WORLDWIDE PDB

PROTEIN DATA BANK

Full wwPDB EM Validation Report (i)

Feb 18, 2023 – 01:14 PM EST

PDB ID	:	7UXH
EMDB ID	:	EMD-26861
Title	:	cryo-EM structure of the mTORC1-TFEB-Rag-Ragulator complex
Authors	:	Cui, Z.; Hurley, J.
Deposited on	:	2022-05-05
Resolution	:	3.20 Å(reported)

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 3.20 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	Percentile Ranks	Value
Ramachandran outliers		0.1%
Sidechain outliers		0.4%

Worse ... *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures
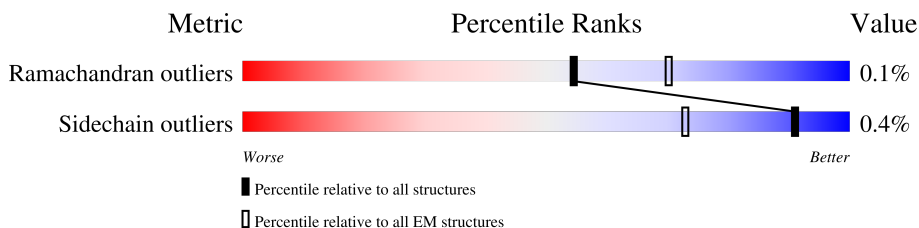
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	A	2549	15% / 86% / 14%
1	C	2549	19% / 86% / 14%
2	B	326	19% / 97% / •
2	D	326	30% / 97% / •
3	E	1335	• / 84% / • / 15%
3	U	1335	• / 84% / 15%
4	F	313	95% / 5%
4	M	313	• / 94% / • 5%
4	V	313	94% / • 5%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
4	c	313	5% / 94% / • 5%
5	G	399	70% / 30%
5	N	399	7% / 69% / 31%
5	W	399	70% / 30%
5	d	399	11% / 69% / 31%
6	H	161	40% / 68% / • 31%
6	O	161	27% / 71% / • 29%
6	X	161	50% / 67% / • 31%
6	e	161	41% / 70% / • 29%
7	I	125	14% / 98% / ••
7	P	125	9% / 99% / •
7	Y	125	26% / 98% / ••
7	f	125	14% / 98% / ••
8	J	124	26% / 95% / • •
8	Q	124	6% / 96% / • •
8	Z	124	54% / 94% / • •
8	g	124	13% / 97% / •
9	K	99	77% / 83% / • 15%
9	R	99	32% / 82% / • 15%
9	a	99	84% / 83% / • 15%
9	h	99	52% / 83% / • 15%
10	L	91	74% / 98% / •
10	S	91	33% / 97% / ••
10	b	91	84% / 98% / •
10	i	91	57% / 98% / •

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
11	T	476	22% 78%
11	j	476	22% 78%

2 Entry composition ⓘ

There are 15 unique types of molecules in this entry. The entry contains 190396 atoms, of which 95230 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 Serine/threonine-protein kinase mTOR.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	2188	Total 35406	C 11226	H 17819	N 3080	O 3164	S 117	0	0
1	C	2188	Total 35404	C 11226	H 17817	N 3080	O 3164	S 117	0	0

- Molecule 2 is a protein called Target of rapamycin complex subunit LST8.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	317	Total 4797	C 1526	H 2341	N 436	O 476	S 18	0	0
2	D	317	Total 4797	C 1526	H 2341	N 436	O 476	S 18	0	0

- Molecule 3 is a protein called Regulatory-associated protein of mTOR.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	E	1133	Total 18025	C 5757	H 9002	N 1568	O 1638	S 60	0	0
3	U	1133	Total 18025	C 5757	H 9002	N 1568	O 1638	S 60	0	0

- Molecule 4 is a protein called Ras-related GTP-binding protein A.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	F	298	Total 4889	C 1554	H 2443	N 427	O 448	S 17	0	0
4	M	298	Total 4890	C 1554	H 2444	N 427	O 448	S 17	0	0
4	V	298	Total 4882	C 1553	H 2438	N 427	O 447	S 17	0	0
4	c	298	Total 4889	C 1554	H 2443	N 427	O 448	S 17	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	66	LEU	GLN	conflict	UNP Q7L523
M	66	LEU	GLN	conflict	UNP Q7L523
V	66	LEU	GLN	conflict	UNP Q7L523
c	66	LEU	GLN	conflict	UNP Q7L523

- Molecule 5 is a protein called Ras-related GTP-binding protein C.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	G	281	Total 4523	C 1459	H 2258	N 370	O 424	S 12	0	0
5	N	277	Total 4446	C 1430	H 2220	N 365	O 419	S 12	0	0
5	W	281	Total 4523	C 1459	H 2258	N 370	O 424	S 12	0	0
5	d	277	Total 4446	C 1430	H 2220	N 365	O 419	S 12	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	75	ASN	SER	engineered mutation	UNP Q9HB90
N	75	ASN	SER	engineered mutation	UNP Q9HB90
W	75	ASN	SER	engineered mutation	UNP Q9HB90
d	75	ASN	SER	engineered mutation	UNP Q9HB90

- Molecule 6 is a protein called Ragulator complex protein LAMTOR1.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	H	111	Total 1738	C 547	H 870	N 150	O 170	S 1	0	0
6	O	115	Total 1791	C 562	H 896	N 155	O 176	S 2	0	0
6	X	111	Total 1738	C 547	H 870	N 150	O 170	S 1	0	0
6	e	115	Total 1791	C 562	H 896	N 155	O 176	S 2	0	0

- Molecule 7 is a protein called Ragulator complex protein LAMTOR2.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	I	124	Total	C	H	N	O	S	0	0
			1888	590	950	161	180	7		
7	P	124	Total	C	H	N	O	S	0	0
			1888	590	950	161	180	7		
7	Y	124	Total	C	H	N	O	S	0	0
			1888	590	950	161	180	7		
7	f	124	Total	C	H	N	O	S	0	0
			1888	590	950	161	180	7		

- Molecule 8 is a protein called Ragulator complex protein LAMTOR3.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	J	120	Total	C	H	N	O	S	0	0
			1892	601	958	157	175	1		
8	Q	120	Total	C	H	N	O	S	0	0
			1892	601	958	157	175	1		
8	Z	120	Total	C	H	N	O	S	0	0
			1892	601	958	157	175	1		
8	g	120	Total	C	H	N	O	S	0	0
			1892	601	958	157	175	1		

- Molecule 9 is a protein called Ragulator complex protein LAMTOR4.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	K	84	Total	C	H	N	O	S	0	0
			1294	404	652	115	122	1		
9	R	84	Total	C	H	N	O	S	0	0
			1294	404	652	115	122	1		
9	a	84	Total	C	H	N	O	S	0	0
			1294	404	652	115	122	1		
9	h	84	Total	C	H	N	O	S	0	0
			1294	404	652	115	122	1		

- Molecule 10 is a protein called Ragulator complex protein LAMTOR5.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	L	89	Total	C	H	N	O	S	0	0
			1312	400	657	113	135	7		
10	S	89	Total	C	H	N	O	S	0	0
			1311	400	656	113	135	7		
10	b	89	Total	C	H	N	O	S	0	0
			1311	400	656	113	135	7		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms						AltConf	Trace
10	i	89	Total	C	H	N	O	S	0	0
			1311	400	656	113	135	7		

- Molecule 11 is a protein called Transcription factor EB.

Mol	Chain	Residues	Atoms						AltConf	Trace
11	T	107	Total	C	H	N	O	S	0	0
			1723	541	847	165	165	5		
11	j	107	Total	C	H	N	O	S	0	0
			1724	541	848	165	165	5		

- Molecule 12 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: $C_6H_{18}O_{24}P_6$).
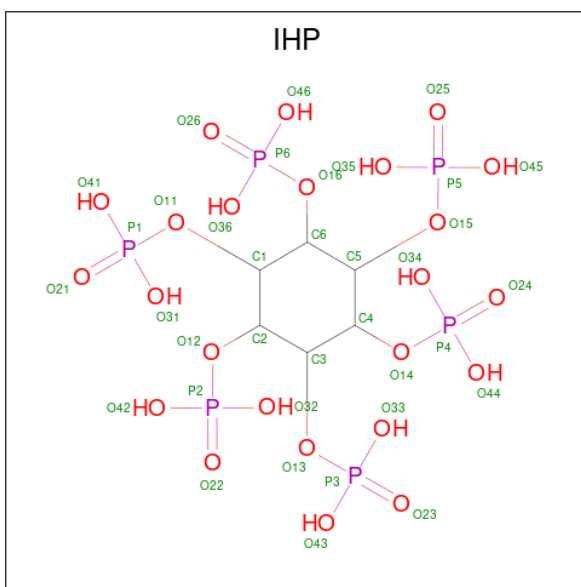
Mol	Chain	Residues	Atoms					AltConf
12	A	1	Total	C	H	O	P	0
			42	6	6	24	6	
12	C	1	Total	C	H	O	P	0
			42	6	6	24	6	

- Molecule 13 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).

GTP

Mol	Chain	Residues	Atoms						AltConf
13	F	1	Total	C	H	N	O	P	0
			42	10	10	5	14	3	
13	M	1	Total	C	H	N	O	P	0
			42	10	10	5	14	3	
13	V	1	Total	C	H	N	O	P	0
			42	10	10	5	14	3	
13	c	1	Total	C	H	N	O	P	0
			42	10	10	5	14	3	

- Molecule 14 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
14	F	1	Total	Mg	0
			1	1	
14	M	1	Total	Mg	0
			1	1	
14	V	1	Total	Mg	0
			1	1	
14	c	1	Total	Mg	0
			1	1	

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

GDP

Mol	Chain	Residues	Atoms						AltConf
15	G	1	Total	C	H	N	O	P	0
			38	10	10	5	11	2	
15	N	1	Total	C	H	N	O	P	0
			38	10	10	5	11	2	
15	W	1	Total	C	H	N	O	P	0
			38	10	10	5	11	2	
15	d	1	Total	C	H	N	O	P	0
			38	10	10	5	11	2	

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: Serine/threonine-protein kinase mTOR

HIS GLN LEU ALA SER PRO GLY LEU THR THR LEU PRO GLU ALA SER ASP V579 G580 S581 L584 F592 E593 F594 E595 G596 H597 S598 H605 N612 P632 S633 ILE HIS LEU ILE SER GLY HIS ALA HIS VAL V644 D785 P786 ASP PRO ASP PRO N791 S831 S832 I903

GLY MET ILE ASP GLN SER ASP ALA ALA VAL LEU SER SER LEU VAL SER GLU SER LYS SER SER GLN ASP SER ASP SER ASP TYR SER THR SER E933 M934 L935 T1046 L1222 ALA ASP GLU GLU GLU ASP PRO LEU ILE TYR GLN HIS ARG MET LEU ARG SER GLY GLN GLY ASP ALA LEU ALA

SER GLY PRO VAL GLU THR GLY PRO MET LYS LYS LEU HIS VAL S1261 T1262 I1263 N1264 D1278 D1468 T1469 H1730 T1734 E1735 A1810 R1811 D1812 E1813 K1814 LYS LYS LEU ARG ALA HIS ALA GLY ALA ASN ILE THR ASN ALA THR ALA THR THR ALA ALA THR ALA THR THR

THR ALA SER GLU GLY ASN SER GLU SER GLU GLU SER THR GLU ASN SER PRO THR PRO SER PRO LEU GLN GLU K1867 K1868 V1869 T1870 E1871 R1896 G1897 R2036 G2040 E2041 R2042 F2048 E2059 E2080 V2094 K2095 R2266 R2430 D2433 T2434 N2435 T2436 LYS GLY

ASN LYS ARG SER ARG THR ARG THR ASP SER TYR SER ALA GLY GLN SER VAL GLU ILE LEU ASP GLY VAL GLU LEU GLY GLU PRO ALA HIS LYS LYS THR GLY THR VAL PRO GLU ILE HIS SER PHE ILE GLY ASP LEU VAL LYS PRO GLU A2492 W2549

• Molecule 1: Serine/threonine-protein kinase mTOR

Chain C:

19%
86%　　　　14%

MET LEU GLY THR GLY PRO ALA ALA ALA THR ALA ALA THR THR SER SER ASN V19 S20 V21 L22 Q23 Q24 F25 A26 S27 G28 L29 LYS SER ARG ASN GLU E35 T36 R37 A38 K39 A40 A41 K42 E43 L44 Q45 H46 Y47 V48 THR MET GLU LEU ARG GLU MET SER GLN GLU SER

T61 R62 F63 Y64 D65 Q66 L67 N68 H69 H70 I71 F72 E73 L74 V75 S76 S77 S78 D79 A80 N81 E82 R83 K84 G85 G86 I87 L88 A89 I90 A91 S92 L93 I94 G95 V96 E97 G98 G99 N100 A101 T102 R103 I104 G105 R106 F107 A108 N109 Y110 L111 R112 N113 L114 L115 P116 S117 N118 D119 P120

V121 V122 M123 E124 M125 A126 S127 K128 A129 I130 G131 R132 L133 A134 M135 A136 G137 D138 T139 F140 T141 A142 E143 Y144 V145 E146 F147 E148 V149 K150 R151 A152 L153 E154 W155 L156 G157 ALA ASP ARG ASN E162 G163 R164 R165 H166 A167 A168 V169 L170 V171 L172 R173 E174 L175 A176 I177 S178 V179 P180

T181 F182 F183 F184 Q185 G186 V187 Q188 P189 F190 F191 D192 N193 I194 F195 V196 A197 V198 W199 D200 P201 K202 Q203 A204 I205 R206 E207 G208 A209 V210 A211 A212 L213 R214 A215 C216 L217 I218 L219 T220 T221 Q222 R223 GLU PRO LYS GLU MET GLN LYS PRO GLN W233 Y234 R235 H236 T237 F238 E239 E240

A241 E242 K243 G244 F245 ASP GLU THR LEU ALA LYS GLU GLY LYS GLY MET ASN R257 D258 D259 R260 I261 H262 G263 A264 L265 L266 I267 L268 N269 E270 L271 V272 R273 I274 S275 S276 M277 E278 G279 E280 R281 L282 R283 E284 E285 M286 E287 E288 I289 T290 GLN GLN LEU VAL HIS ASP LYS TYR CYS

LYS ASP LEU MET GLY PHE GLY THR LYS PRO ARG HIS ILE THR PRO PHE THR SER PHE GLN ALA VAL GLN PRO GLN GLN SER ASN ALA LEU VAL GLY LEU LEU GLY TYR SER HIS GLN GLY LEU MET GLY PHE GLY THR SER PRO SER PRO ALA LYS SER THR LEU VAL E358 S359 R360

C361 C362 R363 D364 L365 M366 E367 E368 K369 F370 D371 Q372 V373 C374 Q375 W376 V377 L378 K379 C380 R381 N382 S383 K384 N385 S386 L387 I388 Q389 M390 T391 I392 L393 N394 L395 L396 P397 R398 L399 A400 A401 F402 R403 P404 S405 A406 F407 T408 D409 T410 Q411 Y412 L413 Q414 D415 T416 M417 N418 H419 V420

• Molecule 2: Target of rapamycin complex subunit LST8

Chain B:

19%

97%

• Molecule 2: Target of rapamycin complex subunit LST8

Chain D:

30%

97%

• Molecule 3: Regulatory-associated protein of mTOR

Chain E:

• Molecule 3: Regulatory-associated protein of mTOR

Chain U:

R1242 K1254 G1255 Y1292 TYR ASP GLY PHE MET GLY GLN ARG VAL G1302 A1303 K1332 ARG VAL ARG

• Molecule 4: Ras-related GTP-binding protein A

Chain F: 95%   5%

MET PRO ASN THR A5 R97 K295 R302 VAL ASP GLY PRO LYS HIS SER LEU LEU MET ARG

• Molecule 4: Ras-related GTP-binding protein A

Chain M: 94%   5%

MET PRO ASN THR A5 V45 R83 R150 R153 E156 M189 R227 A246 K295 R302 VAL ASP GLY PRO LYS HIS SER LEU LEU MET ARG

• Molecule 4: Ras-related GTP-binding protein A

Chain V: 94%   5%

MET PRO ASN THR A5 L151 E156 K220 R227 K295 R302 VAL ASP GLY PRO LYS HIS SER LEU LEU MET ARG

• Molecule 4: Ras-related GTP-binding protein A

5%

Chain c: 94%   5%

MET PRO ASN THR A5 R38 D44 V45 R51 D79 R83 R97 R153 E156 D166 M189 K220 E221 Q222 R223 R227 A246 S280 K295 E301 R302 VAL ASP GLY PRO LYS HIS SER LEU LEU MET ARG

• Molecule 5: Ras-related GTP-binding protein C

Chain G: 70%   30%

MET SER LEU GLN TYR GLY ALA GLU GLU THR PRO LEU ALA GLY SER TYR GLY ALA ALA ASP SER PHE PRO LYS ASP PHE GLY TYR GLY VAL GLU GLU GLU GLU GLU ALA ALA ALA GLY GLY GLY VAL ALA GLY ALA GLY GLY GLY CYS GLY PRO GLY GLY ALA ASP S59

K84 MET SER PRO ASN GLU THR LEU PHE LEU GLU SER THR ASN LYS ILE LYS ASP ILE SER N106 P118 GLY GLN MET ASP PHE PHE ASP PRO THR PHE ASP Y130 D149 E152 K166 D205 S306 V371 THR SER HIS ARG SER CYS GLY HIS GLN THR SER

ALA SER SER LEU LYS ALA LEU THR HIS ASN GLY THR PRO ARG ASN ALA ILE

• Molecule 5: Ras-related GTP-binding protein C

7%

Chain N: 69%   31%

MET SER LEU GLN TYR GLY ALA GLU GLU THR PRO LEU ALA GLY SER TYR GLY ALA ALA ASP SER PHE PRO LYS ASP PHE GLY TYR GLY VAL GLU GLU GLU GLU GLU ALA ALA ALA GLY GLY VAL GLY ALA GLY ALA GLY GLY CYS GLY PRO GLY GLY ALA ASP S59 S60

H83 LYS MET SER PRO ASN GLU THR LEU PHE LEU GLU SER THR ASN LYS ILE TYR LYS ASP ASP ILE SER N106 W115 D116 PHE PRO GLY GLN MET ASP PHE PHE ASP PRO THR PHE ASP TYR E131 M132 I133 F134 R135 I144 Q147 D148 D149 K166 D170 G182

D186 D205 L208 E209 K210 L211 H212 F215 Y216 L217 S306 E347 G370 V371 THR SER HIS ARG SER CYS GLY HIS GLN THR SER ALA SER SER LEU LYS ALA LEU THR HIS ASN GLY THR PRO ARG ASN ALA ILE

• Molecule 5: Ras-related GTP-binding protein C

Chain W: 70%   30%

MET SER LEU GLN TYR GLY ALA GLU GLU THR PRO LEU ALA GLY SER TYR GLY ALA ALA ASP SER PHE PRO LYS ASP PHE GLY TYR GLY VAL GLU GLU GLU GLU GLU ALA ALA ALA GLY GLY VAL GLY ALA GLY ALA GLY GLY CYS GLY PRO GLY GLY ALA ASP S59

K84 MET SER PRO ASN GLU THR LEU PHE LEU GLU SER THR ASN LYS ILE TYR LYS ASP ASP ILE SER N106 P118 GLY GLN MET ASP PHE PHE ASP PRO THR PHE ASP Y130 D149 D205 K210 D304 G305 S306 E347 E365 E368 V371 THR SER HIS SER

CYS GLY HIS GLN THR SER ALA SER SER LEU LYS ALA LEU THR HIS ASN GLY THR PRO ARG ASN ALA ILE

• Molecule 5: Ras-related GTP-binding protein C

Chain d: 11%   69%   31%

MET SER LEU GLN TYR GLY ALA GLU GLU THR PRO LEU ALA GLY SER TYR GLY ALA ALA ASP SER PHE PRO LYS ASP PHE GLY TYR GLY VAL GLU GLU GLU GLU GLU ALA ALA ALA GLY GLY VAL GLY ALA GLY ALA GLY GLY CYS GLY PRO GLY GLY ALA ASP S59 S60

L69 R70 K74 N75 H83 LYS MET SER PRO ASN GLU THR LEU PHE LEU GLU SER THR ASN LYS ILE TYR LYS ASP ASP ILE SER N106 W115 D116 PHE PRO GLY GLN MET ASP PHE PHE ASP PRO THR PHE ASP TYR E131 M132 I133 F134 R135 G136 I144 Q147 D148 D149

E152 A153 L157 H158 I159 K166 D170 G182 L183 D186 Q197 N200 L203 A204 D205 A206 G207 L208 E209 K210 L211 H212 L213 L217 K302 S306 E368 V369 G370 V371 THR SER HIS ARG SER CYS GLY HIS GLN THR SER ALA SER SER LEU LYS ALA

LEU THR HIS ASN GLY THR PRO ARG ASN ALA ILE

• Molecule 6: Ragulator complex protein LAMTOR1

Chain H: 40%   68%   ·   31%

MET GLY CYS CYS TYR SER SER GLU ASN GLU ASP SER ASP GLN ASP ARG GLU GLU ARG LYS LEU LEU ASP PRO SER SER PRO PRO THR LYS ALA LEU ASN GLY ALA GLU PRO ASN TYR HIS SER LEU PRO SER ALA R47 T48 S69 A70 A71 D72 SER GLN GLY MET E77 Q78 H79

• Molecule 6: Ragulator complex protein LAMTOR1

Chain O:

• Molecule 6: Ragulator complex protein LAMTOR1

Chain X:

• Molecule 6: Ragulator complex protein LAMTOR1

Chain e:

• Molecule 7: Ragulator complex protein LAMTOR2

Chain I:

14%

98%

M1 T16 G17 G18 G38 D39 T40 D41 D57 N61 Q62 A63 F64 N65 E66 M77 V86 T98 V99 G100 F101 G102 Q113 Q121 A124 SER

• Molecule 7: Ragulator complex protein LAMTOR2

Chain P:

9%

99%

M1 S12 E28 D39 T40 D41 R58 N61 Q62 N65 M77 T98 Q121 A124 SER

• Molecule 7: Ragulator complex protein LAMTOR2

Chain Y:

26%

98%

M1 T8 T16 G17 G18 E28 Y37 G38 D39 T40 D41 V44 A54 D57 R58 N61 Q62 A63 F64 N65 E66 D67 N68 L69 M77 A82 V86 K96 E97 T98 L104 A108 Q109 Q113 E117 Q121 A124 SER

• Molecule 7: Ragulator complex protein LAMTOR2

Chain f:

14%

98%

M1 Q9 S12 Y37 G38 D39 T40 D41 R58 N61 Q62 N65 E66 D67 E78 V86 T98 Q113 Q121 A124 SER

• Molecule 8: Ragulator complex protein LAMTOR3

Chain J:

26%

95%

MET ALA D3 R7 F8 L9 Y10 K11 K12 L13 P14 S15 V16 E17 R27 D28 G29 I33 K34 V35 A36 N37 D38 N39 E42 H43 A44 L45 S66 K67 T77 F92 S97 V104 E109 F114 E115 E116 Q119 E122 VAL SER

• Molecule 8: Ragulator complex protein LAMTOR3

Chain Q:

6%

96%

MET ALA D3 R7 K11 P14 E17 D38 K108 R118 E122 VAL SER

• Molecule 8: Ragulator complex protein LAMTOR3

Chain Z:

54%

94%

MET ALA D3 D4 L5 K6 R7 F8 L9 Y10 K11 K12 L13 P14 S15 V16 E17 G18 A21 I22 V23 D26 R27 D28 G29 I33 K34 V35 A36 N37 D38 N39 A40 P41 E42 H43 A44 L45 R46 P47 G48 F49 L50 S51 T52 L55 D58 Q59 G64 L65 S66 K67 I72

N76 T77 Y78 Q79 F92 I93 A94 S95 S96 S97 T100 G101 L102 I103 V104 S105 L106 E107 K108 E109 L110 A111 F114 E115 E116 L117 R118 Q119 V120 V121 E122 VAL SER

• Molecule 8: Ragulator complex protein LAMTOR3

13%

Chain g:

97%

MET ALA D3 D4 L13 P14 S15 V16 E17 G18 D38 G64 L65 S66 T77 N84 R85 L86 K108 R118 V121 E122 VAL SER

• Molecule 9: Ragulator complex protein LAMTOR4

77%

Chain K:

83% 15%

MET THR SER ALA L5 T6 Q7 G8 L9 E10 R11 I12 P13 D14 Q15 L16 G17 Y18 L19 V20 L21 S22 E23 G24 A25 V26 L27 A28 S29 S30 G31 D32 L33 E34 N35 D36 E37 Q38 A39 A40 S41 A42 I43 S44 E45 L46 V47 S48 T49 A50 C51 G52 F53 R54 L55 H56 ARG GLY MET ASN

V61 P62 F63 K64 R65 L66 S67 V68 V69 F70 G71 E72 H73 T74 L75 L76 V77 T78 V79 S80 G81 Q82 R83 Q90 N91 R92 GLY ARG GLU PRO ILE ASP VAL

• Molecule 9: Ragulator complex protein LAMTOR4

32%

Chain R:

82% 15%

MET THR SER ALA L5 T6 Q7 G8 R11 I12 P13 D14 Q15 L16 L21 S22 E23 G24 A25 V26 L27 A28 S29 S30 G31 D32 L33 E34 N35 D36 E37 Q38 A39 R54 L55 H56 ARG GLY MET ASN V61 R65 G71 E72 H73 L76 N91 R92 GLY ARG GLU PRO ILE

ASP VAL

• Molecule 9: Ragulator complex protein LAMTOR4

84%

Chain a:

83% 15%

MET THR SER ALA L5 T6 Q7 G8 L9 E10 R11 I12 P13 D14 Q15 L16 G17 Y18 L19 V20 L21 S22 E23 G24 A25 V26 L27 A28 S29 S30 G31 D32 L33 E34 N35 D36 E37 Q38 A39 A40 S41 A42 I43 S44 E45 L46 V47 S48 T49 A50 C51 G52 F53 R54 L55 H56 ARG GLY MET ASN

V61 P62 F63 K64 R65 L66 S67 V68 V69 F70 G71 E72 H73 T74 L75 L76 V77 T78 V79 S80 G81 Q82 R83 V84 F85 V86 V87 K88 R89 Q90 N91 R92 GLY ARG GLU PRO ILE ASP VAL

• Molecule 9: Ragulator complex protein LAMTOR4

52%

Chain h:

83% 15%

MET THR SER ALA L5 T6 Q7 G8 L9 E10 R11 I12 P13 D14 Q15 L16 G17 Y18 L19 V20 L21 S22 E23 G24 A25 V26 L27 A28 S29 S30 G31 D32 L33 E34 N35 D36 E37 Q38 A39 A40 S41 A42 I43 R54 L55 H56 ARG GLY MET ASN V61 P62 F63 K64 R65 L66 S67 F70

G71 E72 H73 L76 S80 F85 N91 R92 GLY ARG GLU PRO ILE ASP VAL

• Molecule 10: Ragulator complex protein LAMTOR5

Chain L:

74%

98%

M1 E2 A3 Q7 H8 L9 E10 D11 T12 M13 K14 N15 P16 S17 I18 V19 G20 V21 L22 S26 G32 C33 R34 G35 T36 L37 S38 D39 H41 A42 G43 V44 I45 S46 V47 L48 A49 Q50 Q51 A52 A53 K54 L55 T56 S57 D58 P59 T60 D61 I62 P63 V64 V65 C66 L67 E68

S69 D70 N71 I74 M75 I76 Q77 K78 H79 D80 G81 I82 T83 V84 A85 V86 H87 K88 M89 ALA SER

• Molecule 10: Ragulator complex protein LAMTOR5

Chain S:

33%

97%

M1 E2 A3 Q7 E10 D11 T12 M13 K14 N15 P16 S17 I18 V19 S26 C33 R34 G35 T36 L37 A53 K54 S57 D58 P59 T60 D61 I62 D70 N71 K78 H79 D80 A85 K88 M89 ALA SER

• Molecule 10: Ragulator complex protein LAMTOR5

Chain b:

84%

98%

M1 E2 A3 T4 L5 E6 Q7 H8 L9 E10 D11 T12 M13 K14 N15 P16 S17 I18 V19 G20 V21 L22 D25 N30 L31 G32 C33 R34 G35 T36 L37 S38 D39 E40 H41 A42 G43 V44 I45 S46 V47 L48 A49 Q50 Q51 A52 A53 K54 L55 T56 S57 D58 P59 T60 D61 I62 P63 V64

V65 C66 L67 E68 S69 D70 N71 G72 N73 I74 M75 I76 Q77 K78 H79 D80 G81 I82 T83 V84 A85 V86 H87 K88 M89 ALA SER

• Molecule 10: Ragulator complex protein LAMTOR5

Chain i:

57%

98%

M1 E2 A3 E6 Q7 H8 L9 E10 D11 T12 M13 K14 N15 P16 S17 I18 V19 G20 V21 S26 Q27 G28 L29 C33 R34 G35 T36 L37 S38 D39 E40 Q50 Q51 A52 A53 K54 L55 T56 S57 D58 P59 T60 D61 I62 C66 L67 E68 S69 D70 N71 G72 N73 I74 M75 I76

H79 D80 G81 I82 A85 V86 H87 K88 M89 ALA SER

• Molecule 11: Transcription factor EB

Chain T:

22%

78%

• Molecule 11: Transcription factor EB

Chain j:　22%　78%

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	192332	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 $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	57.773	Depositor
Minimum map value	-33.205	Depositor
Average map value	-0.015	Depositor
Map value standard deviation	0.964	Depositor
Recommended contour level	6.0	Depositor
Map size (Å)	617.39996, 617.39996, 617.39996	wwPDB
Map dimensions	588, 588, 588	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: GTP, MG, IHP, 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	A	0.28	0/17941	0.60	0/24276
1	C	0.28	0/17941	0.60	0/24276
2	B	0.27	0/2514	0.57	0/3426
2	D	0.26	0/2514	0.57	0/3426
3	E	0.31	0/9242	0.61	2/12573 (0.0%)
3	U	0.31	0/9242	0.62	1/12573 (0.0%)
4	F	0.31	0/2491	0.65	0/3353
4	M	0.30	0/2491	0.65	0/3353
4	V	0.31	0/2489	0.65	1/3350 (0.0%)
4	c	0.33	0/2491	0.70	1/3353 (0.0%)
5	G	0.31	0/2309	0.62	0/3114
5	N	0.29	0/2267	0.62	0/3057
5	W	0.31	0/2309	0.63	0/3114
5	d	0.30	0/2267	0.61	0/3057
6	H	0.28	0/884	0.63	0/1201
6	O	0.29	0/912	0.64	0/1239
6	X	0.27	0/884	0.63	0/1201
6	e	0.30	0/912	0.68	0/1239
7	I	0.31	0/949	0.69	0/1285
7	P	0.32	0/949	0.69	0/1285
7	Y	0.32	0/949	0.74	0/1285
7	f	0.32	0/949	0.71	0/1285
8	J	0.29	0/951	0.64	0/1290
8	Q	0.29	0/951	0.68	0/1290
8	Z	0.29	0/951	0.67	0/1290
8	g	0.32	0/951	0.71	0/1290
9	K	0.28	0/649	0.64	0/876
9	R	0.27	0/649	0.66	0/876
9	a	0.27	0/649	0.65	0/876
9	h	0.27	0/649	0.66	0/876
10	L	0.30	0/661	0.64	0/896
10	S	0.29	0/661	0.66	0/896

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
10	b	0.27	0/661	0.60	0/896
10	i	0.29	0/661	0.64	0/896
11	T	0.28	0/896	0.63	0/1211
11	j	0.31	0/896	0.64	0/1211
All	All	0.29	0/96732	0.62	5/130991 (0.0%)

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
2	D	0	1
3	E	0	3
3	U	0	1
4	M	0	1
4	c	0	1
9	K	0	1
9	R	0	1
9	a	0	1
9	h	0	1
All	All	0	11

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	V	151	LEU	CA-CB-CG	5.77	128.58	115.30
4	c	44	ASP	CB-CG-OD1	5.32	123.09	118.30
3	U	831	MET	CA-CB-CG	5.13	122.02	113.30
3	E	796	LEU	CA-CB-CG	5.12	127.09	115.30
3	E	831	MET	CA-CB-CG	5.04	121.88	113.30

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	25	ARG	Sidechain
3	E	118	ARG	Sidechain
3	E	210	ALA	Mainchain
3	E	211	LEU	Peptide

Continued on next page...

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Res	Type	Group
9	K	65	ARG	Sidechain
4	M	83	ARG	Sidechain
9	R	65	ARG	Sidechain
3	U	118	ARG	Sidechain
9	a	65	ARG	Sidechain
4	c	83	ARG	Sidechain
9	h	65	ARG	Sidechain

5.2 Too-close contacts ⓘ

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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	A	2158/2549 (85%)	2108 (98%)	50 (2%)	0	100	100
1	C	2158/2549 (85%)	2108 (98%)	50 (2%)	0	100	100
2	B	315/326 (97%)	298 (95%)	17 (5%)	0	100	100
2	D	315/326 (97%)	298 (95%)	17 (5%)	0	100	100
3	E	1123/1335 (84%)	1046 (93%)	77 (7%)	0	100	100
3	U	1123/1335 (84%)	1048 (93%)	75 (7%)	0	100	100
4	F	296/313 (95%)	280 (95%)	16 (5%)	0	100	100
4	M	296/313 (95%)	277 (94%)	18 (6%)	1 (0%)	41	74
4	V	296/313 (95%)	283 (96%)	13 (4%)	0	100	100
4	c	296/313 (95%)	272 (92%)	23 (8%)	1 (0%)	41	74
5	G	275/399 (69%)	264 (96%)	11 (4%)	0	100	100
5	N	271/399 (68%)	258 (95%)	13 (5%)	0	100	100
5	W	275/399 (69%)	262 (95%)	13 (5%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	d	271/399 (68%)	259 (96%)	12 (4%)	0	100	100
6	H	107/161 (66%)	103 (96%)	4 (4%)	0	100	100
6	O	113/161 (70%)	106 (94%)	7 (6%)	0	100	100
6	X	107/161 (66%)	102 (95%)	5 (5%)	0	100	100
6	e	113/161 (70%)	106 (94%)	7 (6%)	0	100	100
7	I	122/125 (98%)	118 (97%)	3 (2%)	1 (1%)	19	58
7	P	122/125 (98%)	107 (88%)	15 (12%)	0	100	100
7	Y	122/125 (98%)	117 (96%)	4 (3%)	1 (1%)	19	58
7	f	122/125 (98%)	115 (94%)	6 (5%)	1 (1%)	19	58
8	J	118/124 (95%)	112 (95%)	6 (5%)	0	100	100
8	Q	118/124 (95%)	117 (99%)	1 (1%)	0	100	100
8	Z	118/124 (95%)	112 (95%)	6 (5%)	0	100	100
8	g	118/124 (95%)	114 (97%)	4 (3%)	0	100	100
9	K	80/99 (81%)	68 (85%)	11 (14%)	1 (1%)	12	47
9	R	80/99 (81%)	70 (88%)	9 (11%)	1 (1%)	12	47
9	a	80/99 (81%)	69 (86%)	10 (12%)	1 (1%)	12	47
9	h	80/99 (81%)	69 (86%)	10 (12%)	1 (1%)	12	47
10	L	87/91 (96%)	79 (91%)	8 (9%)	0	100	100
10	S	87/91 (96%)	79 (91%)	8 (9%)	0	100	100
10	b	87/91 (96%)	79 (91%)	8 (9%)	0	100	100
10	i	87/91 (96%)	81 (93%)	6 (7%)	0	100	100
11	T	105/476 (22%)	96 (91%)	8 (8%)	1 (1%)	15	54
11	j	105/476 (22%)	97 (92%)	7 (7%)	1 (1%)	15	54
All	All	11746/14620 (80%)	11177 (95%)	558 (5%)	11 (0%)	54	83

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	M	45	VAL
7	Y	86	VAL
7	f	86	VAL
11	T	43	GLN
11	j	43	GLN
9	a	13	PRO

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
9	h	13	PRO
9	K	13	PRO
9	R	13	PRO
4	c	45	VAL
7	I	86	VAL

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	A	1919/2220 (86%)	1918 (100%)	1 (0%)	93	98
1	C	1919/2220 (86%)	1917 (100%)	2 (0%)	93	98
2	B	269/276 (98%)	269 (100%)	0	100	100
2	D	269/276 (98%)	269 (100%)	0	100	100
3	E	1000/1163 (86%)	997 (100%)	3 (0%)	92	96
3	U	1000/1163 (86%)	996 (100%)	4 (0%)	91	95
4	F	272/287 (95%)	271 (100%)	1 (0%)	91	95
4	M	272/287 (95%)	269 (99%)	3 (1%)	73	88
4	V	271/287 (94%)	268 (99%)	3 (1%)	73	88
4	c	272/287 (95%)	270 (99%)	2 (1%)	84	94
5	G	255/340 (75%)	254 (100%)	1 (0%)	91	95
5	N	251/340 (74%)	251 (100%)	0	100	100
5	W	255/340 (75%)	255 (100%)	0	100	100
5	d	251/340 (74%)	251 (100%)	0	100	100
6	H	97/141 (69%)	95 (98%)	2 (2%)	53	79
6	O	100/141 (71%)	99 (99%)	1 (1%)	76	90
6	X	97/141 (69%)	94 (97%)	3 (3%)	40	72
6	e	100/141 (71%)	98 (98%)	2 (2%)	55	80
7	I	97/98 (99%)	97 (100%)	0	100	100
7	P	97/98 (99%)	97 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
7	Y	97/98 (99%)	97 (100%)	0	100	100
7	f	97/98 (99%)	97 (100%)	0	100	100
8	J	105/108 (97%)	103 (98%)	2 (2%)	57	81
8	Q	105/108 (97%)	104 (99%)	1 (1%)	76	90
8	Z	105/108 (97%)	102 (97%)	3 (3%)	42	74
8	g	105/108 (97%)	105 (100%)	0	100	100
9	K	71/83 (86%)	71 (100%)	0	100	100
9	R	71/83 (86%)	70 (99%)	1 (1%)	67	86
9	a	71/83 (86%)	71 (100%)	0	100	100
9	h	71/83 (86%)	71 (100%)	0	100	100
10	L	76/77 (99%)	76 (100%)	0	100	100
10	S	76/77 (99%)	75 (99%)	1 (1%)	69	87
10	b	76/77 (99%)	76 (100%)	0	100	100
10	i	76/77 (99%)	76 (100%)	0	100	100
11	T	96/419 (23%)	95 (99%)	1 (1%)	76	90
11	j	96/419 (23%)	95 (99%)	1 (1%)	76	90
All	All	10457/12692 (82%)	10419 (100%)	38 (0%)	91	95

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2266	ARG
1	C	970	MET
1	C	2090	LYS
3	E	375	MET
3	E	786	LYS
3	E	1242	ARG
4	F	295	LYS
5	G	166	LYS
6	H	47	ARG
6	H	104	LYS
8	J	7	ARG
8	J	67	LYS
4	M	150	ARG
4	M	227	ARG
4	M	295	LYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
6	O	47	ARG
8	Q	7	ARG
9	R	11	ARG
10	S	78	LYS
11	T	71	LYS
3	U	83	ARG
3	U	786	LYS
3	U	1008	LYS
3	U	1242	ARG
4	V	220	LYS
4	V	227	ARG
4	V	295	LYS
6	X	47	ARG
6	X	114	GLN
6	X	151	LYS
8	Z	7	ARG
8	Z	67	LYS
8	Z	108	LYS
4	c	227	ARG
4	c	295	LYS
6	e	47	ARG
6	e	145	GLN
11	j	71	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	2106	HIS
7	P	121	GLN
11	T	28	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

5.4   Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 14 ligands modelled in this entry, 4 are monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
13	GTP	F	401	14	26,34,34	1.21	2 (7%)	32,54,54	1.64	6 (18%)
15	GDP	W	401	-	24,30,30	0.93	1 (4%)	30,47,47	1.20	3 (10%)
15	GDP	N	401	-	24,30,30	0.96	1 (4%)	30,47,47	1.16	3 (10%)
15	GDP	d	401	-	24,30,30	0.95	1 (4%)	30,47,47	1.24	4 (13%)
13	GTP	M	401	14	26,34,34	1.17	2 (7%)	32,54,54	1.55	6 (18%)
13	GTP	c	401	14	26,34,34	1.17	2 (7%)	32,54,54	1.59	6 (18%)
13	GTP	V	401	14	26,34,34	1.19	2 (7%)	32,54,54	1.63	6 (18%)
15	GDP	G	401	-	24,30,30	0.95	1 (4%)	30,47,47	1.20	3 (10%)
12	IHP	A	2601	-	36,36,36	1.47	6 (16%)	54,60,60	0.73	1 (1%)
12	IHP	C	2601	-	36,36,36	1.47	6 (16%)	54,60,60	0.64	1 (1%)

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
13	GTP	F	401	14	-	1/18/38/38	0/3/3/3
15	GDP	W	401	-	-	1/12/32/32	0/3/3/3
15	GDP	N	401	-	-	2/12/32/32	0/3/3/3
15	GDP	d	401	-	-	3/12/32/32	0/3/3/3
13	GTP	M	401	14	-	5/18/38/38	0/3/3/3
13	GTP	c	401	14	-	5/18/38/38	0/3/3/3

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
13	GTP	V	401	14	-	1/18/38/38	0/3/3/3
15	GDP	G	401	-	-	2/12/32/32	0/3/3/3
12	IHP	A	2601	-	-	7/30/54/54	0/1/1/1
12	IHP	C	2601	-	-	7/30/54/54	0/1/1/1

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	F	401	GTP	C5-C6	-4.16	1.39	1.47
13	c	401	GTP	C5-C6	-4.13	1.39	1.47
13	M	401	GTP	C5-C6	-4.12	1.39	1.47
13	V	401	GTP	C5-C6	-4.12	1.39	1.47
12	C	2601	IHP	P3-O13	3.72	1.66	1.59
12	A	2601	IHP	P3-O13	3.72	1.66	1.59
12	A	2601	IHP	P4-O14	3.07	1.65	1.59
12	C	2601	IHP	P4-O14	3.06	1.65	1.59
12	C	2601	IHP	P2-O12	3.05	1.65	1.59
12	A	2601	IHP	P2-O12	3.05	1.65	1.59
12	A	2601	IHP	P6-O16	3.02	1.65	1.59
12	C	2601	IHP	P6-O16	3.01	1.65	1.59
12	C	2601	IHP	P1-O11	2.93	1.64	1.59
12	C	2601	IHP	P5-O15	2.93	1.64	1.59
12	A	2601	IHP	P1-O11	2.86	1.64	1.59
12	A	2601	IHP	P5-O15	2.84	1.64	1.59
15	d	401	GDP	C6-N1	-2.74	1.33	1.37
15	N	401	GDP	C6-N1	-2.62	1.34	1.37
15	G	401	GDP	C6-N1	-2.42	1.34	1.37
15	W	401	GDP	C6-N1	-2.34	1.34	1.37
13	c	401	GTP	C2-N3	2.12	1.38	1.33
13	M	401	GTP	C2-N3	2.12	1.38	1.33
13	V	401	GTP	C2-N3	2.08	1.38	1.33
13	F	401	GTP	C2-N3	2.03	1.38	1.33

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	V	401	GTP	PB-O3B-PG	-4.34	117.94	132.83
13	F	401	GTP	PB-O3B-PG	-4.08	118.82	132.83
13	c	401	GTP	PB-O3B-PG	-4.07	118.87	132.83
13	F	401	GTP	PA-O3A-PB	-3.93	119.33	132.83
13	M	401	GTP	PB-O3B-PG	-3.79	119.82	132.83

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	V	401	GTP	PA-O3A-PB	-3.74	120.00	132.83
13	c	401	GTP	PA-O3A-PB	-3.71	120.10	132.83
13	M	401	GTP	PA-O3A-PB	-3.68	120.19	132.83
15	d	401	GDP	PA-O3A-PB	-3.59	120.49	132.83
15	G	401	GDP	PA-O3A-PB	-3.56	120.62	132.83
15	W	401	GDP	PA-O3A-PB	-3.45	120.97	132.83
15	N	401	GDP	PA-O3A-PB	-3.45	121.00	132.83
13	V	401	GTP	C5-C6-N1	3.37	119.91	113.95
13	F	401	GTP	C5-C6-N1	3.35	119.86	113.95
13	c	401	GTP	C5-C6-N1	3.30	119.78	113.95
13	M	401	GTP	C5-C6-N1	3.28	119.74	113.95
13	c	401	GTP	C8-N7-C5	3.18	109.05	102.99
13	F	401	GTP	C8-N7-C5	3.17	109.03	102.99
13	V	401	GTP	C8-N7-C5	3.17	109.02	102.99
13	M	401	GTP	C8-N7-C5	3.15	109.00	102.99
13	V	401	GTP	C2-N1-C6	-3.08	119.42	125.10
13	F	401	GTP	C2-N1-C6	-3.03	119.53	125.10
13	M	401	GTP	C2-N1-C6	-3.03	119.53	125.10
13	c	401	GTP	C2-N1-C6	-3.02	119.53	125.10
15	G	401	GDP	C8-N7-C5	2.45	107.65	102.99
15	d	401	GDP	C8-N7-C5	2.43	107.62	102.99
15	W	401	GDP	C5-C6-N1	2.43	118.24	113.95
15	W	401	GDP	C8-N7-C5	2.42	107.60	102.99
15	G	401	GDP	C5-C6-N1	2.42	118.22	113.95
15	N	401	GDP	C8-N7-C5	2.41	107.58	102.99
15	N	401	GDP	C5-C6-N1	2.35	118.11	113.95
13	c	401	GTP	O6-C6-C5	-2.31	119.87	124.37
13	M	401	GTP	O6-C6-C5	-2.29	119.90	124.37
15	d	401	GDP	C5-C6-N1	2.28	117.98	113.95
12	A	2601	IHP	C3-C2-C1	2.24	115.32	110.41
13	V	401	GTP	O6-C6-C5	-2.15	120.18	124.37
13	F	401	GTP	O6-C6-C5	-2.14	120.19	124.37
12	C	2601	IHP	O13-C3-C2	2.13	113.70	108.69
15	d	401	GDP	O4'-C1'-C2'	-2.03	103.96	106.93

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
12	A	2601	IHP	C2-C3-O13-P3
12	A	2601	IHP	C3-C4-O14-P4
12	A	2601	IHP	C5-C4-O14-P4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
12	C	2601	IHP	C2-C3-O13-P3
12	C	2601	IHP	C3-C4-O14-P4
13	M	401	GTP	C5'-O5'-PA-O3A
13	M	401	GTP	C3'-C4'-C5'-O5'
13	c	401	GTP	C5'-O5'-PA-O3A
15	G	401	GDP	C5'-O5'-PA-O1A
15	N	401	GDP	PA-O3A-PB-O2B
15	W	401	GDP	C5'-O5'-PA-O1A
15	d	401	GDP	C5'-O5'-PA-O1A
12	C	2601	IHP	C5-C4-O14-P4
13	M	401	GTP	O4'-C4'-C5'-O5'
15	d	401	GDP	PA-O3A-PB-O2B
12	A	2601	IHP	C1-O11-P1-O31
12	C	2601	IHP	C1-O11-P1-O31
13	M	401	GTP	PA-O3A-PB-O2B
13	M	401	GTP	C5'-O5'-PA-O2A
13	c	401	GTP	C3'-C4'-C5'-O5'
13	c	401	GTP	PA-O3A-PB-O2B
13	F	401	GTP	PA-O3A-PB-O1B
12	A	2601	IHP	C5-O15-P5-O25
12	C	2601	IHP	C5-O15-P5-O25
12	A	2601	IHP	C5-O15-P5-O35
12	A	2601	IHP	C5-O15-P5-O45
12	C	2601	IHP	C5-O15-P5-O35
12	C	2601	IHP	C5-O15-P5-O45
13	V	401	GTP	C5'-O5'-PA-O3A
15	d	401	GDP	C5'-O5'-PA-O3A
15	N	401	GDP	O4'-C4'-C5'-O5'
13	c	401	GTP	PA-O3A-PB-O1B
13	c	401	GTP	C5'-O5'-PA-O2A
15	G	401	GDP	C3'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

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 GTP F 401

Bond lengths · Bond angles · Torsions · Rings

Ligand GDP W 401

Bond lengths · Bond angles · Torsions · Rings

Ligand GDP N 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP d 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP M 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP c 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP V 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP G 401

Bond lengths

Bond angles

Torsions

Rings

Ligand IHP A 2601

Bond lengths

Bond angles

Torsions

Rings

Ligand IHP C 2601

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-26861. 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 |
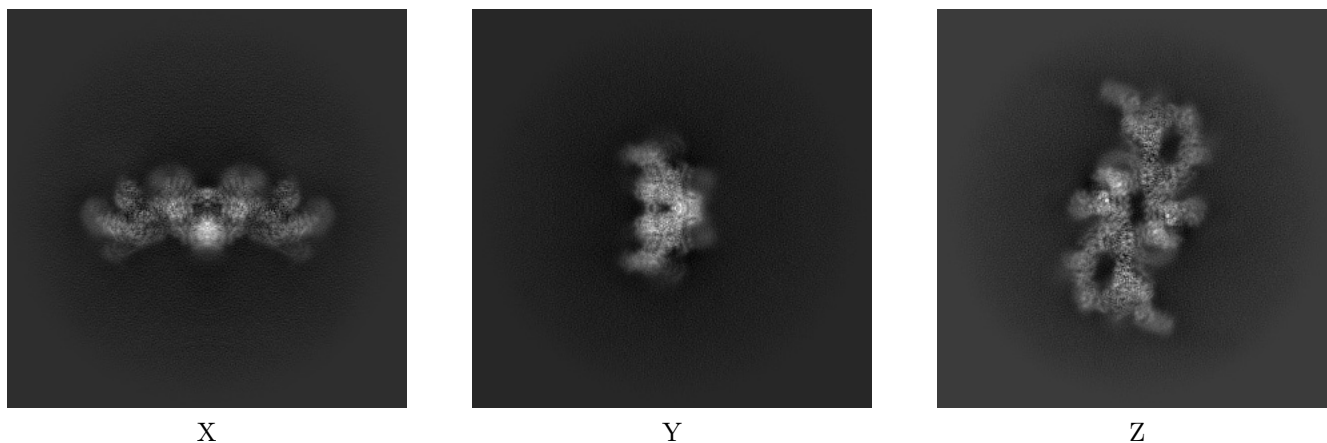
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

6.2.1 Primary map

| X Index: 294 | Y Index: 294 | Z Index: 294 |
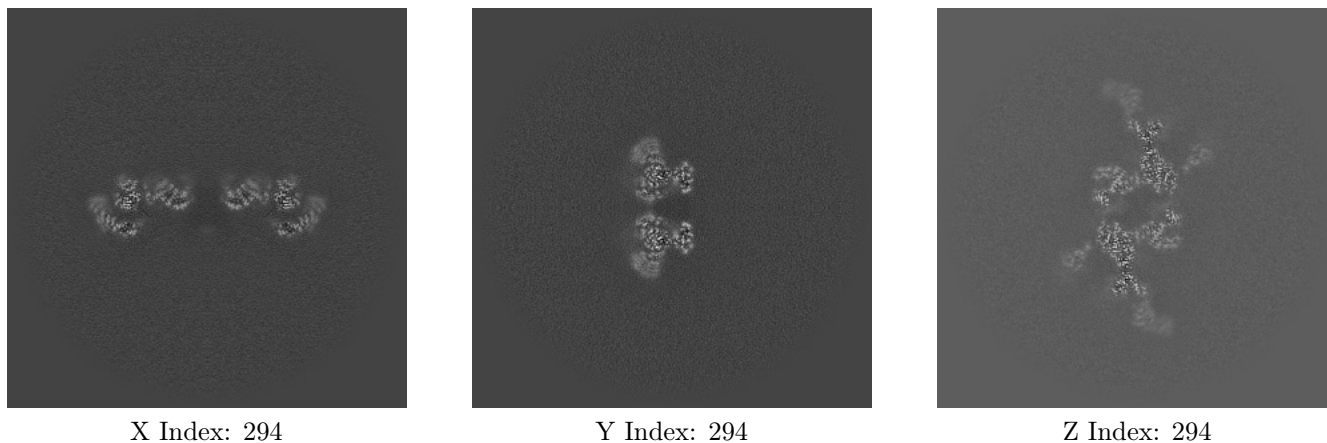
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices ⓘ
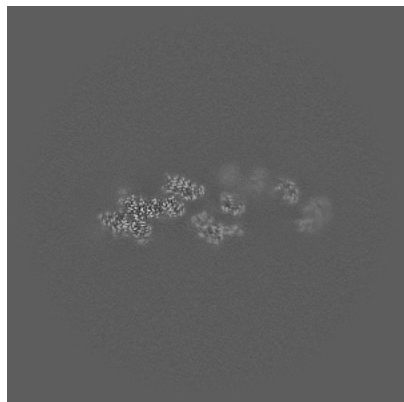
6.3.1 Primary map
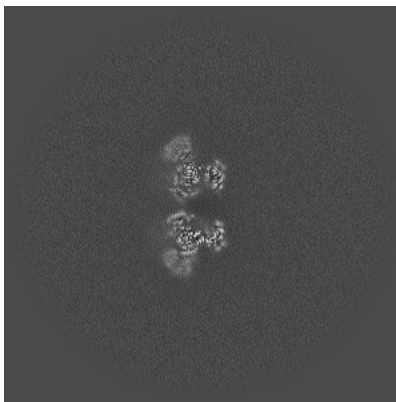
| X Index: 275 | Y Index: 296 | Z Index: 290 |
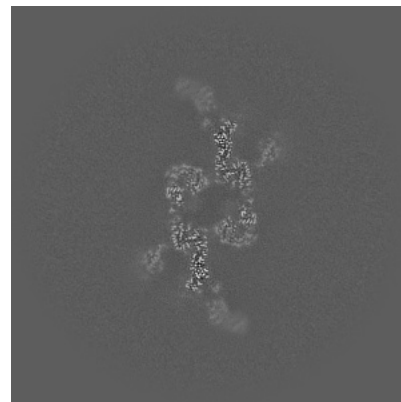
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views ⓘ

6.4.1 Primary map

| X | Y | Z |
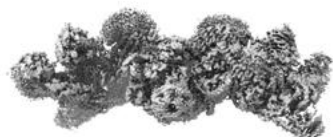
The images above show the 3D surface view of the map at the recommended contour level 6.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5　Mask visualisation ⓘ

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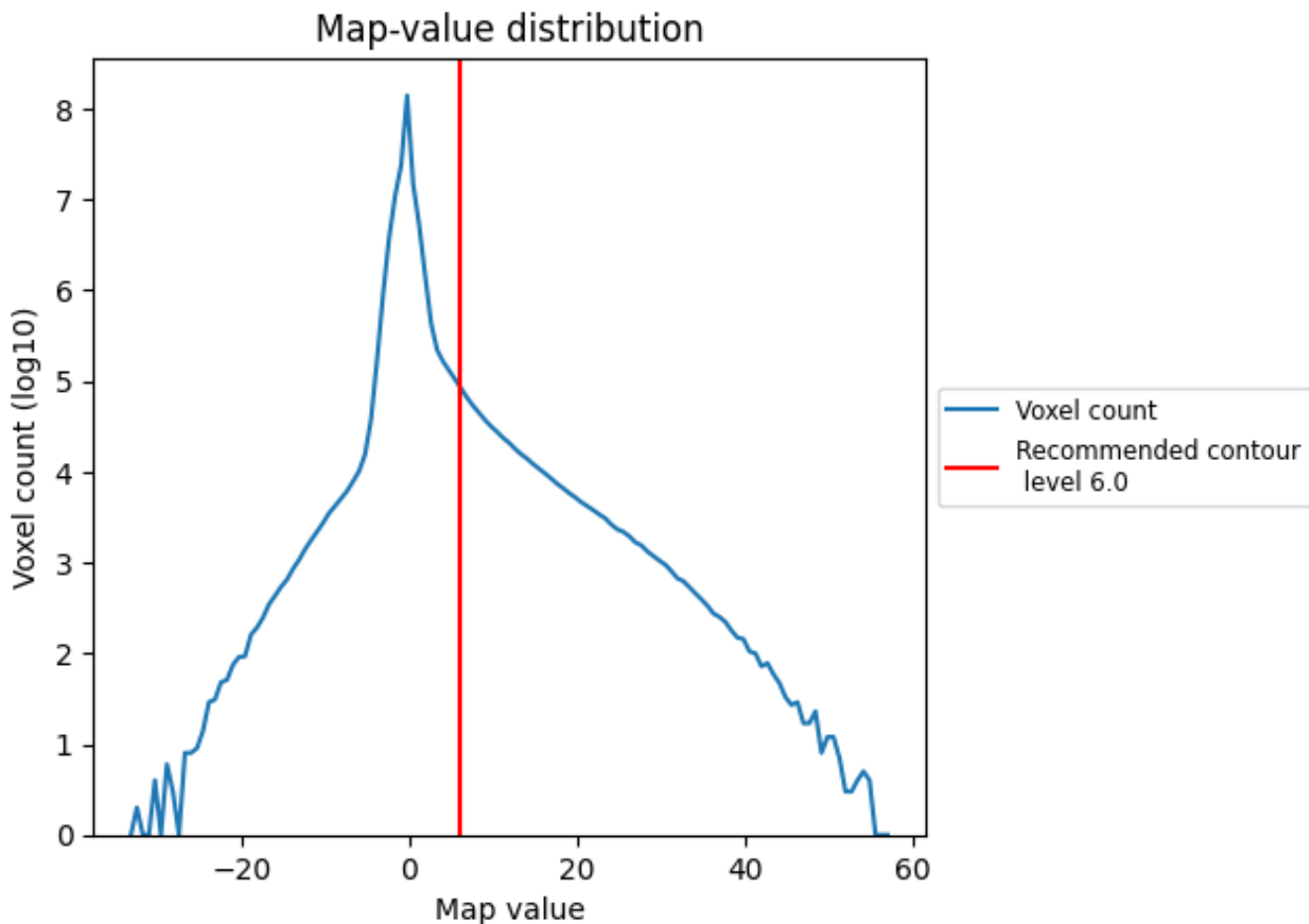
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
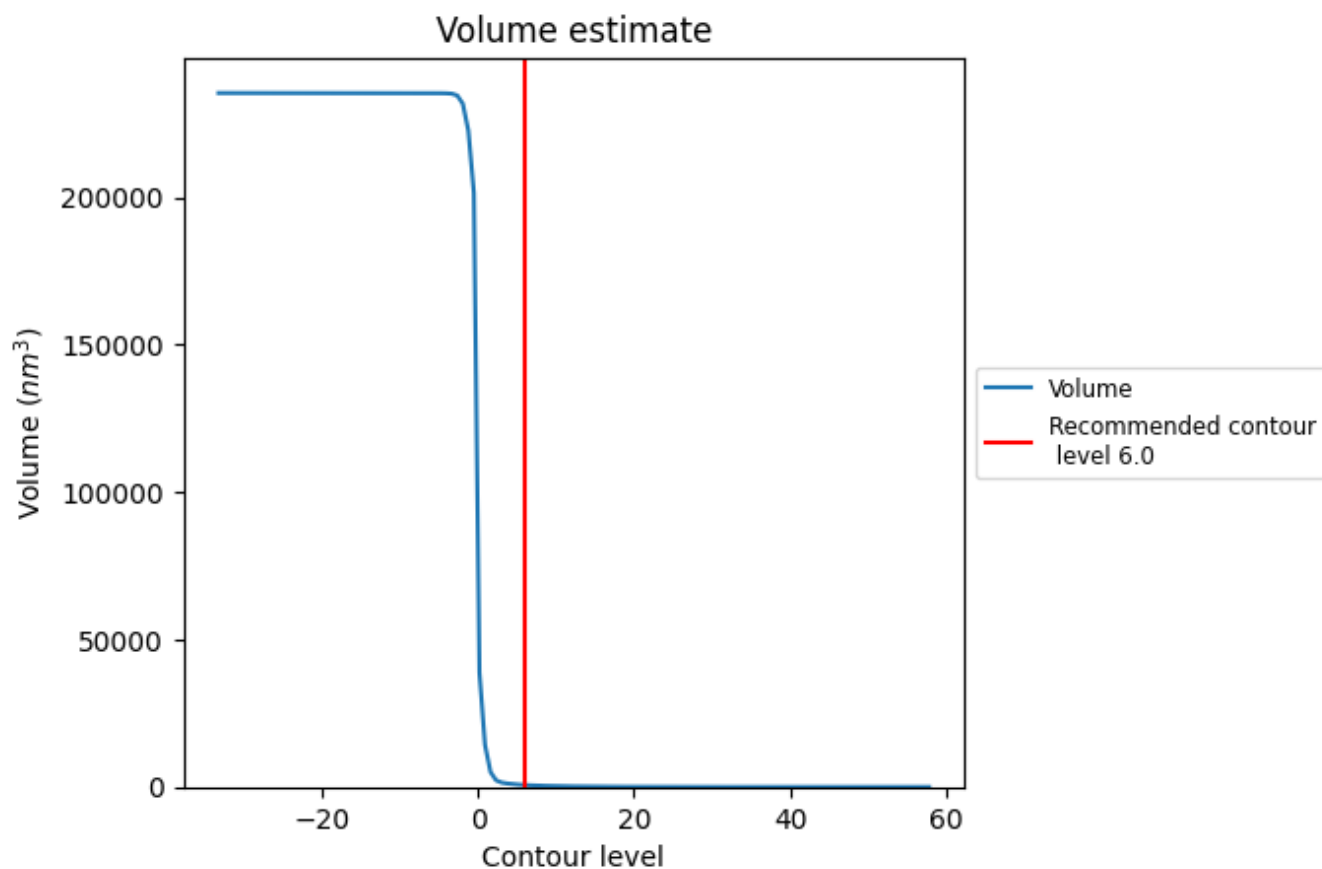
The volume at the recommended contour level is 658 nm^3; this corresponds to an approximate mass of 595 kDa.

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 ⓘ
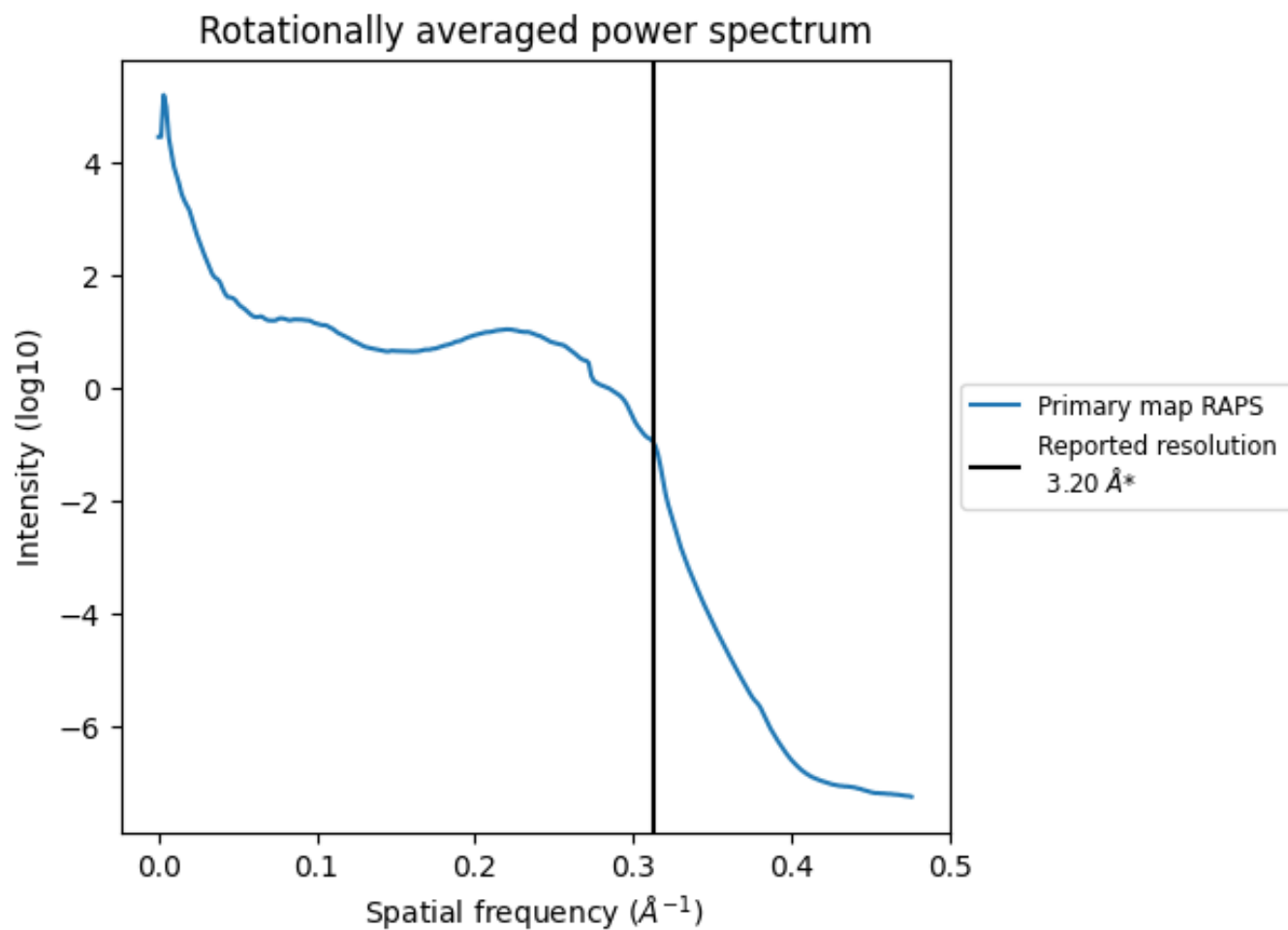
*Reported resolution corresponds to spatial frequency of 0.312 Å^{-1}

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-26861 and PDB model 7UXH. Per-residue inclusion information can be found in section 3 on page 11.

9.1 Map-model overlay (i)

X	Y	Z
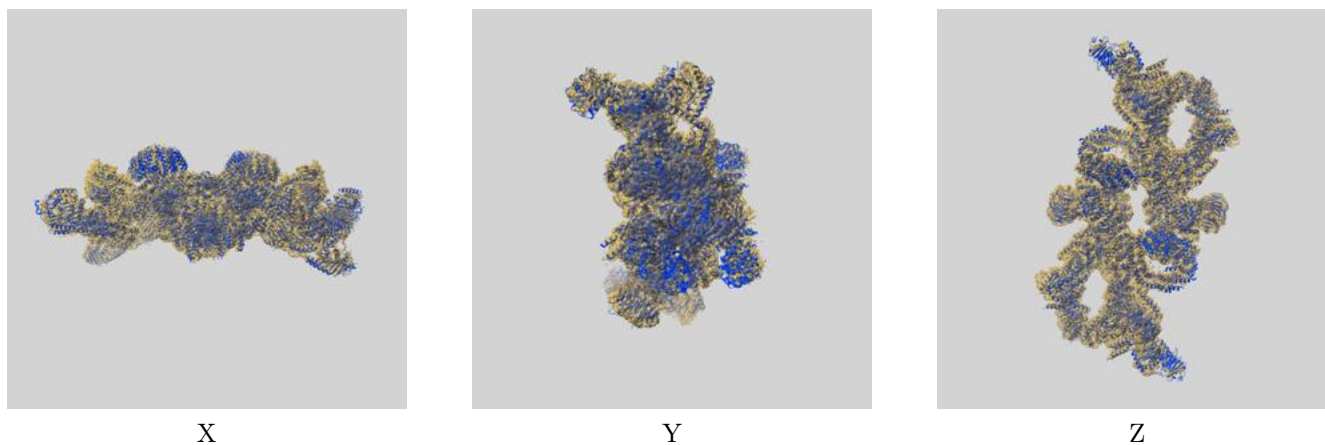
The images above show the 3D surface view of the map at the recommended contour level 6.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2　Q-score mapped to coordinate model　ⓘ

X　　　　　　　　　　　Y　　　　　　　　　　　Z
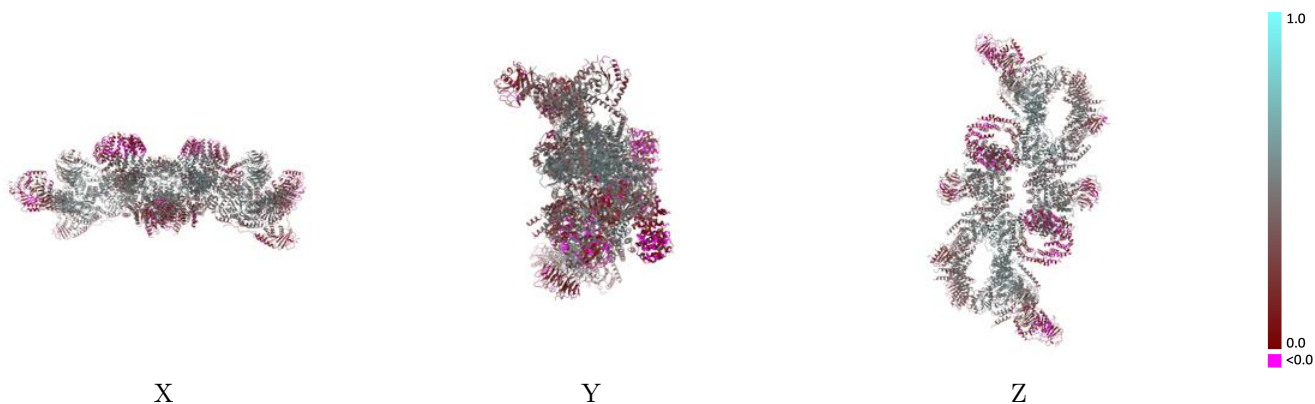
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
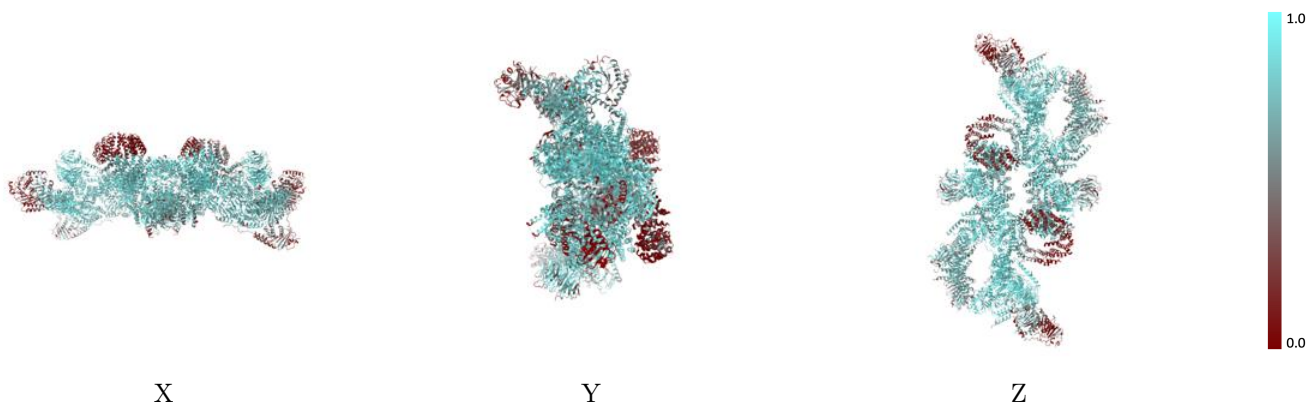
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (6.0).

9.4　Atom inclusion ⓘ
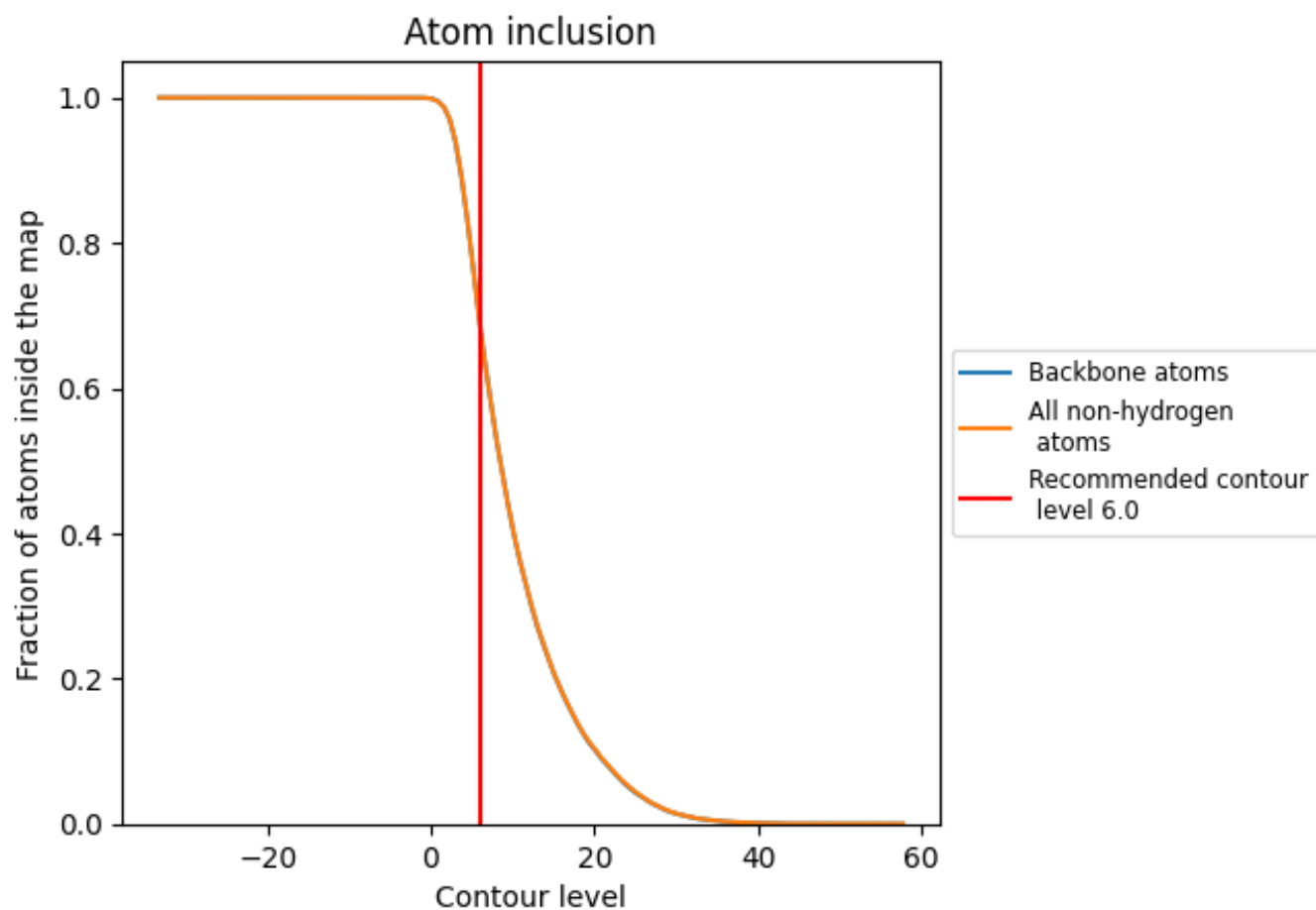
At the recommended contour level, 69% of all backbone atoms, 69% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (6.0) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6882	0.3780
A	0.7186	0.3640
B	0.6614	0.2060
C	0.6671	0.3650
D	0.5555	0.2000
E	0.8820	0.4930
F	0.8877	0.4970
G	0.8504	0.4580
H	0.3525	0.2220
I	0.6475	0.3080
J	0.5467	0.2410
K	0.0906	0.1080
L	0.2052	0.0790
M	0.7866	0.4330
N	0.7030	0.3590
O	0.5091	0.2780
P	0.7191	0.3930
Q	0.7261	0.3850
R	0.4324	0.2090
S	0.4992	0.2580
T	0.7474	0.4180
U	0.8539	0.4940
V	0.8463	0.4920
W	0.7885	0.4530
X	0.2374	0.1730
Y	0.5564	0.3120
Z	0.3804	0.2230
a	0.0350	0.0810
b	0.1669	0.1190
c	0.7359	0.4280
d	0.6305	0.3660
e	0.3941	0.2690
f	0.6518	0.3960
g	0.6457	0.3740
h	0.3052	0.2060

1.0

0.0
<0.0

Continued on next page...

Continued from previous page...

Chain	Atom inclusion	Q-score
i	0.3645	0.2510
j	0.6845	0.4100