



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 12, 2023 – 10:20 am BST

PDB ID : 8BR0  
Title : ExoY Nucleotidyl Cyclase domain from *Vibrio nigripulchritudo* MARTX toxin (residue Q3455 to L3863) in complex with 3'deoxyCTP and two manganese cations bound to Latrunculin-B-ADP-Mn-actin  
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Deposited on : 2022-11-22  
Resolution : 2.22 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35  
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) : 2.35

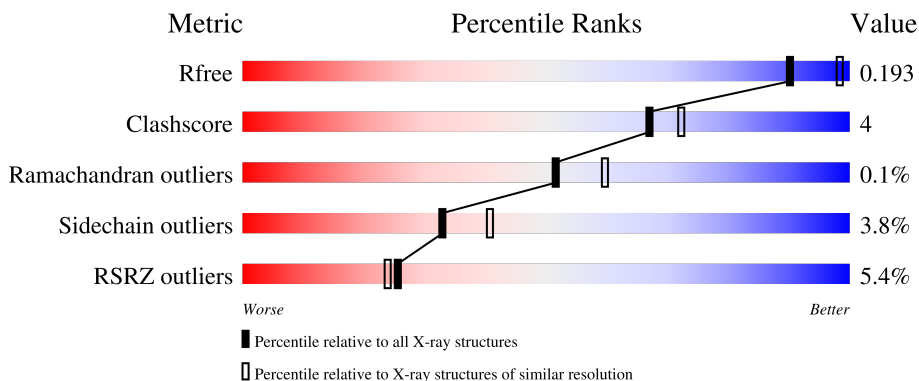
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.22 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	5912 (2.24-2.20)
Clashscore	141614	6646 (2.24-2.20)
Ramachandran outliers	138981	6543 (2.24-2.20)
Sidechain outliers	138945	6544 (2.24-2.20)
RSRZ outliers	127900	5797 (2.24-2.20)

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	375	 3% 85% 9% 6%
1	C	375	 8% 89% 8% .
2	B	591	 4% 58% 8% . 33%
2	D	591	 3% 60% 7% . 33%

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 12638 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 Actin, alpha skeletal muscle, intermediate form.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	354	2768	1757	461	532	18	0	1	0
1	C	365	2858	1811	481	547	19	0	1	0

- Molecule 2 is a protein called Putative Adenylate cyclase,Profilin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	398	3144	1992	519	624	9	0	0	0
2	D	398	3157	1998	524	626	9	0	1	0

There are 20 discrepancies between the modelled and reference sequences:

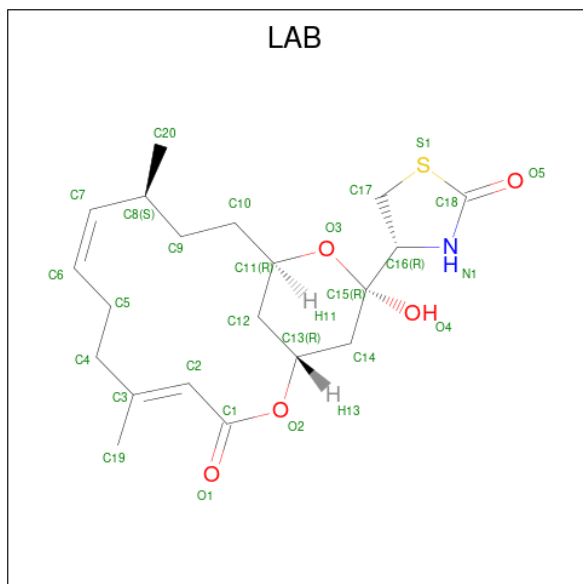
Chain	Residue	Modelled	Actual	Comment	Reference
B	451	GLY	-	expression tag	UNP A0A6N3LUE9
B	452	PRO	-	expression tag	UNP A0A6N3LUE9
B	453	GLY	-	expression tag	UNP A0A6N3LUE9
B	454	SER	-	expression tag	UNP A0A6N3LUE9
B	897	PRO	-	linker	UNP A0A6N3LUE9
B	898	PRO	-	linker	UNP A0A6N3LUE9
B	899	PRO	-	linker	UNP A0A6N3LUE9
B	900	PRO	-	linker	UNP A0A6N3LUE9
B	901	GLY	-	linker	UNP A0A6N3LUE9
B	902	GLY	-	linker	UNP A0A6N3LUE9
D	451	GLY	-	expression tag	UNP A0A6N3LUE9
D	452	PRO	-	expression tag	UNP A0A6N3LUE9
D	453	GLY	-	expression tag	UNP A0A6N3LUE9
D	454	SER	-	expression tag	UNP A0A6N3LUE9
D	897	PRO	-	linker	UNP A0A6N3LUE9
D	898	PRO	-	linker	UNP A0A6N3LUE9

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Chain	Residue	Modelled	Actual	Comment	Reference
D	899	PRO	-	linker	UNP A0A6N3LUE9
D	900	PRO	-	linker	UNP A0A6N3LUE9
D	901	GLY	-	linker	UNP A0A6N3LUE9
D	902	GLY	-	linker	UNP A0A6N3LUE9

- Molecule 3 is LATRUNCULIN B (three-letter code: LAB) (formula: C<sub>20</sub>H<sub>29</sub>NO<sub>5</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	A	1	Total	C	N	O	S	0	0
				27	20	1	5		
3	C	1	Total	C	N	O	S	0	0
				27	20	1	5		

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: C<sub>10</sub>H<sub>15</sub>N<sub>5</sub>O<sub>10</sub>P<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).

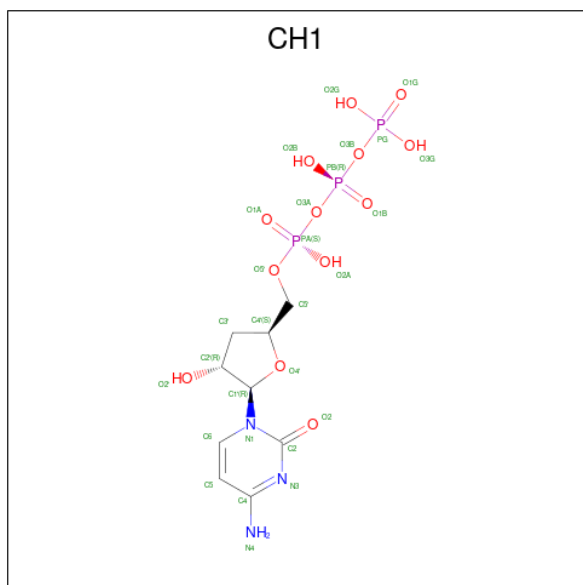


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
4	A	1	27	10	5	10	2	0	0
4	C	1	27	10	5	10	2	0	0

- Molecule 5 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mn		
5	A	1	1	1	0	0
5	B	2	2	2	0	0
5	C	1	1	1	0	0
5	D	2	2	2	0	0

- Molecule 6 is 3'-DEOXY-CYTIDINE-5'-TRIPHOSPHATE (three-letter code: CH1) (formula: C<sub>9</sub>H<sub>16</sub>N<sub>3</sub>O<sub>13</sub>P<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
6	B	1	28	9	3	13	3	0	0
6	D	1	28	9	3	13	3	0	0

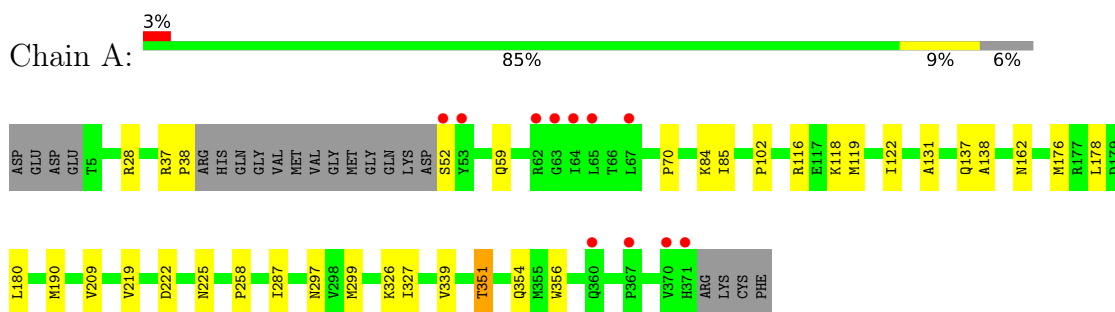
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	147	Total	O	0	0
			147	147		
7	B	132	Total	O	0	0
			132	132		
7	C	71	Total	O	0	0
			71	71		
7	D	191	Total	O	0	0
			191	191		

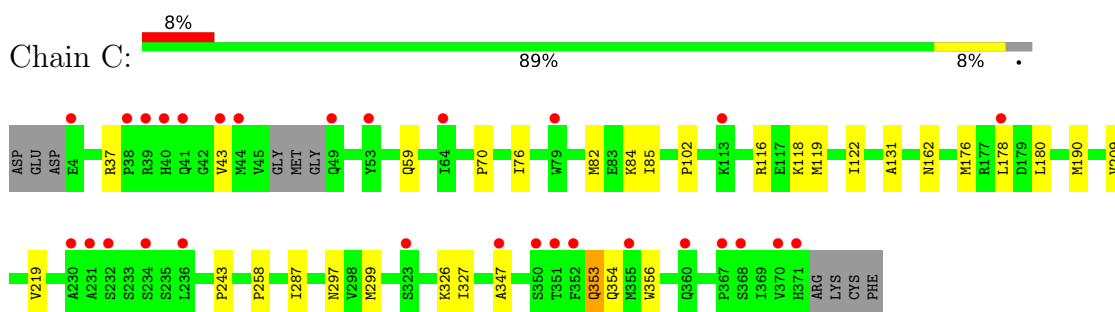
### 3 Residue-property plots [i](#)

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.

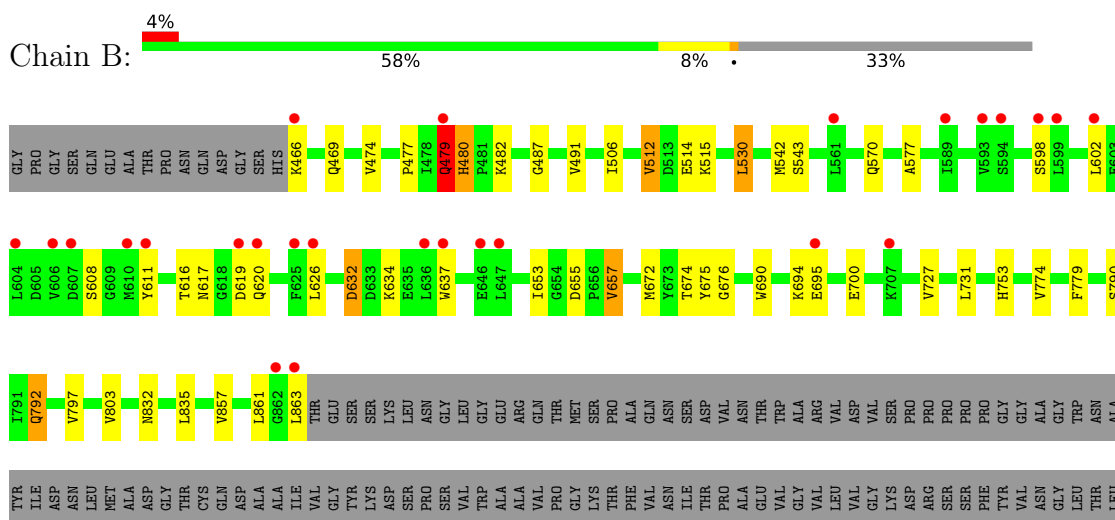
- Molecule 1: Actin, alpha skeletal muscle, intermediate form



- Molecule 1: Actin, alpha skeletal muscle, intermediate form



- Molecule 2: Putative Adenylate cyclase, Profilin-1







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.47Å 132.50Å 96.22Å 90.00° 110.40° 90.00°	Depositor
Resolution (Å)	48.05 – 2.22 48.05 – 2.22	Depositor EDS
% Data completeness (in resolution range)	71.8 (48.05-2.22) 71.8 (48.05-2.22)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.59 (at 2.22Å)	Xtrriage
Refinement program	BUSTER 2.10.4 (3-FEB-2022)	Depositor
R, $R_{free}$	0.208 , 0.243 0.197 , 0.193	Depositor DCC
$R_{free}$ test set	3203 reflections (5.16%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	53.4	Xtrriage
Anisotropy	0.030	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 51.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.016 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	12638	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	72.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.13% 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: LAB, ADP, MN, CH1

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	0.42	0/2831	0.56	0/3841
1	C	0.38	0/2922	0.55	0/3961
2	B	0.43	0/3212	0.60	0/4353
2	D	0.45	0/3229	0.60	0/4375
All	All	0.42	0/12194	0.58	0/16530

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	2768	0	2738	25	0
1	C	2858	0	2828	19	0
2	B	3144	0	3056	28	0
2	D	3157	0	3070	24	0
3	A	27	0	29	4	0
3	C	27	0	29	4	0
4	A	27	0	12	0	0
4	C	27	0	12	0	0
5	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	2	0	0	0	0
5	C	1	0	0	0	0
5	D	2	0	0	0	0
6	B	28	0	12	0	0
6	D	28	0	12	0	0
7	A	147	0	0	3	0
7	B	132	0	0	0	0
7	C	71	0	0	0	0
7	D	191	0	0	0	0
All	All	12638	0	11798	93	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 (93) 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)
2:B:479:GLN:HG2	2:B:480:HIS:H	1.44	0.81
2:B:530:LEU:HD13	2:B:753:HIS:CD2	2.26	0.71
2:D:530:LEU:HD13	2:D:753:HIS:CD2	2.27	0.70
2:B:479:GLN:H	2:B:479:GLN:CD	1.96	0.70
1:C:59:GLN:HG3	3:C:401:LAB:C7	2.24	0.67
1:C:59:GLN:HG3	3:C:401:LAB:H7	1.78	0.65
2:D:515:LYS:HE2	2:D:543[A]:SER:OG	1.96	0.65
1:A:59:GLN:HG3	3:A:401:LAB:C7	2.30	0.62
2:B:515:LYS:HE2	2:B:543:SER:OG	1.99	0.61
1:C:326:LYS:HZ1	1:C:327:ILE:H	1.47	0.60
3:A:401:LAB:H11	3:A:401:LAB:H51	1.84	0.60
1:A:70:PRO:HG2	1:A:85:ILE:HD12	1.85	0.59
1:C:162:ASN:HB2	1:C:176:MET:HB2	1.84	0.59
1:A:162:ASN:HB2	1:A:176:MET:HB2	1.84	0.58
1:C:70:PRO:HG2	1:C:85:ILE:HD12	1.85	0.57
1:A:131:ALA:HB1	1:A:356:TRP:HB3	1.87	0.57
1:C:116:ARG:HA	1:C:119:MET:HG2	1.85	0.57
1:A:116:ARG:HA	1:A:119:MET:HG2	1.87	0.56
1:A:351:THR:HB	2:B:863:LEU:HA	1.89	0.55
1:A:222:ASP:OD2	1:A:225[B]:ASN:ND2	2.37	0.55
2:B:469:GLN:HG2	2:B:474:VAL:HG22	1.89	0.55
2:D:469:GLN:HG2	2:D:474:VAL:HG22	1.89	0.54
1:A:326:LYS:NZ	1:A:327:ILE:H	2.06	0.54
2:B:797:VAL:HG22	2:B:803:VAL:HG22	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:602:LEU:HB3	2:B:611:TYR:HB3	1.91	0.53
1:A:219:VAL:HG22	1:A:258:PRO:HB2	1.90	0.52
1:C:131:ALA:HB1	1:C:356:TRP:HB3	1.89	0.52
1:C:326:LYS:NZ	1:C:327:ILE:H	2.07	0.52
1:C:219:VAL:HG22	1:C:258:PRO:HB2	1.92	0.52
2:D:797:VAL:HG22	2:D:803:VAL:HG22	1.91	0.51
2:B:466:LYS:HG2	2:B:477:PRO:HG2	1.90	0.51
1:A:190:MET:HG3	1:A:209:VAL:HG11	1.93	0.51
2:D:604:LEU:HG	2:D:611:TYR:CZ	2.45	0.50
1:C:190:MET:HG3	1:C:209:VAL:HG11	1.94	0.50
1:C:353:GLN:O	1:C:353:GLN:HG3	2.11	0.50
2:B:655:ASP:OD1	2:B:657:VAL:HG13	2.12	0.49
1:C:243:PRO:O	2:D:704:PRO:HD3	2.12	0.49
1:A:351:THR:HB	2:B:863:LEU:HB3	1.94	0.48
2:D:779:PHE:HA	2:D:792:GLN:OE1	2.12	0.48
2:D:604:LEU:HD22	2:D:608:SER:O	2.14	0.48
1:A:326:LYS:HZ1	1:A:327:ILE:H	1.62	0.48
2:B:617:ASN:HD21	2:B:620:GLN:HG3	1.79	0.48
2:D:506:ILE:HG12	2:D:774:VAL:HG12	1.96	0.47
2:B:779:PHE:HA	2:B:792:GLN:OE1	2.13	0.47
2:B:790:SER:HB2	2:B:792:GLN:OE1	2.15	0.47
2:B:832:ASN:HA	2:B:835:LEU:HD22	1.97	0.47
2:D:606:VAL:HB	2:D:609:GLY:HA3	1.97	0.47
2:D:790:SER:HB2	2:D:792:GLN:OE1	2.15	0.47
2:B:487:GLY:HA3	2:B:512:VAL:HG22	1.97	0.47
1:A:326:LYS:HZ2	1:A:326:LYS:HA	1.79	0.47
2:B:626:LEU:HB3	2:B:637:TRP:HB3	1.96	0.46
2:D:577:ALA:HB1	2:D:653:ILE:HG23	1.96	0.46
2:D:626:LEU:HB3	2:D:637:TRP:HB3	1.97	0.46
1:A:28:ARG:HG2	7:A:546:HOH:O	2.15	0.46
2:D:487:GLY:HA2	2:D:514:GLU:HA	1.98	0.46
1:A:118:LYS:HE3	1:A:122:ILE:HD11	1.98	0.45
2:D:832:ASN:HA	2:D:835:LEU:HD22	1.97	0.45
1:C:70:PRO:HG2	1:C:85:ILE:CD1	2.46	0.45
2:B:479:GLN:HG2	2:B:480:HIS:N	2.23	0.45
1:A:138:ALA:HA	7:A:506:HOH:O	2.16	0.45
1:C:102:PRO:HB3	1:C:131:ALA:HB3	1.98	0.45
2:B:577:ALA:HB1	2:B:653:ILE:HG23	1.98	0.45
2:D:607:ASP:HB2	2:D:608:SER:H	1.62	0.44
2:B:506:ILE:HG12	2:B:774:VAL:HG12	1.98	0.44
1:A:59:GLN:HG3	3:A:401:LAB:H7	1.97	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:59:GLN:HB2	3:C:401:LAB:H7	2.00	0.44
2:B:487:GLY:HA2	2:B:514:GLU:HA	2.00	0.43
1:C:347:ALA:HA	1:C:353:GLN:NE2	2.33	0.43
1:A:70:PRO:HG2	1:A:85:ILE:CD1	2.47	0.43
1:A:102:PRO:HB3	1:A:131:ALA:HB3	1.99	0.43
1:C:178:LEU:HG	1:C:180:LEU:HB3	2.00	0.43
2:B:857:VAL:HG13	2:B:861:LEU:HD12	2.00	0.43
1:A:351:THR:HB	2:B:863:LEU:CB	2.49	0.42
2:D:487:GLY:HA3	2:D:512:VAL:HG22	2.01	0.42
1:A:178:LEU:HG	1:A:180:LEU:HB3	2.01	0.42
2:D:482:LYS:HG3	2:D:484:ILE:HD11	2.02	0.42
2:D:608:SER:O	2:D:609:GLY:C	2.58	0.42
1:C:118:LYS:HE3	1:C:122:ILE:HD11	2.01	0.42
2:D:690:TRP:CE2	2:D:694:LYS:HD2	2.55	0.41
1:C:76:ILE:HD13	1:C:82:MET:HG2	2.03	0.41
3:C:401:LAB:H52	3:C:401:LAB:H11	2.01	0.41
1:A:59:GLN:HB2	3:A:401:LAB:H7	2.03	0.41
1:A:38:PRO:HG3	1:A:52:SER:N	2.36	0.41
7:A:543:HOH:O	2:B:676:GLY:HA2	2.21	0.41
2:B:506:ILE:HB	2:B:672:MET:HB2	2.03	0.41
2:B:632:ASP:HB2	2:B:634:LYS:HE3	2.03	0.41
2:D:606:VAL:O	2:D:609:GLY:N	2.54	0.41
1:A:137:GLN:HG2	1:A:339:VAL:HG11	2.03	0.41
2:D:604:LEU:HG	2:D:611:TYR:CE1	2.55	0.41
2:D:605:ASP:O	2:D:606:VAL:C	2.58	0.41
1:A:351:THR:HB	2:B:863:LEU:CA	2.49	0.40
2:B:690:TRP:CE2	2:B:694:LYS:HD2	2.56	0.40
2:D:510:ARG:HB3	2:D:511:PRO:HD2	2.03	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	351/375 (94%)	338 (96%)	13 (4%)	0	100	100
1	C	362/375 (96%)	348 (96%)	14 (4%)	0	100	100
2	B	396/591 (67%)	385 (97%)	10 (2%)	1 (0%)	41	45
2	D	397/591 (67%)	382 (96%)	14 (4%)	1 (0%)	41	45
All	All	1506/1932 (78%)	1453 (96%)	51 (3%)	2 (0%)	51	60

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	609	GLY
2	B	479	GLN

### 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	301/318 (95%)	294 (98%)	7 (2%)	50	62
1	C	310/318 (98%)	302 (97%)	8 (3%)	46	57
2	B	345/504 (68%)	324 (94%)	21 (6%)	18	20
2	D	348/504 (69%)	334 (96%)	14 (4%)	31	38
All	All	1304/1644 (79%)	1254 (96%)	50 (4%)	33	41

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	ARG
1	A	84	LYS
1	A	287	ILE
1	A	297	ASN
1	A	299	MET
1	A	351	THR
1	A	354	GLN
2	B	479	GLN
2	B	480	HIS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	B	482	LYS
2	B	491	VAL
2	B	512	VAL
2	B	530	LEU
2	B	542	MET
2	B	570	GLN
2	B	598	SER
2	B	608	SER
2	B	616	THR
2	B	619	ASP
2	B	632	ASP
2	B	657	VAL
2	B	674	THR
2	B	675	TYR
2	B	695	GLU
2	B	700	GLU
2	B	727	VAL
2	B	731	LEU
2	B	792	GLN
1	C	37	ARG
1	C	43	VAL
1	C	84	LYS
1	C	287	ILE
1	C	297	ASN
1	C	299	MET
1	C	353	GLN
1	C	354	GLN
2	D	466	LYS
2	D	479	GLN
2	D	491	VAL
2	D	512	VAL
2	D	530	LEU
2	D	542	MET
2	D	570	GLN
2	D	598	SER
2	D	607	ASP
2	D	674	THR
2	D	675	TYR
2	D	695	GLU
2	D	731	LEU
2	D	792	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are

no such sidechains identified.

### 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 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 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
6	CH1	B	1103	5	24,29,29	0.70	1 (4%)	33,45,45	0.91	1 (3%)
6	CH1	D	1103	5	24,29,29	0.68	0	33,45,45	0.73	0
3	LAB	A	401	-	28,29,29	0.27	0	30,41,41	1.10	3 (10%)
4	ADP	C	402	5	24,29,29	0.68	0	29,45,45	0.85	1 (3%)
4	ADP	A	402	5	24,29,29	0.64	0	29,45,45	0.75	1 (3%)
3	LAB	C	401	-	28,29,29	0.29	0	30,41,41	1.29	5 (16%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.



Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	CH1	B	1103	5	-	7/22/34/34	0/2/2/2
6	CH1	D	1103	5	-	5/22/34/34	0/2/2/2
3	LAB	A	401	-	-	2/21/49/49	0/2/3/3
4	ADP	C	402	5	-	0/12/32/32	0/3/3/3
4	ADP	A	402	5	-	0/12/32/32	0/3/3/3
3	LAB	C	401	-	-	6/21/49/49	0/2/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	1103	CH1	PG-O3G	-2.15	1.46	1.54

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	401	LAB	C5-C6-C7	3.14	139.45	125.39
3	C	401	LAB	C3-C2-C1	3.10	135.12	127.46
3	A	401	LAB	C10-C9-C8	2.86	118.71	113.95
3	C	401	LAB	C10-C9-C8	2.77	118.57	113.95
3	A	401	LAB	C3-C2-C1	2.65	134.03	127.46
3	C	401	LAB	O3-C15-C16	2.44	107.38	104.25
3	A	401	LAB	C14-C15-C16	-2.38	109.11	113.75
6	B	1103	CH1	PB-O3B-PG	2.38	140.98	132.83
4	C	402	ADP	C5-C6-N6	2.21	123.70	120.35
4	A	402	ADP	C5-C6-N6	2.19	123.68	120.35
3	C	401	LAB	C14-C15-C16	-2.03	109.78	113.75

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	401	LAB	O3-C15-C16-C17
3	C	401	LAB	C5-C6-C7-C8
6	B	1103	CH1	PB-O3B-PG-O2G
6	B	1103	CH1	PB-O3B-PG-O3G
6	B	1103	CH1	C3'-C4'-C5'-O5'
6	D	1103	CH1	C3'-C4'-C5'-O5'
6	B	1103	CH1	O4'-C4'-C5'-O5'
6	D	1103	CH1	O4'-C4'-C5'-O5'
3	C	401	LAB	C1-C2-C3-C4
6	B	1103	CH1	C2'-C1'-N1-C6

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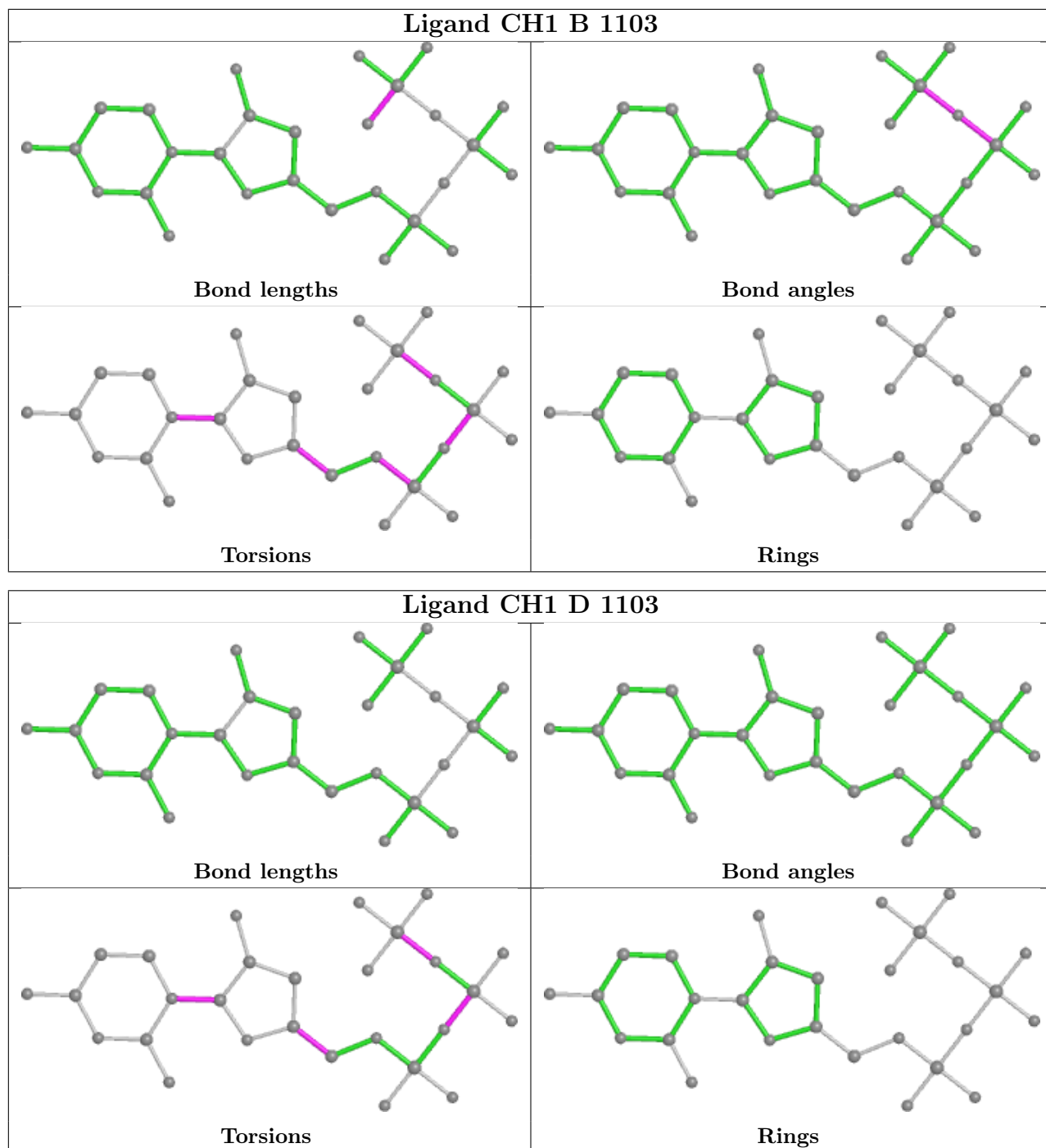
Mol	Chain	Res	Type	Atoms
6	D	1103	CH1	C2'-C1'-N1-C6
6	B	1103	CH1	PA-O3A-PB-O2B
6	D	1103	CH1	PA-O3A-PB-O1B
3	C	401	LAB	O2-C1-C2-C3
3	A	401	LAB	O2-C1-C2-C3
3	C	401	LAB	C19-C3-C4-C5
3	C	401	LAB	O1-C1-C2-C3
6	D	1103	CH1	PB-O3B-PG-O2G
6	B	1103	CH1	C5'-O5'-PA-O1A
3	C	401	LAB	C11-C10-C9-C8

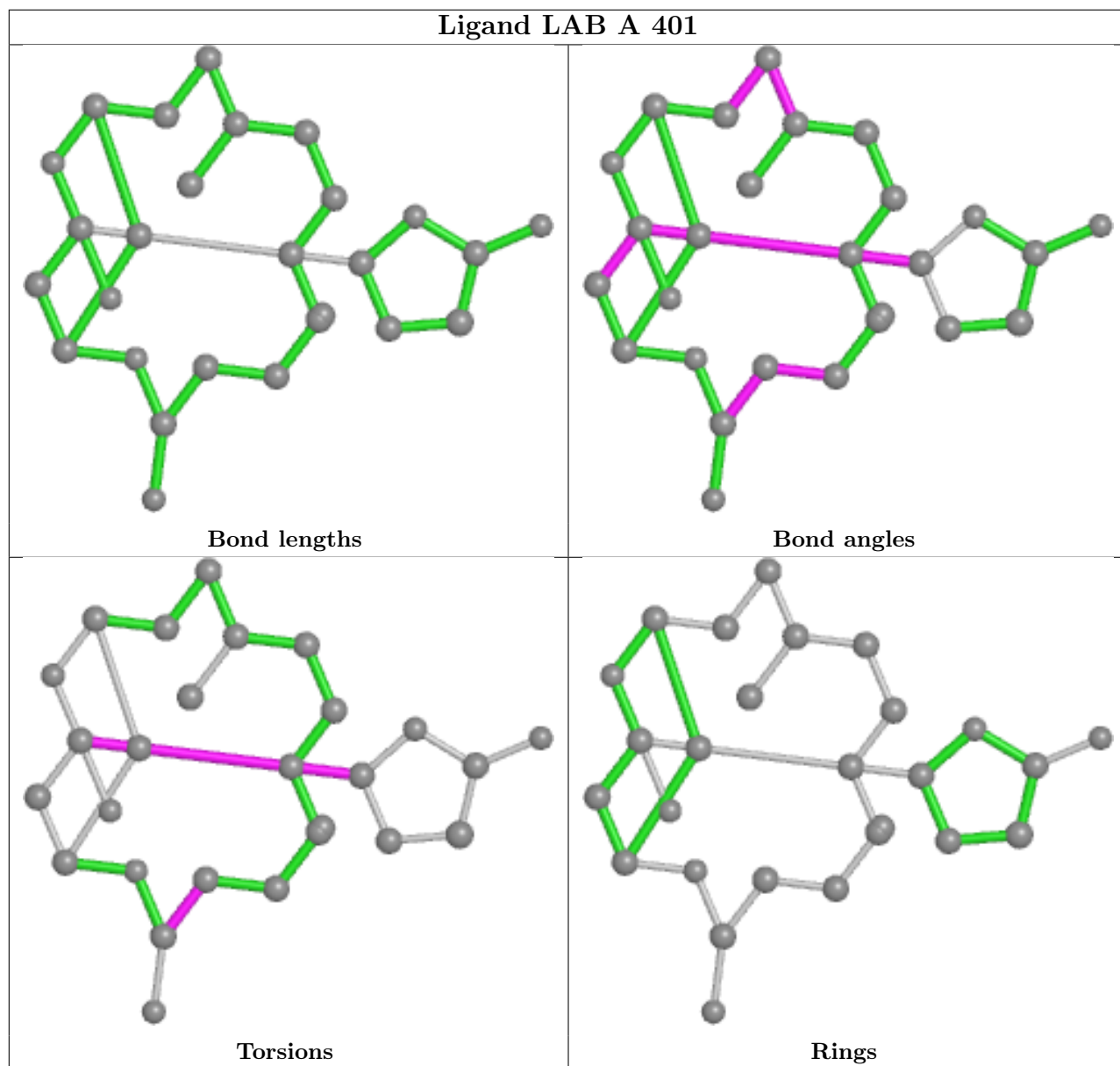
There are no ring outliers.

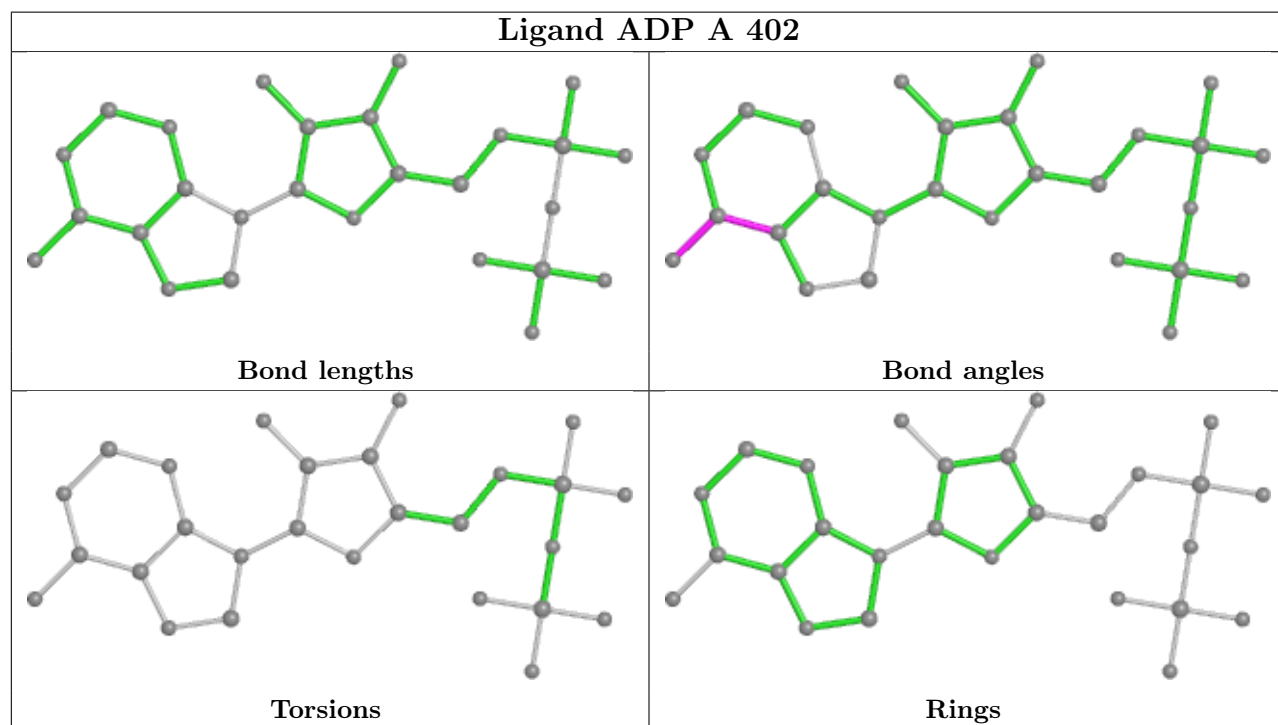
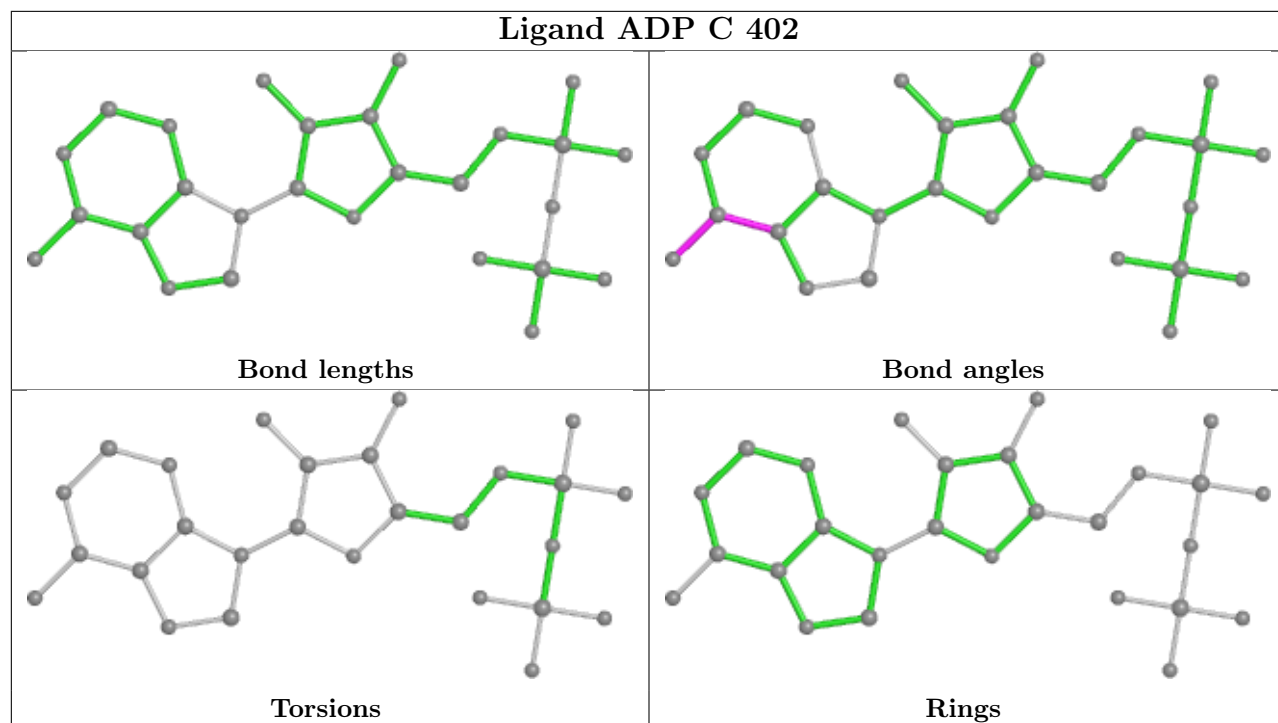
2 monomers are involved in 8 short contacts:

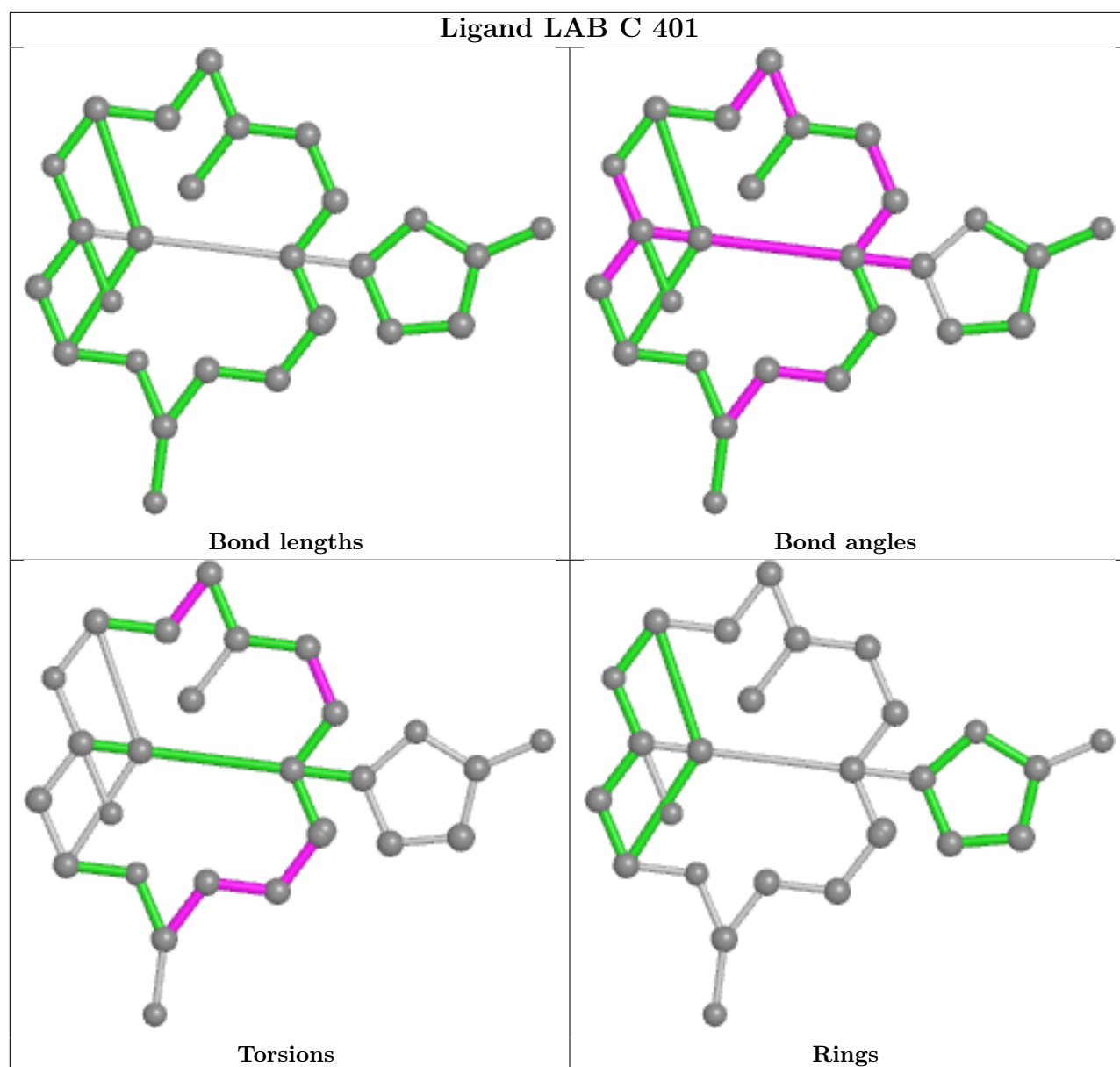
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	401	LAB	4	0
3	C	401	LAB	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.









## 5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

## 6 Fit of model and data

### 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<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	354/375 (94%)	0.21	11 (3%) 49 46	32, 61, 104, 135	0
1	C	365/375 (97%)	0.51	29 (7%) 12 11	48, 83, 137, 181	0
2	B	398/591 (67%)	0.29	26 (6%) 18 17	38, 65, 120, 148	0
2	D	398/591 (67%)	0.24	16 (4%) 38 36	34, 59, 109, 130	0
All	All	1515/1932 (78%)	0.31	82 (5%) 25 24	32, 67, 120, 181	0

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	351	THR	24.0
1	C	350	SER	12.1
1	A	64	ILE	8.6
2	D	608	SER	7.4
2	D	479	GLN	6.8
1	C	371	HIS	6.1
1	C	231	ALA	5.9
2	D	480	HIS	5.7
1	A	65	LEU	5.5
2	B	863	LEU	5.3
1	A	53	TYR	5.3
1	C	370	VAL	4.8
1	A	63	GLY	4.7
2	B	606	VAL	4.6
2	B	607	ASP	4.6
2	B	862	GLY	4.3
1	C	236	LEU	4.1
1	C	232	SER	4.0
2	D	602	LEU	4.0
1	C	234	SER	3.9
2	B	646	GLU	3.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	B	602	LEU	3.7
2	D	611	TYR	3.7
1	C	43	VAL	3.7
1	C	49	GLN	3.7
1	A	367	PRO	3.6
2	D	464	SER	3.5
1	C	352	PHE	3.5
2	B	611	TYR	3.5
2	B	604	LEU	3.4
1	A	62	ARG	3.4
1	A	371	HIS	3.3
1	C	230	ALA	3.3
1	C	4	GLU	3.2
2	B	594	SER	3.1
1	C	44	MET	3.1
2	B	625	PHE	3.1
2	D	482	LYS	3.1
2	B	637	TRP	3.0
1	C	323	SER	3.0
2	D	606	VAL	3.0
1	C	367	PRO	2.8
2	B	626	LEU	2.8
1	C	113	LYS	2.8
2	B	619	ASP	2.7
2	D	637	TRP	2.7
2	B	620	GLN	2.7
1	C	178	LEU	2.7
1	A	370	VAL	2.7
2	B	599	LEU	2.7
1	C	40	HIS	2.6
1	C	368	SER	2.5
1	C	64	ILE	2.5
2	B	466	LYS	2.5
2	B	479	GLN	2.5
2	B	695	GLU	2.5
1	C	39	ARG	2.4
1	C	41	GLN	2.4
1	C	347	ALA	2.4
1	C	360	GLN	2.4
2	D	715	LEU	2.3
2	D	619	ASP	2.3
2	B	593	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
2	B	589	ILE	2.3
2	B	647	LEU	2.2
1	C	38	PRO	2.2
2	D	644	GLU	2.2
2	D	561	LEU	2.2
2	D	609	GLY	2.2
1	A	52	SER	2.1
1	A	360	GLN	2.1
1	C	355	MET	2.1
1	A	67	LEU	2.1
2	D	712	ASN	2.1
2	D	631	VAL	2.1
1	C	79	TRP	2.0
1	C	53	TYR	2.0
2	B	707	LYS	2.0
2	B	561	LEU	2.0
2	B	610	MET	2.0
2	B	636	LEU	2.0
2	B	598	SER	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<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

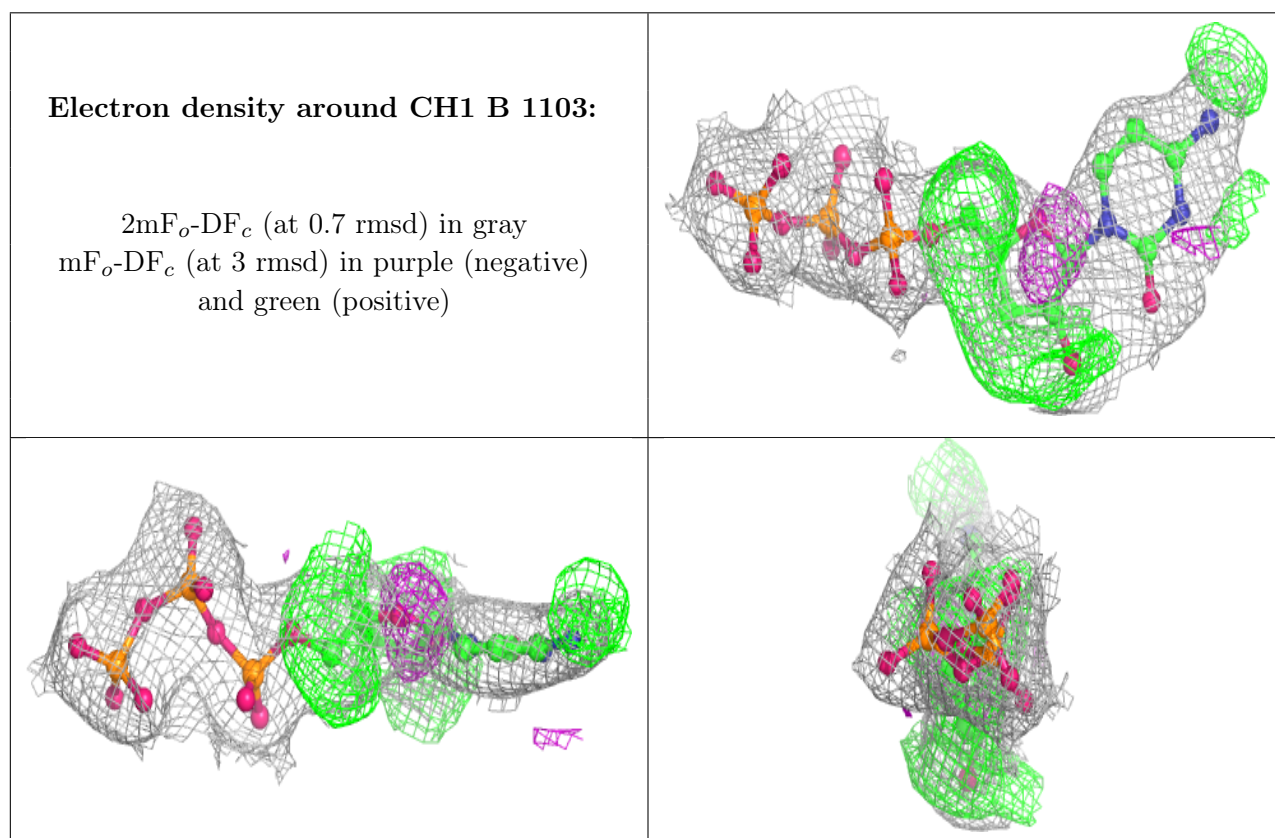
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	CH1	B	1103	28/28	0.86	0.18	53,56,65,65	0
6	CH1	D	1103	28/28	0.90	0.20	44,54,66,67	0
3	LAB	C	401	27/27	0.93	0.15	62,63,64,65	0
3	LAB	A	401	27/27	0.96	0.14	47,49,50,50	0

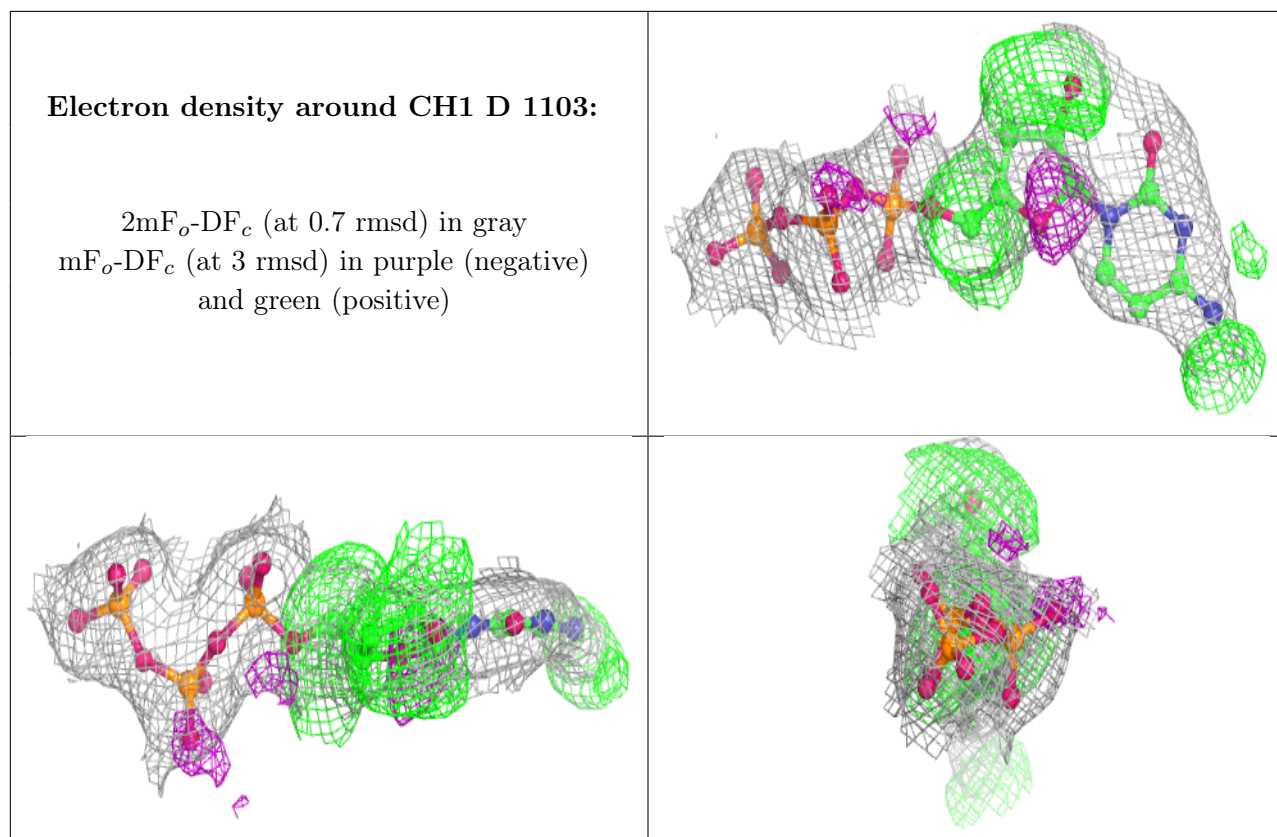
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ADP	C	402	27/27	0.97	0.12	61,63,64,64	0
5	MN	C	403	1/1	0.97	0.16	90,90,90,90	0
5	MN	B	1102	1/1	0.98	0.18	54,54,54,54	0
5	MN	A	403	1/1	0.99	0.13	69,69,69,69	0
5	MN	B	1101	1/1	0.99	0.13	54,54,54,54	0
4	ADP	A	402	27/27	0.99	0.13	39,41,46,46	0
5	MN	D	1101	1/1	1.00	0.18	45,45,45,45	0
5	MN	D	1102	1/1	1.00	0.13	45,45,45,45	0

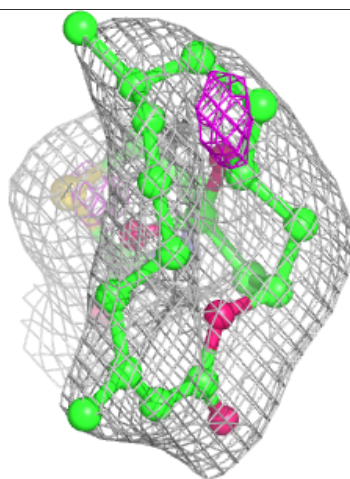
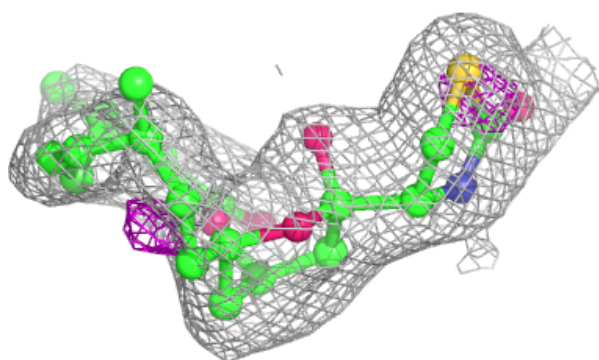
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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





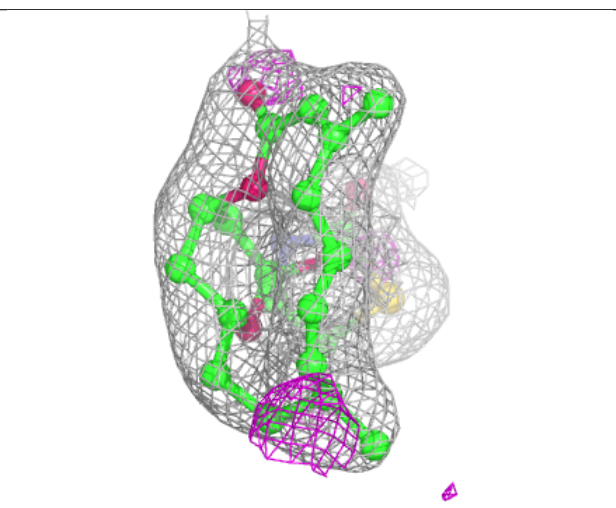
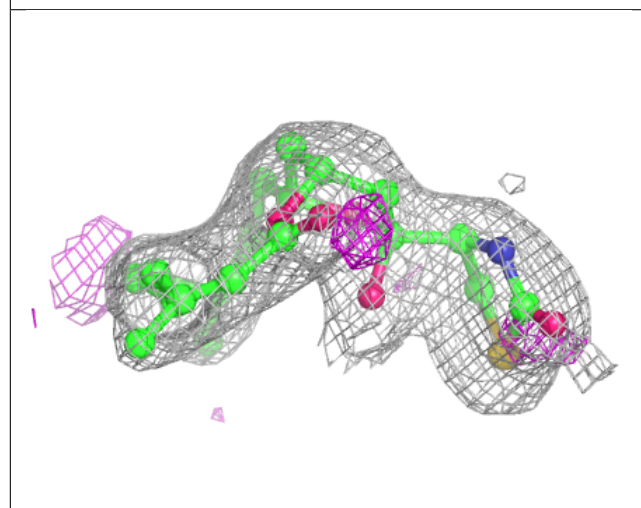
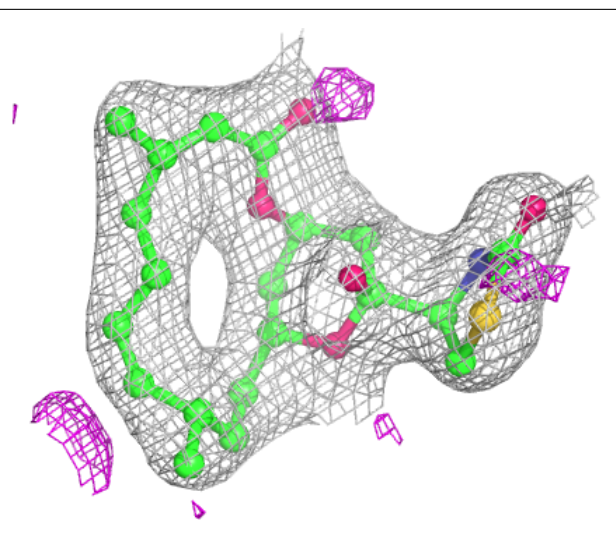
**Electron density around LAB C 401:**

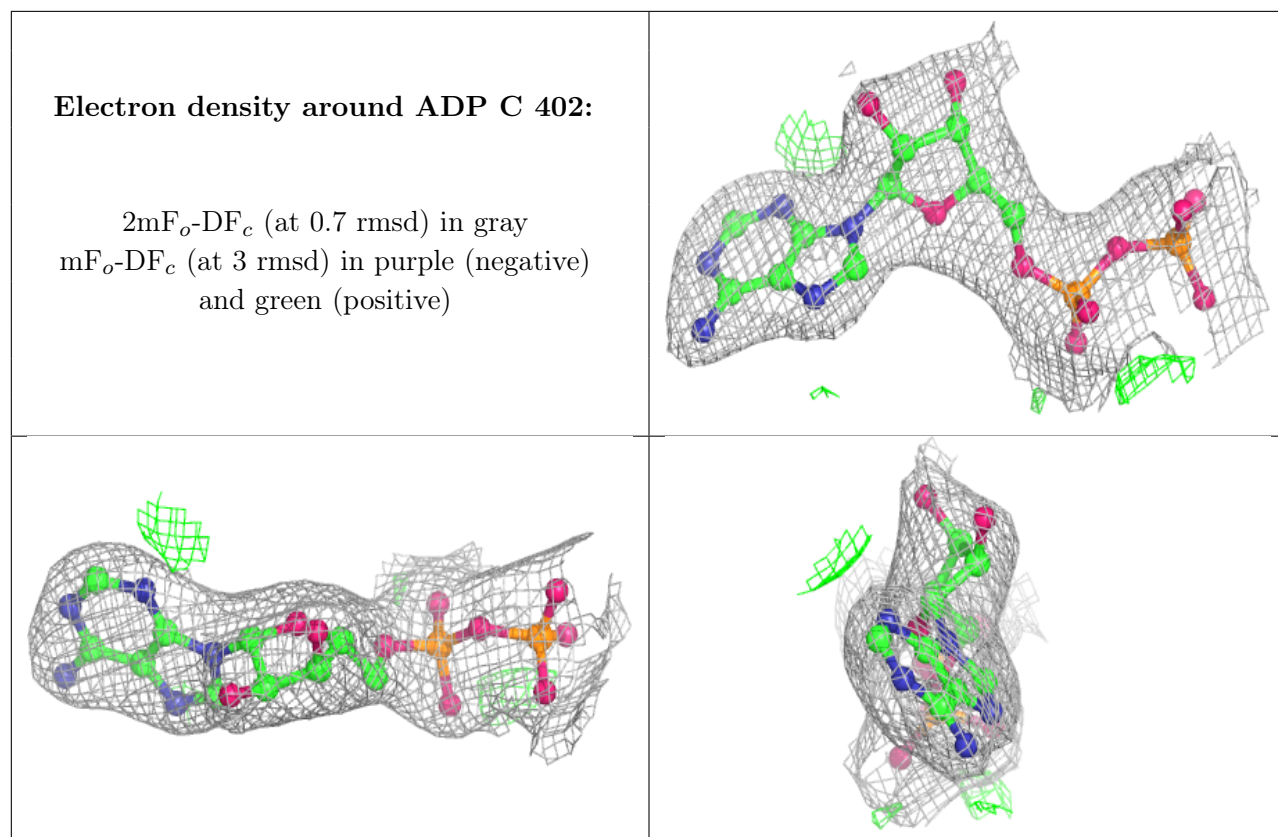
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around LAB A 401:**

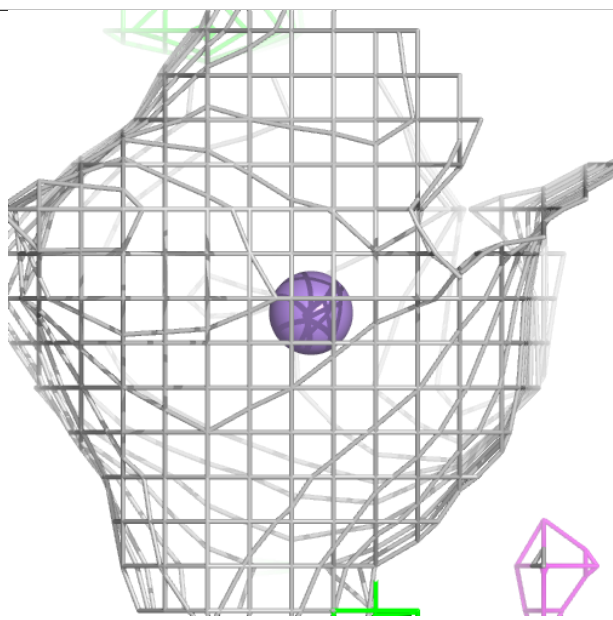
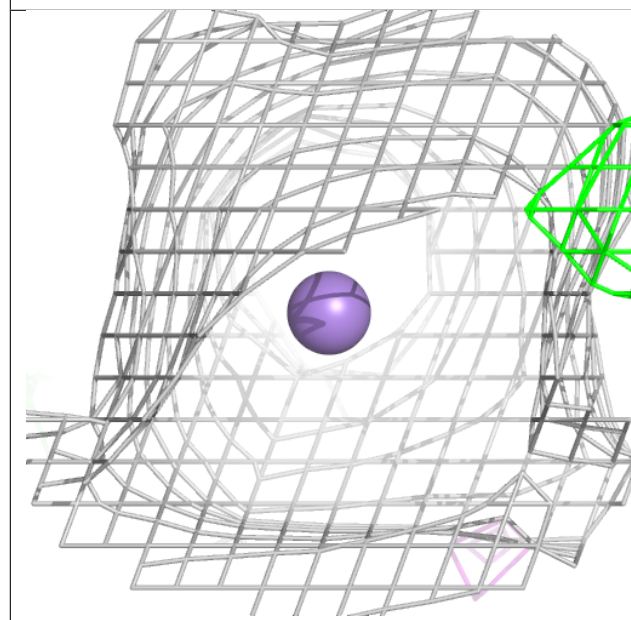
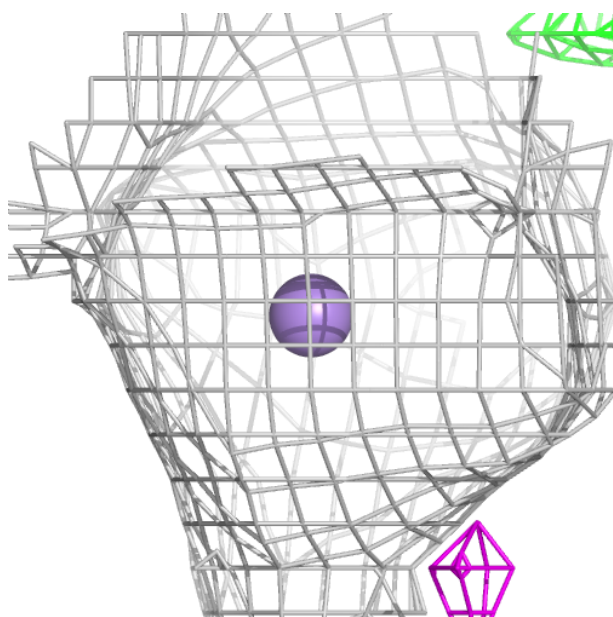
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

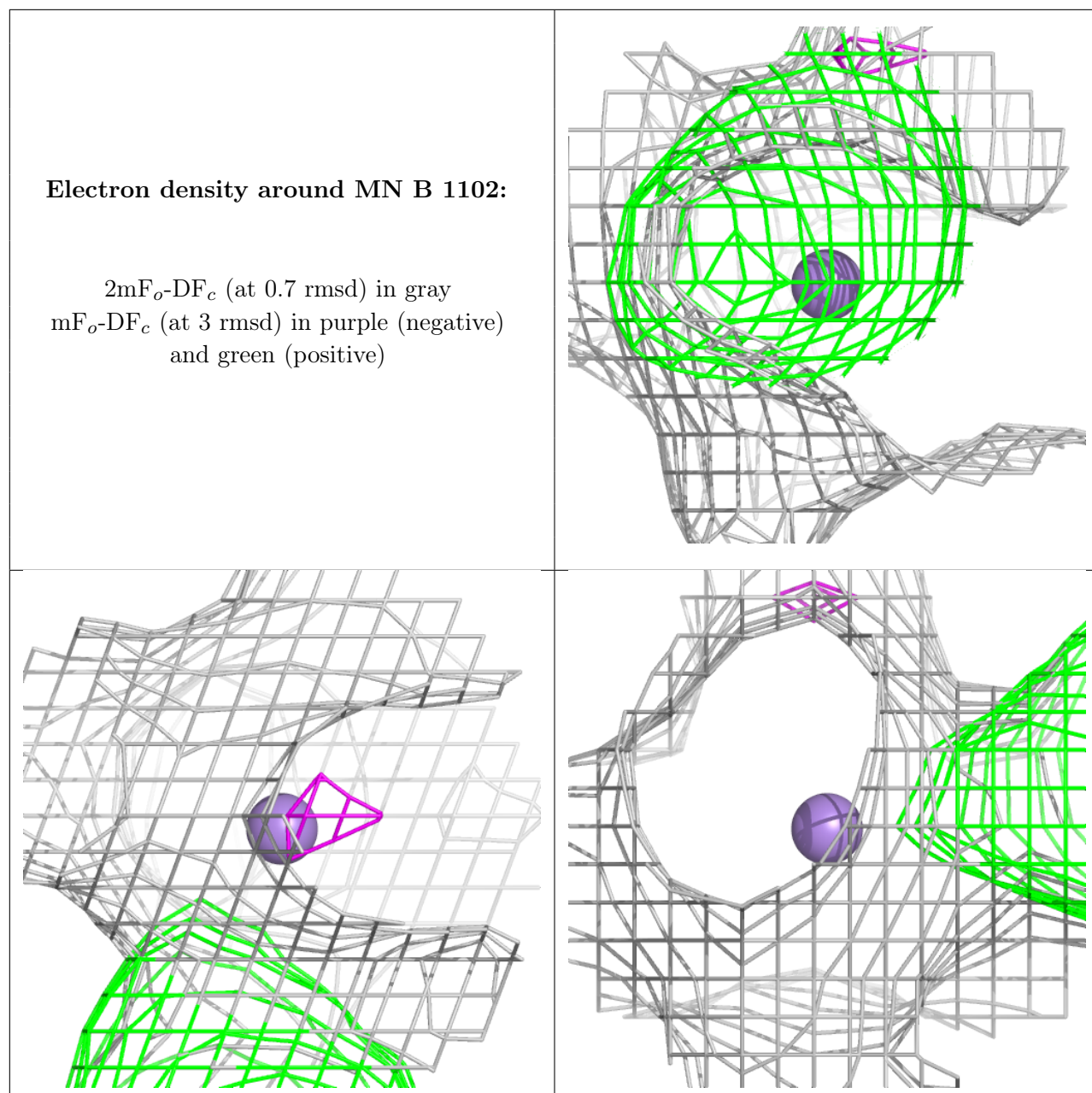




**Electron density around MN C 403:**

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

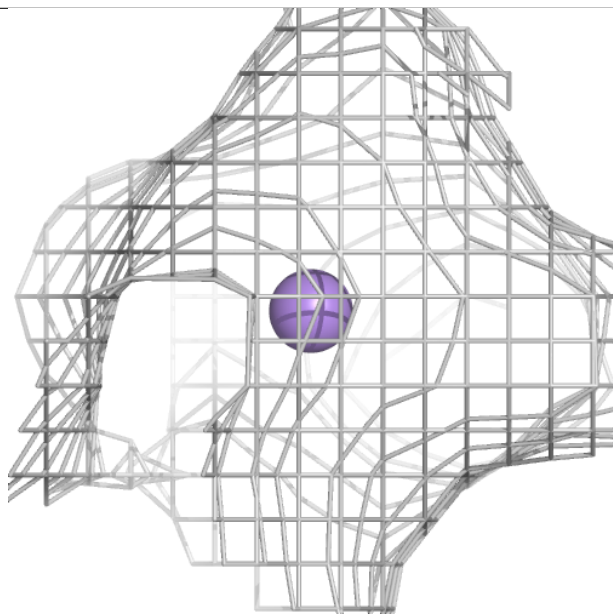
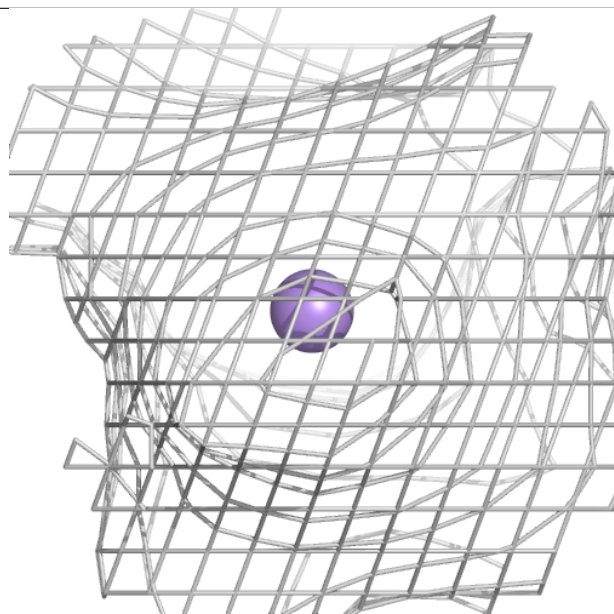
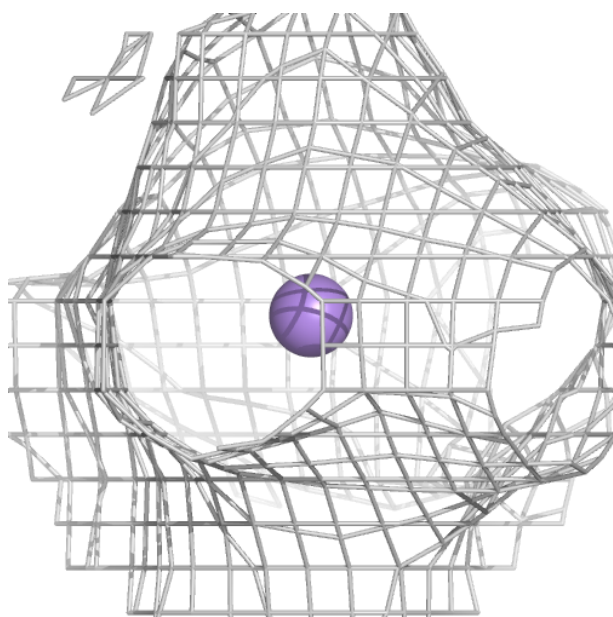


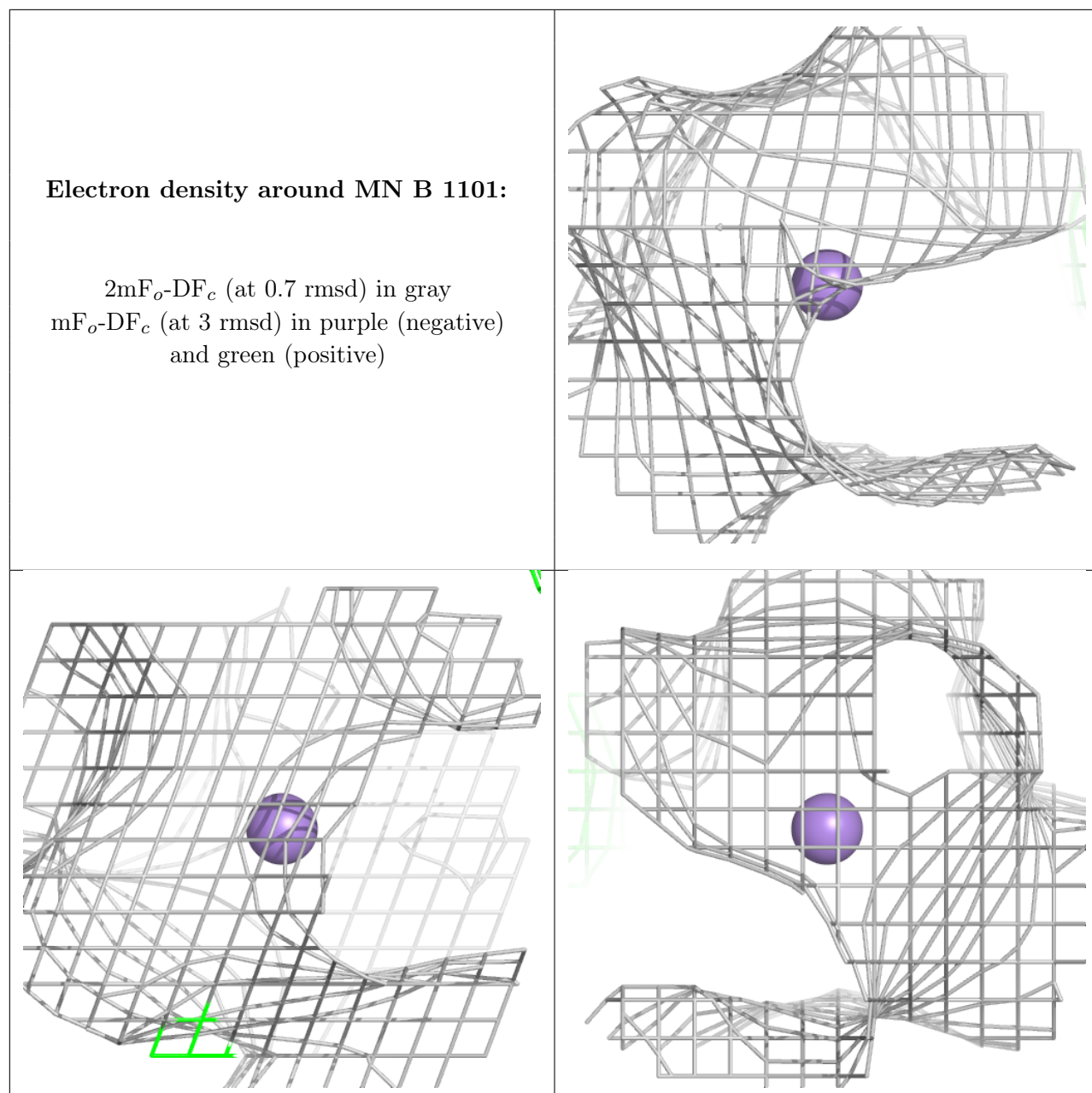


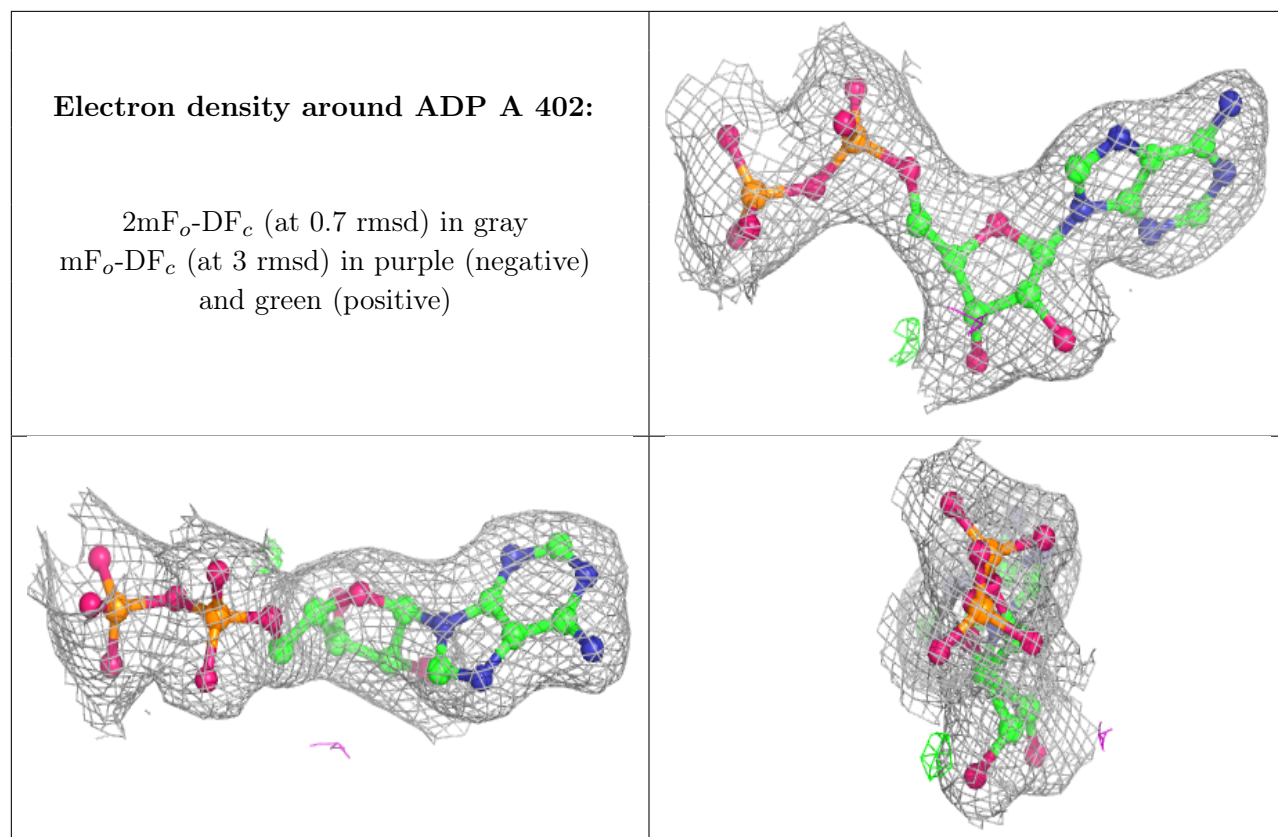


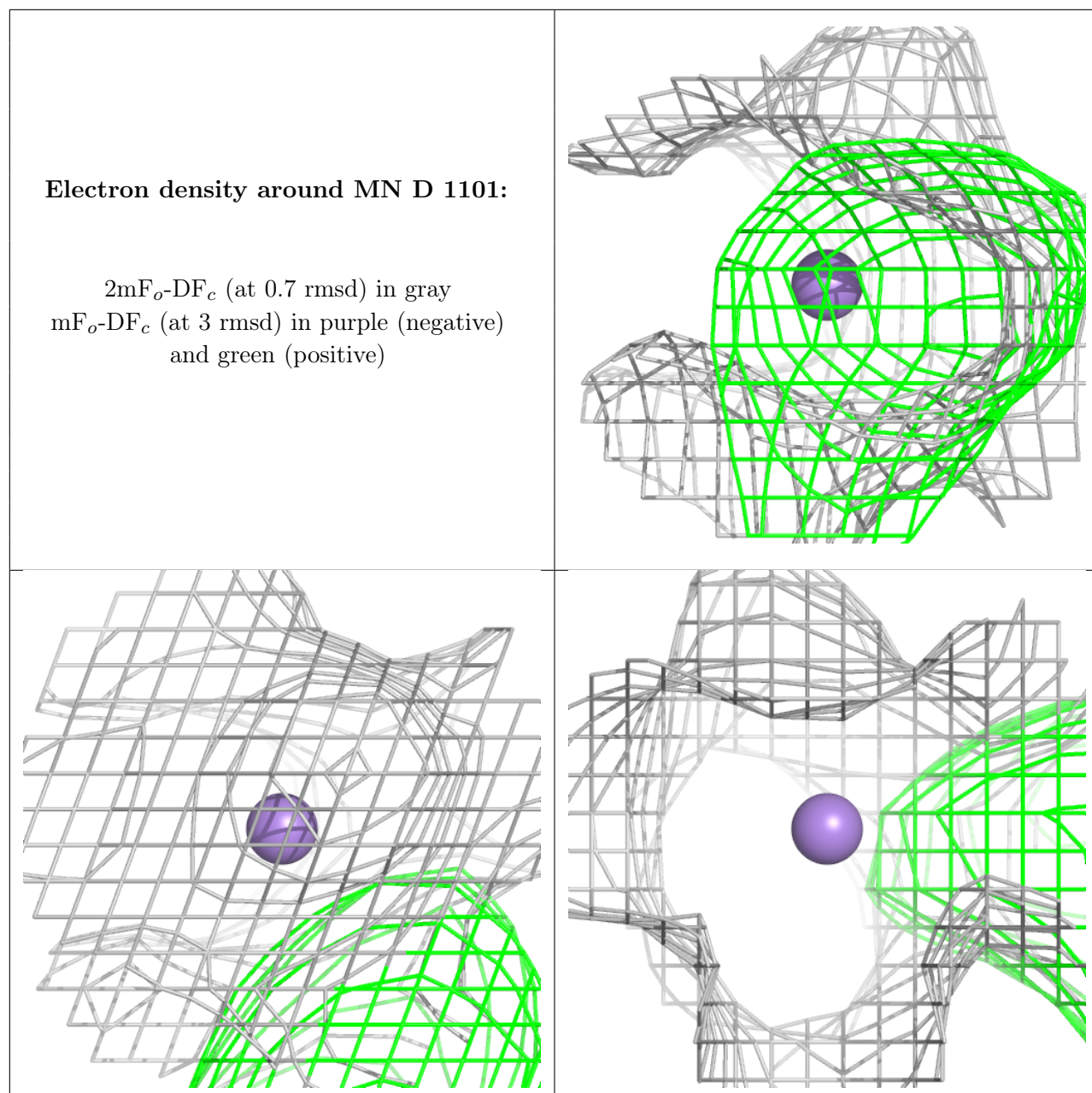
**Electron density around MN A 403:**

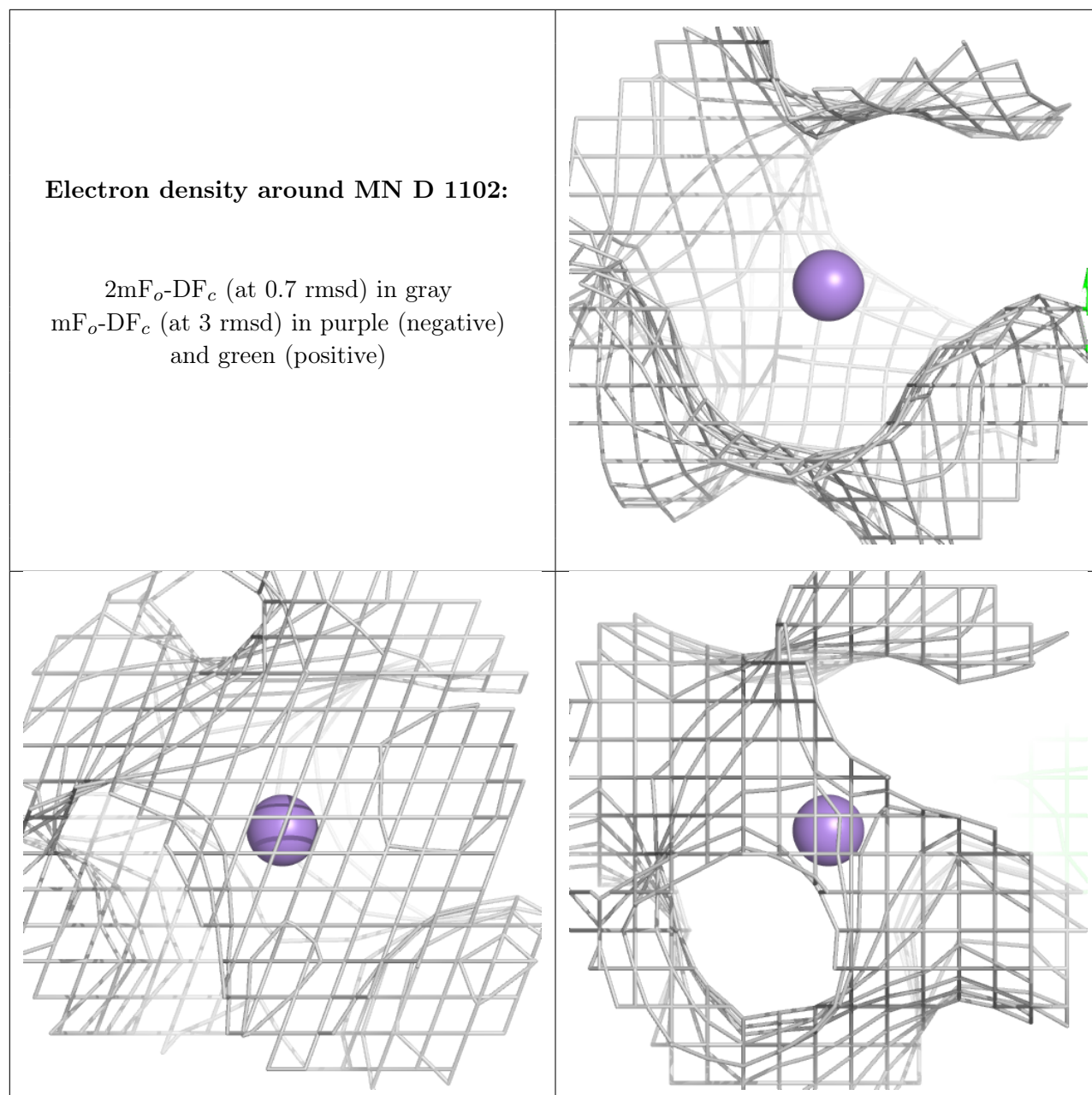
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)











## 6.5 Other polymers [i](#)

There are no such residues in this entry.