Full wwPDB X-ray Structure Validation Report ⓘ

May 7, 2025 – 10:14 AM JST

PDB ID	:	8ZG9 / pdb_00008zg9
Title	:	Y-degron fused ZZ-domain of the Arabidopsis thaliana E3 ubiquitin-protein ligase PRT1
Authors	:	Yang, W.S.; Song, H.K.
Deposited on	:	2024-05-09
Resolution	:	1.67 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 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:

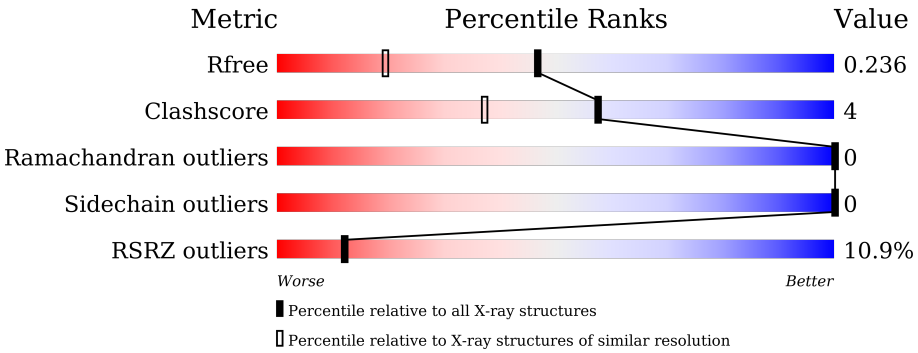
MolProbity	:	4-5-2 with Phenix2.0rc1
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

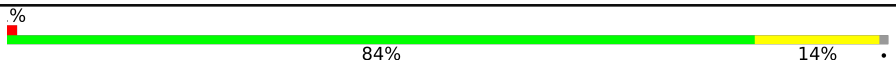
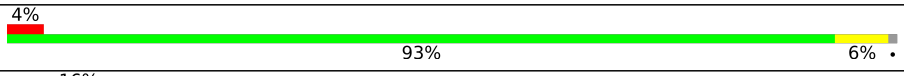
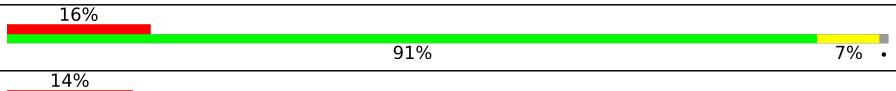
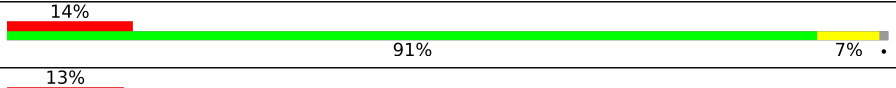
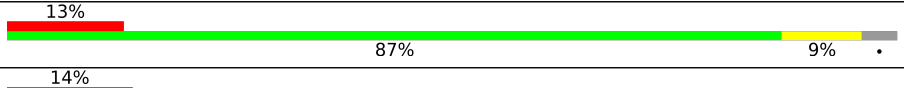
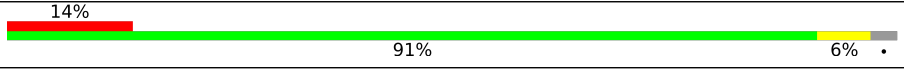
The reported resolution of this entry is 1.67 Å.

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	8422 (1.70-1.66)
Clashscore	180529	1005 (1.68-1.68)
Ramachandran outliers	177936	9065 (1.70-1.66)
Sidechain outliers	177891	9064 (1.70-1.66)
RSRZ outliers	164620	8421 (1.70-1.66)

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 <=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	69	
1	B	69	
1	C	69	
1	D	69	
1	E	69	
1	F	69	

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 6392 atoms, of which 2937 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 Y-degron,E3 ubiquitin-protein ligase PRT1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	68	Total	C	H	N	O	S	0	0	0
			1030	334	493	95	102	6			
1	B	68	Total	C	H	N	O	S	0	0	0
			1030	334	493	95	102	6			
1	C	68	Total	C	H	N	O	S	0	0	0
			1030	334	493	95	102	6			
1	D	68	Total	C	H	N	O	S	0	0	0
			1030	334	493	95	102	6			
1	E	66	Total	C	H	N	O	S	0	0	0
			1000	324	477	93	100	6			
1	F	67	Total	C	H	N	O	S	0	0	0
			1019	331	488	94	100	6			

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Zn	0	0
			2	2		
2	B	2	Total	Zn	0	0
			2	2		
2	C	2	Total	Zn	0	0
			2	2		
2	D	2	Total	Zn	0	0
			2	2		
2	E	2	Total	Zn	0	0
			2	2		
2	F	2	Total	Zn	0	0
			2	2		

- Molecule 3 is MAGNESIUM ION (CCD ID: 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

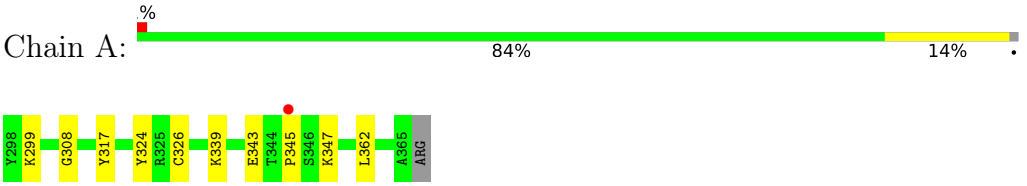
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	51	Total O 51 51	0	0
4	B	39	Total O 39 39	0	0
4	C	31	Total O 31 31	0	0
4	D	33	Total O 33 33	0	0
4	E	39	Total O 39 39	0	0
4	F	46	Total O 46 46	0	0

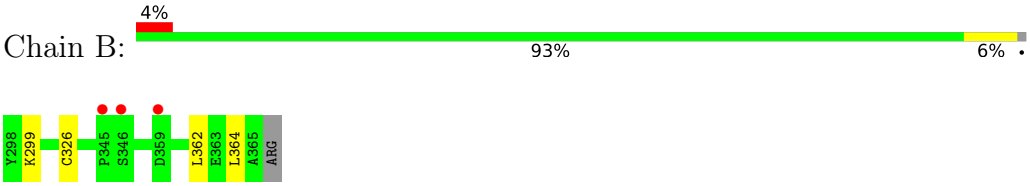
3 Residue-property plots (i)

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.

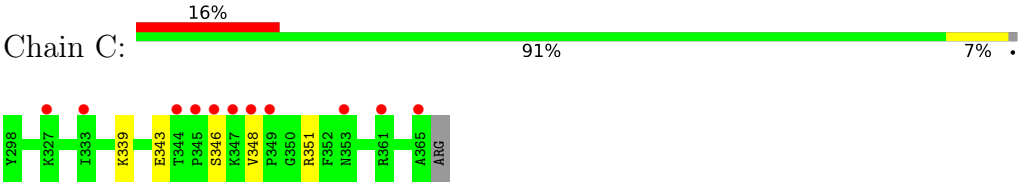
• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1



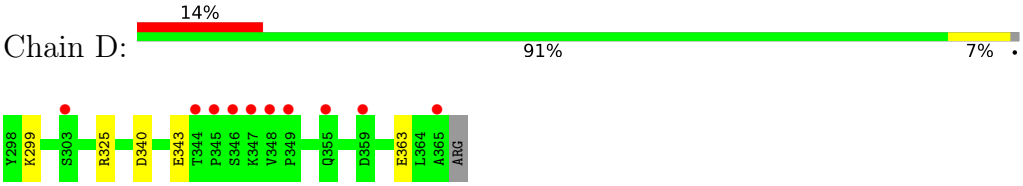
• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1



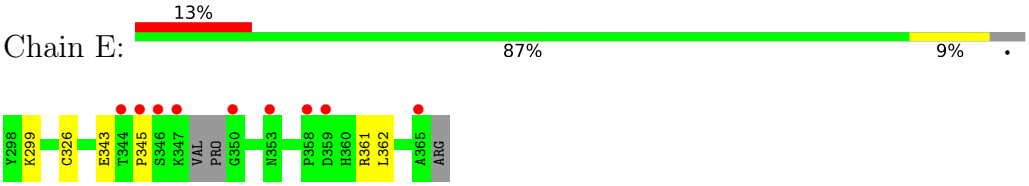
• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1



• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1

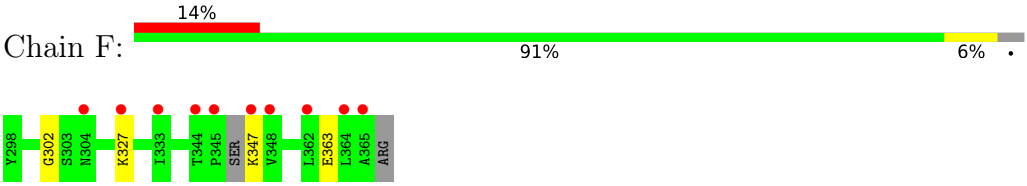


• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1



• Molecule 1: Y-degron,E3 ubiquitin-protein ligase PRT1

Chain F:


14%
91%
6%
Y298
G302
S303
N304
K327
I333
T344
P345
SER
K347
V348
L362
E363
L364
A365
ARG

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	48.25Å 85.74Å 85.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.98 – 1.67 42.98 – 1.67	Depositor EDS
% Data completeness (in resolution range)	98.6 (42.98-1.67) 92.6 (42.98-1.67)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.83 (at 1.67Å)	Xtriage
Refinement program	PHENIX 1.18rc7_3834	Depositor
R, R_{free}	0.211 , 0.237 0.212 , 0.236	Depositor DCC
R_{free} test set	39921 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å^2)	19.2	Xtriage
Anisotropy	0.197	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 36.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.016 for -h,l,k	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6392	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.27% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN

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	0.30	0/551	0.57	0/741
1	B	0.29	0/551	0.56	0/741
1	C	0.29	0/551	0.53	0/741
1	D	0.37	0/551	0.61	0/741
1	E	0.32	0/535	0.59	0/716
1	F	0.35	0/544	0.61	0/730
All	All	0.32	0/3283	0.58	0/4410

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

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	537	493	493	11	0
1	B	537	493	493	5	0
1	C	537	493	493	6	0
1	D	537	493	493	6	0
1	E	523	477	476	5	0
1	F	531	488	487	3	0
2	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
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
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	51	0	0	0	0
4	B	39	0	0	1	0
4	C	31	0	0	0	0
4	D	33	0	0	0	0
4	E	39	0	0	0	0
4	F	46	0	0	1	0
All	All	3455	2937	2935	27	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 4.

All (27) 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:D:340:ASP:HB2	1:F:347:LYS:HD2	1.80	0.63
1:A:347:LYS:HE3	1:E:361:ARG:HE	1.66	0.59
1:E:343:GLU:C	1:E:345:PRO:HD3	2.33	0.54
1:A:324:TYR:OH	1:C:346:SER:HB2	2.10	0.51
1:A:326:CYS:HA	1:A:362:LEU:HD23	1.93	0.51
1:D:363:GLU:O	1:D:363:GLU:HG3	2.10	0.51
1:A:343:GLU:HG2	1:C:348:VAL:HB	1.92	0.50
1:A:299:LYS:HD3	1:A:299:LYS:C	2.38	0.49
1:A:339:LYS:HE3	1:C:346:SER:O	2.13	0.49
1:E:343:GLU:O	1:E:345:PRO:HD3	2.14	0.48
1:A:317:TYR:C	1:A:317:TYR:CD1	2.92	0.48
1:D:299:LYS:C	1:D:299:LYS:HD3	2.39	0.47
1:A:339:LYS:CE	1:C:346:SER:O	2.62	0.47
1:D:325:ARG:NH1	1:D:363:GLU:OE2	2.48	0.46
1:B:326:CYS:HA	1:B:362:LEU:HD23	1.96	0.46
1:C:339:LYS:HE3	1:C:343:GLU:OE2	2.16	0.45
1:A:345:PRO:HD3	1:C:351:ARG:HH12	1.80	0.45
1:E:326:CYS:HA	1:E:362:LEU:HD23	1.98	0.45
1:A:326:CYS:CA	1:A:362:LEU:HD23	2.48	0.43
1:B:299:LYS:HE2	4:B:530:HOH:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:299:LYS:HD3	1:E:299:LYS:C	2.44	0.42
1:B:364:LEU:HD23	1:D:343:GLU:HG2	2.01	0.42
1:B:299:LYS:HD3	1:B:299:LYS:C	2.45	0.42
1:B:364:LEU:HD23	1:D:343:GLU:CG	2.49	0.42
1:A:308:GLY:HA2	1:A:317:TYR:OH	2.21	0.41
1:F:302:GLY:HA2	4:F:509:HOH:O	2.21	0.40
1:F:327:LYS:HG3	1:F:363:GLU:HG2	2.04	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	66/69 (96%)	65 (98%)	1 (2%)	0	100	100
1	B	66/69 (96%)	66 (100%)	0	0	100	100
1	C	66/69 (96%)	65 (98%)	1 (2%)	0	100	100
1	D	66/69 (96%)	66 (100%)	0	0	100	100
1	E	62/69 (90%)	61 (98%)	1 (2%)	0	100	100
1	F	63/69 (91%)	61 (97%)	2 (3%)	0	100	100
All	All	389/414 (94%)	384 (99%)	5 (1%)	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	58/59 (98%)	58 (100%)	0	100	100
1	B	58/59 (98%)	58 (100%)	0	100	100
1	C	58/59 (98%)	58 (100%)	0	100	100
1	D	58/59 (98%)	58 (100%)	0	100	100
1	E	56/59 (95%)	56 (100%)	0	100	100
1	F	57/59 (97%)	57 (100%)	0	100	100
All	All	345/354 (98%)	345 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
1	A	306	HIS
1	B	355	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, 14 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, 95^{th} 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	68/69 (98%)	0.35	1 (1%) 71 75	17, 25, 44, 64	0
1	B	68/69 (98%)	0.47	3 (4%) 39 43	14, 27, 46, 61	0
1	C	68/69 (98%)	0.85	11 (16%) 5 5	21, 32, 59, 82	0
1	D	68/69 (98%)	0.65	10 (14%) 7 6	16, 28, 50, 68	0
1	E	66/69 (95%)	0.73	9 (13%) 8 8	18, 30, 56, 76	0
1	F	67/69 (97%)	0.79	10 (14%) 7 6	19, 29, 51, 73	0
All	All	405/414 (97%)	0.64	44 (10%) 12 12	14, 29, 55, 82	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	345	PRO	5.4
1	E	353	ASN	3.9
1	F	344	THR	3.4
1	F	348	VAL	3.2
1	E	344	THR	3.2
1	C	361	ARG	3.1
1	E	347	LYS	3.1
1	C	345	PRO	3.0
1	E	345	PRO	3.0
1	A	345	PRO	3.0
1	D	348	VAL	3.0
1	D	346	SER	3.0
1	F	365	ALA	3.0
1	D	349	PRO	2.9
1	E	346	SER	2.9
1	C	344	THR	2.7
1	E	359	ASP	2.7
1	C	346	SER	2.7
1	C	348	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	C	365	ALA	2.6
1	F	364	LEU	2.6
1	C	333	ILE	2.6
1	C	349	PRO	2.6
1	D	365	ALA	2.5
1	B	345	PRO	2.5
1	E	365	ALA	2.5
1	D	303	SER	2.5
1	C	327	LYS	2.4
1	F	304	ASN	2.4
1	C	347	LYS	2.4
1	F	327	LYS	2.4
1	B	359	ASP	2.4
1	E	358	PRO	2.3
1	F	362	LEU	2.3
1	C	353	ASN	2.2
1	D	355	GLN	2.2
1	D	359	ASP	2.2
1	E	350	GLY	2.2
1	B	346	SER	2.1
1	D	347	LYS	2.1
1	F	347	LYS	2.1
1	D	345	PRO	2.0
1	D	344	THR	2.0
1	F	333	ILE	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

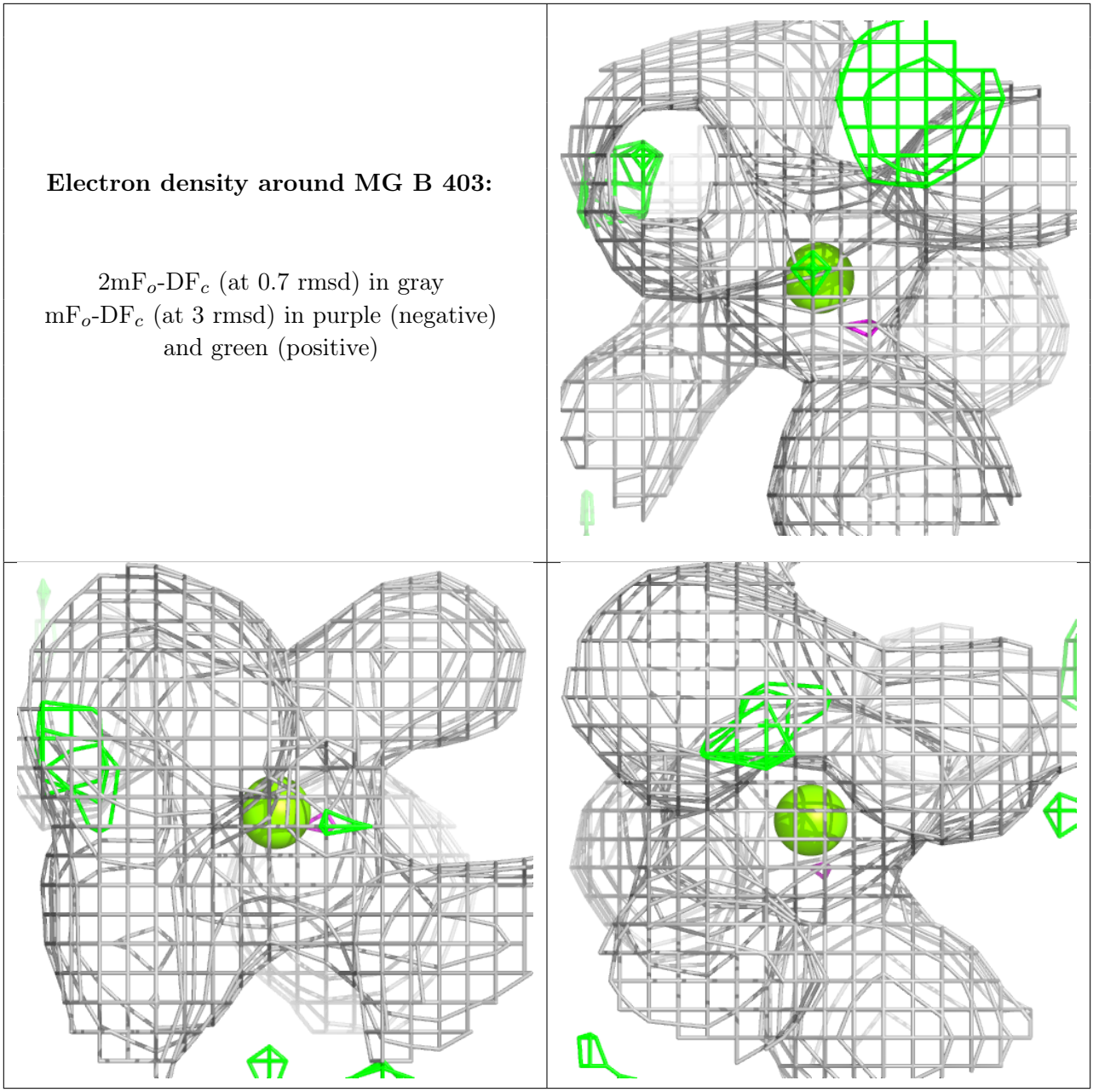
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
3	MG	B	403	1/1	0.87	0.12	32,32,32,32	0
2	ZN	B	402	1/1	0.95	0.07	35,35,35,35	0
2	ZN	D	402	1/1	0.96	0.07	38,38,38,38	0
2	ZN	C	402	1/1	0.97	0.06	39,39,39,39	0
2	ZN	B	401	1/1	0.98	0.05	28,28,28,28	0
2	ZN	A	402	1/1	0.98	0.07	28,28,28,28	0
2	ZN	E	401	1/1	0.98	0.05	34,34,34,34	0
2	ZN	F	401	1/1	0.98	0.06	31,31,31,31	0
2	ZN	F	402	1/1	0.98	0.04	30,30,30,30	0
2	ZN	C	401	1/1	0.98	0.07	30,30,30,30	0
2	ZN	E	402	1/1	0.99	0.05	31,31,31,31	0
2	ZN	A	401	1/1	0.99	0.06	26,26,26,26	0
3	MG	A	403	1/1	1.00	0.10	9,9,9,9	0
2	ZN	D	401	1/1	1.00	0.06	25,25,25,25	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.

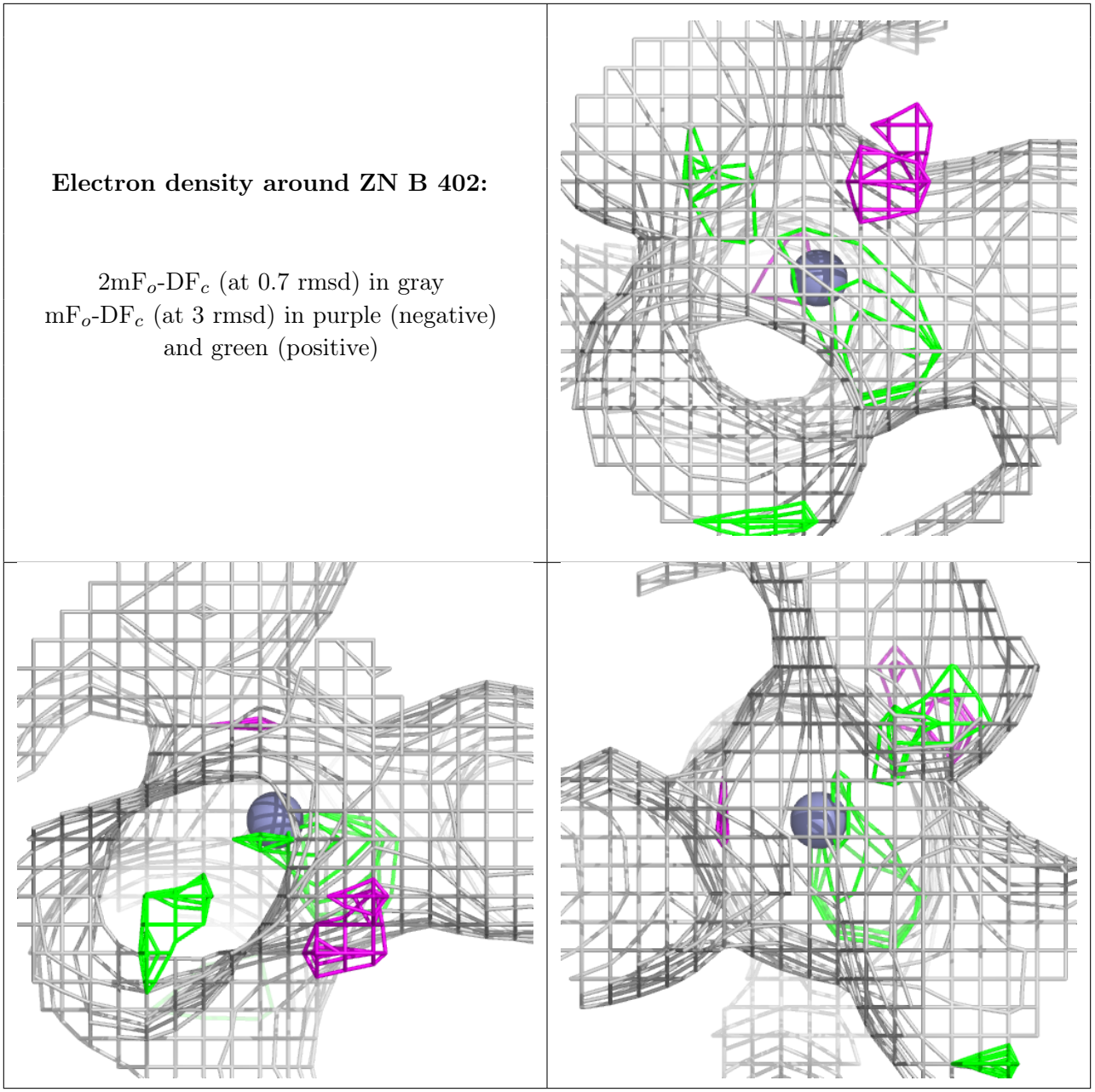
Electron density around MG B 403:

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



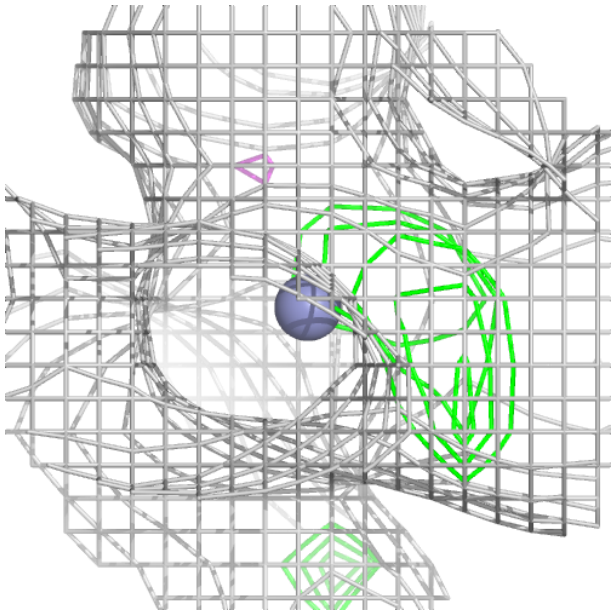
Electron density around ZN B 402:

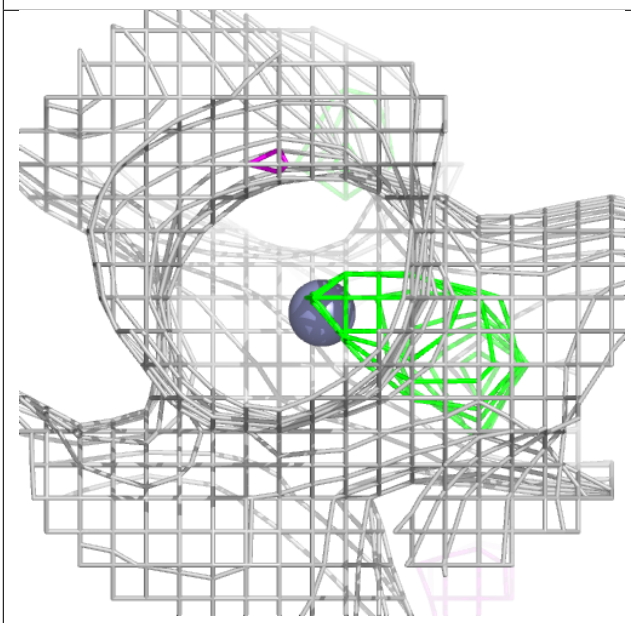
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

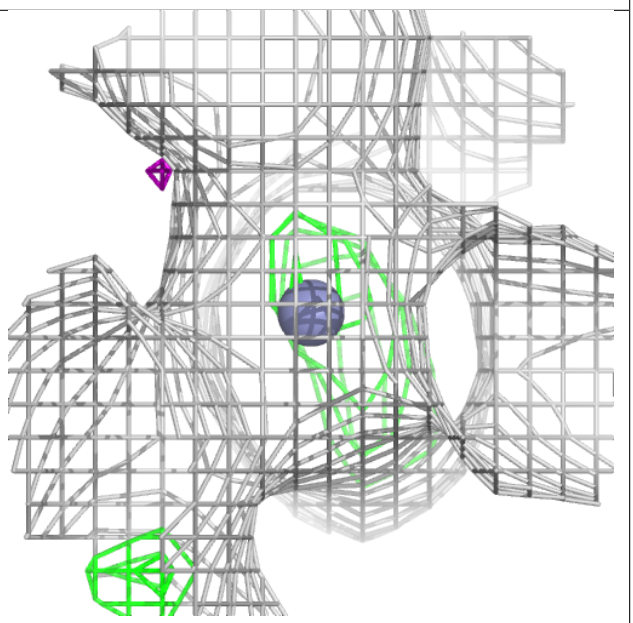


Electron density around ZN D 402:

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

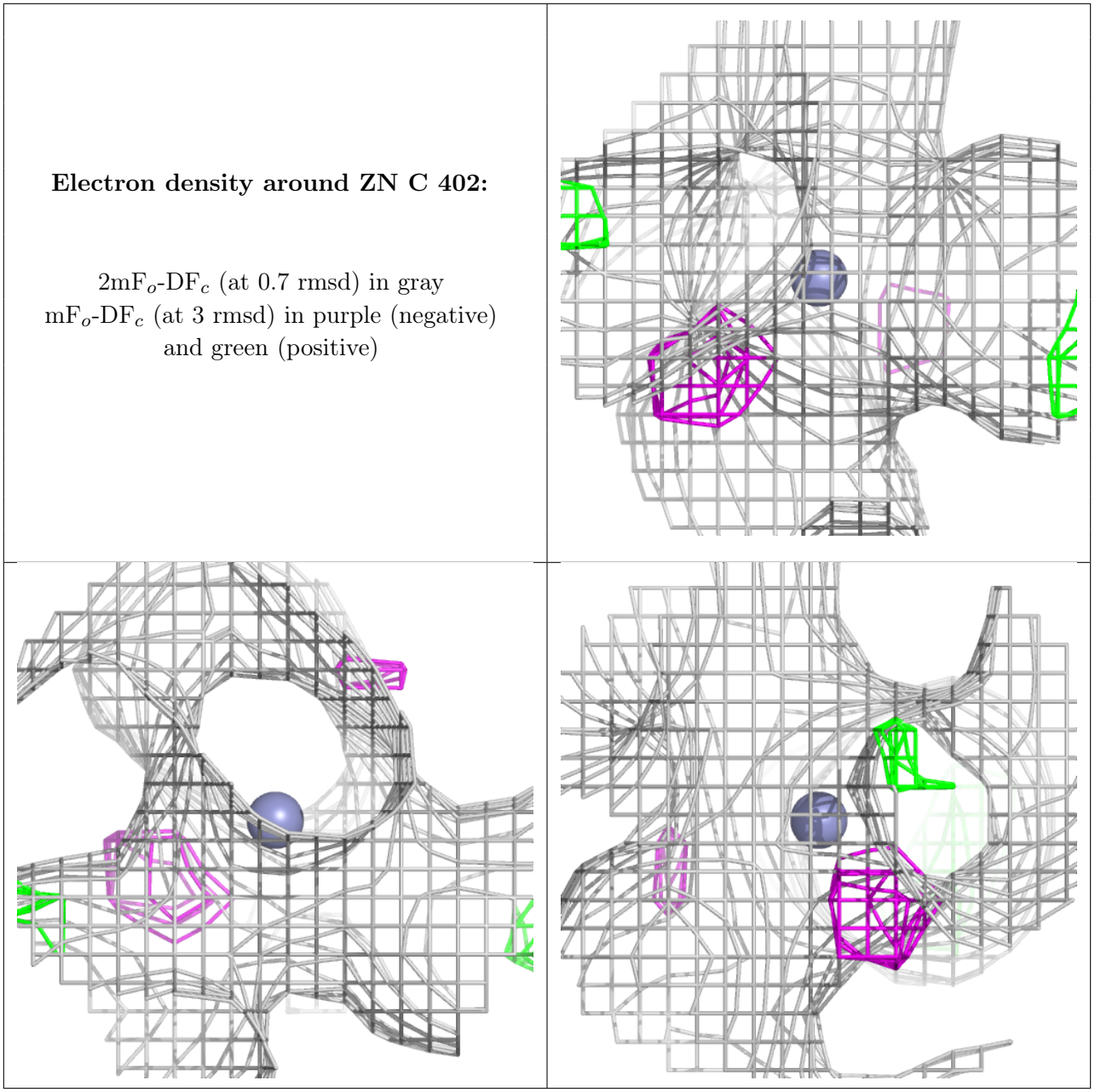






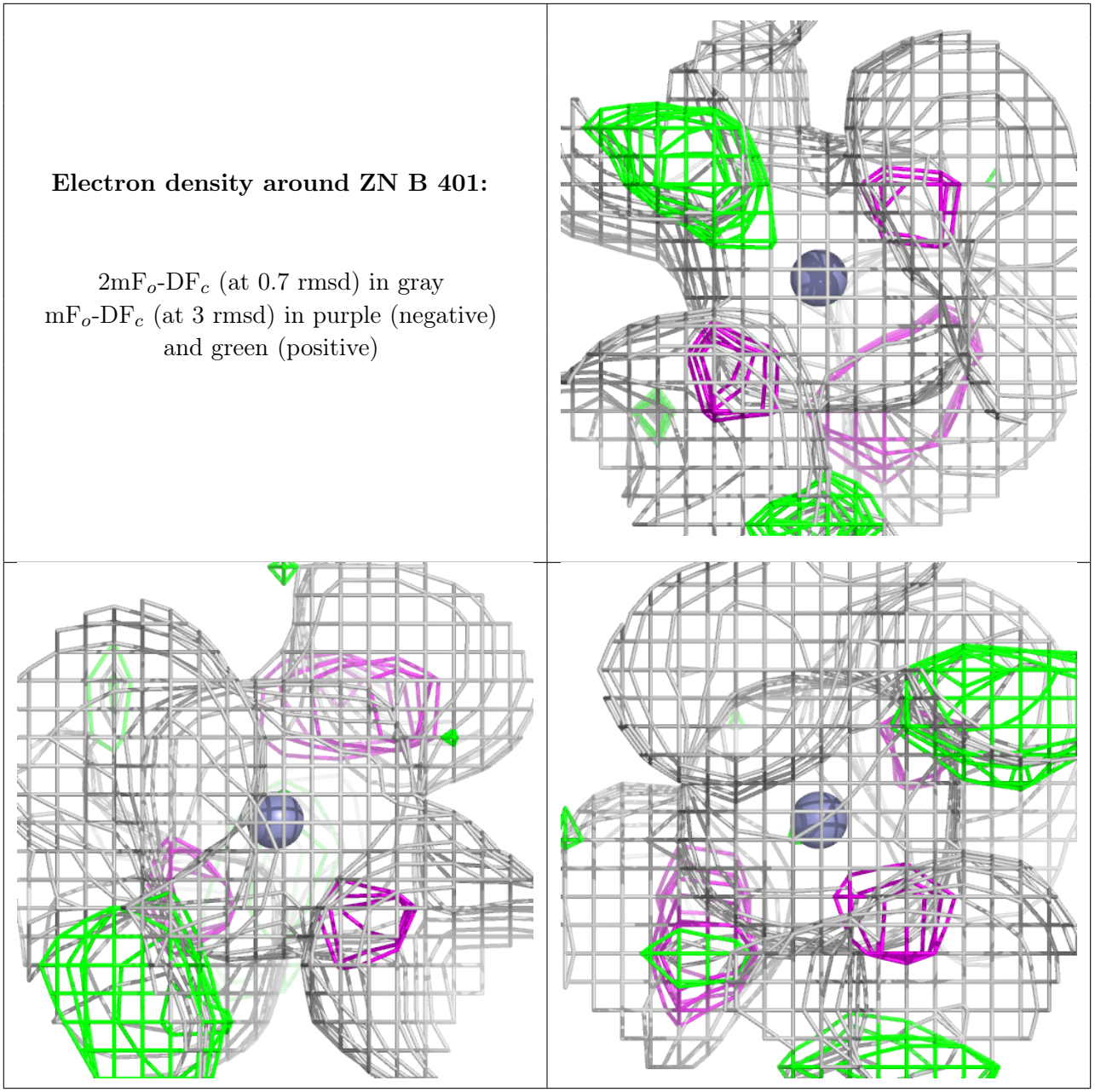
Electron density around ZN C 402:

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



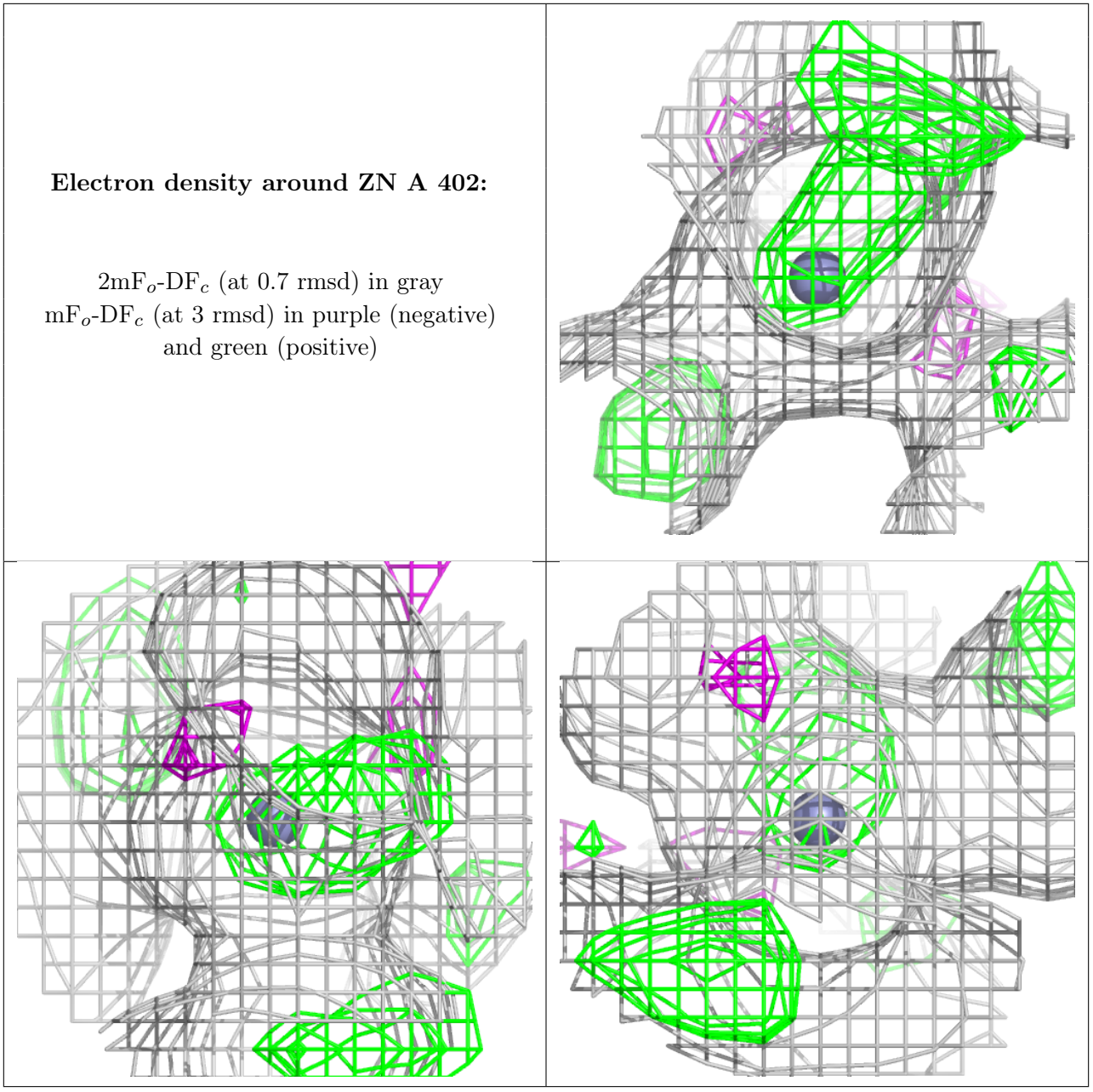
Electron density around ZN B 401:

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



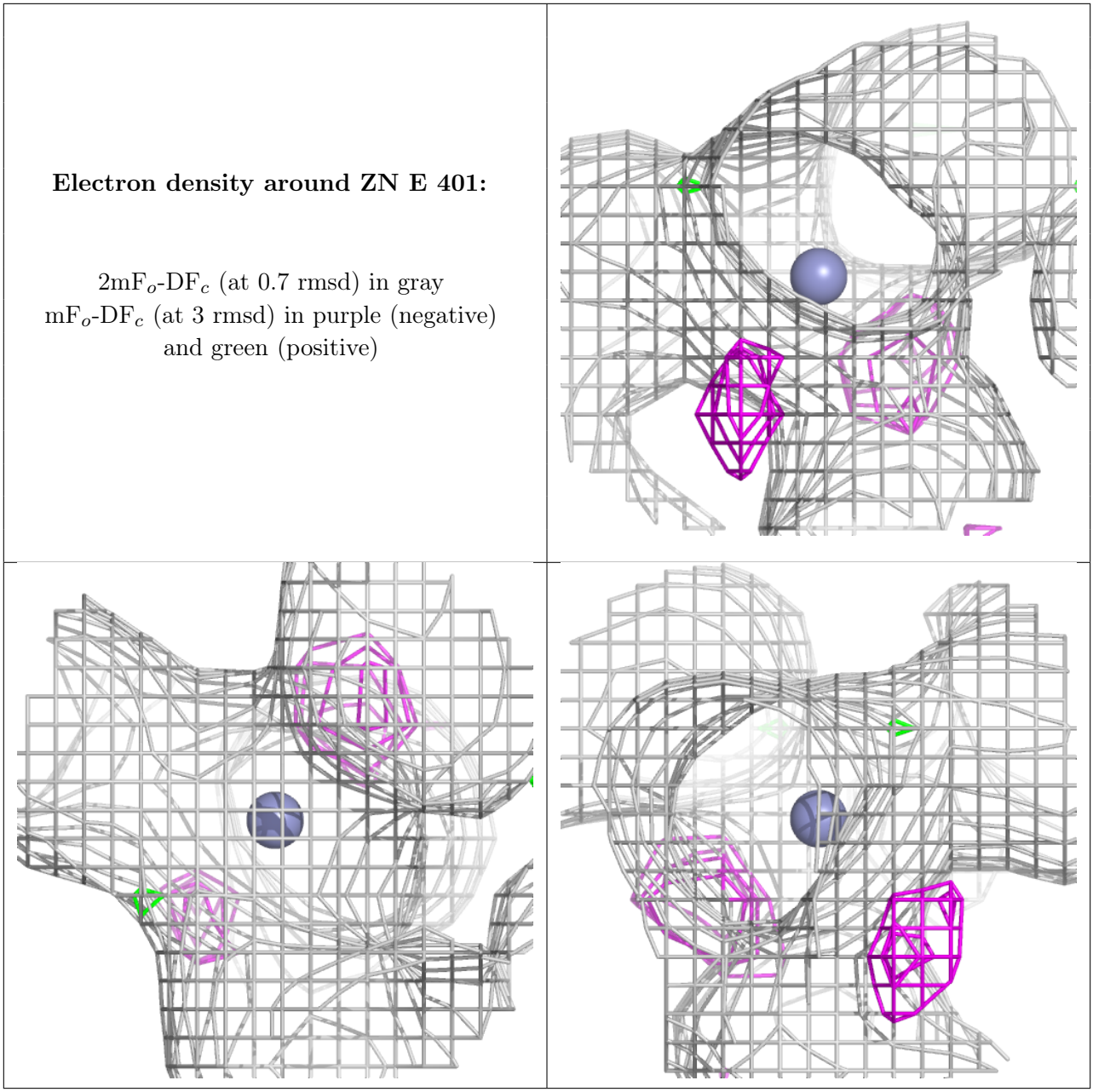
Electron density around ZN A 402:

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



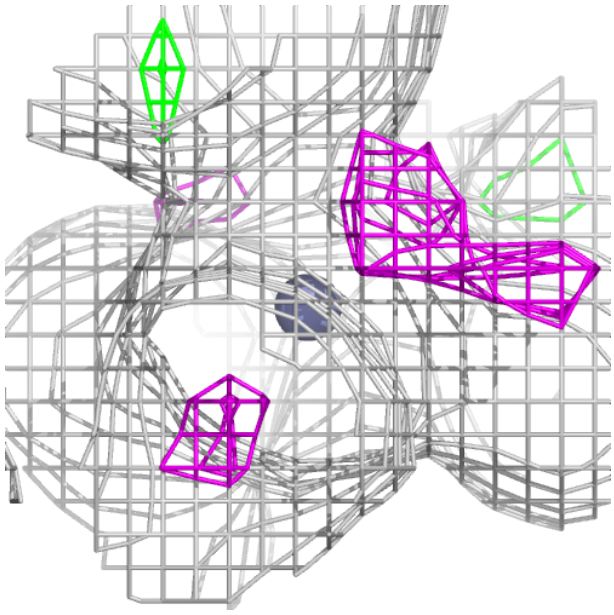
Electron density around ZN E 401:

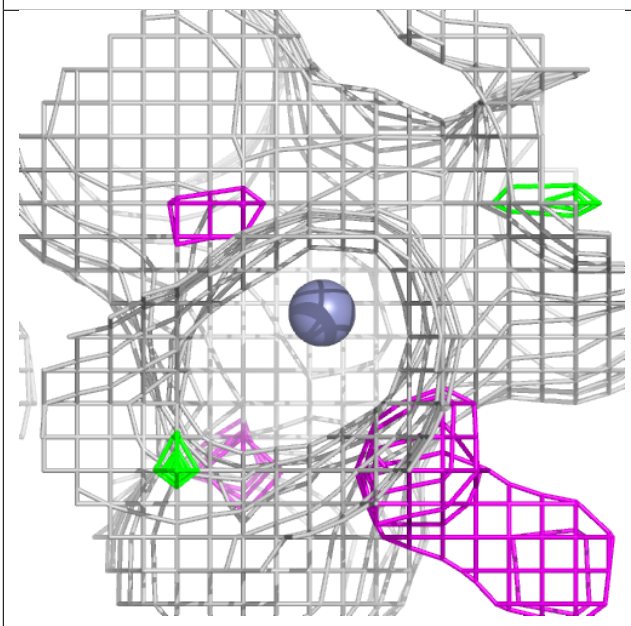
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

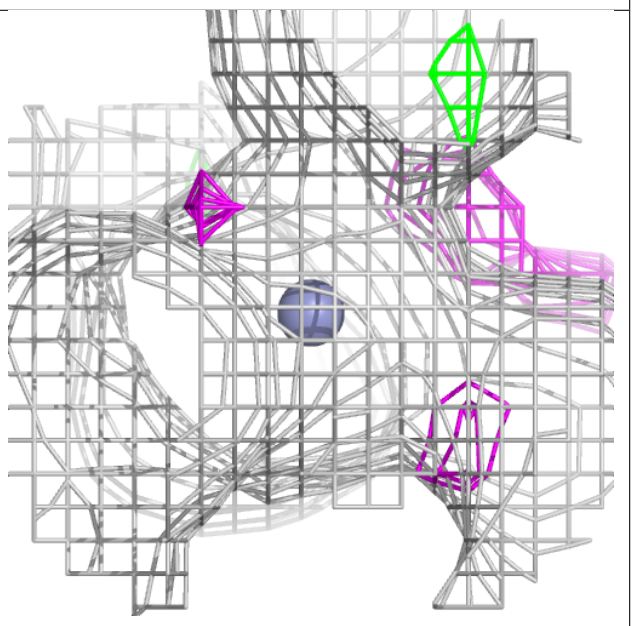


Electron density around ZN F 401:

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

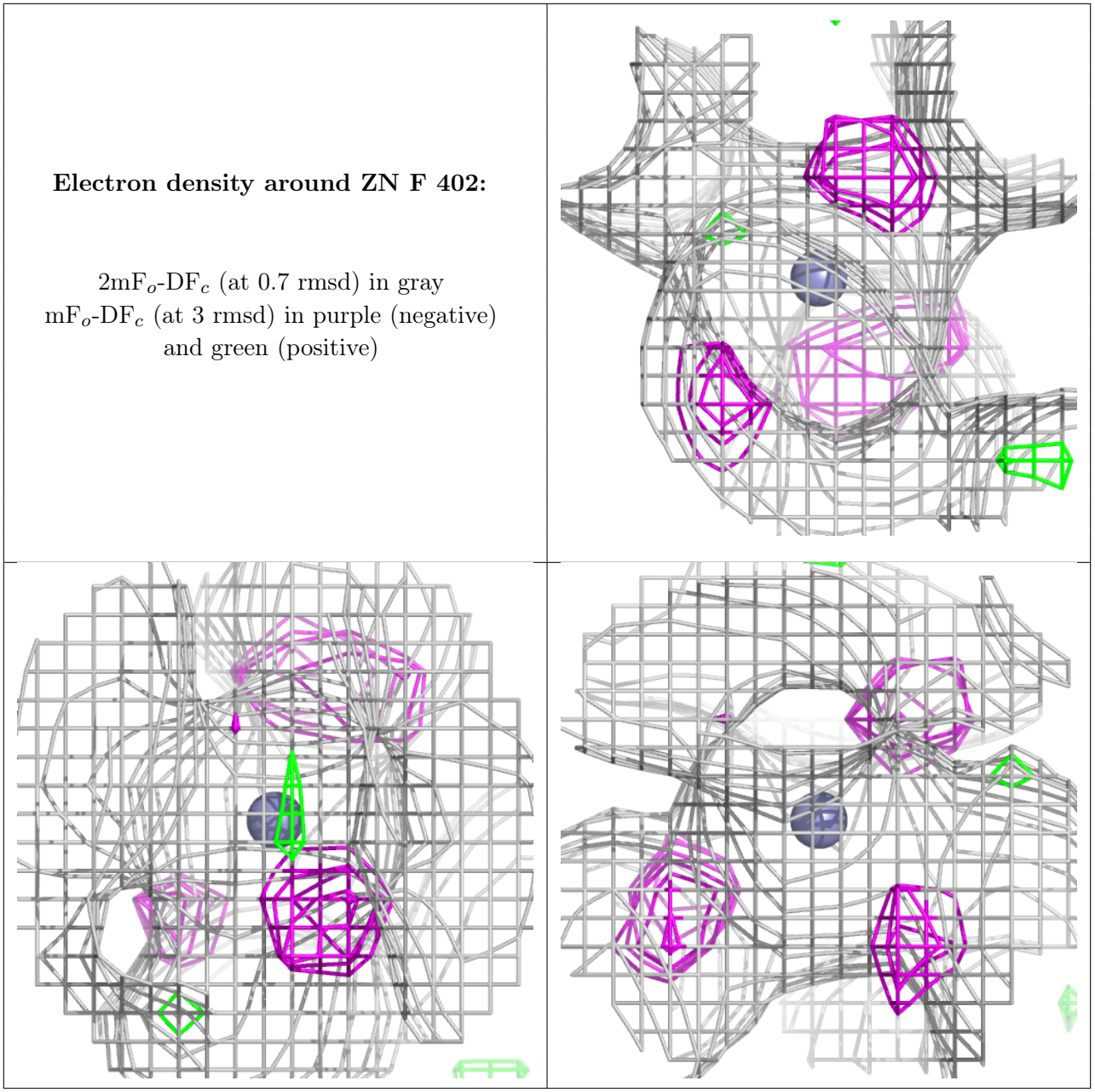






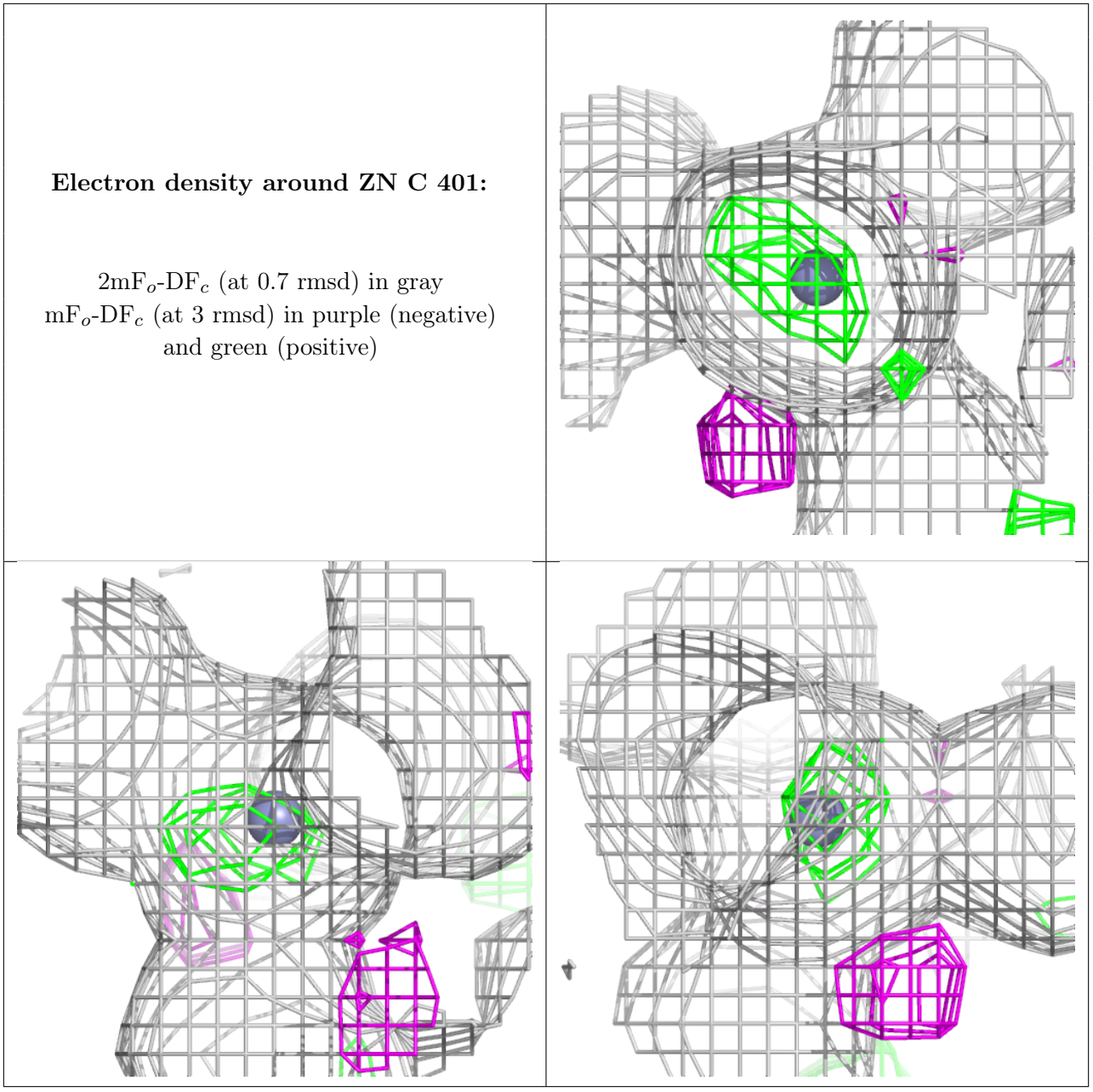
Electron density around ZN F 402:

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



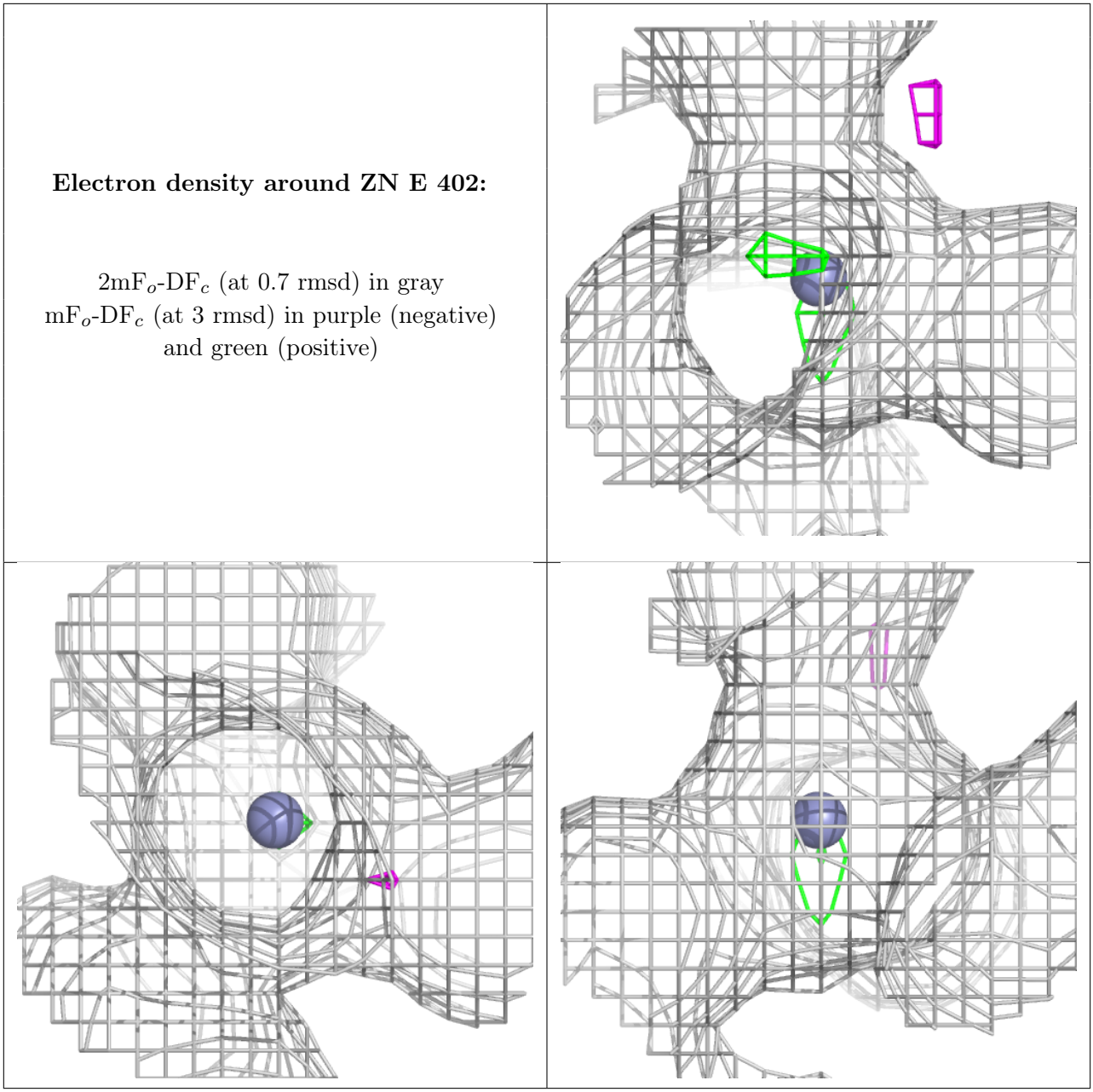
Electron density around ZN C 401:

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



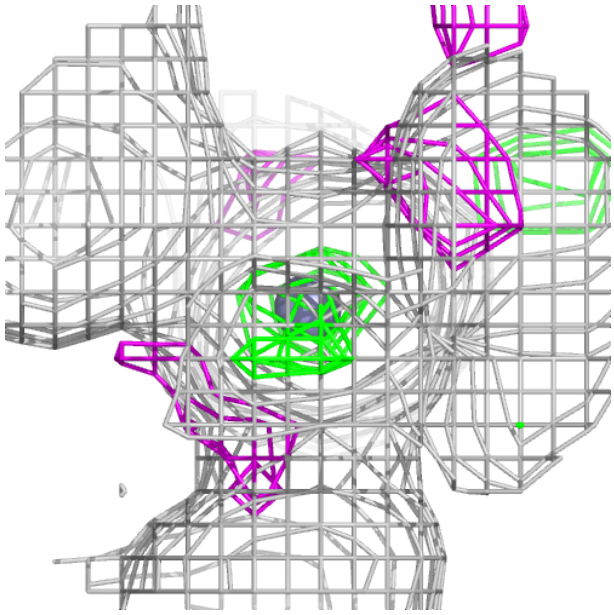
Electron density around ZN E 402:

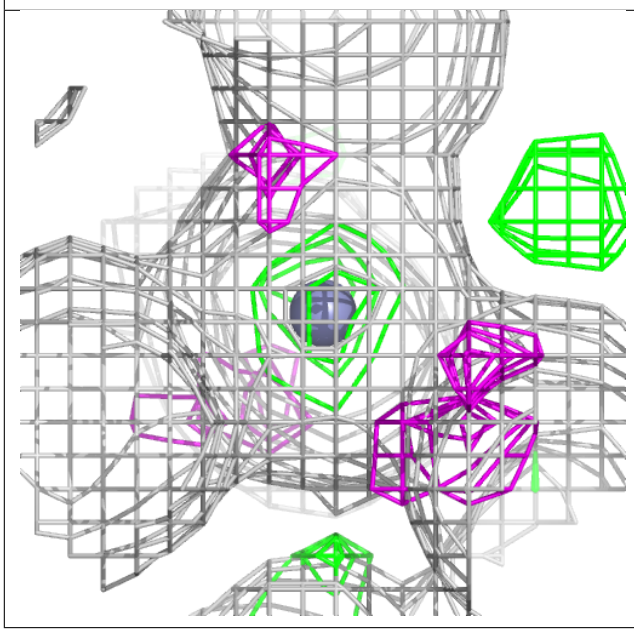
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

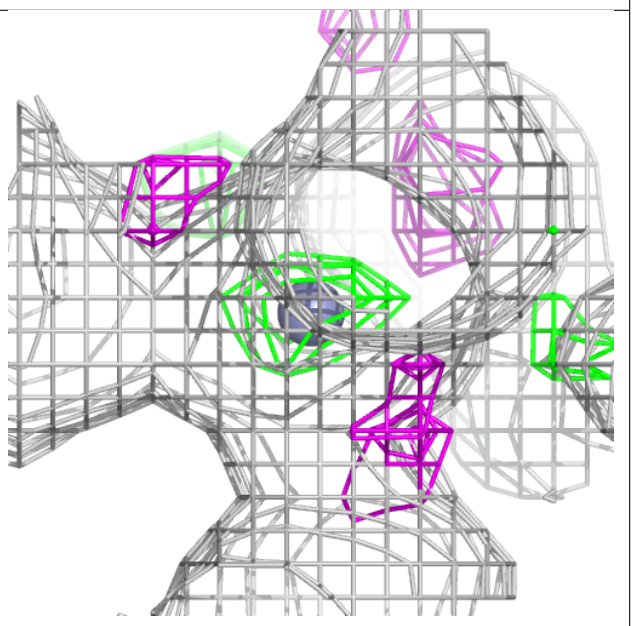


Electron density around ZN A 401:

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

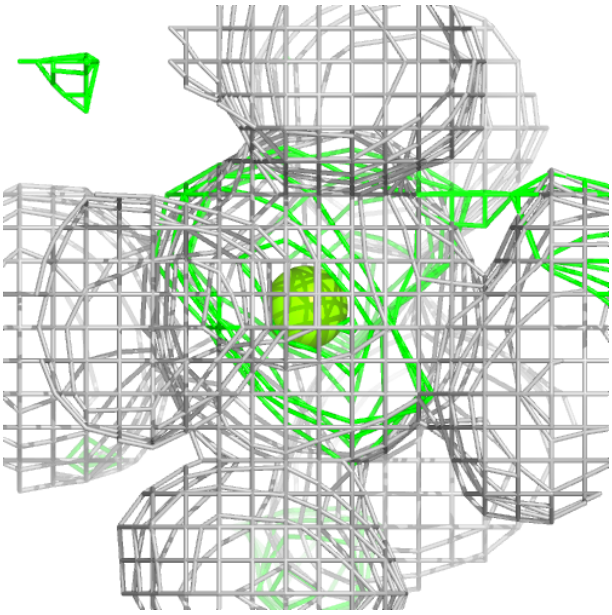


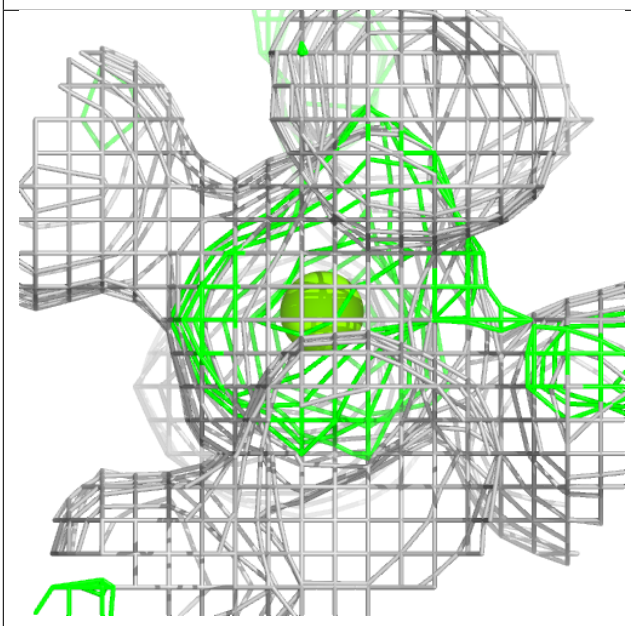


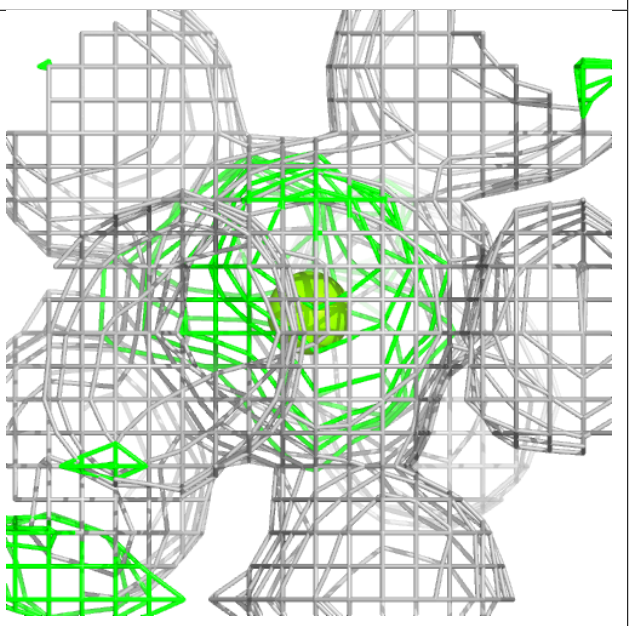


Electron density around MG A 403:

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

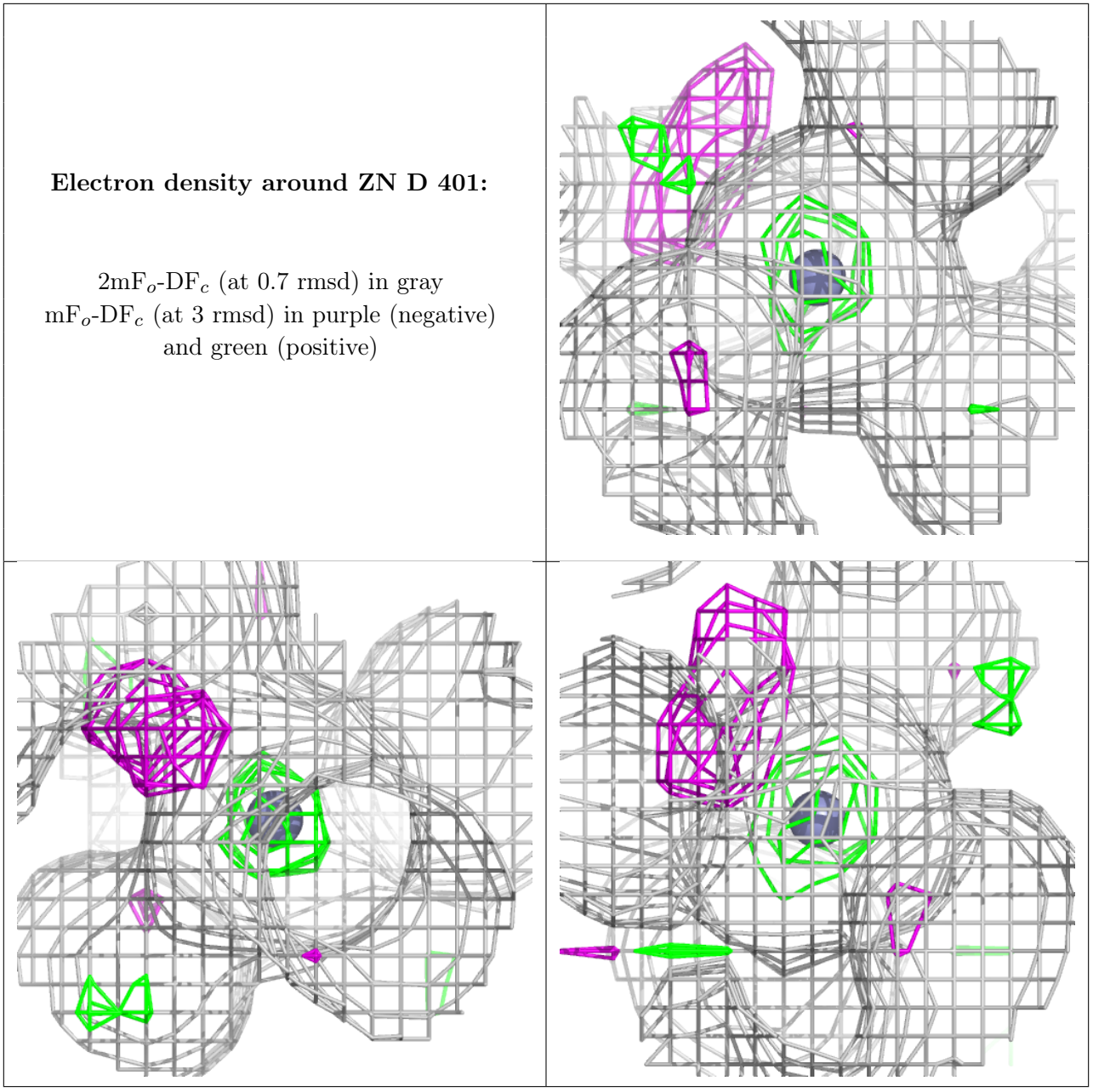






Electron density around ZN D 401:

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



6.5 Other polymers

There are no such residues in this entry.