



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 05:26 AM UTC

PDB ID : 7QJ8 / pdb_00007qj8
EMDB ID : EMD-14013
Title : Structure of recombinant human gamma-Tubulin Ring Complex 12-spoked assembly intermediate (spokes 3-14, substoichiometric spokes 1-2)
Authors : Zupa, E.; Pfeffer, S.
Deposited on : 2021-12-16
Resolution : 8.70 Å (reported)
Based on initial models : 6X0U, 6V6S, 6L81, 7AS4

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 ⓘ 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:

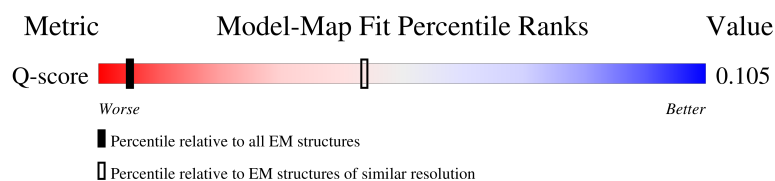
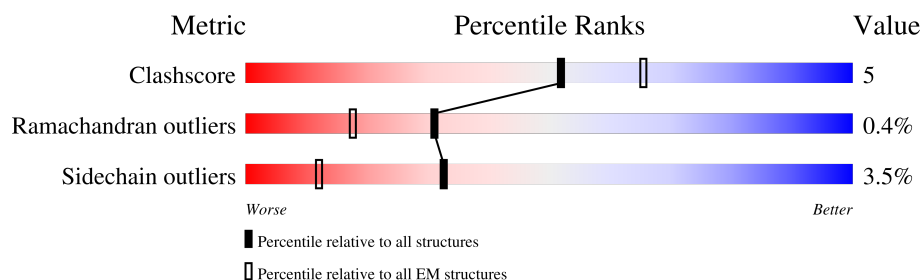
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

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

The reported resolution of this entry is 8.70 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.



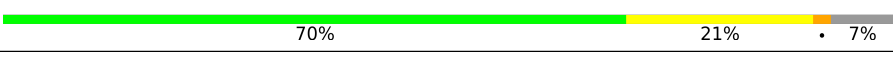
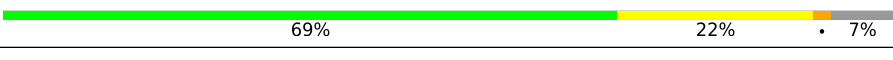
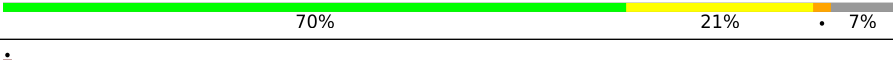
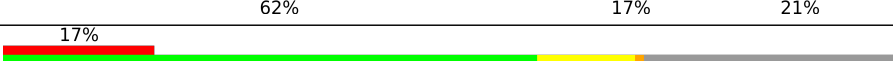
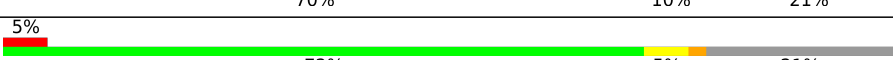
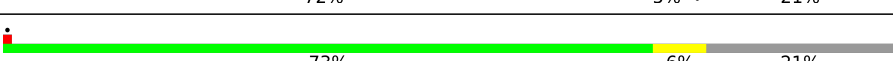
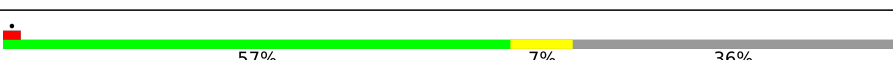
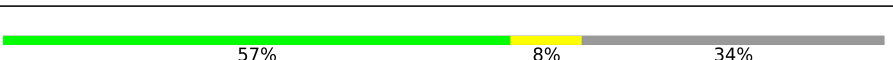
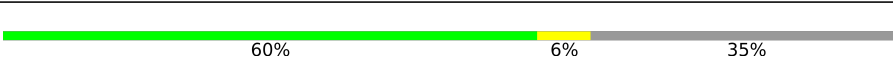
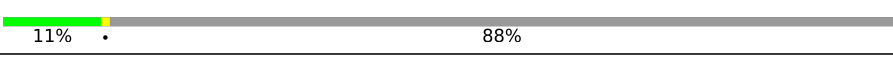
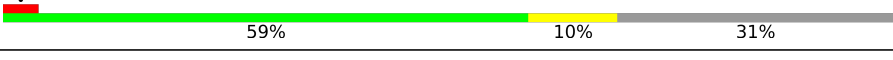
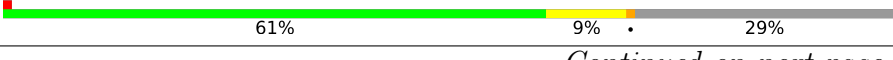
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	282 (8.20 - 9.20)

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 $\leq 5\%$. 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	J	1024	
1	1	1024	
2	1	451	
2	2	451	

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Mol	Chain	Length	Quality of chain
2	Q	451	
2	R	451	
2	S	451	
2	T	451	
2	U	451	
2	V	451	
2	W	451	
2	X	451	
2	Y	451	
2	Z	451	
3	e	375	
4	b	82	
4	d	82	
4	i	82	
4	k	82	
4	m	82	
5	D	907	
5	F	907	
5	H	907	
5	N	907	
5	a	907	
5	h	907	
5	j	907	
6	C	902	
6	E	902	

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Mol	Chain	Length	Quality of chain
6	G	902	
6	M	902	
7	I	667	
7	K	667	
8	L	1819	
8	c	1819	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 108354 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 Gamma-tubulin complex component 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	I	108	Total	C	N	O	S	0	0
			847	539	150	157	1		
1	J	534	Total	C	N	O	S	0	0
			4429	2893	737	776	23		

- Molecule 2 is a protein called Tubulin gamma-1 chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	2	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	Q	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	R	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	S	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	T	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	U	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	V	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	W	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	X	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	Y	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		
2	Z	420	Total	C	N	O	S	0	0
			3373	2134	586	638	15		

- Molecule 3 is a protein called actin, cytoplasmic 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	e	364	Total	C	N	O	S	0	0
			2847	1803	476	548	20		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
4	b	65	Total	C	N	O	S	0	0
			484	299	85	96	4		
4	i	65	Total	C	N	O	S	0	0
			484	299	85	96	4		
4	k	65	Total	C	N	O	S	0	0
			484	299	85	96	4		
4	m	65	Total	C	N	O	S	0	0
			484	299	85	96	4		
4	d	59	Total	C	N	O	S	0	0
			454	281	79	90	4		

- Molecule 5 is a protein called Gamma-tubulin complex component 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	a	116	Total	C	N	O	S	0	0
			933	591	171	169	2		
5	D	581	Total	C	N	O	S	0	0
			4796	3061	842	868	25		
5	F	599	Total	C	N	O	S	0	0
			4941	3151	871	894	25		
5	H	594	Total	C	N	O	S	0	0
			4907	3130	864	888	25		
5	N	594	Total	C	N	O	S	0	0
			4907	3130	864	888	25		
5	h	99	Total	C	N	O	S	0	0
			803	509	148	144	2		
5	j	107	Total	C	N	O	S	0	0
			843	533	156	152	2		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
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		

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Mol	Chain	Residues	Atoms					AltConf	Trace
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
			4225	2737	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 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	L	566	Total	C	N	O	S	0	0
			4587	3000	773	789	25		
8	c	158	Total	C	N	O	S	0	0
			1220	771	209	232	8		

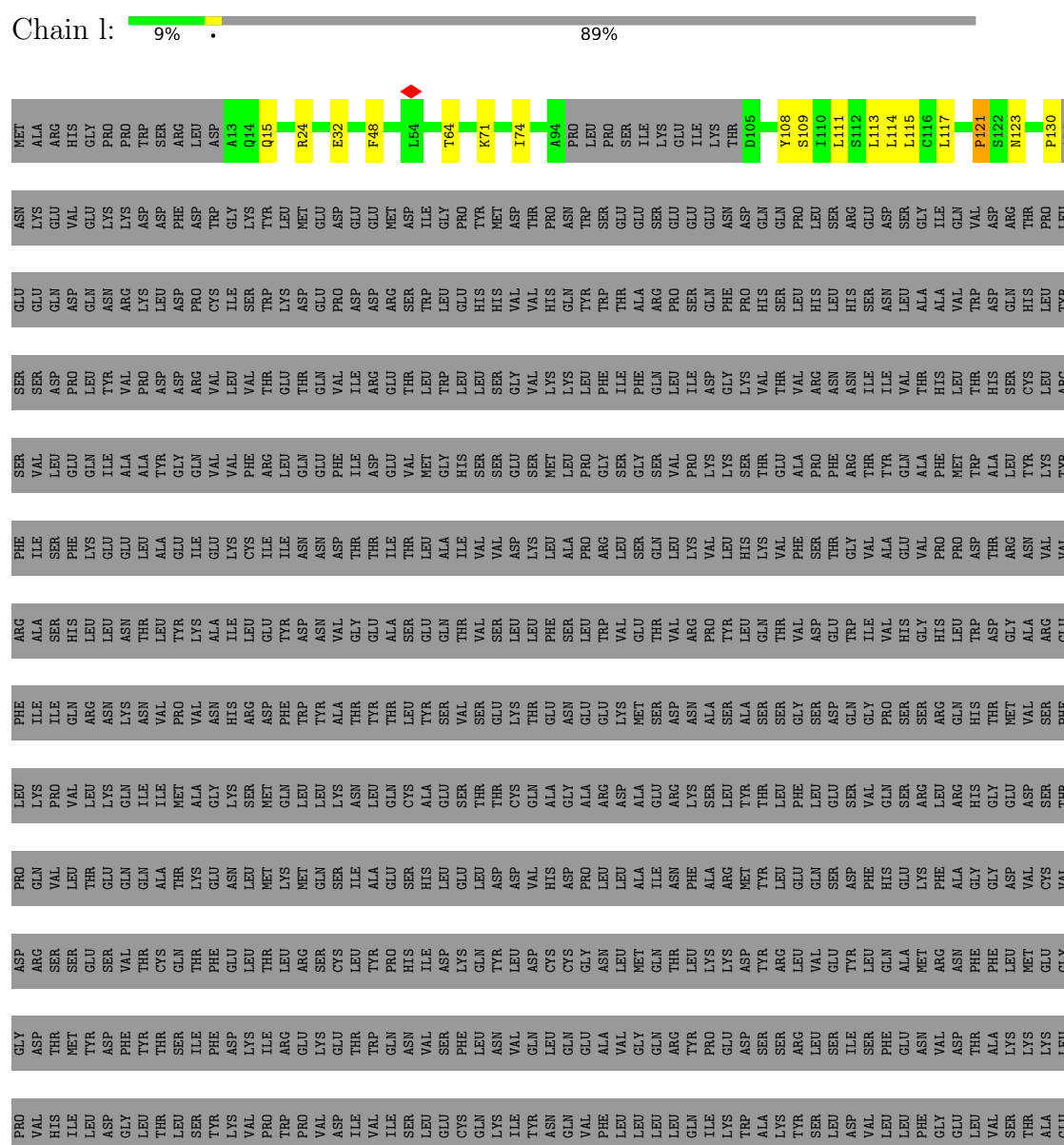
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		AltConf
9	l	5	Total	O	0
			5	5	
9	m	1	Total	O	0
			1	1	

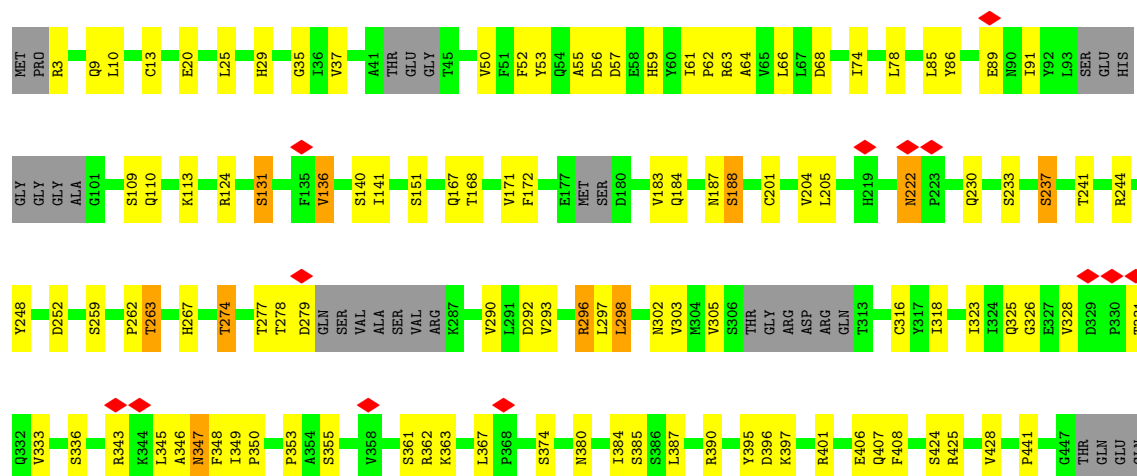
3 Residue-property plots

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.

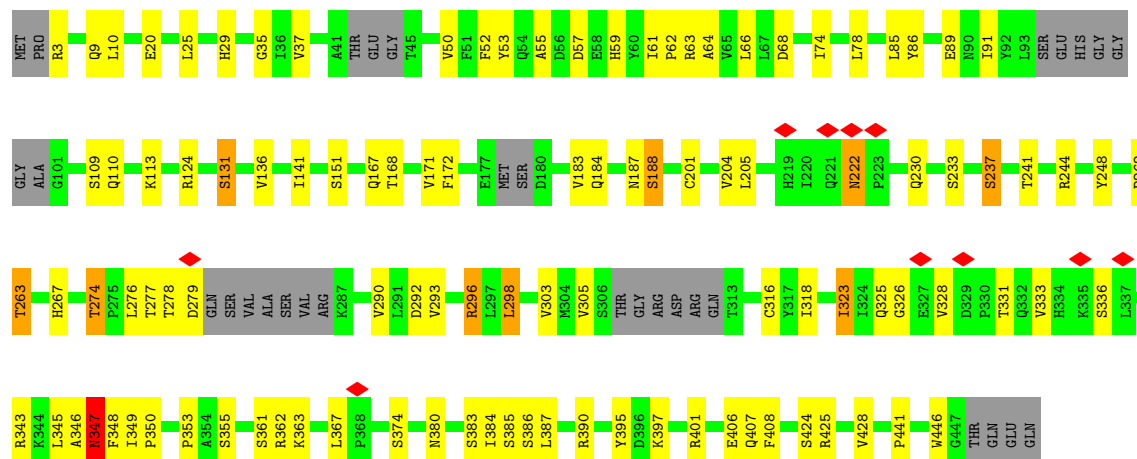
• Molecule 1: Gamma-tubulin complex component 5



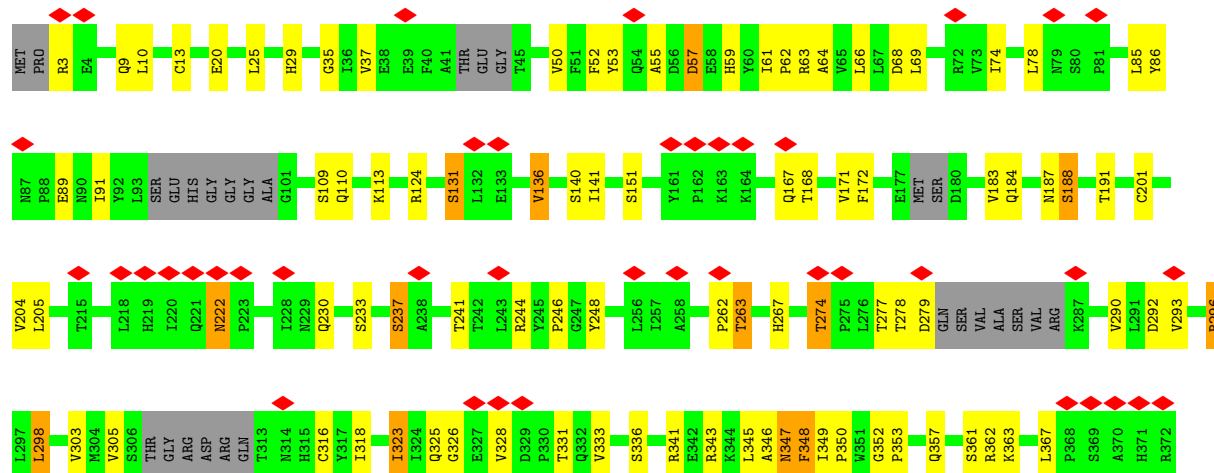




• Molecule 2: Tubulin gamma-1 chain

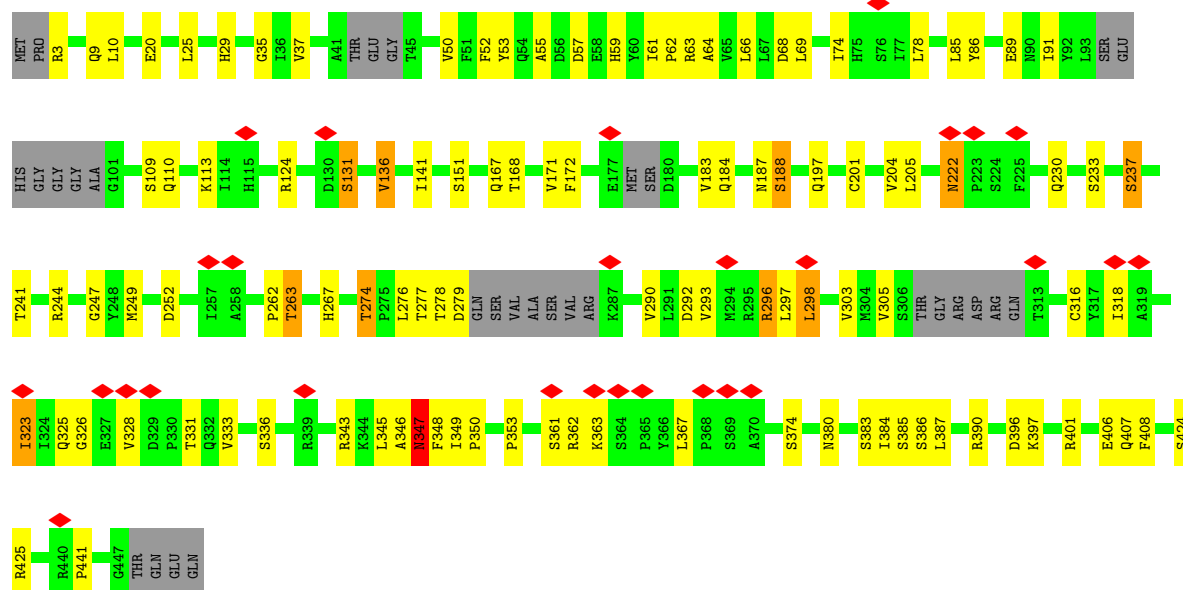


• Molecule 2: Tubulin gamma-1 chain

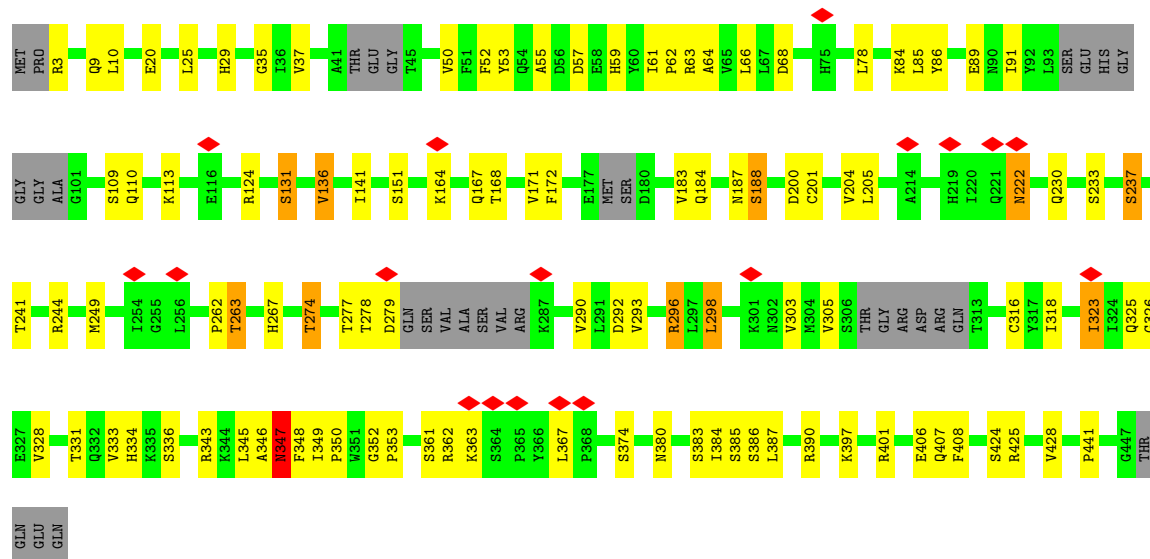




• Molecule 2: Tubulin gamma-1 chain

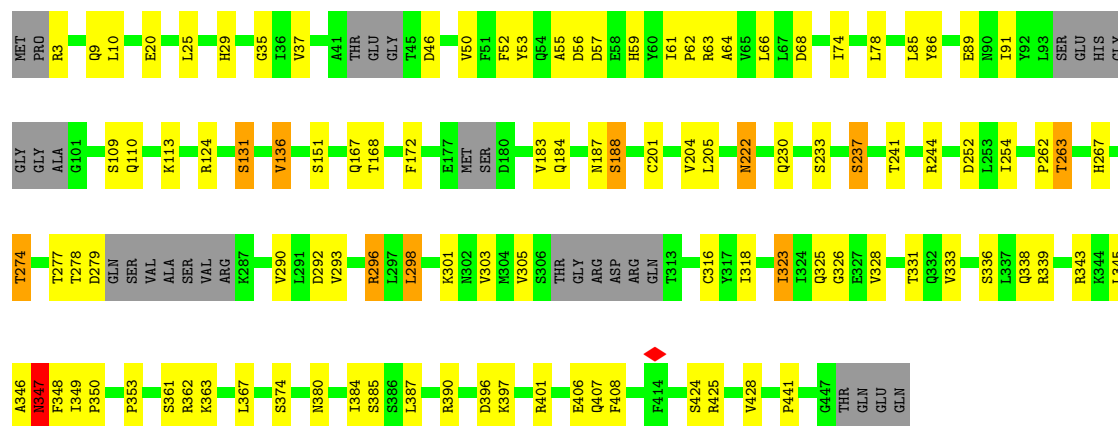


• Molecule 2: Tubulin gamma-1 chain



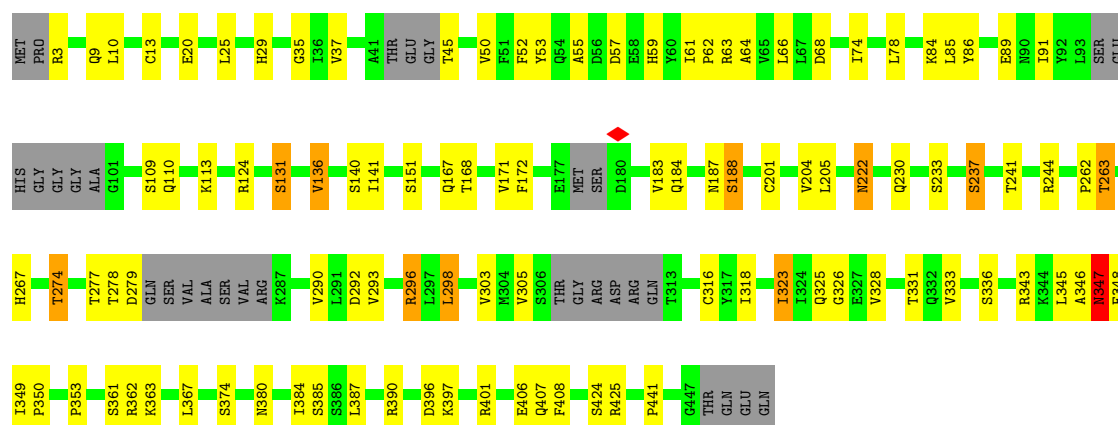
• Molecule 2: Tubulin gamma-1 chain





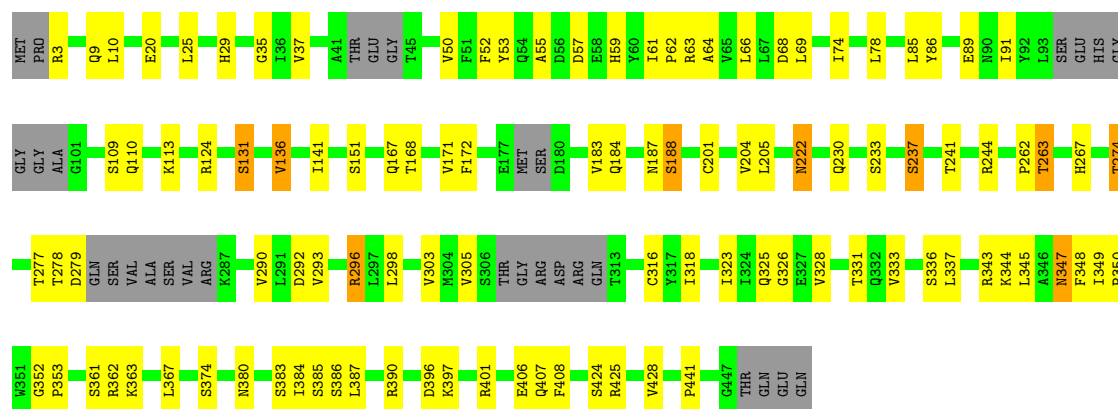
• Molecule 2: Tubulin gamma-1 chain

Chain U: 70% 21% 7%



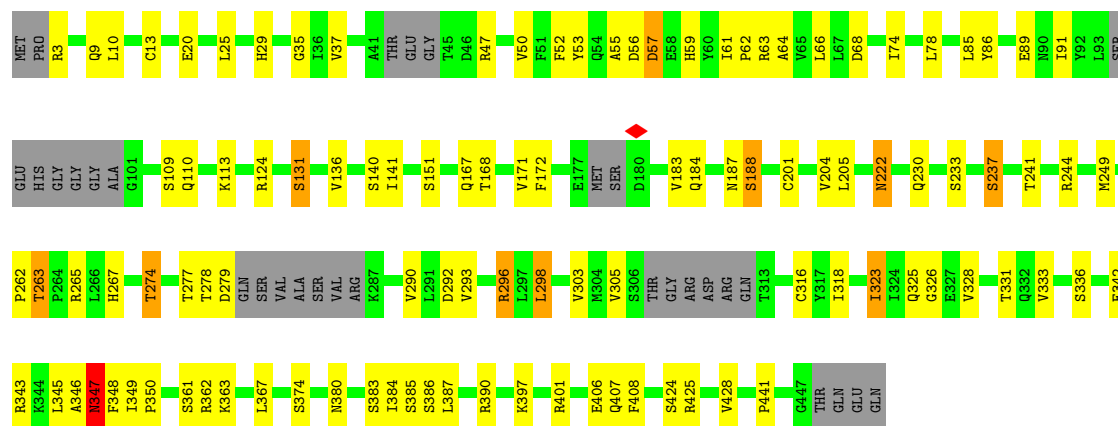
• Molecule 2: Tubulin gamma-1 chain

Chain V: 69% 22% 7%



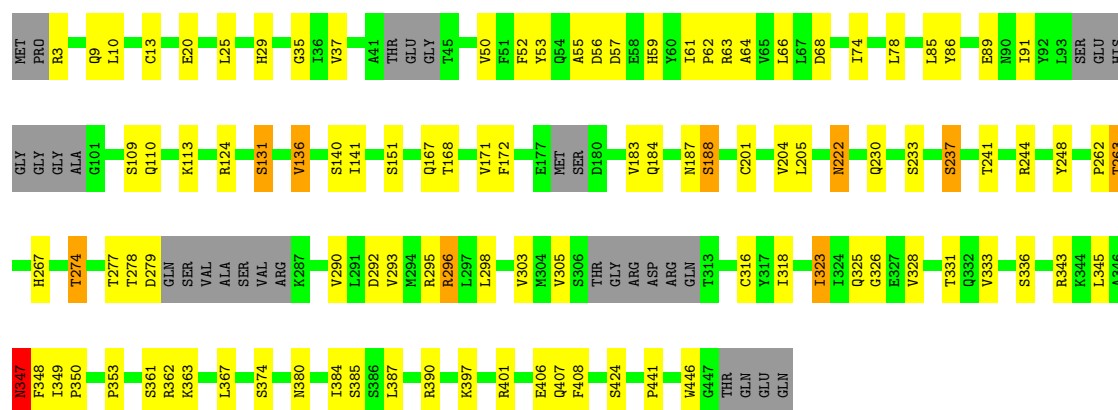
• Molecule 2: Tubulin gamma-1 chain

Chain W: 69% 22% 7%



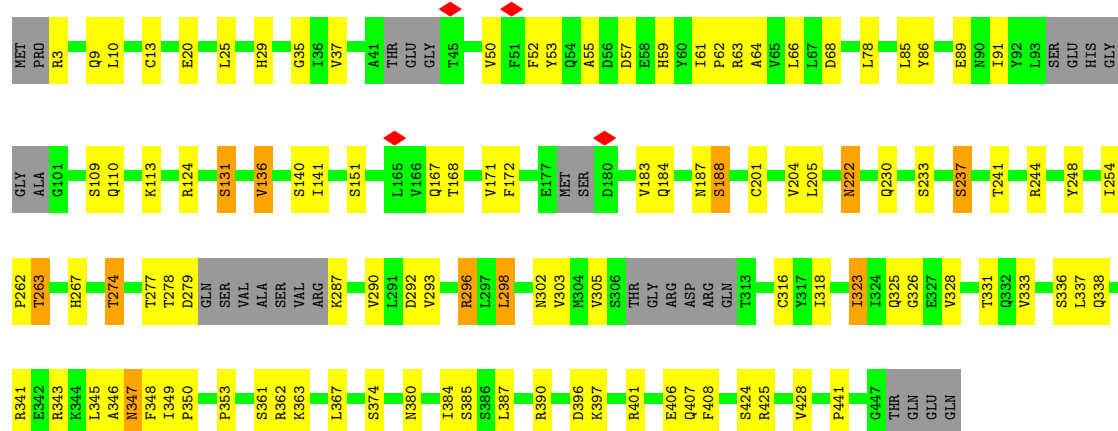
• Molecule 2: Tubulin gamma-1 chain

Chain X: 70% 21% 7%



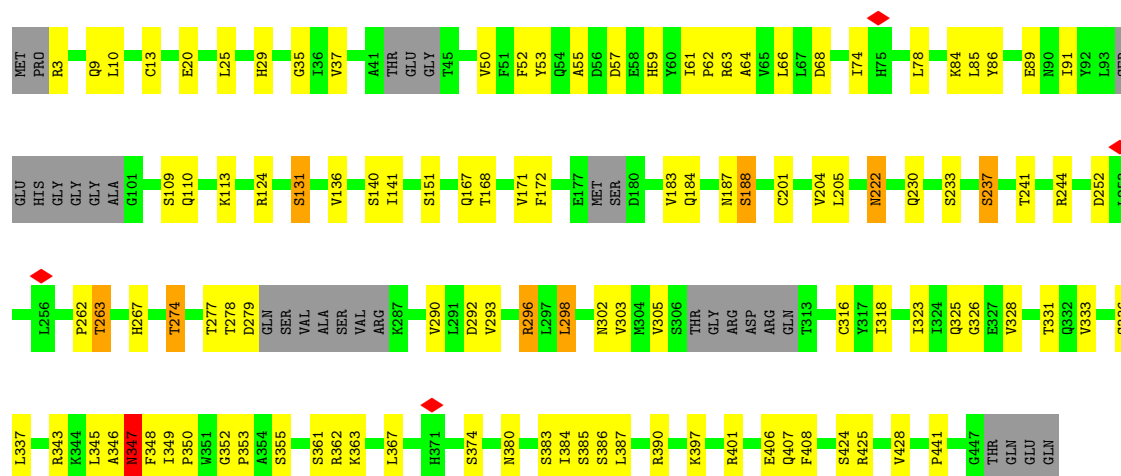
• Molecule 2: Tubulin gamma-1 chain

Chain Y: 69% 22% 7%

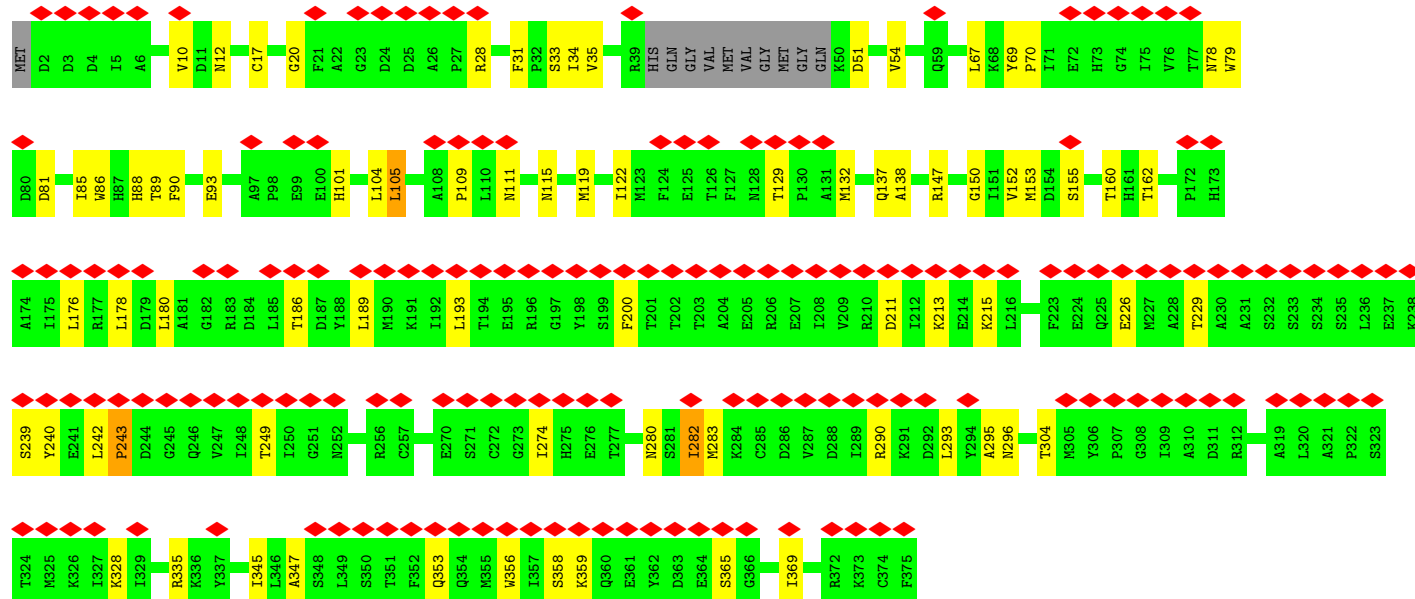
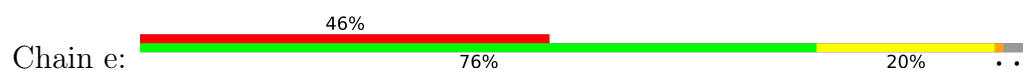


• Molecule 2: Tubulin gamma-1 chain

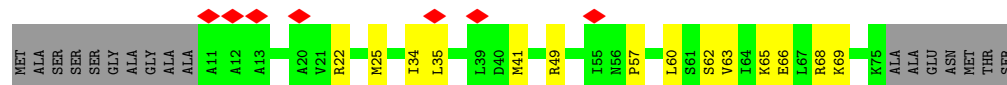
Chain Z: 69% 23% 7%



• Molecule 3: actin, cytoplasmic 1

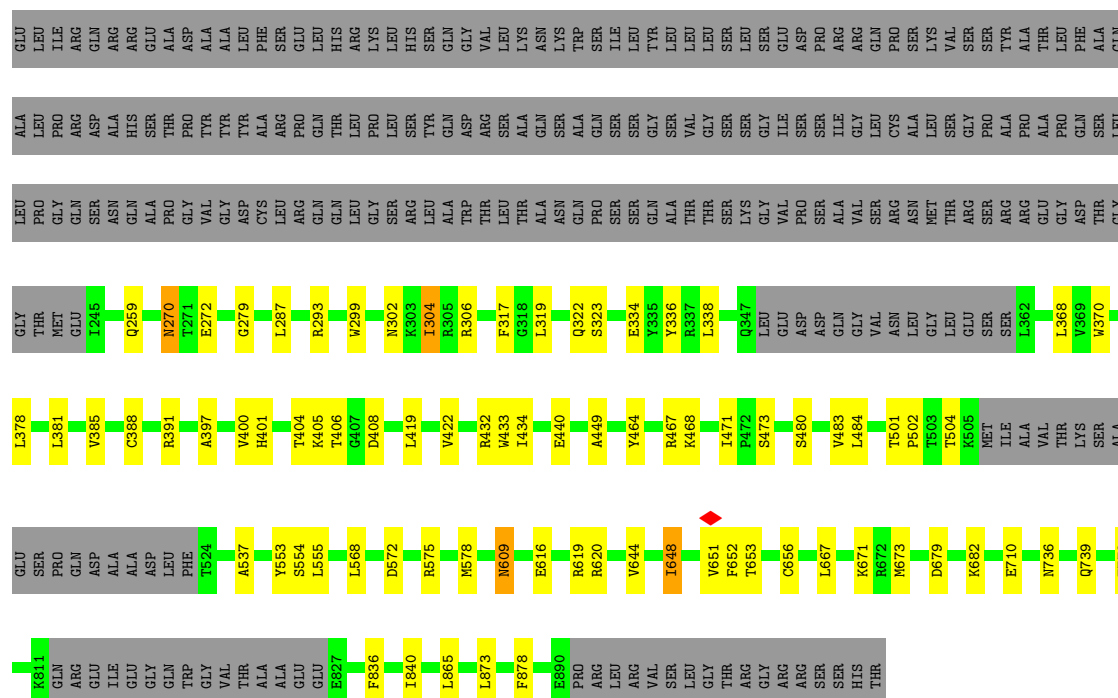


• Molecule 4: Mitotic-spindle organizing protein 1

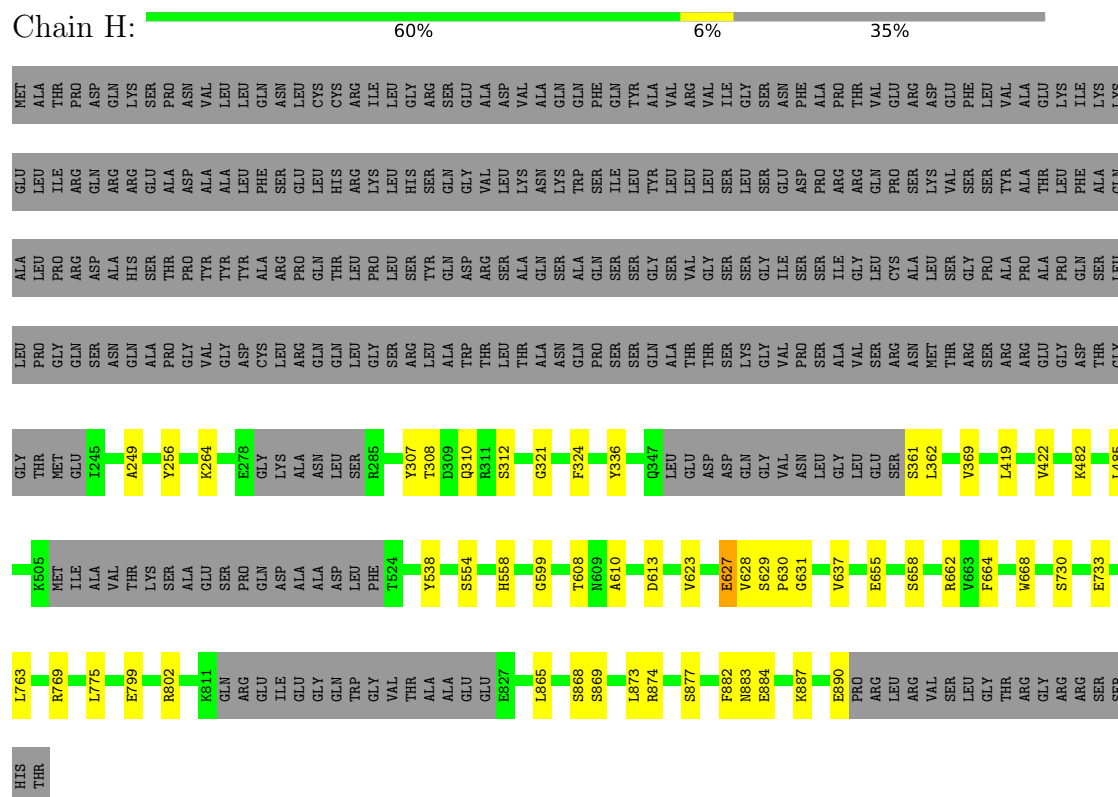


• Molecule 4: Mitotic-spindle organizing protein 1



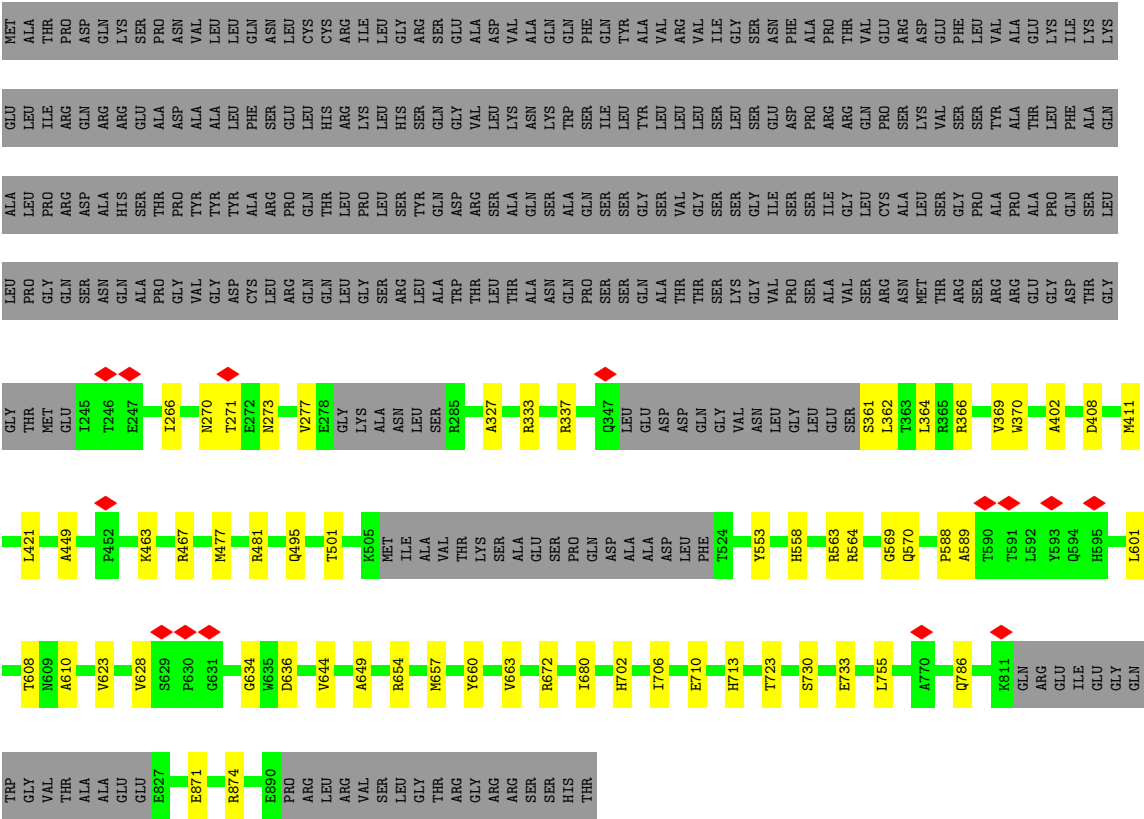


• Molecule 5: Gamma-tubulin complex component 3

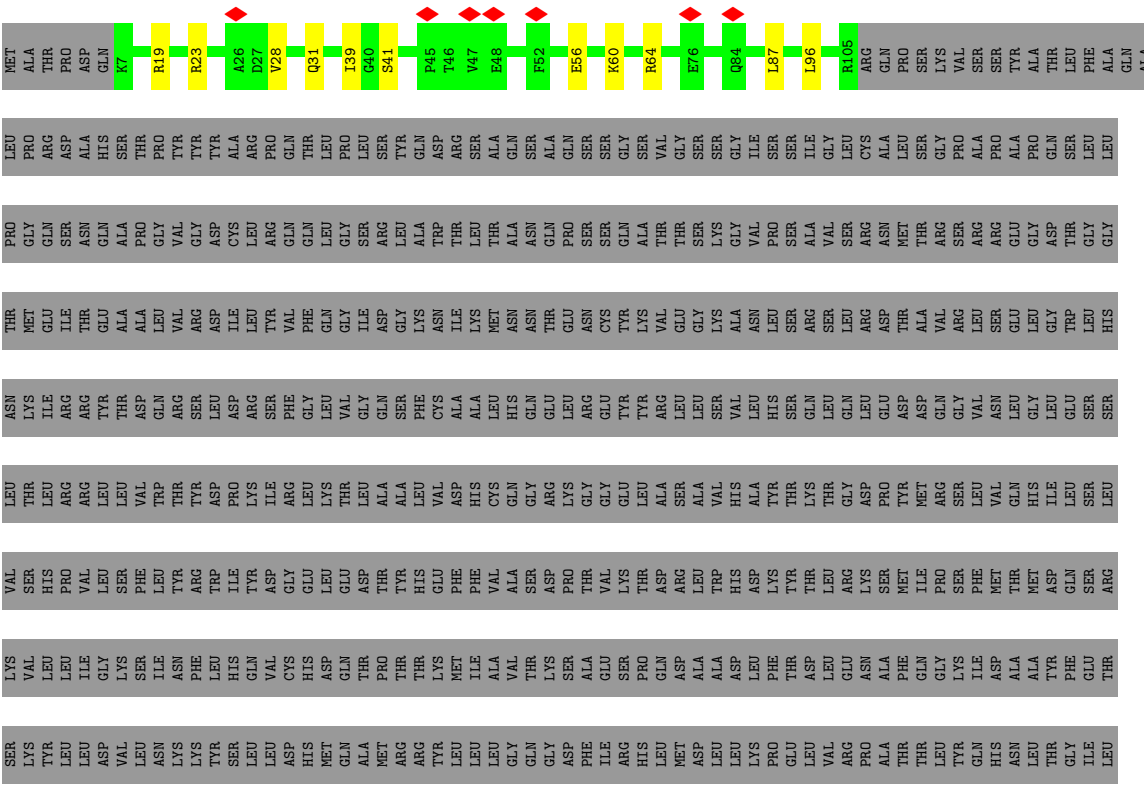


• Molecule 5: Gamma-tubulin complex component 3





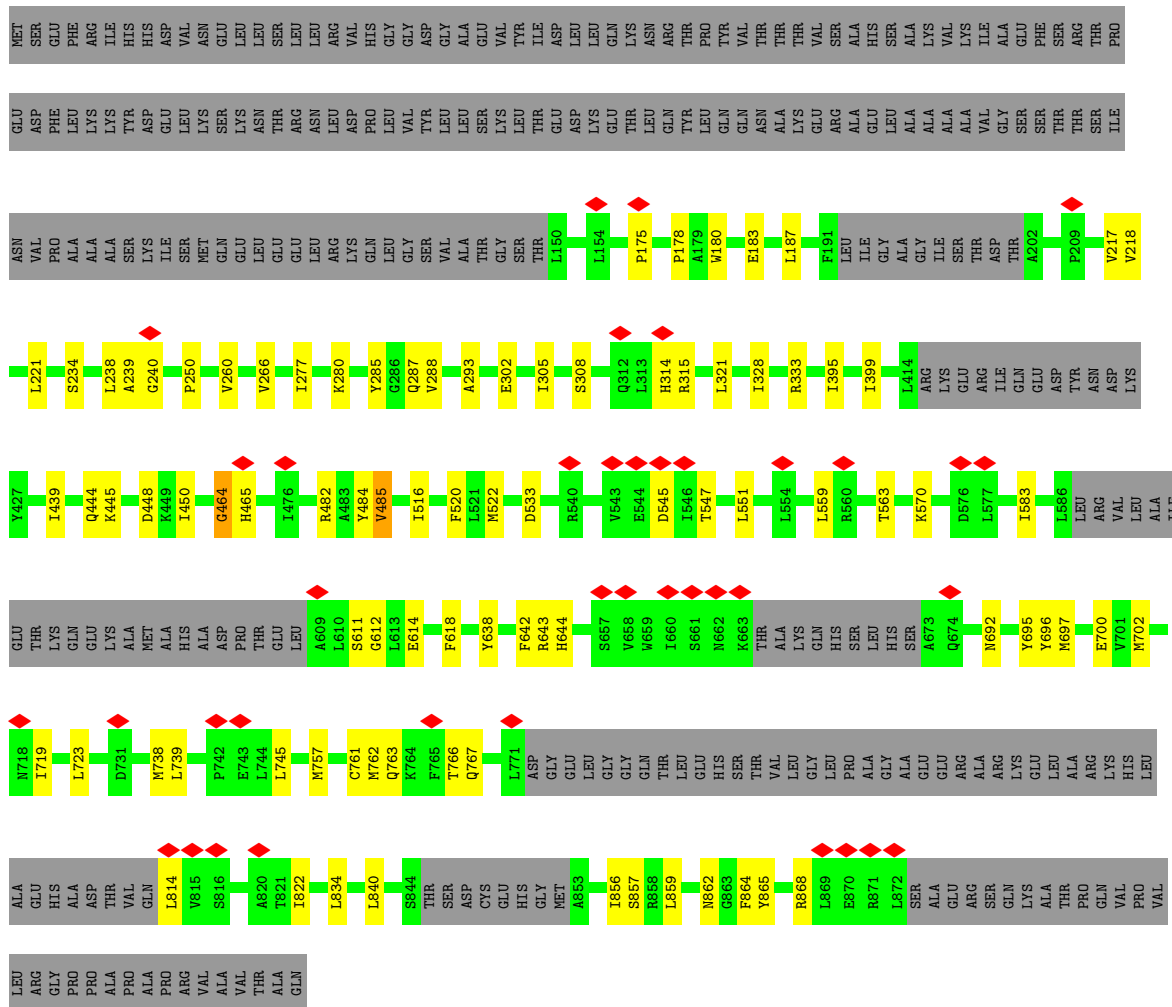
● Molecule 5: Gamma-tubulin complex component 3



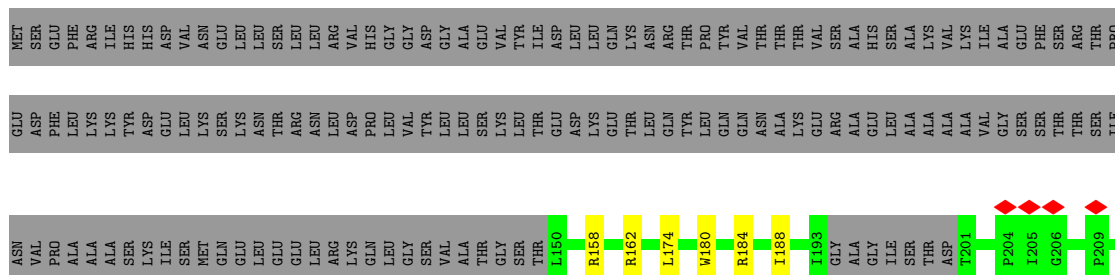
- Molecule 5: Gamma-tubulin complex component 3

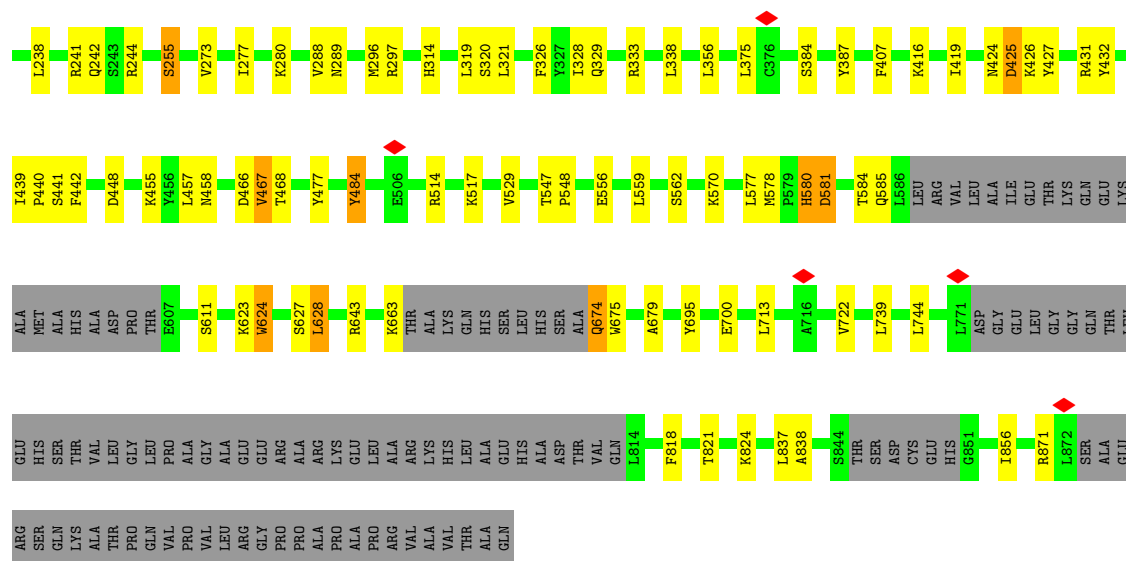
[illegible]

- Molecule 6: Gamma-tubulin complex component 2



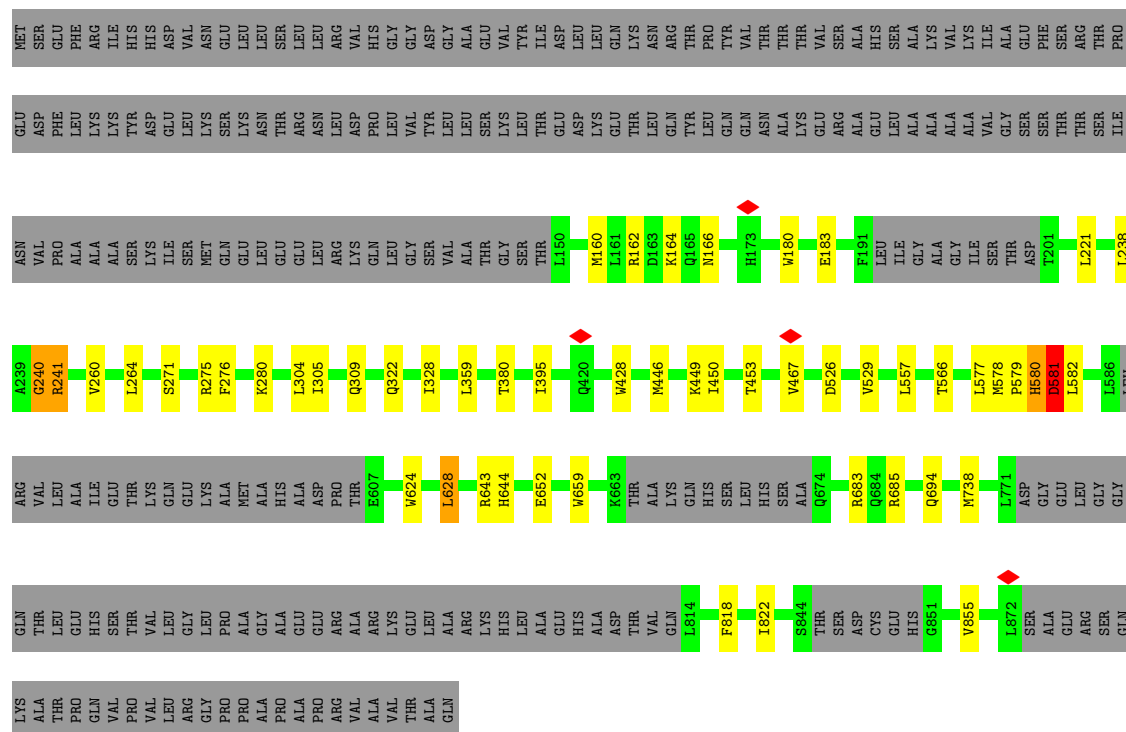
- Molecule 6: Gamma-tubulin complex component 2





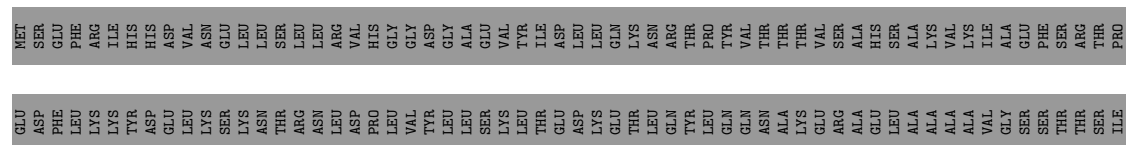
• Molecule 6: Gamma-tubulin complex component 2

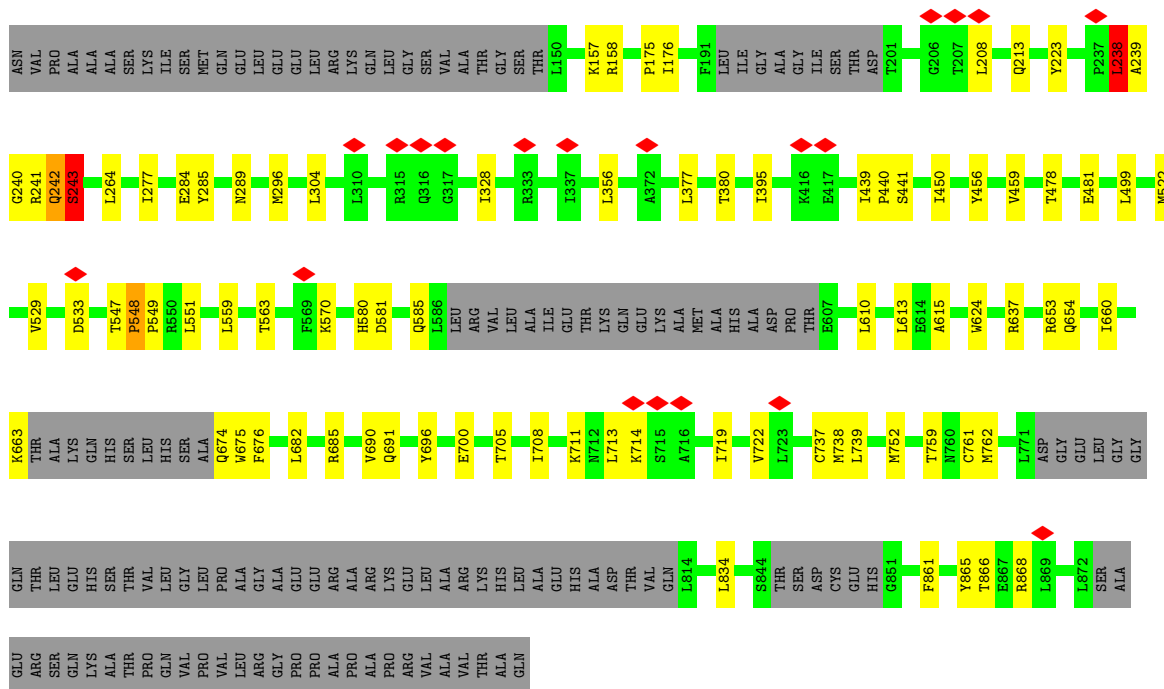
Chain G: 65% 5% 29%



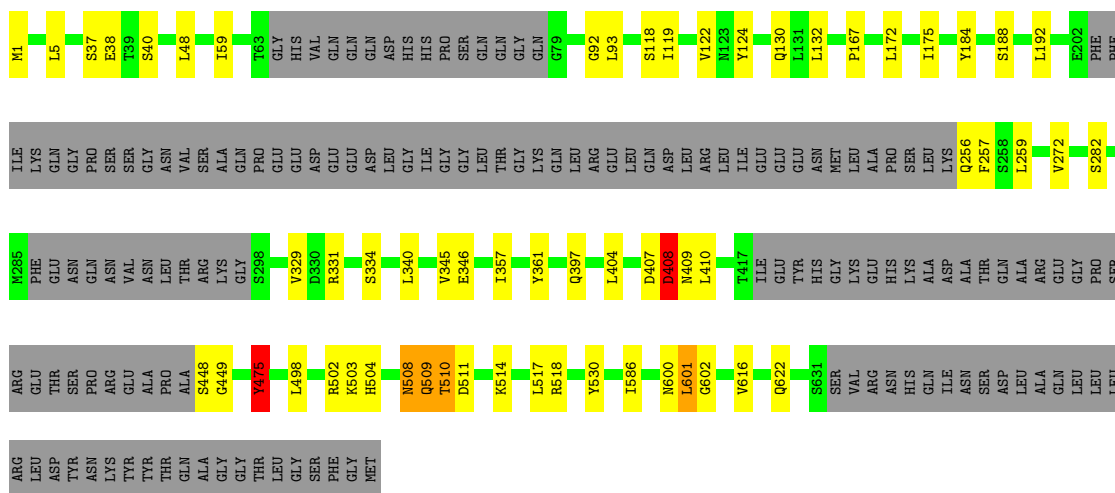
• Molecule 6: Gamma-tubulin complex component 2

Chain M: 61% 9% 29%

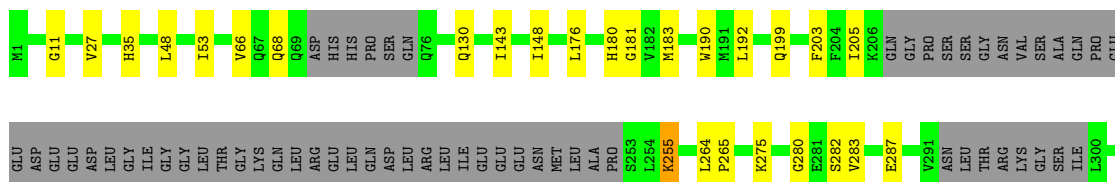


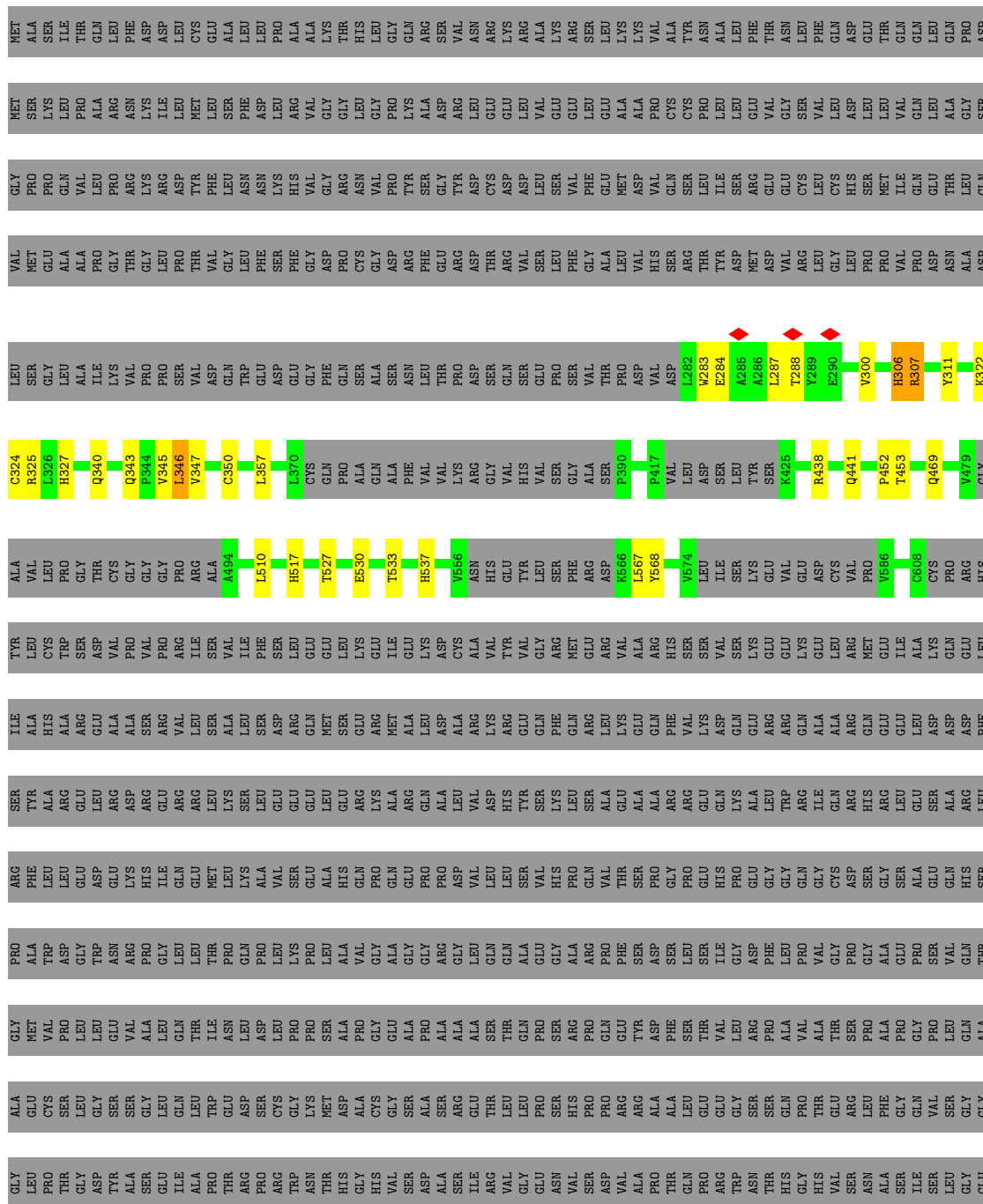


- Molecule 7: Gamma-tubulin complex component 4



- Molecule 7: Gamma-tubulin complex component 4









ARG	GLY	ALA	GLU	HIS	PRO	ASN	PHE	ALA	LEU	MET	GLN	GLN	SER	TYR	ASN	THR	PHE	LYS	TYR	TYR	HIS	PHE	LEU	PHE	LYS	VAL	THR	LYS	LEU	VAL	ASN	ARG	GLY	TYR	GLN	PRO	HIS	LEU	GLU	ASP	PHE	LEU	LEU	ARG	ILE	ASN	PHE	ASN	ASN	TYR	TYR	GLN	ASP	ALA
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4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	5443	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 ($e^-/\text{\AA}^2$)	35	Depositor
Minimum defocus (nm)	2000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.160	Depositor
Minimum map value	-0.013	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.0357	Depositor
Map size (Å)	532.0, 532.0, 532.0	wwPDB
Map dimensions	200, 200, 200	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.66, 2.66, 2.66	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	J	0.36	0/4525	0.80	7/6119 (0.1%)
1	l	0.28	0/863	0.75	2/1166 (0.2%)
2	1	0.24	0/3441	0.60	0/4661
2	2	0.24	0/3441	0.60	0/4661
2	Q	0.24	0/3441	0.60	0/4661
2	R	0.24	0/3441	0.60	0/4661
2	S	0.24	0/3441	0.60	0/4661
2	T	0.24	0/3441	0.60	0/4661
2	U	0.24	0/3441	0.60	0/4661
2	V	0.24	0/3441	0.60	0/4661
2	W	0.24	0/3441	0.60	0/4661
2	X	0.24	0/3441	0.60	0/4661
2	Y	0.24	0/3441	0.60	0/4661
2	Z	0.24	0/3441	0.60	0/4661
3	e	0.51	1/2908 (0.0%)	0.80	2/3938 (0.1%)
4	b	0.32	0/484	0.73	0/653
4	d	0.33	0/454	0.77	0/611
4	i	0.26	0/484	0.62	0/653
4	k	0.25	0/484	0.61	0/653
4	m	0.28	0/484	0.65	0/653
5	D	0.35	0/4897	0.72	4/6610 (0.1%)
5	F	0.33	0/5044	0.73	1/6809 (0.0%)
5	H	0.31	0/5009	0.69	4/6761 (0.1%)
5	N	0.32	0/5009	0.73	2/6761 (0.0%)
5	a	0.28	0/948	0.70	0/1277
5	h	0.28	0/815	0.64	1/1096 (0.1%)
5	j	0.26	0/855	0.87	7/1152 (0.6%)
6	C	0.37	0/5151	0.82	9/6955 (0.1%)
6	E	0.43	2/5311 (0.0%)	0.79	8/7169 (0.1%)
6	G	0.33	1/5295 (0.0%)	0.72	6/7147 (0.1%)
6	M	0.37	1/5295 (0.0%)	0.80	11/7147 (0.2%)
7	I	0.35	0/4322	0.75	5/5853 (0.1%)
7	K	0.37	1/4683 (0.0%)	0.77	9/6338 (0.1%)
8	L	0.36	0/4697	0.78	9/6348 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
8	c	0.32	0/1235	0.76	4/1664 (0.2%)
All	All	0.32	6/110544 (0.0%)	0.70	91/149465 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	J	0	2
1	l	0	1
2	1	0	4
2	2	0	4
2	Q	0	4
2	R	0	4
2	S	0	4
2	T	0	4
2	U	0	4
2	V	0	4
2	W	0	4
2	X	0	4
2	Y	0	4
2	Z	0	4
5	D	0	2
5	F	0	2
5	N	0	1
5	j	0	1
6	C	0	2
6	E	0	4
6	G	0	3
6	M	0	4
7	I	0	4
7	K	0	1
8	L	0	1
8	c	0	1
All	All	0	77

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	e	243	PRO	N-CD	17.64	1.72	1.47
6	E	624	TRP	CZ2-CH2	-6.60	1.24	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	E	624	TRP	CD1-NE1	-6.45	1.24	1.37
6	M	624	TRP	C-N	5.95	1.39	1.33
6	G	624	TRP	C-N	5.66	1.38	1.33

The worst 5 of 91 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	j	107	GLN	CA-C-N	9.44	131.63	119.84
5	j	107	GLN	C-N-CA	9.44	131.63	119.84
8	L	300	VAL	N-CA-C	-9.32	102.52	113.42
6	E	624	TRP	CE3-CZ3-CH2	8.37	131.97	121.10
6	C	583	ILE	N-CA-C	-8.06	105.63	113.53

There are no chirality outliers.

5 of 77 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	1	347	ASN	Peptide
2	1	406	GLU	Peptide
2	1	55	ALA	Peptide
2	1	86	TYR	Peptide
1	1	123	ASN	Peptide

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	J	4429	0	4482	27	0
1	l	847	0	789	12	0
2	1	3373	0	3325	60	0
2	2	3373	0	3325	55	0
2	Q	3373	0	3325	61	0
2	R	3373	0	3325	57	0
2	S	3373	0	3325	56	0
2	T	3373	0	3325	57	0
2	U	3373	0	3325	55	0
2	V	3373	0	3325	54	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	W	3373	0	3325	59	0
2	X	3373	0	3325	55	0
2	Y	3373	0	3325	56	0
2	Z	3373	0	3325	58	0
3	e	2847	0	2810	50	0
4	b	484	0	512	12	0
4	d	454	0	482	7	0
4	i	484	0	512	6	0
4	k	484	0	512	4	0
4	m	484	0	512	5	0
5	D	4796	0	4775	44	0
5	F	4941	0	4935	50	0
5	H	4907	0	4896	32	0
5	N	4907	0	4896	33	0
5	a	933	0	953	4	0
5	h	803	0	831	8	0
5	j	843	0	846	4	0
6	C	5044	0	5081	49	0
6	E	5202	0	5241	59	0
6	G	5186	0	5219	28	0
6	M	5186	0	5219	42	0
7	I	4225	0	4259	37	0
7	K	4579	0	4586	36	0
8	L	4587	0	4636	30	0
8	c	1220	0	1231	19	0
9	l	5	0	0	2	0
9	m	1	0	0	0	0
All	All	108354	0	108115	1166	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 5.

The worst 5 of 1166 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)
3:e:243:PRO:CD	3:e:243:PRO:N	1.72	1.44
3:e:160:THR:HG21	3:e:180:LEU:O	1.36	1.24
3:e:242:LEU:HD12	3:e:243:PRO:HD2	1.12	1.10
2:T:56:ASP:OD1	2:U:296:ARG:NH1	1.96	0.98
3:e:242:LEU:HD12	3:e:243:PRO:CD	1.96	0.95

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	J	506/1024 (49%)	467 (92%)	35 (7%)	4 (1%)	16	54
1	l	104/1024 (10%)	94 (90%)	9 (9%)	1 (1%)	12	49
2	1	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	2	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	Q	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	R	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	S	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	T	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	U	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	V	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	W	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	X	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	Y	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
2	Z	408/451 (90%)	385 (94%)	21 (5%)	2 (0%)	24	63
3	e	360/375 (96%)	339 (94%)	21 (6%)	0	100	100
4	b	63/82 (77%)	62 (98%)	1 (2%)	0	100	100
4	d	57/82 (70%)	57 (100%)	0	0	100	100
4	i	63/82 (77%)	62 (98%)	1 (2%)	0	100	100
4	k	63/82 (77%)	61 (97%)	2 (3%)	0	100	100
4	m	63/82 (77%)	62 (98%)	1 (2%)	0	100	100
5	D	571/907 (63%)	547 (96%)	24 (4%)	0	100	100
5	F	591/907 (65%)	556 (94%)	32 (5%)	3 (0%)	24	63

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	H	584/907 (64%)	565 (97%)	19 (3%)	0	100	100
5	N	584/907 (64%)	565 (97%)	19 (3%)	0	100	100
5	a	112/907 (12%)	108 (96%)	3 (3%)	1 (1%)	14	51
5	h	97/907 (11%)	95 (98%)	2 (2%)	0	100	100
5	j	105/907 (12%)	97 (92%)	7 (7%)	1 (1%)	12	49
6	C	606/902 (67%)	577 (95%)	26 (4%)	3 (0%)	24	63
6	E	626/902 (69%)	577 (92%)	47 (8%)	2 (0%)	36	72
6	G	624/902 (69%)	589 (94%)	32 (5%)	3 (0%)	24	63
6	M	624/902 (69%)	591 (95%)	28 (4%)	5 (1%)	16	54
7	I	511/667 (77%)	473 (93%)	32 (6%)	6 (1%)	10	44
7	K	548/667 (82%)	526 (96%)	21 (4%)	1 (0%)	43	78
8	L	540/1819 (30%)	493 (91%)	44 (8%)	3 (1%)	21	59
8	c	148/1819 (8%)	139 (94%)	9 (6%)	0	100	100
All	All	13046/23174 (56%)	12322 (94%)	667 (5%)	57 (0%)	31	67

5 of 57 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	l	121	PRO
6	C	239	ALA
6	C	465	HIS
6	E	425	ASP
6	G	241	ARG

5.3.2 Protein sidechains ⓘ

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	J	498/933 (53%)	495 (99%)	3 (1%)	78	83
1	l	84/933 (9%)	84 (100%)	0	100	100
2	1	376/400 (94%)	345 (92%)	31 (8%)	10	31

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	2	376/400 (94%)	346 (92%)	30 (8%)	11	31
2	Q	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	R	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	S	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	T	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	U	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	V	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	W	376/400 (94%)	346 (92%)	30 (8%)	11	31
2	X	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	Y	376/400 (94%)	345 (92%)	31 (8%)	10	31
2	Z	376/400 (94%)	346 (92%)	30 (8%)	11	31
3	e	310/318 (98%)	306 (99%)	4 (1%)	61	74
4	b	53/62 (86%)	53 (100%)	0	100	100
4	d	53/62 (86%)	52 (98%)	1 (2%)	50	67
4	i	53/62 (86%)	53 (100%)	0	100	100
4	k	53/62 (86%)	51 (96%)	2 (4%)	29	50
4	m	53/62 (86%)	53 (100%)	0	100	100
5	D	525/798 (66%)	523 (100%)	2 (0%)	84	84
5	F	542/798 (68%)	539 (99%)	3 (1%)	78	83
5	H	539/798 (68%)	536 (99%)	3 (1%)	78	83
5	N	539/798 (68%)	539 (100%)	0	100	100
5	a	101/798 (13%)	101 (100%)	0	100	100
5	h	88/798 (11%)	88 (100%)	0	100	100
5	j	88/798 (11%)	88 (100%)	0	100	100
6	C	556/791 (70%)	552 (99%)	4 (1%)	76	81
6	E	574/791 (73%)	567 (99%)	7 (1%)	63	75
6	G	572/791 (72%)	568 (99%)	4 (1%)	76	81
6	M	572/791 (72%)	569 (100%)	3 (0%)	81	83
7	I	472/594 (80%)	471 (100%)	1 (0%)	87	87
7	K	509/594 (86%)	503 (99%)	6 (1%)	63	75
8	L	501/1546 (32%)	498 (99%)	3 (1%)	78	83

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
8	c	135/1546 (9%)	135 (100%)	0	100	100
All	All	11982/20324 (59%)	11567 (96%)	415 (4%)	32	53

5 of 415 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	U	25	LEU
2	V	333	VAL
2	Z	267	HIS
2	U	151	SER
2	U	424	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 305 such sidechains are listed below:

Mol	Chain	Res	Type
2	T	167	GLN
2	Y	314	ASN
2	T	430	GLN
2	W	29	HIS
4	m	53	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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.

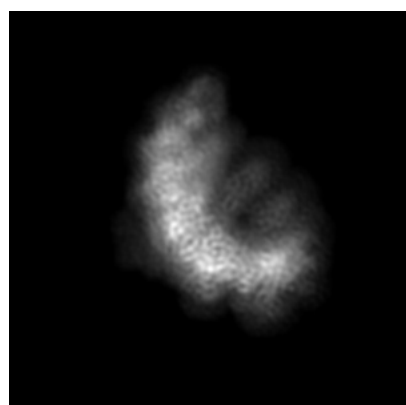
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14013. These allow visual inspection of the internal detail of the map and identification of artifacts.

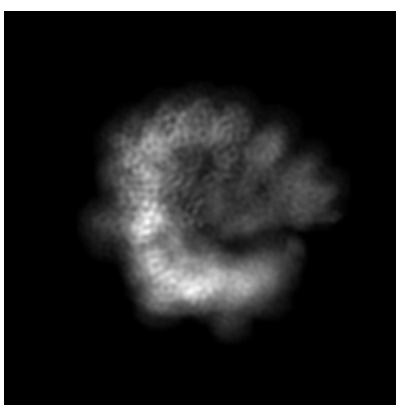
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

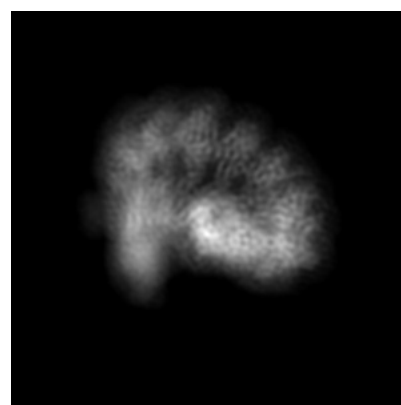
6.1.1 Primary map



X



Y

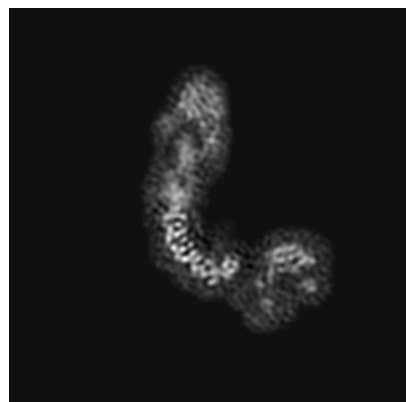


Z

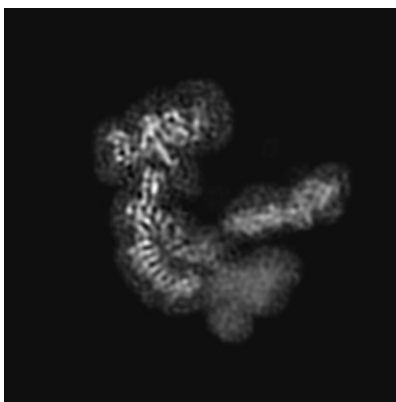
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

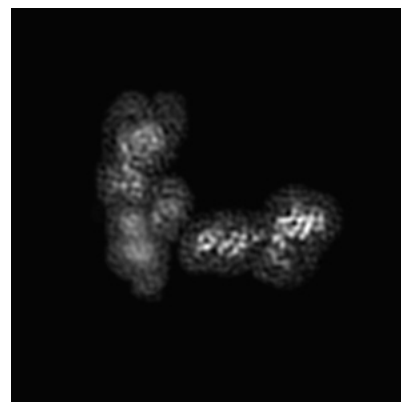
6.2.1 Primary map



X Index: 100



Y Index: 100

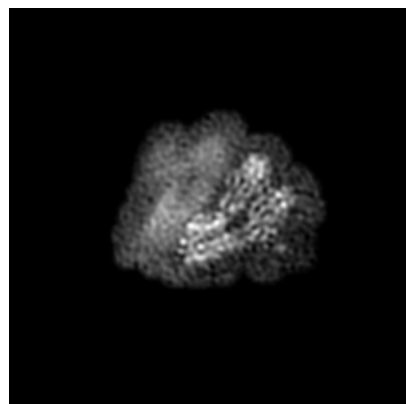


Z Index: 100

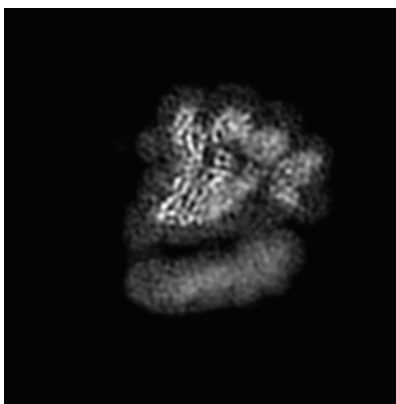
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

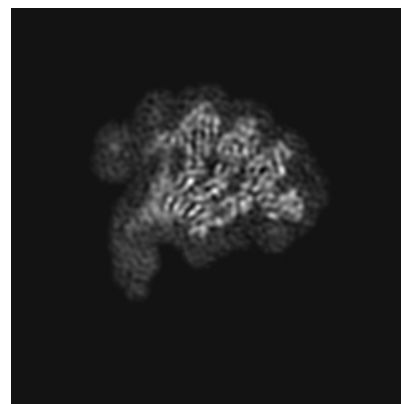
6.3.1 Primary map



X Index: 63



Y Index: 82

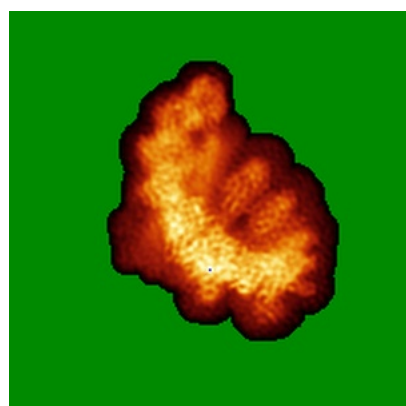


Z Index: 71

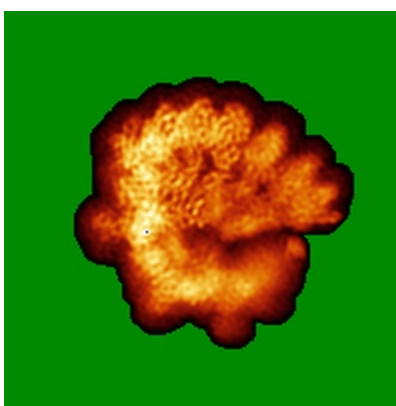
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

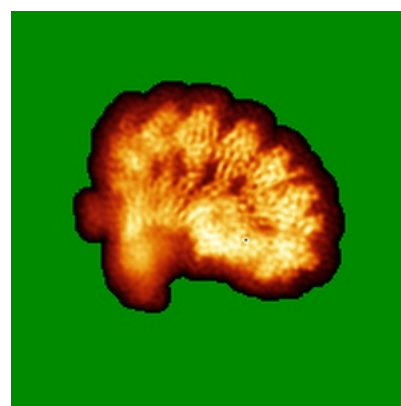
6.4.1 Primary map



X



Y

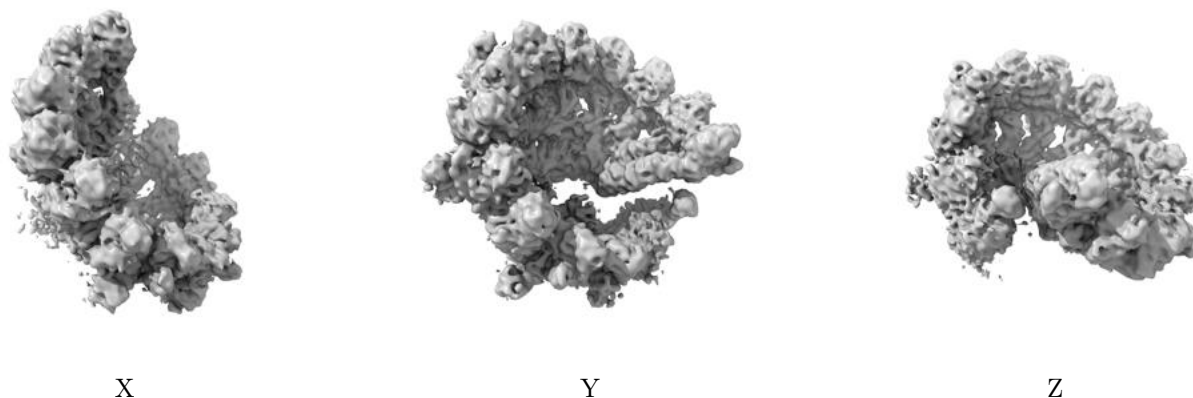


Z

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



The images above show the 3D surface view of the map at the recommended contour level 0.0357. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

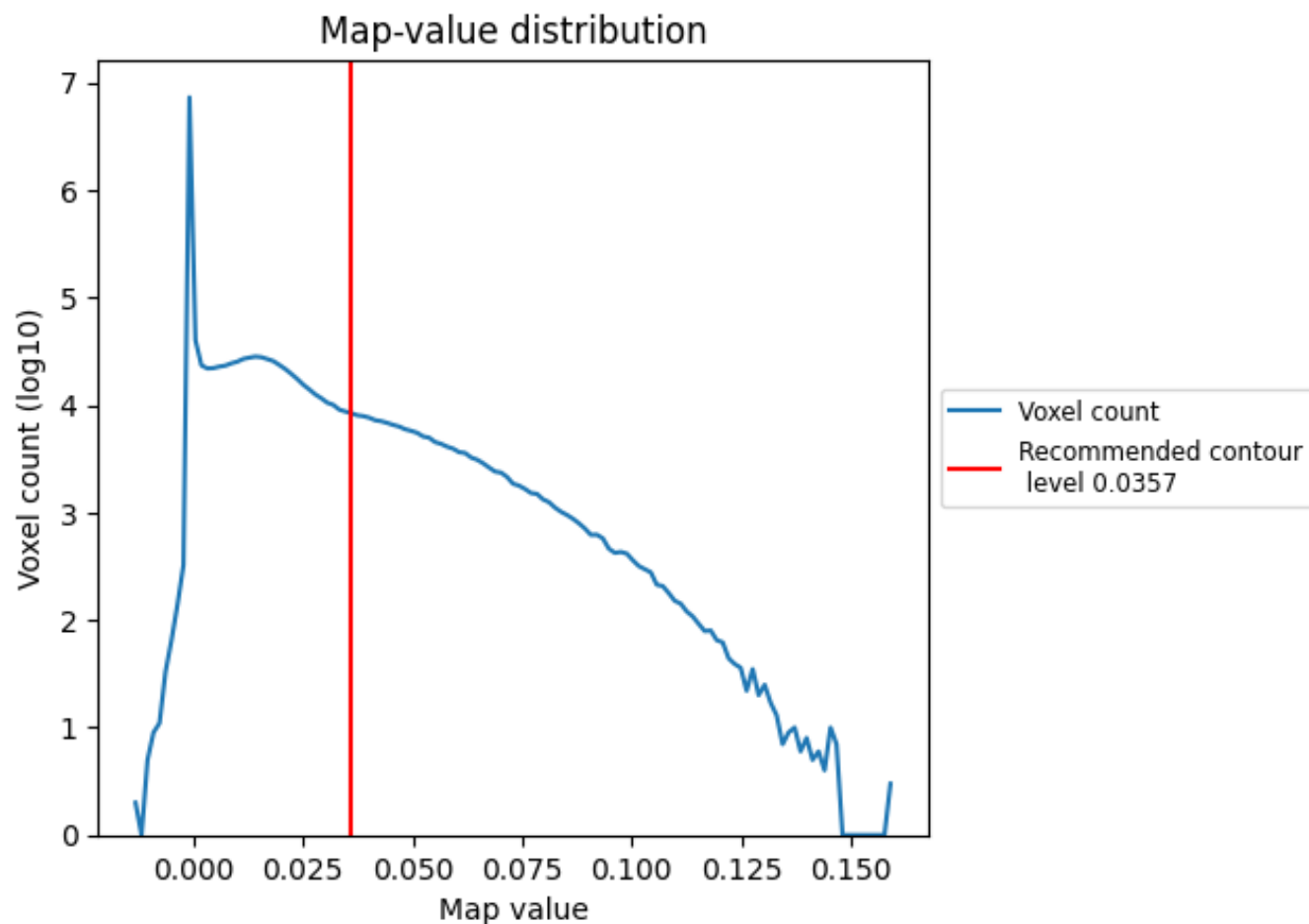
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

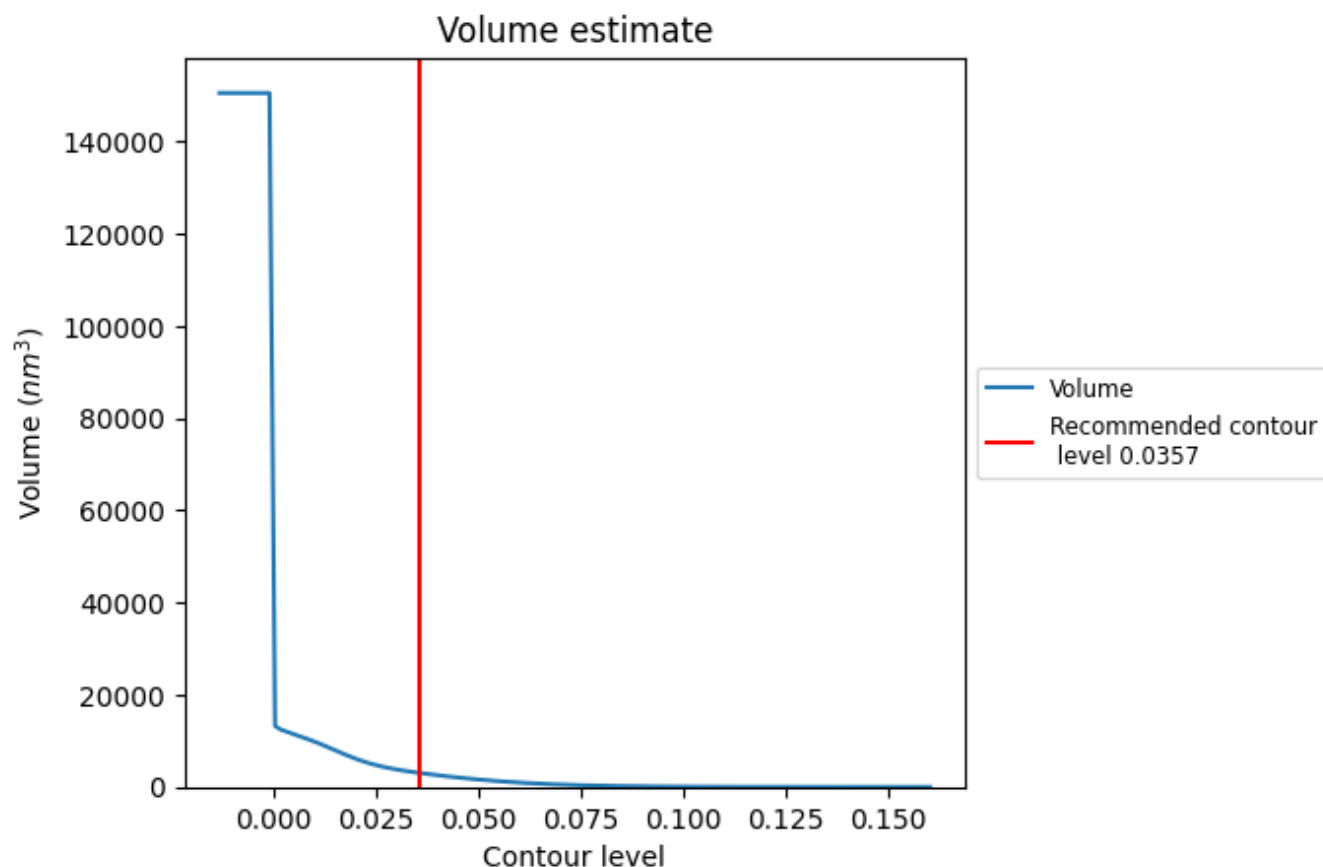
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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.

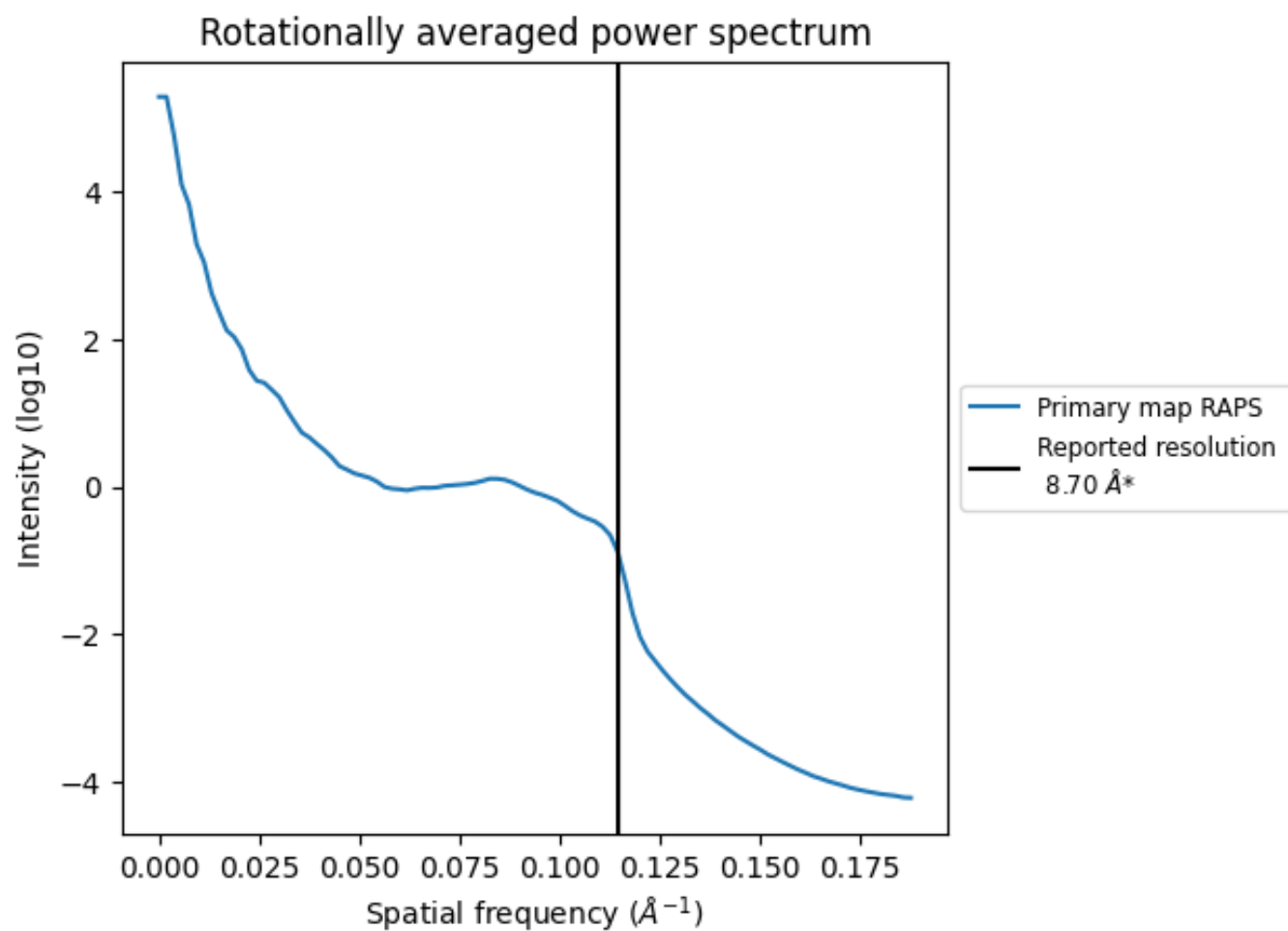
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 3032 nm³; this corresponds to an approximate mass of 2739 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.115 Å⁻¹

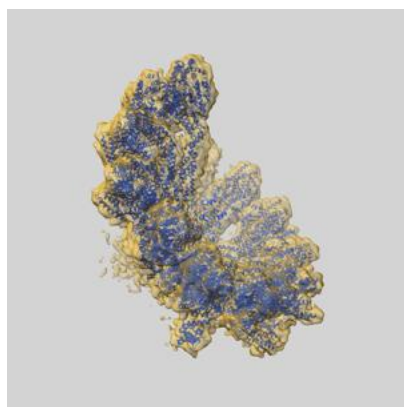
8 Fourier-Shell correlation ⓘ

This section was not generated. No FSC curve or half-maps provided.

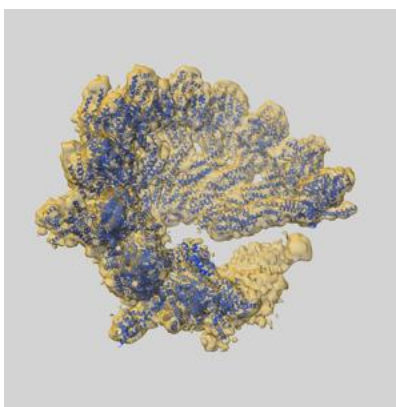
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-14013 and PDB model 7QJ8. Per-residue inclusion information can be found in [section 3](#) on [page 8](#).

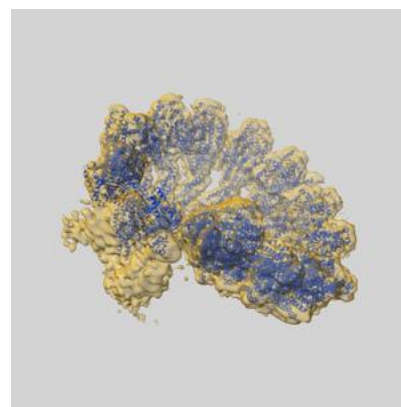
9.1 Map-model overlay [i](#)



X



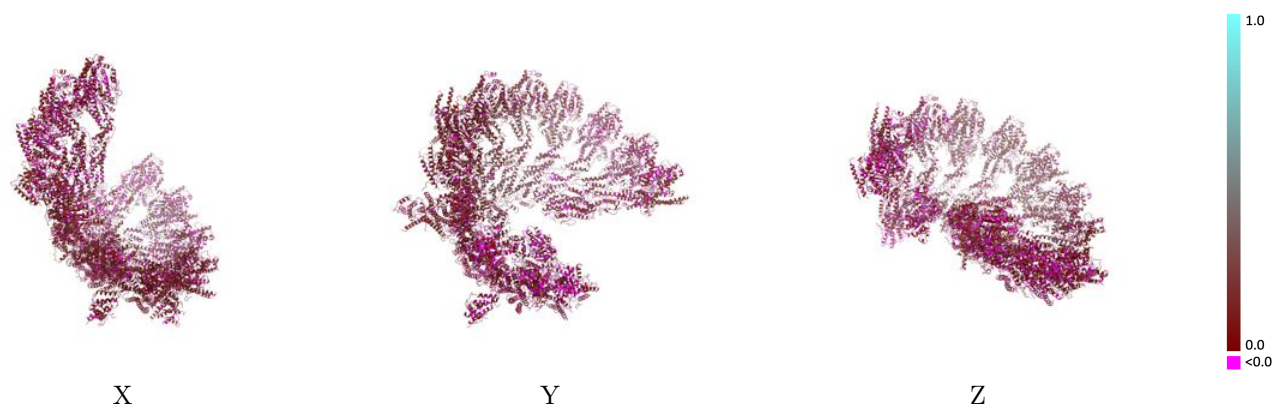
Y



Z

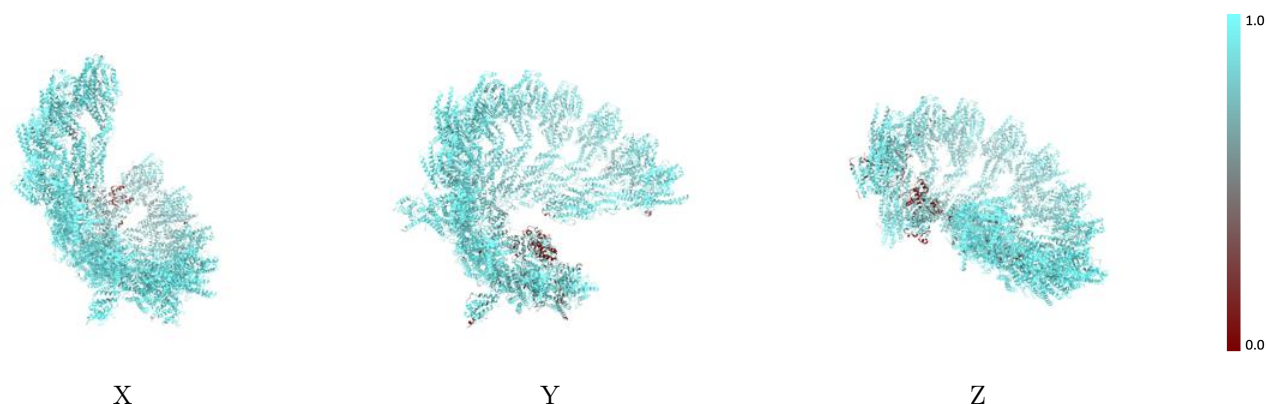
The images above show the 3D surface view of the map at the recommended contour level 0.0357 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



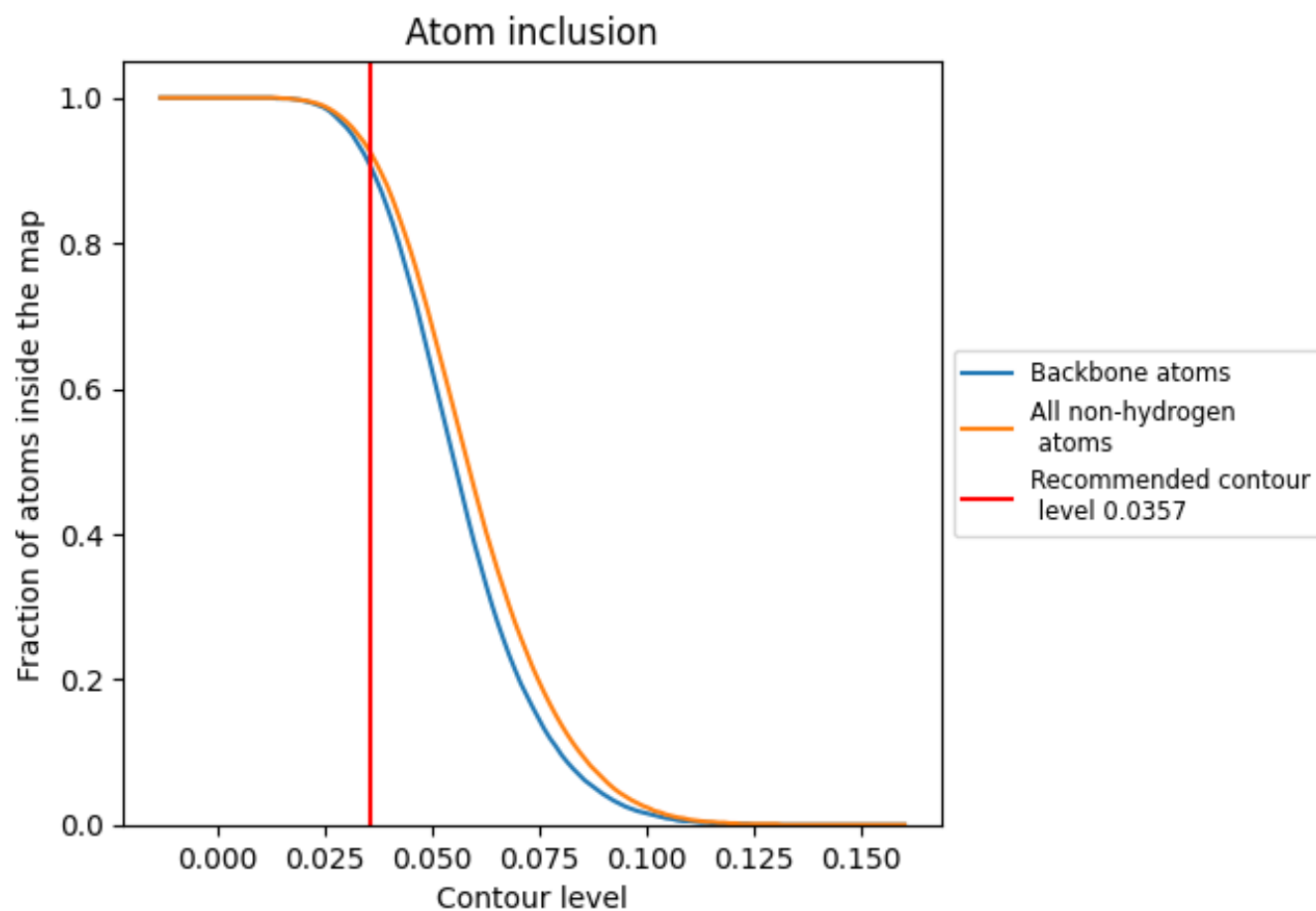
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 [i](#)



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 (0.0357).

9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 93% 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 (0.0357) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9260	 0.1050
1	 0.9240	 0.0670
2	 0.9390	 0.0750
C	 0.9030	 0.0870
D	 0.9190	 0.1100
E	 0.9520	 0.1010
F	 0.9600	 0.1250
G	 0.9560	 0.1330
H	 0.9680	 0.1350
I	 0.9680	 0.1400
J	 0.9730	 0.1460
K	 0.9710	 0.1320
L	 0.9830	 0.0990
M	 0.9260	 0.0900
N	 0.9460	 0.1030
Q	 0.8470	 0.0540
R	 0.8860	 0.0770
S	 0.9280	 0.0590
T	 0.9660	 0.1110
U	 0.9640	 0.1100
V	 0.9820	 0.1320
W	 0.9700	 0.1220
X	 0.9710	 0.1210
Y	 0.9580	 0.0940
Z	 0.9700	 0.0730
a	 0.8440	 0.1280
b	 0.7960	 0.1200
c	 0.7270	 0.0940
d	 0.6860	 0.1270
e	 0.4850	 0.0500
h	 0.8470	 0.0900
i	 0.8070	 0.0920
j	 0.9220	 0.1250
k	 0.9220	 0.1360
l	 0.9560	 0.1250
m	 0.9580	 0.1540

