



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 14, 2021 – 02:12 PM EDT

PDB ID : 7RAB
Title : Crystal structure of a dodecameric multicopper oxidase from *M. hydrothermalis* in a cubic lattice
Authors : Georgiadis, M.M.
Deposited on : 2021-06-30
Resolution : 1.92 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.23.2
buster-report : 1.1.7 (2018)
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) : 2.23.2

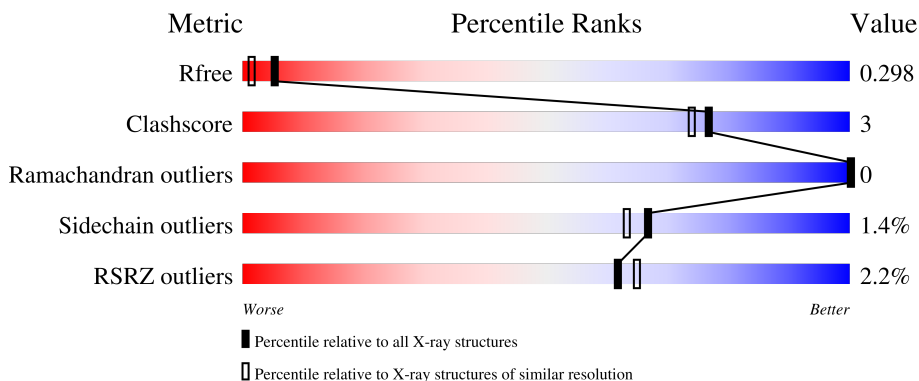
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.92 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.



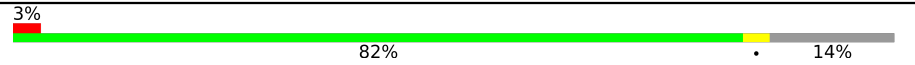


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	7937 (1.94-1.90)
Clashscore	141614	8644 (1.94-1.90)
Ramachandran outliers	138981	8530 (1.94-1.90)
Sidechain outliers	138945	8530 (1.94-1.90)
RSRZ outliers	127900	7793 (1.94-1.90)

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	348	 2% 80% 6% 14%
1	B	348	 2% 79% 6% 14%
1	C	348	 2% 79% 7% 14%
1	D	348	 2% 81% 5% 14%
1	E	348	 2% 78% 7% 14%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	348	 <p>3% 82% 7% 14%</p>
1	G	348	 <p>% 79% 7% 14%</p>
1	H	348	 <p>3% 79% 6% 14%</p>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 20087 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	299	2431	1569	413	438	11	0	2	0
1	B	299	2431	1569	413	438	11	0	2	0
1	C	299	2431	1569	413	438	11	0	2	0
1	D	299	2431	1569	413	438	11	0	2	0
1	E	299	2431	1569	413	438	11	0	2	0
1	F	298	2427	1567	412	437	11	0	2	0
1	G	299	2431	1569	413	438	11	0	2	0
1	H	299	2431	1569	413	438	11	0	2	0

There are 160 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	MET	-	initiating methionine	UNP F2NNS0
A	13	GLY	-	expression tag	UNP F2NNS0
A	14	SER	-	expression tag	UNP F2NNS0
A	15	SER	-	expression tag	UNP F2NNS0
A	16	HIS	-	expression tag	UNP F2NNS0
A	17	HIS	-	expression tag	UNP F2NNS0
A	18	HIS	-	expression tag	UNP F2NNS0
A	19	HIS	-	expression tag	UNP F2NNS0
A	20	HIS	-	expression tag	UNP F2NNS0
A	21	HIS	-	expression tag	UNP F2NNS0
A	22	SER	-	expression tag	UNP F2NNS0
A	23	SER	-	expression tag	UNP F2NNS0
A	24	GLY	-	expression tag	UNP F2NNS0

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	25	LEU	-	expression tag	UNP F2NNS0
A	26	VAL	-	expression tag	UNP F2NNS0
A	27	PRO	-	expression tag	UNP F2NNS0
A	28	ARG	-	expression tag	UNP F2NNS0
A	29	GLY	-	expression tag	UNP F2NNS0
A	30	SER	-	expression tag	UNP F2NNS0
A	31	HIS	-	expression tag	UNP F2NNS0
B	12	MET	-	initiating methionine	UNP F2NNS0
B	13	GLY	-	expression tag	UNP F2NNS0
B	14	SER	-	expression tag	UNP F2NNS0
B	15	SER	-	expression tag	UNP F2NNS0
B	16	HIS	-	expression tag	UNP F2NNS0
B	17	HIS	-	expression tag	UNP F2NNS0
B	18	HIS	-	expression tag	UNP F2NNS0
B	19	HIS	-	expression tag	UNP F2NNS0
B	20	HIS	-	expression tag	UNP F2NNS0
B	21	HIS	-	expression tag	UNP F2NNS0
B	22	SER	-	expression tag	UNP F2NNS0
B	23	SER	-	expression tag	UNP F2NNS0
B	24	GLY	-	expression tag	UNP F2NNS0
B	25	LEU	-	expression tag	UNP F2NNS0
B	26	VAL	-	expression tag	UNP F2NNS0
B	27	PRO	-	expression tag	UNP F2NNS0
B	28	ARG	-	expression tag	UNP F2NNS0
B	29	GLY	-	expression tag	UNP F2NNS0
B	30	SER	-	expression tag	UNP F2NNS0
B	31	HIS	-	expression tag	UNP F2NNS0
C	12	MET	-	initiating methionine	UNP F2NNS0
C	13	GLY	-	expression tag	UNP F2NNS0
C	14	SER	-	expression tag	UNP F2NNS0
C	15	SER	-	expression tag	UNP F2NNS0
C	16	HIS	-	expression tag	UNP F2NNS0
C	17	HIS	-	expression tag	UNP F2NNS0
C	18	HIS	-	expression tag	UNP F2NNS0
C	19	HIS	-	expression tag	UNP F2NNS0
C	20	HIS	-	expression tag	UNP F2NNS0
C	21	HIS	-	expression tag	UNP F2NNS0
C	22	SER	-	expression tag	UNP F2NNS0
C	23	SER	-	expression tag	UNP F2NNS0
C	24	GLY	-	expression tag	UNP F2NNS0
C	25	LEU	-	expression tag	UNP F2NNS0
C	26	VAL	-	expression tag	UNP F2NNS0

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
C	27	PRO	-	expression tag	UNP F2NNS0
C	28	ARG	-	expression tag	UNP F2NNS0
C	29	GLY	-	expression tag	UNP F2NNS0
C	30	SER	-	expression tag	UNP F2NNS0
C	31	HIS	-	expression tag	UNP F2NNS0
D	12	MET	-	initiating methionine	UNP F2NNS0
D	13	GLY	-	expression tag	UNP F2NNS0
D	14	SER	-	expression tag	UNP F2NNS0
D	15	SER	-	expression tag	UNP F2NNS0
D	16	HIS	-	expression tag	UNP F2NNS0
D	17	HIS	-	expression tag	UNP F2NNS0
D	18	HIS	-	expression tag	UNP F2NNS0
D	19	HIS	-	expression tag	UNP F2NNS0
D	20	HIS	-	expression tag	UNP F2NNS0
D	21	HIS	-	expression tag	UNP F2NNS0
D	22	SER	-	expression tag	UNP F2NNS0
D	23	SER	-	expression tag	UNP F2NNS0
D	24	GLY	-	expression tag	UNP F2NNS0
D	25	LEU	-	expression tag	UNP F2NNS0
D	26	VAL	-	expression tag	UNP F2NNS0
D	27	PRO	-	expression tag	UNP F2NNS0
D	28	ARG	-	expression tag	UNP F2NNS0
D	29	GLY	-	expression tag	UNP F2NNS0
D	30	SER	-	expression tag	UNP F2NNS0
D	31	HIS	-	expression tag	UNP F2NNS0
E	12	MET	-	initiating methionine	UNP F2NNS0
E	13	GLY	-	expression tag	UNP F2NNS0
E	14	SER	-	expression tag	UNP F2NNS0
E	15	SER	-	expression tag	UNP F2NNS0
E	16	HIS	-	expression tag	UNP F2NNS0
E	17	HIS	-	expression tag	UNP F2NNS0
E	18	HIS	-	expression tag	UNP F2NNS0
E	19	HIS	-	expression tag	UNP F2NNS0
E	20	HIS	-	expression tag	UNP F2NNS0
E	21	HIS	-	expression tag	UNP F2NNS0
E	22	SER	-	expression tag	UNP F2NNS0
E	23	SER	-	expression tag	UNP F2NNS0
E	24	GLY	-	expression tag	UNP F2NNS0
E	25	LEU	-	expression tag	UNP F2NNS0
E	26	VAL	-	expression tag	UNP F2NNS0
E	27	PRO	-	expression tag	UNP F2NNS0
E	28	ARG	-	expression tag	UNP F2NNS0

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
E	29	GLY	-	expression tag	UNP F2NNS0
E	30	SER	-	expression tag	UNP F2NNS0
E	31	HIS	-	expression tag	UNP F2NNS0
F	12	MET	-	initiating methionine	UNP F2NNS0
F	13	GLY	-	expression tag	UNP F2NNS0
F	14	SER	-	expression tag	UNP F2NNS0
F	15	SER	-	expression tag	UNP F2NNS0
F	16	HIS	-	expression tag	UNP F2NNS0
F	17	HIS	-	expression tag	UNP F2NNS0
F	18	HIS	-	expression tag	UNP F2NNS0
F	19	HIS	-	expression tag	UNP F2NNS0
F	20	HIS	-	expression tag	UNP F2NNS0
F	21	HIS	-	expression tag	UNP F2NNS0
F	22	SER	-	expression tag	UNP F2NNS0
F	23	SER	-	expression tag	UNP F2NNS0
F	24	GLY	-	expression tag	UNP F2NNS0
F	25	LEU	-	expression tag	UNP F2NNS0
F	26	VAL	-	expression tag	UNP F2NNS0
F	27	PRO	-	expression tag	UNP F2NNS0
F	28	ARG	-	expression tag	UNP F2NNS0
F	29	GLY	-	expression tag	UNP F2NNS0
F	30	SER	-	expression tag	UNP F2NNS0
F	31	HIS	-	expression tag	UNP F2NNS0
G	12	MET	-	initiating methionine	UNP F2NNS0
G	13	GLY	-	expression tag	UNP F2NNS0
G	14	SER	-	expression tag	UNP F2NNS0
G	15	SER	-	expression tag	UNP F2NNS0
G	16	HIS	-	expression tag	UNP F2NNS0
G	17	HIS	-	expression tag	UNP F2NNS0
G	18	HIS	-	expression tag	UNP F2NNS0
G	19	HIS	-	expression tag	UNP F2NNS0
G	20	HIS	-	expression tag	UNP F2NNS0
G	21	HIS	-	expression tag	UNP F2NNS0
G	22	SER	-	expression tag	UNP F2NNS0
G	23	SER	-	expression tag	UNP F2NNS0
G	24	GLY	-	expression tag	UNP F2NNS0
G	25	LEU	-	expression tag	UNP F2NNS0
G	26	VAL	-	expression tag	UNP F2NNS0
G	27	PRO	-	expression tag	UNP F2NNS0
G	28	ARG	-	expression tag	UNP F2NNS0
G	29	GLY	-	expression tag	UNP F2NNS0
G	30	SER	-	expression tag	UNP F2NNS0

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
G	31	HIS	-	expression tag	UNP F2NNS0
H	12	MET	-	initiating methionine	UNP F2NNS0
H	13	GLY	-	expression tag	UNP F2NNS0
H	14	SER	-	expression tag	UNP F2NNS0
H	15	SER	-	expression tag	UNP F2NNS0
H	16	HIS	-	expression tag	UNP F2NNS0
H	17	HIS	-	expression tag	UNP F2NNS0
H	18	HIS	-	expression tag	UNP F2NNS0
H	19	HIS	-	expression tag	UNP F2NNS0
H	20	HIS	-	expression tag	UNP F2NNS0
H	21	HIS	-	expression tag	UNP F2NNS0
H	22	SER	-	expression tag	UNP F2NNS0
H	23	SER	-	expression tag	UNP F2NNS0
H	24	GLY	-	expression tag	UNP F2NNS0
H	25	LEU	-	expression tag	UNP F2NNS0
H	26	VAL	-	expression tag	UNP F2NNS0
H	27	PRO	-	expression tag	UNP F2NNS0
H	28	ARG	-	expression tag	UNP F2NNS0
H	29	GLY	-	expression tag	UNP F2NNS0
H	30	SER	-	expression tag	UNP F2NNS0
H	31	HIS	-	expression tag	UNP F2NNS0

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

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

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

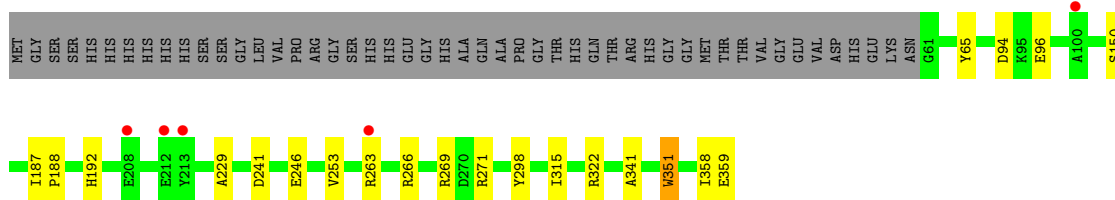
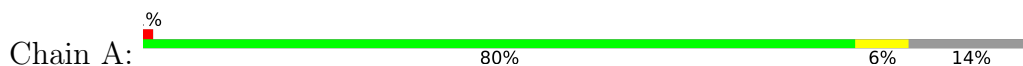
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	94	Total O 94 94	0	0
4	B	84	Total O 84 84	0	0
4	C	87	Total O 87 87	0	0
4	D	87	Total O 87 87	0	0
4	E	70	Total O 70 70	0	0
4	F	59	Total O 59 59	0	0
4	G	75	Total O 75 75	0	0
4	H	63	Total O 63 63	0	0

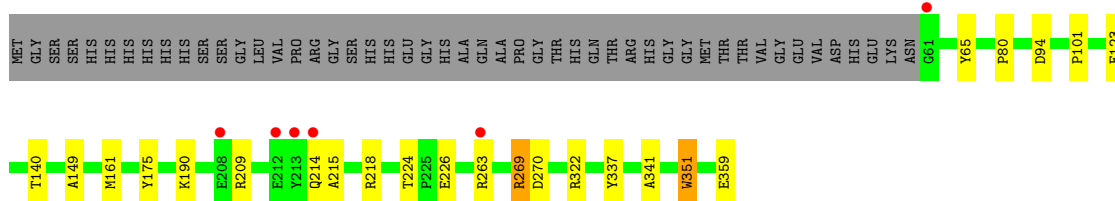
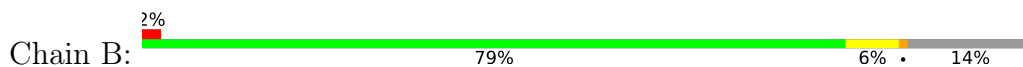
3 Residue-property plots [i](#)

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.

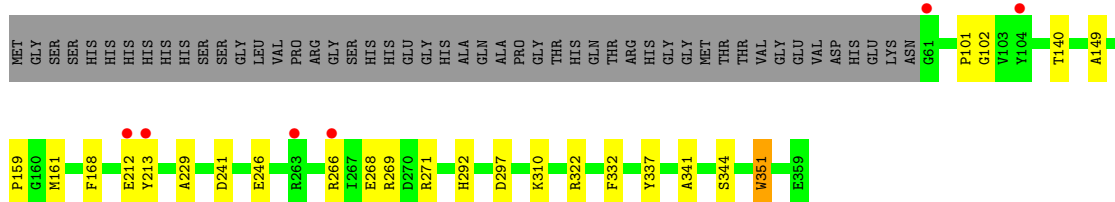
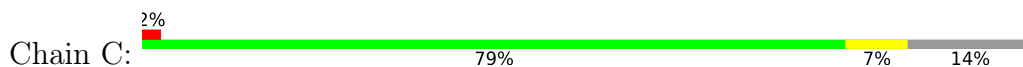
- Molecule 1: multicopper oxidase



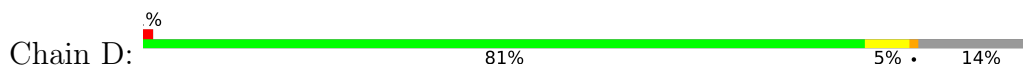
- Molecule 1: multicopper oxidase

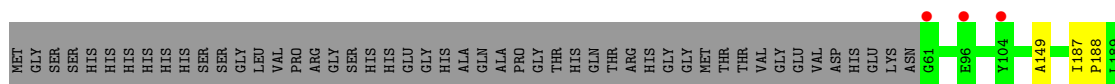


- Molecule 1: multicopper oxidase

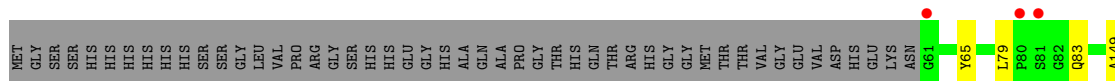
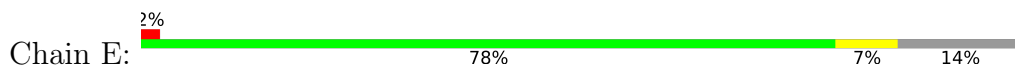


- Molecule 1: multicopper oxidase

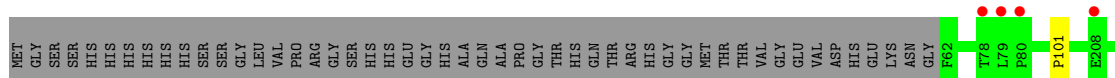
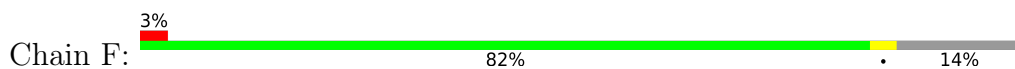




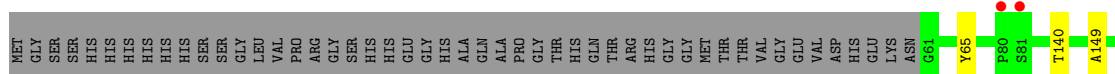
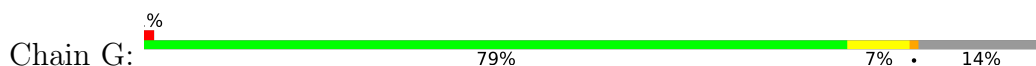
- Molecule 1: multicopper oxidase



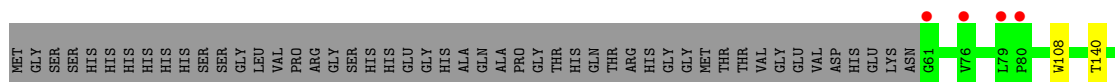
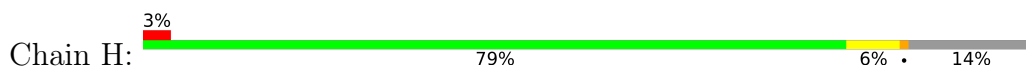
- Molecule 1: multicopper oxidase



- Molecule 1: multicopper oxidase



- Molecule 1: multicopper oxidase



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, α , β , γ	224.24Å 224.24Å 224.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	56.06 – 1.92 56.06 – 1.92	Depositor EDS
% Data completeness (in resolution range)	98.0 (56.06-1.92) 98.0 (56.06-1.92)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.37 (at 1.91Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.270 , 0.298 0.270 , 0.298	Depositor DCC
R_{free} test set	13962 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	27.2	Xtrriage
Anisotropy	0.000	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.66$, $\langle L^2 \rangle = 0.53$	Xtrriage
Estimated twinning fraction	0.000 for l,-k,h	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	20087	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 46.18 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1886e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: MG, 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	0.43	0/2526	0.58	0/3445
1	B	0.40	0/2526	0.57	0/3445
1	C	0.41	0/2526	0.57	0/3445
1	D	0.44	0/2526	0.59	0/3445
1	E	0.39	0/2526	0.58	0/3445
1	F	0.36	0/2522	0.57	0/3440
1	G	0.40	0/2526	0.57	0/3445
1	H	0.38	0/2526	0.57	0/3445
All	All	0.40	0/20204	0.58	0/27555

There are no bond length outliers.

There are no bond angle outliers.

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	2431	0	2261	16	0
1	B	2431	0	2261	21	0
1	C	2431	0	2261	17	0
1	D	2431	0	2261	12	0
1	E	2431	0	2261	17	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	2427	0	2258	8	0
1	G	2431	0	2261	20	0
1	H	2431	0	2261	16	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
2	E	2	0	0	0	0
2	F	2	0	0	0	0
2	G	2	0	0	0	0
2	H	2	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
3	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	94	0	0	1	0
4	B	84	0	0	1	0
4	C	87	0	0	0	0
4	D	87	0	0	1	0
4	E	70	0	0	2	0
4	F	59	0	0	0	0
4	G	75	0	0	1	0
4	H	63	0	0	1	0
All	All	20087	0	18085	113	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 3.

All (113) 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:H:267:ILE:HD11	1:H:355:PHE:CD1	2.13	0.84
1:B:269:ARG:HD2	1:B:359:GLU:HA	1.62	0.82
1:G:269:ARG:HD2	1:G:359:GLU:HA	1.73	0.71
1:H:267:ILE:HD11	1:H:355:PHE:HD1	1.56	0.70
1:C:297:ASP:OD1	1:C:310:LYS:HD3	1.95	0.66
1:D:212:GLU:HG2	1:D:213:TYR:CD2	2.30	0.66

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:269:ARG:HH11	1:A:359:GLU:HB3	1.59	0.66
1:C:229:ALA:O	1:C:271:ARG:HD2	1.95	0.66
1:H:341:ALA:HB2	1:H:351[B]:TRP:CD1	2.33	0.64
1:E:218:ARG:NH2	1:E:226:GLU:OE1	2.31	0.64
1:B:341:ALA:HB2	1:B:351[B]:TRP:CD1	2.33	0.63
1:F:241:ASP:OD2	1:F:246:GLU:N	2.33	0.61
1:F:341:ALA:HB2	1:F:351[A]:TRP:CD1	2.35	0.61
1:C:341:ALA:HB2	1:C:351[B]:TRP:CD1	2.35	0.61
1:H:267:ILE:HD13	1:H:355:PHE:HB3	1.82	0.61
1:B:175:TYR:HE2	1:B:209:ARG:NH2	1.98	0.61
1:G:341:ALA:HB2	1:G:351[B]:TRP:CD1	2.36	0.60
1:B:214:GLN:HG2	1:B:215:ALA:N	2.18	0.59
1:B:341:ALA:HB2	1:B:351[A]:TRP:CD1	2.37	0.59
1:E:341:ALA:HB2	1:E:351[A]:TRP:CD1	2.38	0.58
1:C:341:ALA:HB2	1:C:351[A]:TRP:CD1	2.37	0.58
1:A:269:ARG:HD3	1:A:359:GLU:HA	1.85	0.58
1:G:212:GLU:HG2	1:G:213:TYR:CD2	2.38	0.58
1:B:123:GLU:HG2	1:B:209:ARG:NH2	2.19	0.57
1:D:341:ALA:HB2	1:D:351[A]:TRP:CD1	2.40	0.56
1:F:341:ALA:HB2	1:F:351[B]:TRP:CD1	2.40	0.56
1:D:209:ARG:NH1	4:D:501:HOH:O	2.37	0.56
1:H:341:ALA:HB2	1:H:351[A]:TRP:CD1	2.41	0.56
1:G:341:ALA:HB2	1:G:351[A]:TRP:CD1	2.41	0.55
1:G:224:THR:CG2	1:G:227:ASN:H	2.20	0.55
1:H:241:ASP:OD2	1:H:246:GLU:N	2.39	0.55
1:F:229:ALA:O	1:F:271:ARG:HD2	2.07	0.55
1:A:341:ALA:HB2	1:A:351[A]:TRP:CD1	2.41	0.54
1:H:214:GLN:O	1:H:218:ARG:HG3	2.07	0.54
1:H:224:THR:HG22	1:H:226:GLU:H	1.74	0.53
1:B:209:ARG:NH1	4:B:502:HOH:O	2.38	0.53
1:G:218:ARG:O	1:G:224:THR:HG21	2.10	0.52
1:C:241:ASP:OD2	1:C:246:GLU:N	2.42	0.51
1:H:177:PHE:CZ	1:H:305:LEU:HD22	2.46	0.51
1:B:123:GLU:HG2	1:B:209:ARG:HH22	1.76	0.51
1:D:337:TYR:CZ	1:G:149:ALA:HB2	2.46	0.51
1:B:218:ARG:NH2	1:B:224:THR:HG23	2.27	0.50
1:G:241:ASP:OD2	1:G:246:GLU:N	2.45	0.50
1:E:337:TYR:CZ	1:H:149:ALA:HB2	2.46	0.50
1:H:108:TRP:CE2	1:H:195:LYS:HD2	2.46	0.50
1:A:241:ASP:OD2	1:A:246:GLU:N	2.46	0.49
1:G:214:GLN:O	1:G:218:ARG:HG3	2.12	0.49

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:269:ARG:HH11	1:A:359:GLU:CB	2.24	0.49
1:C:149:ALA:HB2	1:H:337:TYR:CZ	2.48	0.49
1:E:65:TYR:CE1	1:E:263:ARG:HB3	2.48	0.49
1:C:337:TYR:CZ	1:E:149:ALA:HB2	2.48	0.48
1:G:192:HIS:HB2	4:G:537:HOH:O	2.13	0.48
1:B:269:ARG:HG2	1:B:270:ASP:N	2.30	0.47
1:F:269:ARG:HD2	1:F:332:PHE:O	2.14	0.47
1:B:337:TYR:CZ	1:D:149:ALA:HB2	2.49	0.47
1:E:297:ASP:OD1	1:E:310:LYS:HD3	2.15	0.47
1:D:241:ASP:OD2	1:D:246:GLU:N	2.46	0.47
1:A:298:TYR:CE1	1:A:315:ILE:HD13	2.49	0.47
1:B:149:ALA:HB2	1:G:337:TYR:CZ	2.50	0.47
1:E:79:LEU:HD12	1:E:83:GLN:HB3	1.96	0.46
1:A:94:ASP:HB3	1:C:101:PRO:HG2	1.98	0.46
1:C:269:ARG:HD2	1:C:332:PHE:O	2.15	0.46
1:H:192:HIS:HB2	4:H:542:HOH:O	2.15	0.46
1:B:224:THR:HG22	1:B:226:GLU:H	1.80	0.46
1:D:212:GLU:H	1:D:212:GLU:CD	2.20	0.46
1:H:267:ILE:CD1	1:H:355:PHE:HB3	2.46	0.45
1:D:341:ALA:HB2	1:D:351[B]:TRP:CD1	2.51	0.45
1:B:175:TYR:CE2	1:B:209:ARG:NH2	2.82	0.45
1:B:214:GLN:HG2	1:B:215:ALA:H	1.82	0.45
1:A:266:ARG:HD3	1:A:358:ILE:HD13	1.99	0.45
1:H:140:THR:HG22	1:H:161:MET:HA	1.99	0.45
1:B:65:TYR:CE1	1:B:263:ARG:HB2	2.52	0.44
1:G:218:ARG:NH1	1:G:226:GLU:OE1	2.51	0.44
1:A:187:ILE:HA	1:A:188:PRO:HA	1.85	0.44
1:E:269:ARG:HD2	1:E:332:PHE:O	2.18	0.44
1:C:266:ARG:NH2	1:C:268:GLU:OE1	2.41	0.44
1:B:140:THR:HG22	1:B:161:MET:HA	2.01	0.43
1:D:269:ARG:HD3	1:D:332:PHE:O	2.19	0.43
1:D:297:ASP:OD2	1:D:310:LYS:HE2	2.18	0.43
1:E:341:ALA:HB2	1:E:351[B]:TRP:CD1	2.53	0.43
1:G:224:THR:HG22	1:G:227:ASN:CB	2.49	0.43
1:F:263:ARG:HE	1:F:263:ARG:HB2	1.59	0.43
1:A:65:TYR:CE1	1:A:263:ARG:HB3	2.53	0.43
1:C:140:THR:HG22	1:C:161:MET:HA	2.00	0.43
1:B:65:TYR:CE2	1:B:263:ARG:NH1	2.87	0.43
1:F:269:ARG:HB2	1:F:358:ILE:O	2.19	0.43
1:E:192:HIS:HB2	4:E:540:HOH:O	2.19	0.42
1:B:94:ASP:HB3	1:F:101:PRO:HG2	2.00	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:269:ARG:CD	1:G:359:GLU:HA	2.48	0.42
1:A:96:GLU:HB3	1:C:102:GLY:CA	2.50	0.42
1:E:195:LYS:NZ	4:E:502:HOH:O	2.51	0.42
1:A:96:GLU:HB3	1:C:102:GLY:HA2	2.01	0.42
1:G:224:THR:HG22	1:G:227:ASN:H	1.85	0.42
1:H:212:GLU:HG2	1:H:213:TYR:CD2	2.54	0.42
1:A:341:ALA:HB2	1:A:351[B]:TRP:CD1	2.55	0.42
1:E:269:ARG:HB2	1:E:358:ILE:O	2.20	0.42
1:C:212:GLU:HG2	1:C:213:TYR:CD2	2.55	0.41
1:C:292:HIS:ND1	1:E:152:ASP:OD2	2.53	0.41
1:D:187:ILE:HA	1:D:188:PRO:HA	1.89	0.41
1:E:241:ASP:OD2	1:E:246:GLU:N	2.52	0.41
1:C:344:SER:HB2	1:E:190:LYS:HB3	2.01	0.41
1:E:218:ARG:HH21	1:E:226:GLU:CD	2.24	0.41
1:C:159:PRO:HG3	1:C:168:PHE:CE1	2.56	0.41
1:G:224:THR:HG23	1:G:227:ASN:H	1.84	0.41
1:G:298:TYR:CE1	1:G:315:ILE:HD13	2.56	0.41
1:A:229:ALA:O	1:A:271:ARG:HB3	2.20	0.41
1:G:65:TYR:CE1	1:G:263:ARG:HB3	2.56	0.41
1:B:190:LYS:HB3	1:G:344:SER:HB2	2.03	0.41
1:E:296:PHE:HB3	1:E:327:PHE:HB3	2.03	0.41
1:A:192:HIS:HB2	4:A:558:HOH:O	2.20	0.40
1:G:140:THR:HG22	1:G:161:MET:HA	2.02	0.40
1:A:150:SER:HB2	1:B:80:PRO:HB2	2.02	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	299/348 (86%)	289 (97%)	10 (3%)	0	100 100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	299/348 (86%)	290 (97%)	9 (3%)	0	100	100
1	C	299/348 (86%)	291 (97%)	8 (3%)	0	100	100
1	D	299/348 (86%)	292 (98%)	7 (2%)	0	100	100
1	E	299/348 (86%)	289 (97%)	10 (3%)	0	100	100
1	F	298/348 (86%)	290 (97%)	8 (3%)	0	100	100
1	G	299/348 (86%)	289 (97%)	10 (3%)	0	100	100
1	H	299/348 (86%)	290 (97%)	9 (3%)	0	100	100
All	All	2391/2784 (86%)	2320 (97%)	71 (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	254/291 (87%)	249 (98%)	5 (2%)	55	49
1	B	254/291 (87%)	249 (98%)	5 (2%)	55	49
1	C	254/291 (87%)	251 (99%)	3 (1%)	71	69
1	D	254/291 (87%)	247 (97%)	7 (3%)	43	34
1	E	254/291 (87%)	248 (98%)	6 (2%)	49	41
1	F	254/291 (87%)	251 (99%)	3 (1%)	71	69
1	G	254/291 (87%)	248 (98%)	6 (2%)	49	41
1	H	254/291 (87%)	248 (98%)	6 (2%)	49	41
All	All	2032/2328 (87%)	1991 (98%)	41 (2%)	67	49

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	253[A]	VAL
1	A	253[B]	VAL

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	322	ARG
1	A	351[A]	TRP
1	A	351[B]	TRP
1	B	101	PRO
1	B	269	ARG
1	B	322	ARG
1	B	351[A]	TRP
1	B	351[B]	TRP
1	C	322	ARG
1	C	351[A]	TRP
1	C	351[B]	TRP
1	D	190	LYS
1	D	212	GLU
1	D	253[A]	VAL
1	D	253[B]	VAL
1	D	322	ARG
1	D	351[A]	TRP
1	D	351[B]	TRP
1	E	188	PRO
1	E	253[A]	VAL
1	E	253[B]	VAL
1	E	322	ARG
1	E	351[A]	TRP
1	E	351[B]	TRP
1	F	322	ARG
1	F	351[A]	TRP
1	F	351[B]	TRP
1	G	253[A]	VAL
1	G	253[B]	VAL
1	G	269	ARG
1	G	322	ARG
1	G	351[A]	TRP
1	G	351[B]	TRP
1	H	212	GLU
1	H	253[A]	VAL
1	H	253[B]	VAL
1	H	322	ARG
1	H	351[A]	TRP
1	H	351[B]	TRP

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

Mol	Chain	Res	Type
1	B	137	HIS
1	C	317	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 24 ligands modelled in this entry, 24 are monoatomic - leaving 0 for Mogul analysis.

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.

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

6.1 Protein, DNA and RNA chains

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	299/348 (85%)	-0.13	5 (1%) 70 72	20, 25, 41, 52	0
1	B	299/348 (85%)	-0.10	6 (2%) 65 68	21, 28, 42, 54	0
1	C	299/348 (85%)	-0.10	6 (2%) 65 68	21, 28, 43, 58	0
1	D	299/348 (85%)	-0.09	5 (1%) 70 72	21, 26, 41, 51	0
1	E	299/348 (85%)	0.06	7 (2%) 60 63	23, 29, 44, 58	0
1	F	298/348 (85%)	0.11	9 (3%) 50 53	24, 32, 47, 66	0
1	G	299/348 (85%)	-0.01	5 (1%) 70 72	21, 28, 44, 57	0
1	H	299/348 (85%)	0.04	9 (3%) 50 53	23, 31, 46, 61	0
All	All	2391/2784 (85%)	-0.03	52 (2%) 62 65	20, 28, 44, 66	0

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	61	GLY	5.6
1	H	61	GLY	4.8
1	F	213	TYR	3.9
1	B	61	GLY	3.9
1	B	214	GLN	3.9
1	F	79	LEU	3.8
1	G	80	PRO	3.7
1	D	61	GLY	3.3
1	A	212	GLU	3.2
1	F	80	PRO	3.2
1	F	225	PRO	3.2
1	F	78	THR	3.1
1	H	208	GLU	2.9
1	H	80	PRO	2.9
1	H	76	VAL	2.9
1	D	104	TYR	2.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	F	214	GLN	2.8
1	A	213	TYR	2.8
1	C	213	TYR	2.8
1	H	79	LEU	2.8
1	E	61	GLY	2.7
1	C	266	ARG	2.7
1	E	81	SER	2.6
1	E	212	GLU	2.6
1	B	263	ARG	2.6
1	E	208	GLU	2.6
1	G	81	SER	2.6
1	E	214	GLN	2.5
1	H	223	GLY	2.5
1	B	213	TYR	2.4
1	E	80	PRO	2.4
1	F	208	GLU	2.3
1	F	359	GLU	2.3
1	H	267	ILE	2.3
1	E	213	TYR	2.3
1	F	212	GLU	2.2
1	H	263	ARG	2.2
1	G	214	GLN	2.2
1	C	104	TYR	2.2
1	D	208	GLU	2.2
1	D	212	GLU	2.2
1	D	96	GLU	2.1
1	B	212	GLU	2.1
1	A	263	ARG	2.1
1	H	224	THR	2.1
1	A	100	ALA	2.1
1	G	263	ARG	2.1
1	G	208	GLU	2.1
1	A	208	GLU	2.1
1	B	208	GLU	2.1
1	C	212	GLU	2.0
1	C	263	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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](#)

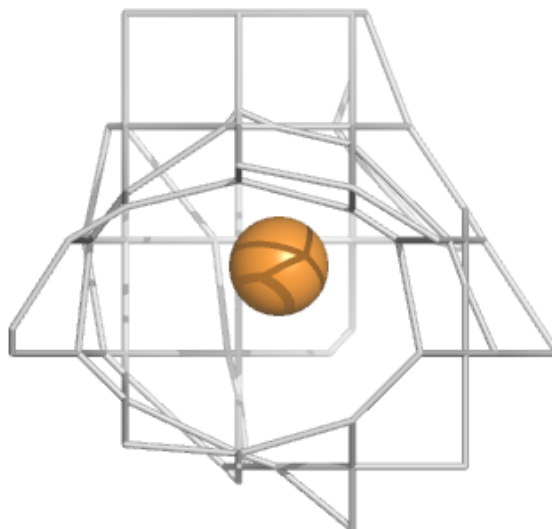
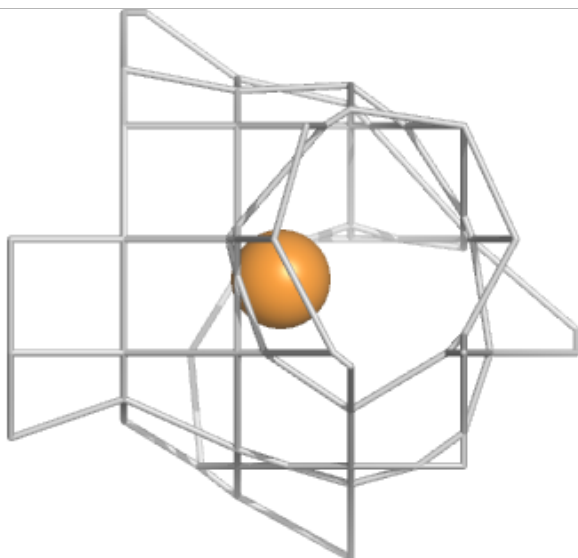
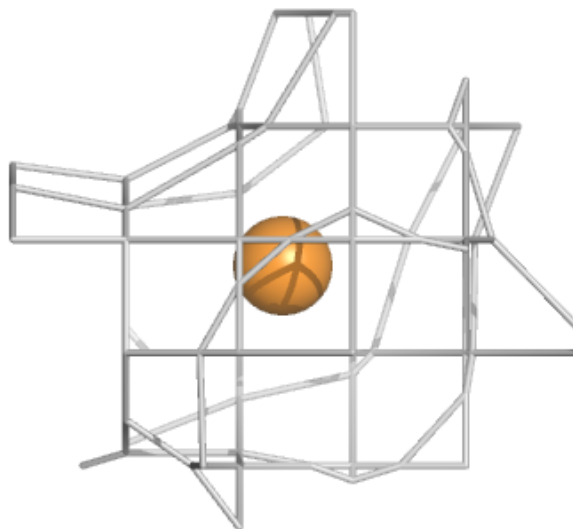
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

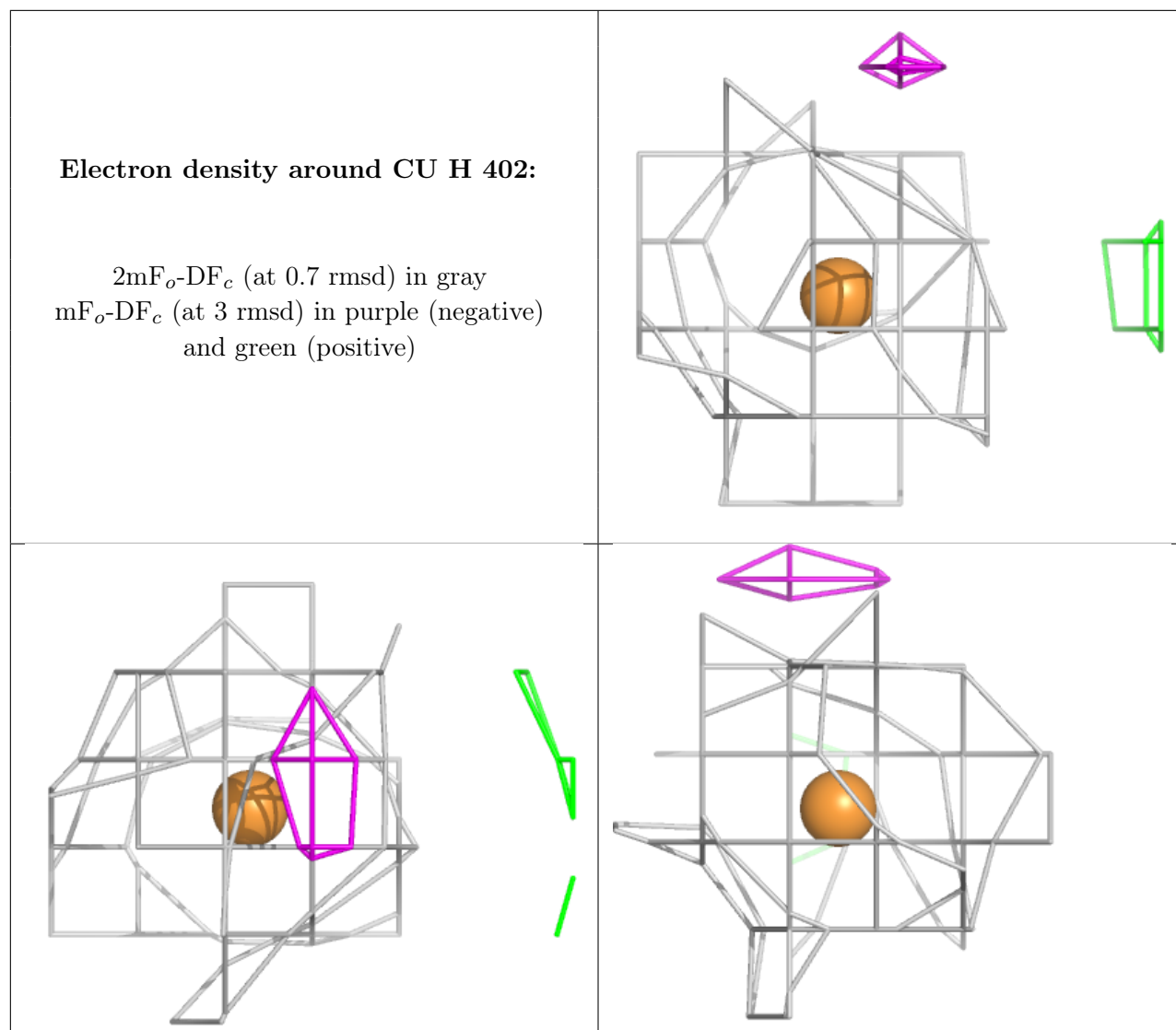
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	CU	B	402	1/1	0.92	0.14	75,75,75,75	1
2	CU	H	402	1/1	0.92	0.09	77,77,77,77	1
2	CU	C	402	1/1	0.93	0.15	71,71,71,71	1
3	MG	E	403	1/1	0.93	0.08	42,42,42,42	0
3	MG	G	403	1/1	0.93	0.11	42,42,42,42	0
3	MG	F	403	1/1	0.94	0.09	41,41,41,41	0
2	CU	D	402	1/1	0.94	0.11	71,71,71,71	1
3	MG	H	403	1/1	0.94	0.07	41,41,41,41	0
3	MG	C	403	1/1	0.95	0.18	42,42,42,42	0
2	CU	C	401	1/1	0.95	0.10	29,29,29,29	1
2	CU	D	401	1/1	0.95	0.15	54,54,54,54	1
3	MG	A	403	1/1	0.95	0.07	39,39,39,39	0
3	MG	B	403	1/1	0.95	0.18	41,41,41,41	0
2	CU	E	402	1/1	0.96	0.13	64,64,64,64	1
2	CU	G	402	1/1	0.96	0.08	54,54,54,54	1
2	CU	F	402	1/1	0.97	0.08	66,66,66,66	1
2	CU	A	402	1/1	0.97	0.14	64,64,64,64	1
2	CU	B	401	1/1	0.97	0.14	27,27,27,27	1
3	MG	D	403	1/1	0.97	0.08	41,41,41,41	0
2	CU	H	401	1/1	0.98	0.09	28,28,28,28	1
2	CU	E	401	1/1	0.98	0.08	28,28,28,28	1
2	CU	A	401	1/1	0.99	0.09	26,26,26,26	1
2	CU	F	401	1/1	0.99	0.06	29,29,29,29	1
2	CU	G	401	1/1	1.00	0.07	28,28,28,28	1

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 CU B 402:

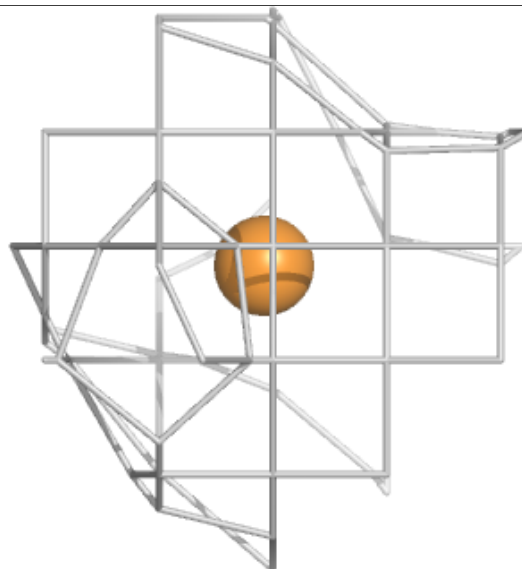
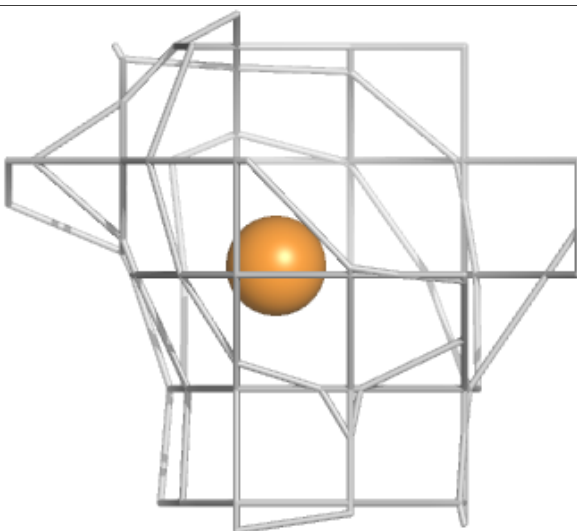
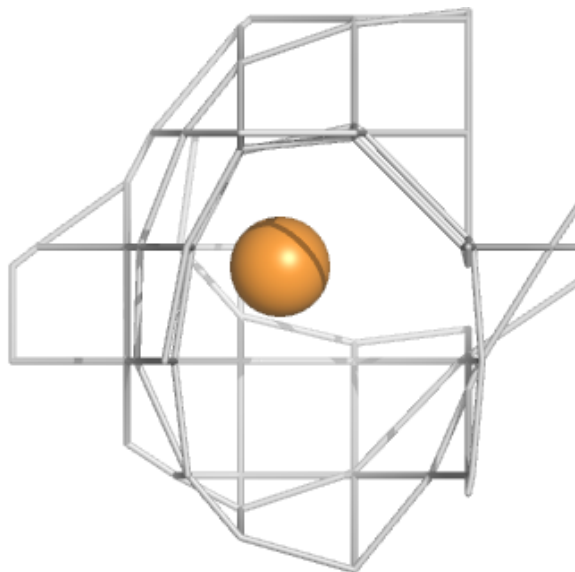
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





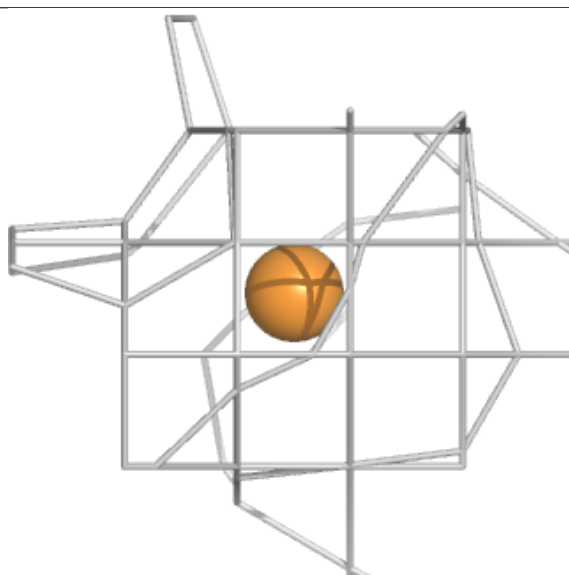
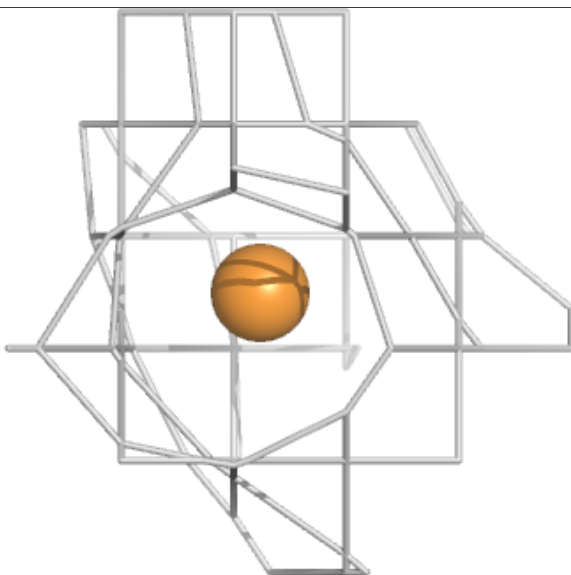
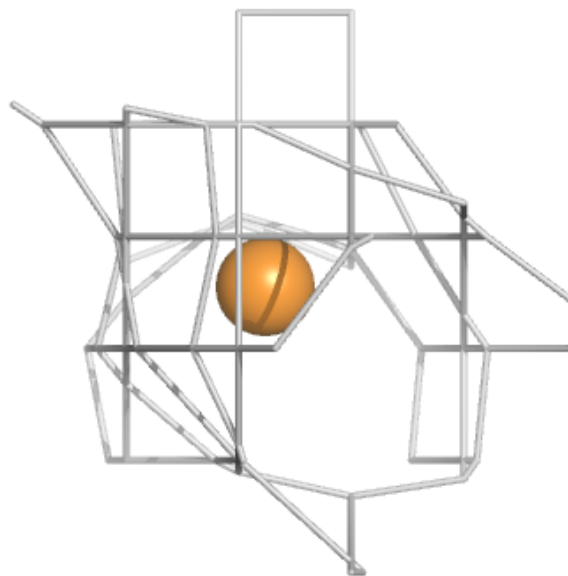
Electron density around CU C 402:

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



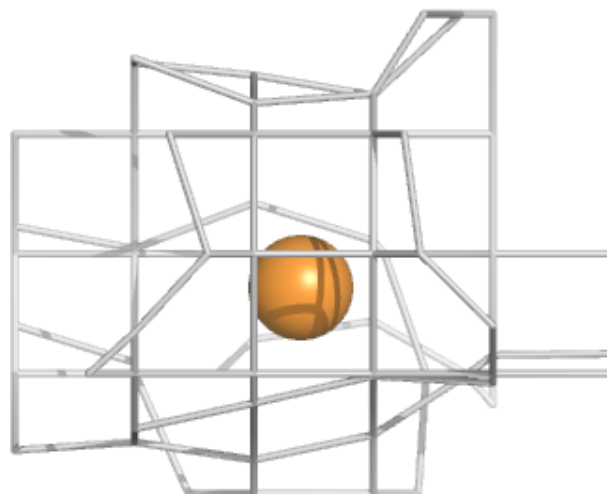
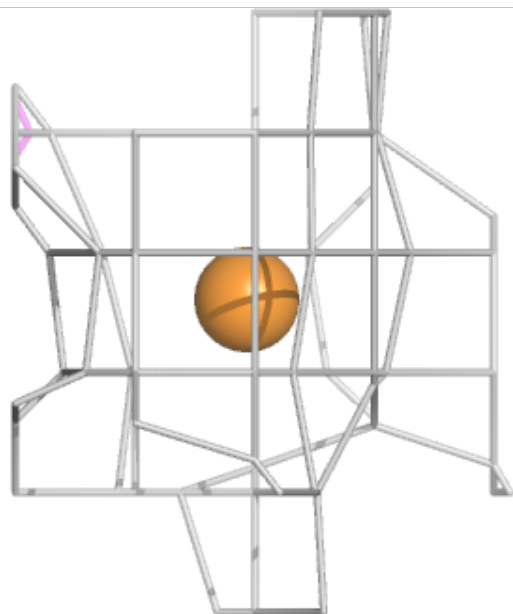
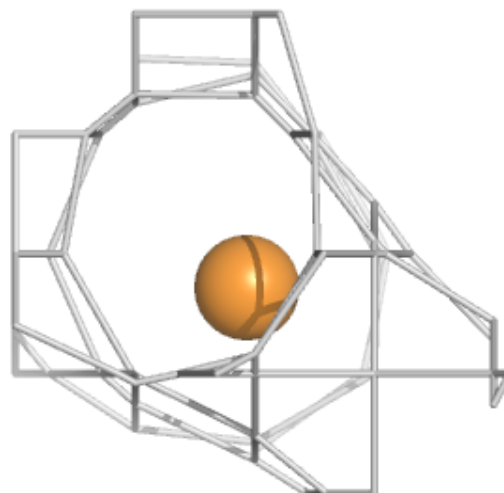
Electron density around CU D 402:

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



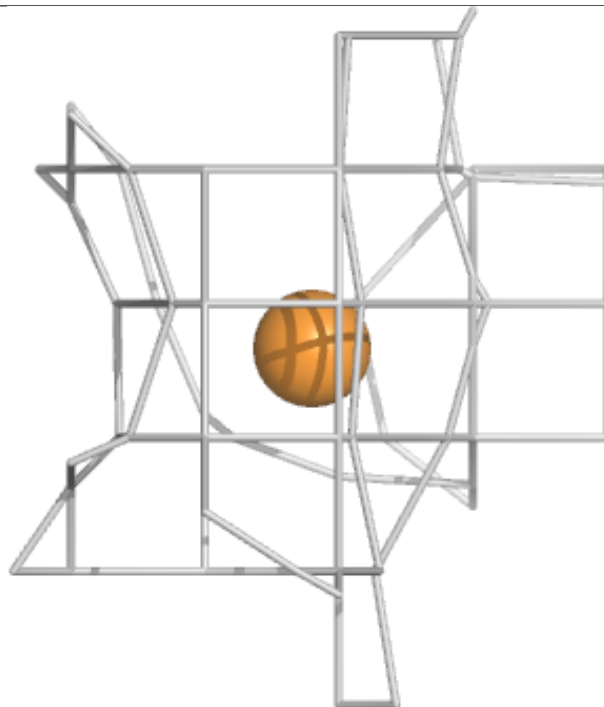
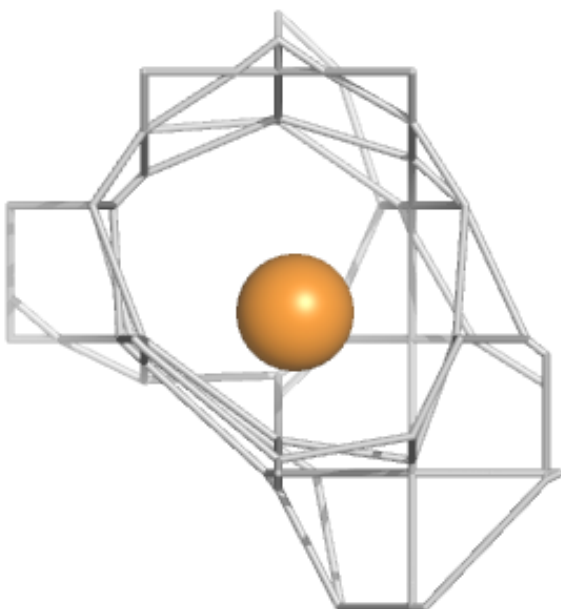
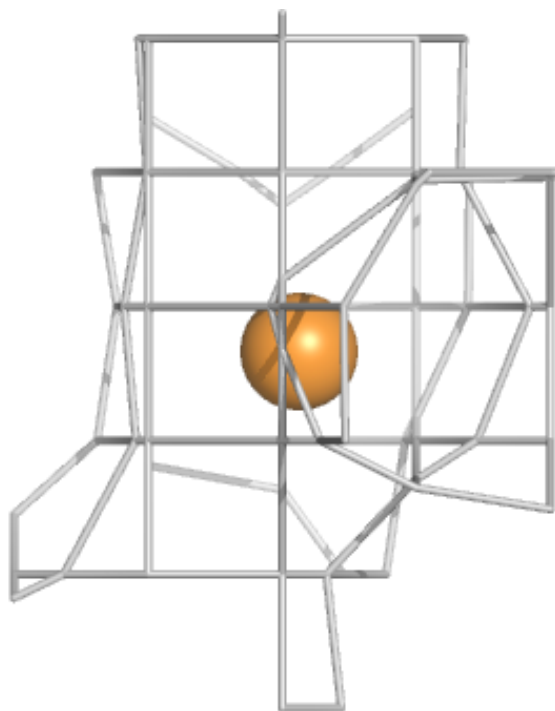
Electron density around CU C 401:

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



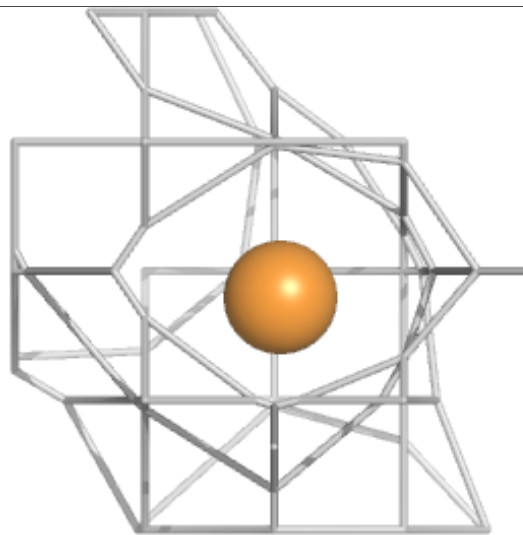
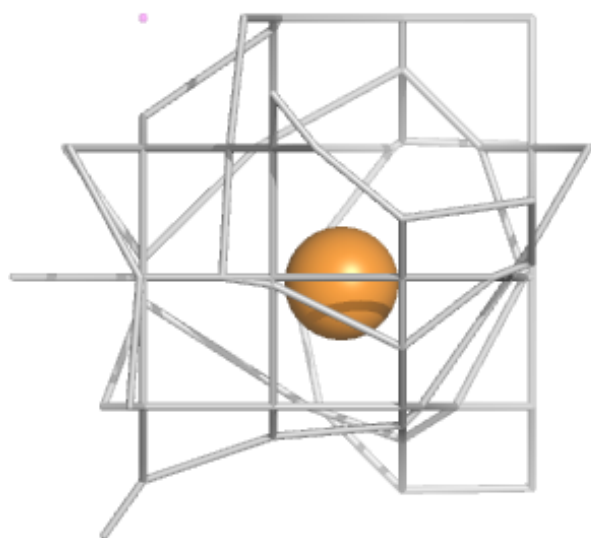
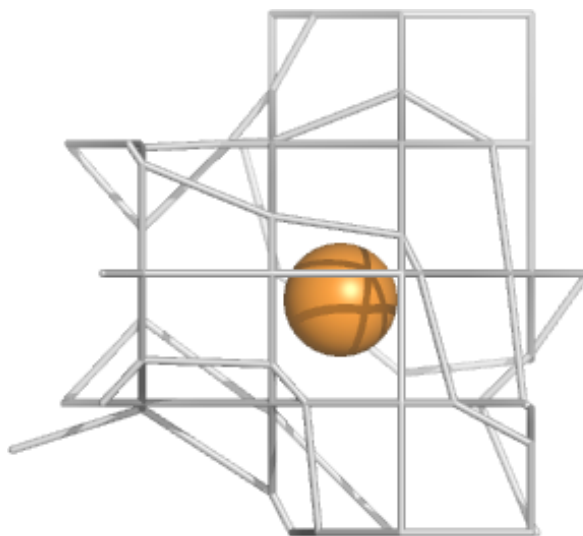
Electron density around CU D 401:

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



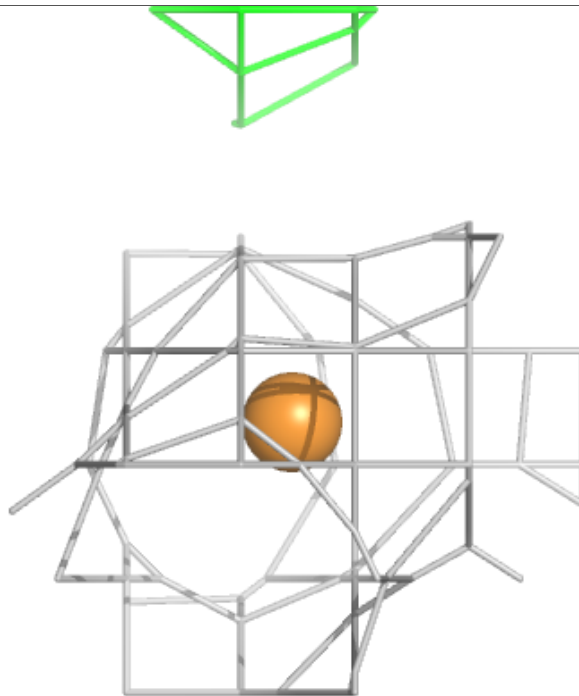
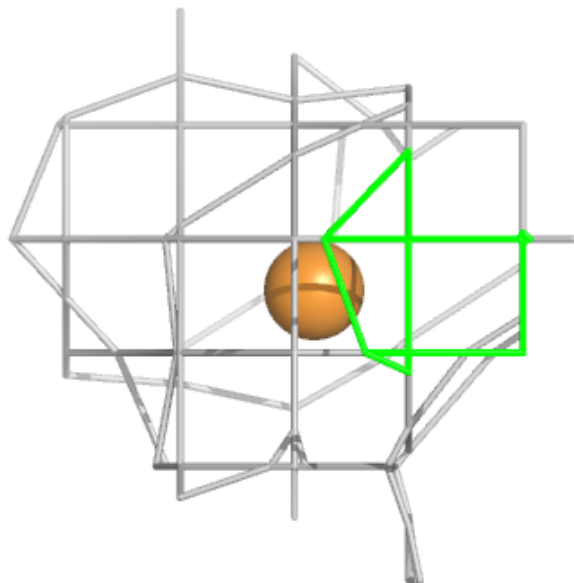
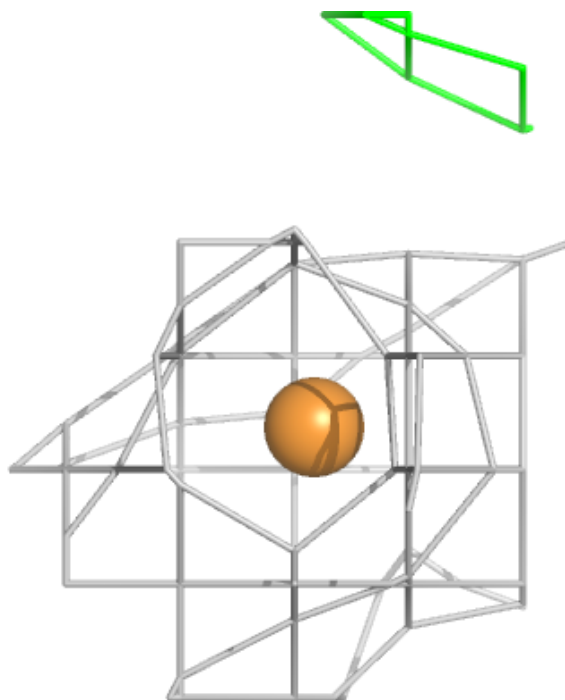
Electron density around CU E 402:

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



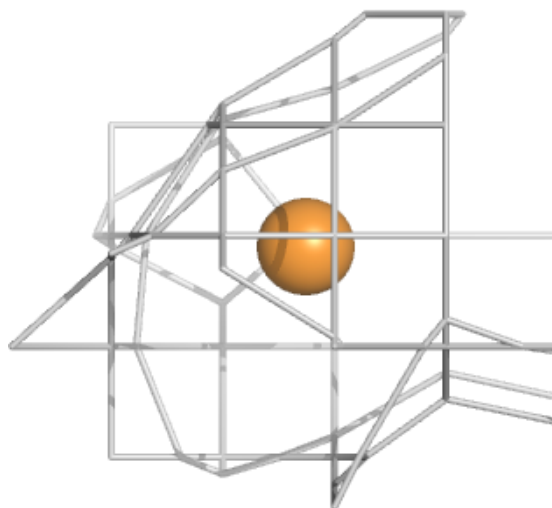
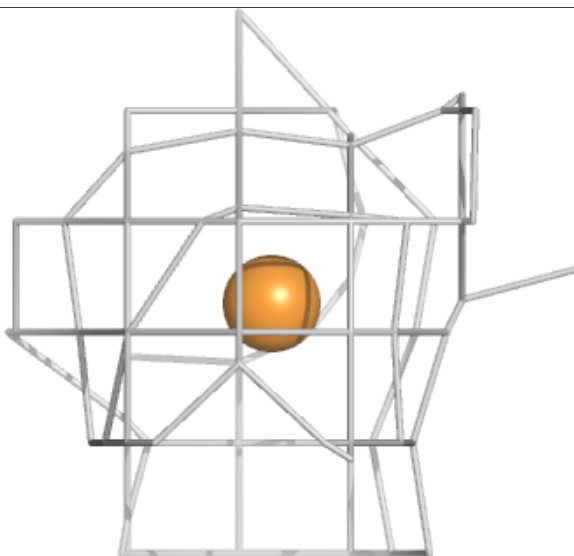
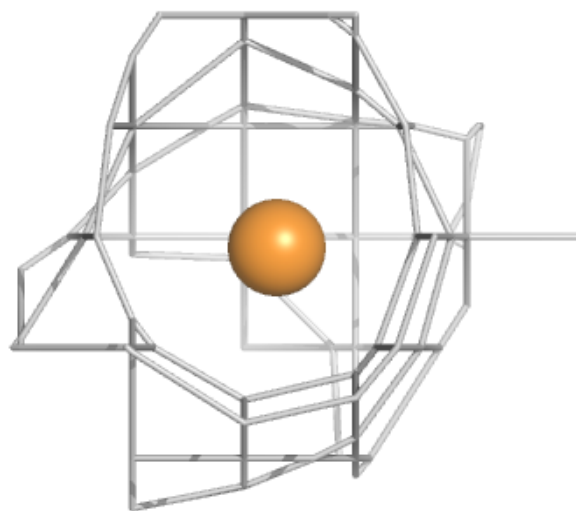
Electron density around CU G 402:

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



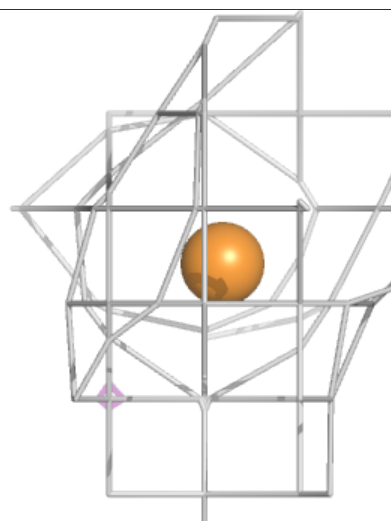
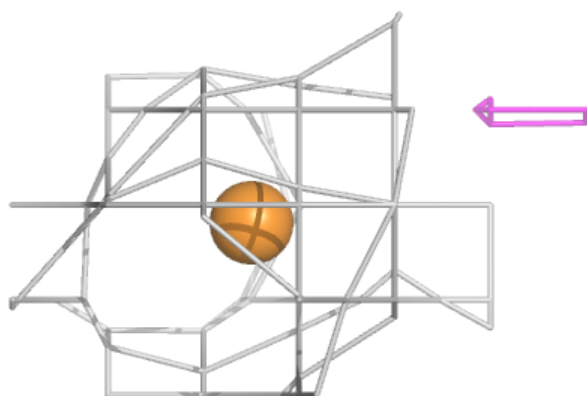
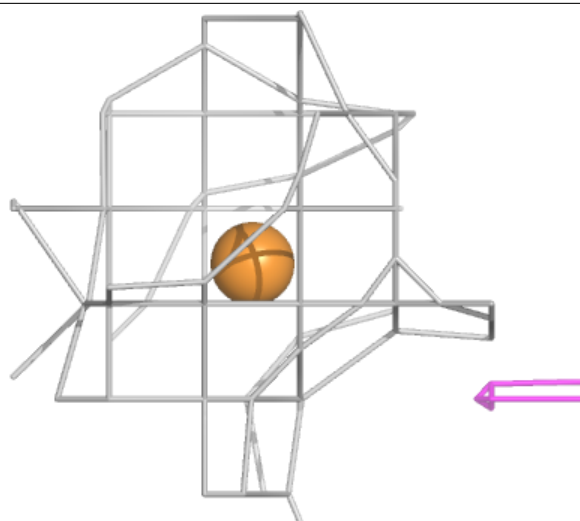
Electron density around CU F 402:

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



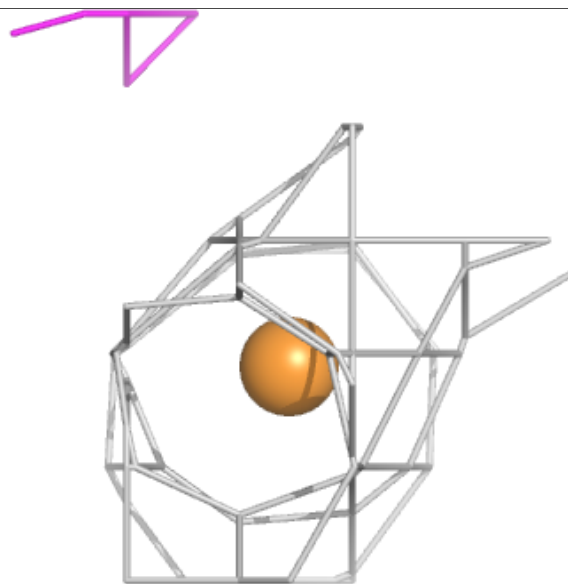
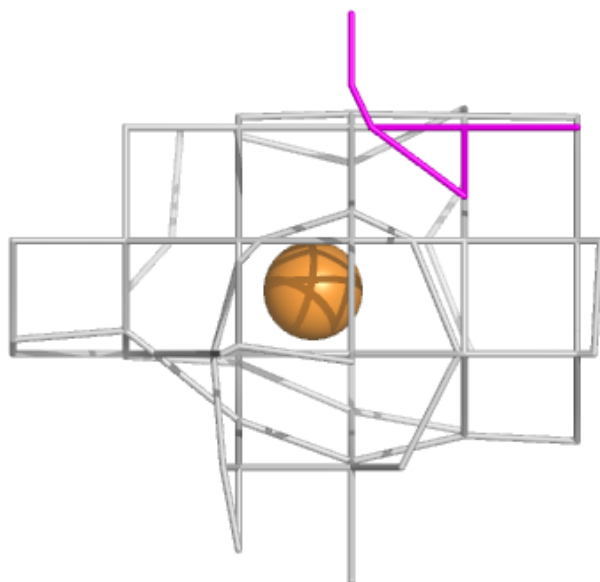
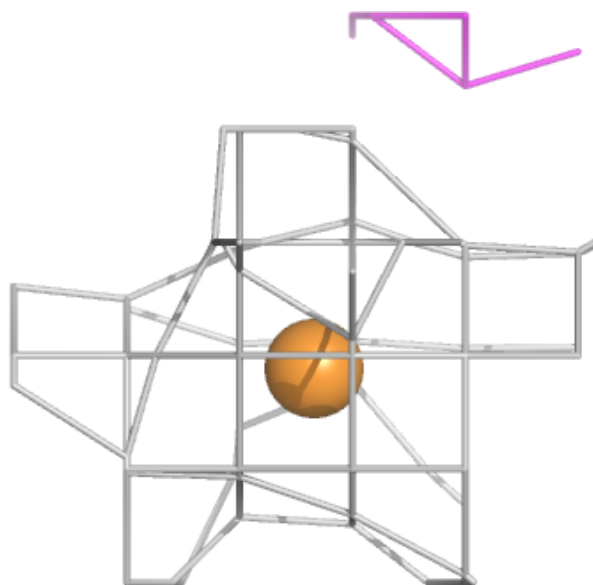
Electron density around CU A 402:

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



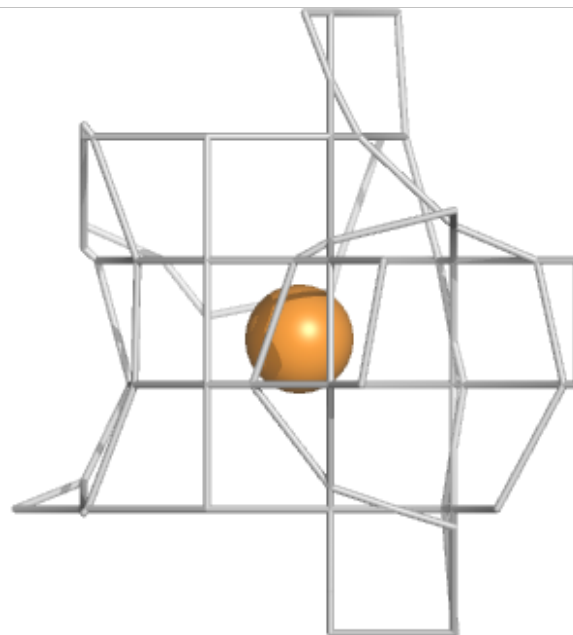
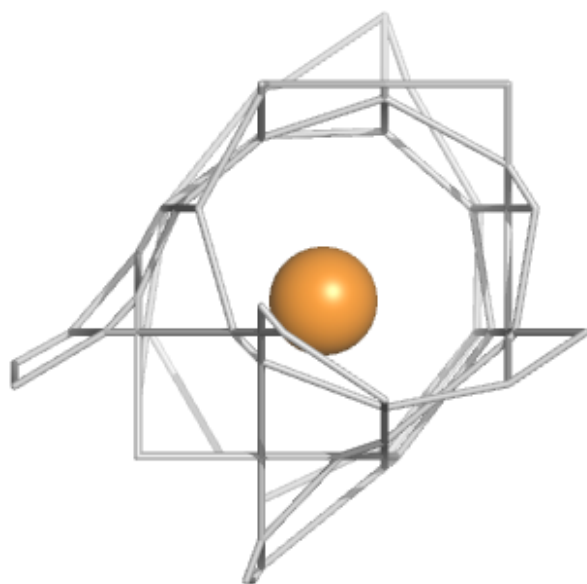
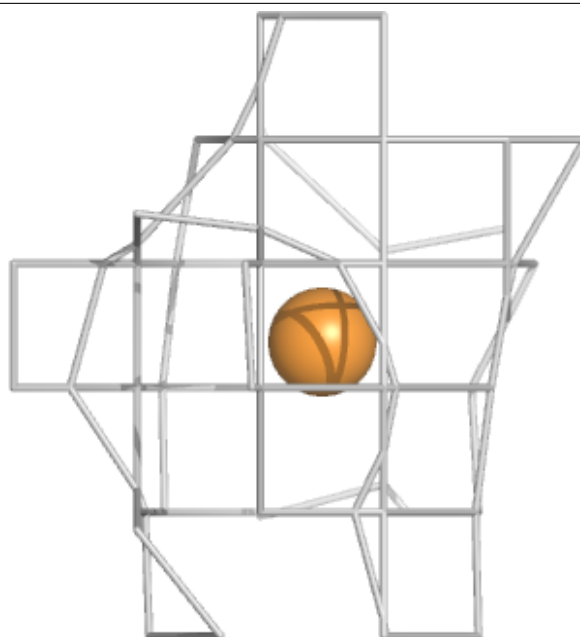
Electron density around CU B 401:

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



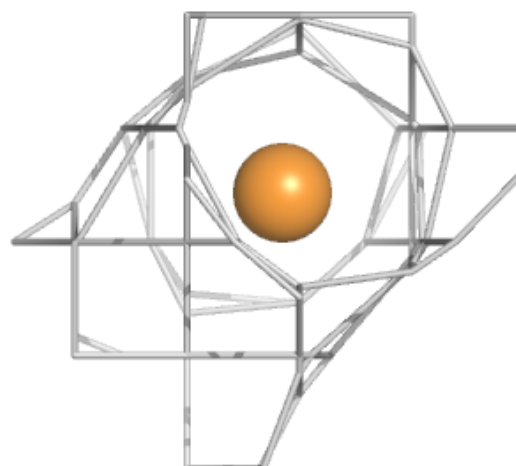
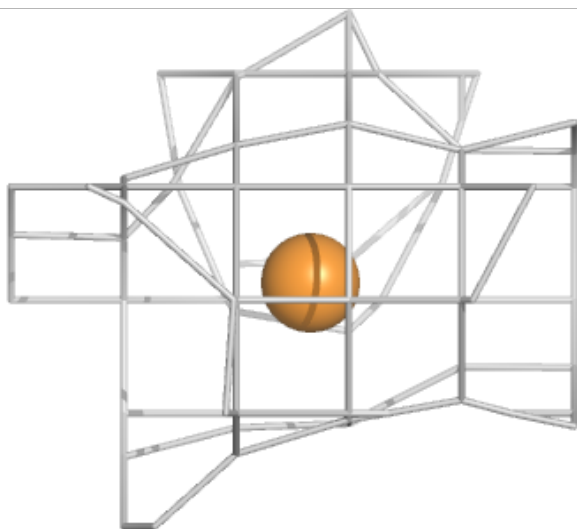
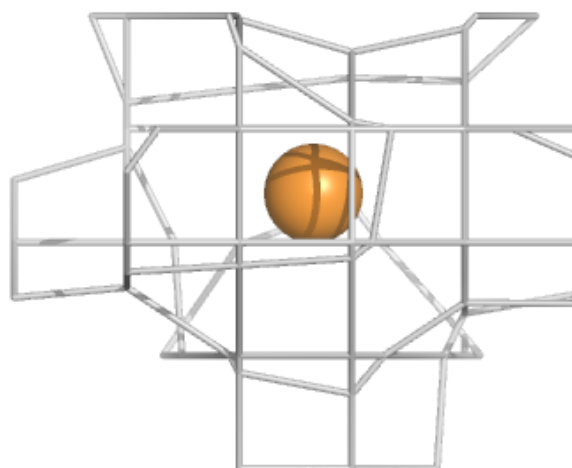
Electron density around CU H 401:

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



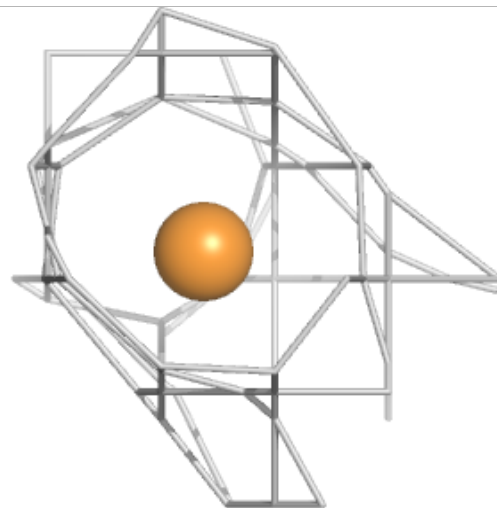
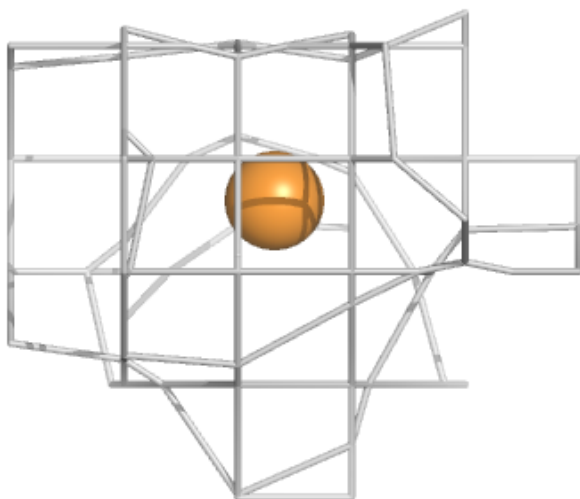
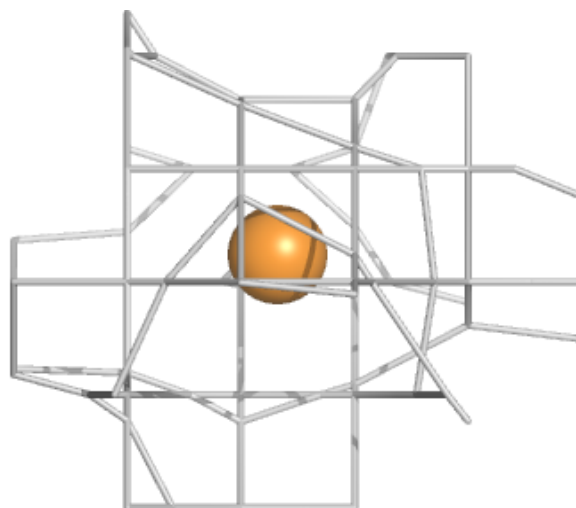
Electron density around CU E 401:

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



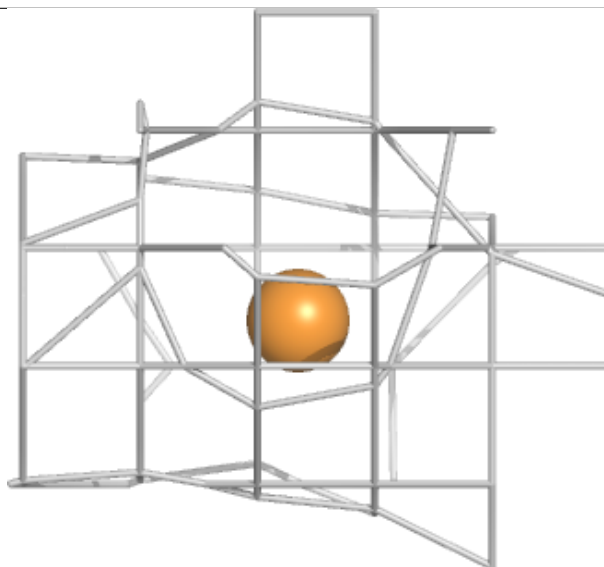
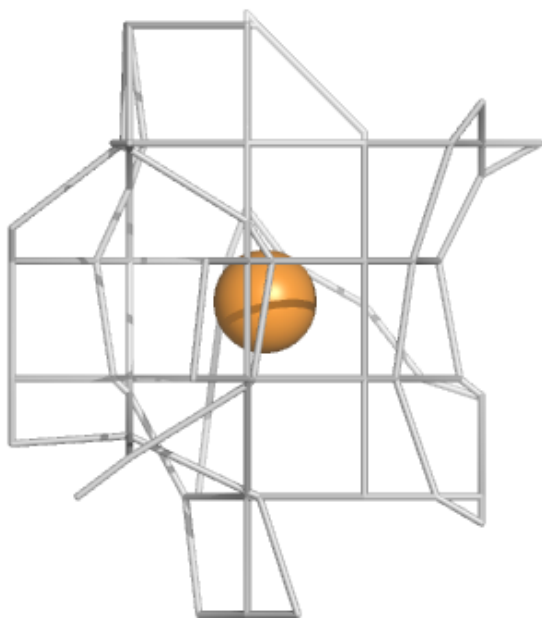
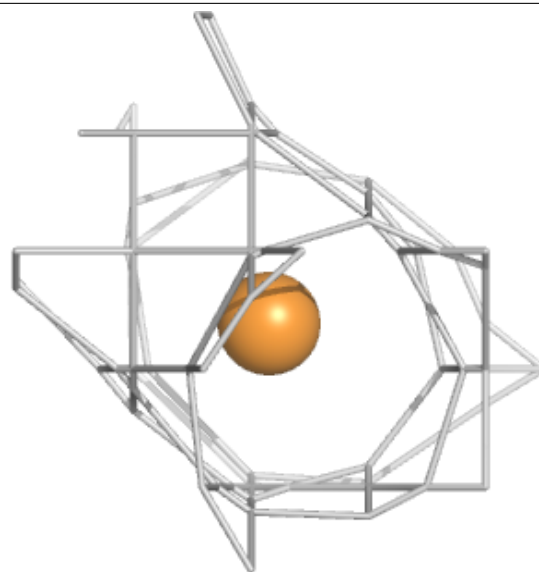
Electron density around CU A 401:

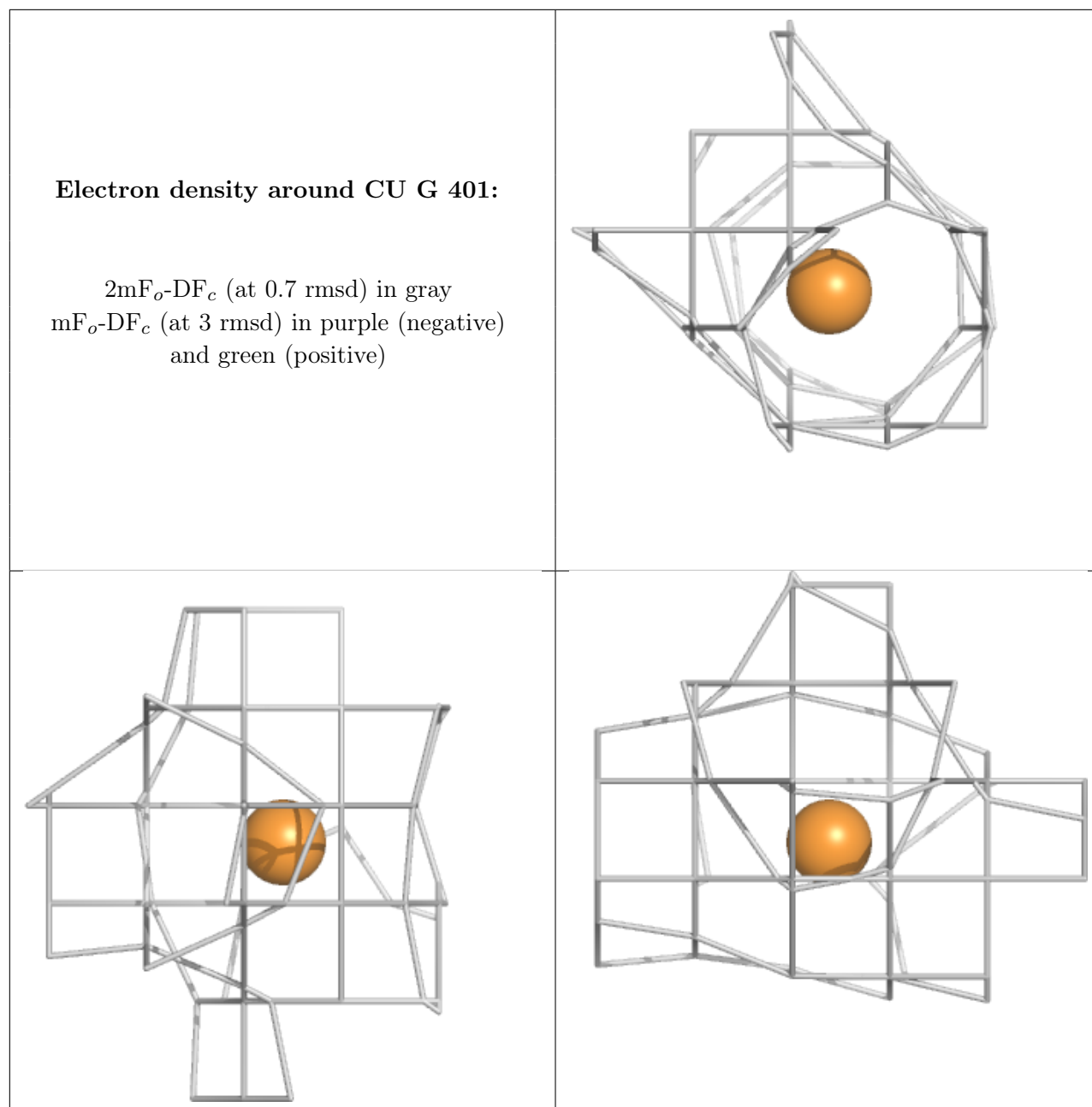
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around CU F 401:

$2mF_o-DF_c$ (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.