# WORLDWIDE
# wwPDB
## PROTEIN DATA BANK

# Full wwPDB EM Validation Report ⓘ

Jun 25, 2025 – 04:04 am BST

|  |  |  |
|---|---|---|
| PDB ID | : | 8Q3I / pdb_00008q3i |
| EMDB ID | : | EMD-18128 |
| Title | : | Mycobacterium smegmatis RNA polymerase in complex with HelD, SigA and RbpA in State I |
| Authors | : | Koval, T.; Krasny, L.; Dohnalek, J.; Kouba, T. |
| Deposited on | : | 2023-08-04 |
| Resolution | : | 3.11 Å(reported) |

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/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.

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The following versions of software and data (see references ⓘ) were used in the production of this report:

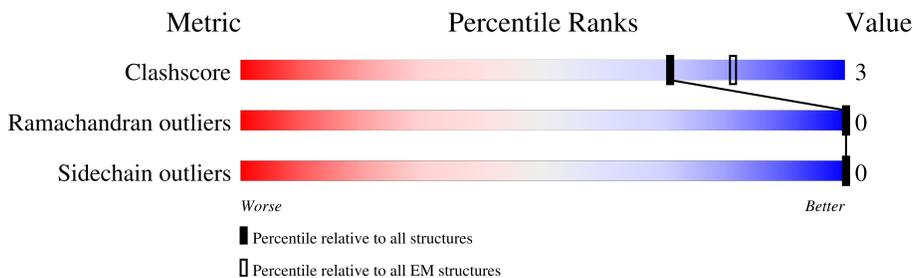|  |  |  |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev118 |
| MolProbity | : | 4-5-2 with Phenix2.0rc1 |
| Percentile statistics | : | 20231227.v01 (using entries in the PDB archive December 27th 2023) |
| MapQ | : | 1.9.13 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.44 |

# 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 3.11 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 | | 3 |
| Ramachandran outliers | | 0 |
| Sidechain outliers | | 0 |

*Worse* *Better*

█ Percentile relative to all structures

▯ Percentile relative to all EM structures

| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|--------|--------------------------|--------------------------|
| Clashscore | 210492 | 15764 |
| Ramachandran outliers | 207382 | 16835 |
| Sidechain outliers | 206894 | 16415 |

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 | 350 | 61% · 35% |
| 1 | B | 350 | 60% 7% 33% |
| 2 | C | 1169 | 87% 6% 7% |
| 3 | D | 1317 | 90% 7% · |
| 4 | E | 107 | 64% 6% 30% |
| 5 | F | 466 | 40% 6% 53% |
| 6 | H | 736 | 85% 9% 6% |
| 7 | J | 114 | 9% 47% 10% 43% |

# 2 Entry composition ⓘ

There are 9 unique types of molecules in this entry. The entry contains 60317 atoms, of which 30177 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 DNA-directed RNA polymerase subunit alpha.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 226 | Total 3475 | C 1080 | H 1759 | N 296 | O 337 | S 3 | 0 | 0 |
| 1 | B | 233 | Total 3574 | C 1112 | H 1803 | N 305 | O 351 | S 3 | 0 | 0 |

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | C | 1093 | Total 16846 | C 5286 | H 8394 | N 1480 | O 1651 | S 35 | 0 | 0 |

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | D | 1272 | Total 20036 | C 6235 | H 10078 | N 1804 | O 1878 | S 41 | 0 | 0 |

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 4 | E | 75 | Total 1167 | C 371 | H 582 | N 100 | O 114 | 0 | 0 |

- Molecule 5 is a protein called RNA polymerase sigma factor SigA.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | F | 218 | Total 3560 | C 1110 | H 1797 | N 319 | O 328 | S 6 | 0 | 0 |

- Molecule 6 is a protein called Helicase.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | H | 690 | Total 10601 | C 3339 | H 5247 | N 971 | O 1028 | S 16 | 0 | 0 |

- Molecule 7 is a protein called RNA polymerase-binding protein RbpA.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | J | 65 | Total 1055 | C 335 | H 517 | N 97 | O 104 | S 2 | 0 | 0 |

- Molecule 8 is ZINC ION (CCD ID: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 8 | D | 2 | Total 2 | Zn 2 | 0 |

- Molecule 9 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 9 | D | 1 | Total 1 | Mg 1 | 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: DNA-directed RNA polymerase subunit alpha

Chain A:



• Molecule 1: DNA-directed RNA polymerase subunit alpha

Chain B:



• Molecule 2: DNA-directed RNA polymerase subunit beta

Chain C:

• Molecule 3: DNA-directed RNA polymerase subunit beta'

Chain D:



90% 7%



• Molecule 4: DNA-directed RNA polymerase subunit omega

Chain E:

64% 6% 30%



• Molecule 5: RNA polymerase sigma factor SigA

Chain F:

40% 6% 53%

I320 L324 D327 L328 T333 P334 L337 A338 K339 E340 M341 D342 I343 R356 GLU PRO ILE LEU SER LEU ASP GLN GLN THR ILE GLY ASP GLU GLY ASP SER GLN LEU GLY ASP PHE ILE GLU ASP SER GLU ASP ALA VAL VAL ALA VAL ASP ALA VAL SER PHE THR LEU LEU GLN ASP

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

ARG SER GLN VAL LEU ARG ASP TYR LEU ASP

• Molecule 6: Helicase

Chain H: 85% 9% 6%

MET S2 G3 R4 L10 R14 R23 R54 K58 D59 L63 D92 T116 H130 V137 N165 R168 G169 E170 R173 D174 I175 V176 D184 L189 P201 R212 V213 L217 V229 V263 L308 V311 E340 V344

T350 I357 T363 R364 D365 H368 E371 V378 G379 E380 A390 L394 V436 E459 R460 E463 E464 M474 VAL ASP ARG GLU ASP LEU MET ASP ASP GLU GLU ASP HIS LEU LEU ALA GLN ASP LEU ILE ASP ALA GLU GLU LEU ALA ASP ARG PHE LYS GLU GLN

D506 V526 T591 M596 A597 V598 V602 L603 A604 E605 F606 V616 C619 G620 V628 I633 E667 V676 V679 E682 T700 R701 A702 T703 Q704 R705 L706 L709 Y710 R711 L721 A722 GLU GLY ASP ALA ALA ALA THR VAL GLU GLN GLN ARG THR SER

ALA

• Molecule 7: RNA polymerase-binding protein RbpA

Chain J: 9% 47% 10% 43%

MET ALA ASP ARG VAL LEU ARG GLY SER ARG LEU GLY ALA VAL SER TYR GLU THR ASP ARG ASN HIS ASP LEU A25 Q28 V29 Y32 N36 E39 V42 A45 D46 D47 A48 E49 I50 T53 W54 L55 G62 I65 GLU GLY ASP VAL PRO GLU PRO LYS LYS

VAL LYS PRO PRO R79 T80 D83 R89 S90 V91 E92 L97 L102 ASP LEU ILE LYS ALA LYS ARG ARG GLY THR GLY SER

# 4 Experimental information ⓘ

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 75256 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING ONLY | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose $(e^-/\text{Å}^2)$ | 55 | Depositor |
| Minimum defocus (nm) | 1200 | Depositor |
| Maximum defocus (nm) | 3200 | Depositor |
| Magnification | Not provided | |
| Image detector | GATAN K2 SUMMIT (4k x 4k) | Depositor |
| Maximum map value | 0.774 | Depositor |
| Minimum map value | -0.257 | Depositor |
| Average map value | 0.003 | Depositor |
| Map value standard deviation | 0.026 | Depositor |
| Recommended contour level | 0.12 | Depositor |
| Map size (Å) | 314.26, 314.26, 314.26 | wwPDB |
| Map dimensions | 380, 380, 380 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.827, 0.827, 0.827 | Depositor |

# 5 Model quality ⓘ

## 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, MG

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 | 0.14 | 0/1742 | 0.38 | 1/2370 (0.0%) |
| 1 | B | 0.14 | 0/1798 | 0.38 | 0/2446 |
| 2 | C | 0.11 | 0/8602 | 0.31 | 0/11658 |
| 3 | D | 0.11 | 0/10119 | 0.31 | 0/13673 |
| 4 | E | 0.09 | 0/596 | 0.26 | 0/810 |
| 5 | F | 0.13 | 0/1788 | 0.32 | 0/2407 |
| 6 | H | 0.11 | 0/5459 | 0.31 | 0/7428 |
| 7 | J | 0.13 | 0/547 | 0.41 | 0/738 |
| All | All | 0.12 | 0/30651 | 0.32 | 1/41530 (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 | C | 0 | 1 |

There are no bond length outliers.

All (1) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|-----|-------|-----|------|-------|---|----------------|-------------|
| 1 | A | 7 | PRO | CA-N-CD | -5.11 | 104.85 | 112.00 |

There are no chirality outliers.

All (1) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|-------|
| 2 | C | 1090 | ARG | 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 | 1716 | 1759 | 1759 | 9 | 0 |
| 1 | B | 1771 | 1803 | 1803 | 18 | 0 |
| 2 | C | 8452 | 8394 | 8393 | 54 | 0 |
| 3 | D | 9958 | 10078 | 10078 | 57 | 0 |
| 4 | E | 585 | 582 | 583 | 6 | 0 |
| 5 | F | 1763 | 1797 | 1795 | 19 | 0 |
| 6 | H | 5354 | 5247 | 5247 | 43 | 0 |
| 7 | J | 538 | 517 | 517 | 9 | 0 |
| 8 | D | 2 | 0 | 0 | 0 | 0 |
| 9 | D | 1 | 0 | 0 | 0 | 0 |
| All | All | 30140 | 30177 | 30175 | 201 | 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 3.

All (201) 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) |
|--------|--------|--------------------------|-------------------|
| 2:C:88:GLU:O | 2:C:392:ARG:NH1 | 2.05 | 0.88 |
| 1:A:179:GLU:OE2 | 1:A:191:LYS:NZ | 2.06 | 0.88 |
| 2:C:1102:ASN:ND2 | 4:E:63:ASP:OD1 | 2.11 | 0.83 |
| 1:B:20:ARG:NE | 1:B:195:ASP:OD2 | 2.13 | 0.82 |
| 5:F:274:ASP:OD2 | 7:J:89:ARG:NH2 | 2.18 | 0.77 |
| 2:C:388:GLU:OE2 | 2:C:392:ARG:NE | 2.18 | 0.76 |
| 1:B:29:GLY:N | 1:B:190:ASP:OD2 | 2.18 | 0.76 |
| 3:D:927:ASP:OD1 | 3:D:939:ARG:N | 2.20 | 0.74 |
| 3:D:653:ASN:OD1 | 3:D:656:LYS:NZ | 2.20 | 0.73 |
| 2:C:1084:SER:O | 2:C:1090:ARG:NH2 | 2.22 | 0.72 |
| 2:C:641:ILE:HD13 | 2:C:651:VAL:HG22 | 1.72 | 0.71 |
| 3:D:155:MET:O | 3:D:155:MET:HE3 | 1.90 | 0.71 |
| 4:E:30:LEU:O | 4:E:33:THR:OG1 | 2.07 | 0.69 |
| 6:H:676:VAL:HG22 | 6:H:702:ALA:HB2 | 1.75 | 0.69 |
| 1:B:78:LEU:HD22 | 3:D:613:SER:HA | 1.75 | 0.68 |
| 3:D:281:ILE:HD13 | 3:D:293:LEU:HD23 | 1.76 | 0.66 |
| 1:B:78:LEU:HD21 | 3:D:611:VAL:HG12 | 1.76 | 0.66 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:199:LYS:O | 1:A:200:ASN:OD1 | 2.14 | 0.65 |
| 3:D:1263:THR:HG23 | 4:E:52:ILE:HD11 | 1.77 | 0.65 |
| 2:C:992:MET:HA | 2:C:992:MET:HE3 | 1.80 | 0.64 |
| 6:H:116:THR:OG1 | 6:H:184:ASP:OD1 | 2.07 | 0.63 |
| 2:C:965:THR:O | 2:C:965:THR:HG23 | 1.99 | 0.63 |
| 3:D:1268:TYR:HB3 | 4:E:52:ILE:HD13 | 1.81 | 0.62 |
| 1:B:149:ALA:N | 1:B:165:ASP:OD1 | 2.33 | 0.62 |
| 3:D:1220:SER:OG | 3:D:1244:ASP:OD2 | 2.17 | 0.61 |
| 2:C:397:THR:HG22 | 2:C:397:THR:O | 2.00 | 0.61 |
| 6:H:217:LEU:HD11 | 6:H:229:VAL:HG21 | 1.81 | 0.61 |
| 1:A:40:ARG:NH1 | 2:C:894:ASP:OD1 | 2.34 | 0.61 |
| 6:H:679:VAL:HG13 | 6:H:709:LEU:HD11 | 1.83 | 0.60 |
| 3:D:218:ARG:HD3 | 3:D:222:ILE:HD11 | 1.84 | 0.59 |
| 2:C:360:ASP:O | 2:C:366:ASN:ND2 | 2.34 | 0.59 |
| 2:C:619:THR:HG22 | 2:C:620:GLY:N | 2.17 | 0.59 |
| 2:C:396:THR:HG22 | 2:C:396:THR:O | 2.03 | 0.58 |
| 1:B:151:GLN:O | 1:B:152:ASN:OD1 | 2.21 | 0.58 |
| 3:D:963:SER:OG | 3:D:1156:GLU:OE1 | 2.14 | 0.57 |
| 3:D:113:ARG:NH2 | 3:D:1236:ASP:OD1 | 2.34 | 0.57 |
| 3:D:1043:ASN:OD1 | 3:D:1085:GLN:NE2 | 2.37 | 0.57 |
| 2:C:1089:GLY:O | 2:C:1093:VAL:HG12 | 2.04 | 0.57 |
| 1:B:8:THR:HG22 | 1:B:24:GLU:O | 2.05 | 0.57 |
| 7:J:28:GLN:HE22 | 7:J:50:ILE:HD11 | 1.70 | 0.57 |
| 2:C:272:LEU:HD11 | 2:C:290:LEU:HD11 | 1.87 | 0.56 |
| 2:C:1088:VAL:HG12 | 2:C:1092:LYS:HD2 | 1.87 | 0.56 |
| 2:C:498:ASN:OD1 | 2:C:499:PRO:HD2 | 2.05 | 0.56 |
| 3:D:609:GLN:O | 3:D:609:GLN:HG2 | 2.06 | 0.56 |
| 6:H:201:PRO:CG | 6:H:700:THR:HG21 | 2.36 | 0.56 |
| 6:H:459:GLU:O | 6:H:463:GLU:OE1 | 2.23 | 0.56 |
| 6:H:130:HIS:O | 6:H:137:VAL:HG22 | 2.06 | 0.55 |
| 6:H:363:THR:OG1 | 6:H:365:ASP:OD1 | 2.24 | 0.55 |
| 6:H:598:VAL:HG21 | 6:H:721:LEU:HB2 | 1.88 | 0.55 |
| 6:H:633:ILE:HD11 | 6:H:711:ARG:HD3 | 1.87 | 0.55 |
| 6:H:460:ARG:NH1 | 6:H:464:GLU:OE2 | 2.40 | 0.55 |
| 2:C:1036:SER:O | 2:C:1037:THR:OG1 | 2.19 | 0.54 |
| 5:F:320:ILE:O | 5:F:324:LEU:HD23 | 2.07 | 0.54 |
| 6:H:10:LEU:HD21 | 6:H:14:ARG:NH2 | 2.23 | 0.54 |
| 6:H:59:ASP:O | 6:H:63:LEU:HD23 | 2.06 | 0.54 |
| 2:C:1080:LEU:O | 2:C:1084:SER:OG | 2.26 | 0.54 |
| 3:D:416:ASN:ND2 | 3:D:1253:VAL:O | 2.37 | 0.54 |
| 1:A:61:HIS:CE1 | 1:A:64:THR:HG23 | 2.43 | 0.54 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 5:F:189:LYS:HG2 | 7:J:97:LEU:HD11 | 1.90 | 0.54 |
| 6:H:676:VAL:HG23 | 6:H:706:LEU:HD12 | 1.91 | 0.53 |
| 6:H:213:VAL:HG21 | 6:H:526:VAL:HG21 | 1.91 | 0.53 |
| 6:H:616:VAL:HG12 | 6:H:616:VAL:O | 2.09 | 0.53 |
| 6:H:189:LEU:O | 6:H:212:ARG:NH1 | 2.37 | 0.52 |
| 3:D:898:VAL:HG11 | 3:D:919:ALA:HB2 | 1.92 | 0.52 |
| 2:C:1047:PRO:HD3 | 2:C:1090:ARG:HH22 | 1.73 | 0.52 |
| 3:D:1192:ARG:HA | 3:D:1195:VAL:HG12 | 1.91 | 0.52 |
| 7:J:32:TYR:HE2 | 7:J:42:VAL:HG21 | 1.74 | 0.52 |
| 2:C:183:ASP:O | 2:C:187:GLU:N | 2.41 | 0.52 |
| 7:J:90:SER:OG | 7:J:92:GLU:OE1 | 2.25 | 0.52 |
| 5:F:333:THR:HG23 | 5:F:334:PRO:HD2 | 1.90 | 0.52 |
| 6:H:700:THR:HG22 | 6:H:700:THR:O | 2.09 | 0.52 |
| 1:B:54:ILE:HG22 | 1:B:138:LEU:HG | 1.91 | 0.52 |
| 1:B:187:THR:HG22 | 1:B:188:ASP:H | 1.75 | 0.52 |
| 1:B:187:THR:HG22 | 1:B:188:ASP:N | 2.25 | 0.51 |
| 2:C:731:ARG:NH1 | 2:C:735:GLU:OE1 | 2.42 | 0.51 |
| 6:H:682:GLU:OE2 | 6:H:682:GLU:N | 2.40 | 0.51 |
| 6:H:596:MET:HE1 | 6:H:700:THR:HG23 | 1.91 | 0.51 |
| 2:C:218:ASP:OD2 | 2:C:220:LYS:NZ | 2.43 | 0.51 |
| 2:C:272:LEU:CD1 | 2:C:290:LEU:HD11 | 2.41 | 0.51 |
| 6:H:350:THR:HG21 | 6:H:378:VAL:HG23 | 1.93 | 0.51 |
| 6:H:619:CYS:SG | 6:H:620:GLY:N | 2.84 | 0.51 |
| 3:D:447:MET:O | 3:D:451:LEU:HD13 | 2.11 | 0.51 |
| 1:A:65:THR:HG21 | 2:C:647:ASP:OD2 | 2.11 | 0.50 |
| 2:C:162:THR:HG21 | 2:C:430:PHE:CE1 | 2.46 | 0.50 |
| 3:D:35:ASN:HB2 | 3:D:40:LYS:O | 2.12 | 0.50 |
| 3:D:741:LYS:NZ | 3:D:841:GLU:OE2 | 2.45 | 0.50 |
| 3:D:1127:GLY:O | 3:D:1131:VAL:HG23 | 2.12 | 0.49 |
| 6:H:165:ASN:O | 6:H:165:ASN:OD1 | 2.30 | 0.49 |
| 5:F:337:LEU:O | 5:F:341:MET:HG3 | 2.12 | 0.49 |
| 2:C:619:THR:HG22 | 2:C:620:GLY:H | 1.77 | 0.49 |
| 6:H:10:LEU:HD21 | 6:H:14:ARG:HH21 | 1.77 | 0.49 |
| 7:J:28:GLN:NE2 | 7:J:50:ILE:HD11 | 2.28 | 0.49 |
| 1:B:54:ILE:HD11 | 1:B:77:ILE:HG12 | 1.95 | 0.49 |
| 2:C:304:ARG:NH2 | 2:C:323:THR:O | 2.41 | 0.49 |
| 2:C:310:LYS:NZ | 2:C:359:ASP:OD1 | 2.38 | 0.49 |
| 5:F:297:MET:O | 5:F:302:ARG:NH2 | 2.46 | 0.48 |
| 6:H:602:VAL:O | 6:H:605:GLU:HG2 | 2.13 | 0.48 |
| 5:F:272:LYS:HB2 | 5:F:284:TYR:OH | 2.14 | 0.48 |
| 3:D:330:LEU:N | 3:D:334:ARG:O | 2.34 | 0.48 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 7:J:32:TYR:CE2 | 7:J:42:VAL:HG21 | 2.49 | 0.48 |
| 1:B:61:HIS:O | 1:B:62:GLU:HG3 | 2.14 | 0.48 |
| 2:C:535:ALA:HB2 | 2:C:571:ASP:HB2 | 1.94 | 0.48 |
| 3:D:35:ASN:OD1 | 3:D:42:GLU:OE2 | 2.32 | 0.48 |
| 2:C:619:THR:O | 2:C:622:GLU:OE1 | 2.32 | 0.48 |
| 4:E:35:PRO:HG2 | 4:E:40:LEU:HD11 | 1.96 | 0.48 |
| 5:F:233:LEU:HD21 | 5:F:281:PHE:CE2 | 2.48 | 0.48 |
| 5:F:324:LEU:O | 5:F:328:LEU:HB2 | 2.13 | 0.47 |
| 3:D:1128:PRO:CB | 3:D:1163:LEU:HD21 | 2.44 | 0.47 |
| 5:F:191:ILE:O | 5:F:195:LEU:HD23 | 2.14 | 0.47 |
| 2:C:172:ARG:HH22 | 2:C:196:ILE:HD13 | 1.79 | 0.47 |
| 3:D:365:ILE:H | 3:D:365:ILE:HD12 | 1.79 | 0.47 |
| 3:D:116:TYR:O | 3:D:295:ARG:NE | 2.44 | 0.47 |
| 3:D:222:ILE:HD13 | 3:D:243:GLU:HG2 | 1.97 | 0.47 |
| 2:C:403:ILE:HB | 2:C:408:LEU:HD11 | 1.97 | 0.46 |
| 2:C:919:ILE:HG21 | 3:D:816:LEU:HD11 | 1.98 | 0.46 |
| 4:E:52:ILE:HD12 | 4:E:52:ILE:H | 1.81 | 0.46 |
| 2:C:939:VAL:HG22 | 2:C:939:VAL:O | 2.15 | 0.46 |
| 2:C:1040:TYR:CE2 | 2:C:1090:ARG:NH1 | 2.84 | 0.46 |
| 2:C:1086:ASP:O | 2:C:1090:ARG:HG3 | 2.15 | 0.46 |
| 2:C:1043:ILE:H | 2:C:1043:ILE:HD12 | 1.80 | 0.46 |
| 5:F:263:ASN:O | 5:F:267:ILE:HG12 | 2.16 | 0.46 |
| 7:J:80:THR:HG23 | 7:J:83:ASP:H | 1.80 | 0.46 |
| 2:C:722:TYR:OH | 3:D:578:ARG:NH1 | 2.49 | 0.45 |
| 2:C:1128:VAL:HG22 | 3:D:7:PHE:HE1 | 1.81 | 0.45 |
| 6:H:23:ARG:NH2 | 6:H:92:ASP:OD1 | 2.49 | 0.45 |
| 1:A:183:VAL:HG23 | 1:A:183:VAL:O | 2.16 | 0.45 |
| 3:D:1188:GLU:HA | 3:D:1188:GLU:OE1 | 2.16 | 0.45 |
| 2:C:299:LEU:N | 2:C:322:SER:O | 2.49 | 0.45 |
| 1:B:51:VAL:HG22 | 1:B:140:VAL:HG22 | 1.99 | 0.45 |
| 3:D:32:GLU:HB3 | 3:D:42:GLU:HG3 | 1.98 | 0.45 |
| 3:D:260:SER:O | 3:D:264:LEU:HD13 | 2.15 | 0.45 |
| 6:H:213:VAL:HG21 | 6:H:526:VAL:CG2 | 2.47 | 0.45 |
| 2:C:404:THR:O | 2:C:408:LEU:HD13 | 2.17 | 0.45 |
| 2:C:619:THR:HG23 | 2:C:966:PRO:HA | 1.98 | 0.45 |
| 3:D:277:LEU:O | 3:D:281:ILE:HG13 | 2.16 | 0.44 |
| 6:H:591:THR:HG23 | 6:H:596:MET:HE3 | 2.00 | 0.44 |
| 6:H:704:GLN:OE1 | 6:H:705:ARG:NH2 | 2.51 | 0.44 |
| 3:D:331:ASP:OD1 | 3:D:331:ASP:N | 2.50 | 0.44 |
| 5:F:324:LEU:HD21 | 5:F:340:GLU:HG3 | 1.99 | 0.44 |
| 3:D:3:ASP:N | 3:D:3:ASP:OD1 | 2.50 | 0.44 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 3:D:198:ARG:NH2 | 3:D:202:GLU:OE2 | 2.51 | 0.44 |
| 6:H:311:VAL:HG13 | 6:H:357:ILE:HD11 | 1.99 | 0.44 |
| 1:A:214:THR:HG23 | 1:B:231:HIS:ND1 | 2.32 | 0.44 |
| 2:C:1128:VAL:HG13 | 3:D:7:PHE:CD1 | 2.53 | 0.44 |
| 3:D:185:GLU:OE1 | 3:D:194:ARG:NH1 | 2.51 | 0.44 |
| 3:D:415:GLN:HA | 3:D:415:GLN:OE1 | 2.18 | 0.44 |
| 3:D:154:GLU:HA | 3:D:157:VAL:HG22 | 1.99 | 0.44 |
| 2:C:1084:SER:C | 2:C:1090:ARG:NH2 | 2.76 | 0.43 |
| 3:D:141:ASP:OD1 | 3:D:142:GLU:N | 2.52 | 0.43 |
| 7:J:28:GLN:OE1 | 7:J:29:VAL:N | 2.50 | 0.43 |
| 1:A:181:THR:O | 1:A:181:THR:HG22 | 2.19 | 0.43 |
| 6:H:591:THR:CG2 | 6:H:596:MET:HE3 | 2.48 | 0.43 |
| 2:C:747:GLU:HG2 | 2:C:861:ARG:HG2 | 2.01 | 0.43 |
| 5:F:299:ASP:O | 5:F:302:ARG:NH2 | 2.52 | 0.43 |
| 6:H:340:GLU:O | 6:H:344:VAL:HG23 | 2.19 | 0.43 |
| 6:H:390:ALA:O | 6:H:394:LEU:HD13 | 2.19 | 0.43 |
| 3:D:1053:ARG:HG2 | 3:D:1053:ARG:HH11 | 1.84 | 0.43 |
| 6:H:667:GLU:HA | 6:H:667:GLU:OE1 | 2.19 | 0.43 |
| 1:B:150:VAL:HG12 | 1:B:152:ASN:H | 1.83 | 0.42 |
| 2:C:242:ARG:NH2 | 2:C:334:GLU:OE1 | 2.42 | 0.42 |
| 5:F:272:LYS:HD2 | 5:F:288:TRP:CZ2 | 2.54 | 0.42 |
| 1:B:194:ILE:O | 1:B:194:ILE:HG23 | 2.19 | 0.42 |
| 3:D:861:ASP:O | 3:D:865:ARG:HG3 | 2.19 | 0.42 |
| 5:F:312:GLU:HG2 | 5:F:313:VAL:N | 2.35 | 0.42 |
| 1:B:151:GLN:OE1 | 1:B:153:LYS:HE2 | 2.20 | 0.42 |
| 3:D:281:ILE:HD13 | 3:D:293:LEU:CD2 | 2.47 | 0.42 |
| 1:A:199:LYS:O | 1:A:200:ASN:CG | 2.63 | 0.42 |
| 1:B:51:VAL:HA | 1:B:140:VAL:HG22 | 2.01 | 0.42 |
| 3:D:143:MET:HA | 3:D:146:ASN:ND2 | 2.35 | 0.42 |
| 2:C:1040:TYR:CD2 | 2:C:1090:ARG:NH1 | 2.88 | 0.41 |
| 6:H:54:ARG:O | 6:H:58:LYS:HG2 | 2.20 | 0.41 |
| 3:D:577:PRO:HA | 3:D:581:MET:HE3 | 2.03 | 0.41 |
| 5:F:218:ASP:O | 5:F:222:ILE:HG12 | 2.20 | 0.41 |
| 2:C:850:ASP:CG | 2:C:852:LEU:HD13 | 2.45 | 0.41 |
| 3:D:339:ASP:OD2 | 3:D:397:ARG:NH1 | 2.48 | 0.41 |
| 3:D:814:ARG:O | 3:D:818:GLY:N | 2.51 | 0.41 |
| 6:H:368:HIS:O | 6:H:371:GLU:HG2 | 2.20 | 0.41 |
| 2:C:23:VAL:HG11 | 2:C:623:LEU:HD21 | 2.01 | 0.41 |
| 3:D:35:ASN:ND2 | 3:D:37:ARG:HB3 | 2.36 | 0.41 |
| 3:D:453:LYS:O | 3:D:456:VAL:HG22 | 2.20 | 0.41 |
| 6:H:603:LEU:HA | 6:H:606:PHE:CE1 | 2.56 | 0.41 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 6:H:174:ASP:O | 6:H:176:VAL:N | 2.52 | 0.41 |
| 2:C:346:MET:HE3 | 2:C:348:VAL:HG13 | 2.03 | 0.41 |
| 3:D:665:THR:HG22 | 3:D:684:ASN:CG | 2.46 | 0.41 |
| 3:D:1047:ILE:O | 3:D:1078:TYR:OH | 2.17 | 0.41 |
| 5:F:338:ALA:HB1 | 5:F:343:ILE:O | 2.21 | 0.41 |
| 6:H:628:VAL:HG11 | 6:H:633:ILE:HA | 2.03 | 0.41 |
| 3:D:890:CYS:SG | 3:D:892:THR:HG22 | 2.61 | 0.41 |
| 2:C:633:VAL:HB | 2:C:694:ALA:HB3 | 2.03 | 0.40 |
| 5:F:288:TRP:O | 5:F:291:GLN:HG3 | 2.21 | 0.40 |
| 6:H:308:LEU:HD22 | 6:H:380:GLU:OE1 | 2.21 | 0.40 |
| 3:D:687:MET:HE2 | 3:D:687:MET:HA | 2.03 | 0.40 |
| 3:D:1089:VAL:HG12 | 3:D:1114:GLU:OE1 | 2.22 | 0.40 |
| 2:C:649:ILE:HD11 | 2:C:679:PRO:HB3 | 2.03 | 0.40 |
| 2:C:372:VAL:HG13 | 2:C:373:GLY:N | 2.36 | 0.40 |
| 6:H:10:LEU:O | 6:H:14:ARG:HG3 | 2.21 | 0.40 |
| 6:H:263:VAL:HG23 | 6:H:436:VAL:HG13 | 2.03 | 0.40 |
| 2:C:619:THR:CG2 | 2:C:620:GLY:N | 2.84 | 0.40 |
| 3:D:920:PHE:O | 3:D:921:ALA:HB3 | 2.22 | 0.40 |
| 5:F:151:ARG:HH11 | 5:F:151:ARG:HG2 | 1.86 | 0.40 |
| 6:H:130:HIS:C | 6:H:137:VAL:HG22 | 2.47 | 0.40 |

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 | 224/350 (64%) | 220 (98%) | 4 (2%) | 0 | 100 | 100 |
| 1 | B | 231/350 (66%) | 220 (95%) | 11 (5%) | 0 | 100 | 100 |
| 2 | C | 1089/1169 (93%) | 1073 (98%) | 16 (2%) | 0 | 100 | 100 |
| 3 | D | 1268/1317 (96%) | 1244 (98%) | 24 (2%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|----------|----------|---------|----------|-------------|-------------|
| 4 | E | 71/107 (66%) | 71 (100%) | 0 | 0 | 100 | 100 |
| 5 | F | 216/466 (46%) | 210 (97%) | 6 (3%) | 0 | 100 | 100 |
| 6 | H | 686/736 (93%) | 675 (98%) | 11 (2%) | 0 | 100 | 100 |
| 7 | J | 61/114 (54%) | 59 (97%) | 2 (3%) | 0 | 100 | 100 |
| All | All | 3846/4609 (83%) | 3772 (98%) | 74 (2%) | 0 | 100 | 100 |

There are no Ramachandran outliers to report.

### 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 | 193/297 (65%) | 193 (100%) | 0 | 100 | 100 |
| 1 | B | 199/297 (67%) | 199 (100%) | 0 | 100 | 100 |
| 2 | C | 922/984 (94%) | 922 (100%) | 0 | 100 | 100 |
| 3 | D | 1062/1095 (97%) | 1062 (100%) | 0 | 100 | 100 |
| 4 | E | 63/86 (73%) | 63 (100%) | 0 | 100 | 100 |
| 5 | F | 181/379 (48%) | 181 (100%) | 0 | 100 | 100 |
| 6 | H | 545/583 (94%) | 545 (100%) | 0 | 100 | 100 |
| 7 | J | 57/98 (58%) | 57 (100%) | 0 | 100 | 100 |
| All | All | 3222/3819 (84%) | 3222 (100%) | 0 | 100 | 100 |

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | B | 5 | GLN |
| 1 | B | 36 | ASN |
| 1 | B | 129 | ASN |
| 2 | C | 314 | ASN |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 2 | C | 406 | GLN |
| 2 | C | 594 | ASN |
| 2 | C | 605 | GLN |
| 2 | C | 857 | ASN |
| 3 | D | 35 | ASN |
| 3 | D | 482 | GLN |
| 3 | D | 499 | ASN |
| 3 | D | 510 | GLN |
| 3 | D | 609 | GLN |
| 3 | D | 760 | GLN |
| 3 | D | 851 | ASN |
| 3 | D | 1161 | GLN |
| 3 | D | 1240 | ASN |
| 4 | E | 103 | HIS |
| 5 | F | 231 | ASN |
| 5 | F | 237 | ASN |
| 6 | H | 227 | HIS |
| 6 | H | 411 | 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 oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

# 6　Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-18128. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

## 6.1　Orthogonal projections ⓘ
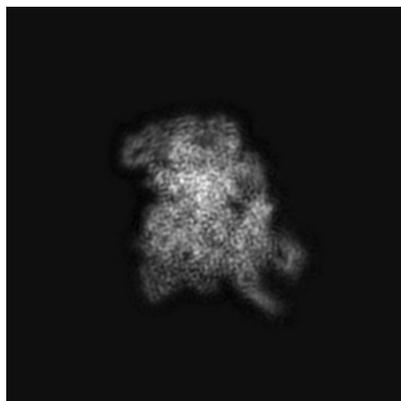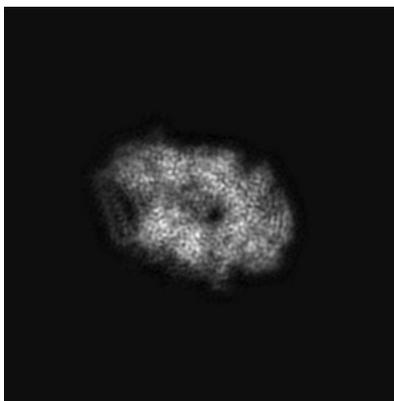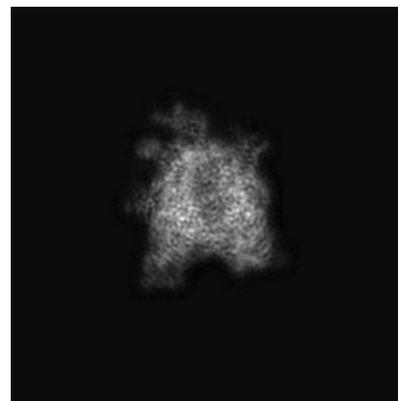
### 6.1.1　Primary map



X　　　　　　　　　　　Y　　　　　　　　　　　Z

### 6.1.2　Raw map



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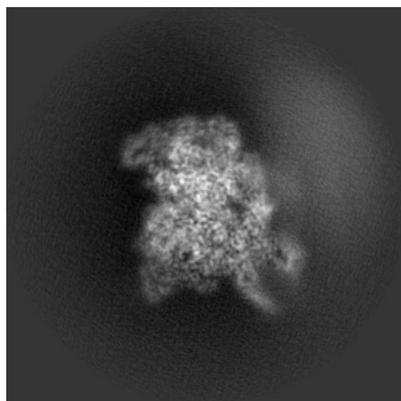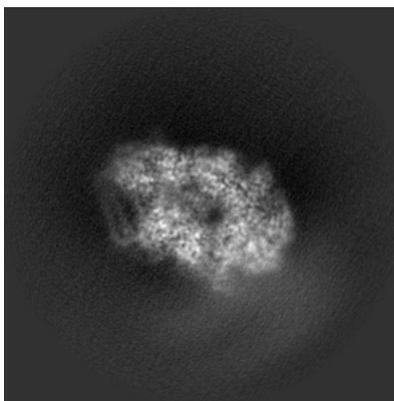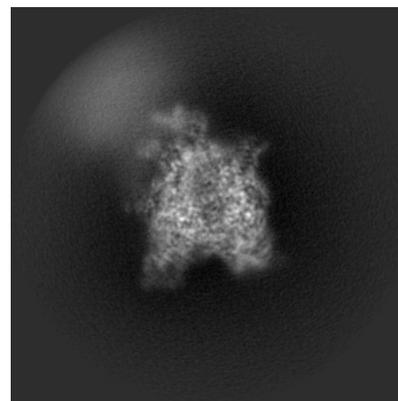
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices ⓘ
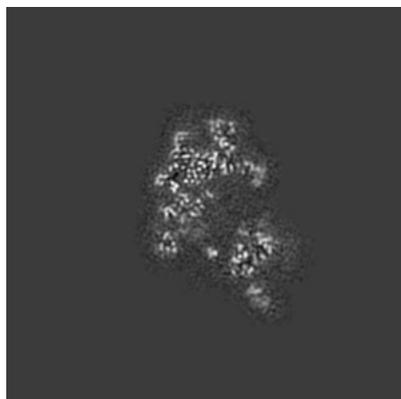
### 6.2.1 Primary map
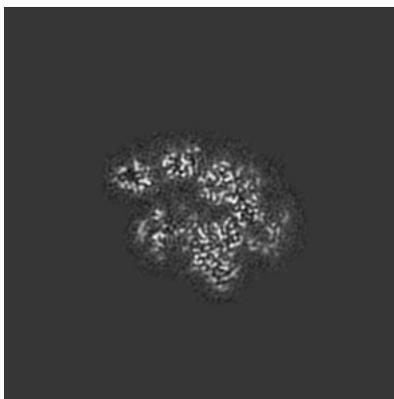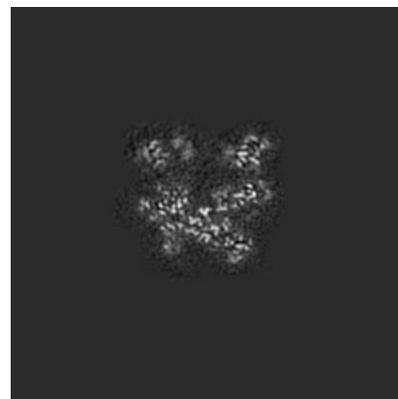


| X Index: 190 | Y Index: 190 | Z Index: 190 |

### 6.2.2 Raw map
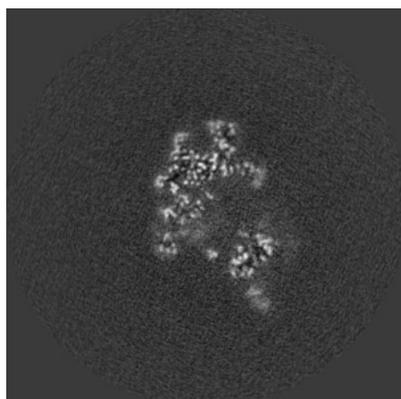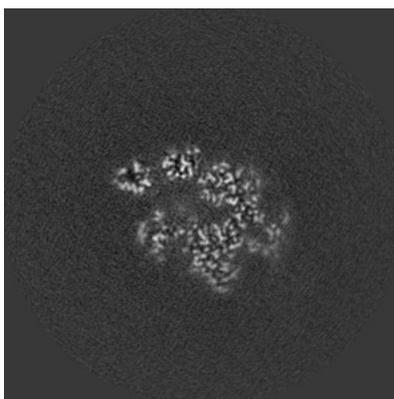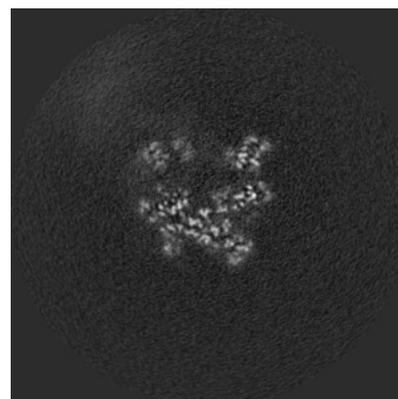


| X Index: 190 | Y Index: 190 | Z Index: 190 |

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

## 6.3　Largest variance slices ⓘ

### 6.3.1　Primary map
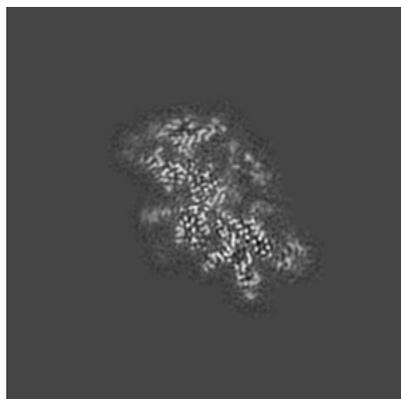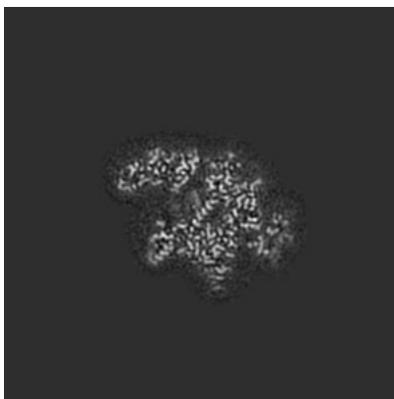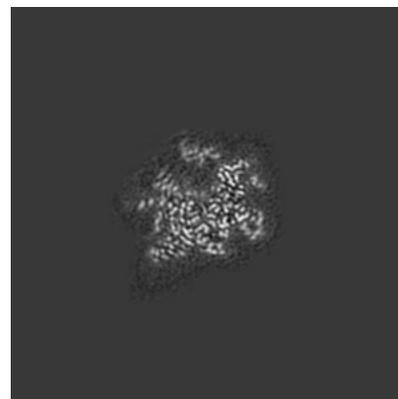


| X Index: 165 | Y Index: 183 | Z Index: 218 |

### 6.3.2　Raw map
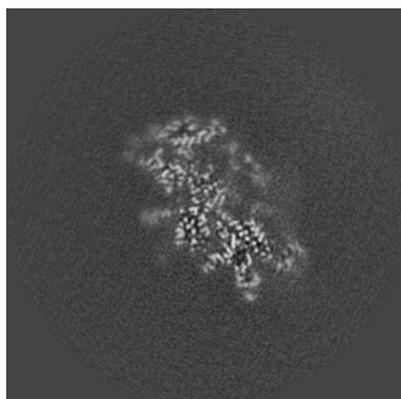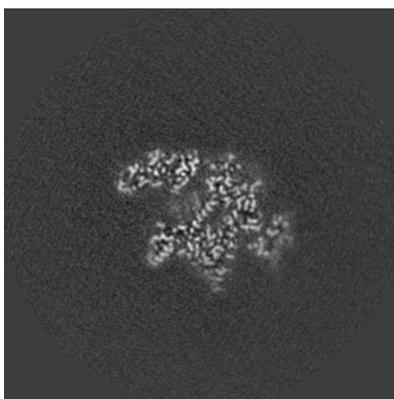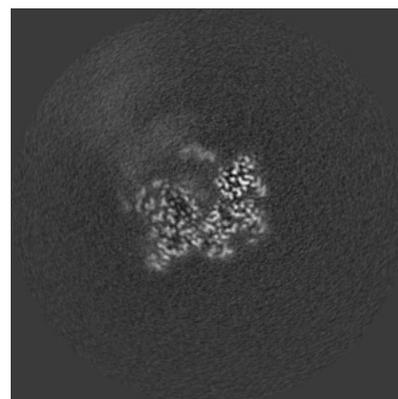


| X Index: 165 | Y Index: 183 | Z Index: 213 |

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

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

### 6.4.1 Primary map
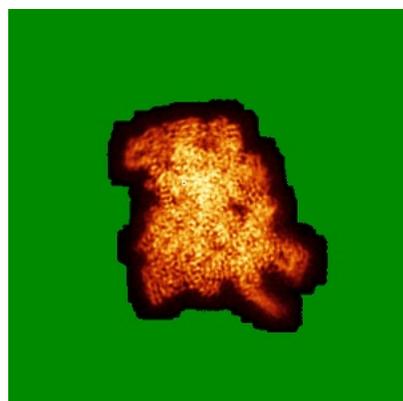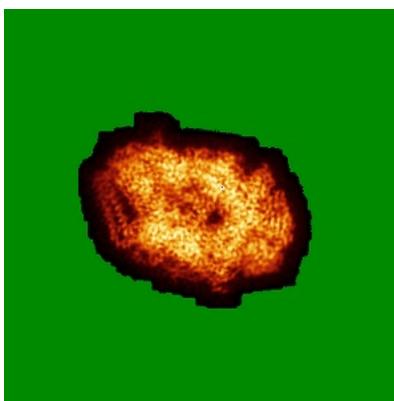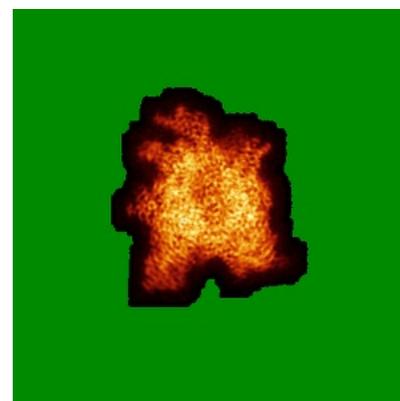


X       Y       Z

### 6.4.2 Raw map



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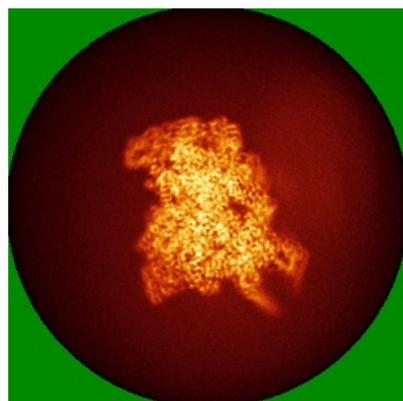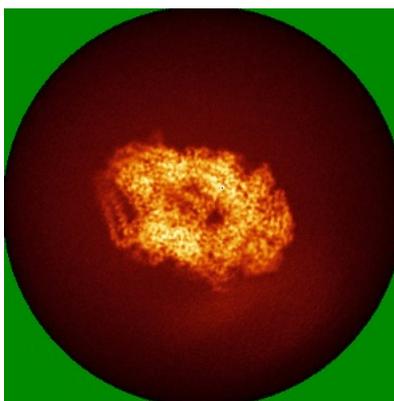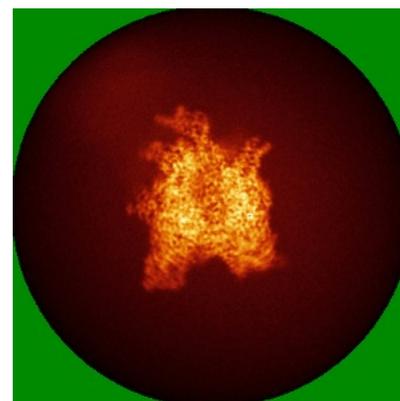
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views ⓘ

### 6.5.1 Primary map



X Y Z
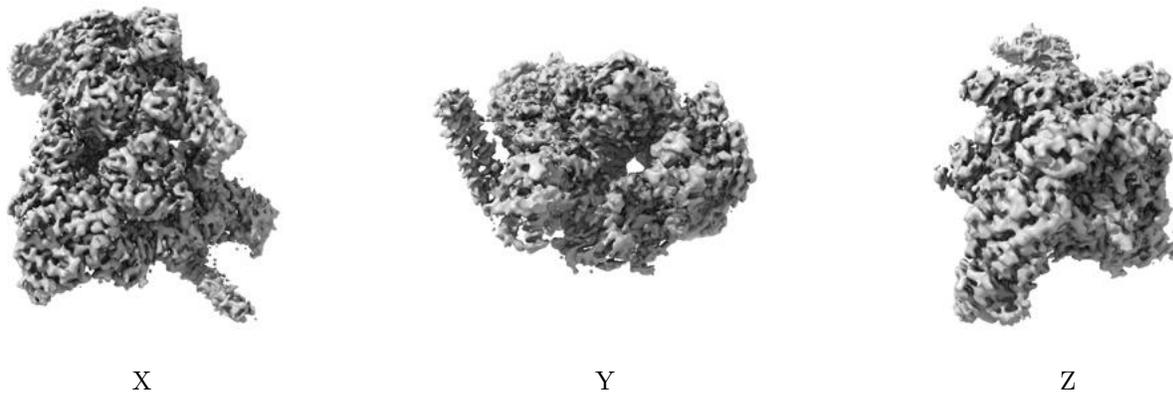
The images above show the 3D surface view of the map at the recommended contour level 0.12. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



X Y Z

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

## 6.6 Mask visualisation ⓘ

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 ⓘ
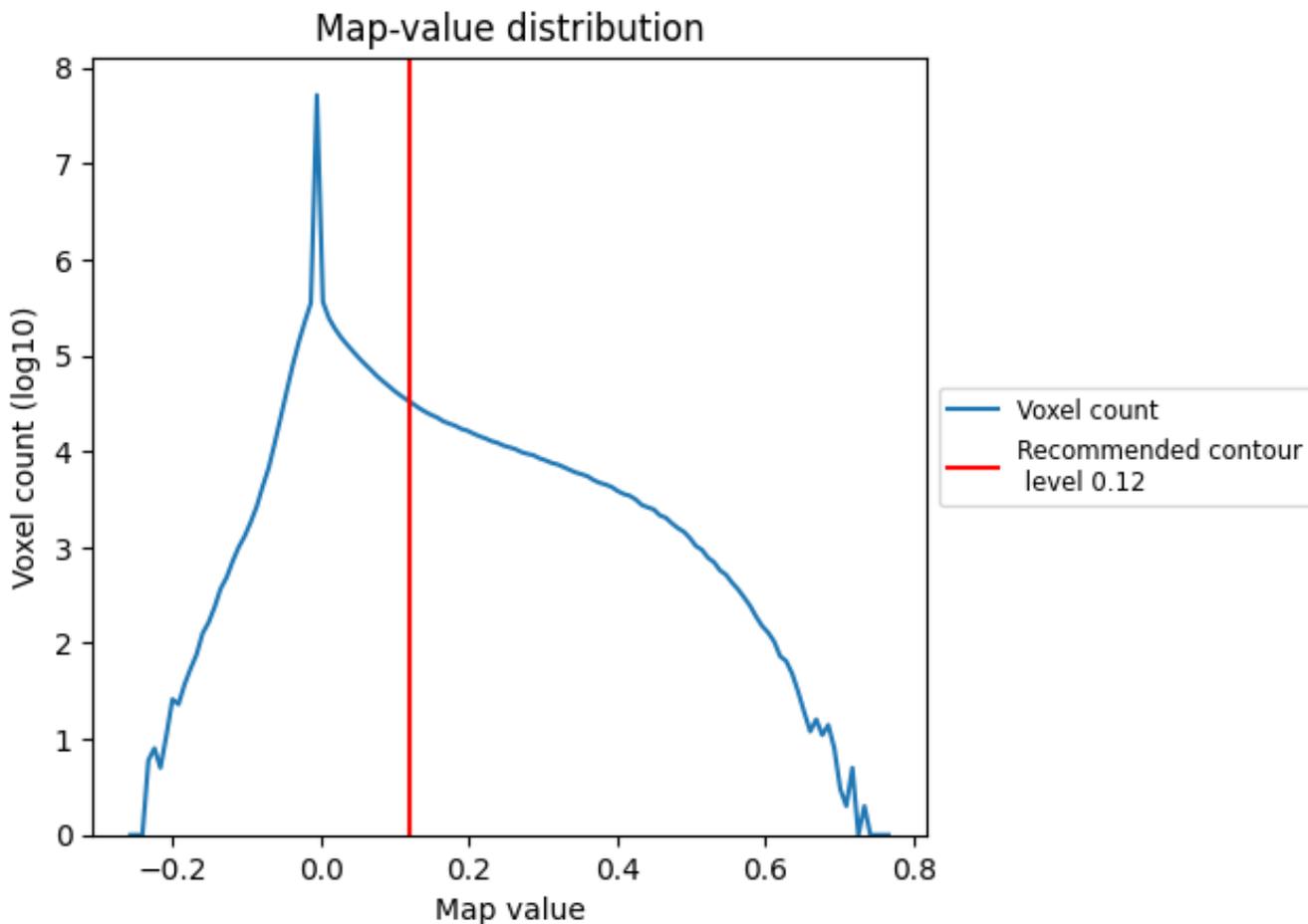


The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

## 7.2 Volume estimate ⓘ
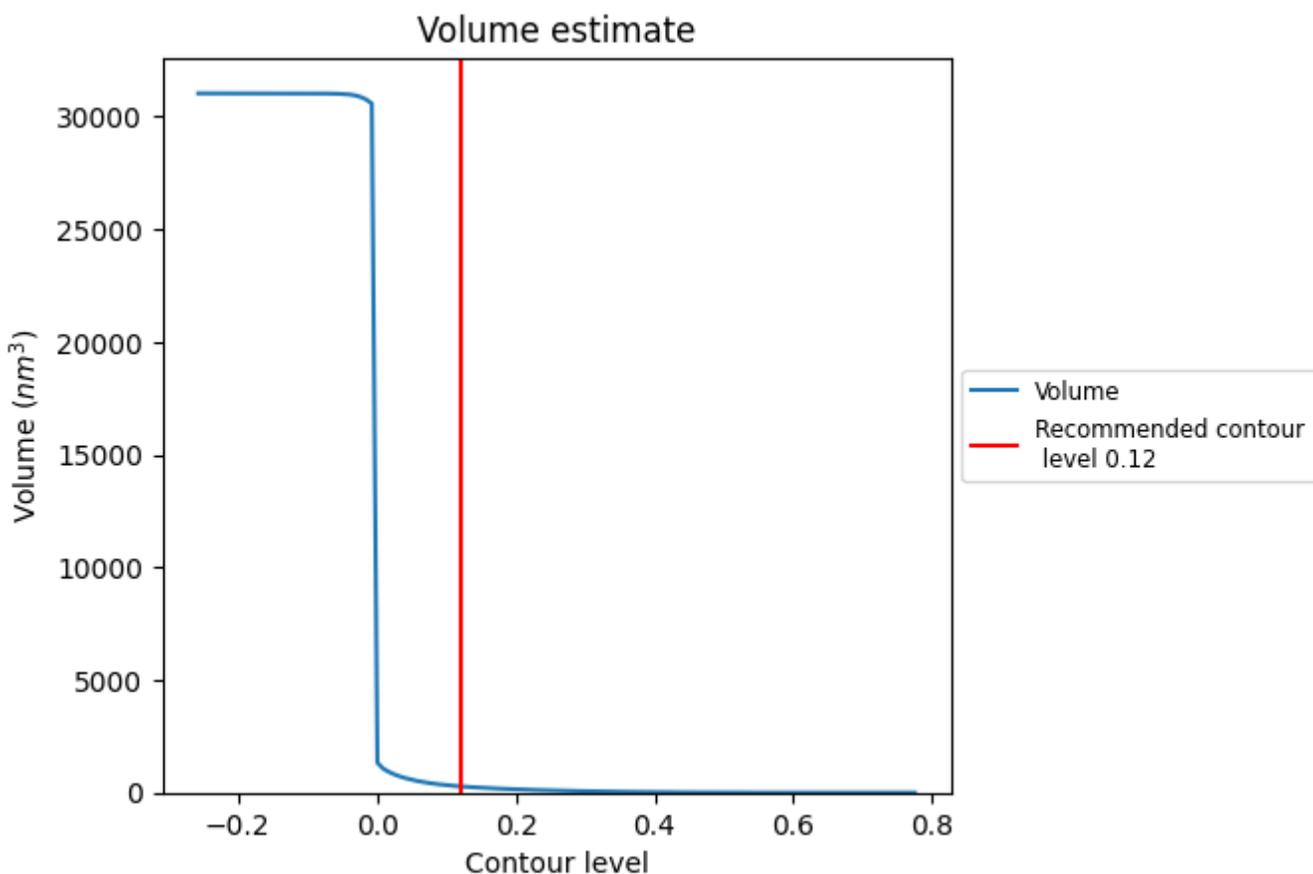


The volume at the recommended contour level is 279 nm$^3$; this corresponds to an approximate mass of 252 kDa.

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 ⓘ
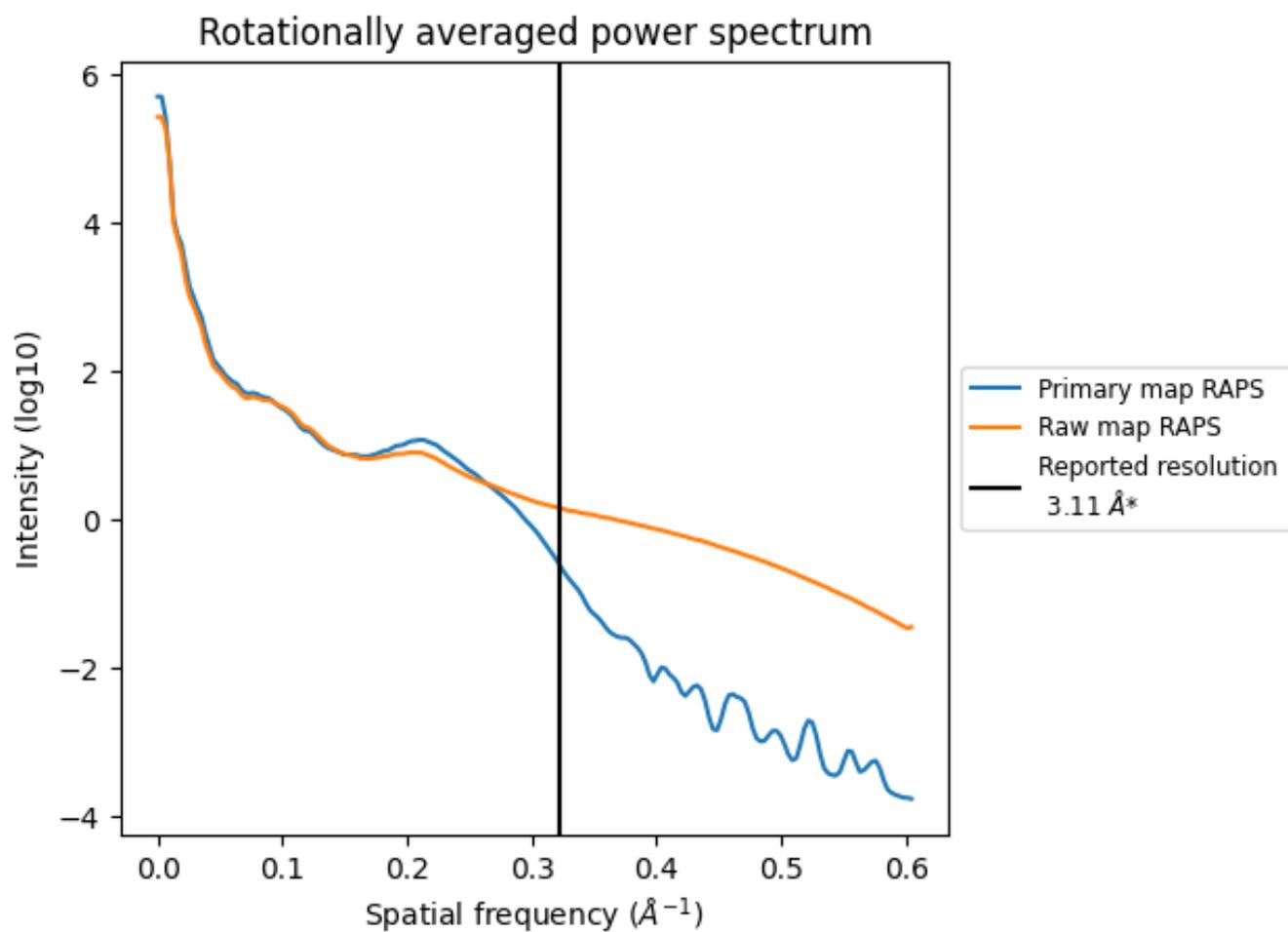


*Reported resolution corresponds to spatial frequency of 0.322 Å$^{-1}$

# 8 Fourier-Shell correlation ⓘ

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

## 8.1 FSC ⓘ
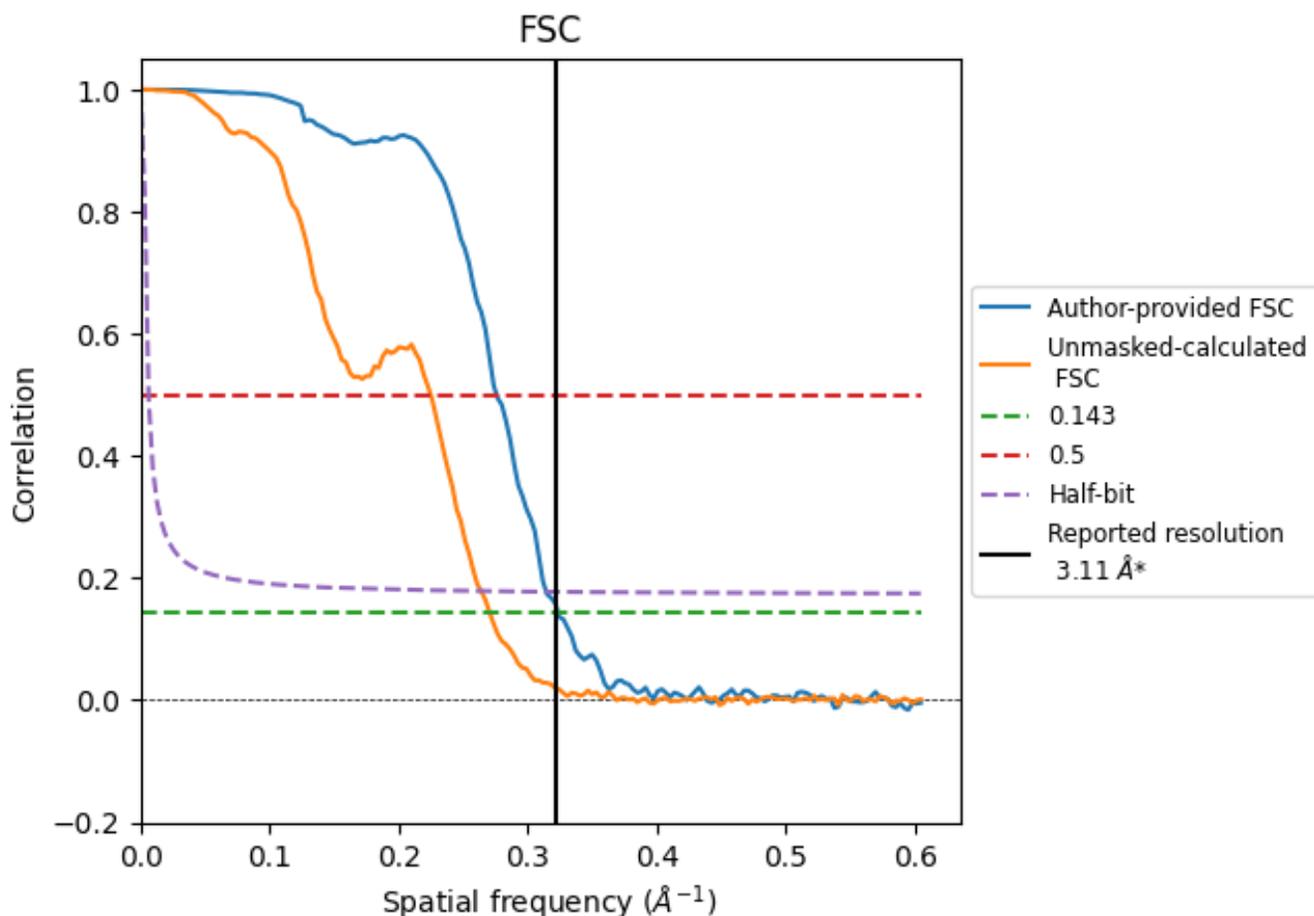


*Reported resolution corresponds to spatial frequency of 0.322 Å$^{-1}$

## 8.2 Resolution estimates (i)

| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 3.11 | - | - |
| Author-provided FSC curve | 3.09 | 3.62 | 3.18 |
| Unmasked-calculated* | 3.70 | 4.45 | 3.79 |

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.70 differs from the reported value 3.11 by more than 10 %

# 9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-18128 and PDB model 8Q3I. Per-residue inclusion information can be found in section 3 on page 5.

## 9.1 Map-model overlay ⓘ



| X | Y | Z |
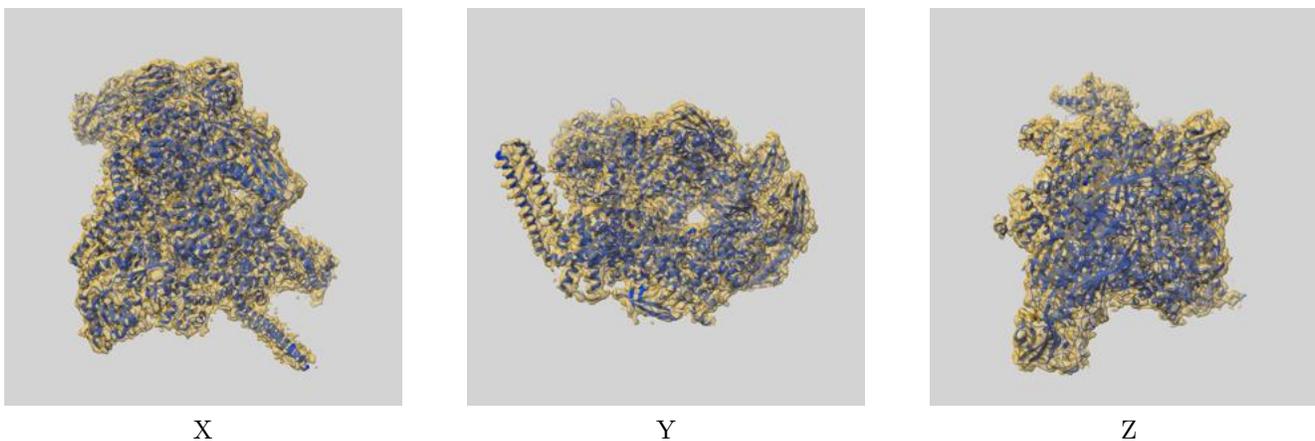
The images above show the 3D surface view of the map at the recommended contour level 0.12 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2　Q-score mapped to coordinate model ⓘ



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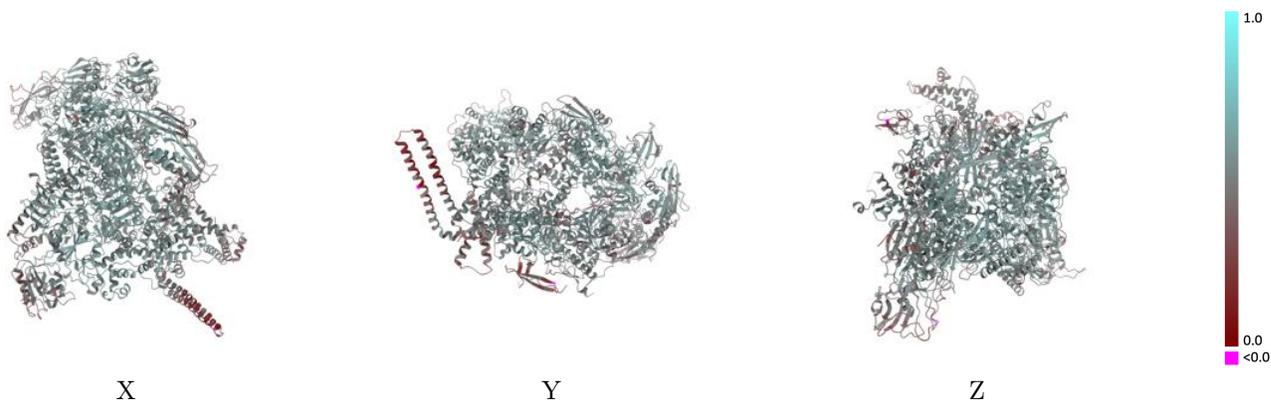
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

## 9.3　Atom inclusion mapped to coordinate model ⓘ



X　　　　　　　　　　Y　　　　　　　　　　Z
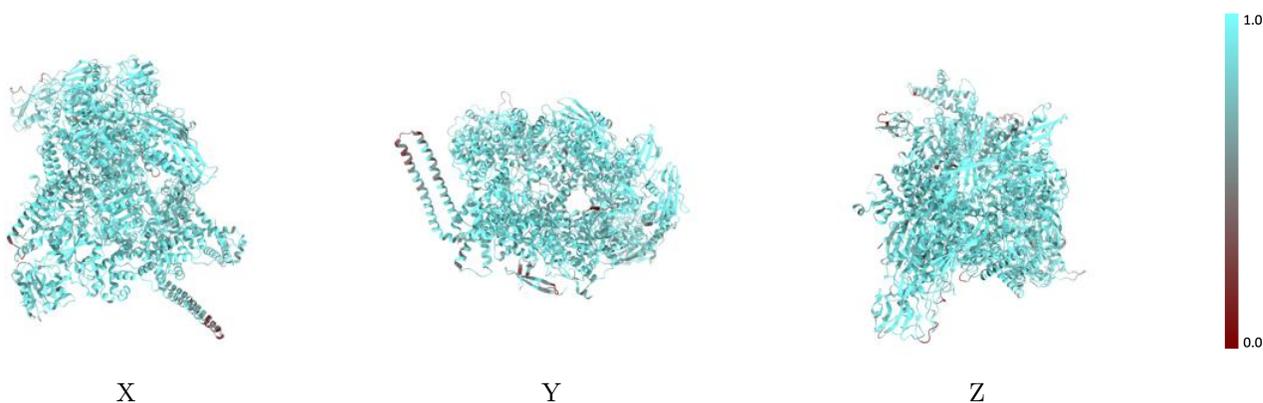
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.12).

## 9.4　Atom inclusion ⓘ
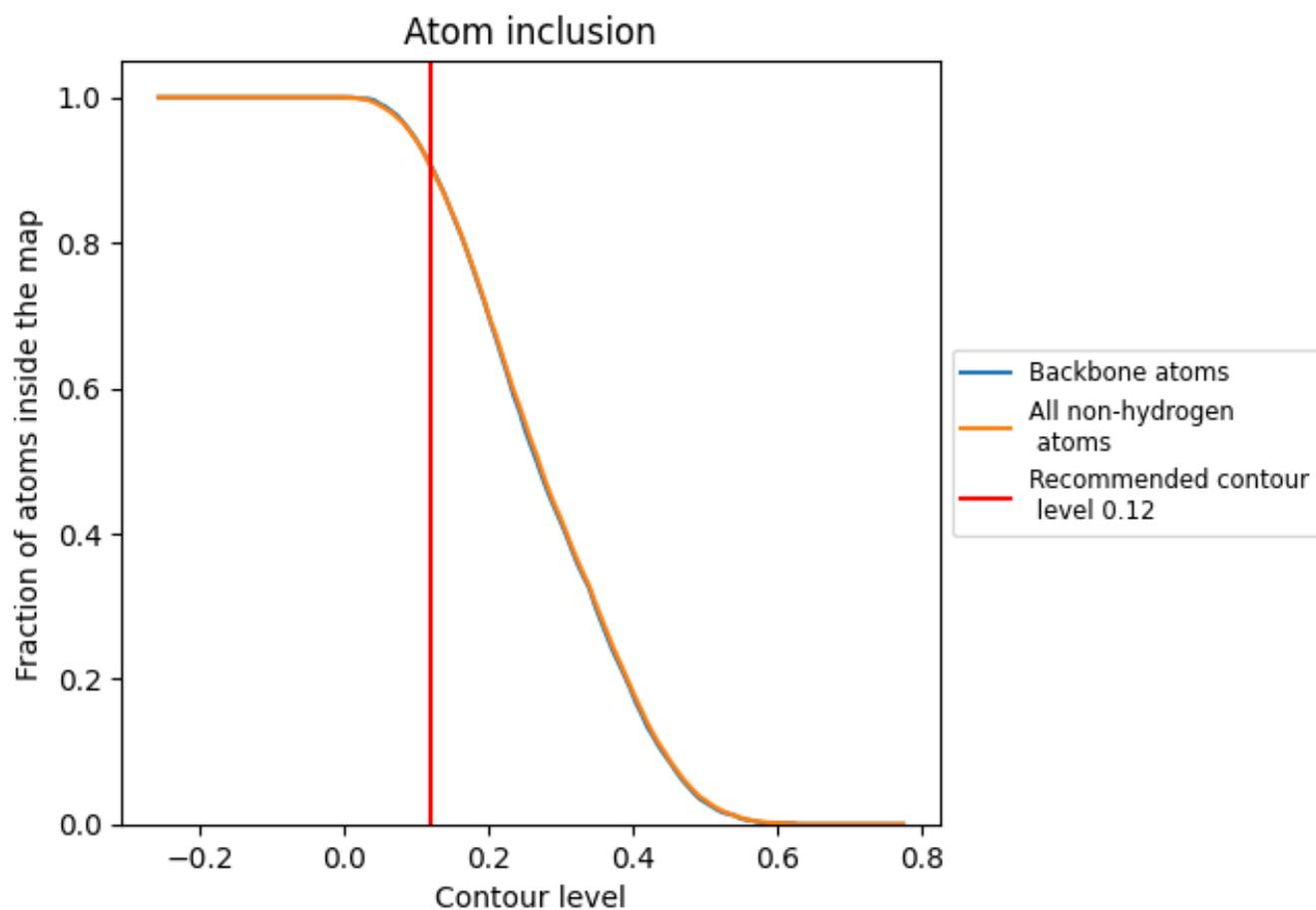


At the recommended contour level, 91% of all backbone atoms, 90% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.12) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|:-----:|:--------------:|:-------:|
| All | 0.9050 | 0.5170 |
| A | 0.9040 | 0.5080 |
| B | 0.8540 | 0.4480 |
| C | 0.9350 | 0.5430 |
| D | 0.9120 | 0.5180 |
| E | 0.9090 | 0.5220 |
| F | 0.8740 | 0.4790 |
| H | 0.9210 | 0.5270 |
| J | 0.6700 | 0.3550 |

1.0

0.0

<0.0