wwPDB EM Validation Summary Report (i)

Dec 10, 2022 – 11:55 pm GMT

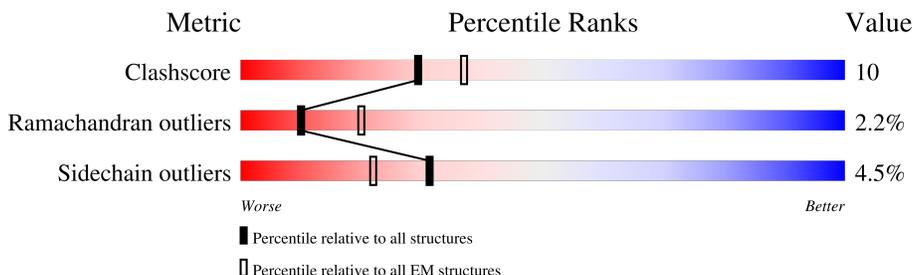|		
PDB ID	:	6R7F
EMDB ID	:	EMD-4739
Title	:	Structural basis of Cullin-2 RING E3 ligase regulation by the COP9 signalosome
Authors	:	Faull, S.V.; Lau, A.M.C.; Martens, C.; Ahdash, Z.; Yebenes, H.; Schmidt, C.; Beuron, F.; Cronin, N.B.; Morris, E.P.; Politis, A.
Deposited on	:	2019-03-28
Resolution	:	8.20 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 8.20 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.
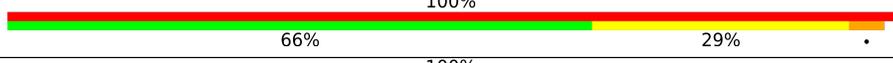
Metric	Percentile Ranks	Value
Clashscore		10
Ramachandran outliers		2.2%
Sidechain outliers		4.5%

Worse *Better*

■ Percentile relative to all structures
▯ Percentile relative to all EM structures

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	A	433	100% 76% 21% •
2	B	443	93% 63% 24% 6% 7%
3	C	403	100% 73% 23% •
4	D	406	100% 78% 18% • •
5	E	311	100% 71% 21% 7% •
6	F	288	100% 74% 21% • •
7	H	209	80% 60% 17% • 20%
8	G	208	100% 80% 15% • •

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Mol	Chain	Length	Quality of chain
9	V	160	100% · 31% 66% ·
10	P	118	100% · 76% 19% ·
11	Q	112	100% · 71% 22% 6%
12	O	745	100% · 66% 29% ·
13	R	90	100% · 60% 32% 8%
14	N	76	100% · 58% 38% ·
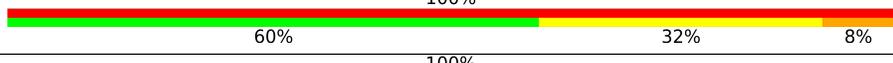
2 Entity composition ⓘ

There are 14 unique types of molecules in this entry. The entry contains 31558 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 COP9 signalosome complex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	433	Total 3450	C 2174	N 605	O 649	S 22	0	0

- Molecule 2 is a protein called COP9 signalosome complex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	414	Total 3386	C 2149	N 579	O 643	S 15	0	0

- Molecule 3 is a protein called COP9 signalosome complex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	403	Total 3205	C 2040	N 537	O 601	S 27	0	0

- Molecule 4 is a protein called COP9 signalosome complex subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	406	Total 3251	C 2047	N 566	O 622	S 16	0	0

- Molecule 5 is a protein called COP9 signalosome complex subunit 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	311	Total 2472	C 1575	N 412	O 471	S 14	0	0

- Molecule 6 is a protein called COP9 signalosome complex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	288	Total 2280	C 1452	N 379	O 434	S 15	0	0

- Molecule 7 is a protein called COP9 signalosome complex subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	168	Total	C	N	O	S	0	0
			1340	859	232	245	4		

- Molecule 8 is a protein called COP9 signalosome complex subunit 7b.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	G	208	Total	C	N	O	S	0	0
			1645	1039	279	321	6		

- Molecule 9 is a protein called von Hippel-Lindau disease tumor suppressor.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	V	160	Total	C	N	O	S	0	0
			1308	824	245	235	4		

- Molecule 10 is a protein called Elongin-B.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	P	118	Total	C	N	O	S	0	0
			921	575	156	185	5		

- Molecule 11 is a protein called Elongin-C.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	Q	112	Total	C	N	O	S	0	0
			873	553	139	173	8		

- Molecule 12 is a protein called Cullin-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	O	744	Total	C	N	O	S	0	0
			6090	3869	1029	1146	46		

- Molecule 13 is a protein called E3 ubiquitin-protein ligase RBX1.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	R	90	Total	C	N	O	S	0	0
			746	472	137	128	9		

- Molecule 14 is a protein called NEDD8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	N	76	591	372	102	115	2	0	0

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: COP9 signalosome complex subunit 1

Chain A:

• Molecule 2: COP9 signalosome complex subunit 2

Chain B:

• Molecule 3: COP9 signalosome complex subunit 3

100%

Chain C:

73% 23%

S301 L302 Y303 K304 K305 N306 I307 Q308 R309 L310 T311 K312 T313 F314 L315 T316 L317 S318 L319 Q320 D321 M322 A323 S324 R325 V326 Q327 L328 S329 G330 P331 Q332 E333 A334 E335 K336 Y337 V338 L339 H340 M341 I342 E343 D344 G345 E346 I347 F348 A349 S350 I351 N352 Q353 K354 D355 G356 M357 V358 S359 F360

H361 D362 N363 P364 E365 K366 Y367 N368 N369 P370 A371 M372 L373 H374 N375 I376 D377 Q378 E379 M380 L381 K382 C383 I384 E385 L386 D387 E388 R389 L390 K391 A392 M393 D394 Q395 E396 I397 T398 V399 N400 P401 Q402 F403

• Molecule 4: COP9 signalosome complex subunit 4

Chain D:

• Molecule 5: COP9 signalosome complex subunit 5

Chain E:

Q204 T205 I206 P207 L208 N209 K210 I211 E212 D213 F214 G215 V216 H217 C218 K219 Q220 Y221 Y222 A223 L224 E225 V226 S227 Y228 F229 K230 S231 S232 L233 D234 R235 K236 L237 L238 E239 L240 L241 W242 N243 K244 Y245 W246 V247 N248 T249 L250 S251 S252 S253 S254 L255 L256 T257 N258 A259 D260 Y261 T262 T263

G264 Q265 V266 F267 D268 L269 S270 E271 K272 L273 E274 Q275 S276 E277 A278 Q279 L280 G281 R282 G283 S284 F285 M286 L287 G288 L289 E290 T291 H292 D293 R294 K295 S296 E297 D298 K299 L300 A301 K302 A303 T304 R305 D306 S307 C308 K309 T310 T311 I312 E313 A314 I315 H316 G317 L318 M319 S320 Q321 V322 I323

K324 D325 K326 L327 F328 N329 Q330 I331 N332 I333 S334

• Molecule 6: COP9 signalosome complex subunit 6

Chain F:

S29 V30 M31 A32 C33 G34 V35 T36 G37 S38 V39 S40 V41 A42 L43 H44 P45 L46 V47 I48 L49 N50 I51 S52 D53 H54 W55 I56 R57 M58 R59 S60 Q61 E62 G63 R64 P65 V66 Q67 V68 I69 G70 A71 L72 I73 G74 K75 Q76 E77 G78 R79 N80 I81 E82 V83 M84 N85 S86 F87 E88

L89 L90 S91 H92 T93 V94 E95 E96 K97 I98 I99 I100 D101 K102 E103 Y104 Y105 Y106 T107 K108 E109 E110 Q111 F112 K113 Q114 V115 F116 K117 E118 L119 E120 F121 L122 G123 W124 Y125 T126 T127 G128 G129 P130 P131 D132 P133 S134 D135 I136 H137 V138 H139 K140 Q141 V142 C143 E144 I145 I146 E147 S148

P149 L150 F151 L152 K153 L154 N155 P156 M157 T158 K159 H160 T161 D162 L163 P164 V165 S166 V167 F168 E169 S170 V171 I172 D173 I174 I175 N176 G177 E178 A179 T180 M181 L182 F183 A184 E185 L186 T187 Y188 L189 L190 A191 T192 E193 E194 A195 E196 R197 I198 G199 V200 D201 H202 V203 A204 R205 M206 T207 A208

T209 G210 S211 G212 E213 N214 S215 T216 V217 A218 E219 H220 L221 I222 A223 Q224 H225 S226 A227 I228 K229 M230 L231 H232 S233 R234 V235 K236 L237 I238 L239 E240 Y241 V242 K243 A244 S245 E246 A247 G248 E249 V250 P251 F252 N253 H254 E255 I256 L257 R258 E259 A260 Y261 A262 L263 C264 H265 C266 L267 P268

V269 L270 S271 T272 D273 K274 F275 K276 T277 D278 F279 Y280 D281 Q282 C283 N284 D285 V286 G287 L288 M289 A290 Y291 L292 G293 T294 I295 T296 K297 T298 C299 N300 T301 M302 N303 Q304 F305 V306 N307 K308 F309 N310 V311 L312 Y313 D314 R315 Q316

• Molecule 7: COP9 signalosome complex subunit 8

Chain H:

MET PRO VAL ALA VAL MET ALA GLU SER ALA F11 S12 F13 K14 K15 L16 L17 D18 Q19 C20 E21 N22 Q23 E24 L25 E26 A27 P28 G29 G30 I31 A32 T33 P34 P35 V36 Y37 G38 Q39 L40 L41 A42 L43 Y44 L45 L46 H47 N48 D49 M50 N51 N52 A53 R54 Y55 L56 W57 K58 R59 I60

P61 P62 A63 I64 K65 S66 A67 N68 S69 E70 L71 G72 G73 I74 W75 S76 V77 G78 Q79 R80 I81 W82 Q83 R84 D85 F86 P87 G88 I89 Y90 T91 T92 I93 N94 A95 H96 Q97 W98 S99 E100 T101 V102 Q103 P104 I105 M106 E107 A108 L109 R110 D111 A112 T113 R114 R115 R116 A117 F118 A119 L120

V121 S122 Q123 A124 Y125 T126 S127 I128 I129 A130 D131 D132 F133 A134 A135 F136 V137 G138 L139 P140 V141 E142 E143 A144 V145 K146 G147 I148 L149 E150 Q151 G152 W153 Q154 A155 D156 S157 T158 T159 R160 M161 V162 L163 P164 R165 LYS PRO VAL ALA GLY ALA LEU ASP VAL SER PHE ASN LYS PHE ILE

PRO LEU SER GLU PRO ALA PRO VAL PRO PRO ILE PRO ASN GLU GLN GLN L197 A198 R199 L200 T201 D202 Y203 V204 A205 F206 L207 E208 N209
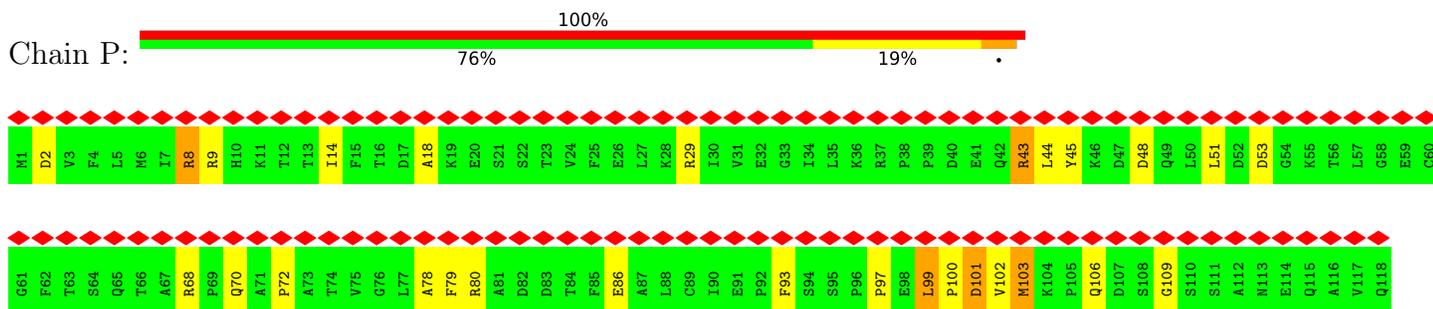
• Molecule 8: COP9 signalosome complex subunit 7b

Chain G:

• Molecule 9: von Hippel-Lindau disease tumor suppressor
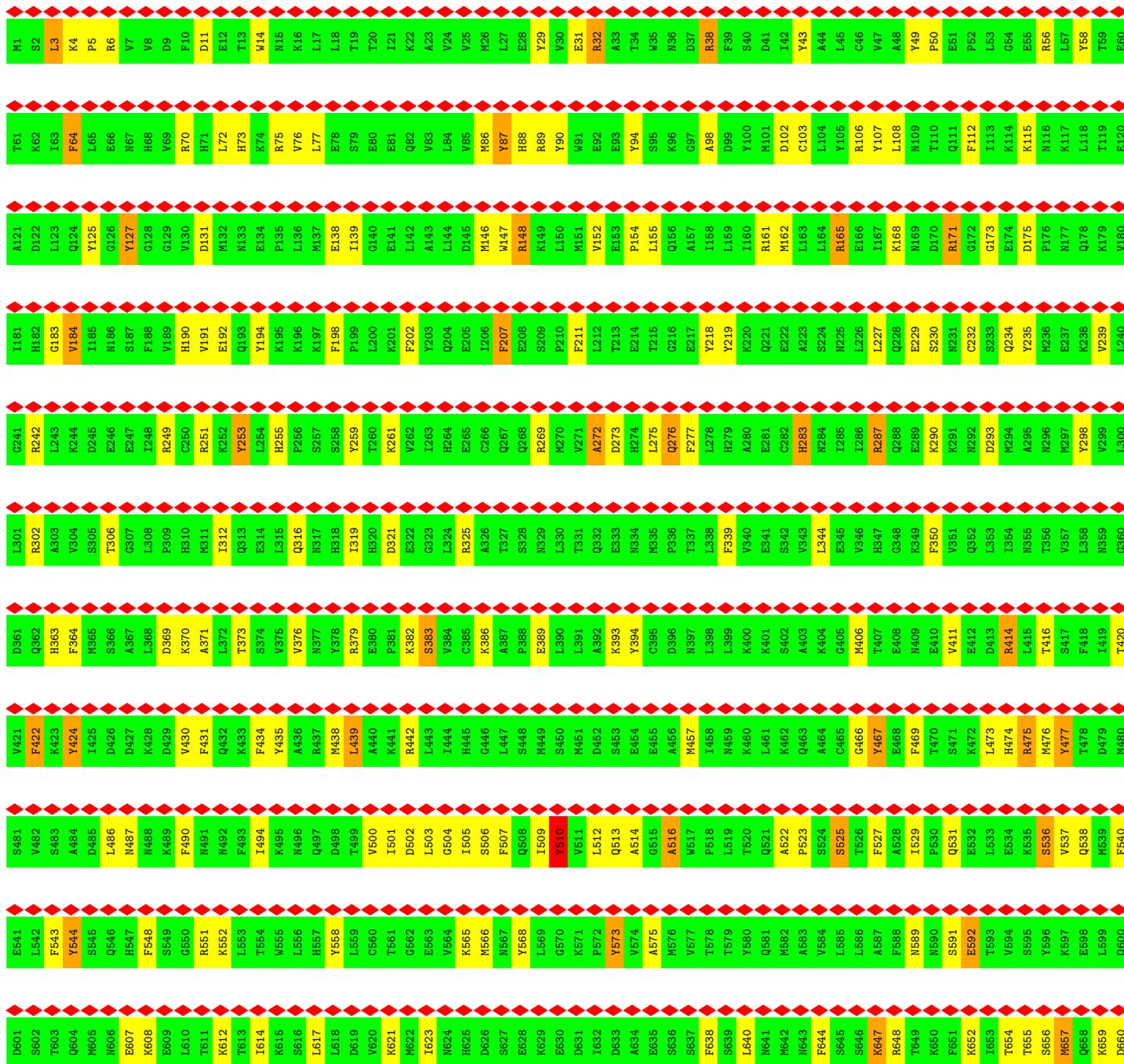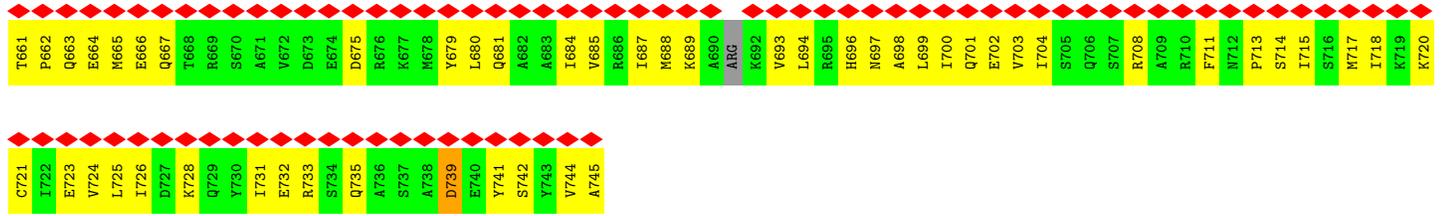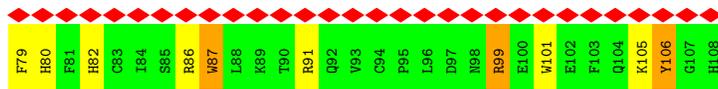
Chain V:

• Molecule 10: Elongin-B

Chain P:

• Molecule 11: Elongin-C

Chain Q:

M1 D2 G3 E4 E5 K6 T7 Y8 V9 G10 C11 E12 G13 P14 D15 A16 M17 Y18 V19 K20 L21 I22 S23 S24 D25 G26 H27 E28 F29 I30 V31 K32 R33 E34 H35 A36 L37 T38 S39 G40 T41 I42 K43 A44 M45 L46 S47 G48 P49 G50 Q51 F52 A53 E54 N55 E56 T57 N58 E59 V60

N61 F62 R63 E64 I65 P66 S67 H68 V69 L70 S71 K72 V73 C74 M75 Y76 F77 T78 Y79 K80 V81 R82 Y83 T84 N85 S86 S87 T88 E89 I90 P91 E92 F93 P94 I95 A96 P97 E98 I99 A100 L101 E102 L103 L104 M105 A106 A107 N108 F109 L110 D111 C112

● Molecule 12: Cullin-2

Chain O:

M1 S2 L3 K4 P5 R6 V7 V8 D9 F10 D11 E12 T13 W14 N15 K16 L17 L18 T19 T20 I21 K22 A23 V24 V25 M26 L27 E28 Y29 V30 E31 R32 A33 T34 W35 N36 D37 R38 F39 S40 D41 I42 Y43 A44 L45 C46 V47 A48 Y49 P50 E51 P52 L53 G54 E55 R56 L57 Y58 T59 E60

T61 K62 I63 F64 L65 E66 N67 H68 V69 R70 H71 L72 H73 K74 R75 V76 L77 E78 S79 E80 E81 Q82 V83 L84 V85 M86 Y87 H88 R89 Y90 W91 E92 E93 Y94 S95 K96 G97 A98 D99 Y100 M101 D102 C103 L104 Y105 R106 Y107 L108 N109 T110 Q111 F112 I113 K114 K115 N116 K117 L118 T119 E120

A121 D122 L123 Q124 Y125 G126 Y127 G128 G129 V130 D131 M132 N133 E134 P135 L136 M37 E138 I139 G140 E141 L142 A143 L144 D145 M146 W47 R148 K149 L150 M51 V152 E153 P154 L155 Q156 A157 I158 L159 I160 R161 M162 L163 L164 R165 E166 I167 K168 N169 D170 R171 G172 G173 E174 D175 P176 N177 Q178 K179 V180

I181 H182 G183 V184 I185 N186 S187 F188 V189 H90 V191 E192 Q193 Y194 K195 K196 K197 F198 P199 L200 K201 F202 Y203 Q204 E205 I206 F207 E208 S209 P210 F211 L212 T213 E214 T215 G216 E217 Y218 Y219 K220 Q221 E222 A223 S224 N225 L226 L227 Q228 E229 S230 N231 C232 S233 Q234 Y235 M236 E237 K238 V239 L240

G241 R242 L243 K244 D245 E246 E247 I248 R249 C250 R251 K252 Y253 L254 H255 P256 S257 S258 Y259 T260 K261 V262 I263 H264 E265 C266 C267 Q268 R269 M270 V271 A272 D273 H274 L275 Q276 F277 L278 H279 A280 E281 C282 H283 N284 I285 I286 R287 Q288 E289 K290 K291 N292 D293 M294 A295 N296 M297 Y298 V299 L300

L301 R302 A303 V304 S305 T306 G307 L308 P309 H310 M311 I312 Q313 E314 L315 Q316 N317 H318 I319 H320 D321 E322 G323 L324 R325 A326 T327 S328 N329 L330 T331 Q332 E333 N334 M335 P336 T337 L338 F339 V340 E341 S342 V343 L344 E345 V346 H347 G348 K349 F350 V351 Q352 L353 I354 N355 T356 V357 L358 N359 G360

D361 Q362 H363 F364 M365 S366 A367 L368 D369 K370 A371 L372 T373 S374 V375 V376 N377 Y378 R379 E380 P381 K382 S383 V384 C385 K386 A387 P388 E389 L390 L391 A392 K393 Y394 C395 D396 N397 L398 L399 K400 K401 S402 A403 K404 G405 M406 T407 E408 N409 E410 V411 E412 D413 R414 L415 T416 S417 F418 I419 T420

V421 F422 K423 Y424 I425 D426 D427 K428 D429 V430 F431 Q432 K433 F434 Y435 A436 R437 M438 L439 A440 K441 R442 L443 I444 H445 G446 L447 S448 M449 S450 M451 D452 S453 E454 E455 A456 M457 I458 N459 K460 L461 K462 Q463 A464 C465 G466 Y467 E468 F469 T470 S471 K472 L473 H474 R475 M476 Y477 T478 D479 M480

S481 V482 S483 A484 D485 L486 N487 N488 K489 F490 N491 N492 F493 I494 K495 N496 Q497 D498 T499 V500 I501 D502 L503 G504 I505 S506 F507 Q508 I509 Y510 V511 L512 Q513 A514 G515 A516 W517 P518 L519 T520 Q521 A522 P523 S524 S525 T526 F527 A528 I529 P530 Q531 E532 L533 E534 K535 S536 V537 Q538 M539 F540

E541 L542 F543 Y544 S545 Q546 H547 F548 S549 G550 R551 K552 L553 T554 W555 L556 H557 Y558 L559 C560 T561 G562 E563 V564 K565 M566 N567 T568 L569 G570 K571 P572 Y573 V574 A575 M576 V577 T578 T579 Y580 Q581 M582 A583 V584 L585 L586 A587 F588 N589 N590 S591 E592 T593 V594 S595 Y596 K597 E598 L599 Q600

D601 S602 T603 Q604 M605 N606 E607 K608 E609 L610 T611 K612 T613 I614 K615 S616 L617 L618 D619 V620 K621 M622 I623 N624 H625 D626 S627 E628 K629 E630 D631 I632 D633 A634 E635 S636 S637 F638 S639 L640 N641 M642 N643 F644 S645 S646 K647 R648 T649 K650 F651 K652 I653 T654 T655 S656 M657 Q658 K659 D660

T661 P662 Q663 E664 M665 E666 Q667 T668 R669 S670 A671 V672 D673 E674 D675 R676 K677 M678 Y679 L680 Q681 A682 A683 I684 V685 R686 I687 M688 K689 A690 ARG K692 V693 L694 R695 H696 N697 A698 L699 I700 Q701 E702 V703 I704 S705 Q706 S707 R708 A709 R710 F711 N712 P713 S714 I715 S716 M717 I718 K719 K720

C721 I722 E723 V724 L725 I726 D727 K728 Q729 Y730 I731 E732 R733 S734 Q735 A736 S737 A738 D739 E740 Y741 S742 Y743 V744 A745

● Molecule 13: E3 ubiquitin-protein ligase RBX1

Chain R:

100%

60% 32% 8%

K19 K20 R21 F22 E23 V24 K25 K26 W27 N28 A29 V30 A31 L32 W33 A34 W35 D36 I37 V38 V39 D40 N41 C42 A43 I44 C45 R46 N47 H48 I49 M50 D51 L52 C53 I54 E55 C56 Q57 A58 N59 Q60 A61 S62 A63 T64 S65 E66 E67 C68 T69 V70 A71 W72 G73 V74 C75 N76 H77 A78

F79 H80 F81 H82 C83 I84 S85 R86 W87 L88 K89 T90 R91 Q92 V93 C94 P95 L96 D97 N98 R99 E100 W101 E102 F103 Q104 K105 Y106 G107 H108

● Molecule 14: NEDD8

Chain N:

100%

58% 38% •

M1 L2 I3 K4 V5 K6 T7 L8 T9 G10 K11 E12 I13 E14 I15 D16 I17 E18 P19 T20 D21 K22 V23 E24 R25 I26 K27 E28 R29 V30 E31 E32 K33 E34 G35 I36 P37 P38 Q39 Q40 Q41 R42 L43 I44 Y45 S46 G47 K48 Q49 M50 N51 D52 E53 K54 T55 A56 A57 D58 Y59 K60

I61 L62 G63 G64 S65 V66 L67 H68 L69 V70 L71 A72 L73 R74 G75 G76

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	20055	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 $(e^-/\text{Å}^2)$	45	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	17.442	Depositor
Minimum map value	-4.128	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	6.0	Depositor
Map size (Å)	317.99997, 317.99997, 317.99997	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	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	A	1.70	38/3509 (1.1%)	1.85	69/4733 (1.5%)
2	B	2.07	30/3444 (0.9%)	1.94	86/4634 (1.9%)
3	C	1.63	20/3264 (0.6%)	1.85	65/4407 (1.5%)
4	D	1.69	31/3303 (0.9%)	1.87	71/4460 (1.6%)
5	E	2.67	31/2526 (1.2%)	1.94	64/3411 (1.9%)
6	F	1.68	15/2327 (0.6%)	1.99	56/3153 (1.8%)
7	H	1.71	14/1372 (1.0%)	1.91	29/1865 (1.6%)
8	G	1.60	7/1665 (0.4%)	1.90	30/2253 (1.3%)
9	V	1.05	0/1341	1.07	0/1824
10	P	1.75	8/938 (0.9%)	1.93	21/1267 (1.7%)
11	Q	1.72	8/892 (0.9%)	1.82	19/1204 (1.6%)
12	O	1.60	37/6207 (0.6%)	1.84	131/8358 (1.6%)
13	R	2.63	12/768 (1.6%)	1.93	20/1040 (1.9%)
14	N	0.36	0/596	0.56	0/800
All	All	1.80	251/32152 (0.8%)	1.84	661/43409 (1.5%)

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	A	0	12
2	B	0	15
3	C	0	6
4	D	0	10
5	E	0	10
6	F	0	7
7	H	0	7
8	G	0	9
10	P	0	2
11	Q	0	5
12	O	0	17

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Mol	Chain	#Chirality outliers	#Planarity outliers
13	R	0	2
All	All	0	102

The worst 5 of 251 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	309	LYS	CA-CB	85.10	3.41	1.53
2	B	294	PHE	CA-C	70.42	3.36	1.52
5	E	203	TYR	CE1-CZ	26.85	1.73	1.38
5	E	203	TYR	CG-CD2	26.55	1.73	1.39
13	R	106	TYR	CG-CD2	26.45	1.73	1.39

The worst 5 of 661 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	98	TYR	CB-CG-CD2	-18.83	109.70	121.00
6	F	205	ARG	NE-CZ-NH1	-16.75	111.93	120.30
4	D	6	ARG	NE-CZ-NH2	-16.17	112.22	120.30
6	F	45	PRO	N-CA-C	15.86	153.33	112.10
12	O	87	TYR	CB-CG-CD2	-15.76	111.55	121.00

There are no chirality outliers.

5 of 102 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	135	ARG	Sidechain
1	A	152	TYR	Sidechain
1	A	187	ARG	Sidechain
1	A	221	TYR	Sidechain
1	A	66	HIS	Sidechain

5.2   Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3450	0	3482	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	3386	0	3424	37	0
3	C	3205	0	3225	15	0
4	D	3251	0	3253	13	0
5	E	2472	0	2444	74	0
6	F	2280	0	2263	35	0
7	H	1340	0	1324	2	0
8	G	1645	0	1667	3	0
9	V	1308	0	1299	327	0
10	P	921	0	908	92	0
11	Q	873	0	845	90	0
12	O	6090	0	6071	181	0
13	R	746	0	705	29	0
14	N	591	0	616	45	0
All	All	31558	0	31526	644	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 10.

The worst 5 of 644 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)
9:V:178:LEU:CD2	10:P:103:MET:HG3	1.06	1.53
9:V:171:LYS:NZ	10:P:106:GLN:CB	1.70	1.52
9:V:178:LEU:CD2	10:P:103:MET:CG	1.75	1.50
9:V:178:LEU:HD21	10:P:103:MET:CG	1.27	1.50
9:V:178:LEU:HD13	10:P:103:MET:CE	1.32	1.50

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	A	431/433 (100%)	399 (93%)	26 (6%)	6 (1%)	11	46
2	B	412/443 (93%)	364 (88%)	33 (8%)	15 (4%)	3	25
3	C	401/403 (100%)	361 (90%)	26 (6%)	14 (4%)	3	25
4	D	404/406 (100%)	387 (96%)	8 (2%)	9 (2%)	6	35
5	E	309/311 (99%)	290 (94%)	15 (5%)	4 (1%)	12	48
6	F	286/288 (99%)	272 (95%)	8 (3%)	6 (2%)	7	36
7	H	164/209 (78%)	158 (96%)	5 (3%)	1 (1%)	25	66
8	G	206/208 (99%)	189 (92%)	13 (6%)	4 (2%)	8	38
9	V	158/160 (99%)	154 (98%)	1 (1%)	3 (2%)	8	38
10	P	116/118 (98%)	109 (94%)	7 (6%)	0	100	100
11	Q	110/112 (98%)	102 (93%)	8 (7%)	0	100	100
12	O	738/745 (99%)	691 (94%)	29 (4%)	18 (2%)	6	33
13	R	88/90 (98%)	70 (80%)	13 (15%)	5 (6%)	1	18
14	N	74/76 (97%)	71 (96%)	3 (4%)	0	100	100
All	All	3897/4002 (97%)	3617 (93%)	195 (5%)	85 (2%)	10	35

5 of 85 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	115	ALA
1	A	426	ALA
2	B	61	GLU
2	B	141	ASP
2	B	186	ASP

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	377/377 (100%)	363 (96%)	14 (4%)	34	58
2	B	376/405 (93%)	356 (95%)	20 (5%)	22	47

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	359/359 (100%)	348 (97%)	11 (3%)	40	62
4	D	347/347 (100%)	342 (99%)	5 (1%)	67	80
5	E	267/267 (100%)	250 (94%)	17 (6%)	17	42
6	F	255/255 (100%)	237 (93%)	18 (7%)	14	39
7	H	139/173 (80%)	133 (96%)	6 (4%)	29	53
8	G	181/181 (100%)	171 (94%)	10 (6%)	21	47
9	V	147/147 (100%)	145 (99%)	2 (1%)	67	80
10	P	103/103 (100%)	99 (96%)	4 (4%)	32	56
11	Q	96/96 (100%)	95 (99%)	1 (1%)	76	86
12	O	680/681 (100%)	644 (95%)	36 (5%)	22	47
13	R	79/79 (100%)	70 (89%)	9 (11%)	5	21
14	N	64/66 (97%)	60 (94%)	4 (6%)	18	43
All	All	3470/3536 (98%)	3313 (96%)	157 (4%)	31	52

5 of 157 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
12	O	131	ASP
12	O	657	MET
12	O	175	ASP
12	O	420	THR
13	R	82	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 50 such sidechains are listed below:

Mol	Chain	Res	Type
11	Q	108	ASN
12	O	310	HIS
14	N	41	GLN
12	O	73	HIS
12	O	190	HIS

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 ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
12	O	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	O	654:THR	C	655:THR	N	4.12

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-4739. 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 ⓘ

6.1.1 Primary map

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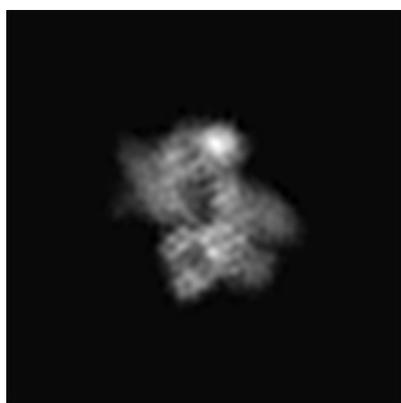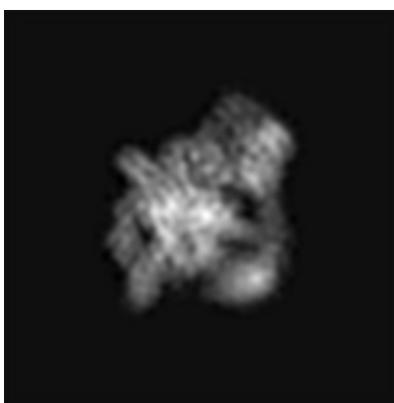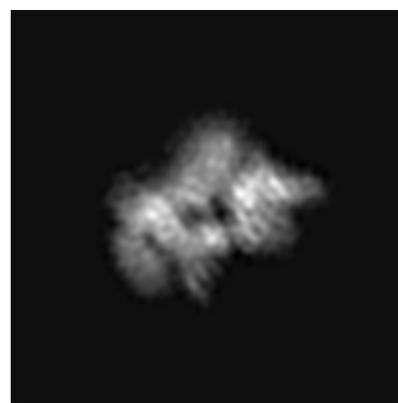
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ

6.2.1 Primary map

X Index: 150	Y Index: 150	Z Index: 150

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: 145 | Y Index: 160 | Z Index: 126 |
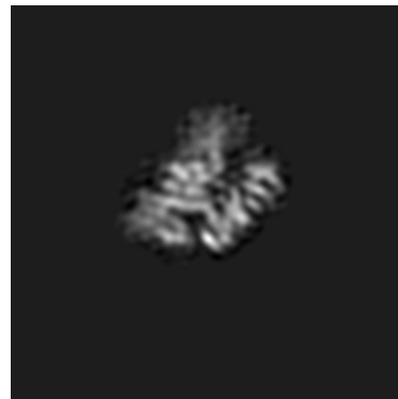
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views ⓘ

6.4.1 Primary map

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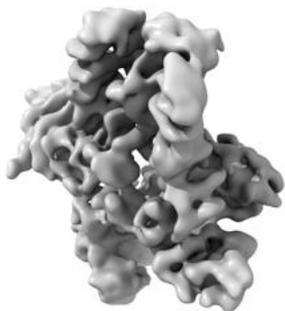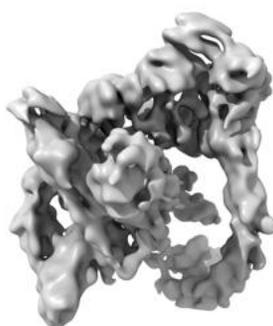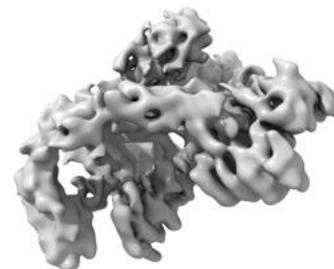
The images above show the 3D surface view of the map at the recommended contour level 6.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

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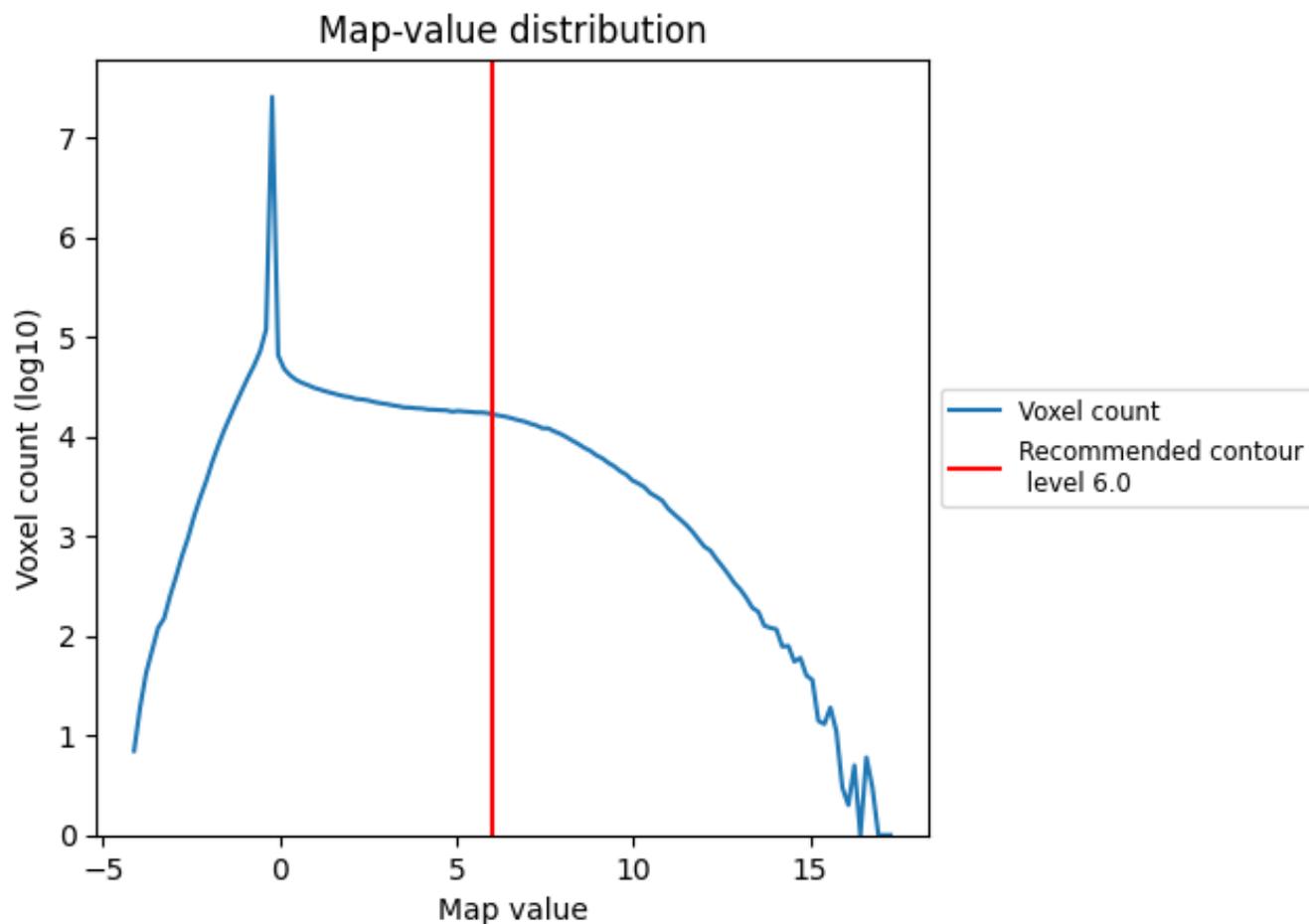
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
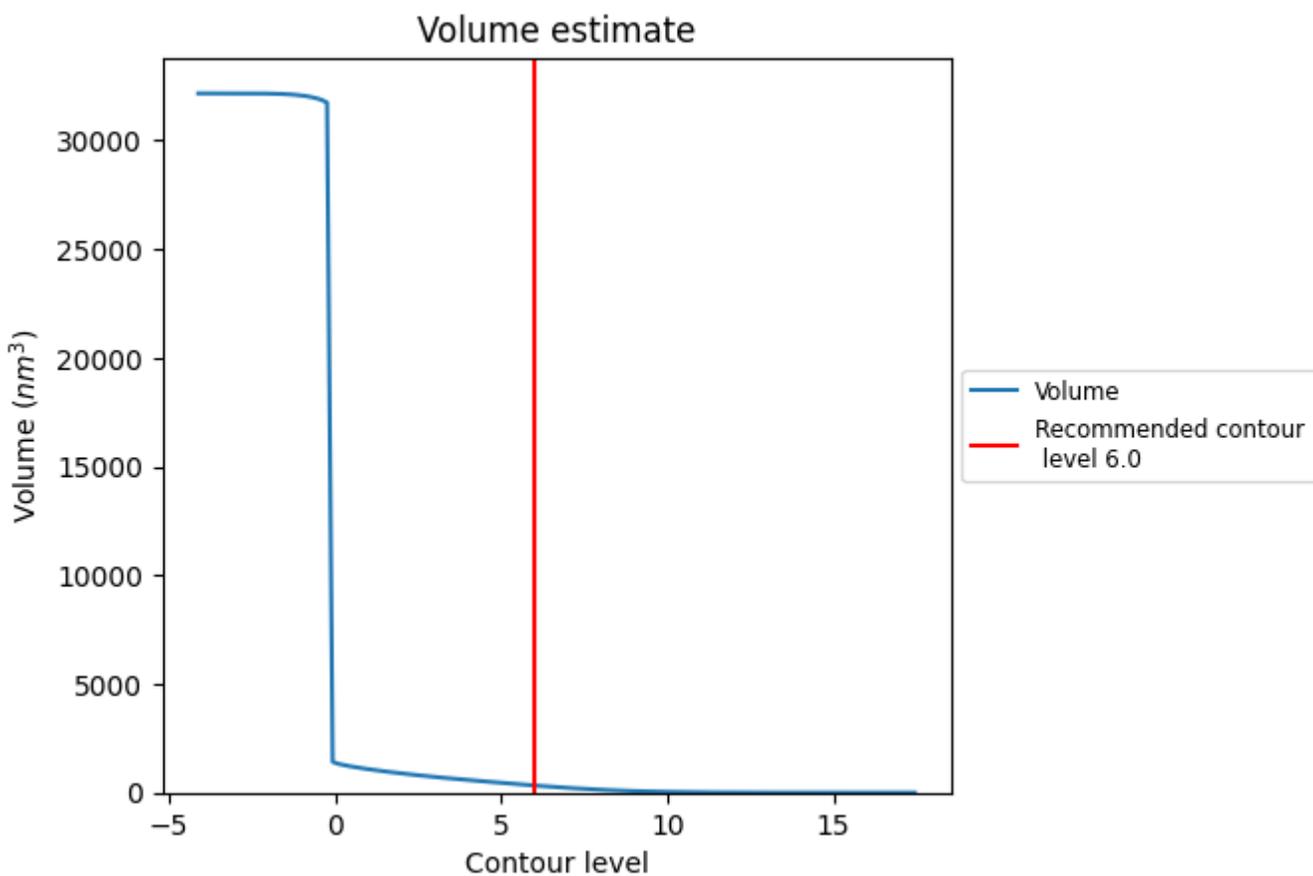
The volume at the recommended contour level is 327 nm^3; this corresponds to an approximate mass of 296 kDa.

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   ⓘ
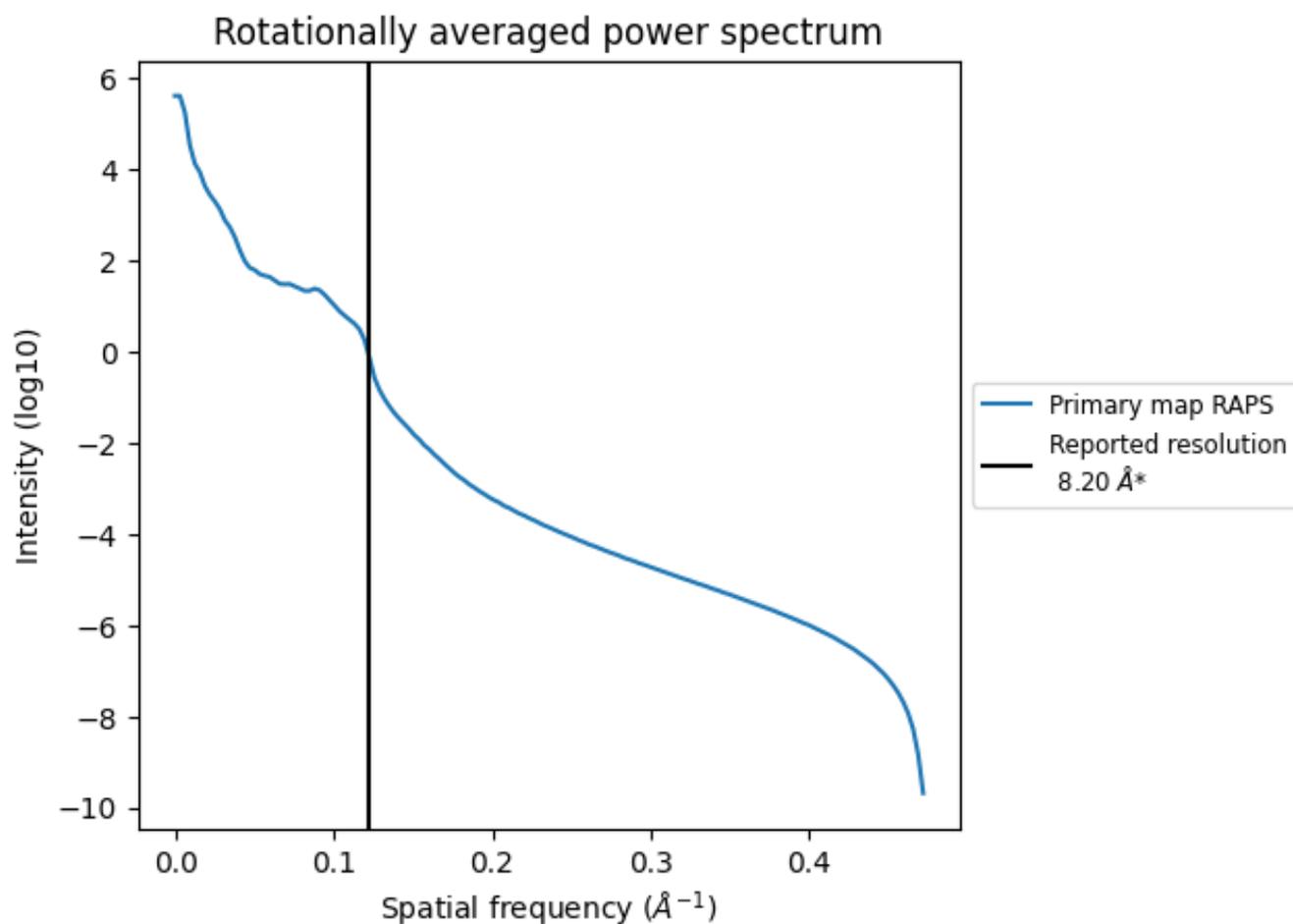
*Reported resolution corresponds to spatial frequency of 0.122 Å^{-1}

8 Fourier-Shell correlation ⓘ

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

9   Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-4739 and PDB model 6R7F. Per-residue inclusion information can be found in section 3 on page 7.

9.1   Map-model overlay ⓘ

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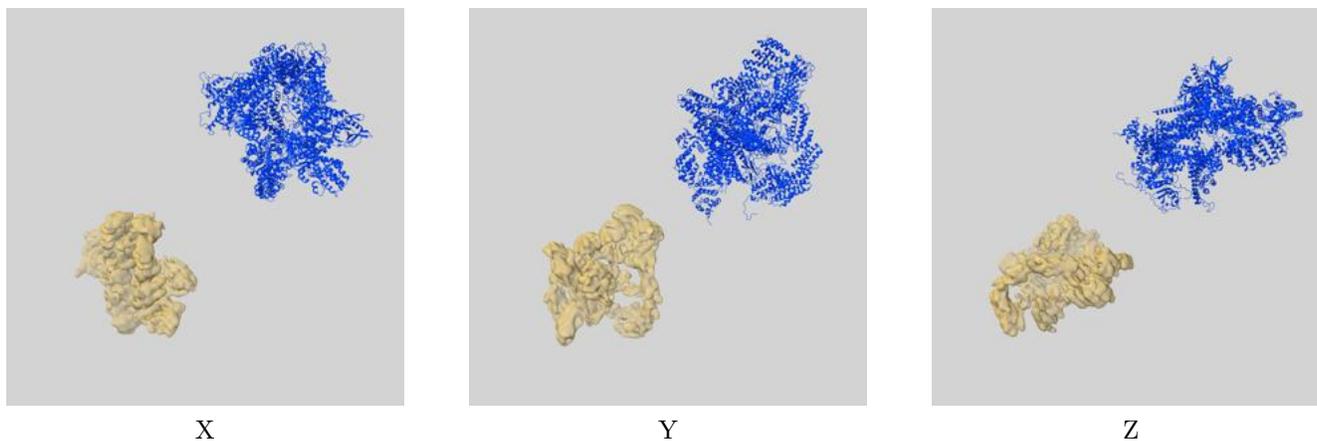
The images above show the 3D surface view of the map at the recommended contour level 6.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2　Q-score mapped to coordinate model ⓘ

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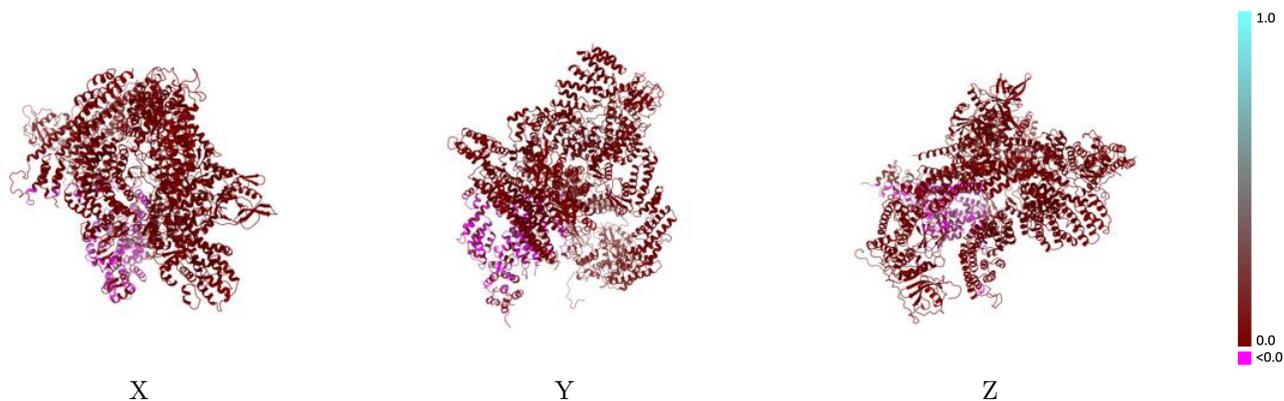
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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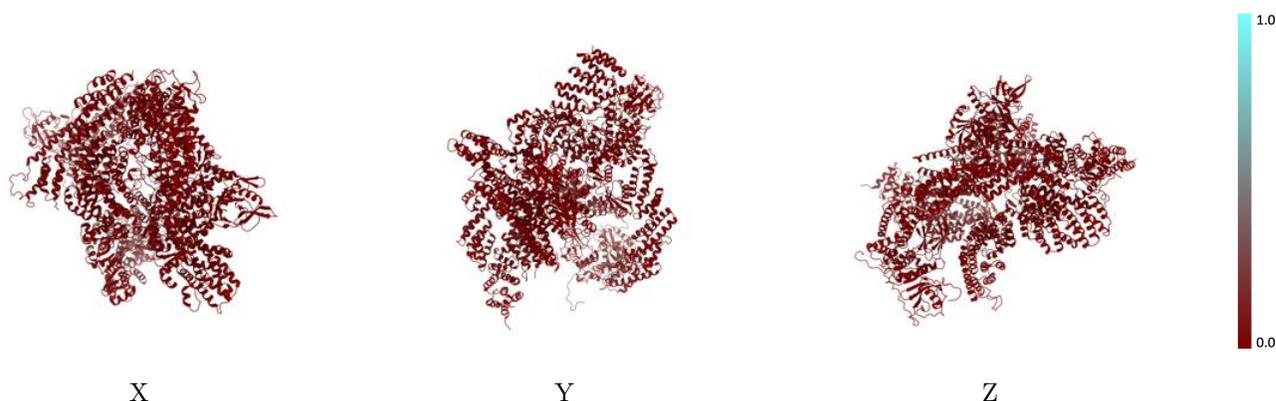
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (6.0).

9.4   Atom inclusion (i)
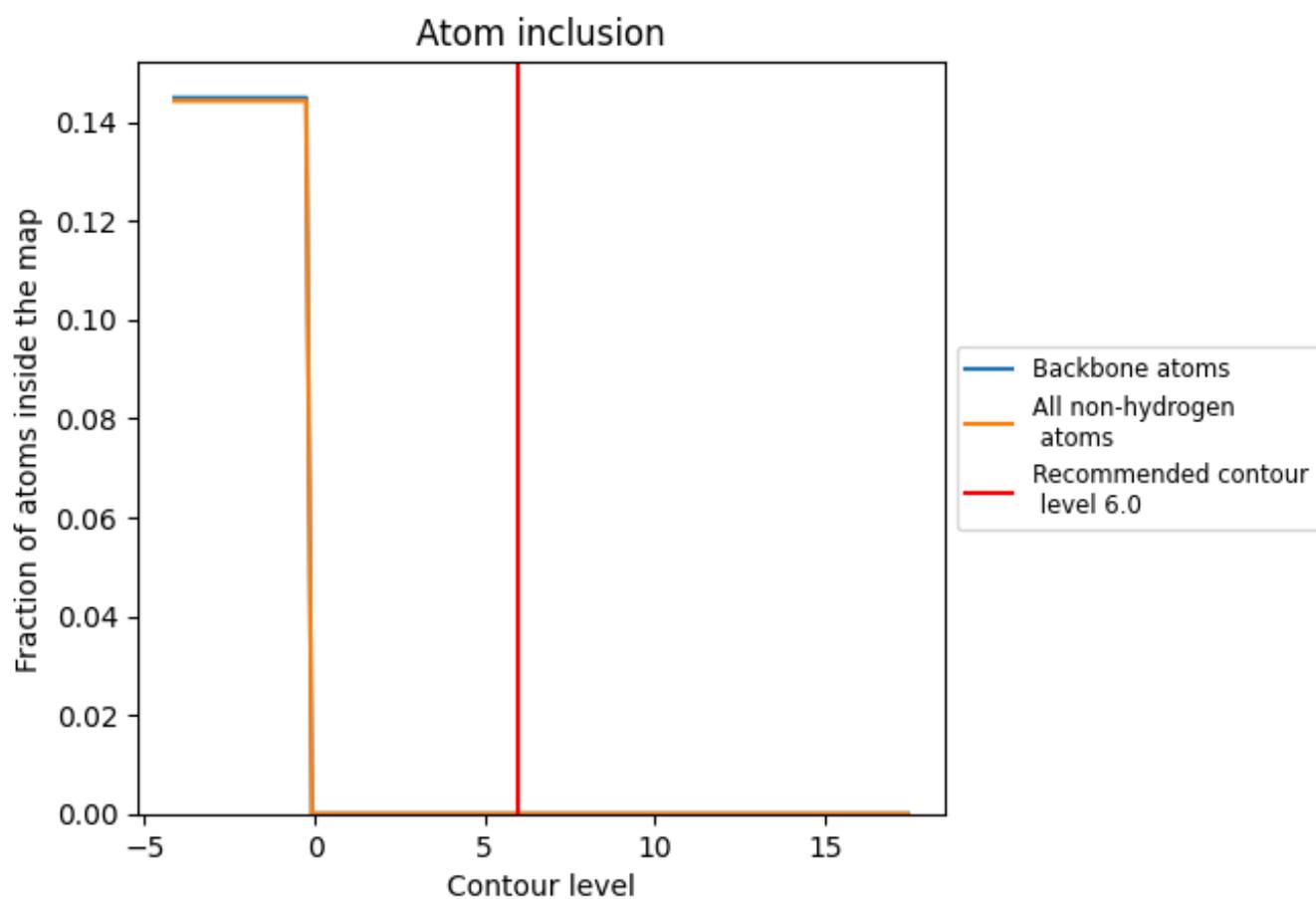
At the recommended contour level, 0% of all backbone atoms, 0% of all non-hydrogen atoms, are inside the map.

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	0.0000	0.0010
A	0.0000	0.0040
B	0.0000	0.0010
C	0.0000	0.0040
D	0.0000	0.0000
E	0.0000	-0.0010
F	0.0000	0.0030
G	0.0000	0.0000
H	0.0000	-0.0030
N	0.0000	0.0000
O	0.0000	0.0000
P	0.0000	0.0060
Q	0.0000	0.0000
R	0.0000	0.0000
V	0.0000	0.0070

1.0

0.0
<0.0