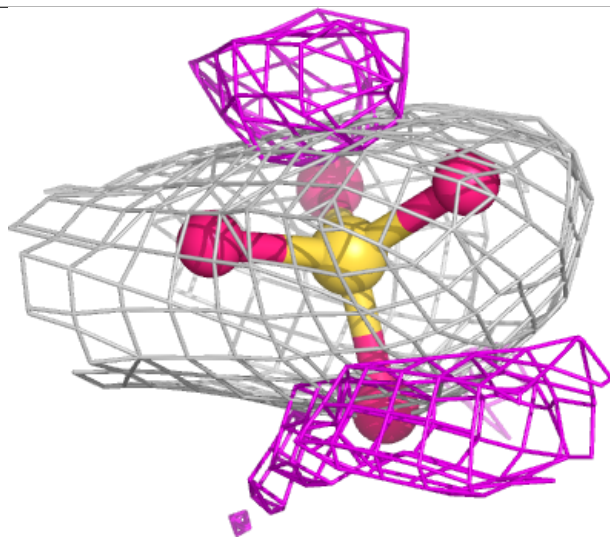
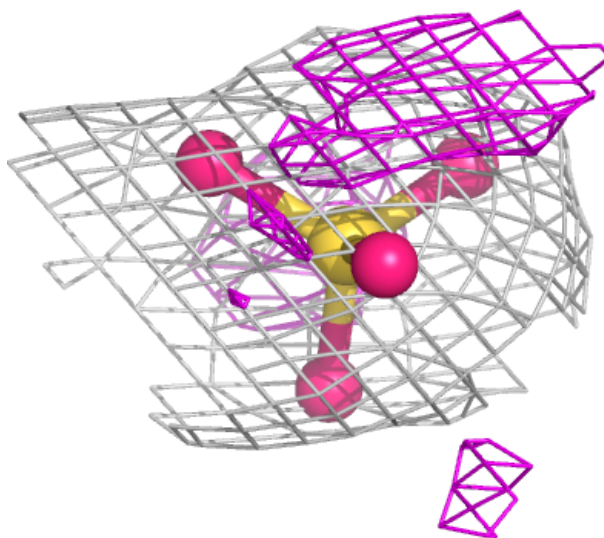
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	SO4	C	606	5/5	0.69	0.11	104,115,116,117	0
3	AG	A	605	1/1	0.79	0.29	154,154,154,154	1
4	SO4	C	607	5/5	0.84	0.12	84,88,90,100	0
3	AG	C	605	1/1	0.85	0.29	159,159,159,159	1
4	SO4	G	601	5/5	0.98	0.08	58,59,65,67	0
3	AG	A	606	1/1	0.99	0.08	75,75,75,75	1
2	CU	A	602	1/1	0.99	0.04	53,53,53,53	0
2	CU	A	604	1/1	0.99	0.02	43,43,43,43	0
2	CU	C	602	1/1	0.99	0.04	49,49,49,49	0
2	CU	A	601	1/1	0.99	0.03	48,48,48,48	0
2	CU	C	603	1/1	1.00	0.05	41,41,41,41	0
2	CU	C	604	1/1	1.00	0.03	40,40,40,40	0
2	CU	C	601	1/1	1.00	0.02	43,43,43,43	0
2	CU	A	603	1/1	1.00	0.06	41,41,41,41	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.

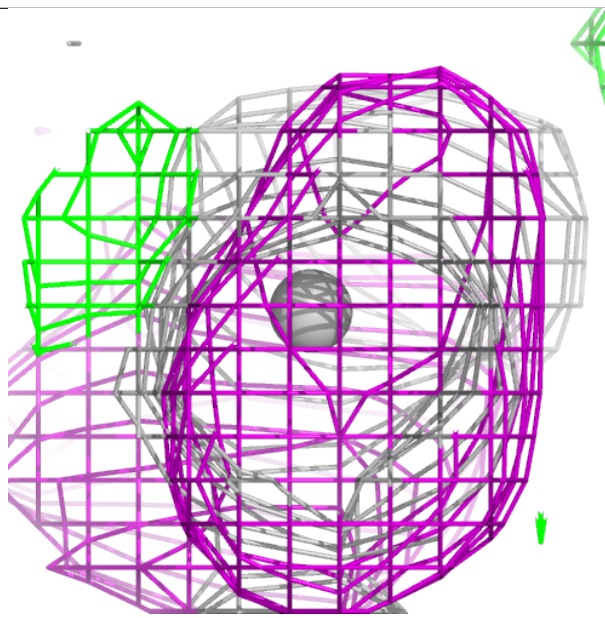
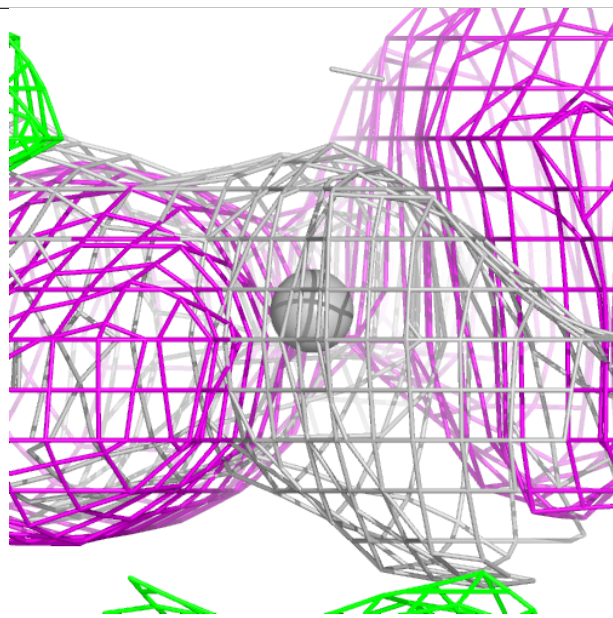
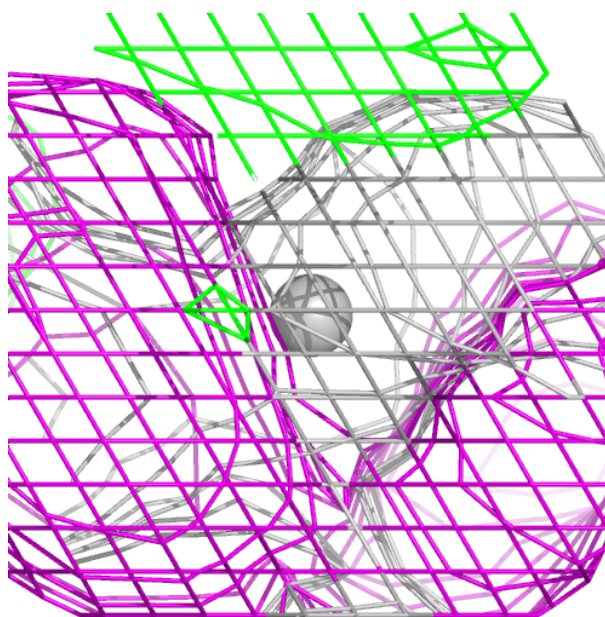
**Electron density around SO4 C 606:**

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around AG A 605:**

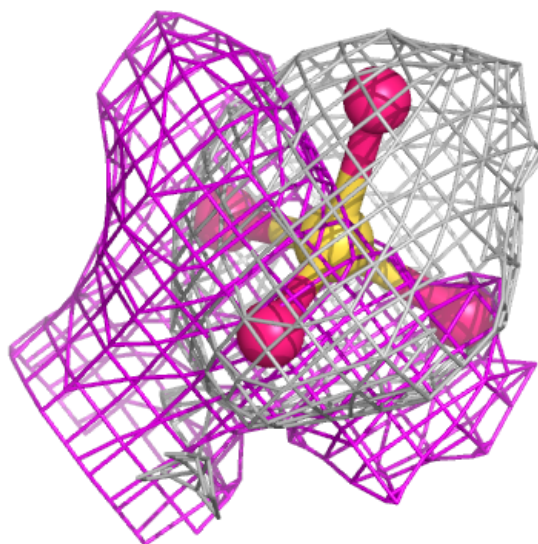
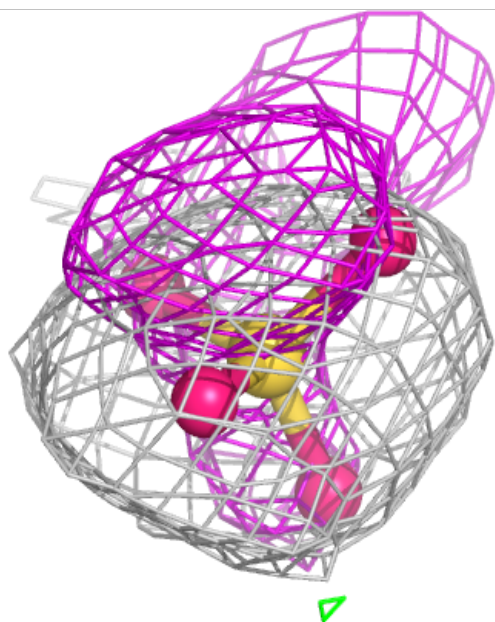
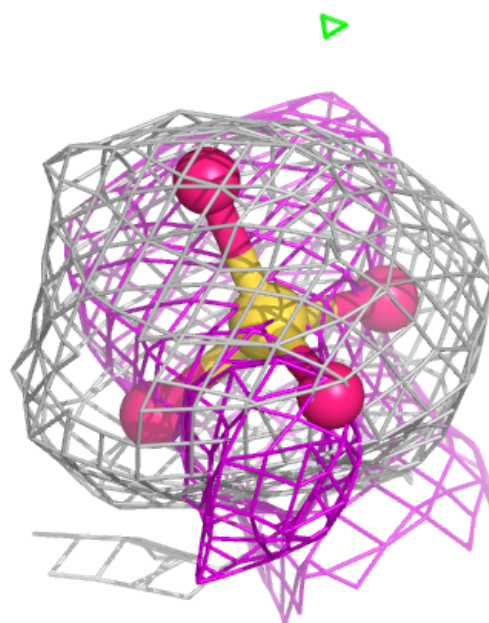
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





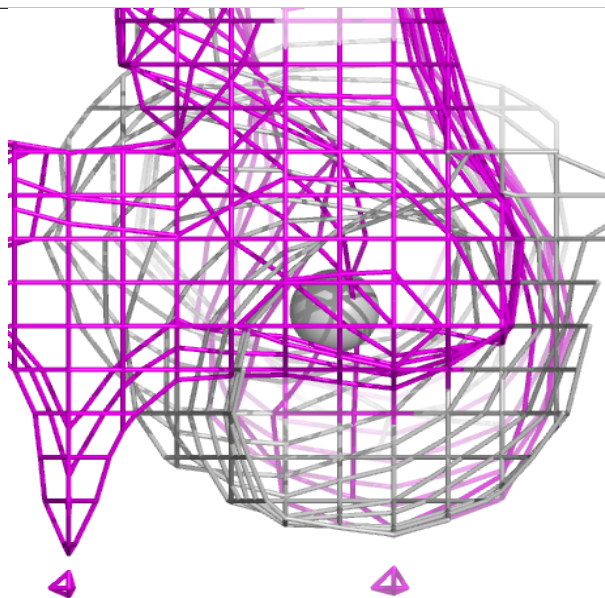
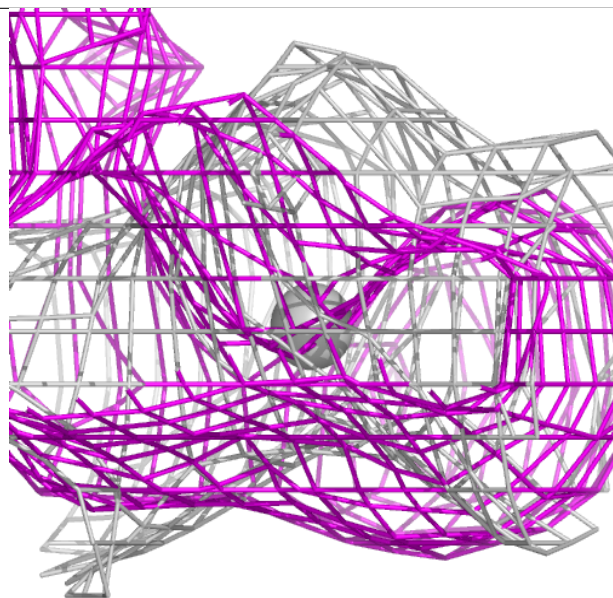
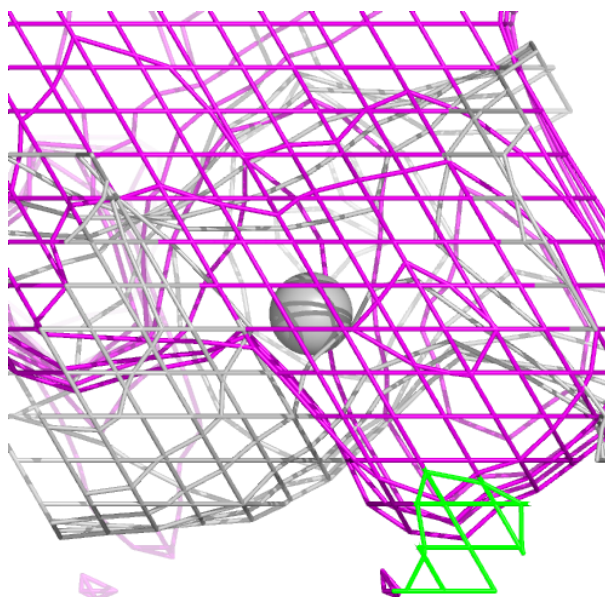
**Electron density around SO4 C 607:**

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



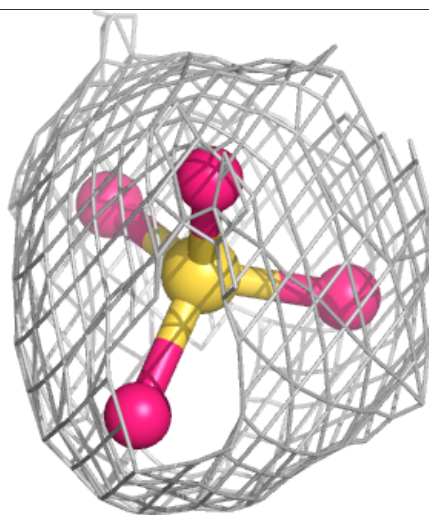
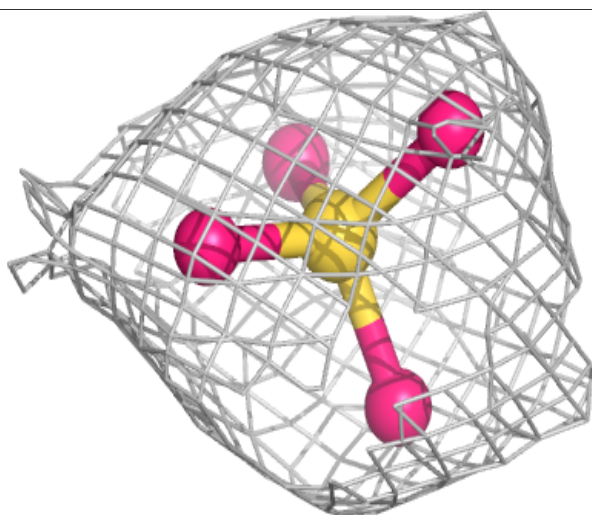
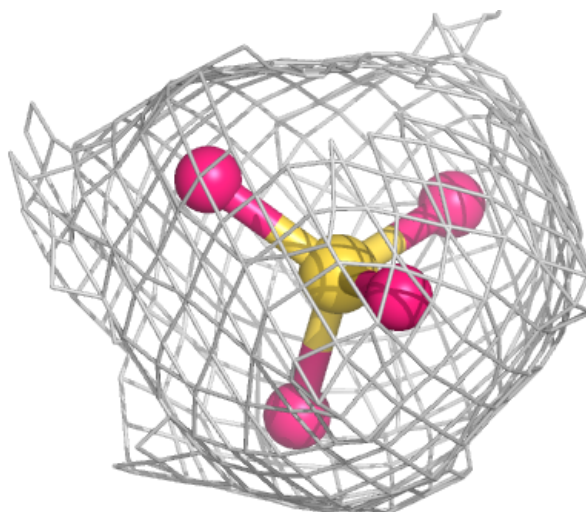
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and green (positive)



**Electron density around SO4 G 601:**

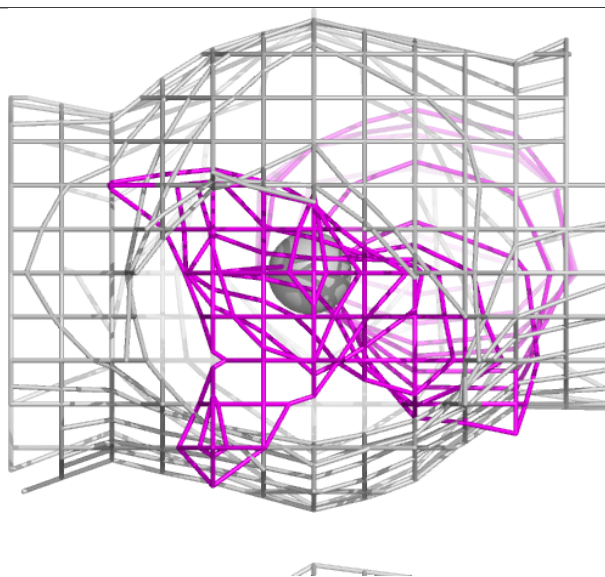
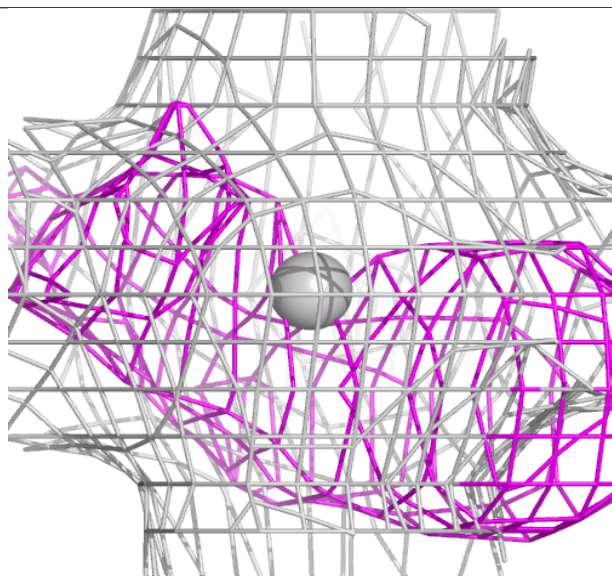
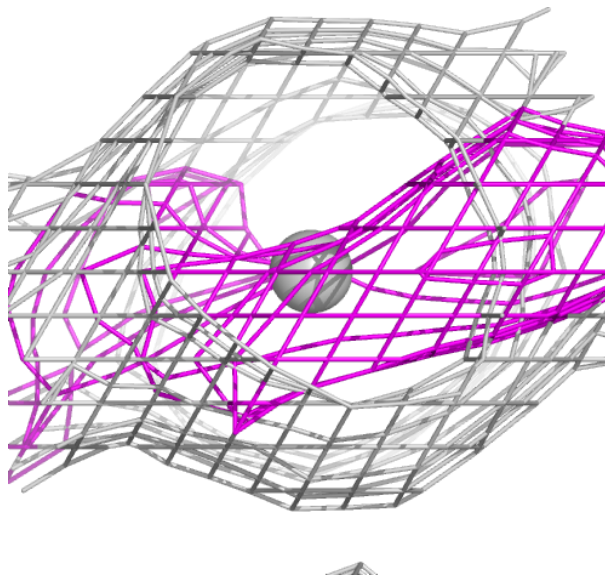
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and green (positive)





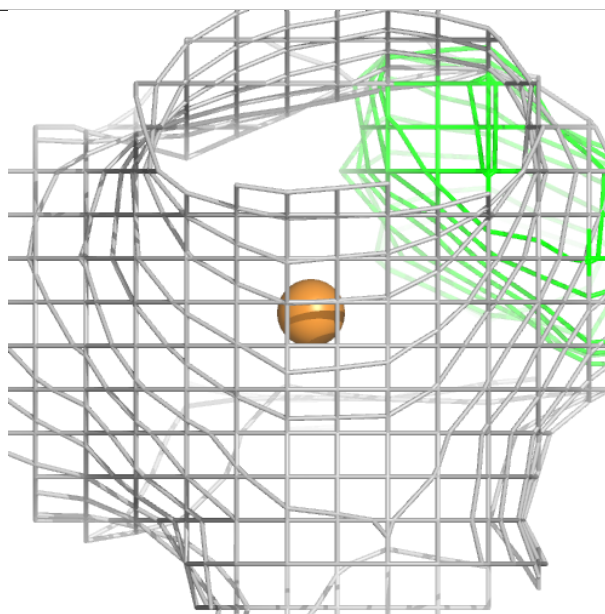
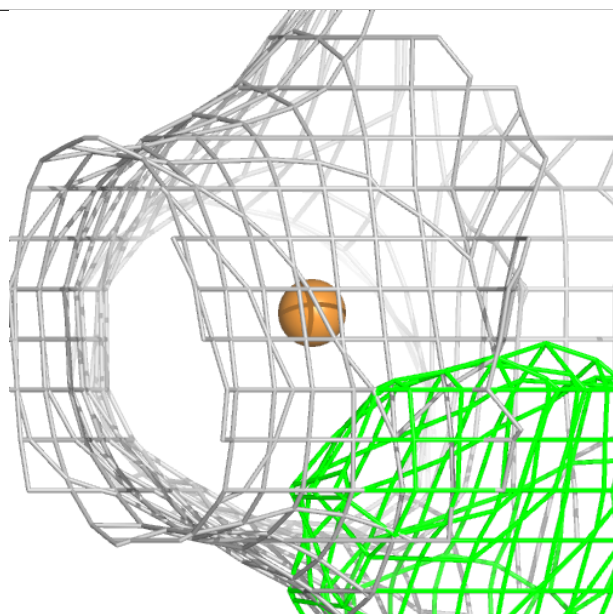
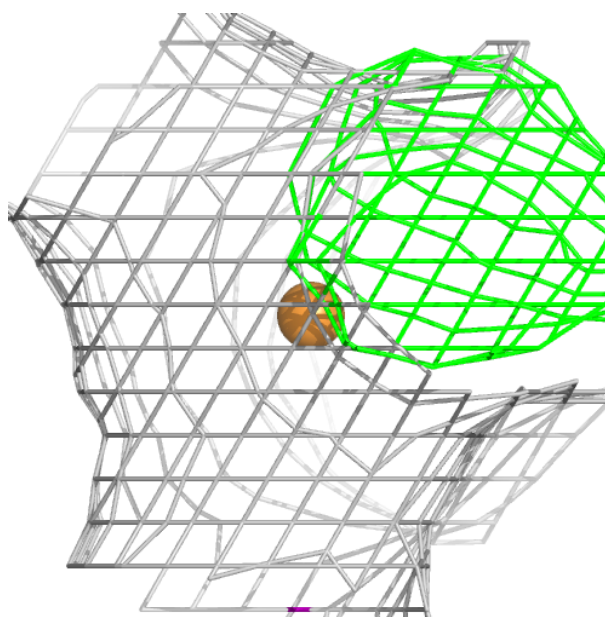
**Electron density around AG A 606:**

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and green (positive)



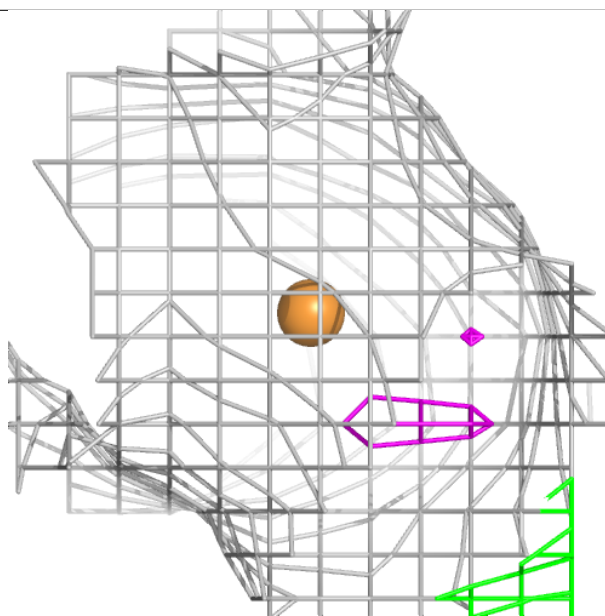
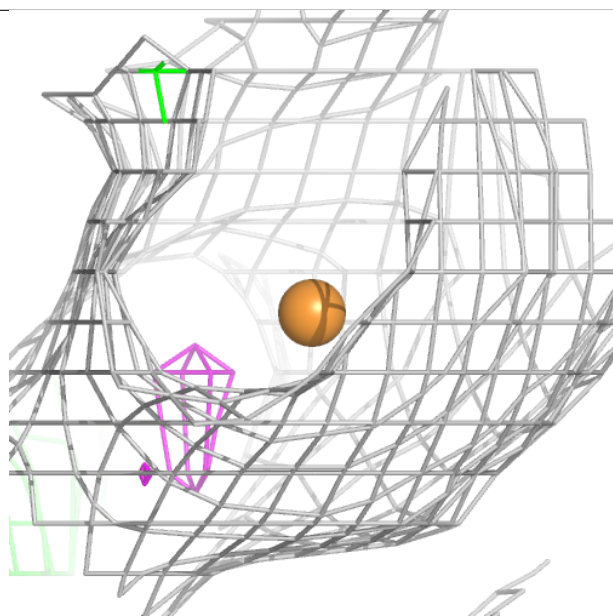
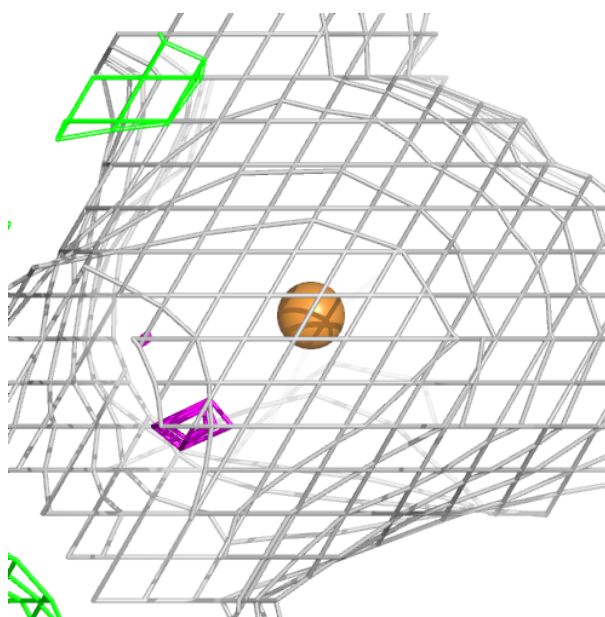
**Electron density around CU A 602:**

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



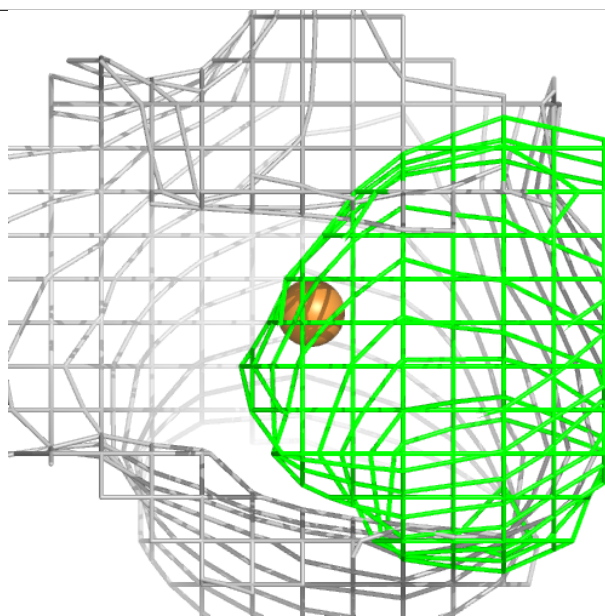
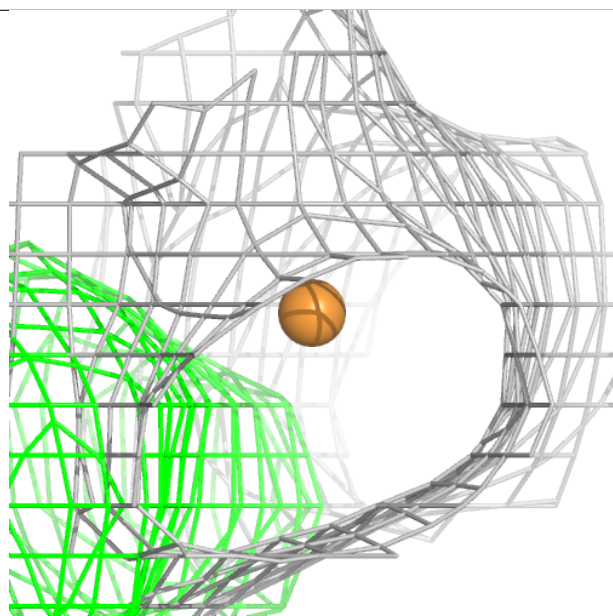
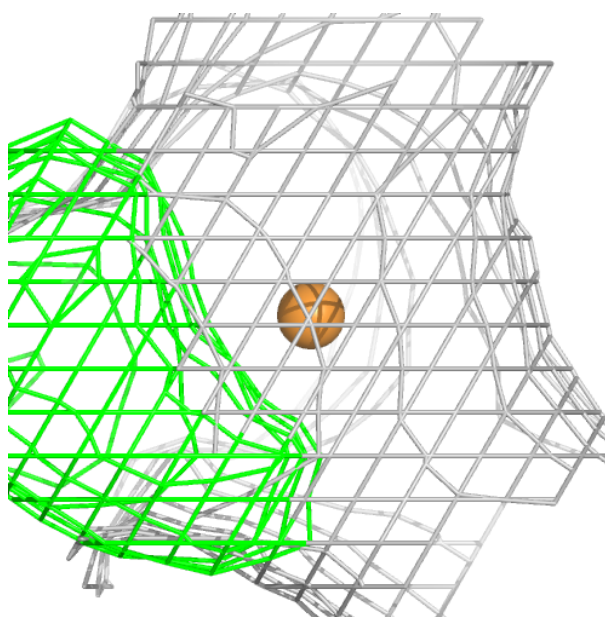
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**Electron density around CU C 602:**

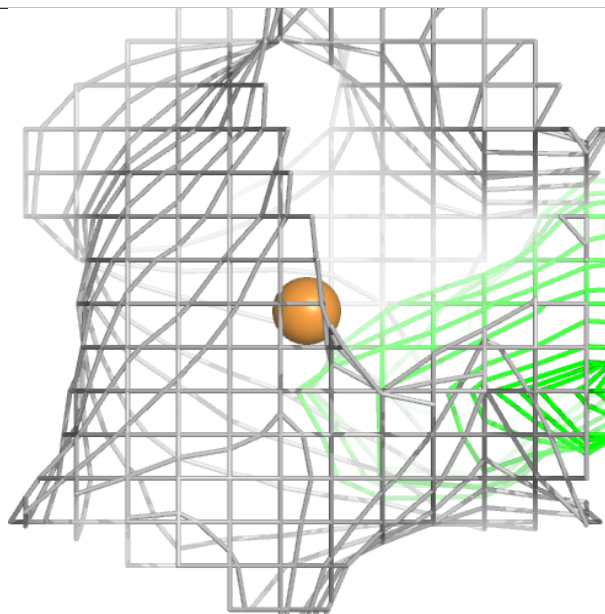
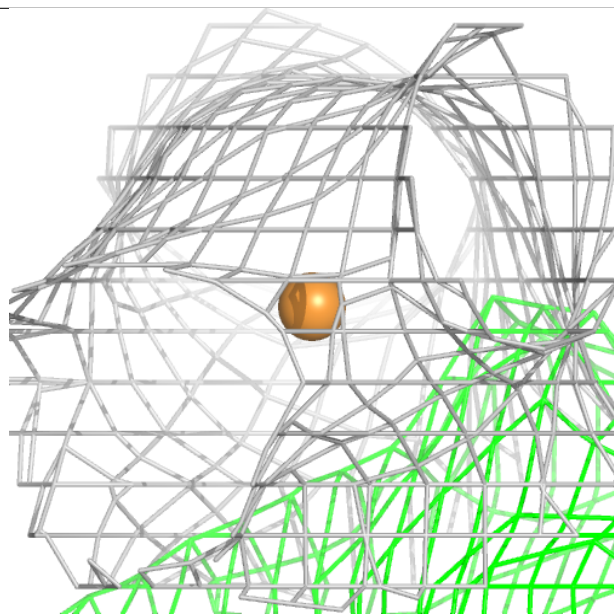
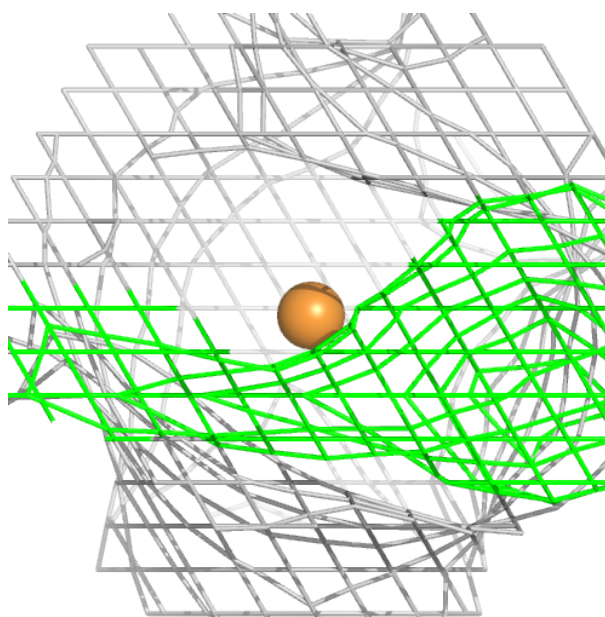
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and green (positive)





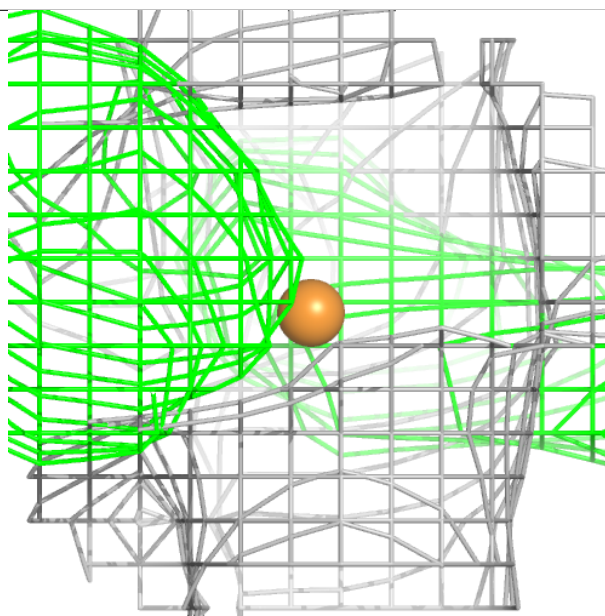
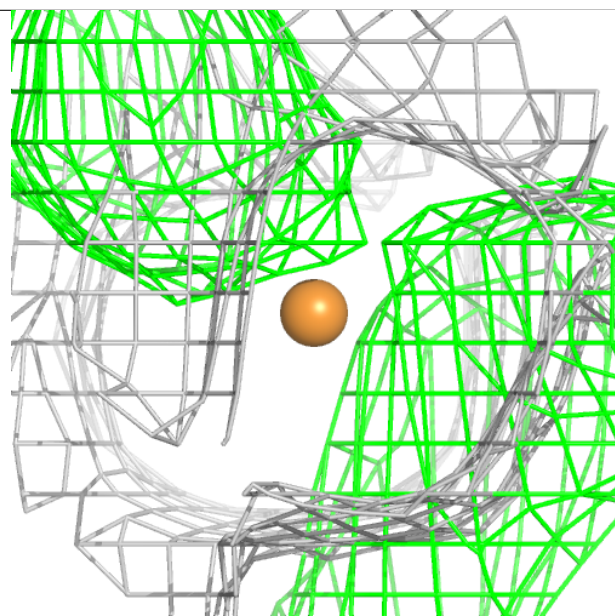
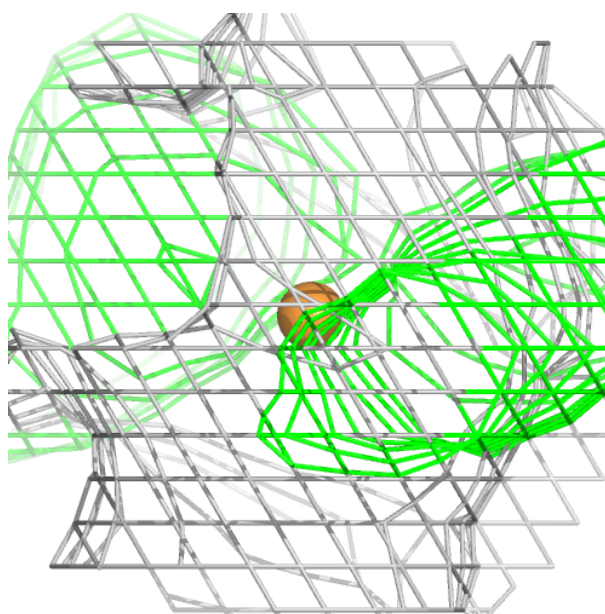
**Electron density around CU A 601:**

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and green (positive)



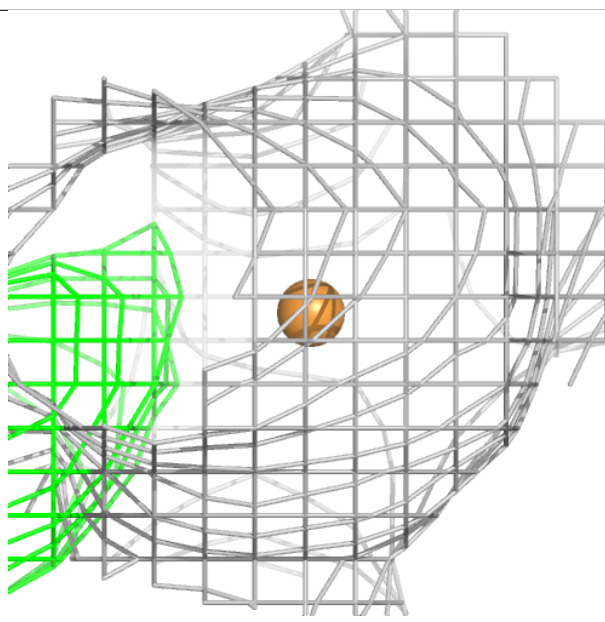
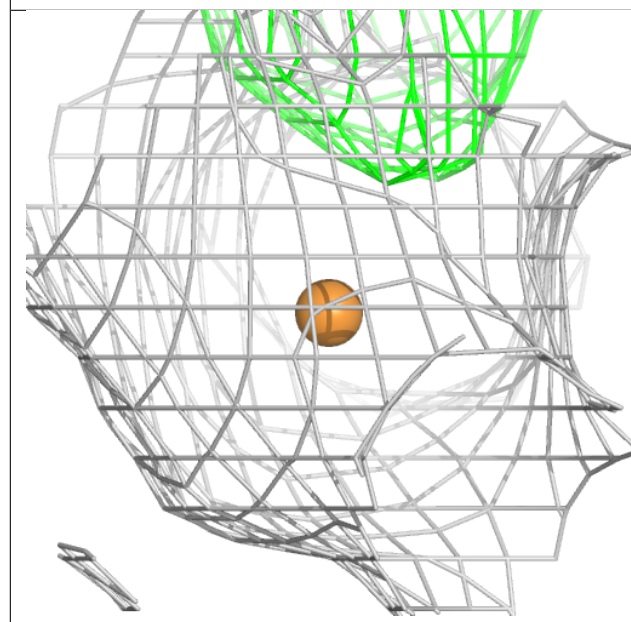
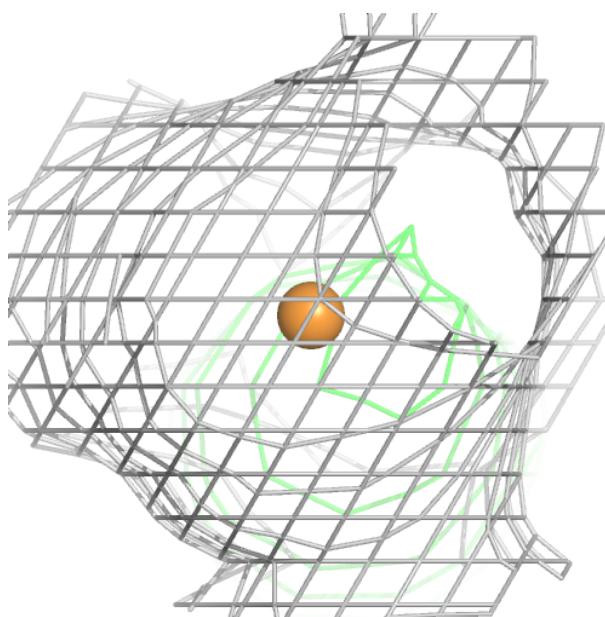
**Electron density around CU C 603:**

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and green (positive)



**Electron density around CU C 604:**

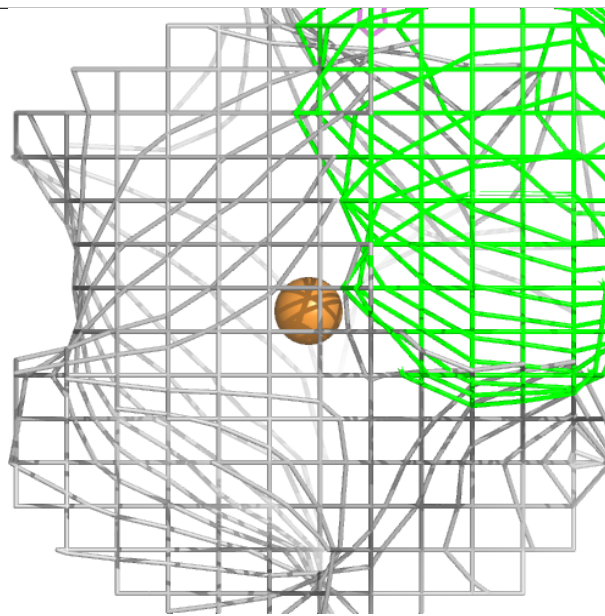
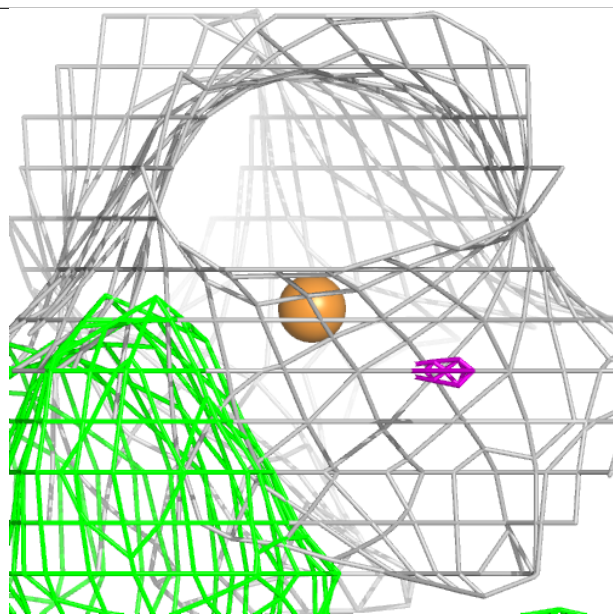
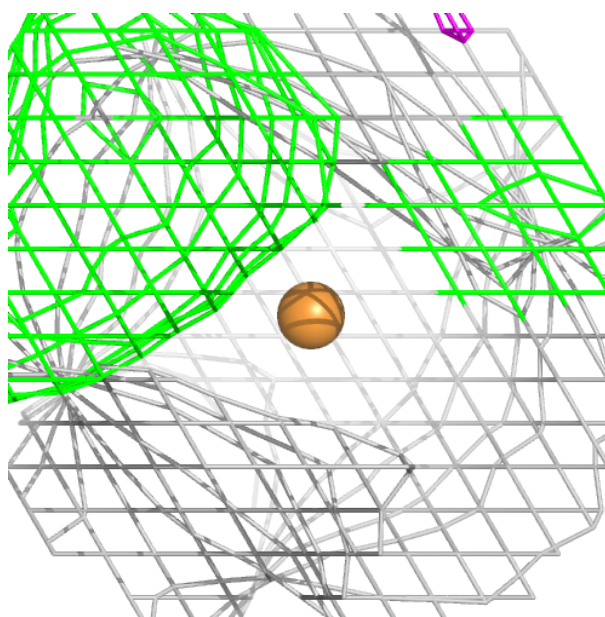
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
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and green (positive)





**Electron density around CU C 601:**

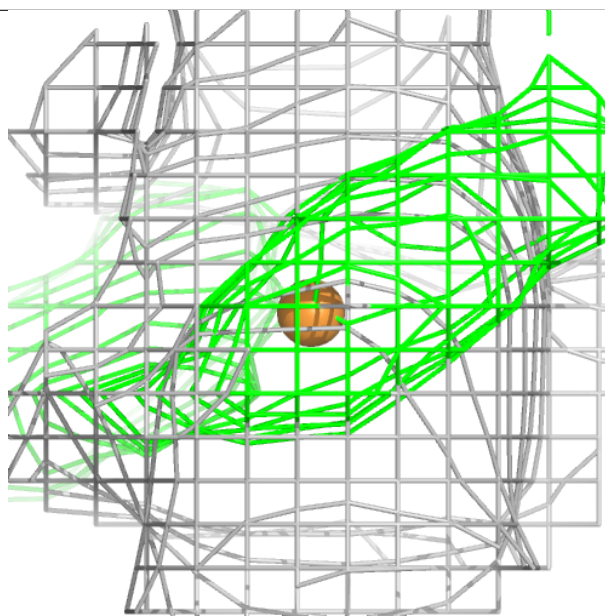
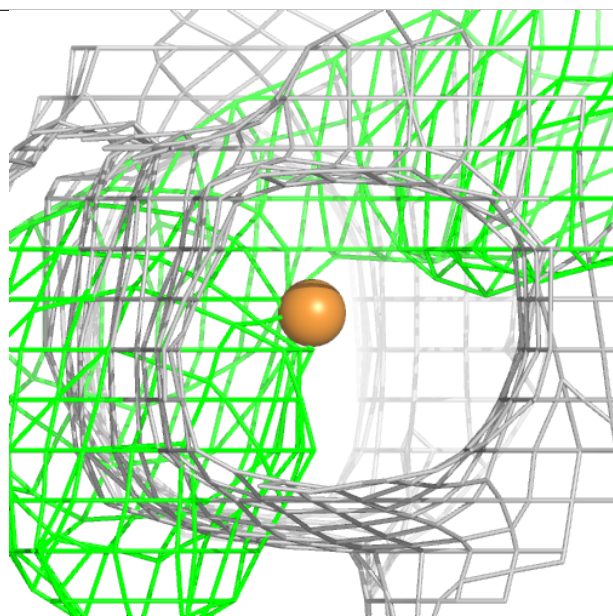
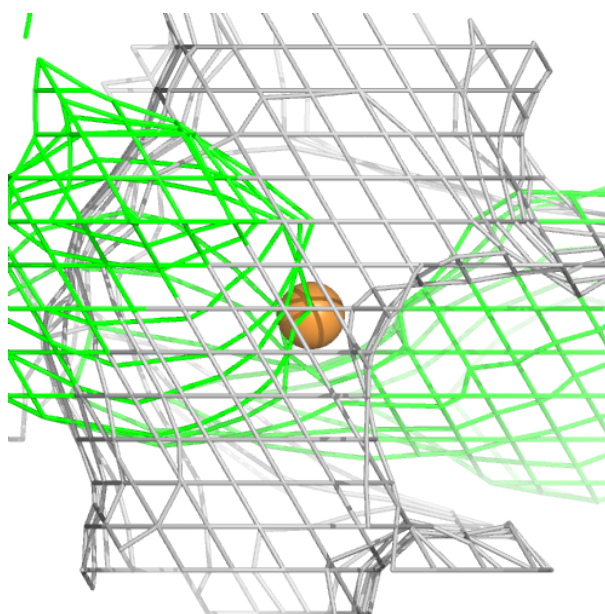
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around CU A 603:**

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



## 6.5 Other polymers ⓘ

There are no such residues in this entry.