



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 18, 2023 – 10:27 am GMT

PDB ID : 8A9T
Title : Tubulin-[1,2]oxazoloisoindole-1 complex
Authors : Prota, A.E.; Abel, A.-C.; Steinmetz, M.O.; Barraja, P.; Montalbano, A.; Spano, V.
Deposited on : 2022-06-29
Resolution : 2.30 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.32.1
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) : 2.32.1

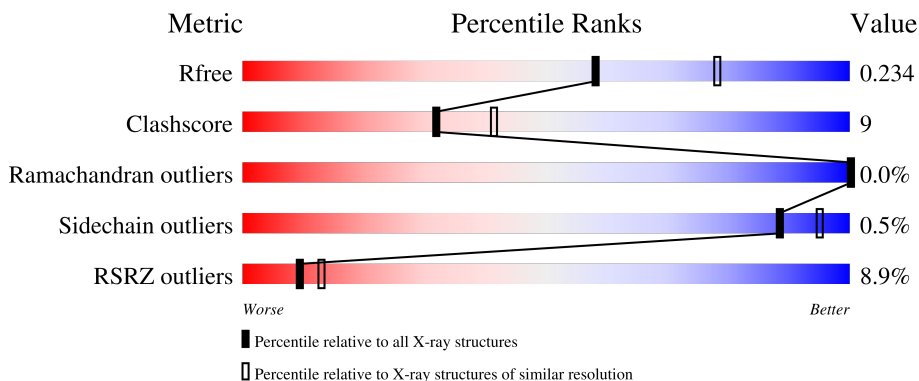
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	451	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 76%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 40px;">4% 76% 20% ••</p>
1	C	451	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 81%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 3%; height: 10px; background-color: grey; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 40px;">% 81% 16% •</p>
2	B	445	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 77%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 40px;">4% 77% 19% •</p>
2	D	445	<div style="display: flex; align-items: center;"> <div style="width: 8%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 76%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 40px;">8% 76% 20% •</p>
3	E	143	<div style="display: flex; align-items: center;"> <div style="width: 9%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 17%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: grey; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 40px;">9% 68% 17% 15%</p>

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Mol	Chain	Length	Quality of chain
4	F	384	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
12	ACP	F	401	-	-	-	X

2 Entry composition [i](#)

There are 13 unique types of molecules in this entry. The entry contains 17688 atoms, of which 5 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 Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	437	Total	C	N	O	S	0	8	0
			3454	2190	583	657	24			
1	C	440	Total	C	N	O	S	0	1	0
			3445	2180	587	656	22			

- Molecule 2 is a protein called Tubulin beta-2B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	426	Total	C	N	O	S	0	3	0
			3384	2125	582	650	27			
2	D	425	Total	C	N	O	S	0	0	0
			3335	2094	569	645	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	122	Total	C	N	O	S	0	0	0
			1009	622	182	200	5			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	3	MET	-	initiating methionine	UNP P63043
E	4	ALA	-	expression tag	UNP P63043

- Molecule 4 is a protein called Tubulin beta-2B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	F	309	Total	C	N	O	S	0	1	0
			2538	1637	435	454	12			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	379	HIS	-	expression tag	UNP E1BQ43
F	380	HIS	-	expression tag	UNP E1BQ43
F	381	HIS	-	expression tag	UNP E1BQ43
F	382	HIS	-	expression tag	UNP E1BQ43
F	383	HIS	-	expression tag	UNP E1BQ43
F	384	HIS	-	expression tag	UNP E1BQ43

- Molecule 5 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	A	1	Total	C	N	O	P	0	0
			32	10	5	14	3		
5	C	1	Total	C	N	O	P	0	0
			32	10	5	14	3		

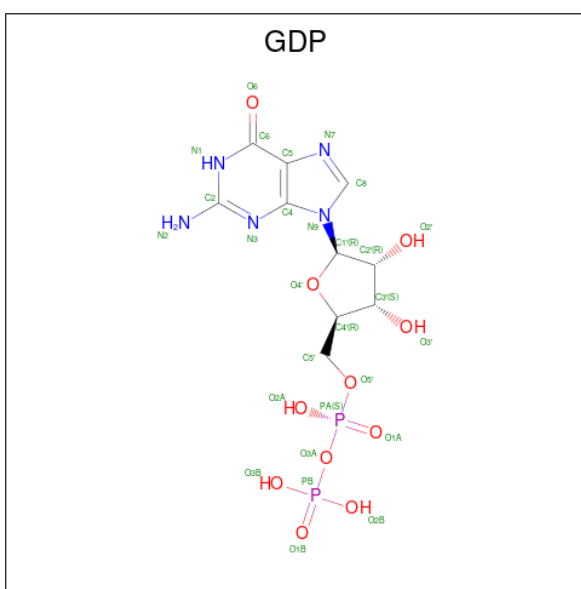
- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mg	0	0
			1	1		
6	B	1	Total	Mg	0	0
			1	1		
6	C	1	Total	Mg	0	0
			1	1		
6	D	1	Total	Mg	0	0
			1	1		

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	2	Total Ca 2 2	0	0
7	B	1	Total Ca 1 1	0	0
7	C	2	Total Ca 2 2	0	0

- Molecule 8 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂).



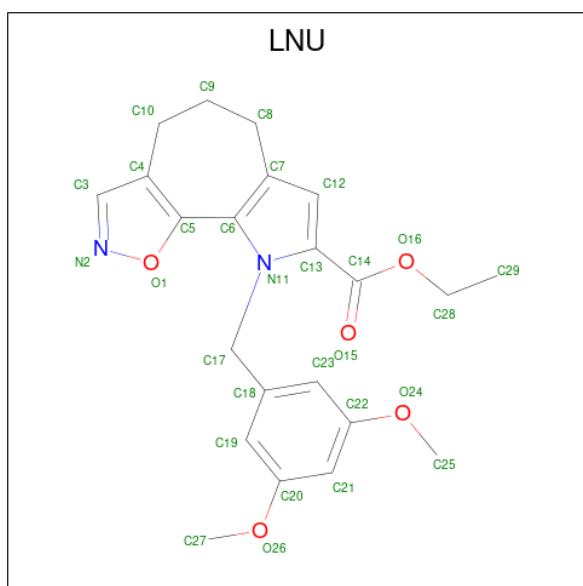
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C N O P 28 10 5 11 2	0	0
8	D	1	Total C N O P 28 10 5 11 2	0	0

- Molecule 9 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C₆H₁₃NO₄S).



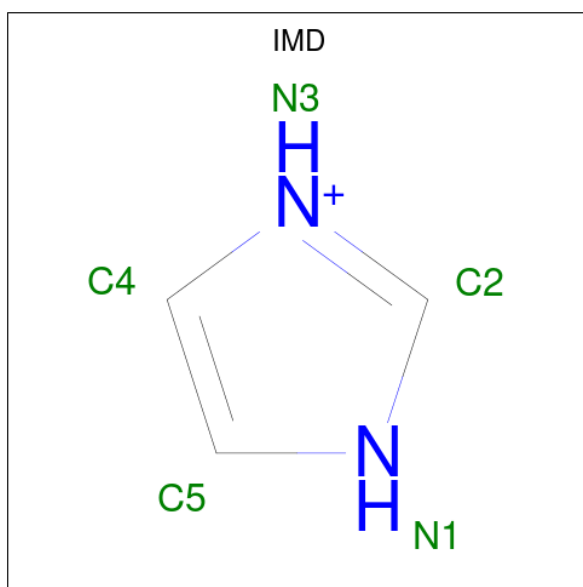
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
9	B	1	12	6	1	4	1	0	0

- Molecule 10 is ethyl 13-[(3,5-dimethoxyphenyl)methyl]-3-oxa-4,13-diazatricyclo[8.3.0.0[^]{2,6}]trideca-1(10),2(6),4,11-tetraene-12-carboxylate (three-letter code: LNU) (formula: C₂₂H₂₄N₂O₅) (labeled as "Ligand of Interest" by depositor).



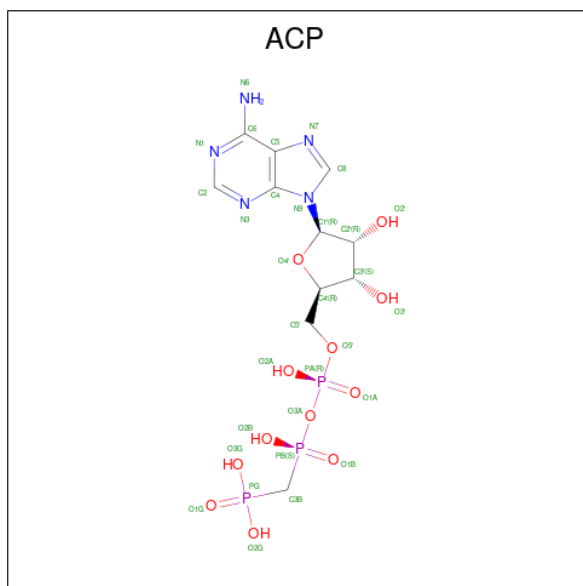
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
10	B	1	29	22	2	5	0	0

- Molecule 11 is IMIDAZOLE (three-letter code: IMD) (formula: C₃H₅N₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	N		
11	D	1	10	3	5	2	0	0

- Molecule 12 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
12	F	1	31	11	5	12	3	0	0

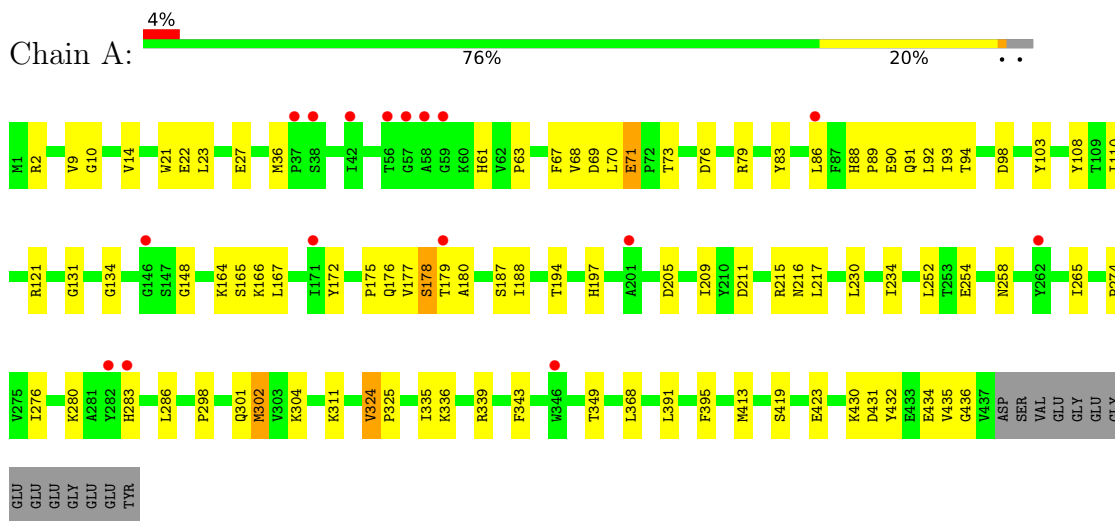
- Molecule 13 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	A	50	Total O 50 50	0	0
13	B	60	Total O 60 60	0	0
13	C	148	Total O 148 148	0	0
13	D	26	Total O 26 26	0	0
13	E	15	Total O 15 15	0	0
13	F	13	Total O 13 13	0	0

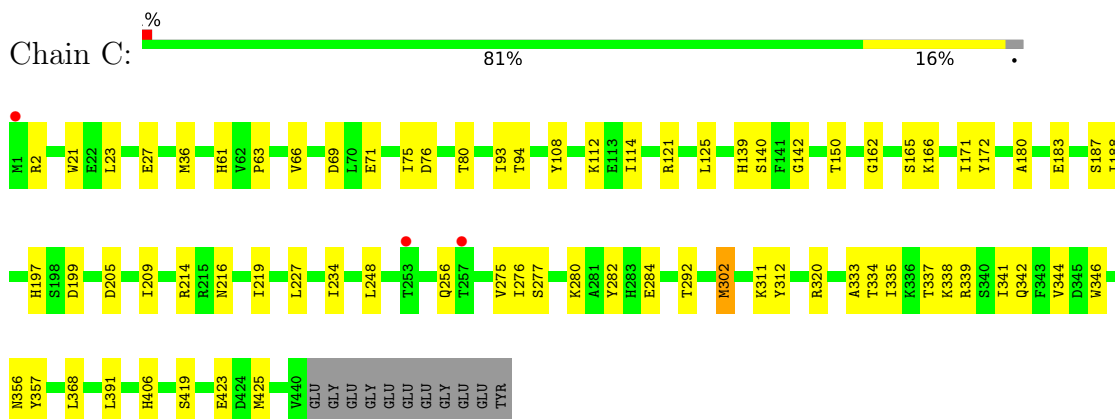
3 Residue-property plots [i](#)

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.

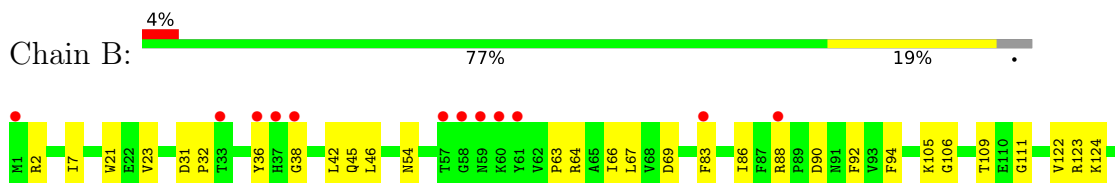
- Molecule 1: Tubulin alpha-1B chain

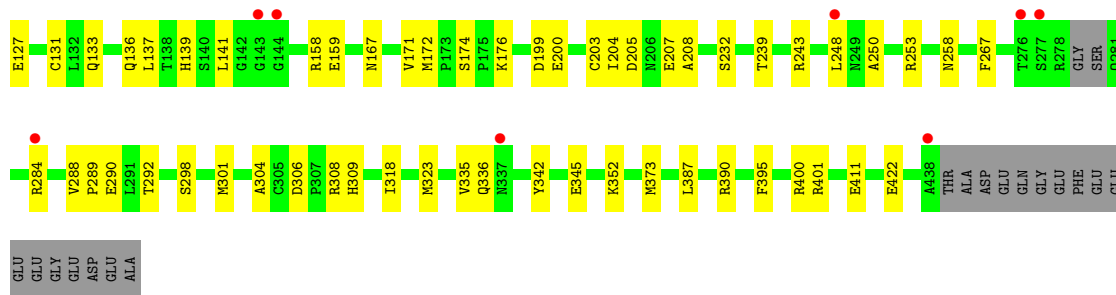


- Molecule 1: Tubulin alpha-1B chain

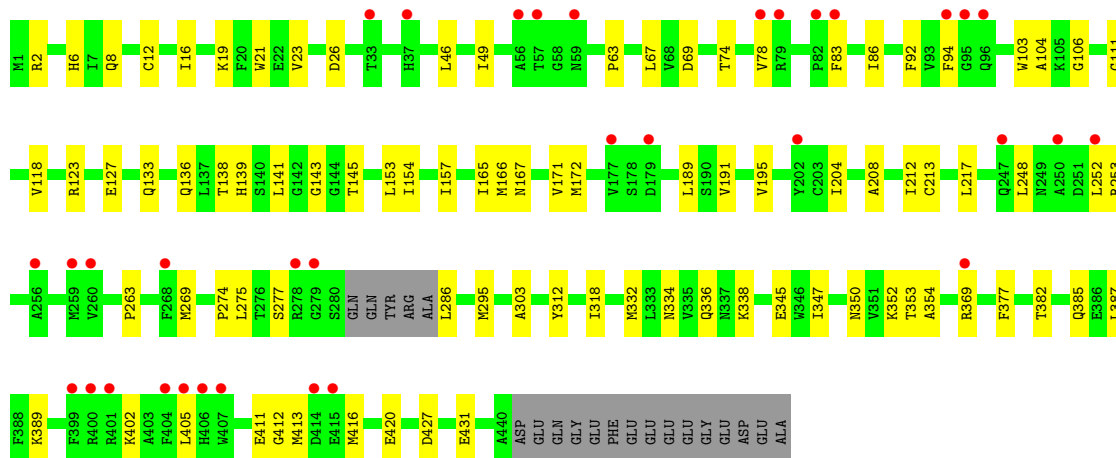
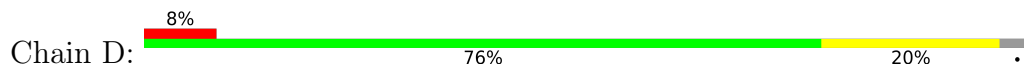


- Molecule 2: Tubulin beta-2B chain

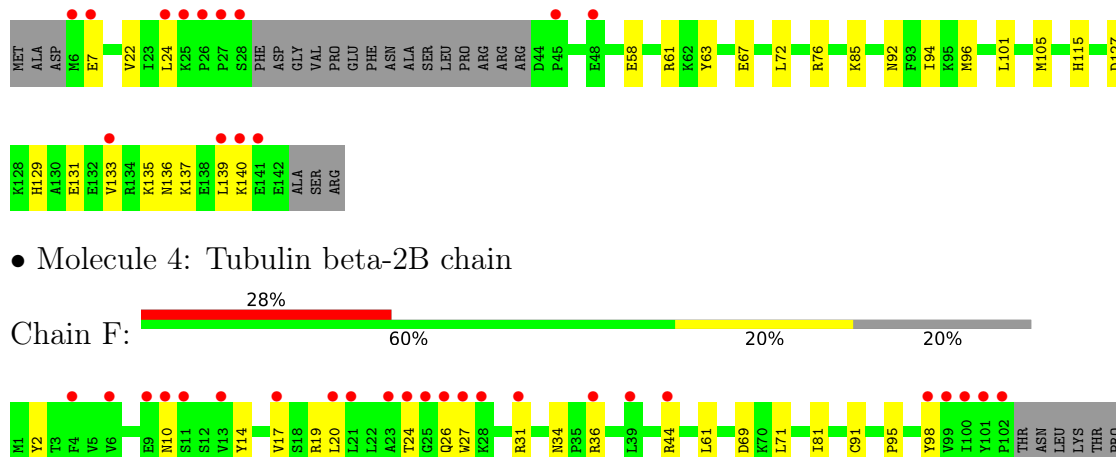




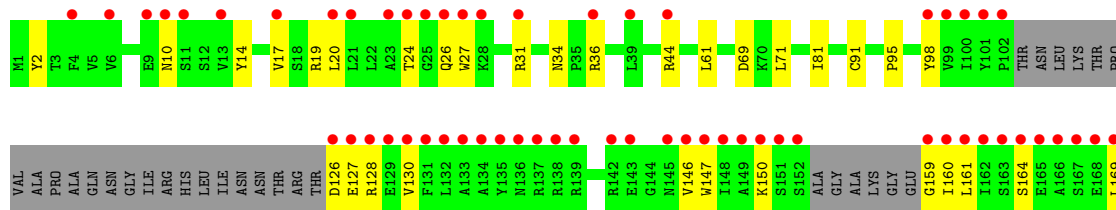
• Molecule 2: Tubulin beta-2B chain

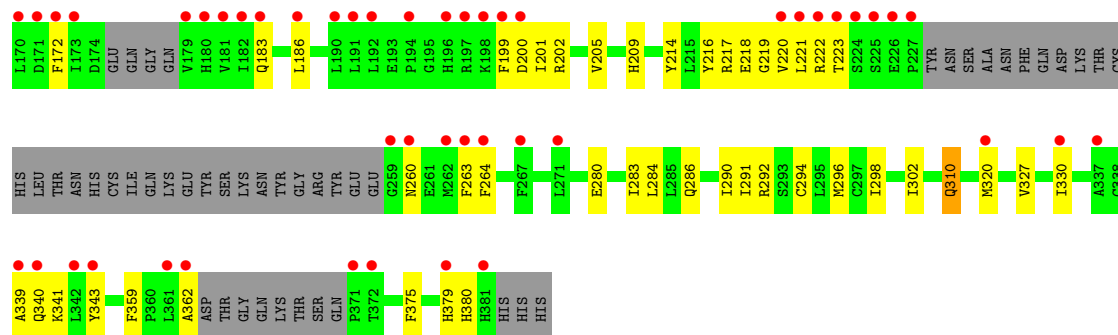


• Molecule 3: Stathmin-4



• Molecule 4: Tubulin beta-2B chain





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	105.21Å 158.05Å 180.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.91 – 2.30 48.11 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.91-2.30) 100.0 (48.11-2.30)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.42 (at 2.32Å)	Xtrriage
Refinement program	PHENIX 1.20_4459	Depositor
R, R_{free}	0.194 , 0.237 0.191 , 0.234	Depositor DCC
R_{free} test set	6664 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	53.9	Xtrriage
Anisotropy	0.098	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	17688	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.43% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, ACP, MES, LNU, GDP, MG, GTP, IMD

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	0.24	0/3553	0.46	0/4824
1	C	0.24	0/3526	0.47	0/4786
2	B	0.24	0/3464	0.46	0/4688
2	D	0.24	0/3408	0.46	0/4615
3	E	0.23	0/1017	0.40	0/1349
4	F	0.23	0/2595	0.46	0/3503
All	All	0.24	0/17563	0.46	0/23765

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	3454	0	3382	64	0
1	C	3445	0	3360	49	1
2	B	3384	0	3272	65	1
2	D	3335	0	3218	61	0
3	E	1009	0	1024	20	0
4	F	2538	0	2536	57	0
5	A	32	0	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	32	0	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	2	0	0	0	0
7	B	1	0	0	0	0
7	C	2	0	0	0	0
8	B	28	0	12	0	0
8	D	28	0	12	3	0
9	B	12	0	12	5	0
10	B	29	0	0	3	0
11	D	5	5	5	0	0
12	F	31	0	14	2	0
13	A	50	0	0	1	0
13	B	60	0	0	0	0
13	C	148	0	0	3	0
13	D	26	0	0	2	0
13	E	15	0	0	1	0
13	F	13	0	0	0	0
All	All	17683	5	16871	304	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 9.

All (304) 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)
4:F:209:HIS:HB2	4:F:310:GLN:HG3	1.53	0.89
1:A:280:LYS:HE2	1:A:283:HIS:HA	1.55	0.86
1:A:175:PRO:HA	1:A:179:THR:HG21	1.58	0.85
1:C:93:ILE:HD11	1:C:121:ARG:HG3	1.62	0.81
4:F:320:MET:HG3	4:F:330:ILE:HD11	1.64	0.77
2:B:2:ARG:HB3	2:B:133:GLN:CG	2.15	0.77
2:B:199:ASP:OD2	9:B:504:MES:H52	1.85	0.76
1:A:88:HIS:CE1	1:A:91:GLN:HG3	2.21	0.76
1:A:335:ILE:HG23	1:A:339:ARG:HG3	1.68	0.74
2:D:83:PHE:O	2:D:86:ILE:HG22	1.89	0.73
2:B:158:ARG:CZ	9:B:504:MES:H21	2.23	0.69
1:A:234:ILE:HD13	1:A:302:MET:SD	2.34	0.68
4:F:31:ARG:HG3	4:F:34:ASN:HB2	1.75	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:311:LYS:HG2	1:C:342:GLN:OE1	1.95	0.67
4:F:200:ASP:OD1	4:F:222:ARG:HB2	1.95	0.67
2:B:248:LEU:HD11	10:B:505:LNU:C4	2.26	0.66
2:D:143:GLY:HA3	8:D:501:GDP:O3A	1.95	0.66
1:A:166:LYS:HE2	1:A:197:HIS:O	1.95	0.65
1:A:336:LYS:HG3	3:E:24:LEU:HD13	1.79	0.65
2:B:323:MET:HB3	2:B:373:MET:HE1	1.77	0.65
3:E:85:LYS:NZ	13:E:201:HOH:O	2.30	0.65
2:B:323:MET:HB3	2:B:373:MET:CE	2.27	0.65
1:A:175:PRO:HA	1:A:179:THR:CG2	2.26	0.64
2:D:217:LEU:HA	2:D:277:SER:HB3	1.79	0.64
2:D:136:GLN:HA	2:D:167:ASN:O	1.98	0.63
1:C:75:ILE:HD12	1:C:94:THR:HG22	1.80	0.63
1:C:320:ARG:HA	1:C:356:ASN:O	1.98	0.63
2:B:83:PHE:O	2:B:86:ILE:HG22	1.99	0.63
1:A:76:ASP:OD1	1:A:79:ARG:NH1	2.32	0.62
1:C:209:ILE:HG22	1:C:227:LEU:HD22	1.80	0.62
2:D:172:MET:HG3	2:D:387:LEU:HD11	1.82	0.62
4:F:81:ILE:HG23	4:F:91:CYS:SG	2.39	0.62
2:B:172:MET:HG3	2:B:387:LEU:HD11	1.82	0.62
2:D:2:ARG:HB3	2:D:133:GLN:CG	2.30	0.62
1:A:88:HIS:HB2	1:A:89:PRO:HD2	1.82	0.61
1:A:93:ILE:HD11	1:A:121:ARG:HG3	1.83	0.61
2:D:269:MET:HG3	2:D:303:ALA:HB3	1.81	0.61
2:B:136:GLN:HA	2:B:167:ASN:O	2.00	0.61
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.36	0.61
1:C:275:VAL:HG13	1:C:368:LEU:HD21	1.83	0.60
4:F:330:ILE:HG21	12:F:401:ACP:H5'2	1.83	0.60
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.81	0.60
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.36	0.60
1:C:93:ILE:CD1	1:C:121:ARG:HG3	2.31	0.59
2:B:2:ARG:HB3	2:B:133:GLN:HG2	1.84	0.59
2:B:199:ASP:OD1	9:B:504:MES:H32	2.02	0.59
4:F:209:HIS:HB2	4:F:310:GLN:CG	2.29	0.59
1:C:341:ILE:HD12	1:C:341:ILE:H	1.66	0.59
1:C:108:TYR:O	1:C:112:LYS:HG2	2.02	0.59
2:D:248:LEU:HD22	2:D:354:ALA:HB2	1.85	0.59
2:D:248:LEU:HD11	2:D:352:LYS:HB3	1.84	0.59
1:A:172:TYR:HB3	1:A:205:ASP:HA	1.84	0.59
2:D:253:ARG:NH1	13:D:601:HOH:O	2.08	0.59
2:B:141:LEU:HD12	2:B:172:MET:SD	2.42	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:302:MET:HA	1:C:302:MET:HE2	1.85	0.58
1:A:324:VAL:HG22	1:A:325:PRO:HD2	1.86	0.58
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.39	0.58
1:C:2:ARG:HD3	13:C:688:HOH:O	2.04	0.57
2:D:295:MET:HG2	2:D:377:PHE:HB2	1.87	0.57
2:D:431:GLU:OE1	13:D:602:HOH:O	2.17	0.57
1:A:254:GLU:HG2	1:A:258:ASN:ND2	2.20	0.56
2:B:69:ASP:O	2:B:94:PHE:HA	2.05	0.56
1:C:214:ARG:HG2	1:C:219:ILE:O	2.05	0.56
1:A:311:LYS:HD2	1:A:436:GLY:HA2	1.87	0.56
2:D:21:TRP:CZ3	2:D:63:PRO:HB3	2.40	0.56
3:E:129:HIS:O	3:E:133:VAL:HG23	2.05	0.56
4:F:223:THR:OG1	4:F:260:ASN:HA	2.05	0.56
1:C:76:ASP:O	1:C:80:THR:HG22	2.05	0.56
4:F:61:LEU:HD13	4:F:310:GLN:HB3	1.88	0.56
2:B:42:LEU:H	2:B:42:LEU:HD12	1.71	0.56
1:C:234:ILE:HG12	1:C:302:MET:SD	2.46	0.55
2:D:295:MET:CG	2:D:377:PHE:HB2	2.35	0.55
1:A:265:ILE:HG23	1:A:432:TYR:CE1	2.42	0.55
1:A:217:LEU:HD21	1:A:368:LEU:HD23	1.89	0.55
2:D:191:VAL:O	2:D:195:VAL:HG23	2.07	0.55
3:E:136:ASN:O	3:E:140:LYS:HE3	2.06	0.55
2:D:332:MET:O	2:D:336:GLN:HG3	2.07	0.55
1:A:2:ARG:HB3	1:A:131:GLY:O	2.07	0.55
2:D:248:LEU:HD13	2:D:353:THR:O	2.07	0.54
3:E:7:GLU:O	3:E:22:VAL:HA	2.07	0.54
2:D:26:ASP:OD2	2:D:369:ARG:HD2	2.06	0.54
4:F:292:ARG:HD2	4:F:379:HIS:O	2.08	0.54
4:F:126:ASP:OD1	4:F:127:GLU:N	2.41	0.54
2:D:106:GLY:O	2:D:111:GLY:HA3	2.08	0.54
2:D:412:GLY:HA2	3:E:140:LYS:HZ1	1.73	0.54
2:B:2:ARG:HB3	2:B:133:GLN:HG3	1.90	0.53
2:D:69:ASP:O	2:D:94:PHE:HA	2.08	0.53
2:B:23:VAL:HG21	2:B:232:SER:HB3	1.90	0.53
1:C:166:LYS:HE2	1:C:197:HIS:O	2.08	0.53
2:B:239:THR:O	2:B:243:ARG:HG3	2.09	0.53
2:D:74:THR:O	2:D:78:VAL:HG23	2.08	0.53
4:F:263:PHE:CZ	4:F:341:LYS:HE2	2.43	0.53
1:A:108:TYR:CE2	1:A:413:MET:HG3	2.44	0.53
1:A:70:LEU:HD13	1:A:110:ILE:HG21	1.91	0.53
2:B:38:GLY:HA3	2:B:45:GLN:OE1	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:217:ARG:HG3	4:F:218:GLU:HG2	1.91	0.52
2:D:6:HIS:HE2	2:D:8:GLN:HE21	1.55	0.52
4:F:201:ILE:HG12	4:F:221:LEU:HG	1.92	0.52
1:A:187:SER:CB	1:A:391:LEU:HD21	2.39	0.52
1:A:419:SER:O	1:A:423[A]:GLU:HG3	2.10	0.52
4:F:69:ASP:N	4:F:69:ASP:OD1	2.43	0.52
2:B:67:LEU:N	2:B:67:LEU:HD12	2.25	0.52
1:C:256:GLN:NE2	13:C:602:HOH:O	2.29	0.52
2:D:118:VAL:HG11	2:D:153:LEU:HD11	1.92	0.52
3:E:63:TYR:O	3:E:67:GLU:HG2	2.11	0.51
1:C:276:ILE:CG1	1:C:280:LYS:HB2	2.41	0.51
2:B:292:THR:HG22	2:B:335:VAL:HG21	1.92	0.51
2:D:141:LEU:HD12	2:D:172:MET:SD	2.51	0.51
3:E:127:ASP:O	3:E:131:GLU:HG2	2.11	0.51
2:B:400:ARG:HG3	2:B:401:ARG:HG2	1.91	0.51
1:C:339:ARG:HB2	1:C:341:ILE:HD11	1.93	0.51
1:C:419:SER:O	1:C:423:GLU:HG3	2.11	0.50
2:D:67:LEU:N	2:D:67:LEU:HD12	2.26	0.50
4:F:26:GLN:HE22	4:F:362:ALA:H	1.59	0.50
4:F:280:GLU:HA	4:F:284:LEU:CB	2.41	0.50
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.92	0.50
2:B:88:ARG:NH1	2:B:90:ASP:HB2	2.27	0.50
2:D:347:ILE:HG22	2:D:350:ASN:HB3	1.94	0.50
1:C:21:TRP:CZ3	1:C:63:PRO:HB3	2.47	0.50
1:C:172:TYR:HB3	1:C:205:ASP:HA	1.93	0.50
3:E:101:LEU:O	3:E:105:MET:HG2	2.11	0.50
4:F:147:TRP:HB2	4:F:169:LEU:HD11	1.94	0.49
2:B:2:ARG:HA	2:B:131:CYS:O	2.11	0.49
2:B:67:LEU:HD22	2:B:92:PHE:CE2	2.47	0.49
2:D:67:LEU:HD22	2:D:92:PHE:CE2	2.47	0.49
4:F:202:ARG:HB3	4:F:220:VAL:HG23	1.93	0.49
2:B:345:GLU:HB3	4:F:31:ARG:NH1	2.27	0.49
1:C:75:ILE:HD12	1:C:94:THR:CG2	2.42	0.49
2:D:154:ILE:HG23	2:D:166:MET:HG2	1.94	0.49
3:E:137:LYS:O	3:E:140:LYS:HG2	2.13	0.49
1:A:71:GLU:OE1	1:A:73:THR:OG1	2.28	0.49
1:A:188:ILE:HD12	1:A:395:PHE:HB2	1.94	0.49
2:B:250:ALA:HA	10:B:505:LNU:N2	2.28	0.49
13:C:730:HOH:O	3:E:115:HIS:HB3	2.12	0.49
2:D:345:GLU:OE1	2:D:345:GLU:N	2.35	0.49
1:A:298:PRO:HA	1:A:301:GLN:CD	2.33	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:302:MET:HE2	1:A:302:MET:HA	1.95	0.49
2:B:159:GLU:HB2	3:E:72:LEU:HD13	1.95	0.49
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.48	0.49
4:F:14:TYR:HA	4:F:17:VAL:HB	1.95	0.49
1:A:343:PHE:CD1	1:A:349:THR:HG23	2.48	0.48
2:D:103:TRP:CE3	2:D:189:LEU:HD13	2.47	0.48
1:C:341:ILE:HD12	1:C:341:ILE:N	2.28	0.48
1:A:302:MET:HA	1:A:302:MET:CE	2.43	0.48
1:A:176:GLN:HB2	13:A:620:HOH:O	2.14	0.48
3:E:92:ASN:O	3:E:96:MET:HG2	2.13	0.48
1:A:79:ARG:HG2	1:A:92:LEU:CD1	2.44	0.48
1:C:165:SER:HA	1:C:199:ASP:OD2	2.13	0.48
2:B:124:LYS:HD3	2:B:124:LYS:C	2.35	0.47
2:D:387:LEU:HD23	2:D:387:LEU:C	2.34	0.47
1:A:79:ARG:HG2	1:A:92:LEU:HD12	1.97	0.47
2:B:176:LYS:HE3	2:B:207:GLU:HG3	1.96	0.47
2:B:208:ALA:HB2	2:B:304:ALA:HB2	1.97	0.47
1:A:430:LYS:HE2	1:A:434:GLU:OE2	2.14	0.47
1:C:180:ALA:O	1:C:183:GLU:HG3	2.13	0.47
2:D:6:HIS:HE2	2:D:8:GLN:CG	2.28	0.47
1:C:333:ALA:O	1:C:337:THR:HG23	2.15	0.47
2:D:12:CYS:HB2	8:D:501:GDP:C8	2.49	0.47
2:D:274:PRO:HB3	2:D:286:LEU:HD22	1.97	0.47
2:D:19:LYS:O	2:D:23:VAL:HG23	2.15	0.47
4:F:160:ILE:HD12	4:F:160:ILE:N	2.30	0.47
4:F:216:TYR:CE2	4:F:218:GLU:HB2	2.50	0.47
2:D:411:GLU:HA	3:E:137:LYS:HD2	1.97	0.46
3:E:135:LYS:O	3:E:139:LEU:HG	2.15	0.46
1:A:22:GLU:HG3	1:A:83:TYR:CE2	2.50	0.46
2:B:171:VAL:HA	2:B:204:ILE:O	2.15	0.46
2:B:318:ILE:N	2:B:318:ILE:HD12	2.29	0.46
2:D:21:TRP:CE3	2:D:63:PRO:HB3	2.50	0.46
1:A:69:ASP:O	1:A:94:THR:HA	2.16	0.46
1:C:277:SER:OG	1:C:280:LYS:HG2	2.16	0.46
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.45	0.46
2:D:385:GLN:O	2:D:389:LYS:HG3	2.16	0.46
4:F:159:GLY:C	4:F:160:ILE:HD12	2.35	0.46
2:B:21:TRP:CE3	2:B:63:PRO:HB3	2.51	0.46
2:B:36:TYR:CD1	2:B:46:LEU:HD21	2.50	0.46
1:C:140:SER:HA	1:C:171:ILE:HB	1.98	0.46
2:B:336:GLN:HB3	4:F:36[A]:ARG:NH1	2.31	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:416:MET:O	2:D:420:GLU:HG3	2.16	0.46
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.34	0.46
2:D:402:LYS:HB3	2:D:405:LEU:HD12	1.97	0.46
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.51	0.45
1:A:179:THR:HG23	2:B:352:LYS:NZ	2.31	0.45
1:A:335:ILE:HG23	1:A:339:ARG:CG	2.43	0.45
2:B:123:ARG:O	2:B:127:GLU:HG3	2.15	0.45
1:C:66:VAL:HG23	1:C:125:LEU:CD1	2.46	0.45
1:C:187:SER:HB3	1:C:391:LEU:HD21	1.99	0.45
2:B:203:CYS:SG	2:B:267:PHE:HB3	2.55	0.45
1:C:75:ILE:HB	1:C:94:THR:HG21	1.97	0.45
2:D:213:CYS:HA	2:D:217:LEU:HB2	1.97	0.45
4:F:2:TYR:HB2	4:F:27:TRP:CD2	2.51	0.45
2:B:205:ASP:OD2	2:B:304:ALA:HB3	2.16	0.45
2:B:395:PHE:CE1	2:B:422[B]:GLU:HB3	2.51	0.45
2:D:208:ALA:O	2:D:212:ILE:HG13	2.17	0.45
2:B:352:LYS:HG3	10:B:505:LNU:C12	2.47	0.45
1:C:216:ASN:HB3	1:C:275:VAL:O	2.17	0.45
4:F:71:LEU:HD11	4:F:294:CYS:HB3	1.99	0.45
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.98	0.45
4:F:220:VAL:HG11	4:F:339:ALA:HB2	1.99	0.45
4:F:280:GLU:HA	4:F:284:LEU:HB2	1.97	0.45
1:A:211:ASP:OD2	1:A:304:LYS:NZ	2.33	0.44
2:B:105:LYS:HA	2:B:109:THR:OG1	2.17	0.44
2:D:2:ARG:HB3	2:D:133:GLN:HG2	1.99	0.44
4:F:280:GLU:OE1	4:F:284:LEU:HD23	2.17	0.44
4:F:320:MET:CG	4:F:330:ILE:HD11	2.43	0.44
1:A:103:TYR:CD2	1:A:148:GLY:HA2	2.52	0.44
1:A:215:ARG:HG3	1:A:216:ASN:OD1	2.16	0.44
1:C:234:ILE:HD12	1:C:234:ILE:N	2.32	0.44
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.53	0.44
1:A:9:VAL:HG22	1:A:68:VAL:CG1	2.48	0.44
1:A:21:TRP:CH2	1:A:63:PRO:HB3	2.52	0.44
2:D:427:ASP:O	2:D:431:GLU:HG3	2.17	0.44
3:E:137:LYS:HA	3:E:140:LYS:CD	2.48	0.44
1:A:274:PRO:HB3	1:A:286:LEU:HD12	1.98	0.44
4:F:205:VAL:CG2	4:F:291:ILE:HD13	2.48	0.44
1:A:63:PRO:HD3	1:A:86:LEU:HG	1.98	0.44
4:F:61:LEU:CD1	4:F:310:GLN:HB3	2.48	0.44
2:B:323:MET:CE	2:B:373:MET:HE2	2.48	0.44
2:D:318:ILE:N	2:D:318:ILE:HD12	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:126:ASP:OD1	4:F:128:ARG:HG3	2.18	0.44
2:D:2:ARG:HB3	2:D:133:GLN:HG3	1.98	0.44
2:B:306:ASP:HB3	2:B:309:HIS:ND1	2.33	0.44
2:D:334:ASN:O	2:D:338:LYS:HG2	2.18	0.44
3:E:137:LYS:HA	3:E:140:LYS:HD2	1.99	0.44
1:A:14:VAL:HG13	1:A:67:PHE:HD2	1.83	0.44
2:D:46:LEU:HA	2:D:49:ILE:HB	2.00	0.43
2:D:171:VAL:HA	2:D:204:ILE:O	2.18	0.43
1:A:180:ALA:HB1	2:B:258:ASN:OD1	2.18	0.43
2:B:253:ARG:NH1	9:B:504:MES:O3S	2.51	0.43
4:F:98:TYR:CE1	4:F:130:VAL:HG12	2.53	0.43
4:F:205:VAL:HG21	4:F:291:ILE:HD13	2.00	0.43
1:C:334:THR:HG23	1:C:338:LYS:HE3	2.01	0.43
4:F:19:ARG:HD2	4:F:19:ARG:O	2.18	0.43
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.54	0.43
2:D:153:LEU:O	2:D:157:ILE:HG13	2.18	0.43
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.48	0.43
2:B:199:ASP:C	2:B:200:GLU:HG3	2.39	0.43
1:C:69:ASP:O	1:C:94:THR:HA	2.19	0.43
2:D:104:ALA:HB2	2:D:413:MET:SD	2.59	0.43
4:F:296:MET:SD	4:F:380:HIS:HB2	2.59	0.43
1:A:167:LEU:HD13	1:A:252:LEU:HD22	2.01	0.43
1:C:276:ILE:HD11	1:C:280:LYS:HB2	2.00	0.43
4:F:298:ILE:HD12	4:F:302:ILE:HD13	2.00	0.43
2:B:336:GLN:HB3	4:F:36[A]:ARG:CZ	2.49	0.43
4:F:2:TYR:CE1	4:F:359:PHE:HB3	2.54	0.43
4:F:186:LEU:H	12:F:401:ACP:C2	2.31	0.42
2:D:382:THR:O	2:D:385:GLN:HG2	2.19	0.42
1:A:134:GLY:HA3	1:A:165:SER:O	2.19	0.42
1:A:177:VAL:O	1:A:178:SER:C	2.58	0.42
1:A:179:THR:HG23	2:B:352:LYS:HZ2	1.84	0.42
2:B:395:PHE:CE1	2:B:422[A]:GLU:HB2	2.55	0.42
4:F:200:ASP:O	4:F:221:LEU:HA	2.19	0.42
4:F:280:GLU:HA	4:F:284:LEU:HB3	2.02	0.42
4:F:340:GLN:HA	4:F:343:TYR:HD2	1.85	0.42
4:F:95:PRO:HB2	4:F:183:GLN:CG	2.50	0.42
2:B:158:ARG:NE	9:B:504:MES:H21	2.34	0.42
1:C:142:GLY:HA3	1:C:183:GLU:OE1	2.20	0.42
1:A:98:ASP:HB2	5:A:501:GTP:O3G	2.19	0.42
1:A:134:GLY:HA2	1:A:164:LYS:HB3	2.01	0.42
2:D:312:TYR:CE1	2:D:377:PHE:HZ	2.37	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:406:HIS:CG	2:D:263:PRO:HD3	2.55	0.42
1:C:162:GLY:HA2	3:E:94:ILE:HD11	2.02	0.42
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.20	0.42
2:D:145:THR:HB	8:D:501:GDP:O2B	2.19	0.42
4:F:283:ILE:HG23	4:F:327:VAL:CG2	2.49	0.42
1:C:312:TYR:CE1	1:C:341:ILE:HG23	2.55	0.42
1:A:211:ASP:HB3	1:A:215:ARG:NH2	2.34	0.41
2:B:298:SER:HA	2:B:301:MET:HG2	2.02	0.41
2:D:165:ILE:HG21	2:D:252:LEU:HB3	2.01	0.41
1:A:88:HIS:CE1	1:A:90:GLU:HB2	2.55	0.41
4:F:199:PHE:CD2	4:F:221:LEU:HD23	2.55	0.41
1:A:431:ASP:O	1:A:435:VAL:HG23	2.20	0.41
1:C:188:ILE:HG13	1:C:425:MET:HG3	2.01	0.41
4:F:20:LEU:O	4:F:24:THR:HG23	2.19	0.41
4:F:161:LEU:HD22	4:F:172:PHE:HB2	2.01	0.41
1:A:21:TRP:CE3	1:A:63:PRO:HB3	2.55	0.41
2:B:66:ILE:HD12	2:B:122:VAL:HG22	2.02	0.41
2:B:387:LEU:C	2:B:387:LEU:HD23	2.41	0.41
1:C:93:ILE:HD11	1:C:121:ARG:CG	2.42	0.41
1:A:10:GLY:O	1:A:14:VAL:HG23	2.20	0.41
1:A:23:LEU:O	1:A:27:GLU:HG3	2.21	0.41
1:C:23:LEU:O	1:C:27:GLU:HG3	2.21	0.41
2:B:288:VAL:N	2:B:289:PRO:CD	2.84	0.41
2:B:308:ARG:HA	2:B:342:TYR:CE1	2.56	0.41
3:E:58:GLU:HG3	3:E:61:ARG:HH21	1.86	0.41
1:A:276:ILE:HG13	1:A:283:HIS:CE1	2.55	0.41
2:B:174:SER:HB2	2:B:207:GLU:HB2	2.03	0.41
2:B:284:ARG:NH1	2:B:290:GLU:OE1	2.46	0.41
1:C:93:ILE:HG22	1:C:114:ILE:HD11	2.03	0.41
2:D:123:ARG:O	2:D:127:GLU:HG3	2.20	0.41
4:F:10:ASN:HB2	4:F:44:ARG:HH22	1.86	0.41
4:F:146:VAL:HG22	4:F:164:SER:HB3	2.03	0.41
1:A:194:THR:HG22	1:A:194:THR:O	2.21	0.41
2:B:54:ASN:OD1	2:B:64:ARG:NH2	2.51	0.41
1:C:139:HIS:CD2	1:C:150:THR:HG21	2.55	0.41
2:D:16:ILE:HD11	2:D:138:THR:HB	2.02	0.41
4:F:186:LEU:HD23	4:F:320:MET:CE	2.51	0.40
2:B:2:ARG:NE	2:B:133:GLN:HG2	2.36	0.40
4:F:286:GLN:O	4:F:290:ILE:HG13	2.21	0.40
2:B:106:GLY:O	2:B:111:GLY:HA3	2.21	0.40
2:B:205:ASP:OD2	2:B:390[B]:ARG:NH1	2.51	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:7:ILE:O	2:B:137:LEU:HA	2.21	0.40
2:D:212:ILE:HG21	2:D:275:LEU:HD13	2.04	0.40
3:E:72:LEU:O	3:E:76:ARG:HG2	2.21	0.40
4:F:98:TYR:HE1	4:F:130:VAL:HG12	1.87	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:411:GLU:OE1	1:C:282:TYR:OH[4_555]	2.10	0.10

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	443/451 (98%)	431 (97%)	11 (2%)	1 (0%)	47	58
1	C	439/451 (97%)	426 (97%)	13 (3%)	0	100	100
2	B	425/445 (96%)	414 (97%)	11 (3%)	0	100	100
2	D	421/445 (95%)	411 (98%)	10 (2%)	0	100	100
3	E	118/143 (82%)	118 (100%)	0	0	100	100
4	F	298/384 (78%)	286 (96%)	12 (4%)	0	100	100
All	All	2144/2319 (92%)	2086 (97%)	57 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	178	SER

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	376/379 (99%)	373 (99%)	3 (1%)	81	91
1	C	372/379 (98%)	369 (99%)	3 (1%)	81	91
2	B	372/383 (97%)	371 (100%)	1 (0%)	92	97
2	D	367/383 (96%)	366 (100%)	1 (0%)	92	97
3	E	110/127 (87%)	110 (100%)	0	100	100
4	F	279/342 (82%)	277 (99%)	2 (1%)	84	92
All	All	1876/1993 (94%)	1866 (100%)	10 (0%)	88	95

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	GLU
1	A	302	MET
1	A	324	VAL
2	B	139	HIS
1	C	71	GLU
1	C	284	GLU
1	C	302	MET
2	D	139	HIS
4	F	150	LYS
4	F	310	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	285	GLN
1	C	406	HIS
2	D	136	GLN
3	E	92	ASN
3	E	115	HIS
4	F	38	ASN
4	F	196	HIS

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Mol	Chain	Res	Type
4	F	380	HIS

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 17 ligands modelled in this entry, 9 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	GDP	D	501	6	24,30,30	0.94	1 (4%)	30,47,47	1.16	4 (13%)
10	LNU	B	505	-	25,32,32	0.75	0	24,45,45	1.10	3 (12%)
8	GDP	B	501	6	24,30,30	0.92	1 (4%)	30,47,47	1.09	3 (10%)
9	MES	B	504	-	12,12,12	2.19	1 (8%)	14,16,16	2.01	5 (35%)
12	ACP	F	401	-	27,33,33	0.78	1 (3%)	32,52,52	1.41	2 (6%)
5	GTP	C	501	6	26,34,34	1.13	2 (7%)	32,54,54	1.48	6 (18%)
5	GTP	A	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.50	6 (18%)
11	IMD	D	503	-	3,5,5	0.42	0	4,5,5	0.59	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	GDP	D	501	6	-	5/12/32/32	0/3/3/3
10	LNU	B	505	-	-	6/15/25/25	0/4/4/4
8	GDP	B	501	6	-	3/12/32/32	0/3/3/3
9	MES	B	504	-	-	1/6/14/14	0/1/1/1
12	ACP	F	401	-	-	3/15/38/38	0/3/3/3
5	GTP	C	501	6	-	5/18/38/38	0/3/3/3
5	GTP	A	501	6	-	6/18/38/38	0/3/3/3
11	IMD	D	503	-	-	-	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	B	504	MES	C8-S	-7.33	1.67	1.77
5	C	501	GTP	C5-C6	-4.00	1.39	1.47
5	A	501	GTP	C5-C6	-3.95	1.39	1.47
12	F	401	ACP	PB-O3A	2.95	1.61	1.58
8	B	501	GDP	C6-N1	-2.33	1.34	1.37
8	D	501	GDP	C6-N1	-2.23	1.34	1.37
5	A	501	GTP	C2-N3	2.16	1.38	1.33
5	C	501	GTP	C2-N3	2.15	1.38	1.33

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	F	401	ACP	PB-O3A-PA	-7.30	109.41	132.56
9	B	504	MES	C5-N4-C3	4.14	118.15	108.83
5	C	501	GTP	PB-O3B-PG	-3.36	121.30	132.83
5	A	501	GTP	PA-O3A-PB	-3.23	121.76	132.83
5	C	501	GTP	C5-C6-N1	3.14	119.49	113.95
5	A	501	GTP	C5-C6-N1	3.12	119.47	113.95
5	A	501	GTP	PB-O3B-PG	-3.10	122.17	132.83
9	B	504	MES	C6-C5-N4	-3.09	105.42	110.10
8	D	501	GDP	PA-O3A-PB	-3.06	122.34	132.83
5	A	501	GTP	C8-N7-C5	3.03	108.76	102.99
5	C	501	GTP	C8-N7-C5	3.01	108.72	102.99
5	C	501	GTP	PA-O3A-PB	-2.96	122.67	132.83
10	B	505	LNU	O16-C14-O15	-2.87	117.84	123.67
8	B	501	GDP	PA-O3A-PB	-2.81	123.19	132.83
5	A	501	GTP	C2-N1-C6	-2.76	120.02	125.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	501	GTP	C2-N1-C6	-2.73	120.07	125.10
10	B	505	LNU	C13-C12-C7	2.70	109.54	105.52
9	B	504	MES	O1S-S-C8	2.49	109.91	106.92
9	B	504	MES	C7-N4-C5	2.35	117.24	111.23
8	D	501	GDP	C8-N7-C5	2.35	107.46	102.99
9	B	504	MES	O3S-S-C8	2.35	109.56	105.77
8	B	501	GDP	C8-N7-C5	2.33	107.42	102.99
12	F	401	ACP	C5-C6-N6	2.31	123.86	120.35
8	D	501	GDP	C5-C6-N1	2.27	117.96	113.95
8	B	501	GDP	C5-C6-N1	2.25	117.93	113.95
10	B	505	LNU	O16-C14-C13	2.15	115.47	111.66
5	C	501	GTP	O6-C6-C5	-2.08	120.30	124.37
5	A	501	GTP	O6-C6-C5	-2.04	120.39	124.37
8	D	501	GDP	C3'-C2'-C1'	2.01	104.00	100.98

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O1A
8	B	501	GDP	C5'-O5'-PA-O1A
8	B	501	GDP	C5'-O5'-PA-O2A
8	D	501	GDP	C5'-O5'-PA-O3A
8	D	501	GDP	C5'-O5'-PA-O1A
8	D	501	GDP	C5'-O5'-PA-O2A
9	B	504	MES	C8-C7-N4-C5
10	B	505	LNU	C13-C14-O16-C28
10	B	505	LNU	O15-C14-O16-C28
10	B	505	LNU	C21-C22-O24-C25
10	B	505	LNU	C23-C22-O24-C25
12	F	401	ACP	O4'-C4'-C5'-O5'
12	F	401	ACP	C3'-C4'-C5'-O5'
5	A	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O3A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	C5'-O5'-PA-O2A
10	B	505	LNU	N11-C17-C18-C19
10	B	505	LNU	N11-C17-C18-C23
5	A	501	GTP	PB-O3A-PA-O2A
5	C	501	GTP	PB-O3A-PA-O2A

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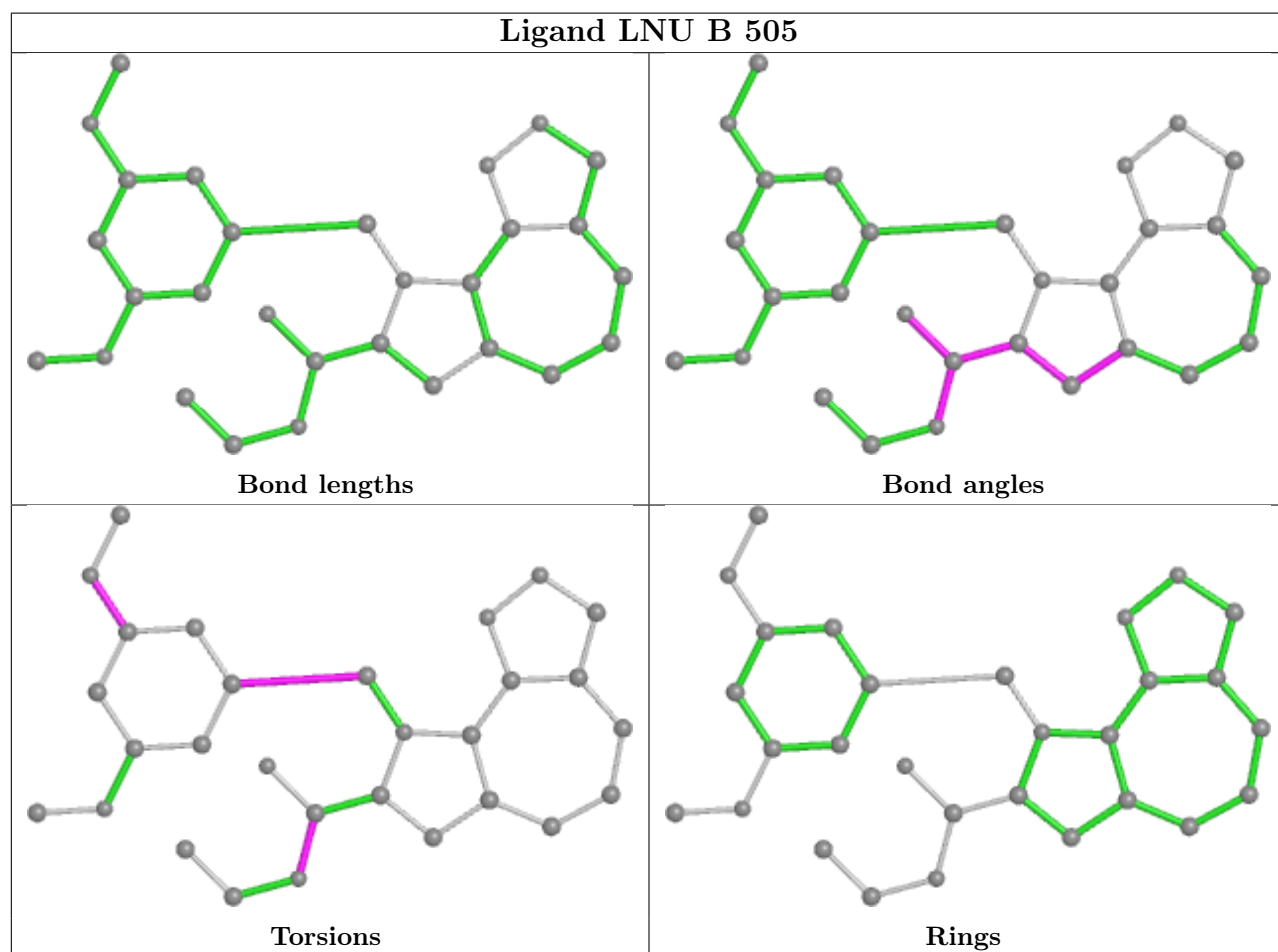
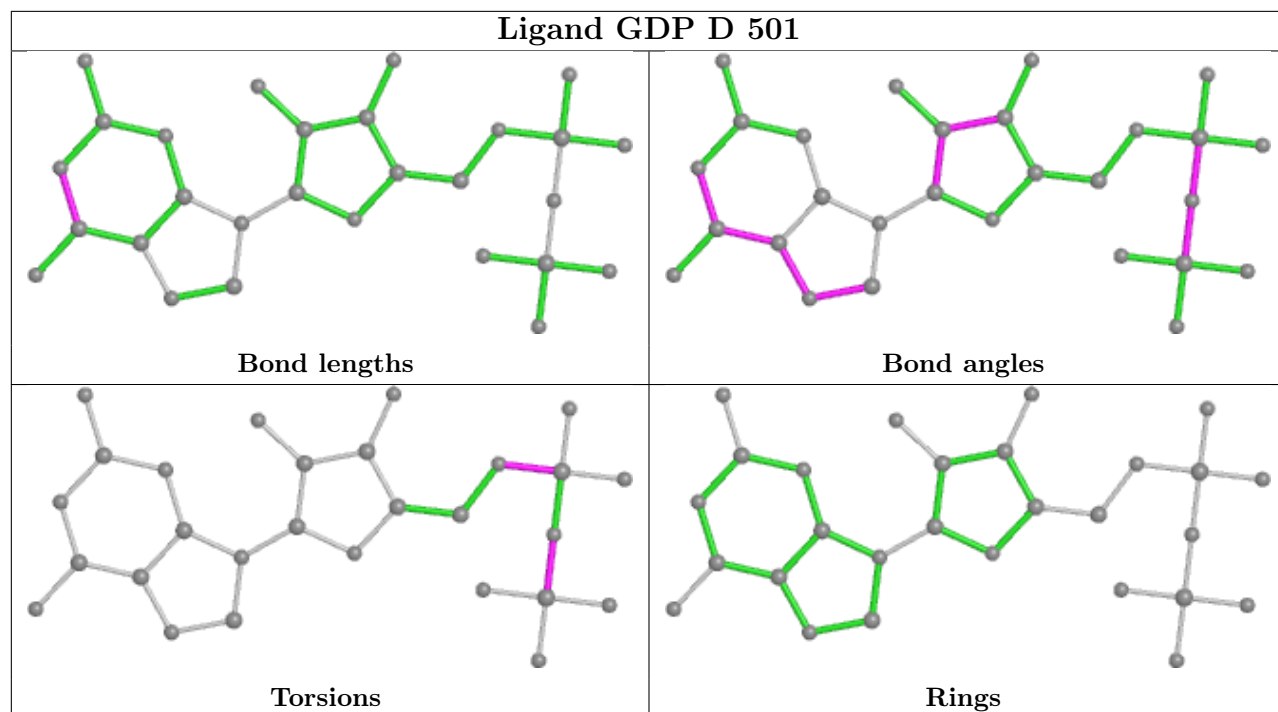
Mol	Chain	Res	Type	Atoms
5	C	501	GTP	C4'-C5'-O5'-PA
5	A	501	GTP	PB-O3B-PG-O1G
8	D	501	GDP	PA-O3A-PB-O2B
8	B	501	GDP	C5'-O5'-PA-O3A
12	F	401	ACP	C5'-O5'-PA-O1A
8	D	501	GDP	PA-O3A-PB-O1B

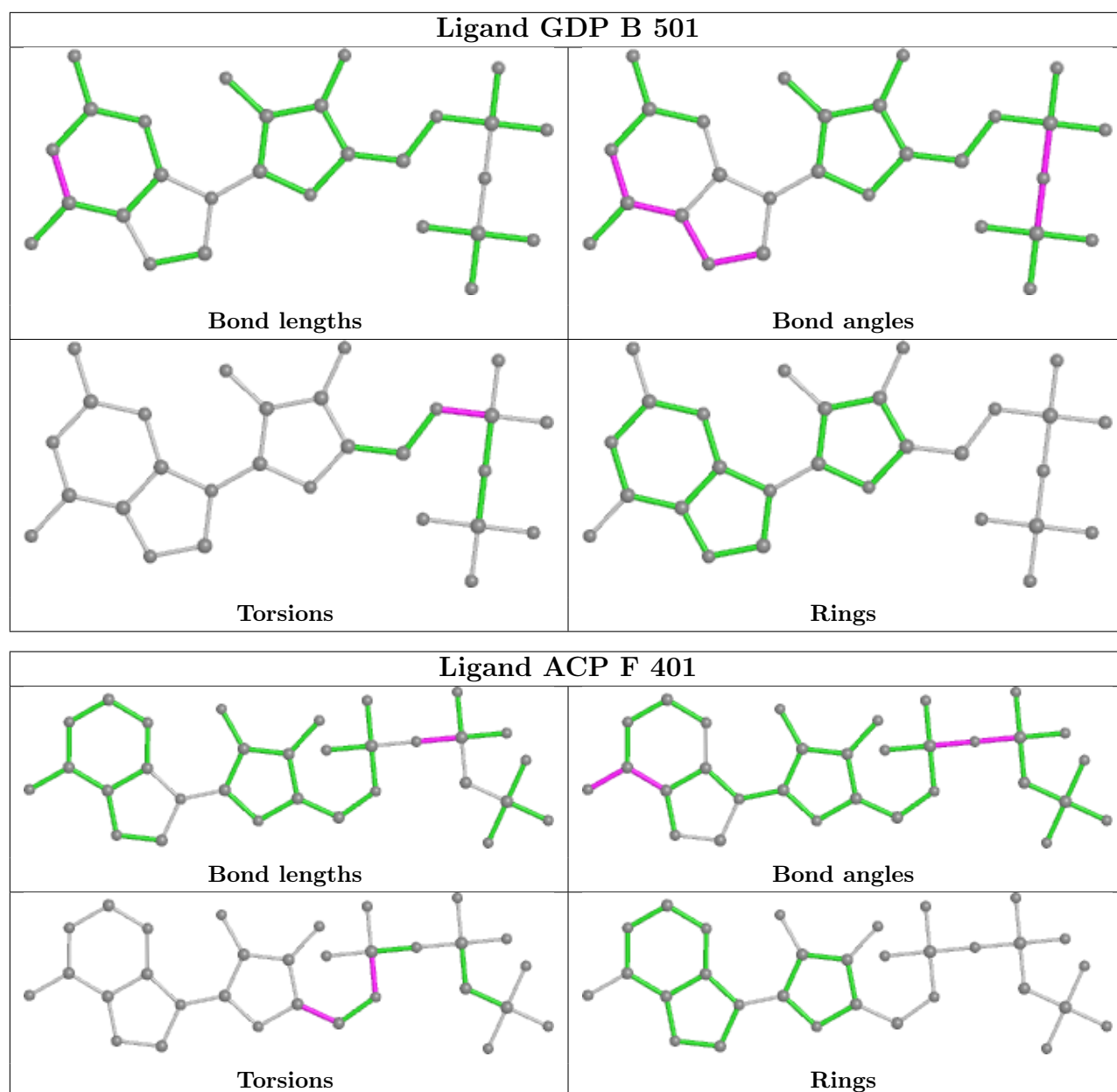
There are no ring outliers.

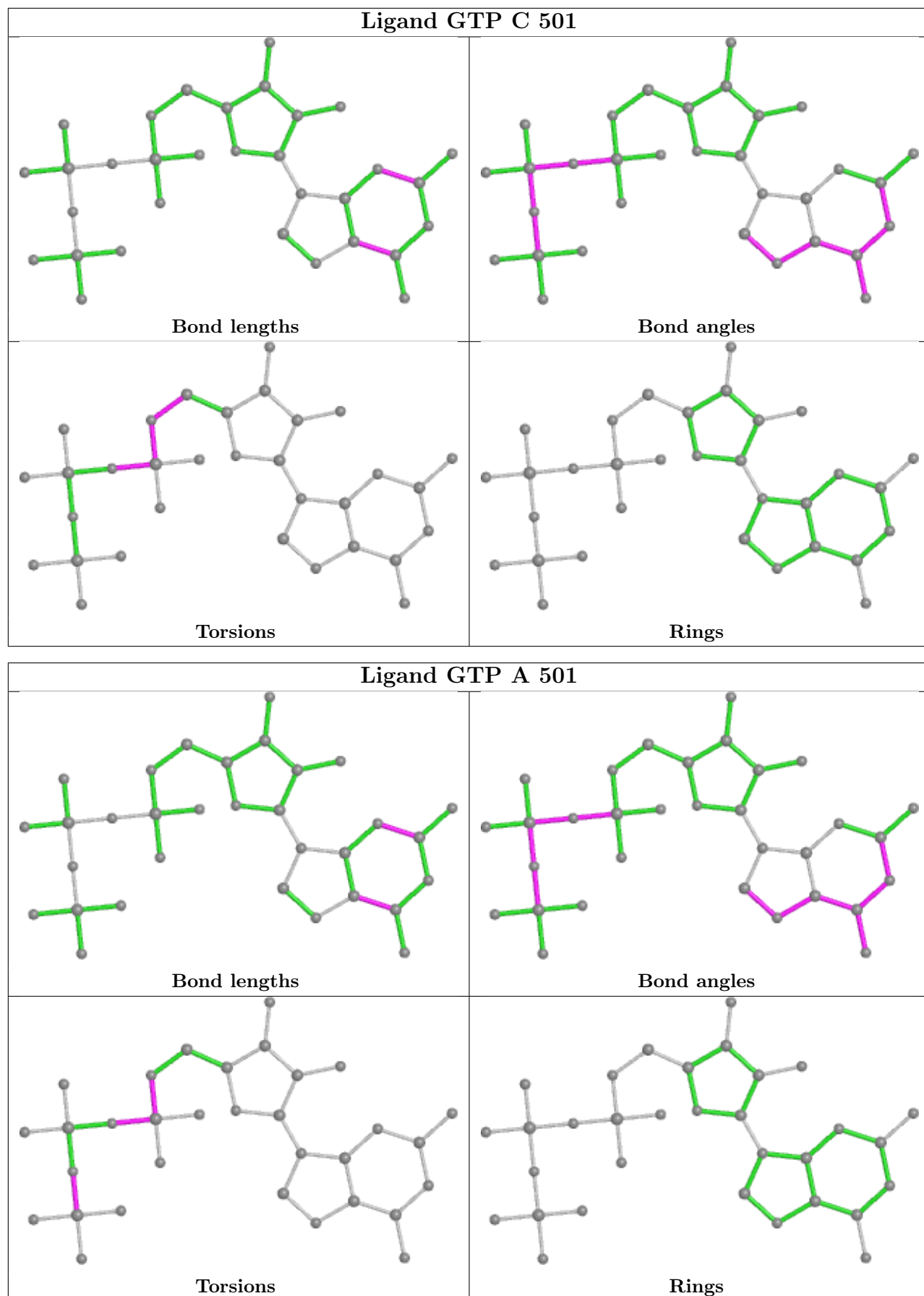
5 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	D	501	GDP	3	0
10	B	505	LNU	3	0
9	B	504	MES	5	0
12	F	401	ACP	2	0
5	A	501	GTP	1	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, 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	437/451 (96%)	0.28	16 (3%) 41 48	46, 66, 100, 175	0
1	C	440/451 (97%)	-0.00	3 (0%) 87 91	36, 51, 78, 116	0
2	B	426/445 (95%)	0.26	20 (4%) 31 38	39, 60, 102, 149	0
2	D	425/445 (95%)	0.37	34 (8%) 12 16	48, 75, 115, 158	1 (0%)
3	E	122/143 (85%)	0.58	13 (10%) 6 8	51, 79, 123, 142	0
4	F	309/384 (80%)	1.45	106 (34%) 0 0	59, 89, 161, 185	0
All	All	2159/2319 (93%)	0.42	192 (8%) 9 13	36, 68, 119, 185	1 (0%)

All (192) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	173	ILE	10.9
4	F	161	LEU	8.5
4	F	169	LEU	8.2
4	F	132	LEU	8.1
4	F	225	SER	7.6
3	E	27	PRO	7.6
4	F	130	VAL	7.5
2	B	59	ASN	7.3
4	F	131	PHE	7.0
4	F	224	SER	6.7
4	F	172	PHE	6.3
4	F	142	ARG	6.3
4	F	197	ARG	6.2
4	F	166	ALA	6.2
3	E	26	PRO	5.8
4	F	139	ARG	5.5
4	F	227	PRO	5.5
4	F	100	ILE	5.3
2	D	59	ASN	5.2

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Mol	Chain	Res	Type	RSRZ
4	F	134	ALA	5.2
4	F	170	LEU	4.9
2	B	1	MET	4.9
4	F	226	GLU	4.9
4	F	182	ILE	4.9
4	F	199	PHE	4.9
3	E	45	PRO	4.8
4	F	17	VAL	4.7
4	F	223	THR	4.7
1	A	262	TYR	4.6
4	F	361	LEU	4.6
3	E	24	LEU	4.6
4	F	21	LEU	4.6
4	F	135	TYR	4.6
1	A	283	HIS	4.5
4	F	163	SER	4.5
2	D	407	TRP	4.5
2	B	284	ARG	4.5
4	F	165	GLU	4.5
4	F	136	ASN	4.4
4	F	101	TYR	4.4
4	F	164	SER	4.4
4	F	129	GLU	4.4
4	F	99	VAL	4.3
2	B	57	THR	4.3
2	D	94	PHE	4.3
4	F	147	TRP	4.3
1	A	282	TYR	4.2
4	F	138	ARG	4.2
4	F	186	LEU	4.2
4	F	259	GLY	4.1
1	A	42	ILE	4.1
4	F	145	ASN	4.1
2	D	405	LEU	4.0
2	D	415	GLU	4.0
4	F	263	PHE	4.0
4	F	339	ALA	4.0
4	F	196	HIS	3.9
4	F	372	THR	3.9
4	F	192	LEU	3.9
4	F	194	PRO	3.8
4	F	220	VAL	3.8

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Mol	Chain	Res	Type	RSRZ
4	F	371	PRO	3.7
2	B	276	THR	3.7
4	F	260	ASN	3.7
4	F	133	ALA	3.7
2	D	57	THR	3.7
2	D	37	HIS	3.6
4	F	143	GLU	3.5
2	D	279	GLY	3.5
3	E	7	GLU	3.5
4	F	264	PHE	3.5
2	D	400	ARG	3.5
4	F	190	LEU	3.4
4	F	162	ILE	3.4
4	F	26	GLN	3.4
4	F	31	ARG	3.4
4	F	262	MET	3.4
3	E	139	LEU	3.4
4	F	198	LYS	3.4
4	F	181	VAL	3.3
2	B	37	HIS	3.3
2	D	96	GLN	3.3
4	F	343	TYR	3.3
4	F	27	TRP	3.3
4	F	160	ILE	3.3
4	F	167	SER	3.2
4	F	146	VAL	3.2
4	F	102	PRO	3.2
4	F	362	ALA	3.2
4	F	28	LYS	3.1
4	F	20	LEU	3.1
4	F	342	LEU	3.1
4	F	267	PHE	3.1
4	F	159	GLY	3.1
2	B	438	ALA	3.1
4	F	149	ALA	3.0
1	A	58	ALA	3.0
4	F	128	ARG	3.0
4	F	168	GLU	2.9
3	E	140	LYS	2.9
4	F	137	ARG	2.9
1	A	346	TRP	2.9
4	F	221	LEU	2.9

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Mol	Chain	Res	Type	RSRZ
4	F	98	TYR	2.9
4	F	152	SER	2.8
4	F	340	GLN	2.8
2	D	177	VAL	2.8
4	F	179	VAL	2.8
3	E	25	LYS	2.8
1	A	146	GLY	2.7
4	F	151	SER	2.7
2	B	58	GLY	2.7
4	F	222	ARG	2.7
4	F	126	ASP	2.7
4	F	25	GLY	2.7
4	F	4	PHE	2.6
1	A	179	THR	2.6
2	D	404	PHE	2.6
4	F	6	VAL	2.6
4	F	320	MET	2.6
2	B	60	LYS	2.6
4	F	180	HIS	2.6
2	D	56	ALA	2.6
3	E	141	GLU	2.6
2	D	247	GLN	2.6
2	B	33	THR	2.5
4	F	24	THR	2.5
2	D	278	ARG	2.5
1	C	253	THR	2.5
2	B	61	TYR	2.5
4	F	200	ASP	2.4
2	B	36	TYR	2.4
2	D	202	TYR	2.4
4	F	191	LEU	2.4
2	D	82	PRO	2.4
4	F	11	SER	2.4
3	E	133	VAL	2.4
2	D	401	ARG	2.3
2	D	406	HIS	2.3
4	F	127	GLU	2.3
4	F	150	LYS	2.3
3	E	48	GLU	2.3
4	F	381	HIS	2.3
1	A	37	PRO	2.3
1	A	86	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
4	F	337	ALA	2.3
4	F	148	ILE	2.3
1	A	59	GLY	2.3
2	D	95	GLY	2.3
2	D	78	VAL	2.3
2	D	369	ARG	2.3
1	A	56	THR	2.3
2	D	33	THR	2.3
2	D	252	LEU	2.3
1	A	57	GLY	2.2
4	F	36[A]	ARG	2.2
2	B	144	GLY	2.2
2	B	38	GLY	2.2
2	D	250	ALA	2.2
2	B	337	ASN	2.2
4	F	10	ASN	2.2
4	F	379	HIS	2.2
2	D	259	MET	2.2
2	D	260	VAL	2.2
2	D	256	ALA	2.2
2	B	248	LEU	2.2
3	E	6	MET	2.2
2	D	83	PHE	2.2
4	F	330	ILE	2.2
4	F	271	LEU	2.2
2	B	277	SER	2.2
4	F	171	ASP	2.2
4	F	44	ARG	2.1
1	A	201	ALA	2.1
1	A	38	SER	2.1
2	B	83	PHE	2.1
4	F	23	ALA	2.1
1	A	171	ILE	2.1
2	B	88	ARG	2.1
2	D	414	ASP	2.1
4	F	183	GLN	2.1
2	B	143	GLY	2.1
2	D	268	PHE	2.1
3	E	28	SER	2.1
4	F	13	VAL	2.1
2	D	399	PHE	2.1
2	D	79	ARG	2.0

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Mol	Chain	Res	Type	RSRZ
1	C	1	MET	2.0
4	F	9	GLU	2.0
2	D	179	ASP	2.0
4	F	39	LEU	2.0
1	C	257	THR	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](#)

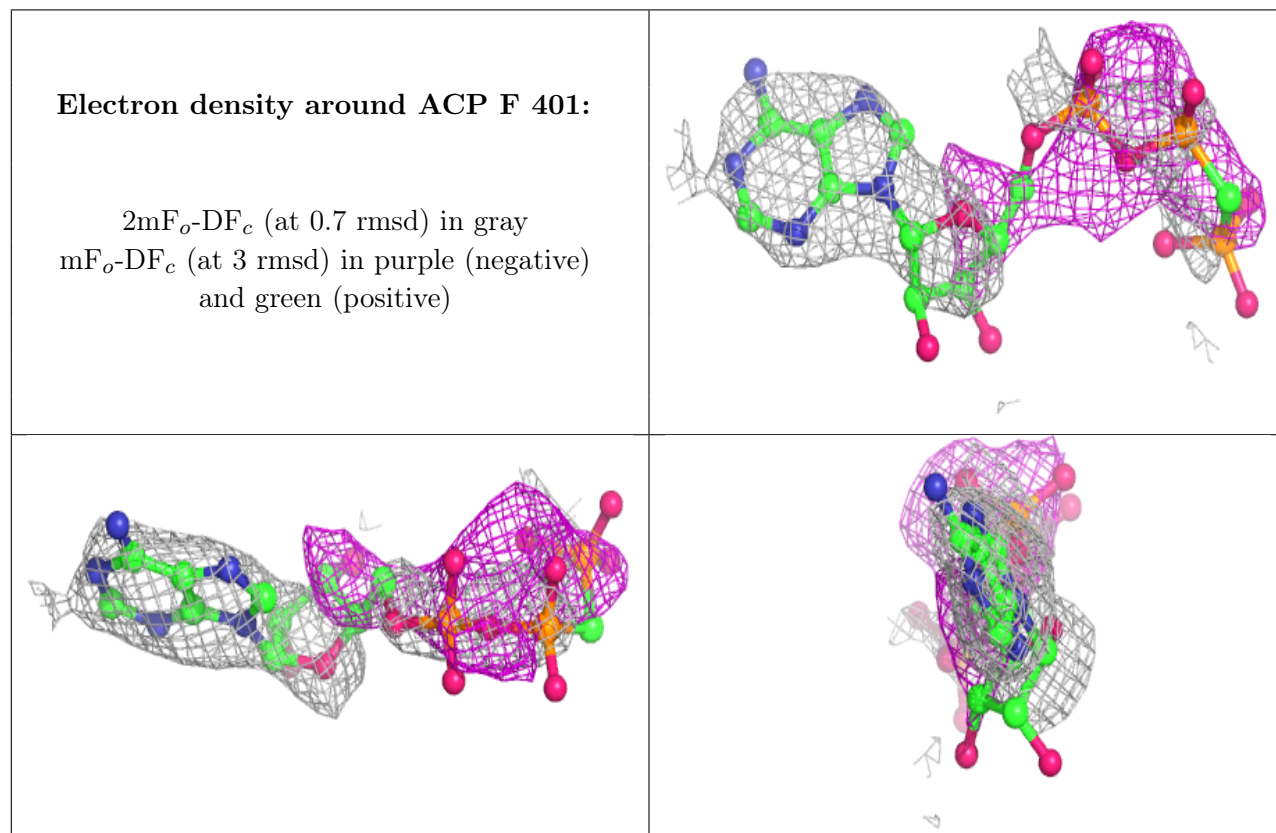
There are no monosaccharides in this entry.

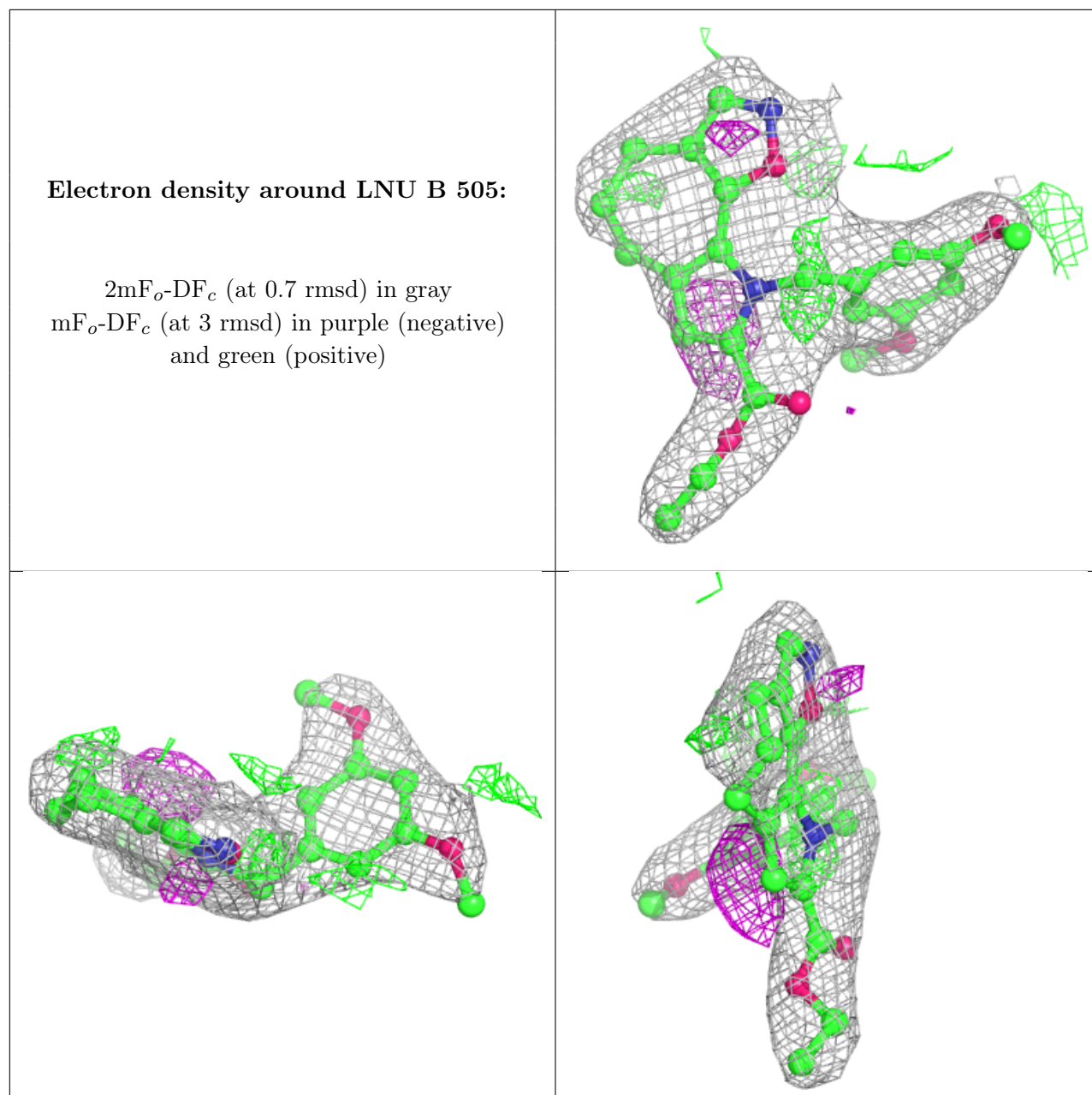
6.4 Ligands [i](#)

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, 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
11	IMD	D	503	5/5	0.65	0.40	113,120,143,144	0
12	ACP	F	401	31/31	0.70	0.56	118,135,188,189	0
7	CA	A	504	1/1	0.78	0.17	107,107,107,107	0
10	LNU	B	505	29/29	0.89	0.21	50,76,89,90	0
7	CA	B	503	1/1	0.90	0.20	98,98,98,98	0
6	MG	D	502	1/1	0.94	0.04	85,85,85,85	0
6	MG	A	502	1/1	0.94	0.18	47,47,47,47	0
8	GDP	D	501	28/28	0.95	0.13	57,70,90,113	0
7	CA	A	503	1/1	0.96	0.04	93,93,93,93	0
9	MES	B	504	12/12	0.97	0.14	49,60,74,74	0
7	CA	C	503	1/1	0.97	0.05	68,68,68,68	0
7	CA	C	504	1/1	0.97	0.52	102,102,102,102	0
6	MG	B	502	1/1	0.97	0.21	37,37,37,37	0
5	GTP	C	501	32/32	0.98	0.17	37,43,53,54	0
6	MG	C	502	1/1	0.98	0.12	46,46,46,46	0
8	GDP	B	501	28/28	0.98	0.20	36,45,54,60	0
5	GTP	A	501	32/32	0.98	0.22	39,51,59,67	0

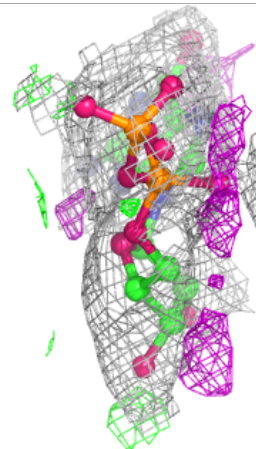
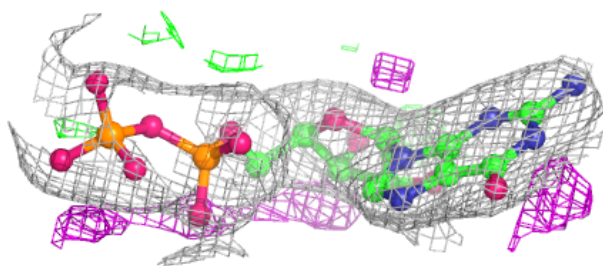
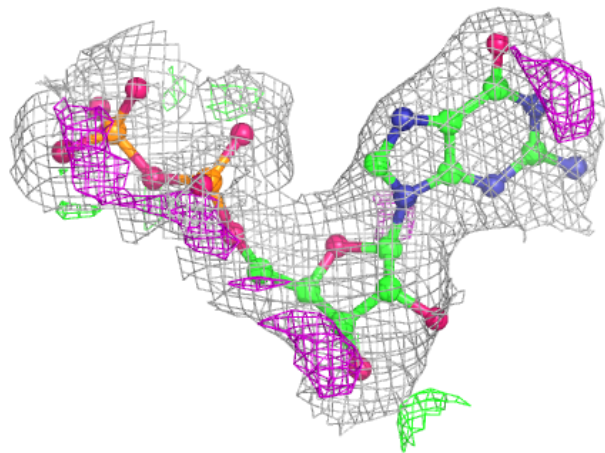
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

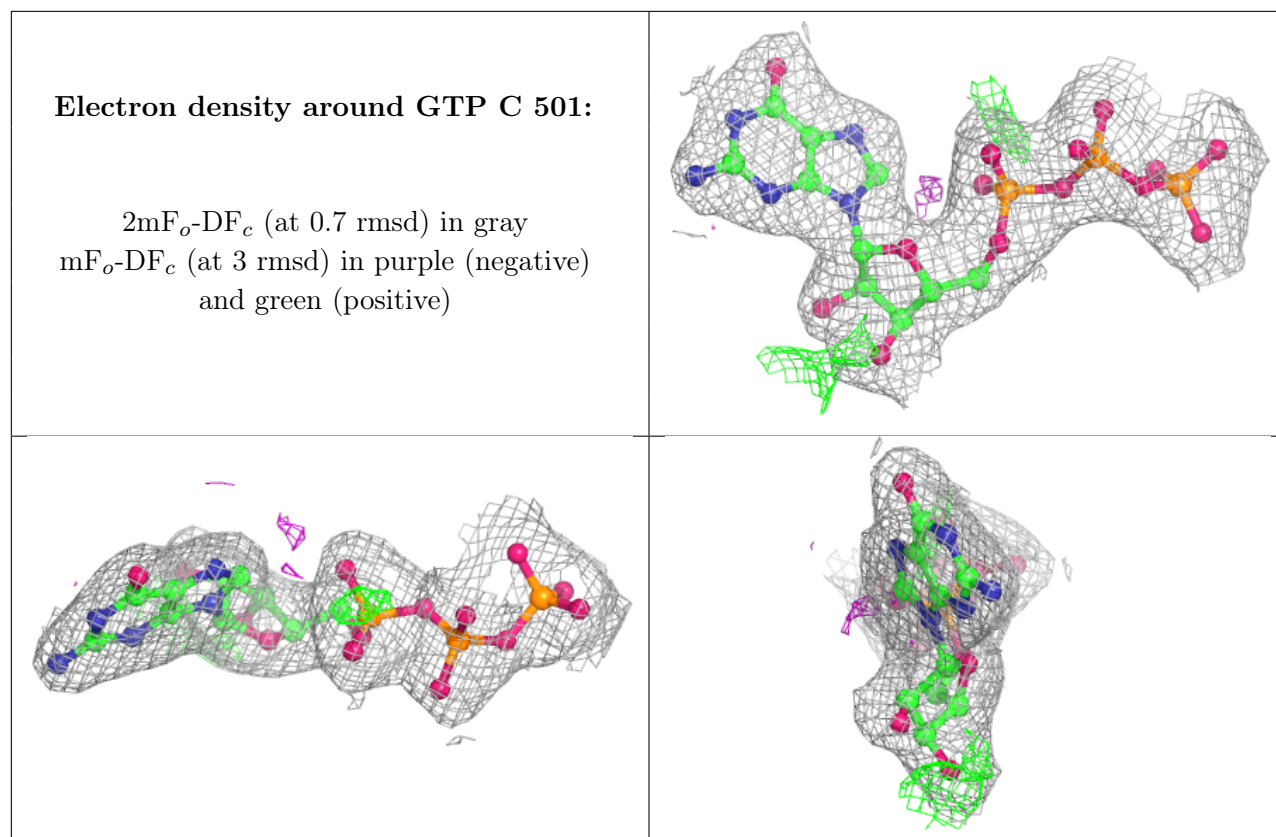




Electron density around GDP D 501:

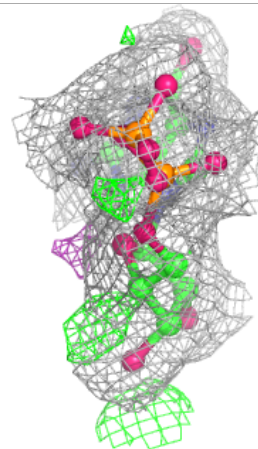
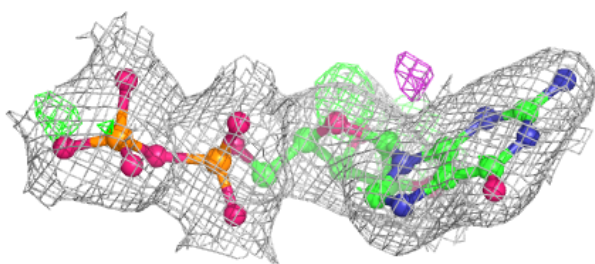
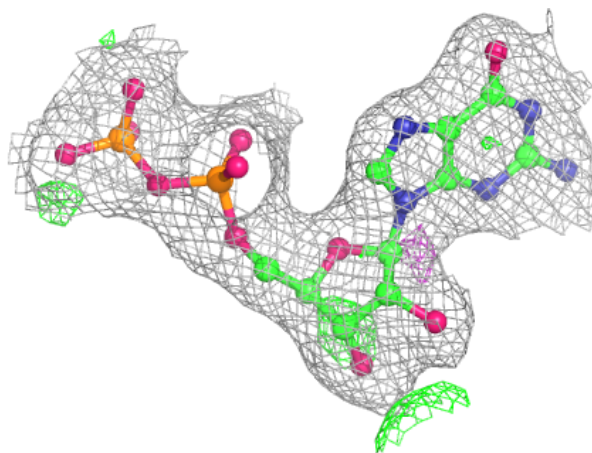
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

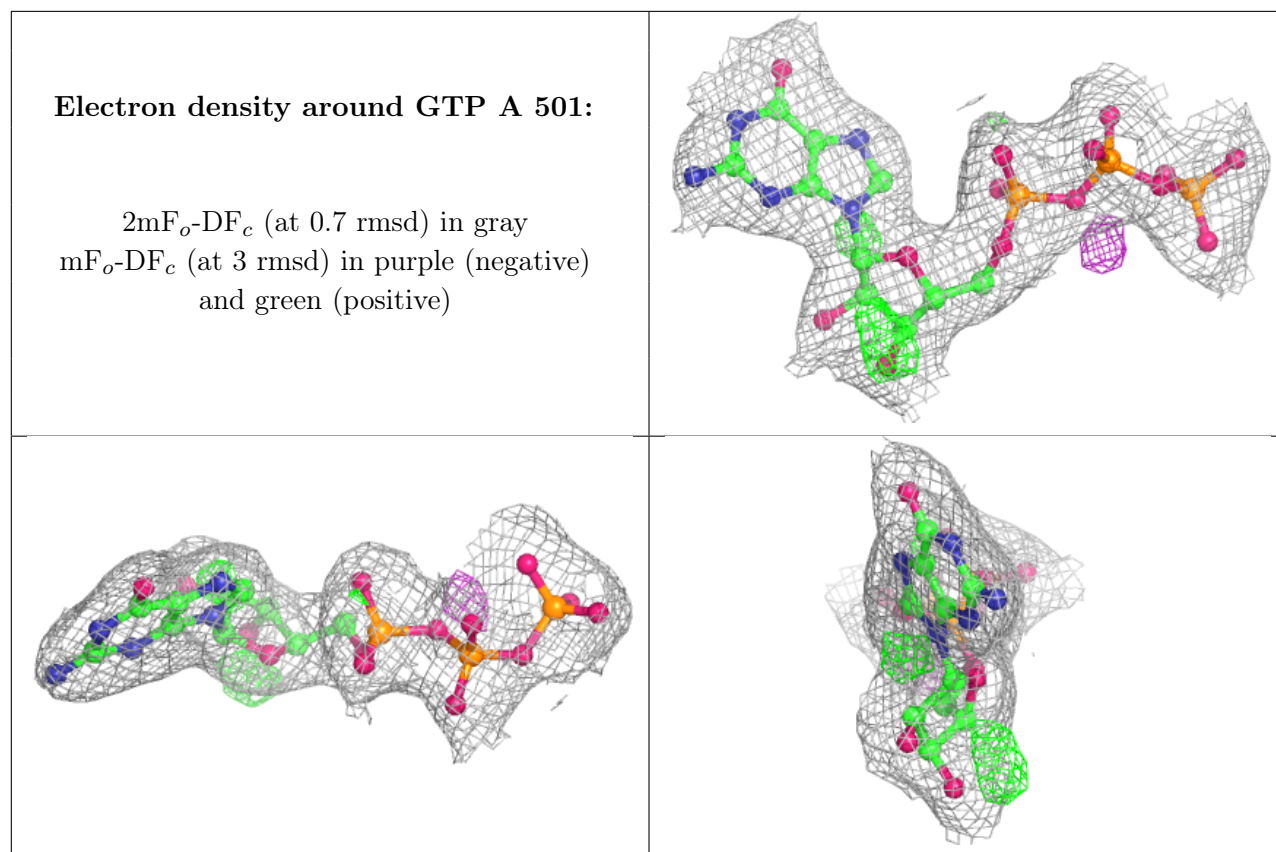




Electron density around GDP B 501:

$2mF_o-DF_c$ (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.