wwPDB EM Validation Summary Report

Apr 23, 2024 – 02:57 am BST

PDB ID	:	7AS4
EMDB ID	:	EMD-11888
Title	:	Recombinant human gTuRC
Authors	:	Serna, M.; Fernandez-Leiro, R.; Llorca, O.
Deposited on	:	2020-10-26
Resolution	:	4.13 Å(reported)

This is a wwPDB EM Validation Summary 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/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

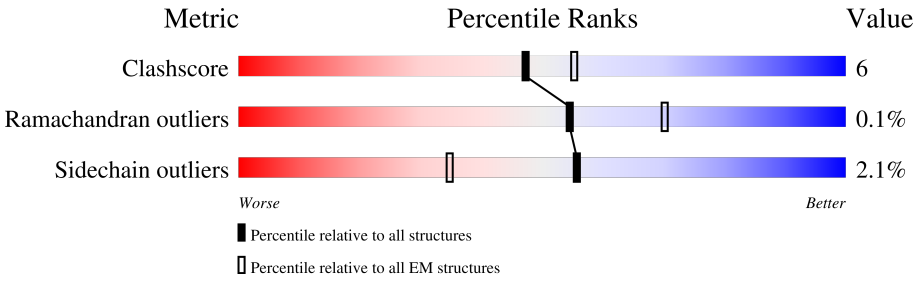
EMDB validation analysis	:	0.0.1.dev92
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.13 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	1	447	81% 13% 6%
1	2	447	14% 82% 11% 6%
1	O	447	81% 12% 6%
1	P	447	80% 13% 6%
1	Q	447	81% 12% 6%
1	R	447	74% 19% 6%
1	S	447	67% 25% 6%
1	T	447	82% 12% 6%

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Mol	Chain	Length	Quality of chain
1	U	447	82% 12% 6%
1	V	447	81% 13% 6%
1	W	447	81% 12% 6%
1	X	447	74% 19% 6%
1	Y	447	82% 12% 6%
1	Z	447	76% 17% 6%
2	3	907	8% 89%
2	B	907	57% 10% 33%
2	D	907	53% 11% 36%
2	F	907	53% 12% 34%
2	H	907	53% 12% 35%
2	N	907	54% 11% 35%
3	4	1819	97%
3	L	1819	30% 7% 63%
4	5	82	54% 20% 27%
4	6	82	60% 15% 26%
5	7	374	93% 5%
6	A	902	57% 10% 32%
6	C	902	59% 9% 31%
6	E	902	59% 12% 29%
6	G	902	61% 10% 29%
6	M	902	61% 9% 29%
7	I	667	68% 10% 22%
7	K	667	72% 12% 16%
8	J	1024	52% 7% 41%

2 Entry composition (i)

There are 9 unique types of molecules in this entry. The entry contains 120779 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 gamma-1 chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	2	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	O	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	P	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	Q	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	R	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	S	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	T	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	U	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	V	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	W	420	Total	C	N	O	S	0	0
			3371	2133	586	637	15		
1	X	420	Total	C	N	O	S	0	0
			3371	2133	586	637	15		
1	Y	420	Total	C	N	O	S	1	0
			3380	2138	587	640	15		
1	Z	420	Total	C	N	O	S	0	0
			3371	2133	586	637	15		

- Molecule 2 is a protein called Gamma-tubulin complex component 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	3	102	Total	C	N	O	S	0	0
			830	524	156	148	2		

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Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	610	Total	C	N	O	S	0	0
			5021	3198	888	910	25		
2	D	581	Total	C	N	O	S	0	0
			4796	3061	842	868	25		
2	F	599	Total	C	N	O	S	0	0
			4933	3146	871	891	25		
2	H	594	Total	C	N	O	S	0	0
			4899	3125	864	885	25		
2	N	594	Total	C	N	O	S	0	0
			4899	3125	864	885	25		

- Molecule 3 is a protein called Gamma-tubulin complex component 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	4	46	Total	C	N	O	S	0	0
			355	229	58	67	1		
3	L	679	Total	C	N	O	S	0	0
			5413	3526	910	950	27		

- Molecule 4 is a protein called Mitotic-spindle organizing protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	5	60	Total	C	N	O	S	0	0
			452	278	79	91	4		
4	6	61	Total	C	N	O	S	0	0
			457	281	80	92	4		

- Molecule 5 is a protein called Actin, cytoplasmic 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	7	364	Total	C	N	O	0	0
			1795	1067	364	364		

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
7	3	GLU	ASP	conflict	UNP P60709
7	4	GLU	ASP	conflict	UNP P60709
7	5	VAL	ILE	conflict	UNP P60709
7	153	LEU	MET	conflict	UNP P60709
7	160	SER	THR	conflict	UNP P60709
7	204	GLU	ALA	conflict	UNP P60709

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Chain	Residue	Modelled	Actual	Comment	Reference
7	243	LYS	PRO	conflict	UNP P60709
7	271	ALA	SER	conflict	UNP P60709
7	279	TYR	PHE	conflict	UNP P60709

- Molecule 6 is a protein called Gamma-tubulin complex component 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	A	613	Total	C	N	O	S	0	0
			4978	3212	831	903	32		
6	C	620	Total	C	N	O	S	0	0
			5044	3257	845	910	32		
6	E	638	Total	C	N	O	S	0	0
			5202	3354	873	942	33		
6	G	636	Total	C	N	O	S	0	0
			5186	3342	871	940	33		
6	M	636	Total	C	N	O	S	0	0
			5186	3342	871	940	33		

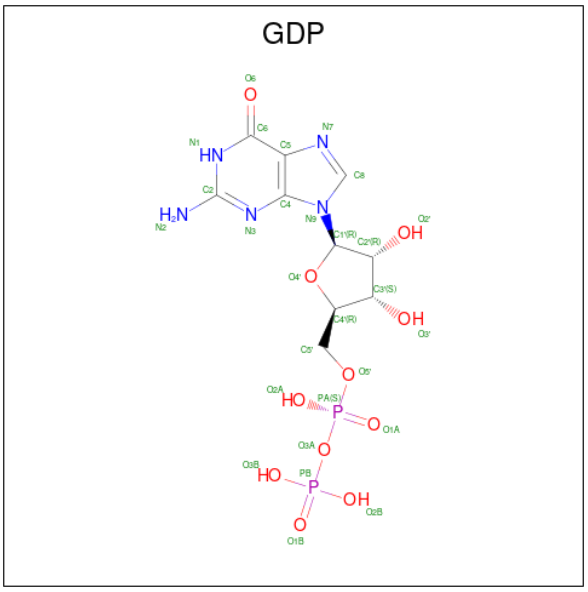
- Molecule 7 is a protein called Gamma-tubulin complex component 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	I	521	Total	C	N	O	S	0	0
			4222	2734	720	750	18		
7	K	562	Total	C	N	O	S	0	0
			4579	2964	781	816	18		

- Molecule 8 is a protein called Gamma-tubulin complex component 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	J	601	Total	C	N	O	S	0	0
			4847	3131	817	872	27		

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



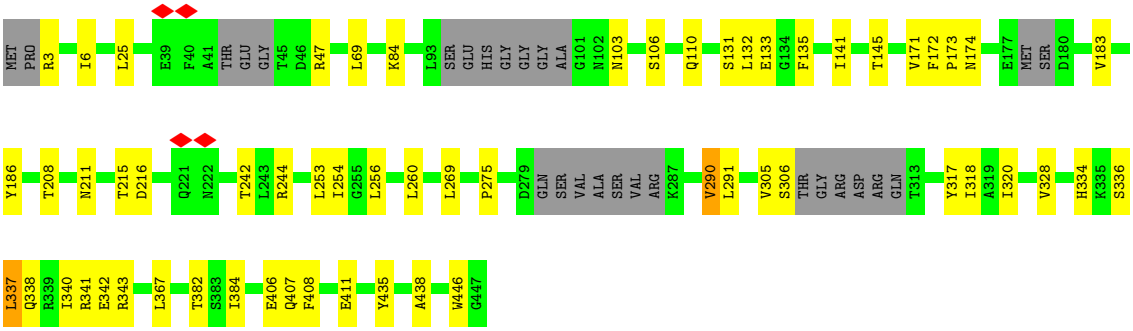
Mol	Chain	Residues	Atoms					AltConf
9	1	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	2	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	O	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	P	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	Q	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	R	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	S	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	T	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	U	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	V	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	W	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	X	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	Y	1	Total	C	N	O	P	0
			28	10	5	11	2	
9	Z	1	Total	C	N	O	P	0
			28	10	5	11	2	

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

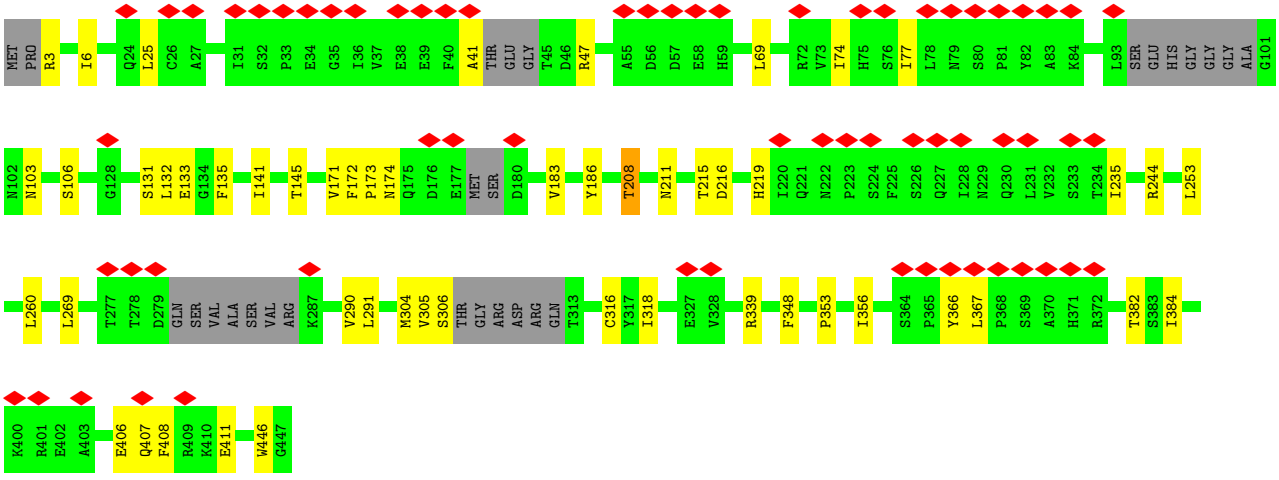
• Molecule 1: Tubulin gamma-1 chain

Chain 1:



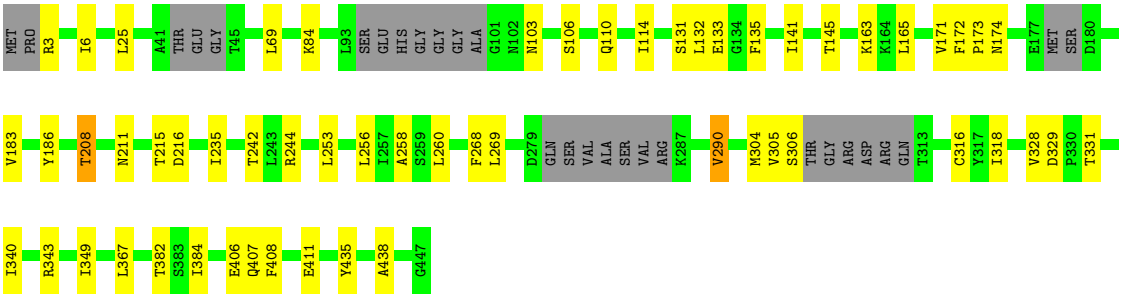
• Molecule 1: Tubulin gamma-1 chain

Chain 2:



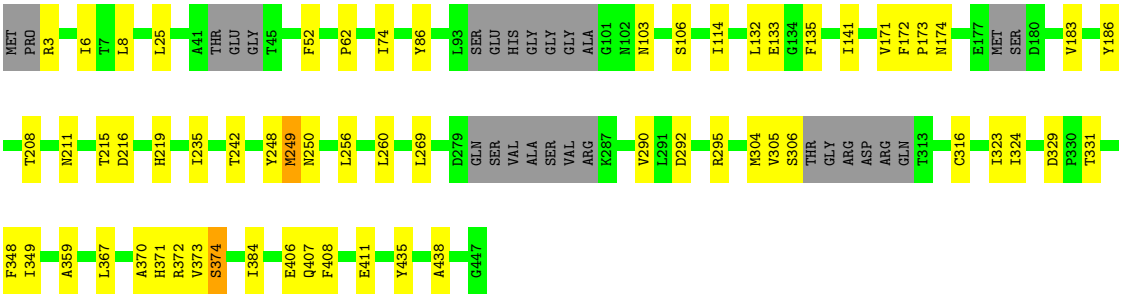
• Molecule 1: Tubulin gamma-1 chain

Chain O:



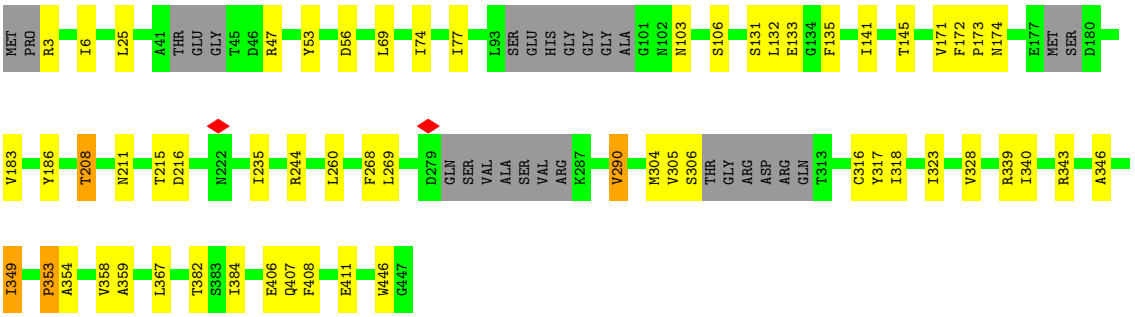
• Molecule 1: Tubulin gamma-1 chain

Chain P:



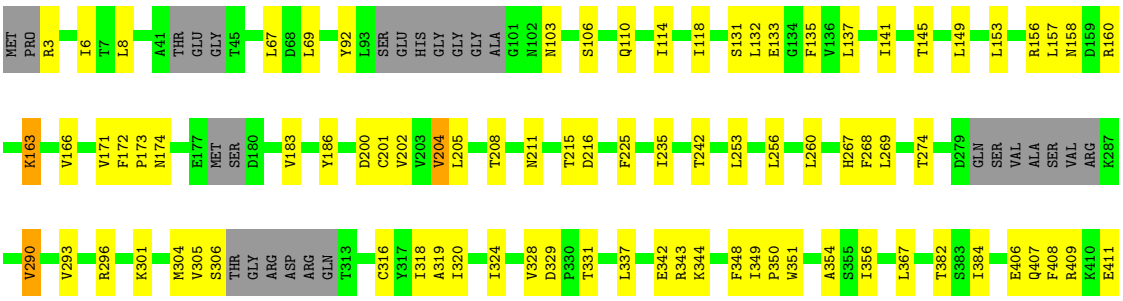
• Molecule 1: Tubulin gamma-1 chain

Chain Q:



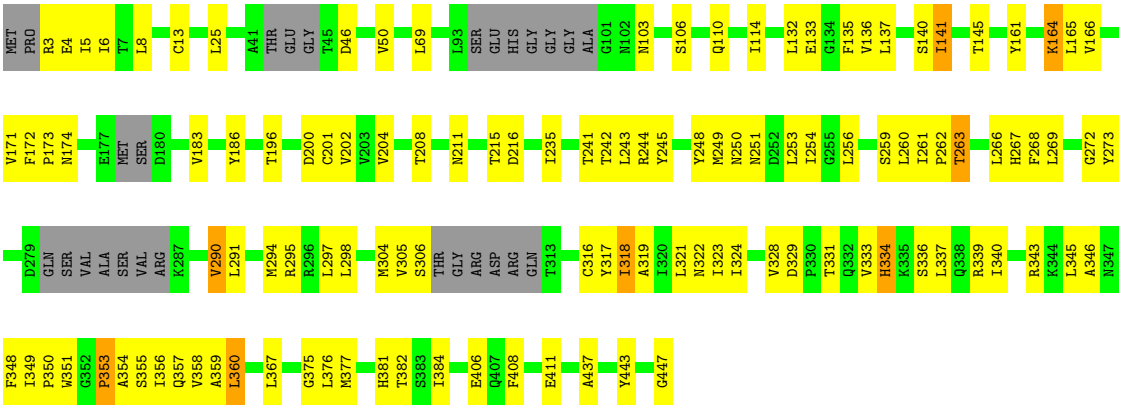
• Molecule 1: Tubulin gamma-1 chain

Chain R:



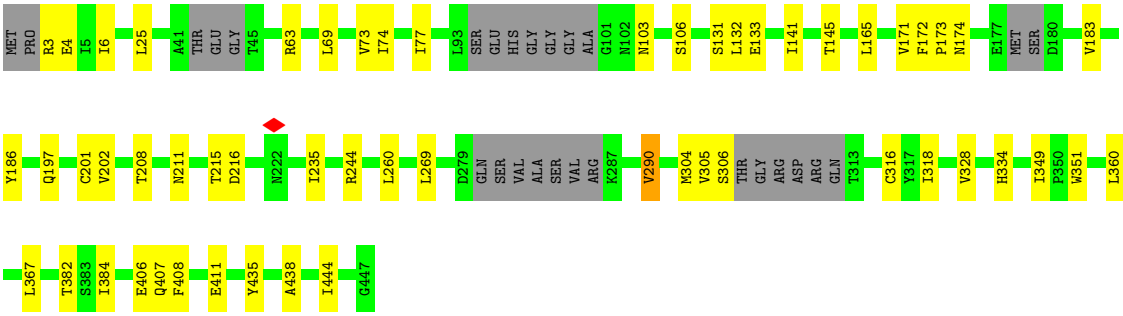
• Molecule 1: Tubulin gamma-1 chain

Chain S:



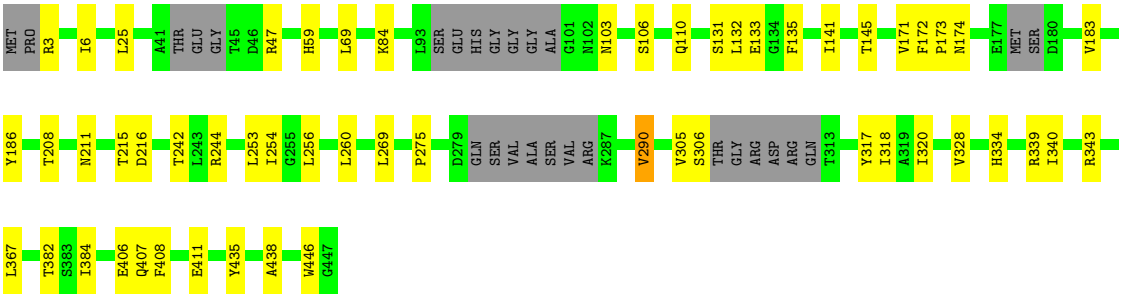
• Molecule 1: Tubulin gamma-1 chain

Chain T:



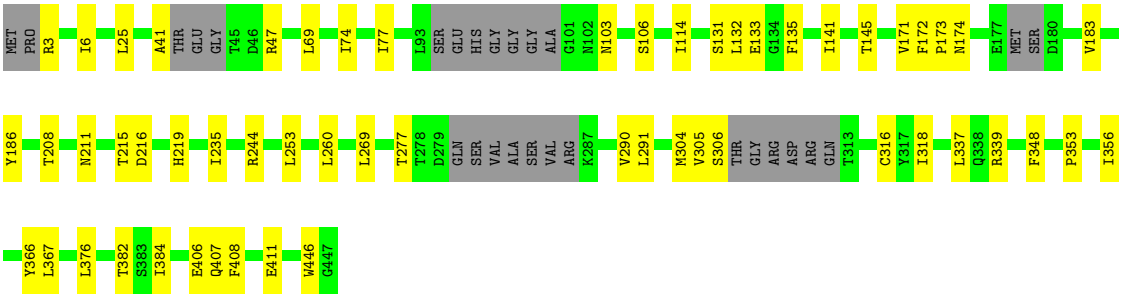
• Molecule 1: Tubulin gamma-1 chain

Chain U:



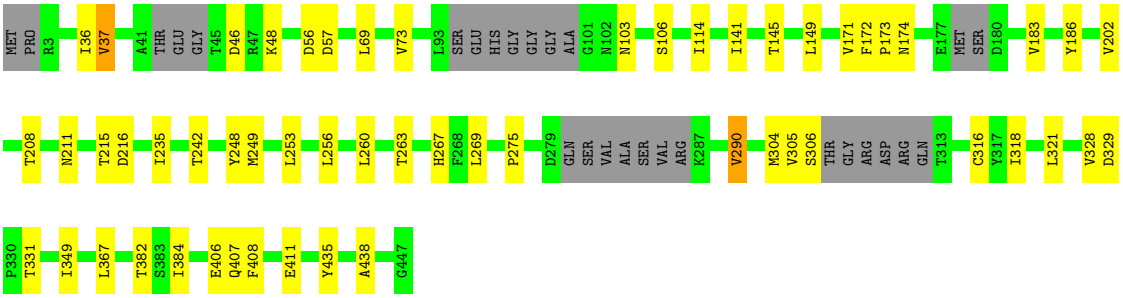
• Molecule 1: Tubulin gamma-1 chain

Chain V:



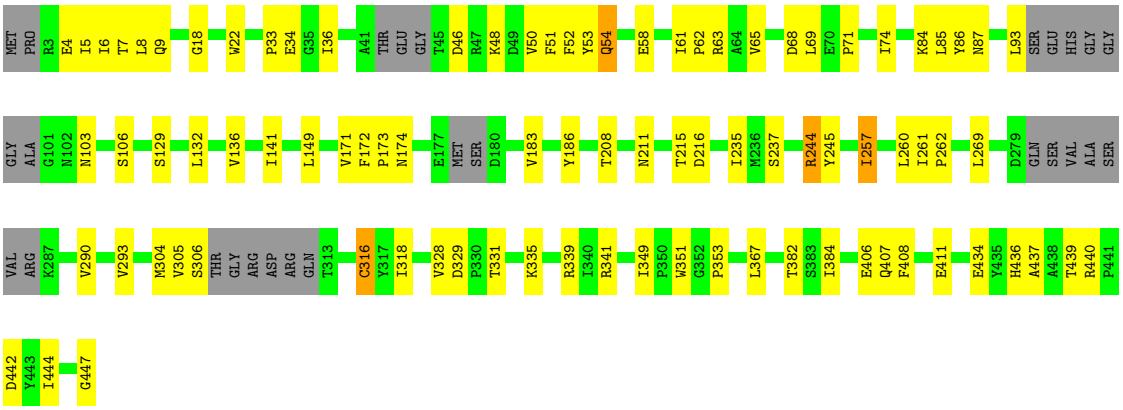
• Molecule 1: Tubulin gamma-1 chain

Chain W:



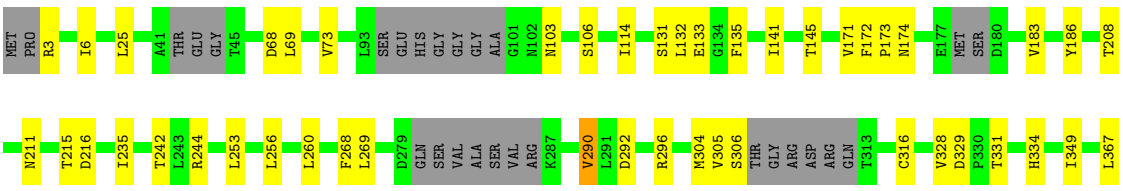
• Molecule 1: Tubulin gamma-1 chain

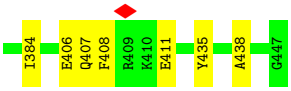
Chain X:



• Molecule 1: Tubulin gamma-1 chain

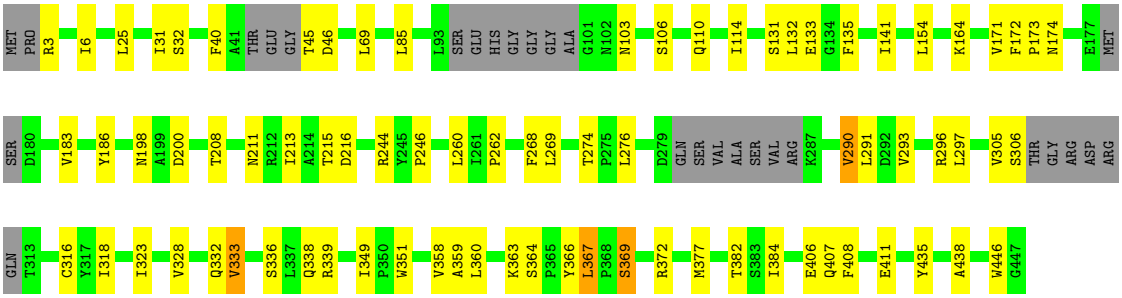
Chain Y:





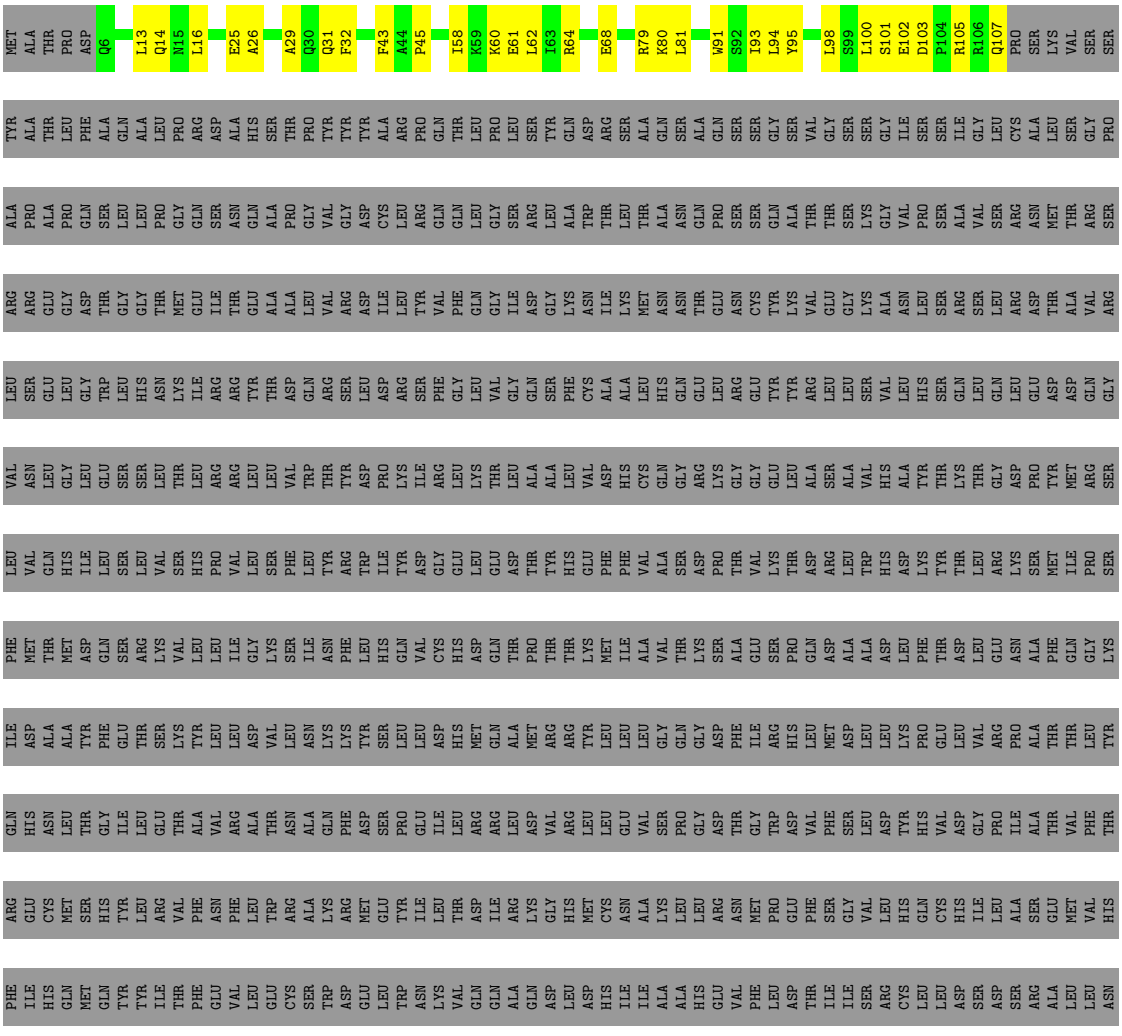
• Molecule 1: Tubulin gamma-1 chain

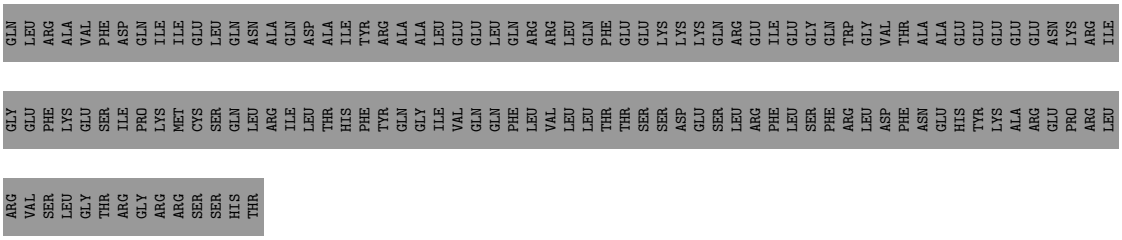
Chain Z:



• Molecule 2: Gamma-tubulin complex component 3

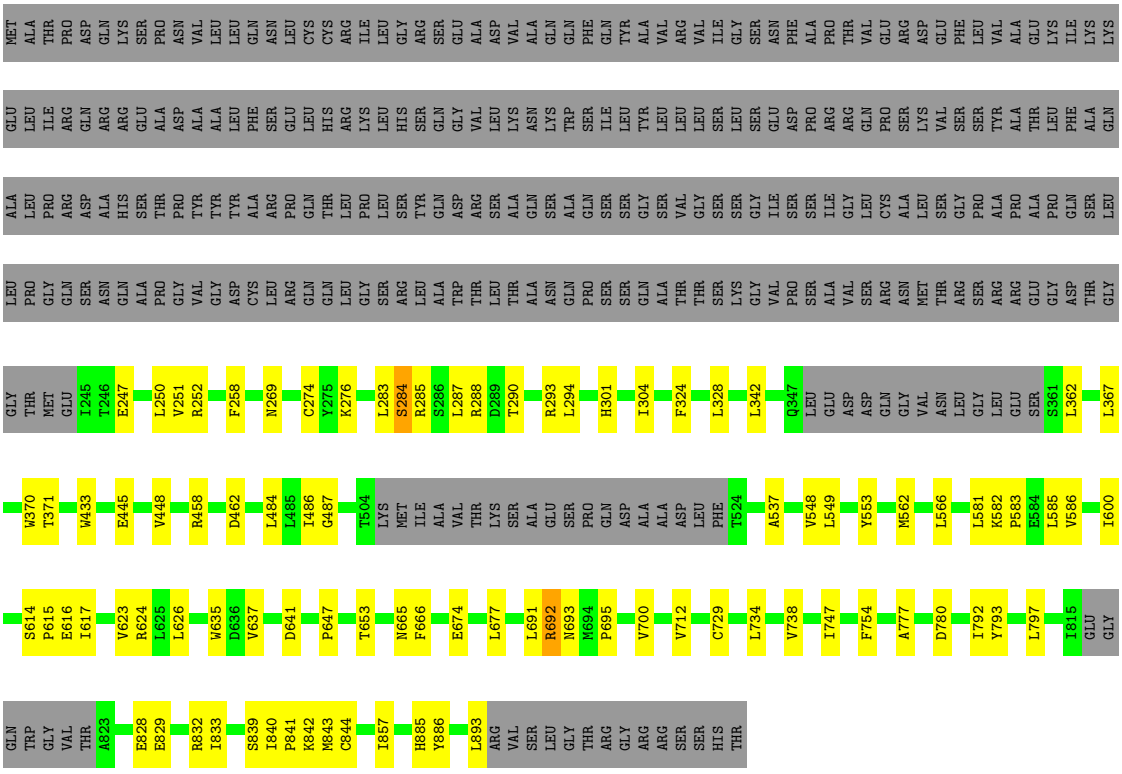
Chain 3:





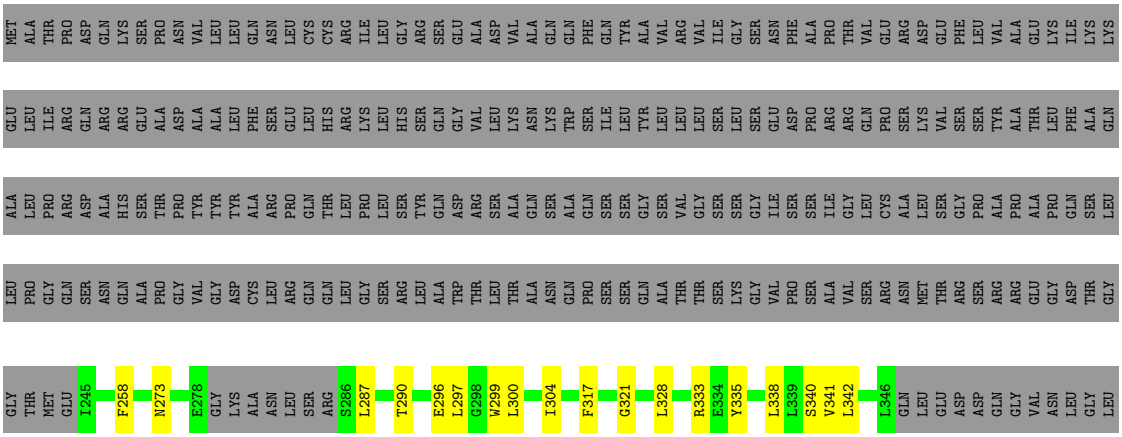
• Molecule 2: Gamma-tubulin complex component 3

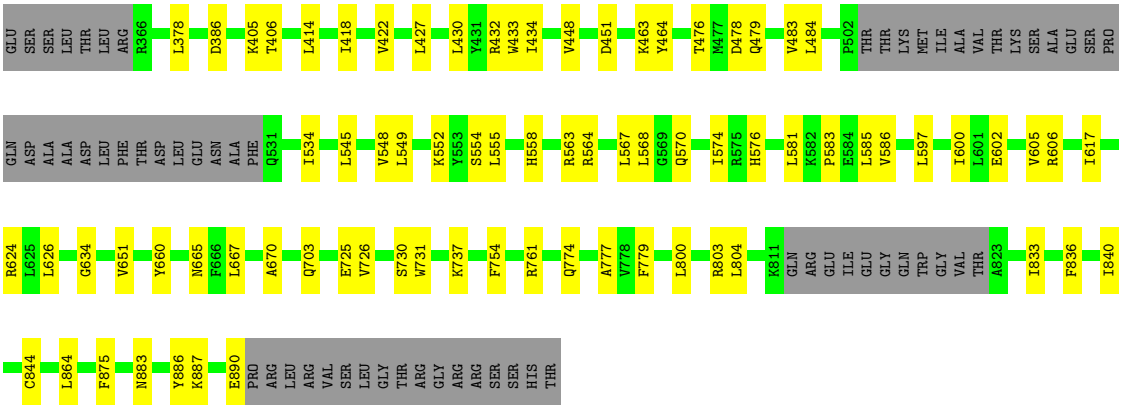
Chain B:



• Molecule 2: Gamma-tubulin complex component 3

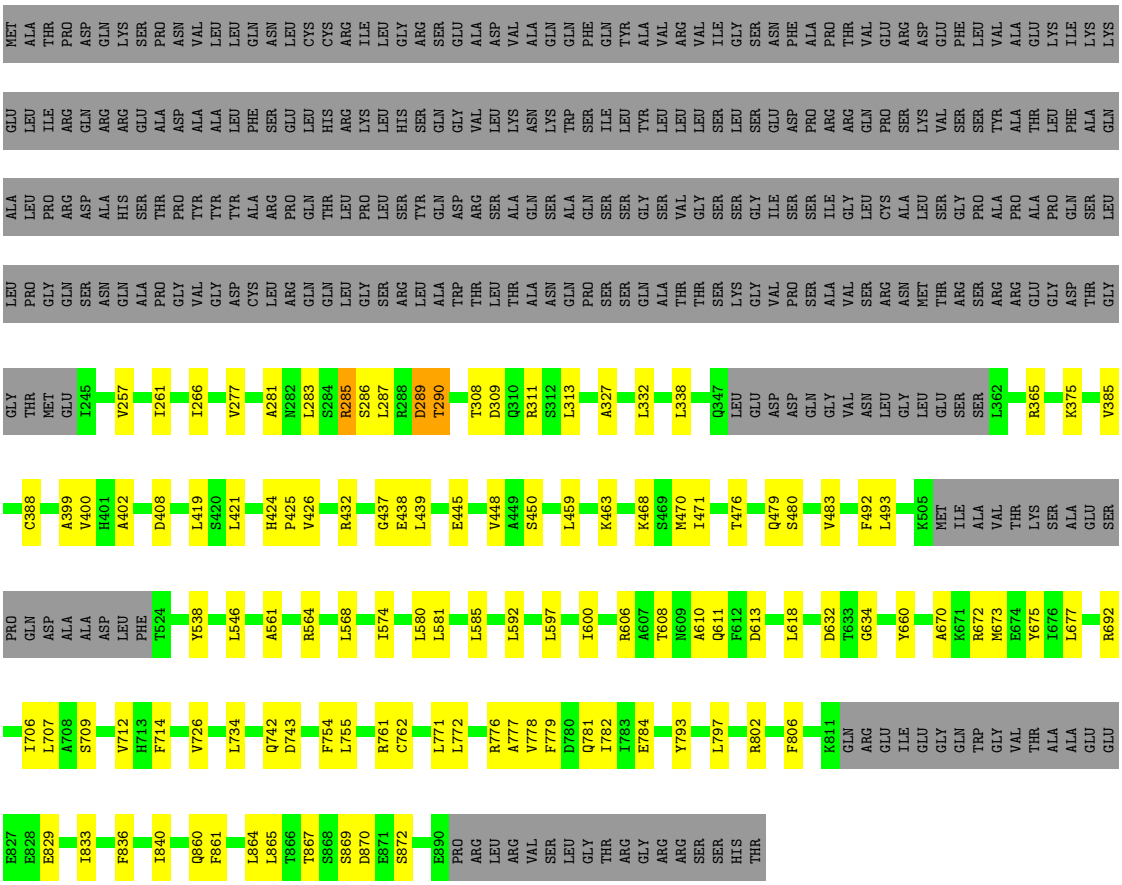
Chain D:





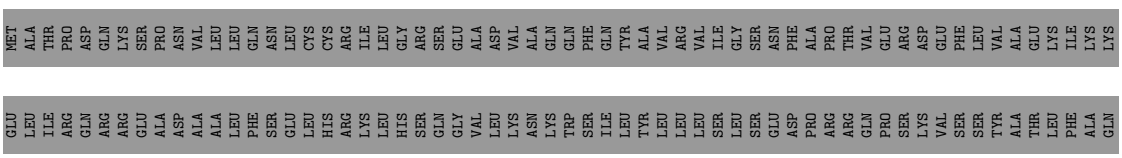
• Molecule 2: Gamma-tubulin complex component 3

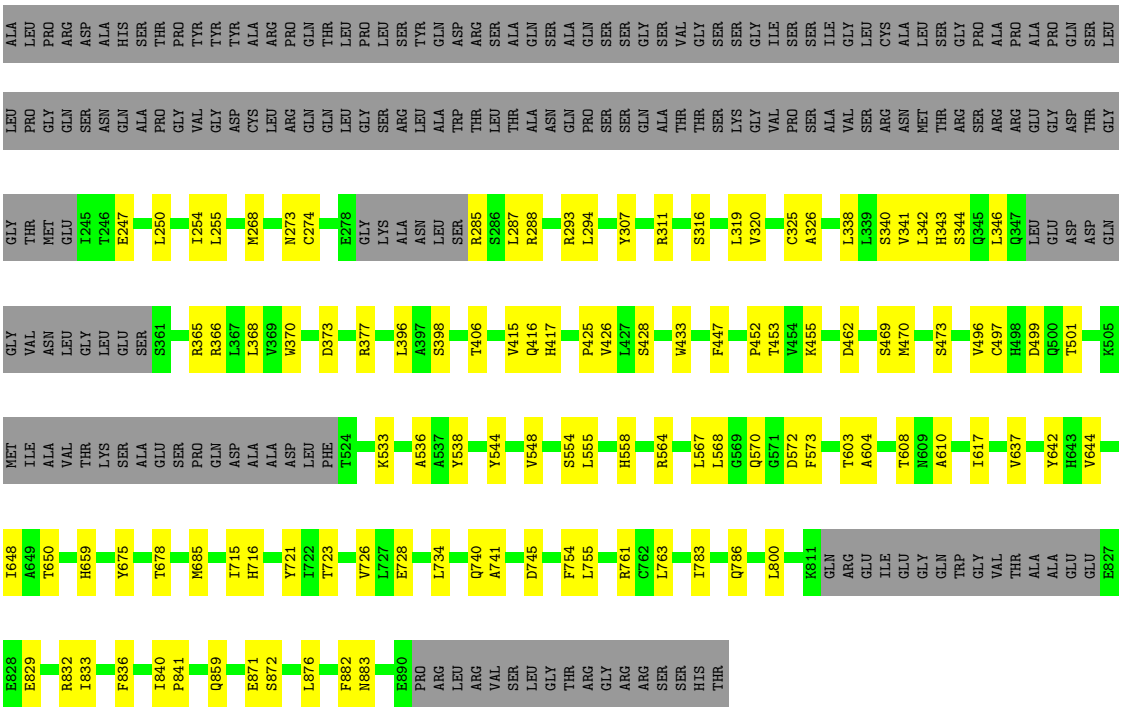
Chain F:



• Molecule 2: Gamma-tubulin complex component 3

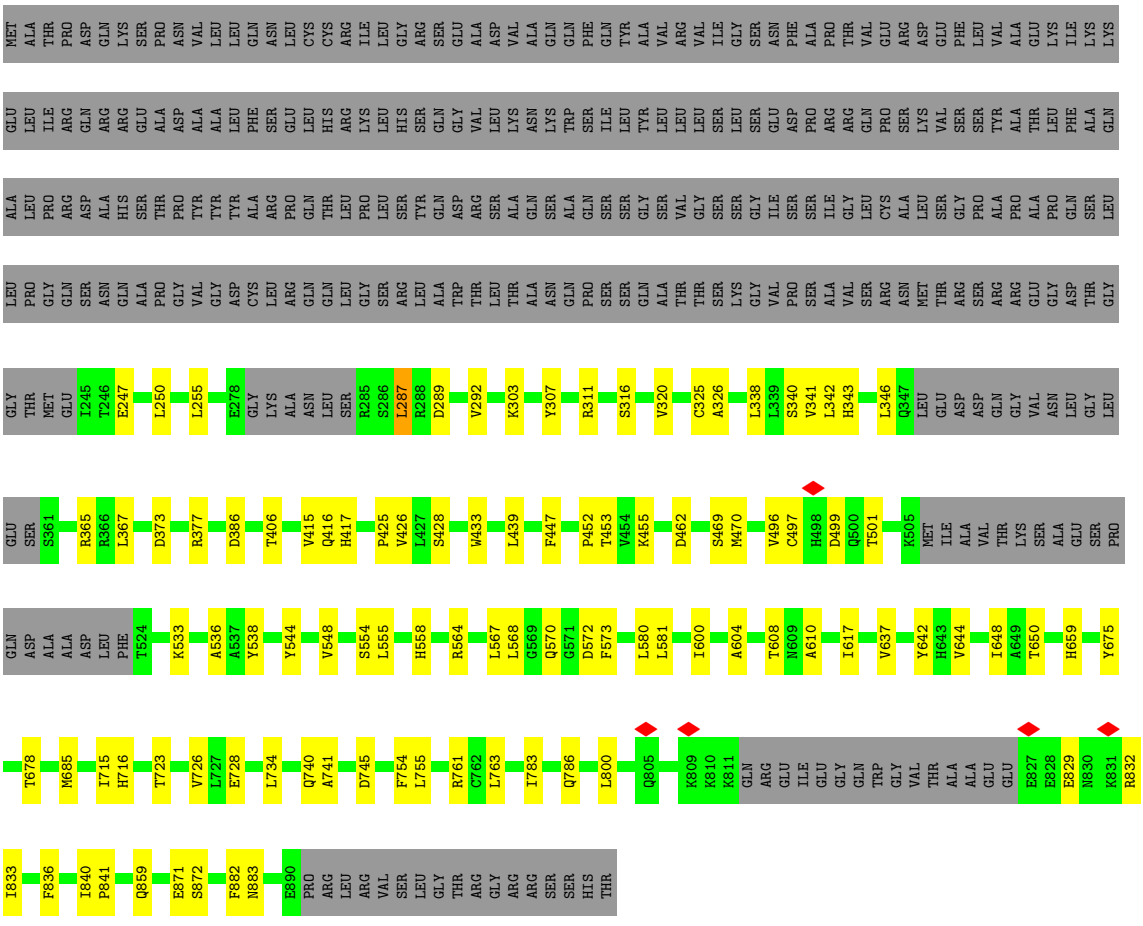
Chain H:





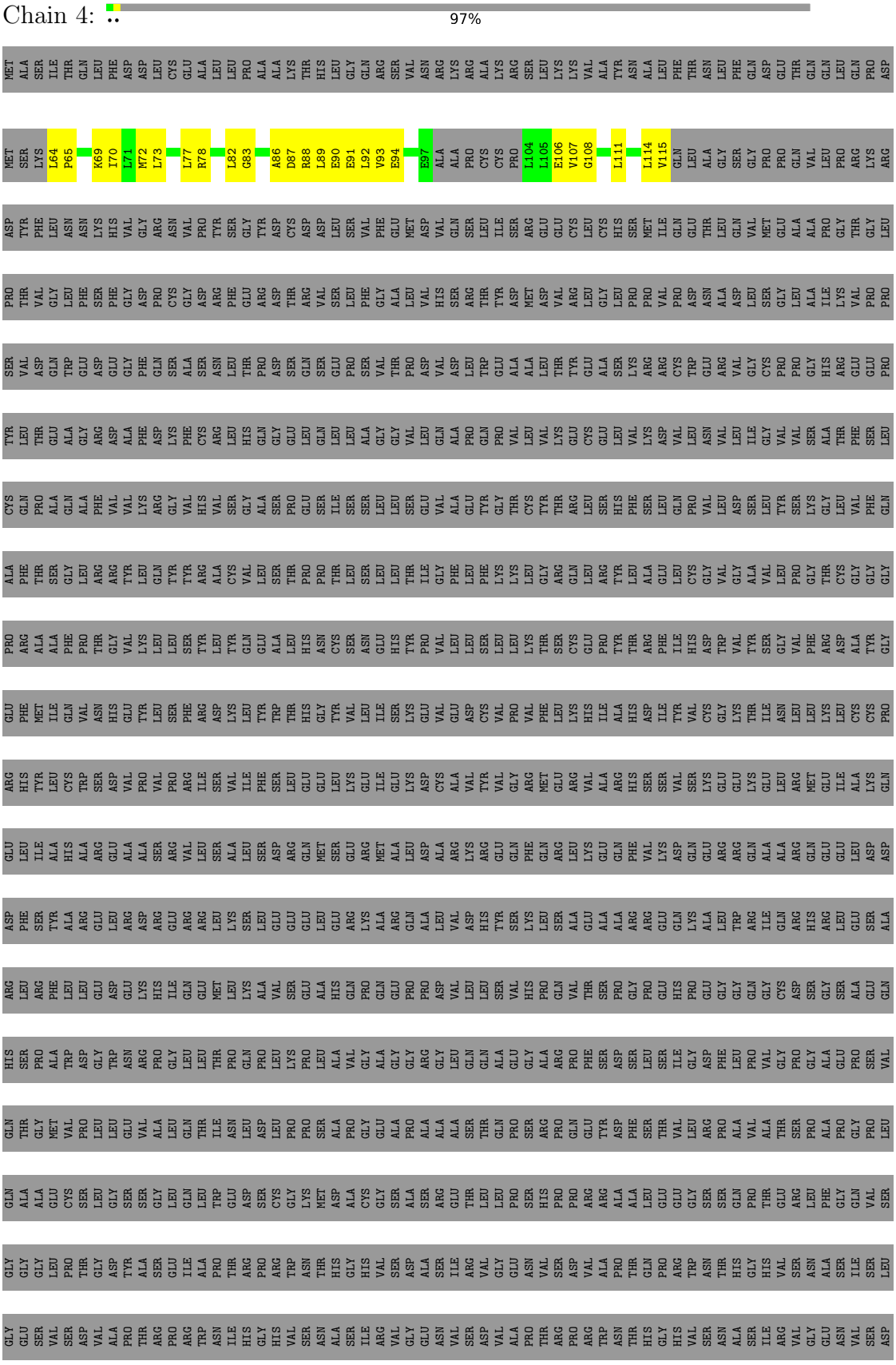
• Molecule 2: Gamma-tubulin complex component 3

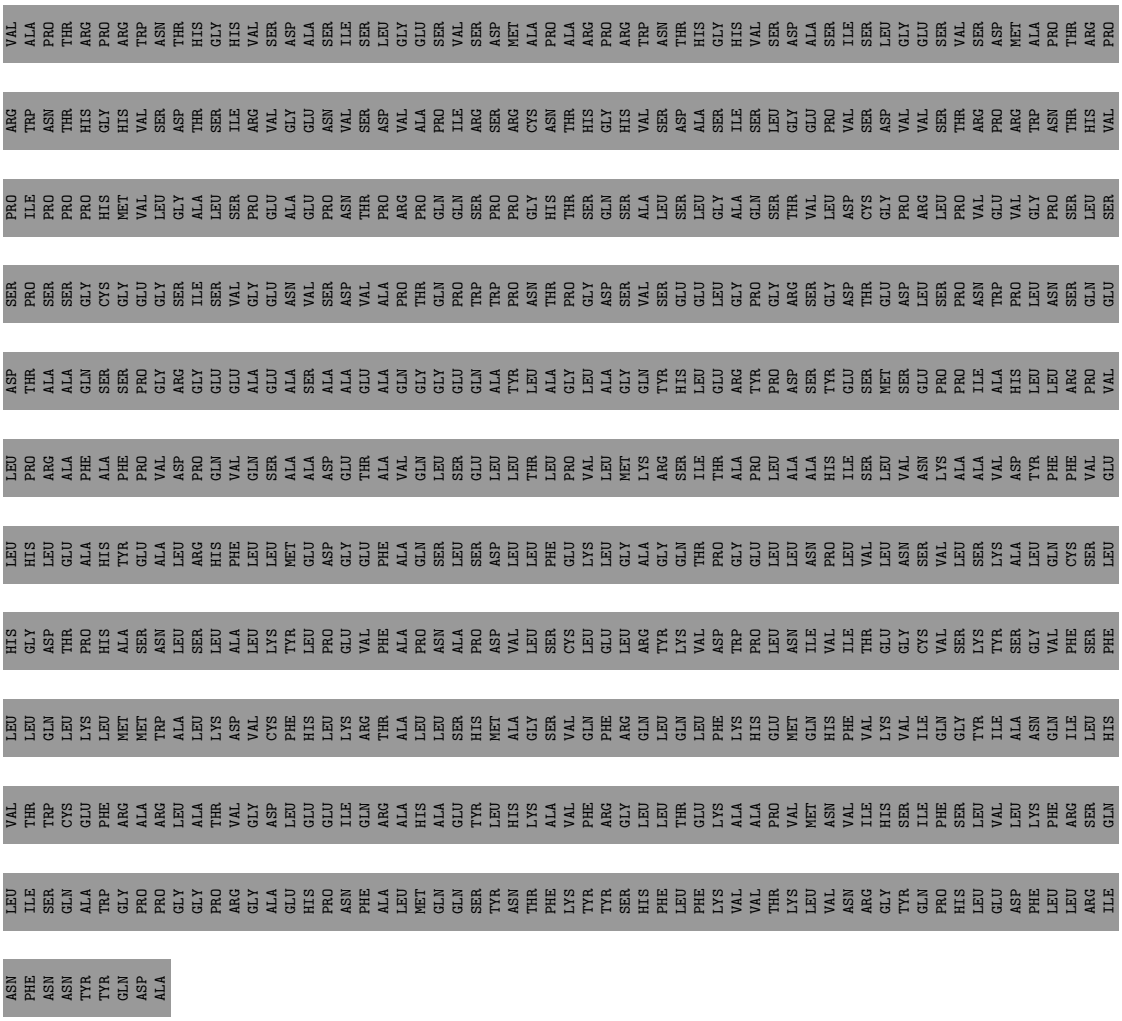
Chain N:



• Molecule 3: Gamma-tubulin complex component 6

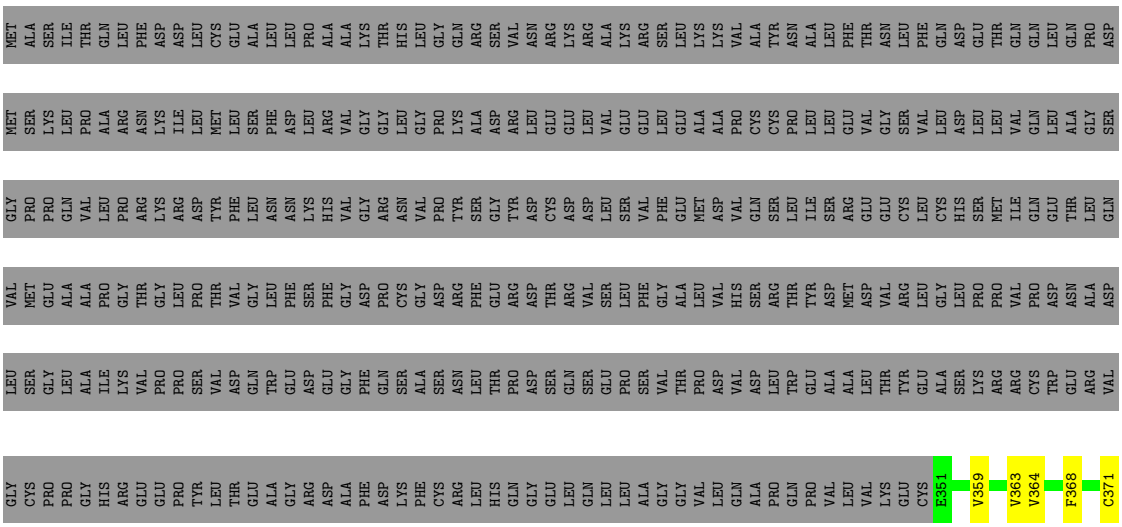
Chain 4:

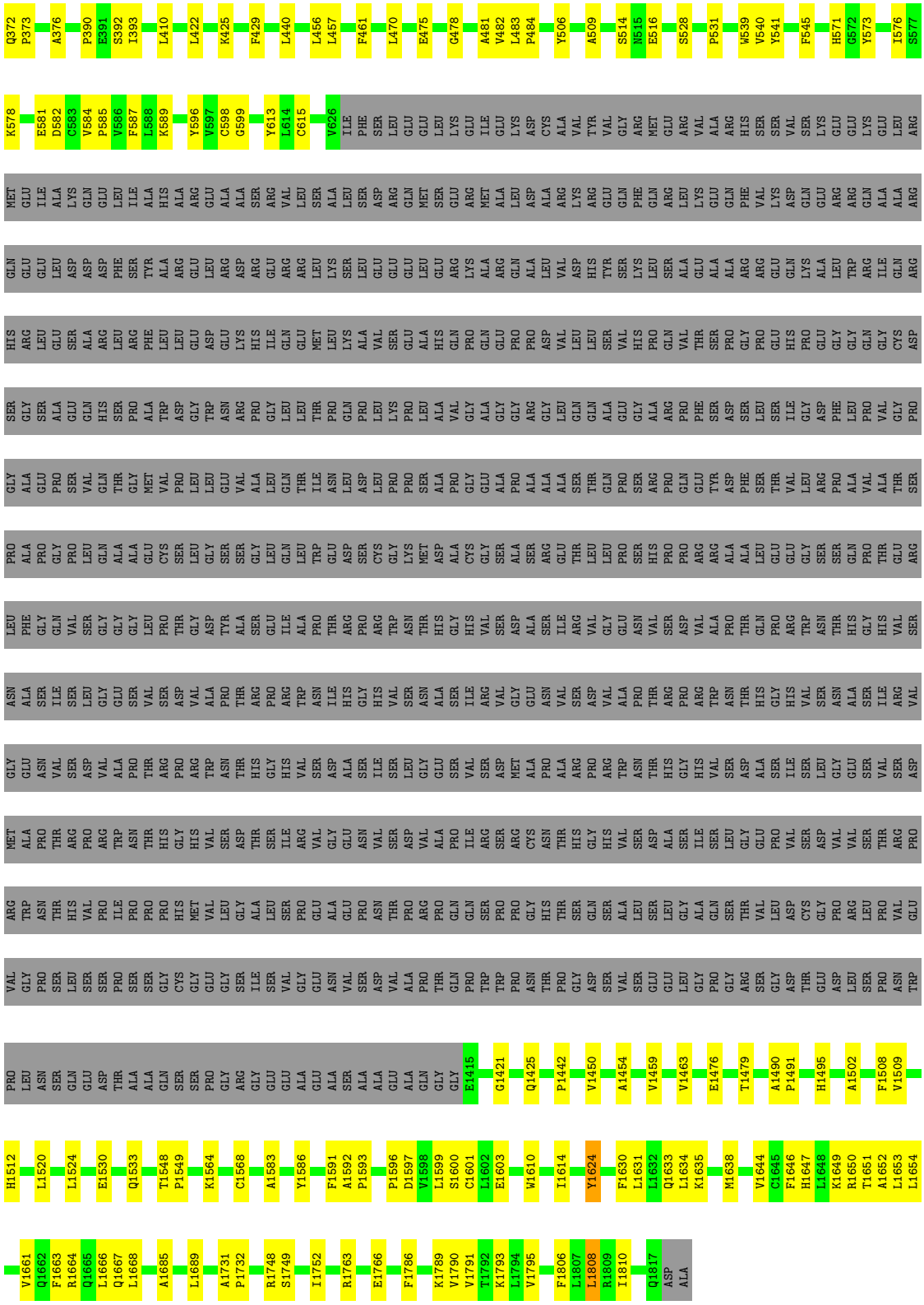




• Molecule 3: Gamma-tubulin complex component 6

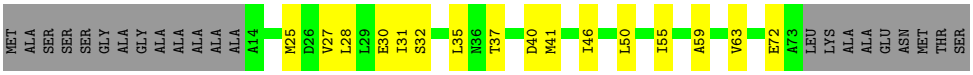
Chain L:





• Molecule 4: Mitotic-spindle organizing protein 1

Chain 5:

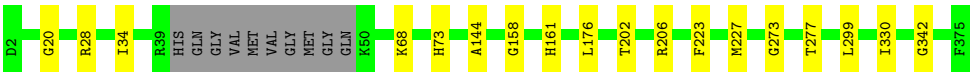


• Molecule 4: Mitotic-spindle organizing protein 1

Chain 6:

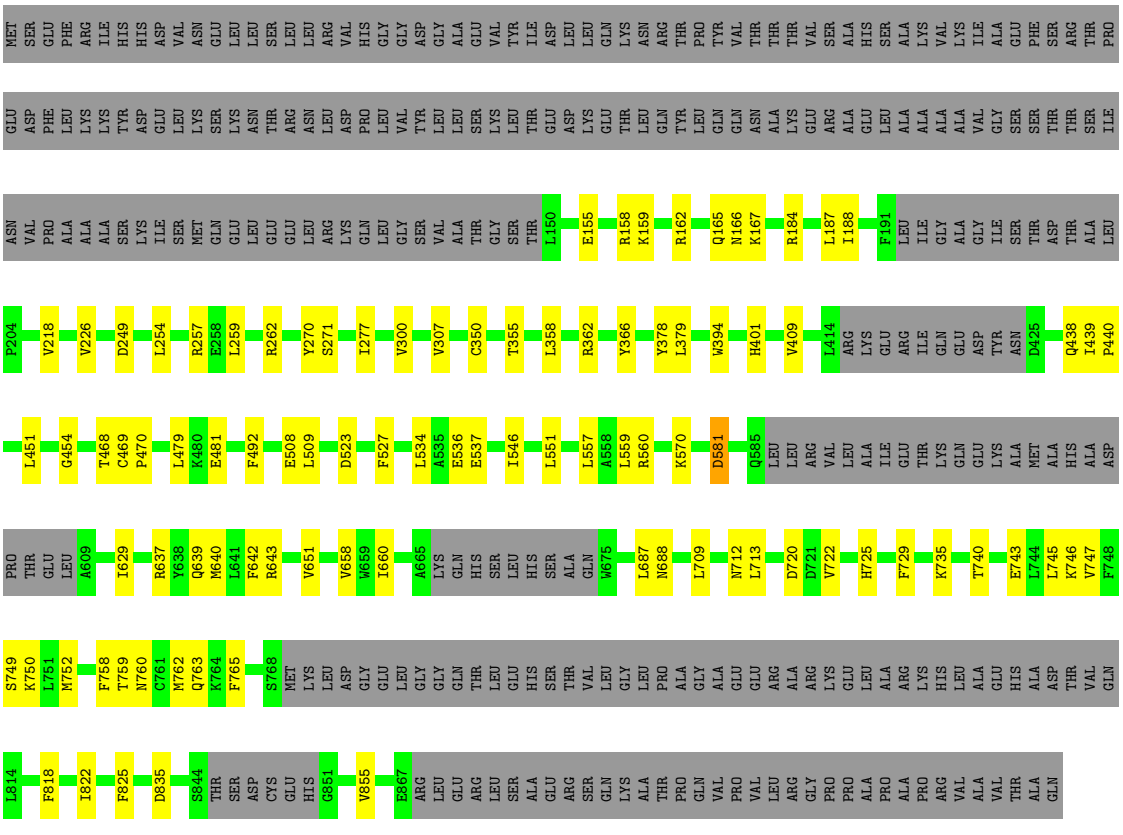
• Molecule 5: Actin, cytoplasmic 1

Chain 7:



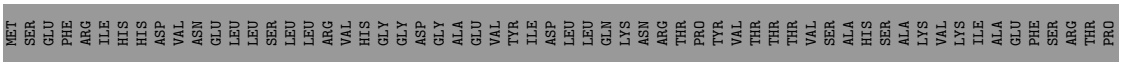
• Molecule 6: Gamma-tubulin complex component 2

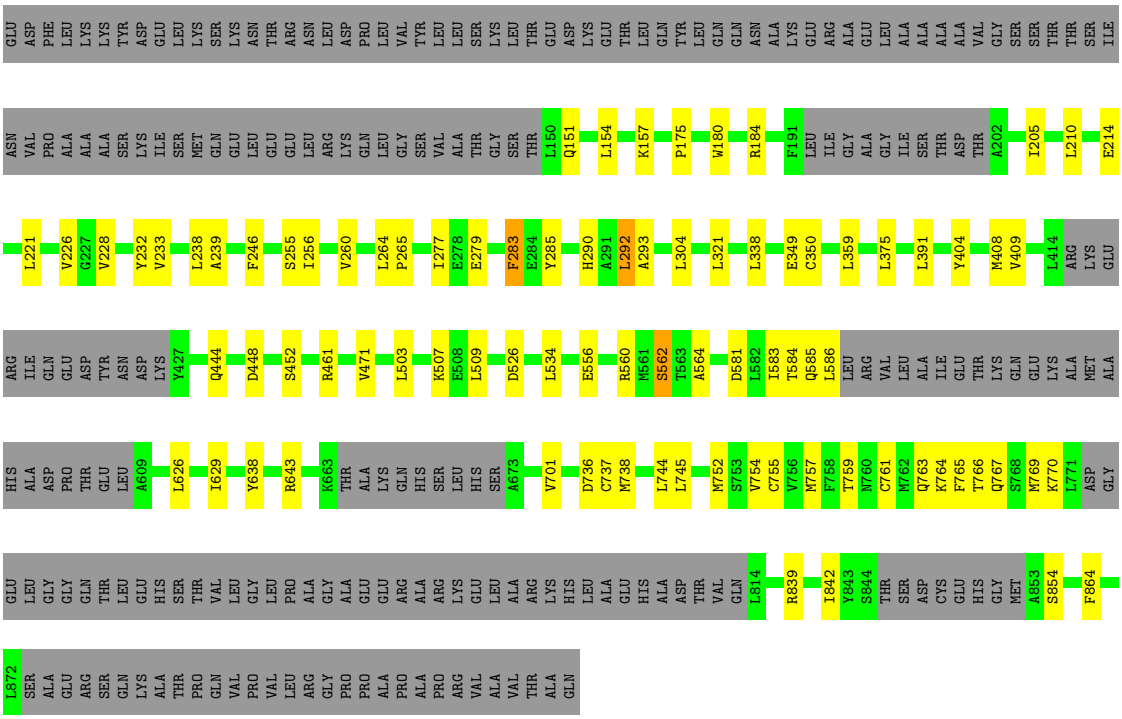
Chain A:



• Molecule 6: Gamma-tubulin complex component 2

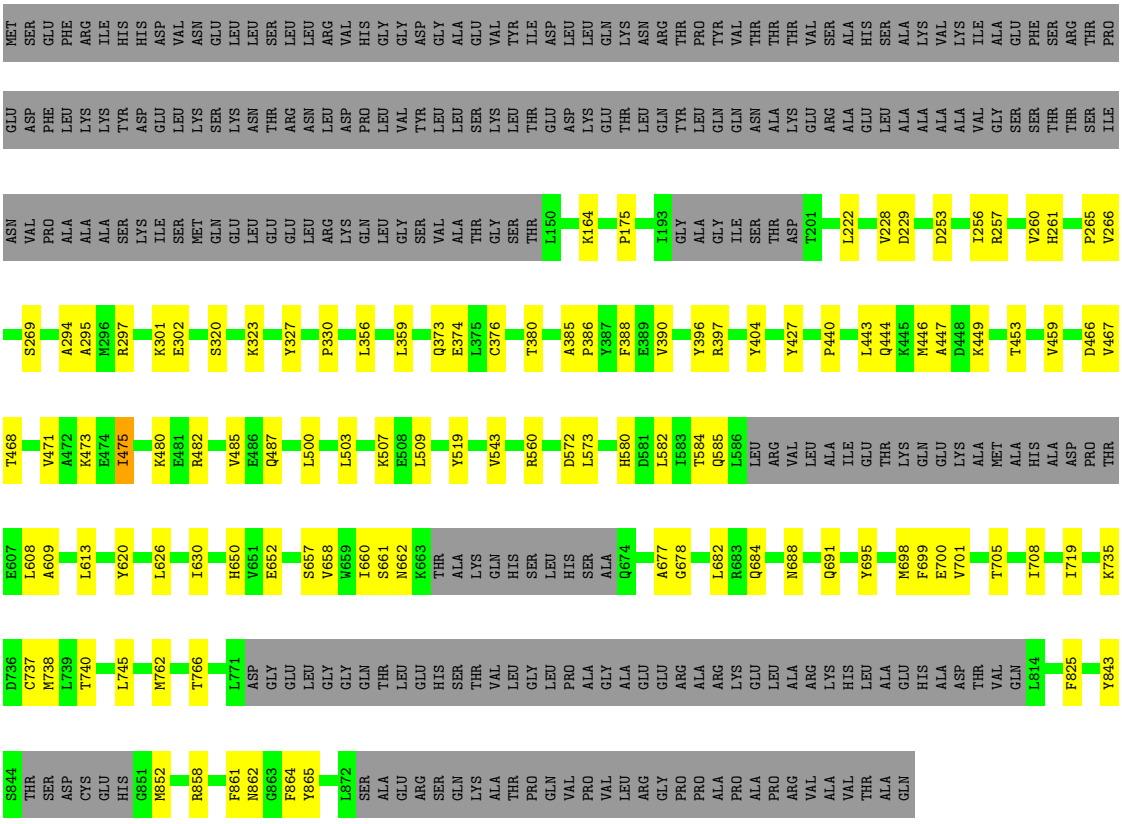
Chain C:





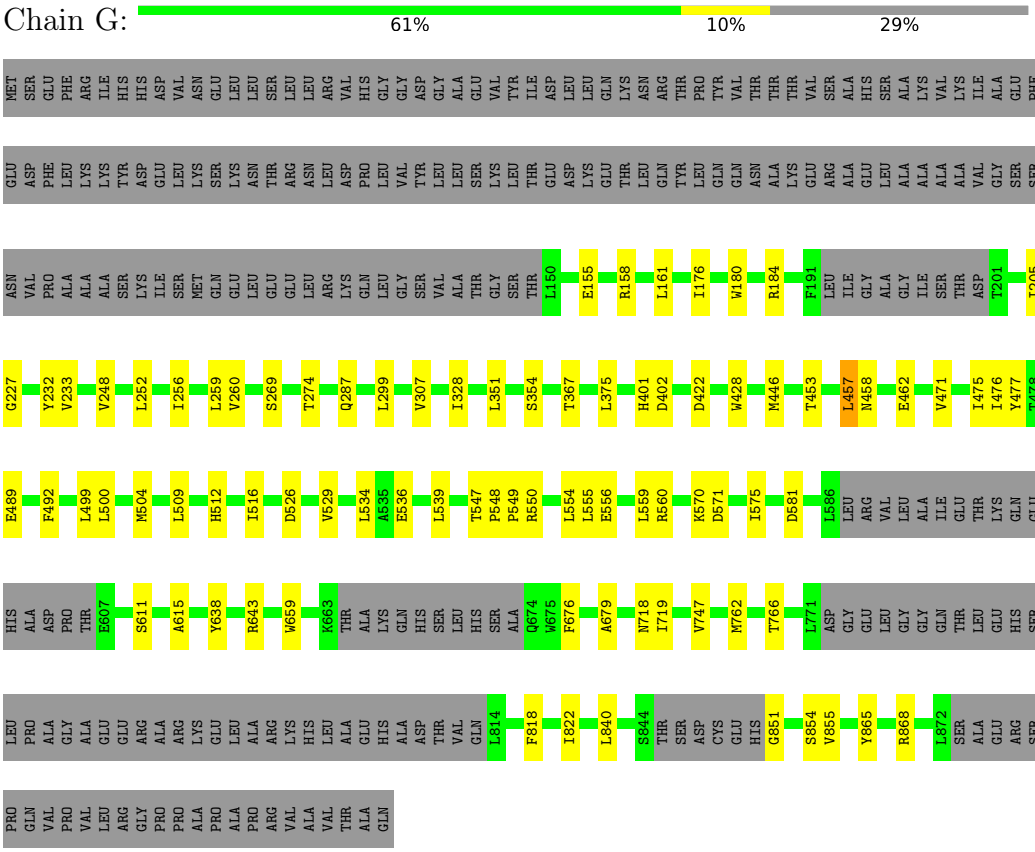
• Molecule 6: Gamma-tubulin complex component 2

Chain E:



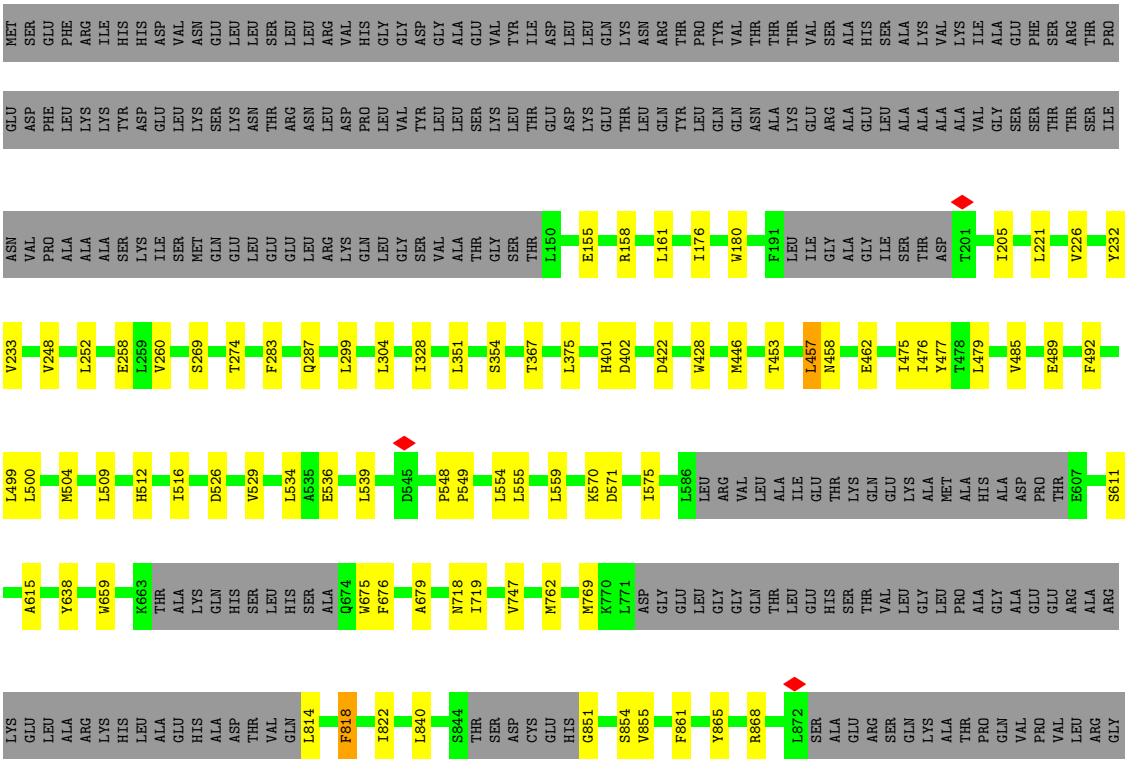
• Molecule 6: Gamma-tubulin complex component 2

Chain G:



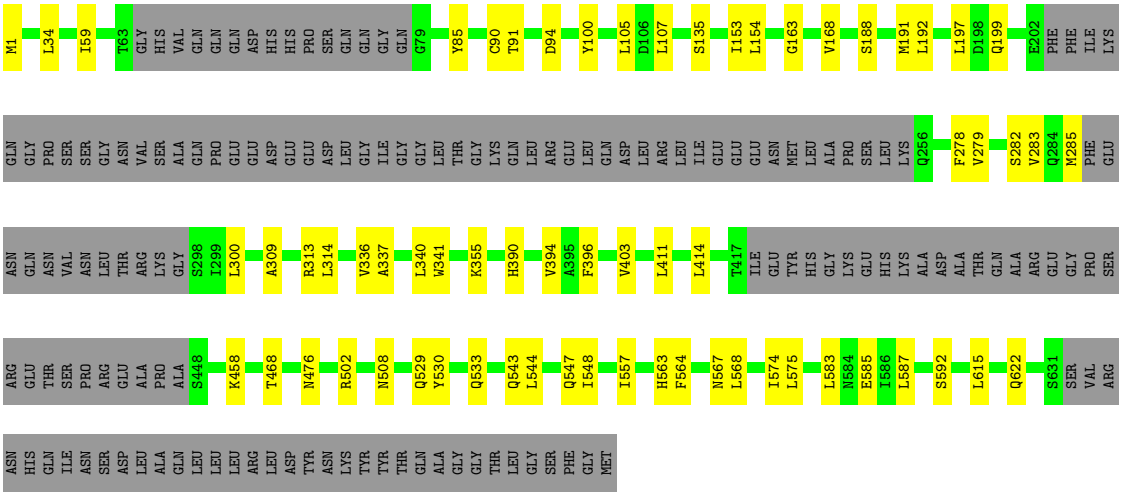
• Molecule 6: Gamma-tubulin complex component 2

Chain M:



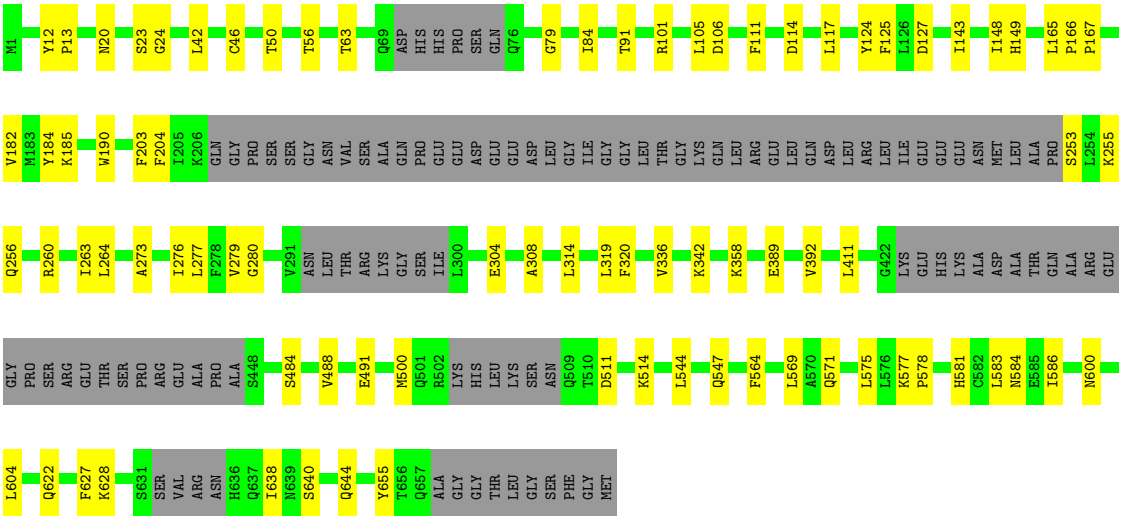
• Molecule 7: Gamma-tubulin complex component 4

Chain I:



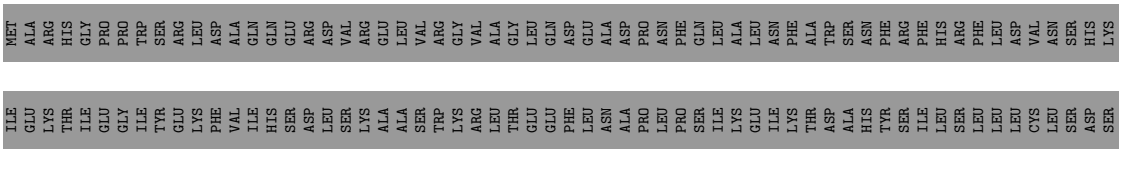
• Molecule 7: Gamma-tubulin complex component 4

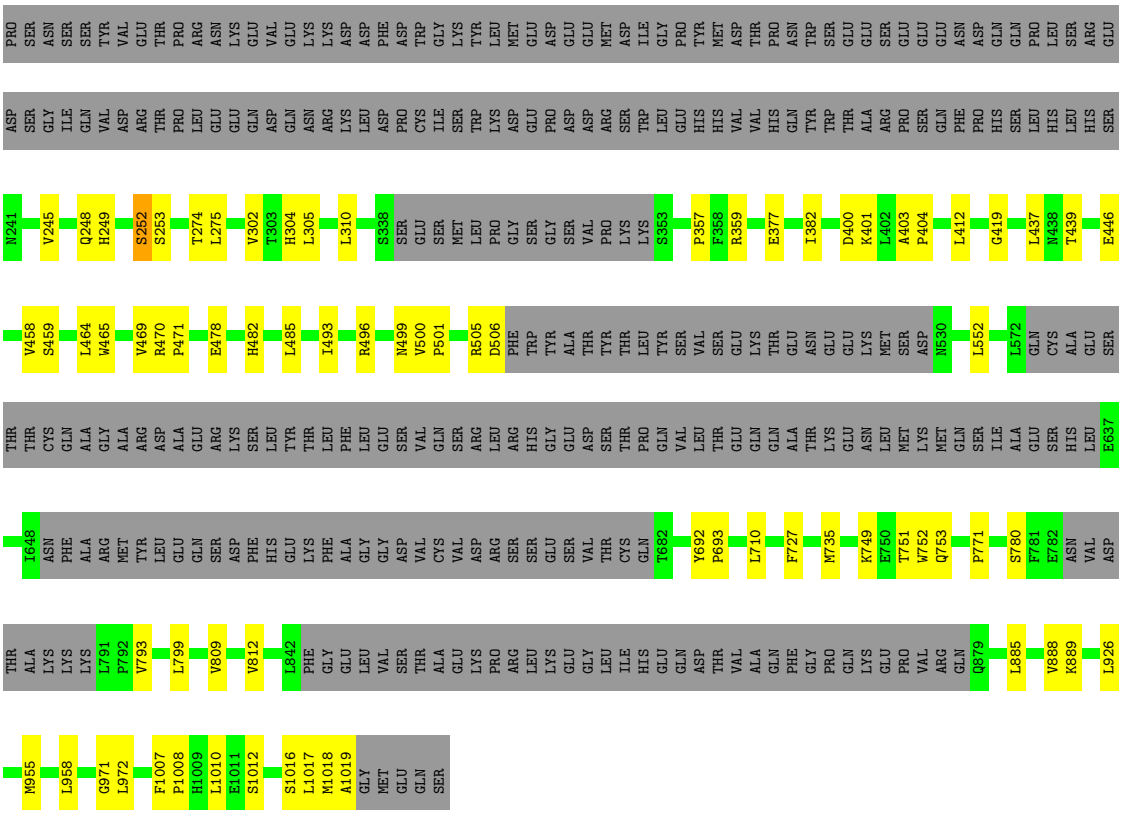
Chain K:



• Molecule 8: Gamma-tubulin complex component 5

Chain J:




PRO SER ASN SER SER TYR VAL GLU THR PRO ARG ASN LYS GLU VAL GLU LYS LYS ASP ASP PHE ASP TRP GLY LYS TYR LEU MET GLU ASP GLU GLU MET ASP ILE GLY PRO TYR MET ASP THR PRO ASN TRP SER GLU GLU SER GLU GLU GLU ASN ASP GLN GLN PRO LEU SER ARG GLU
ASP SER GLY ILE GLN VAL ASP ARG THR PRO LEU GLU GLU GLN ASP GLN ASN ARG LYS LEU ASP PRO CYS ILE SER TRP LYS ASP GLU PRO ASP ASP ARG SER TRP LEU GLU HIS HIS VAL VAL HIS GLN TYR TRP THR ALA ARG PRO SER GLN PHE PRO HIS SER LEU HIS LEU HIS SER
N241 V245 Q248 H249 S252 S253 T274 L275 V302 T303 H304 L305 L310 S338 SER GLU SER MET LEU PRO GLY SER GLY SER VAL PRO LYS LYS S353 P357 F358 R359 E377 I382 D400 K401 L402 A403 P404 L412 G419 L437 N438 T439 E446
V458 S459 L464 W465 V469 R470 P471 E478 H482 L485 I493 R496 N499 V500 P501 R505 D506 PHE TRP TYR ALA THR TYR THR LEU TYR SER VAL SER GLU LYS THR GLU ASN GLU GLU LYS MET SER ASP N530 L552 L572 GLN CYS ALA GLU SER
THR THR CYS GLN ALA GLY ALA ARG ASP ALA GLU GLU ARG LYS SER LEU TYR THR LEU PHE LEU GLU GLU SER VAL GLN SER ARG LEU ARG HIS GLY GLU ASP SER THR PRO GLN VAL LEU THR GLU GLN GLN ALA THR LYS GLU ASN LEU MET LYS MET GLN SER ILE ALA GLU GLY SER HIS LEU E637
I648 ASN PHE ALA ARG MET TYR LEU GLU GLN SER ASP PHE HIS GLU LYS PHE ALA GLY GLY ASP VAL CYS VAL ASP ARG SER SER GLU SER VAL THR CYS GLN T682 Y692 P693 L710 F727 M735 K749 E750 T751 W752 Q753 P771 S780 F781 E782 ASN VAL ASP
THR ALA LYS LYS LYS L791 P792 V793 L799 V809 V812 L842 PHE GLY GLU LEU VAL SER THR ALA GLU LYS PRO ARG LEU LYS GLU GLY LEU ILE HIS GLU GLN ASP THR VAL ALA GLN PHE GLY PRO GLN LYS GLU PRO VAL ARG GLN Q879 L885 V888 K889 L926
M955 L958 G971 L972 F1007 P1008 H1009 L1010 E1011 S1012 S1016 L1017 M1018 A1019 GLY MET GLU GLN SER

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	105181	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	58	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.055	Depositor
Minimum map value	-0.008	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.007	Depositor
Map size (Å)	549.35986, 549.35986, 549.35986	wwPDB
Map dimensions	390, 390, 390	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.408615, 1.408615, 1.408615	Depositor

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: GDP

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	1	0.63	0/3448	0.90	0/4670
1	2	0.64	0/3448	0.95	0/4670
1	O	0.63	0/3448	0.92	0/4670
1	P	0.64	0/3448	0.91	0/4670
1	Q	0.62	0/3448	0.90	0/4670
1	R	0.64	0/3448	0.91	0/4670
1	S	0.63	0/3448	0.87	0/4670
1	T	0.63	0/3448	0.90	0/4670
1	U	0.63	0/3448	0.90	0/4670
1	V	0.64	0/3448	0.94	0/4670
1	W	0.62	0/3439	0.91	0/4658
1	X	0.63	0/3439	0.90	0/4658
1	Y	0.63	0/3448	0.92	0/4670
1	Z	0.62	0/3439	0.89	0/4658
2	3	0.70	0/842	1.10	0/1131
2	B	0.69	0/5125	0.96	0/6919
2	D	0.68	0/4897	0.96	0/6610
2	F	0.70	0/5036	0.95	0/6798
2	H	0.69	0/5001	1.02	0/6750
2	N	0.70	0/5001	1.03	0/6750
3	4	0.62	0/356	0.85	0/478
3	L	0.61	0/5562	0.95	0/7563
4	5	0.82	0/452	1.08	0/610
4	6	0.77	0/457	0.87	0/617
5	7	0.27	0/1793	0.42	0/2492
6	A	0.66	0/5085	0.90	0/6866
6	C	0.65	0/5151	0.93	0/6955
6	E	0.70	0/5311	0.96	0/7169
6	G	0.66	0/5295	0.91	0/7147
6	M	0.67	0/5295	0.91	0/7147
7	I	0.65	0/4319	0.94	0/5849
7	K	0.59	0/4683	0.87	0/6338

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
8	J	0.69	0/4948	0.95	0/6702
All	All	0.65	0/122854	0.93	0/166235

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	1	3380	0	3325	39	0
1	2	3380	0	3325	28	0
1	O	3380	0	3325	33	0
1	P	3380	0	3325	34	0
1	Q	3380	0	3325	41	0
1	R	3380	0	3325	65	0
1	S	3380	0	3325	119	0
1	T	3380	0	3325	32	0
1	U	3380	0	3325	37	0
1	V	3380	0	3325	36	0
1	W	3371	0	3320	29	0
1	X	3371	0	3320	77	0
1	Y	3380	0	3325	27	0
1	Z	3371	0	3320	50	0
2	3	830	0	855	29	0
2	B	5021	0	5002	58	0
2	D	4796	0	4775	67	0
2	F	4933	0	4919	91	0
2	H	4899	0	4880	80	0
2	N	4899	0	4880	70	0
3	4	355	0	380	20	0
3	L	5413	0	5431	85	0
4	5	452	0	473	16	0
4	6	457	0	478	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	7	1795	0	820	9	0
6	A	4978	0	4996	65	0
6	C	5044	0	5081	78	0
6	E	5202	0	5241	84	0
6	G	5186	0	5219	58	0
6	M	5186	0	5219	56	0
7	I	4222	0	4250	44	0
7	K	4579	0	4586	60	0
8	J	4847	0	4838	60	0
9	1	28	0	12	0	0
9	2	28	0	12	0	0
9	O	28	0	12	0	0
9	P	28	0	12	0	0
9	Q	28	0	12	0	0
9	R	28	0	12	1	0
9	S	28	0	12	0	0
9	T	28	0	12	0	0
9	U	28	0	12	0	0
9	V	28	0	12	0	0
9	W	28	0	12	0	0
9	X	28	0	12	0	0
9	Y	28	0	12	0	0
9	Z	28	0	12	0	0
All	All	120779	0	119026	1544	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 6.

The worst 5 of 1544 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)
6:A:758:PHE:CE1	6:A:762:MET:CG	2.22	1.22
6:A:758:PHE:CZ	6:A:762:MET:HG3	1.80	1.16
1:W:56:ASP:OD1	1:W:57:ASP:N	1.85	1.08
6:E:657:SER:O	6:E:660:ILE:HG12	1.62	0.99
6:A:758:PHE:CE1	6:A:762:MET:HG3	1.90	0.98

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 PDB entries followed by that with respect to all EM entries.

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	1	409/447 (92%)	388 (95%)	20 (5%)	1 (0%)	47 80
1	2	409/447 (92%)	386 (94%)	22 (5%)	1 (0%)	47 80
1	O	409/447 (92%)	389 (95%)	20 (5%)	0	100 100
1	P	409/447 (92%)	390 (95%)	19 (5%)	0	100 100
1	Q	409/447 (92%)	388 (95%)	20 (5%)	1 (0%)	47 80
1	R	409/447 (92%)	388 (95%)	21 (5%)	0	100 100
1	S	409/447 (92%)	385 (94%)	23 (6%)	1 (0%)	47 80
1	T	409/447 (92%)	388 (95%)	21 (5%)	0	100 100
1	U	409/447 (92%)	389 (95%)	19 (5%)	1 (0%)	47 80
1	V	409/447 (92%)	388 (95%)	20 (5%)	1 (0%)	47 80
1	W	408/447 (91%)	388 (95%)	19 (5%)	1 (0%)	47 80
1	X	408/447 (91%)	390 (96%)	18 (4%)	0	100 100
1	Y	409/447 (92%)	390 (95%)	19 (5%)	0	100 100
1	Z	408/447 (91%)	390 (96%)	18 (4%)	0	100 100
2	3	100/907 (11%)	86 (86%)	14 (14%)	0	100 100
2	B	602/907 (66%)	571 (95%)	30 (5%)	1 (0%)	47 80
2	D	571/907 (63%)	543 (95%)	28 (5%)	0	100 100
2	F	591/907 (65%)	551 (93%)	40 (7%)	0	100 100
2	H	584/907 (64%)	546 (94%)	38 (6%)	0	100 100
2	N	584/907 (64%)	545 (93%)	39 (7%)	0	100 100
3	4	42/1819 (2%)	42 (100%)	0	0	100 100
3	L	675/1819 (37%)	641 (95%)	34 (5%)	0	100 100
4	5	58/82 (71%)	55 (95%)	3 (5%)	0	100 100
4	6	59/82 (72%)	58 (98%)	1 (2%)	0	100 100
5	7	360/374 (96%)	337 (94%)	23 (6%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	A	599/902 (66%)	565 (94%)	34 (6%)	0	100	100
6	C	606/902 (67%)	574 (95%)	32 (5%)	0	100	100
6	E	626/902 (69%)	592 (95%)	34 (5%)	0	100	100
6	G	624/902 (69%)	595 (95%)	29 (5%)	0	100	100
6	M	624/902 (69%)	594 (95%)	30 (5%)	0	100	100
7	I	511/667 (77%)	482 (94%)	29 (6%)	0	100	100
7	K	548/667 (82%)	532 (97%)	16 (3%)	0	100	100
8	J	587/1024 (57%)	554 (94%)	31 (5%)	2 (0%)	41	76
All	All	14674/22744 (64%)	13900 (95%)	764 (5%)	10 (0%)	54	85

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
8	J	771	PRO
1	1	275	PRO
1	U	275	PRO
1	W	275	PRO
2	B	695	PRO

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 PDB entries followed by that with respect to all EM entries.

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	1	376/396 (95%)	369 (98%)	7 (2%)	57	74
1	2	376/396 (95%)	368 (98%)	8 (2%)	53	71
1	O	376/396 (95%)	367 (98%)	9 (2%)	49	68
1	P	376/396 (95%)	365 (97%)	11 (3%)	42	64
1	Q	376/396 (95%)	367 (98%)	9 (2%)	49	68
1	R	376/396 (95%)	362 (96%)	14 (4%)	34	59
1	S	376/396 (95%)	365 (97%)	11 (3%)	42	64
1	T	376/396 (95%)	367 (98%)	9 (2%)	49	68

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	U	376/396 (95%)	370 (98%)	6 (2%)	62 79
1	V	376/396 (95%)	367 (98%)	9 (2%)	49 68
1	W	375/396 (95%)	363 (97%)	12 (3%)	39 62
1	X	375/396 (95%)	366 (98%)	9 (2%)	49 68
1	Y	376/396 (95%)	365 (97%)	11 (3%)	42 64
1	Z	375/396 (95%)	360 (96%)	15 (4%)	31 57
2	3	90/798 (11%)	89 (99%)	1 (1%)	73 84
2	B	548/798 (69%)	540 (98%)	8 (2%)	65 79
2	D	525/798 (66%)	516 (98%)	9 (2%)	60 78
2	F	539/798 (68%)	530 (98%)	9 (2%)	60 78
2	H	536/798 (67%)	524 (98%)	12 (2%)	52 70
2	N	536/798 (67%)	524 (98%)	12 (2%)	52 70
3	4	40/1546 (3%)	36 (90%)	4 (10%)	7 28
3	L	591/1546 (38%)	582 (98%)	9 (2%)	65 79
4	5	51/62 (82%)	50 (98%)	1 (2%)	55 73
4	6	51/62 (82%)	51 (100%)	0	100 100
6	A	549/791 (69%)	539 (98%)	10 (2%)	59 76
6	C	556/791 (70%)	545 (98%)	11 (2%)	55 73
6	E	574/791 (73%)	568 (99%)	6 (1%)	76 86
6	G	572/791 (72%)	557 (97%)	15 (3%)	46 67
6	M	572/791 (72%)	558 (98%)	14 (2%)	49 68
7	I	471/594 (79%)	468 (99%)	3 (1%)	86 92
7	K	509/594 (86%)	496 (97%)	13 (3%)	46 67
8	J	532/933 (57%)	528 (99%)	4 (1%)	81 89
All	All	13103/19624 (67%)	12822 (98%)	281 (2%)	56 71

5 of 281 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	V	367	LEU
1	W	248	TYR
1	Y	290	VAL
2	H	716	HIS
2	H	417	HIS

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)

14 ligands are modelled in this entry.

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	$\#\|Z\| > 2$
9	GDP	Q	1501	-	24,30,30	0.95	1 (4%)	30,47,47	1.41	5 (16%)
9	GDP	O	1501	-	24,30,30	1.00	2 (8%)	30,47,47	1.54	5 (16%)
9	GDP	V	1501	-	24,30,30	1.00	1 (4%)	30,47,47	1.55	5 (16%)
9	GDP	S	1501	-	24,30,30	1.00	2 (8%)	30,47,47	1.54	4 (13%)
9	GDP	W	1501	-	24,30,30	0.95	1 (4%)	30,47,47	1.43	5 (16%)
9	GDP	X	1501	-	24,30,30	1.00	2 (8%)	30,47,47	1.53	4 (13%)
9	GDP	2	1501	-	24,30,30	0.99	1 (4%)	30,47,47	1.55	5 (16%)
9	GDP	Z	1501	-	24,30,30	1.01	2 (8%)	30,47,47	1.53	4 (13%)
9	GDP	R	1501	-	24,30,30	1.00	1 (4%)	30,47,47	1.35	5 (16%)
9	GDP	P	1501	-	24,30,30	1.07	2 (8%)	30,47,47	1.42	5 (16%)
9	GDP	1	1501	-	24,30,30	0.93	1 (4%)	30,47,47	1.44	5 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
9	GDP	T	1501	-	24,30,30	0.93	1 (4%)	30,47,47	1.41	4 (13%)
9	GDP	Y	1501	-	24,30,30	0.96	1 (4%)	30,47,47	1.55	4 (13%)
9	GDP	U	1501	-	24,30,30	0.92	1 (4%)	30,47,47	1.44	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
9	GDP	Q	1501	-	-	2/12/32/32	0/3/3/3
9	GDP	O	1501	-	-	2/12/32/32	0/3/3/3
9	GDP	V	1501	-	-	4/12/32/32	0/3/3/3
9	GDP	S	1501	-	-	3/12/32/32	0/3/3/3
9	GDP	W	1501	-	-	4/12/32/32	0/3/3/3
9	GDP	X	1501	-	-	1/12/32/32	0/3/3/3
9	GDP	2	1501	-	-	4/12/32/32	0/3/3/3
9	GDP	Z	1501	-	-	1/12/32/32	0/3/3/3
9	GDP	R	1501	-	-	6/12/32/32	0/3/3/3
9	GDP	P	1501	-	-	3/12/32/32	0/3/3/3
9	GDP	1	1501	-	-	2/12/32/32	0/3/3/3
9	GDP	T	1501	-	-	2/12/32/32	0/3/3/3
9	GDP	Y	1501	-	-	2/12/32/32	0/3/3/3
9	GDP	U	1501	-	-	3/12/32/32	0/3/3/3

The worst 5 of 19 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	V	1501	GDP	C6-N1	-2.96	1.33	1.37
9	P	1501	GDP	C6-N1	-2.95	1.33	1.37
9	2	1501	GDP	C6-N1	-2.85	1.33	1.37
9	Y	1501	GDP	C6-N1	-2.61	1.34	1.37
9	Z	1501	GDP	C6-N1	-2.57	1.34	1.37

The worst 5 of 65 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	V	1501	GDP	PA-O3A-PB	-5.04	115.54	132.83
9	2	1501	GDP	PA-O3A-PB	-5.03	115.56	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	S	1501	GDP	PA-O3A-PB	-4.93	115.90	132.83
9	O	1501	GDP	PA-O3A-PB	-4.93	115.91	132.83
9	X	1501	GDP	PA-O3A-PB	-4.92	115.93	132.83

There are no chirality outliers.

5 of 39 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	2	1501	GDP	C5'-O5'-PA-O1A
9	O	1501	GDP	C5'-O5'-PA-O1A
9	P	1501	GDP	PA-O3A-PB-O2B
9	P	1501	GDP	C5'-O5'-PA-O3A
9	Q	1501	GDP	C5'-O5'-PA-O3A

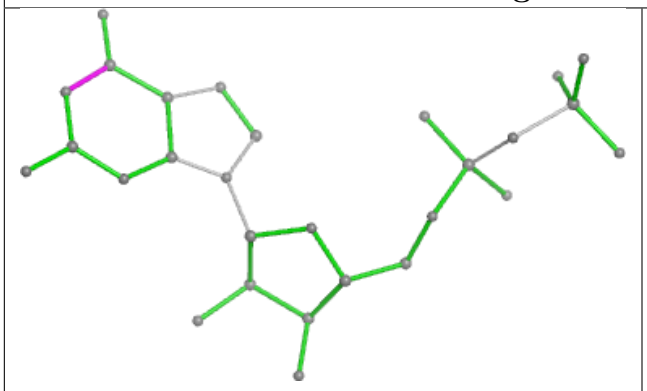
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	R	1501	GDP	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand GDP Q 1501



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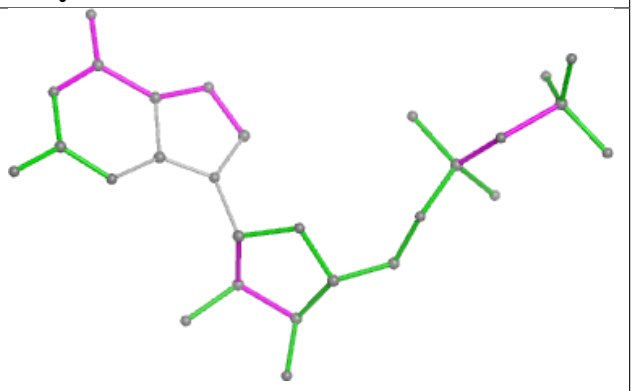
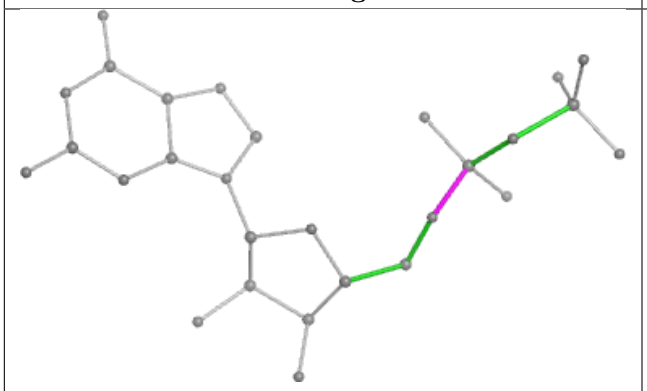
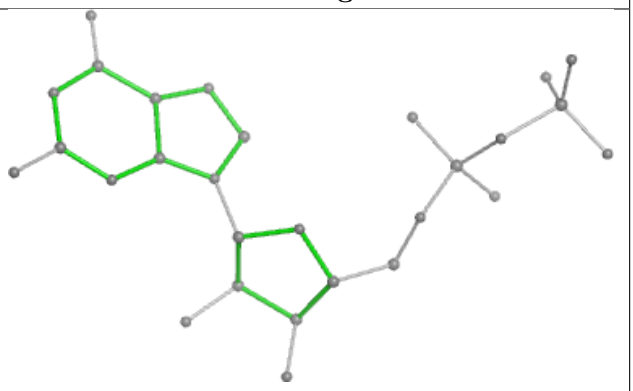


Bond angles

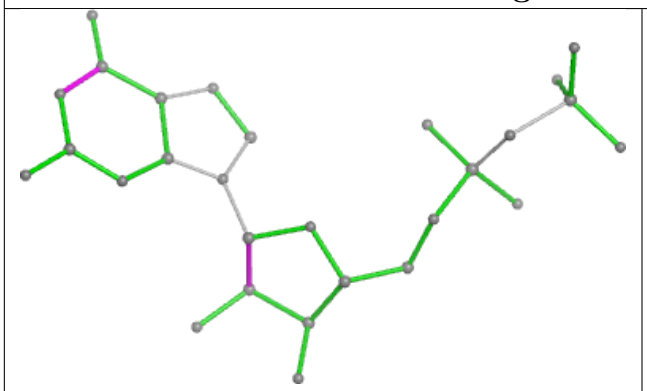


Torsions



Rings

Ligand GDP O 1501



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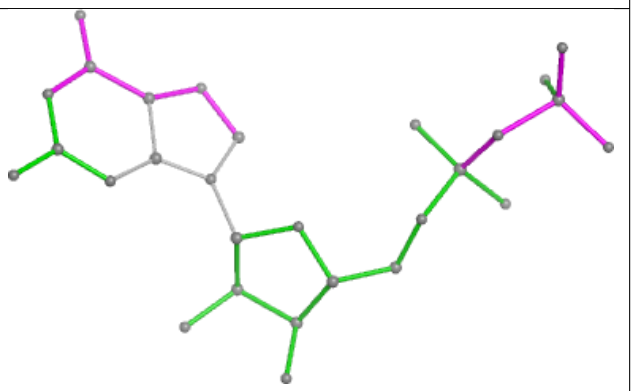

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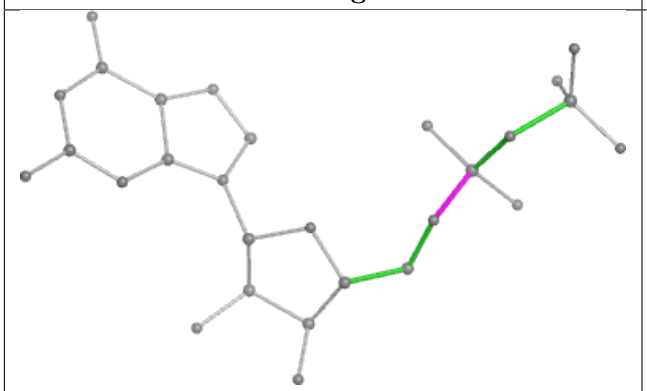

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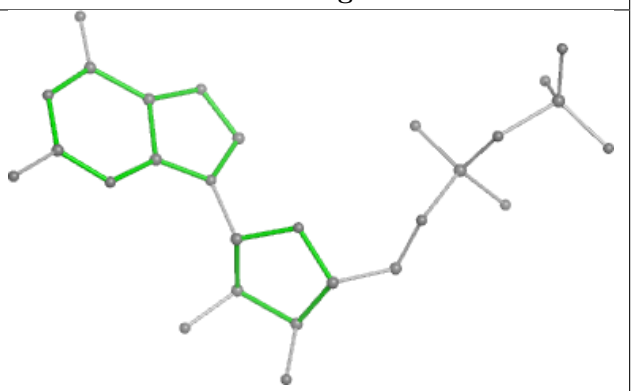
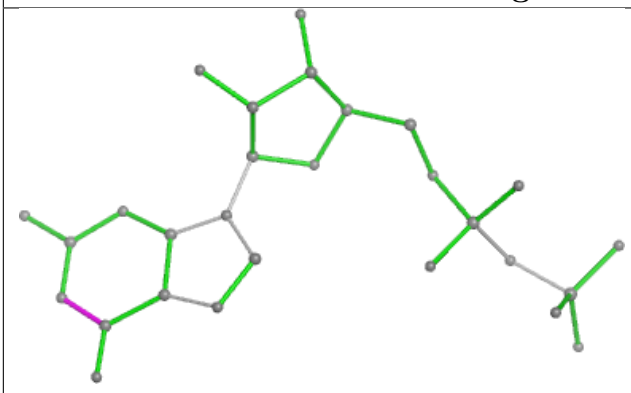


Rings

Ligand GDP V 1501



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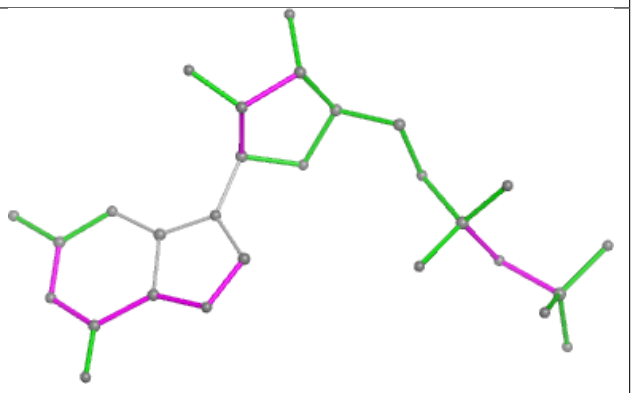

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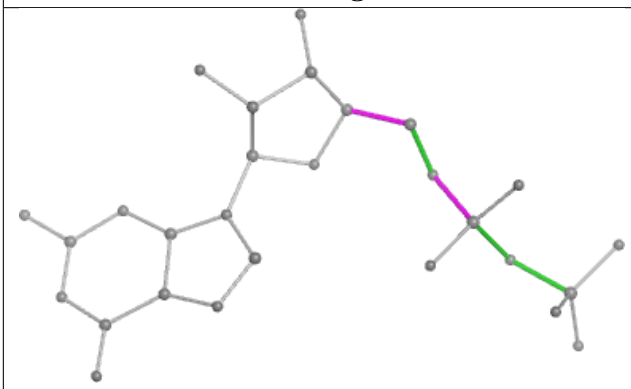

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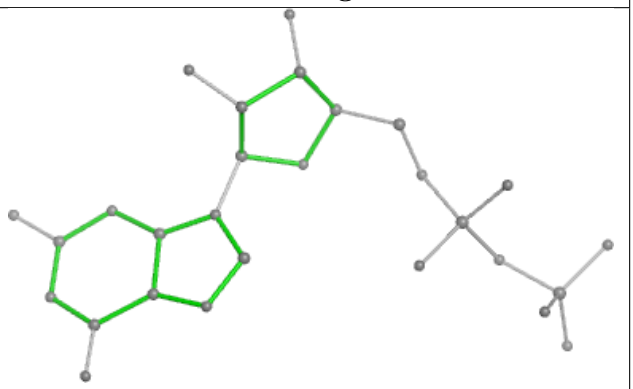
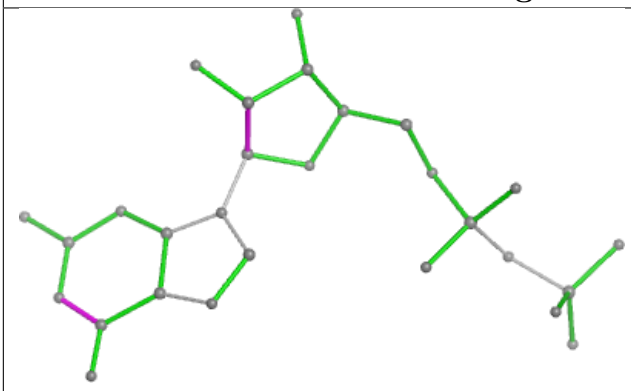


Rings

Ligand GDP S 1501



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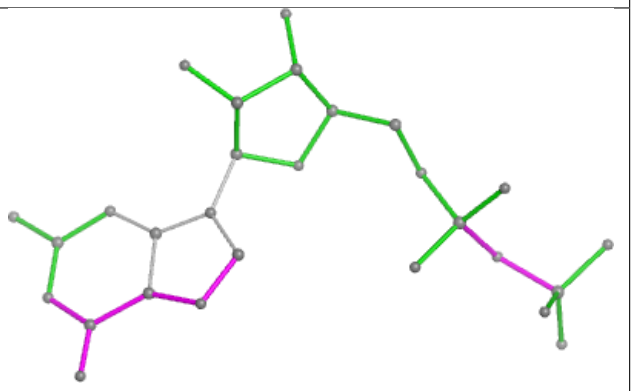

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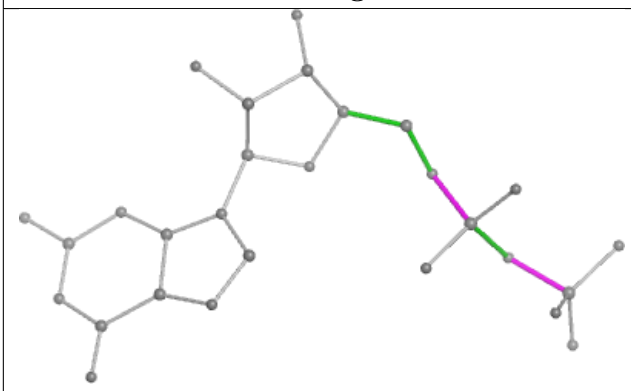

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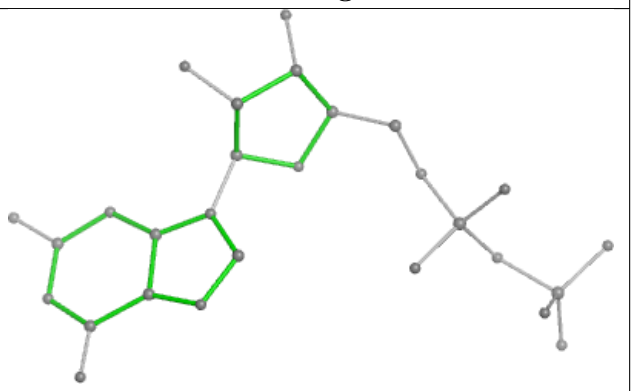

Rings

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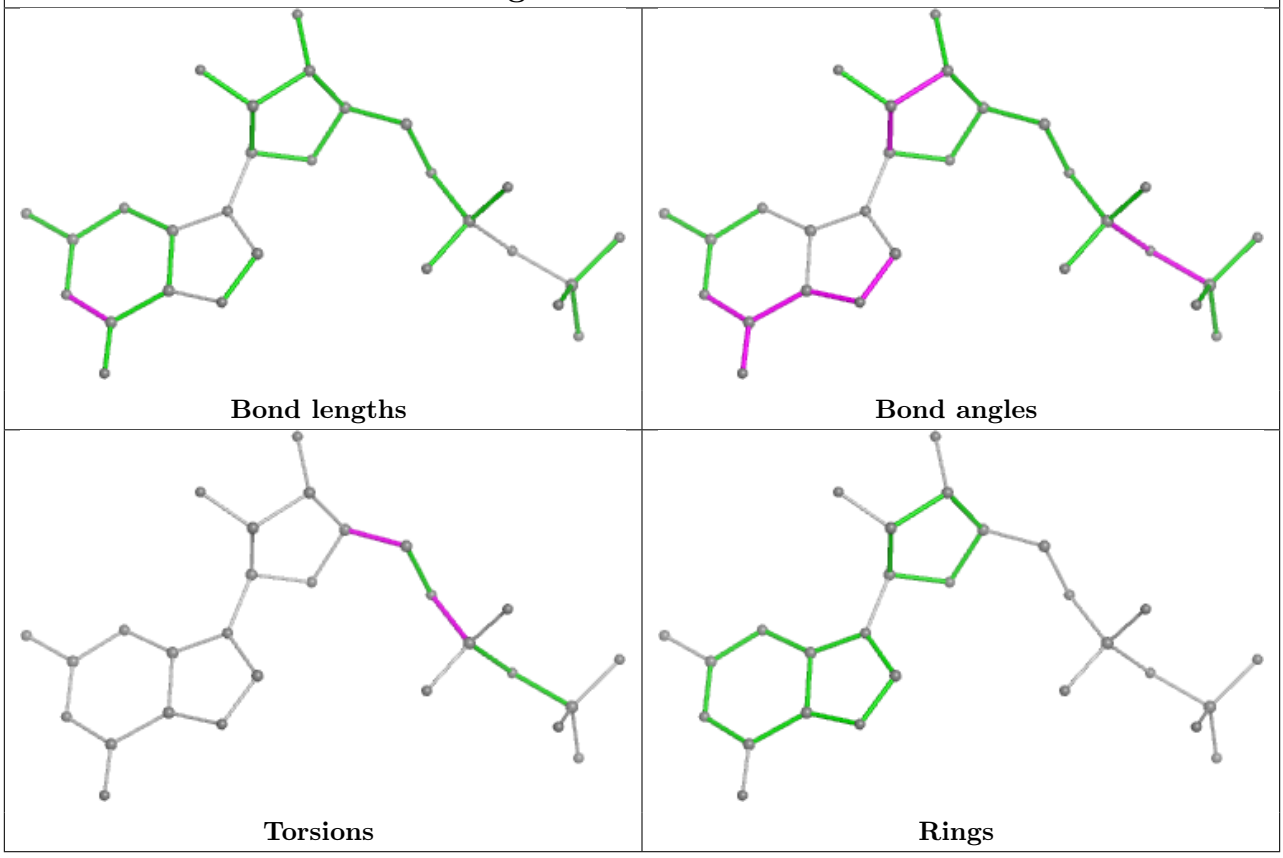

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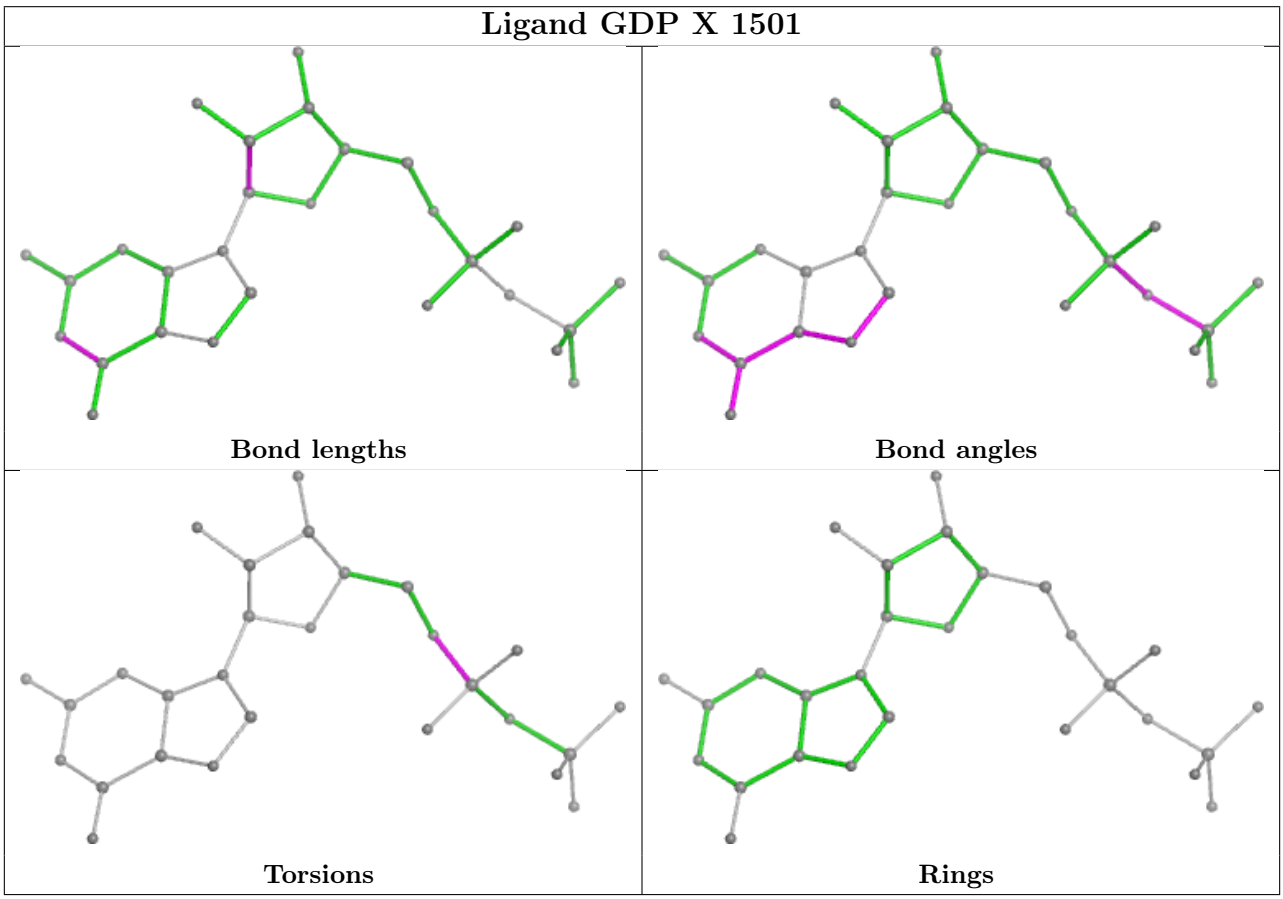

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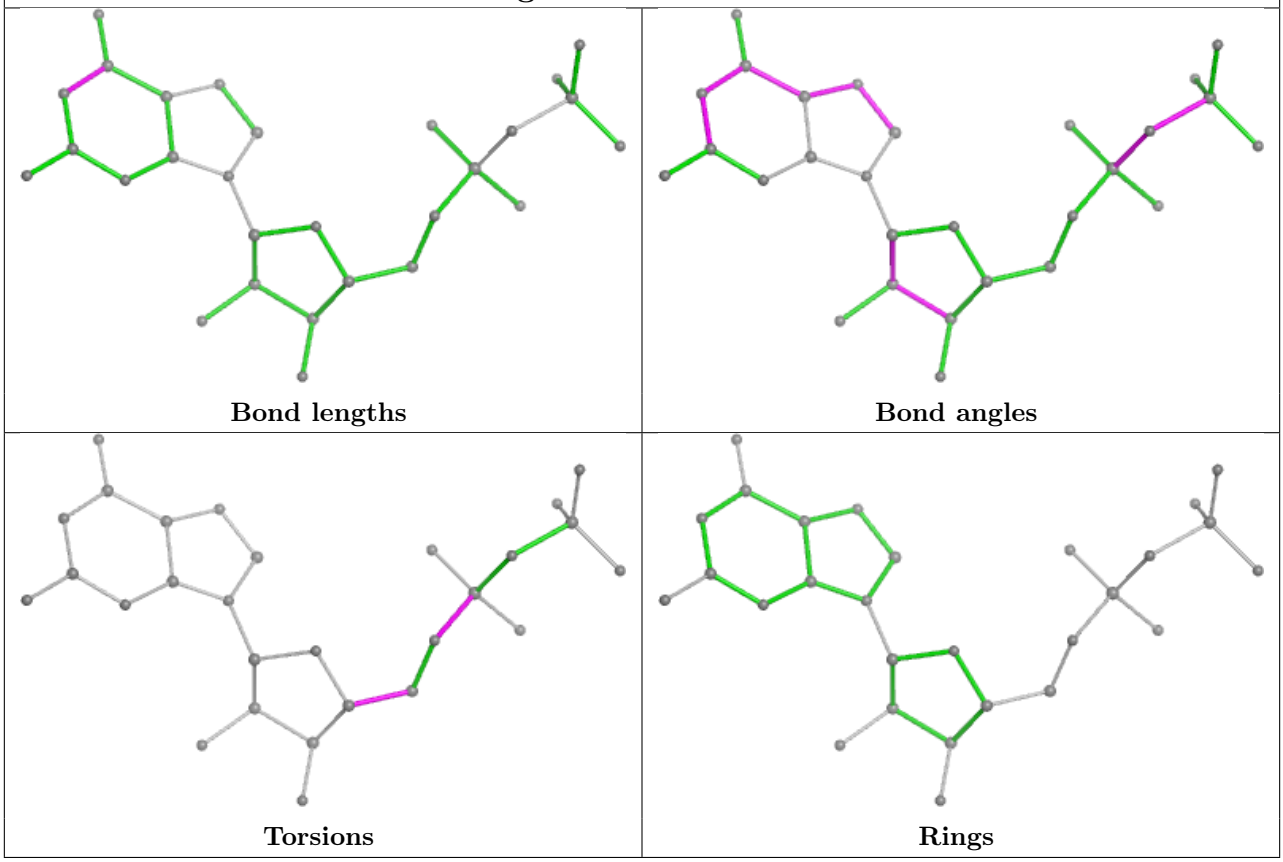

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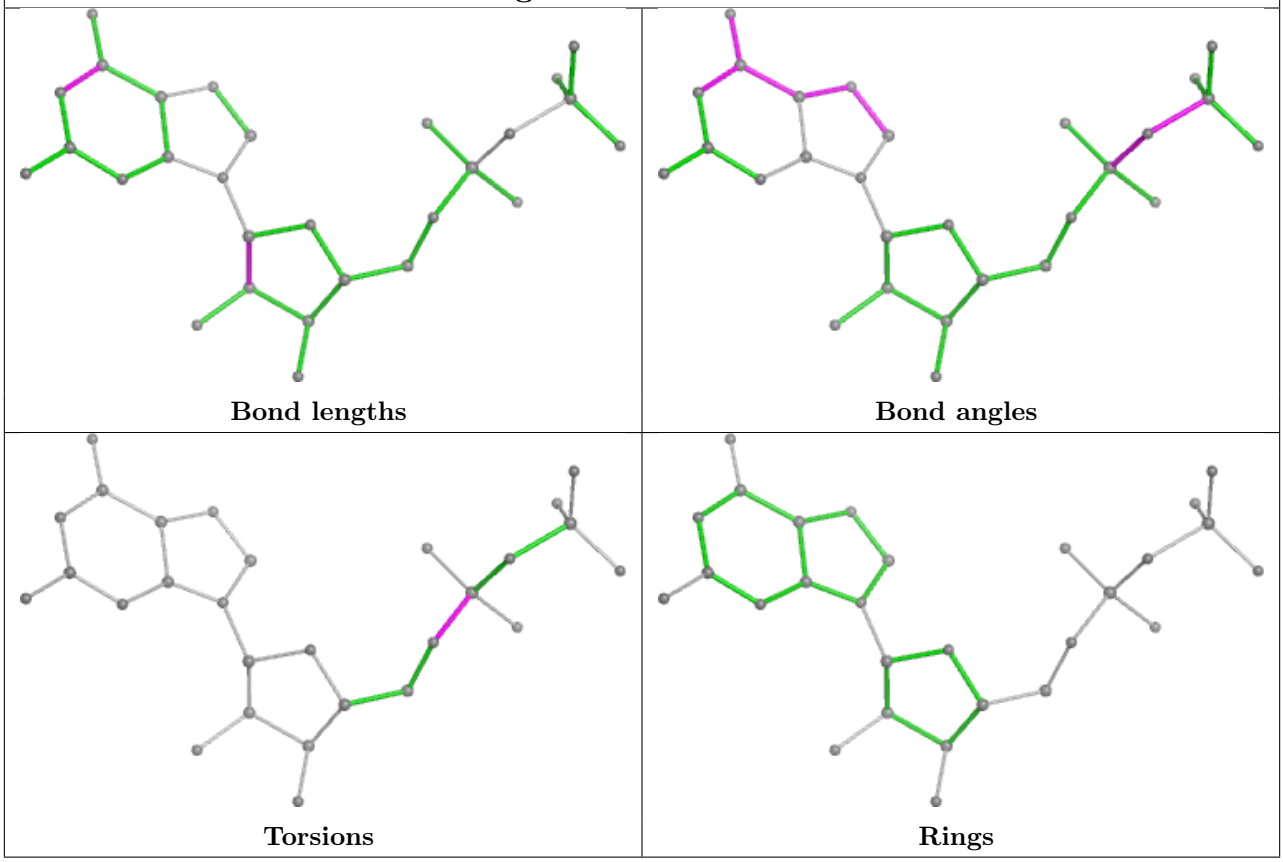

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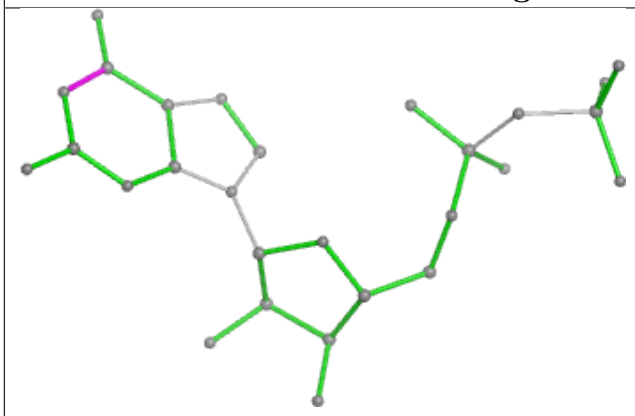

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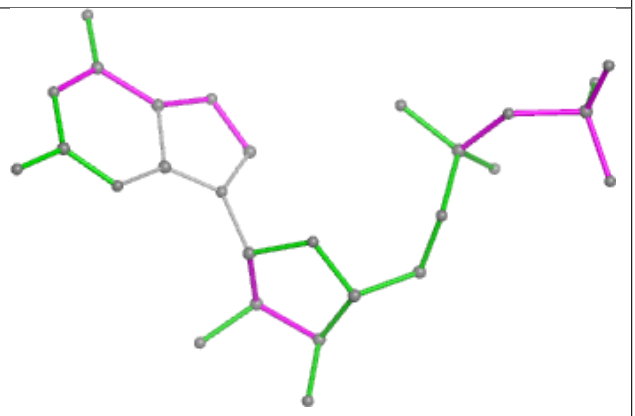
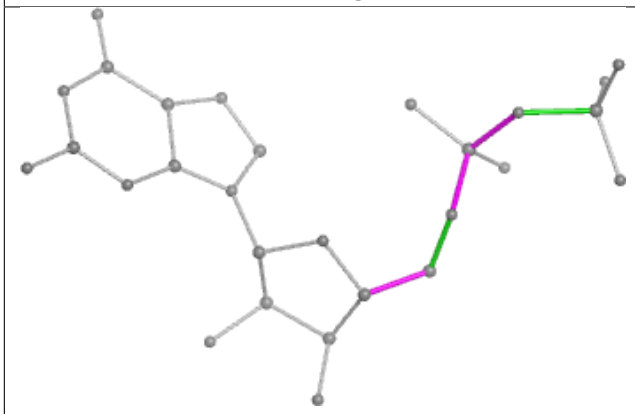


Bond angles



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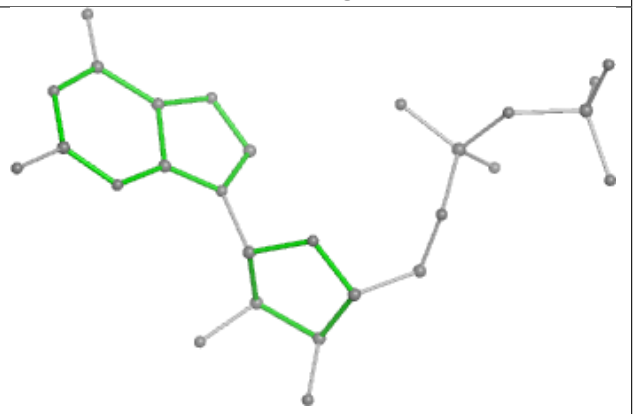
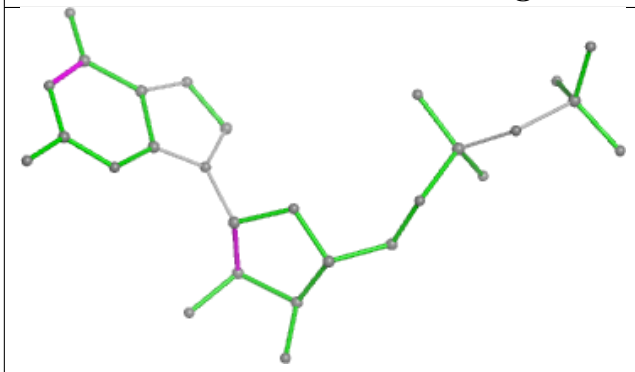


Rings

Ligand GDP P 1501



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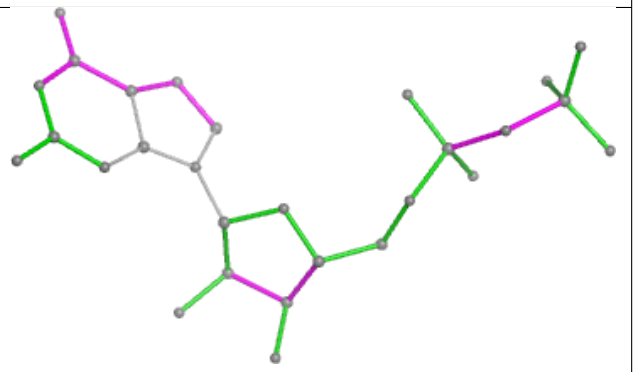

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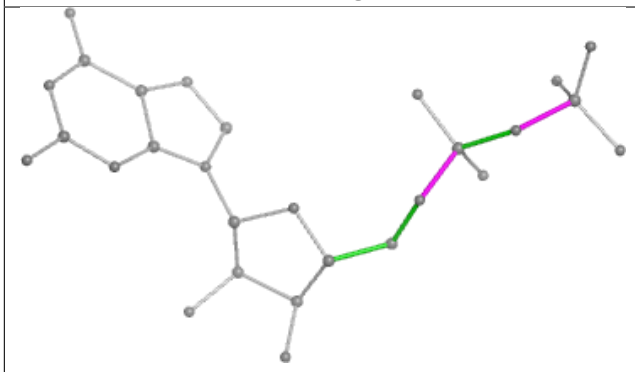

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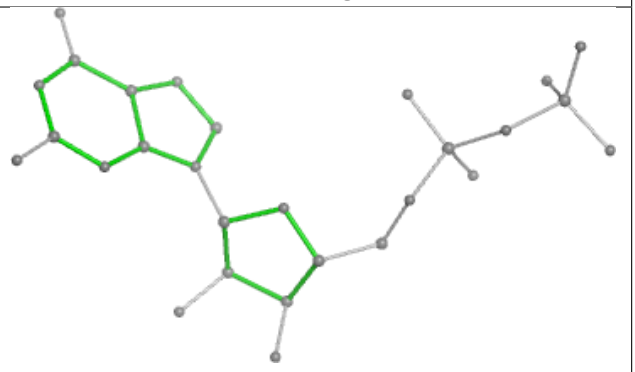

Rings

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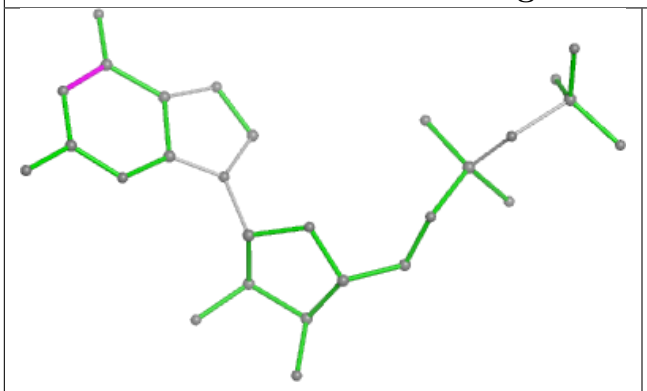

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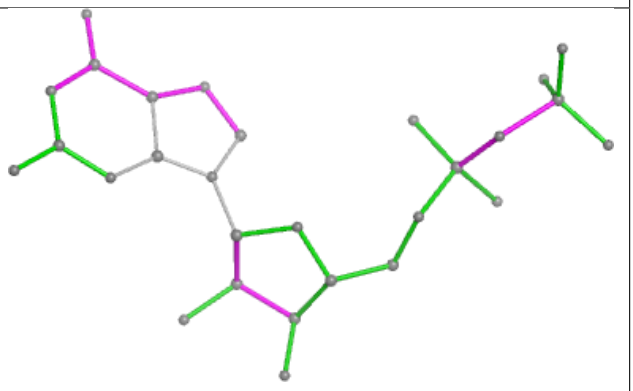

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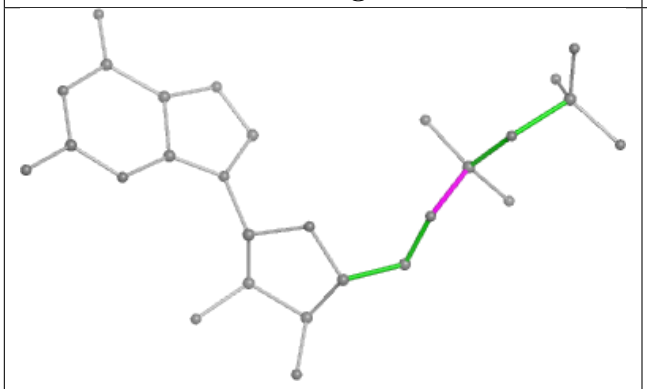

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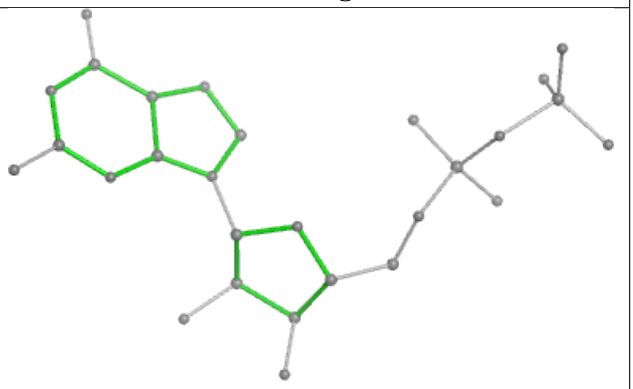
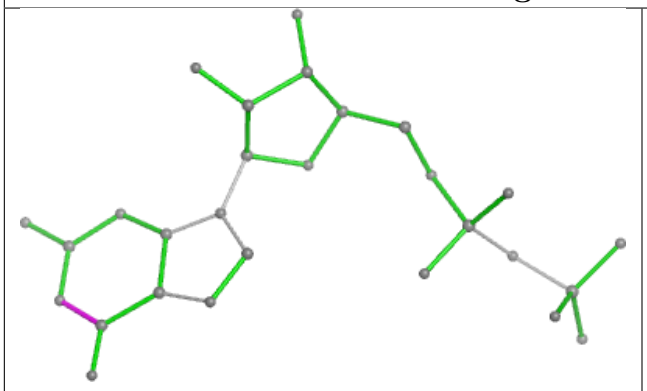


Rings

Ligand GDP T 1501



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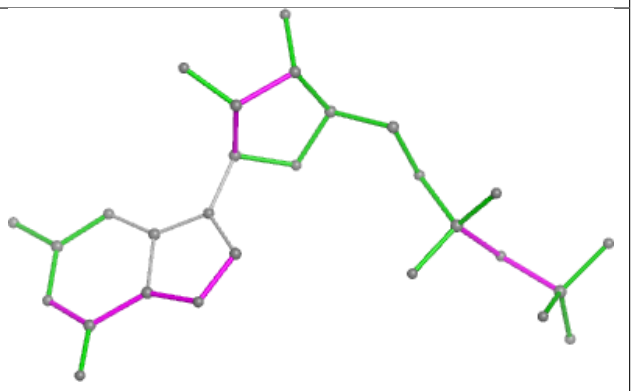

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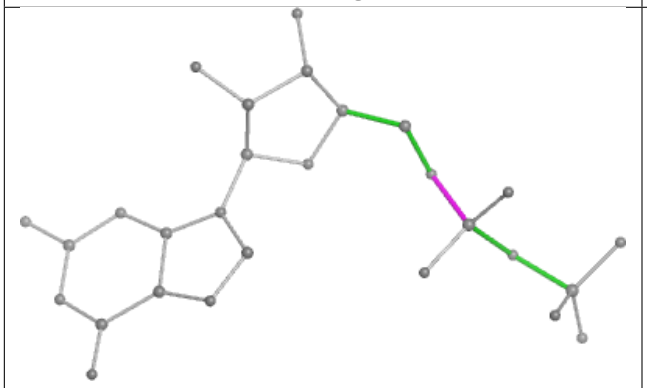

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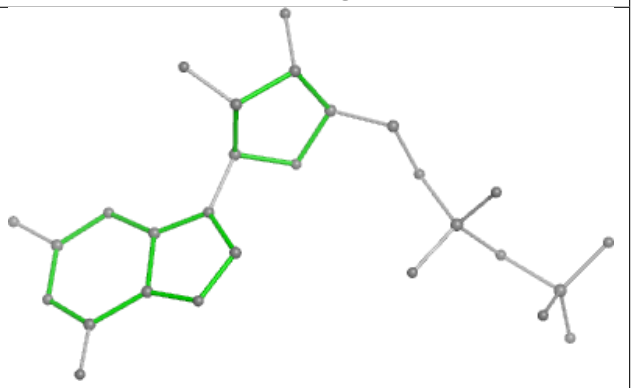
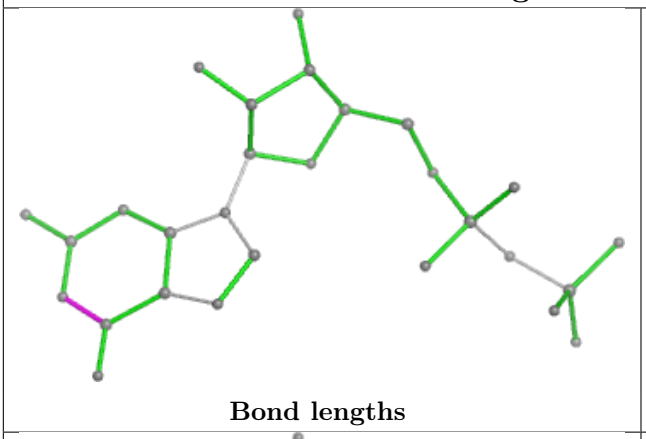


Rings

Ligand GDP Y 1501



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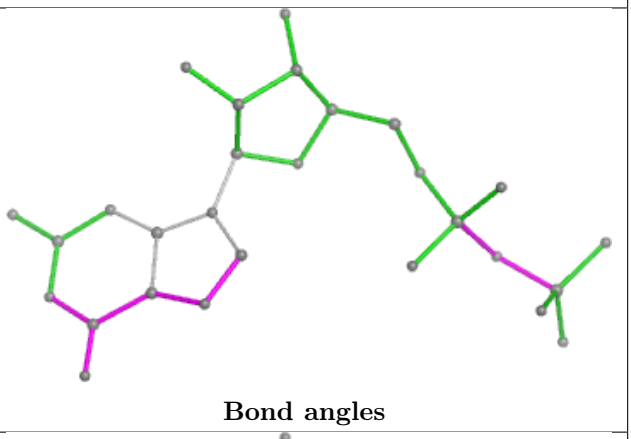

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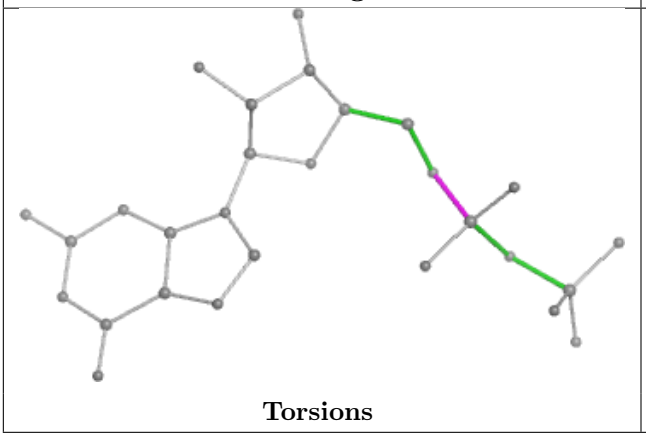

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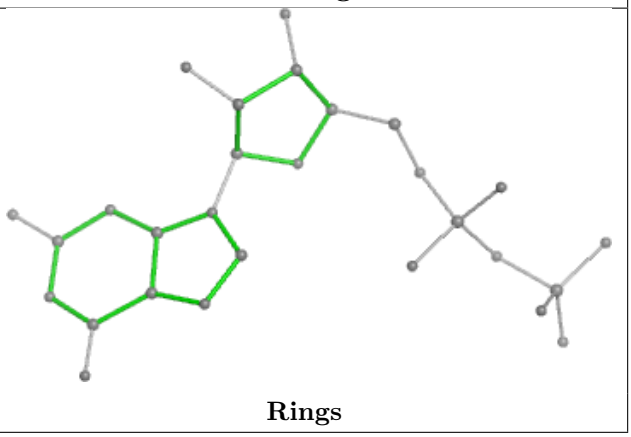
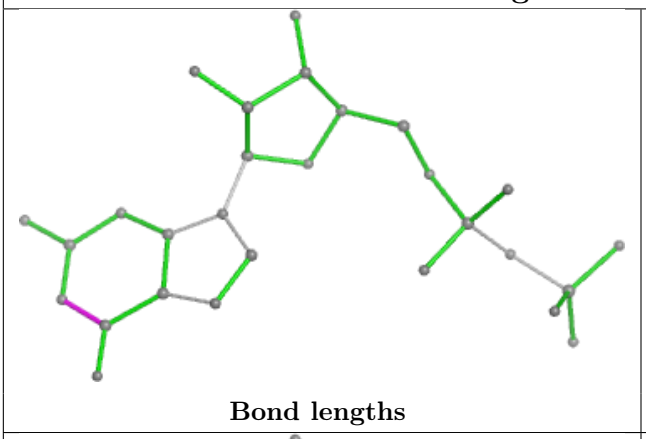


Rings

Ligand GDP U 1501



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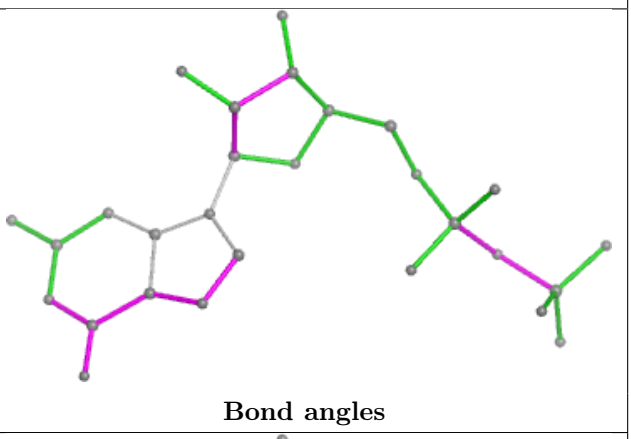
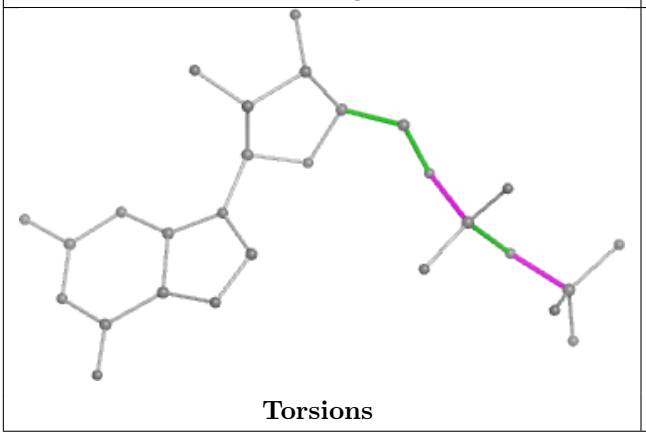
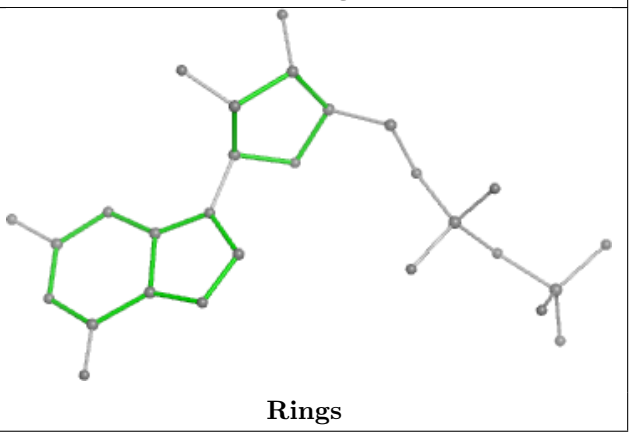


Bond angles



Torsions



Rings

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.

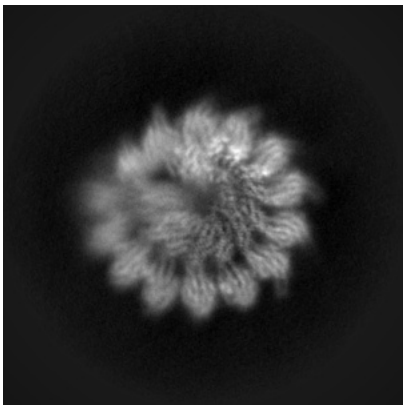
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-11888. These allow visual inspection of the internal detail of the map and identification of artifacts.

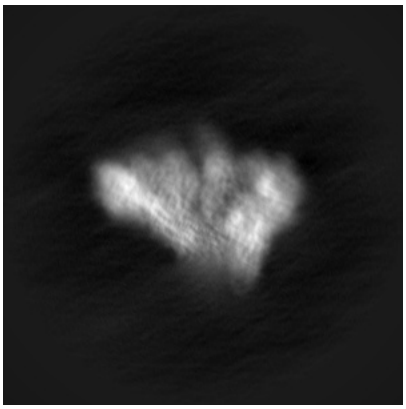
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

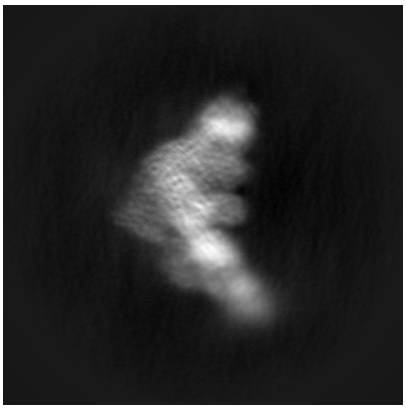
6.1.1 Primary map



X

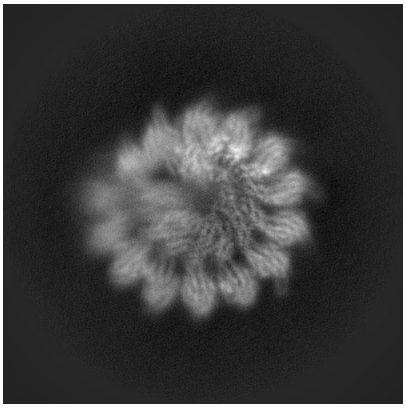


Y

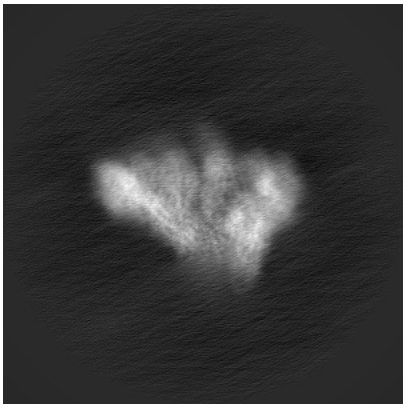


Z

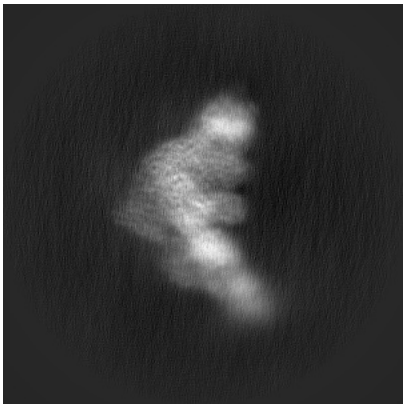
6.1.2 Raw map



X



Y

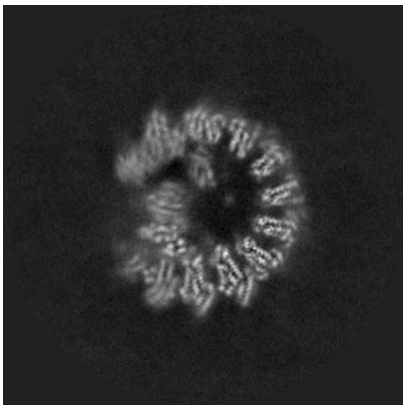


Z

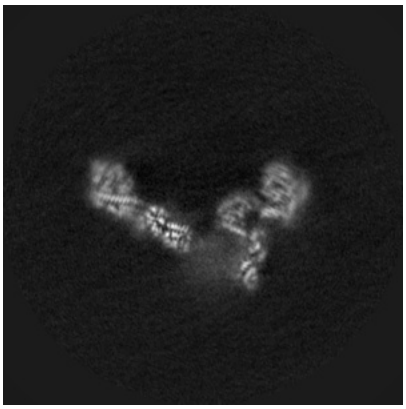
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

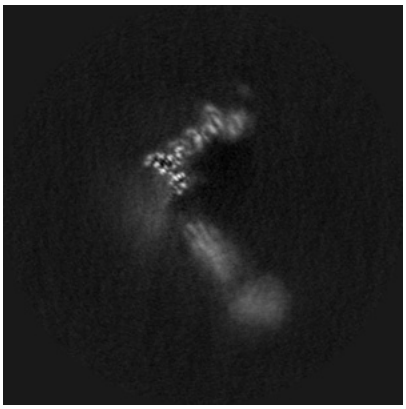
6.2.1 Primary map



X Index: 195

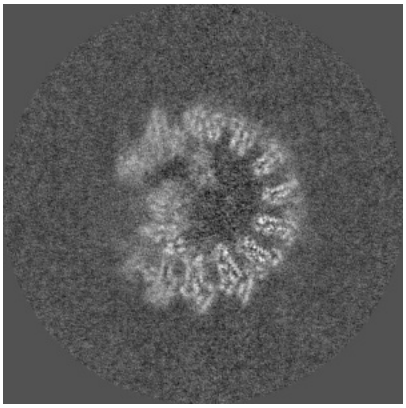


Y Index: 195

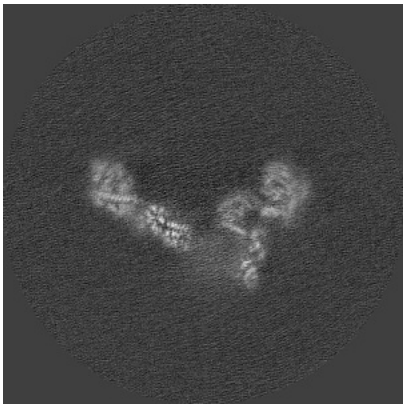


Z Index: 195

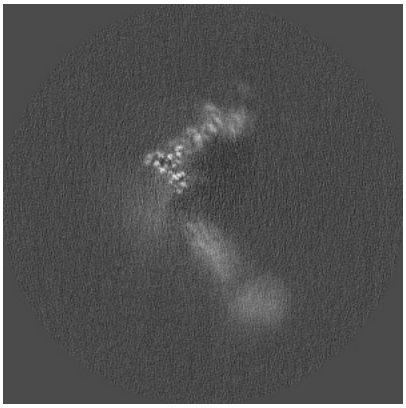
6.2.2 Raw map



X Index: 195



Y Index: 195

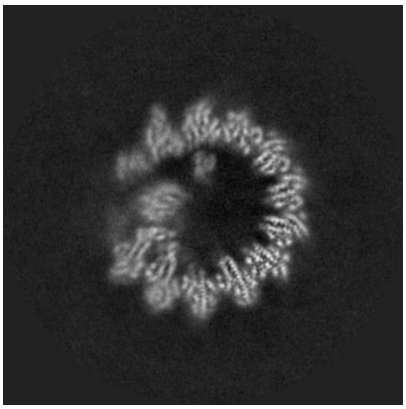


Z Index: 195

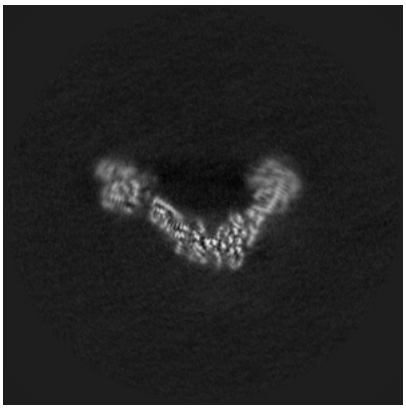
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

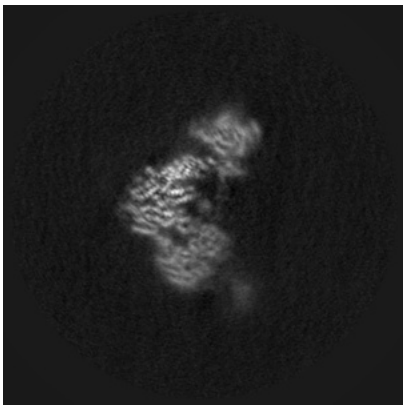
6.3.1 Primary map



X Index: 203

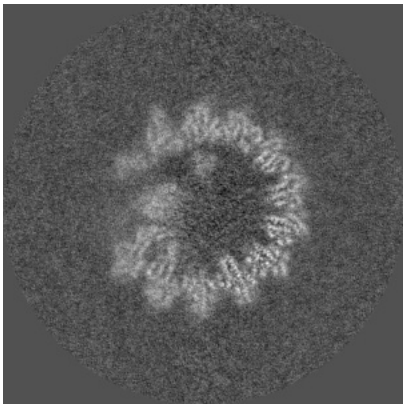


Y Index: 236

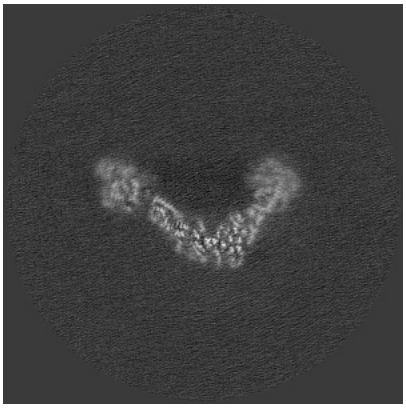


Z Index: 247

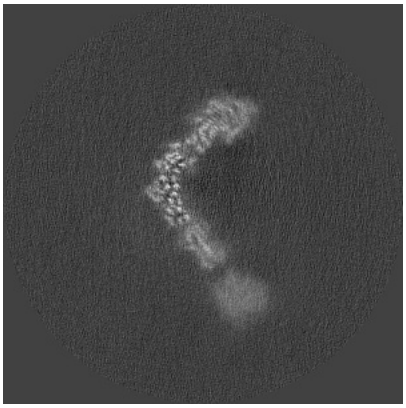
6.3.2 Raw map



X Index: 203



Y Index: 236

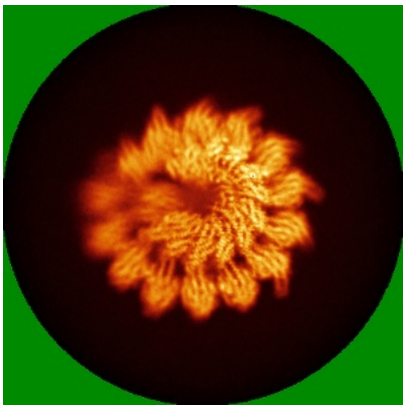


Z Index: 171

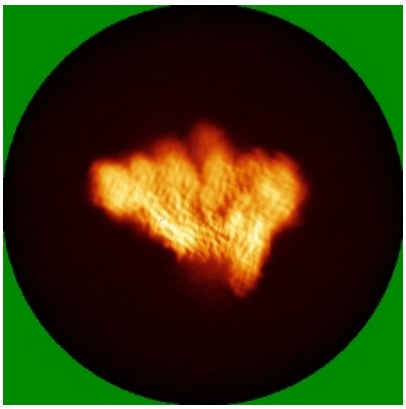
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

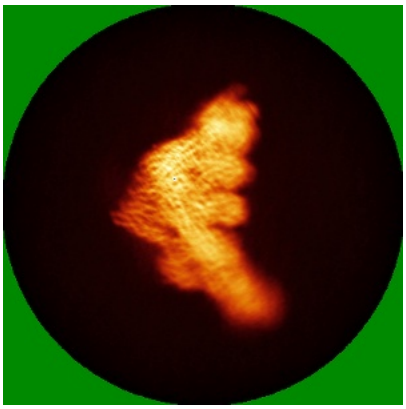
6.4.1 Primary map



X

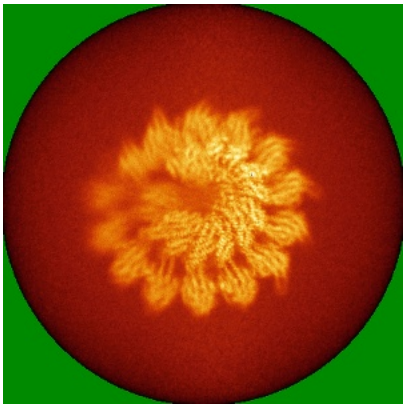


Y

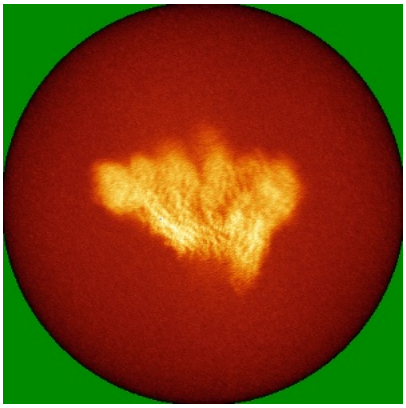


Z

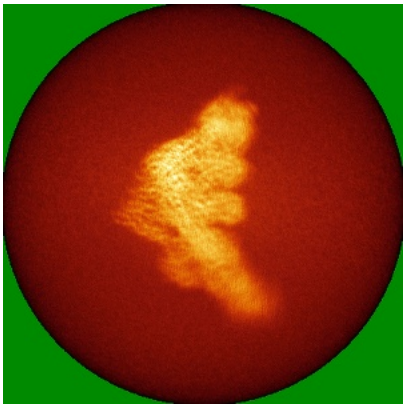
6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

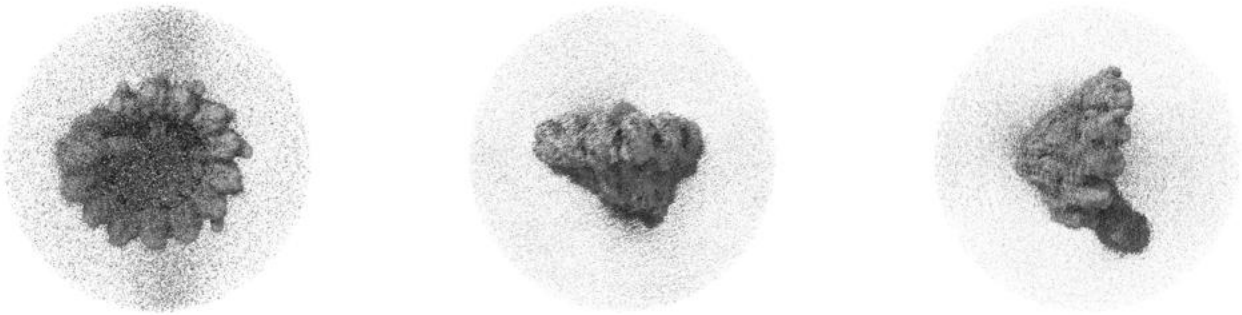
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.007. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

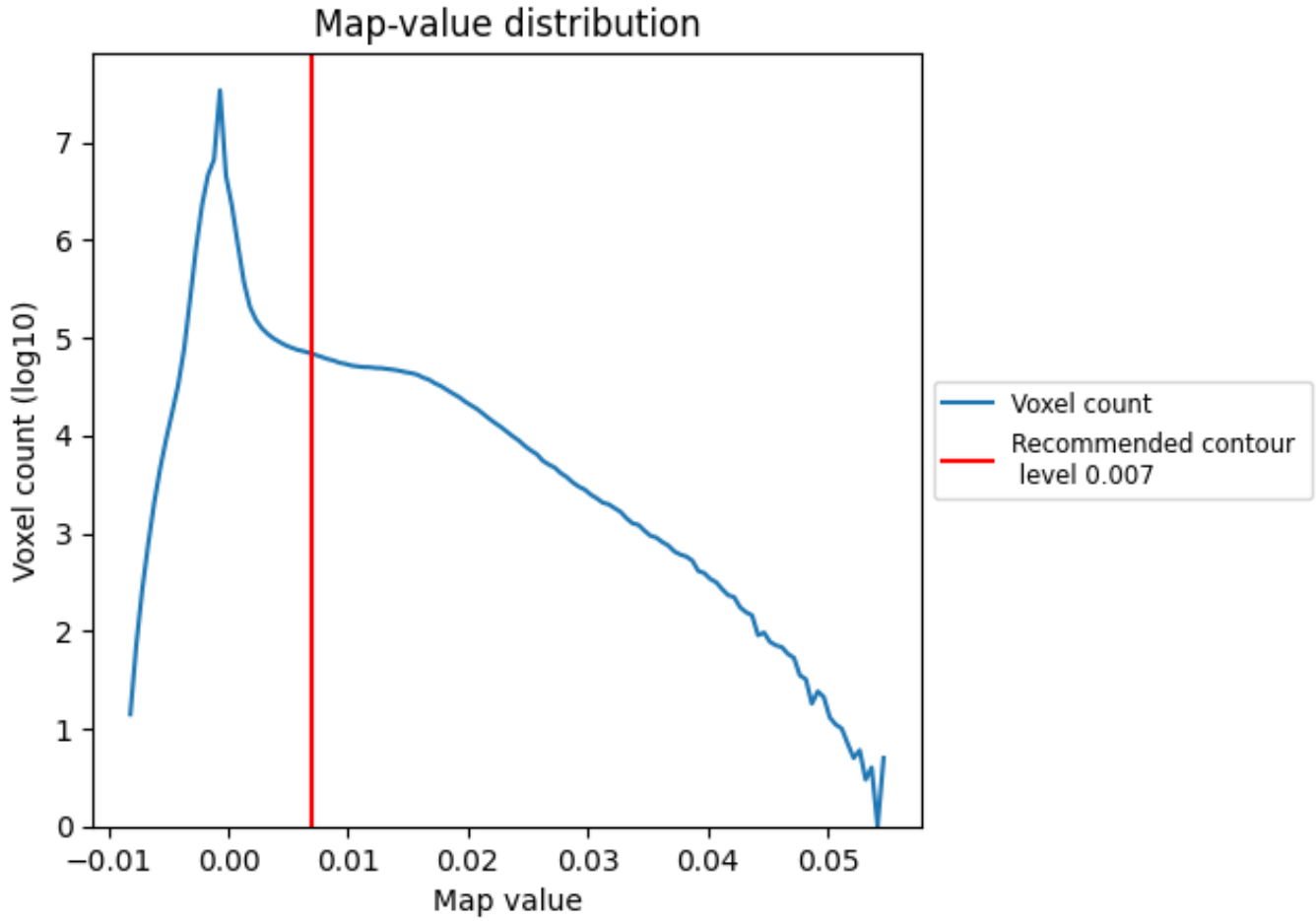
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

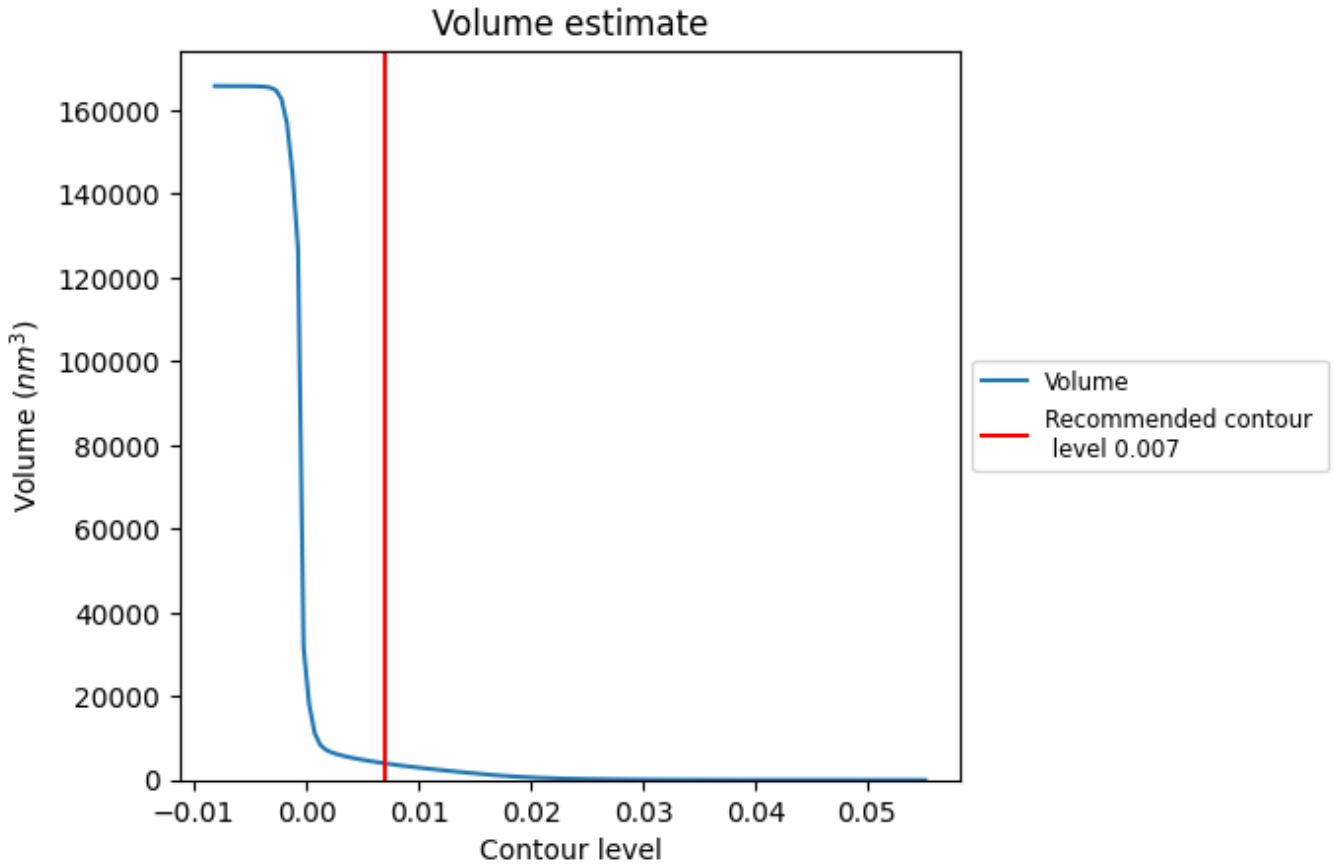
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

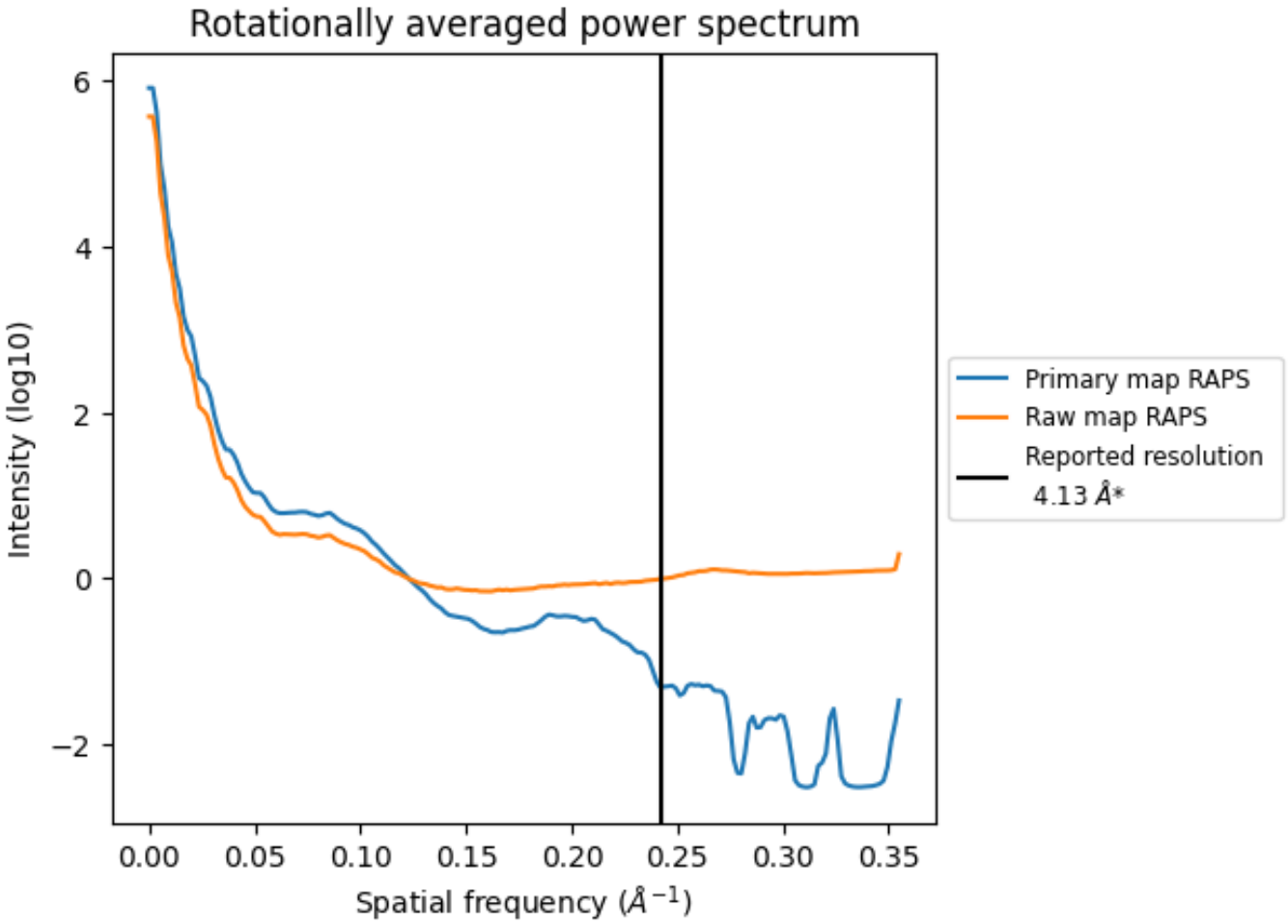
7.2 Volume estimate



The volume at the recommended contour level is 3969 nm^3; this corresponds to an approximate mass of 3585 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)

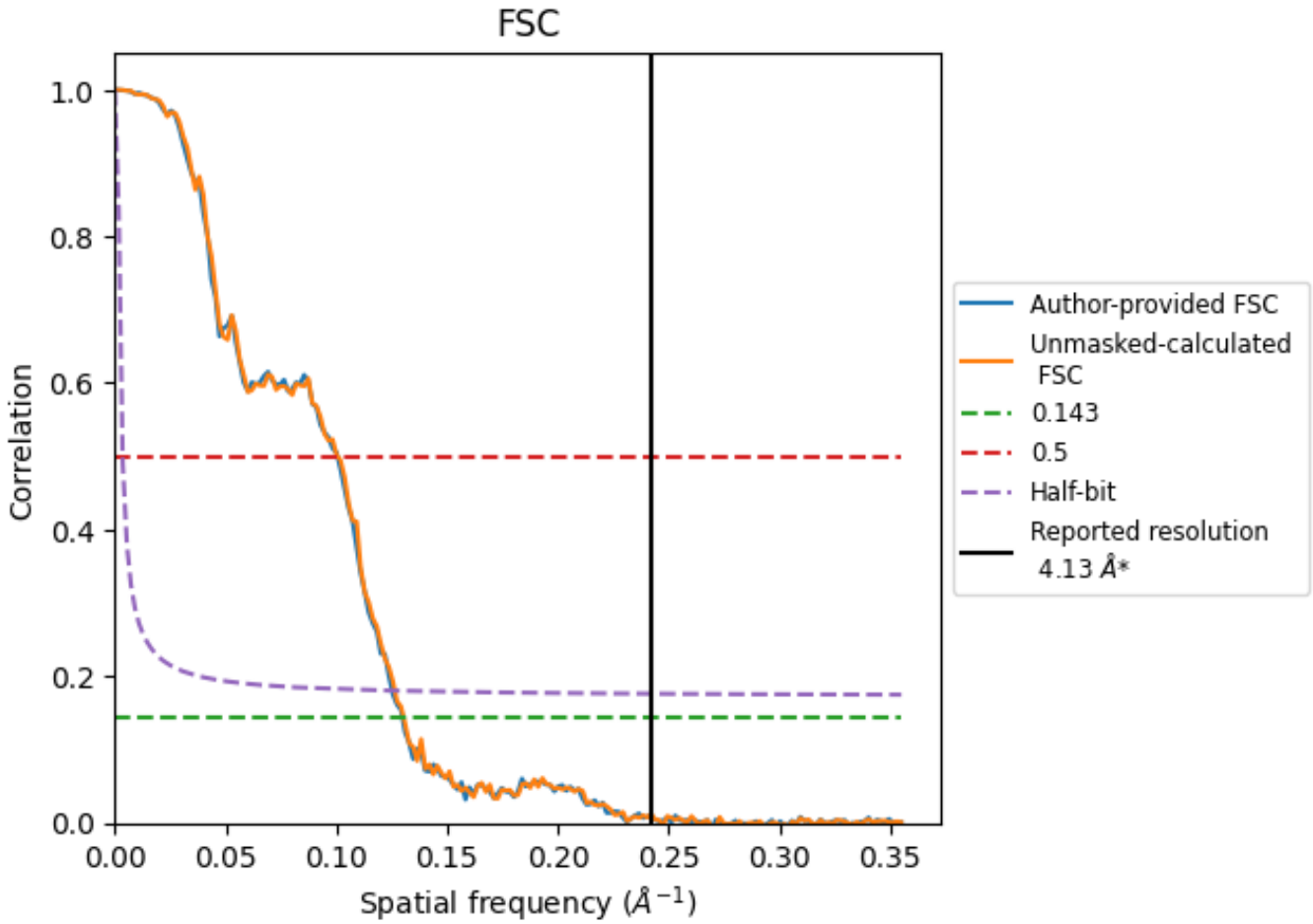


*Reported resolution corresponds to spatial frequency of 0.242 Å^{-1}

8 Fourier-Shell correlation

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.242 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.13	-	-
Author-provided FSC curve	7.70	9.95	7.99
Unmasked-calculated*	7.67	9.94	7.91

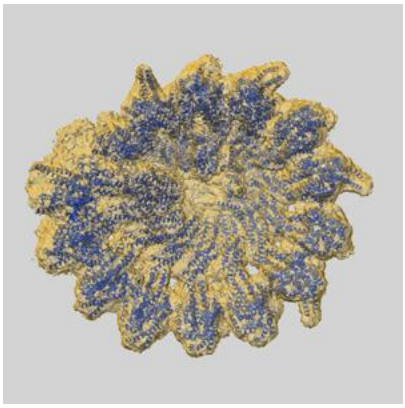
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 7.70 differs from the reported value 4.13 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 7.67 differs from the reported value 4.13 by more than 10 %

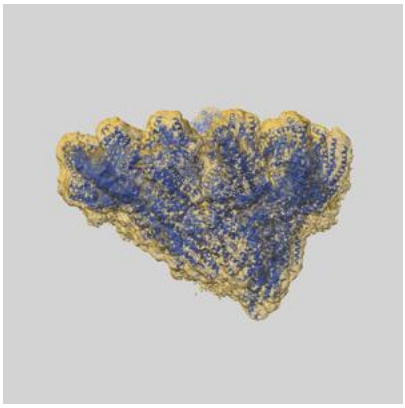
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-11888 and PDB model 7AS4. Per-residue inclusion information can be found in section 3 on page 8.

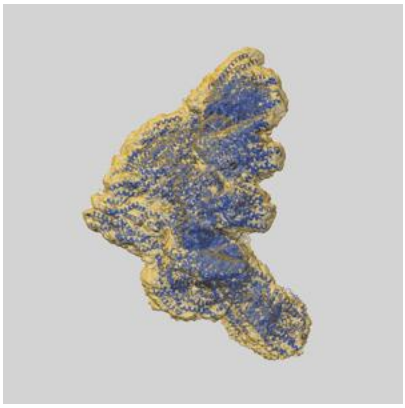
9.1 Map-model overlay



X



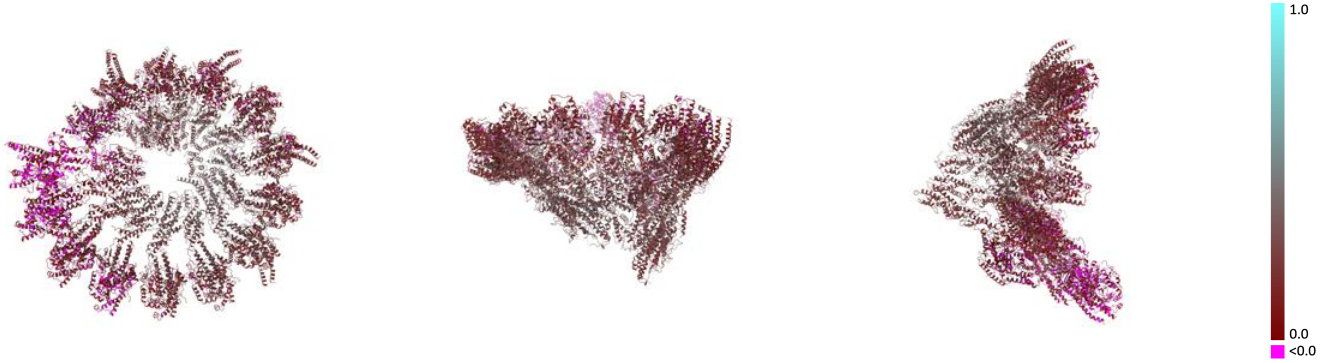
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.007 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

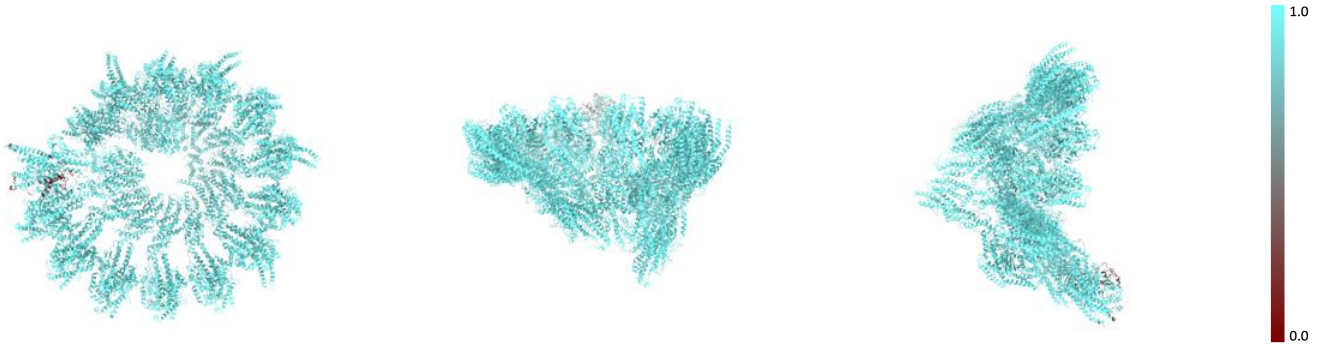
9.2 Q-score mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

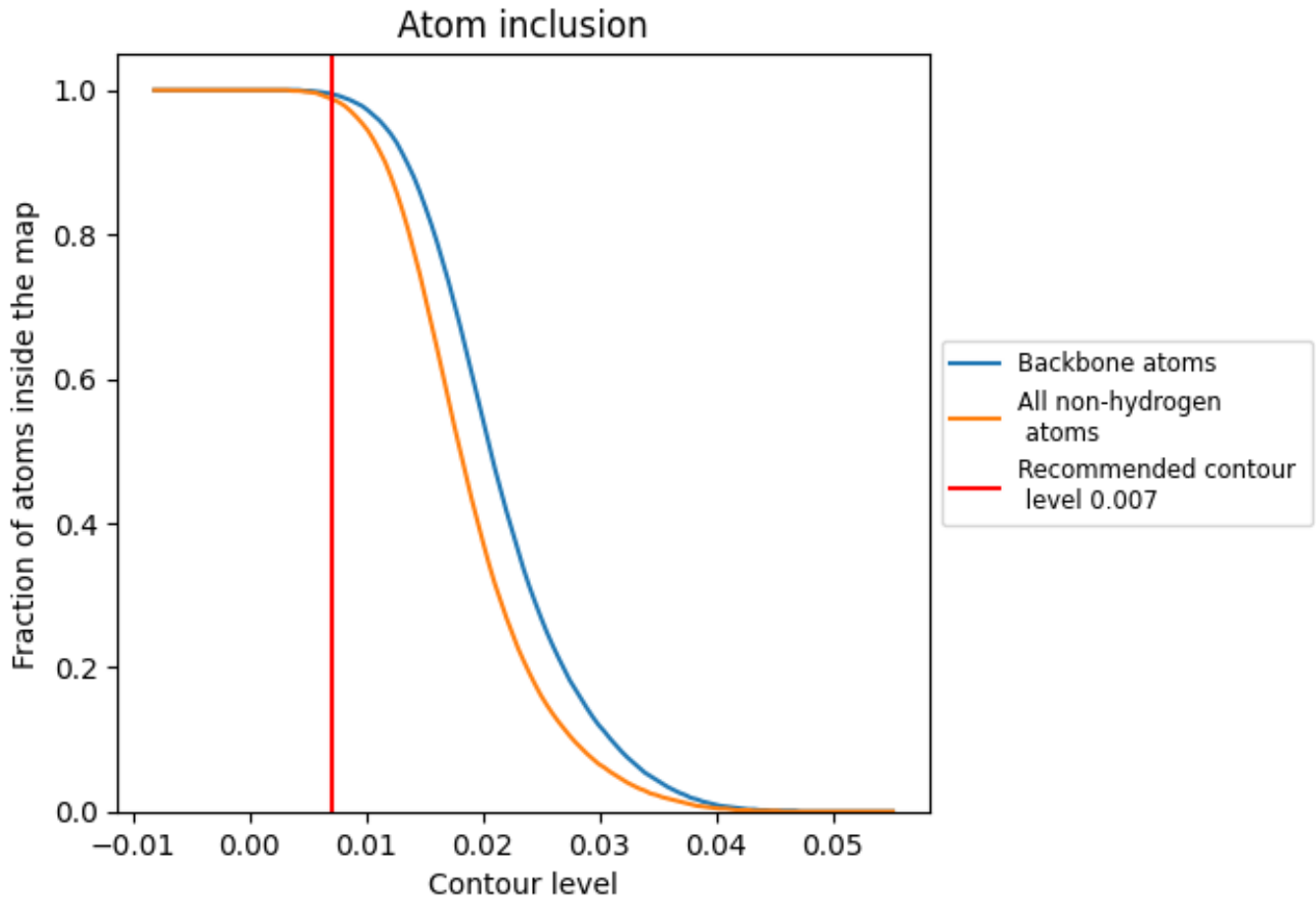
9.3 Atom inclusion mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.007).

9.4 Atom inclusion (i)



At the recommended contour level, 100% of all backbone atoms, 99% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.007) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9880	0.1990
1	0.9880	0.0560
2	0.8170	0.0290
3	0.9850	0.3300
4	1.0000	0.2870
5	0.9820	0.3250
6	1.0000	0.2580
7	0.9990	0.2670
A	0.9980	0.1880
B	0.9920	0.2050
C	0.9970	0.2590
D	0.9930	0.2510
E	0.9980	0.2830
F	0.9940	0.2780
G	0.9960	0.2960
H	0.9940	0.3100
I	0.9900	0.2980
J	0.9940	0.2690
K	0.9980	0.2290
L	0.9990	0.1950
M	0.9880	0.1210
N	0.9730	0.0840
O	0.9930	0.0930
P	0.9940	0.1510
Q	0.9850	0.1680
R	0.9900	0.1420
S	0.9980	0.1720
T	0.9950	0.1880
U	0.9940	0.1940
V	0.9970	0.2370
W	0.9980	0.2140
X	0.9970	0.1810
Y	0.9900	0.0790
Z	0.9950	0.1140