# wwPDB EM Validation Summary Report (i)

Jan 30, 2025 – 12:35 pm GMT

| | | |
|---|---|---|
| PDB ID | : | 9G9D |
| EMDB ID | : | EMD-51148 |
| Title | : | CryoEM structure of Enterococcus italicus Csm-crRNA-CTR (4.3) complex |
| Authors | : | Jungfer, K.; Jinek, M. |
| Deposited on | : | 2024-07-25 |
| Resolution | : | 2.90 Å(reported) |

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

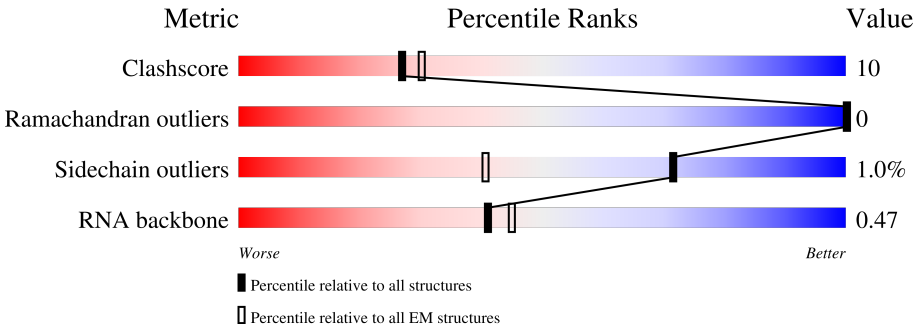
| | | |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev113 |
| MolProbity | : | 4.02b-467 |
| Percentile statistics | : | 20231227.v01 (using entries in the PDB archive December 27th 2023) |
| MapQ | : | 1.9.13 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.40 |

# 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 2.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 210492 | 15764 |
| Ramachandran outliers | 207382 | 16835 |
| Sidechain outliers | 206894 | 16415 |
| RNA backbone | 6643 | 2191 |

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 | B | 140 | 69% 22% 9% |
| 1 | C | 140 | 14% 59% 35% 6% |
| 1 | J | 140 | 23% 75% 21% |
| 2 | D | 214 | 66% 27% 7% |
| 2 | E | 214 | 73% 25% |
| 2 | F | 214 | 77% 21% |
| 2 | I | 214 | 71% 27% |

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| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 3 | G | 307 | 6% 72% 24% |
| 4 | R | 45 | 11% 42% 29% 16% |
| 5 | T | 47 | 43% 30% 26% |
| 6 | H | 379 | 17% 55% 27% 18% |
| 7 | A | 774 | 23% 69% 15% 16% |

# 2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 21333 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 CRISPR system Cms protein Csm2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 1 | C | 132 | Total | C | N | O | S | 0 | 0 |
| | | | 1102 | 708 | 186 | 206 | 2 | | |
| 1 | B | 128 | Total | C | N | O | S | 0 | 0 |
| | | | 1065 | 690 | 175 | 198 | 2 | | |
| 1 | J | 135 | Total | C | N | O | S | 0 | 0 |
| | | | 1124 | 723 | 190 | 209 | 2 | | |

- Molecule 2 is a protein called CRISPR system Cms endoribonuclease Csm3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 2 | F | 210 | Total | C | N | O | S | 0 | 0 |
| | | | 1620 | 1019 | 288 | 309 | 4 | | |
| 2 | E | 210 | Total | C | N | O | S | 0 | 0 |
| | | | 1620 | 1019 | 288 | 309 | 4 | | |
| 2 | D | 200 | Total | C | N | O | S | 0 | 0 |
| | | | 1548 | 976 | 274 | 295 | 3 | | |
| 2 | I | 210 | Total | C | N | O | S | 0 | 0 |
| | | | 1620 | 1019 | 288 | 309 | 4 | | |

There are 4 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| F | 32 | ALA | ASP | engineered mutation | UNP E6LHV5 |
| E | 32 | ALA | ASP | engineered mutation | UNP E6LHV5 |
| D | 32 | ALA | ASP | engineered mutation | UNP E6LHV5 |
| I | 32 | ALA | ASP | engineered mutation | UNP E6LHV5 |

- Molecule 3 is a protein called CRISPR system Cms protein Csm4.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 3 | G | 296 | Total | C | N | O | S | 0 | 0 |
| | | | 2341 | 1509 | 384 | 443 | 5 | | |

- Molecule 4 is a RNA chain called RNA (35-MER).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 4 | R | 38 | Total | C | N | O | P | 0 | 0 |
| | | | 816 | 366 | 158 | 255 | 37 | | |

- Molecule 5 is a RNA chain called RNA (35-MER).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 5 | T | 35 | Total | C | N | O | P | 0 | 0 |
| | | | 740 | 330 | 125 | 250 | 35 | | |

- Molecule 6 is a protein called CRISPR system Cms protein Csm5.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 6 | H | 310 | Total | C | N | O | S | 0 | 0 |
| | | | 2510 | 1625 | 430 | 447 | 8 | | |

There are 30 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| H | 350 | LEU | - | expression tag | UNP E6LHV3 |
| H | 351 | GLU | - | expression tag | UNP E6LHV3 |
| H | 352 | VAL | - | expression tag | UNP E6LHV3 |
| H | 353 | LEU | - | expression tag | UNP E6LHV3 |
| H | 354 | PHE | - | expression tag | UNP E6LHV3 |
| H | 355 | GLN | - | expression tag | UNP E6LHV3 |
| H | 356 | GLY | - | expression tag | UNP E6LHV3 |
| H | 357 | PRO | - | expression tag | UNP E6LHV3 |
| H | 358 | GLY | - | expression tag | UNP E6LHV3 |
| H | 359 | GLY | - | expression tag | UNP E6LHV3 |
| H | 360 | GLY | - | expression tag | UNP E6LHV3 |
| H | 361 | TRP | - | expression tag | UNP E6LHV3 |
| H | 362 | SER | - | expression tag | UNP E6LHV3 |
| H | 363 | HIS | - | expression tag | UNP E6LHV3 |
| H | 364 | PRO | - | expression tag | UNP E6LHV3 |
| H | 365 | GLN | - | expression tag | UNP E6LHV3 |
| H | 366 | PHE | - | expression tag | UNP E6LHV3 |
| H | 367 | GLU | - | expression tag | UNP E6LHV3 |
| H | 368 | LYS | - | expression tag | UNP E6LHV3 |
| H | 369 | GLY | - | expression tag | UNP E6LHV3 |
| H | 370 | GLY | - | expression tag | UNP E6LHV3 |
| H | 371 | GLY | - | expression tag | UNP E6LHV3 |
| H | 372 | TRP | - | expression tag | UNP E6LHV3 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| H | 373 | SER | - | expression tag | UNP E6LHV3 |
| H | 374 | HIS | - | expression tag | UNP E6LHV3 |
| H | 375 | PRO | - | expression tag | UNP E6LHV3 |
| H | 376 | GLN | - | expression tag | UNP E6LHV3 |
| H | 377 | PHE | - | expression tag | UNP E6LHV3 |
| H | 378 | GLU | - | expression tag | UNP E6LHV3 |
| H | 379 | LYS | - | expression tag | UNP E6LHV3 |

- Molecule 7 is a protein called CRISPR system single-strand-specific deoxyribonuclease Cas10/Csm1 (subtype III-A).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 7 | A | 653 | Total | C | N | O | S | 0 | 0 |
| | | | 5227 | 3338 | 866 | 1000 | 23 | | |

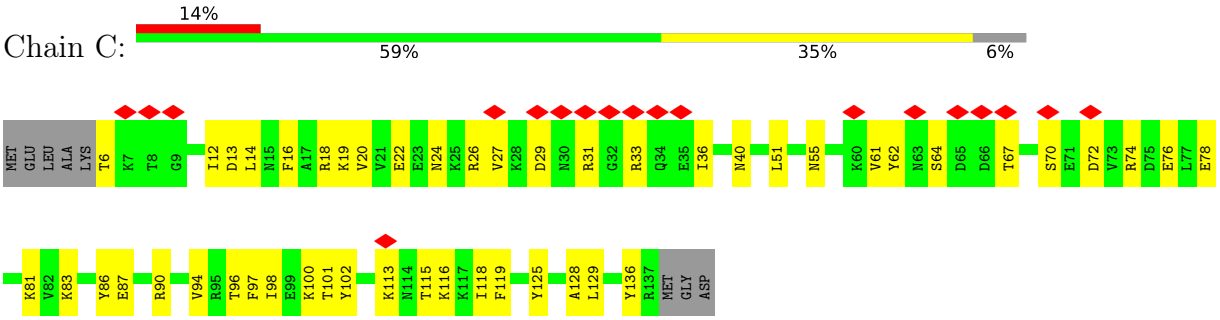
There are 20 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | -18 | MET | - | initiating methionine | UNP E6LHV7 |
| A | -17 | HIS | - | expression tag | UNP E6LHV7 |
| A | -16 | HIS | - | expression tag | UNP E6LHV7 |
| A | -15 | HIS | - | expression tag | UNP E6LHV7 |
| A | -14 | HIS | - | expression tag | UNP E6LHV7 |
| A | -13 | HIS | - | expression tag | UNP E6LHV7 |
| A | -12 | HIS | - | expression tag | UNP E6LHV7 |
| A | -11 | HIS | - | expression tag | UNP E6LHV7 |
| A | -10 | HIS | - | expression tag | UNP E6LHV7 |
| A | -9 | HIS | - | expression tag | UNP E6LHV7 |
| A | -8 | HIS | - | expression tag | UNP E6LHV7 |
| A | -7 | LEU | - | expression tag | UNP E6LHV7 |
| A | -6 | GLU | - | expression tag | UNP E6LHV7 |
| A | -5 | VAL | - | expression tag | UNP E6LHV7 |
| A | -4 | LEU | - | expression tag | UNP E6LHV7 |
| A | -3 | PHE | - | expression tag | UNP E6LHV7 |
| A | -2 | GLN | - | expression tag | UNP E6LHV7 |
| A | -1 | GLY | - | expression tag | UNP E6LHV7 |
| A | 0 | PRO | - | expression tag | UNP E6LHV7 |
| A | 1 | SER | - | expression tag | UNP E6LHV7 |

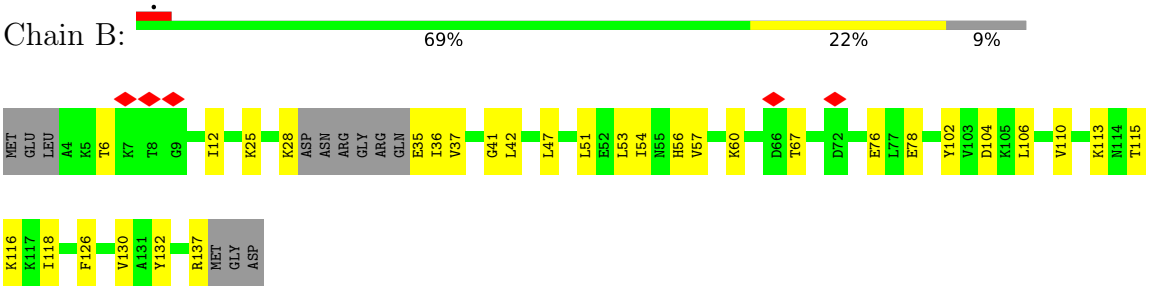
# 3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

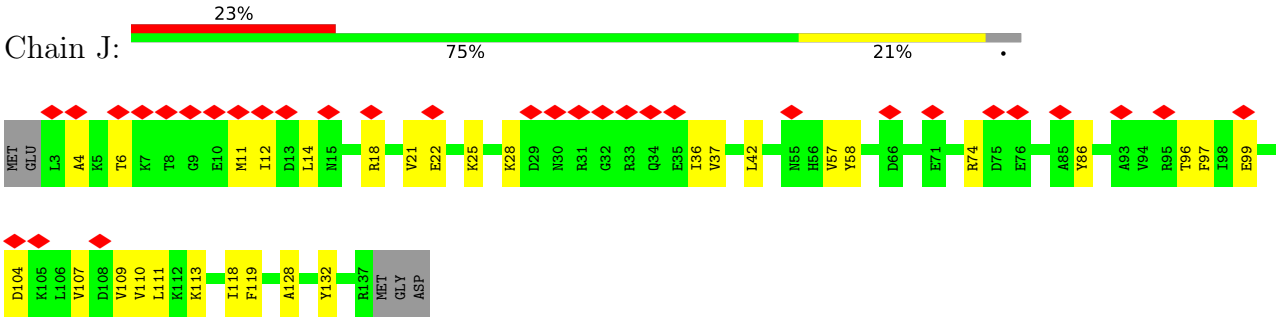
• Molecule 1: CRISPR system Cms protein Csm2



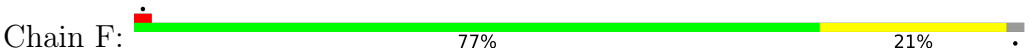

• Molecule 1: CRISPR system Cms protein Csm2

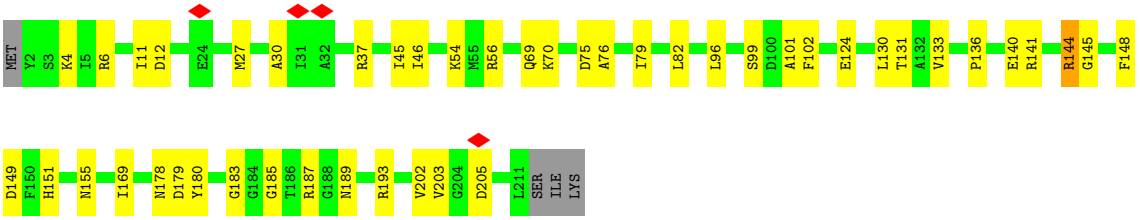



• Molecule 1: CRISPR system Cms protein Csm2



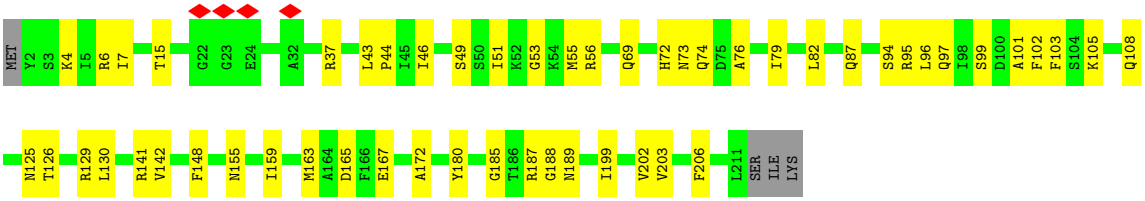

• Molecule 2: CRISPR system Cms endoribonuclease Csm3





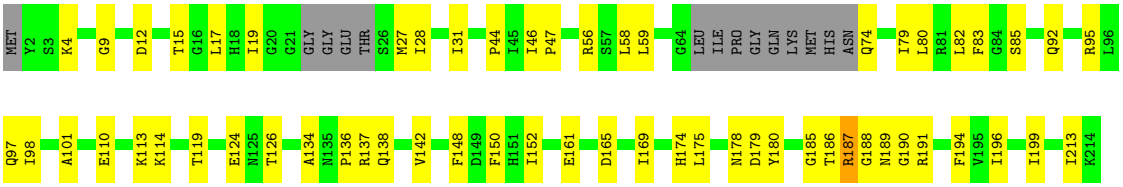
• Molecule 2: CRISPR system Cms endoribonuclease Csm3

Chain E:

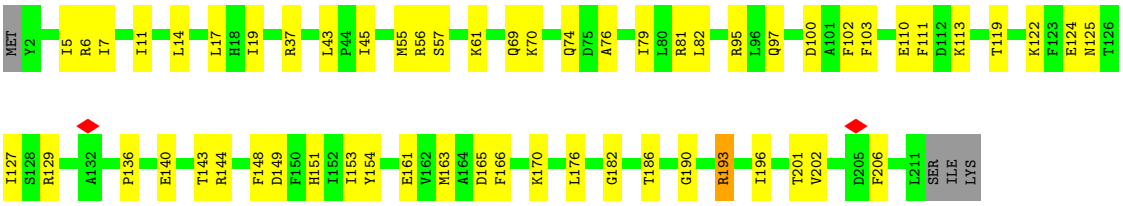
• Molecule 2: CRISPR system Cms endoribonuclease Csm3

Chain D:

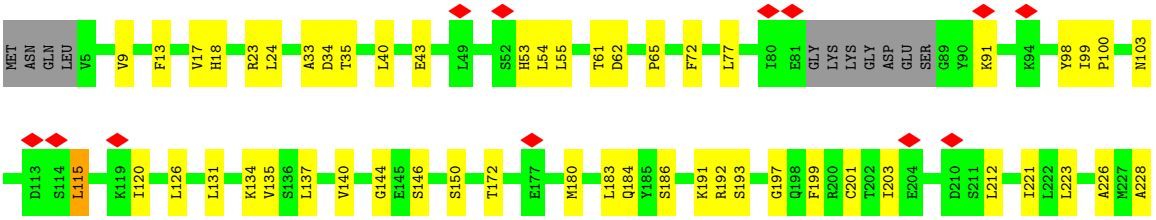
• Molecule 2: CRISPR system Cms endoribonuclease Csm3

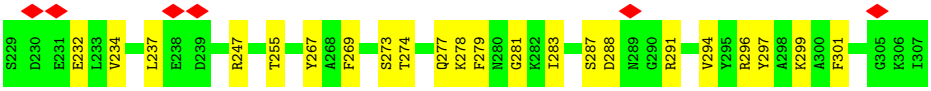
Chain I:

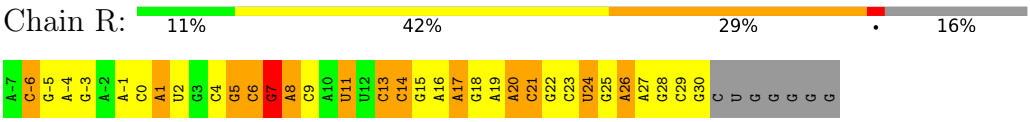
• Molecule 3: CRISPR system Cms protein Csm4

Chain G:

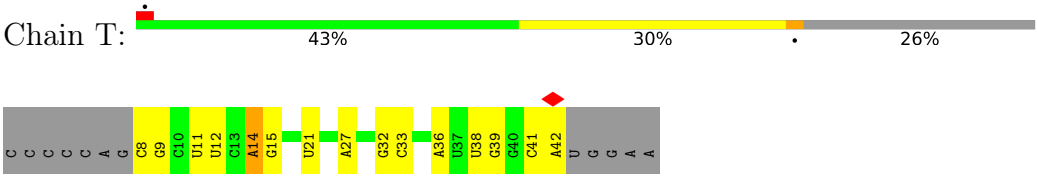





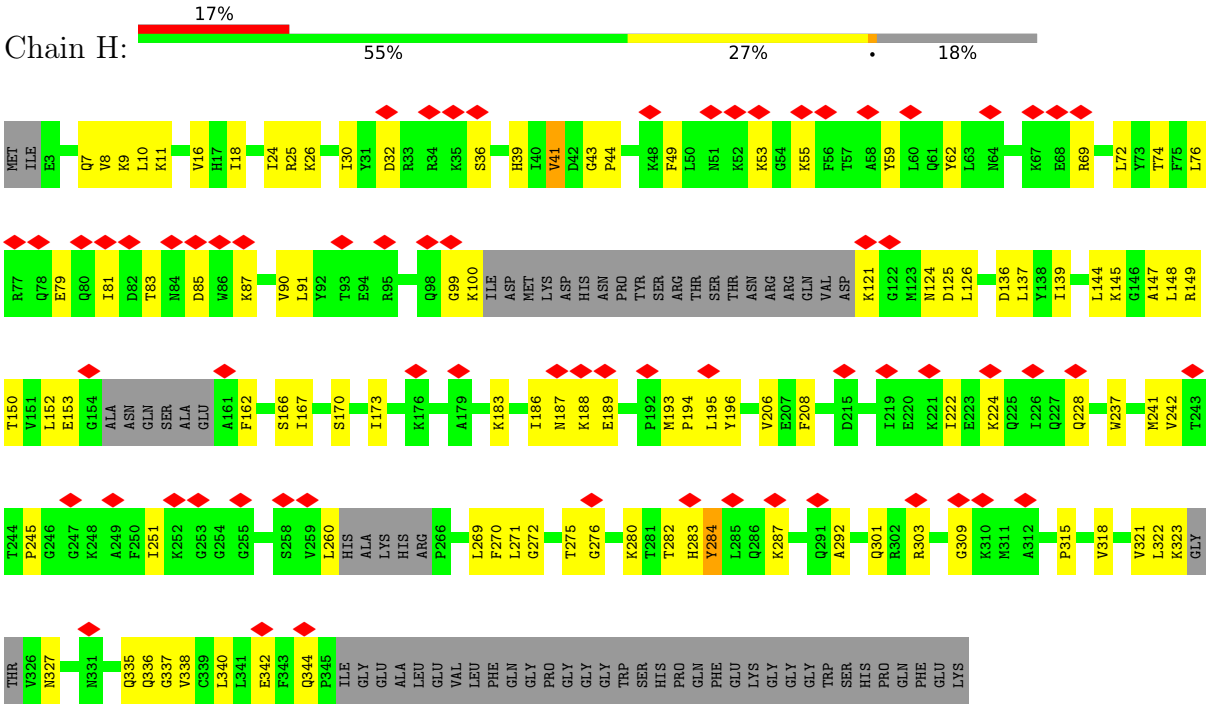

• Molecule 4: RNA (35-MER)



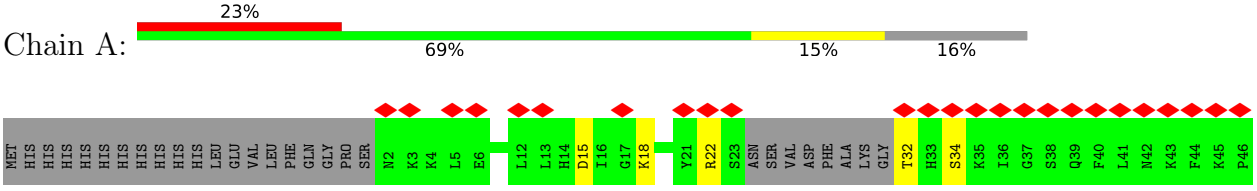

• Molecule 5: RNA (35-MER)

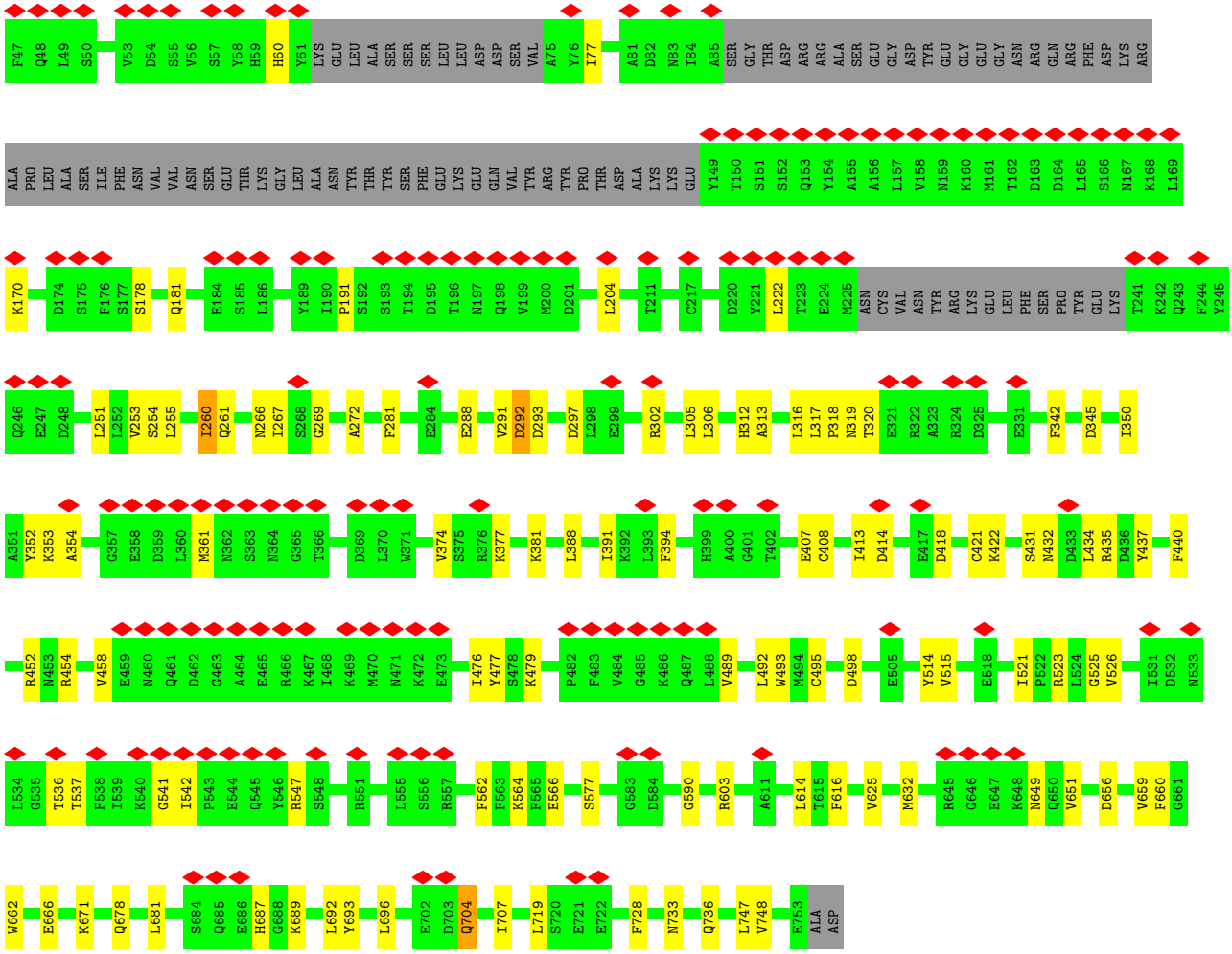



• Molecule 6: CRISPR system Cms protein Csm5




• Molecule 7: CRISPR system single-strand-specific deoxyribonuclease Cas10/Csm1 (subtype III-A)




F47 Q48 L49 S50 V53 D54 S55 V56 S57 Y58 H59 H60 Y61 LYS GLU LEU ALA SER SER SER LEU LEU ASP ASP SER VAL A75 Y76 I77 A81 D82 N83 I84 A85 SER GLY THR ASP ARG ARG ALA SER GLU GLY ASP TYR GLU GLY GLU GLY ASN ARG GLN ARG PHE ASP LYS ARG
ALA PRO LEU ALA SER ILE PHE ASN VAL VAL ASN SER GLU THR LYS GLY LEU ALA ASN TYR THR TYR SER PHE GLU LYS GLU GLN VAL TYR ARG TYR PRO THR ASP ALA LYS LYS GLU Y149 T150 S151 S152 Q153 Y154 A155 A156 L157 V158 N159 K160 M161 T162 D163 D164 L165 S166 N167 K168 L169
K170 D174 S175 F176 S177 S178 Q181 E184 S185 L186 Y189 I190 P191 S192 S193 T194 D196 T196 N197 Q198 V199 M200 D201 L204 T211 C217 D220 Y221 L222 T223 E224 M225 ASN CYS VAL ASN TYR ARG LYS GLU LEU PHE SER PRO TYR GLU LYS T241 K242 Q243 F244 Y245
Q246 E247 D248 L251 L252 V253 S254 L255 I260 Q261 N266 I267 S268 G269 A272 F281 E284 E288 V291 D292 D293 D297 L298 E299 R302 L305 L306 H312 A313 L316 L317 P318 N319 T320 E321 R322 A323 R324 D325 E331 F342 D345 I350
A351 Y352 K353 A354 G357 E358 D359 L360 M361 N362 S363 N364 G365 T366 D369 L370 W371 V374 S375 R376 K377 K381 L388 I391 K392 L393 F394 H399 A400 G401 T402 E407 C408 I413 D414 E417 D418 C421 K422 S431 N432 D433 L434 R435 D436 Y437 F440
R452 N453 R454 V458 E459 N460 Q461 D462 G463 A464 E465 R466 K467 I468 K469 M470 N471 K472 E473 I476 Y477 S478 K479 P482 F483 V484 G485 K486 Q487 L488 V489 L492 W493 M494 C495 D498 E505 Y514 V515 E518 I521 P522 R523 L524 G525 V526 I531 D532 N533
L534 G535 T536 T537 F538 I539 K540 G541 I542 P543 E544 Q545 Y546 R547 S548 R551 L555 S556 R557 F562 F563 K564 F565 E566 S577 G583 D584 G590 R603 A611 L614 T615 F616 V625 M632 R645 G646 E647 K648 N649 G650 V651 D656 V659 F660 G661
W662 E666 K671 Q678 L681 S684 Q685 E686 H687 G688 K689 L692 Y693 L696 E702 D703 Q704 I707 L719 S720 E721 E722 F728 N733 Q736 L747 V748 E753 ALA ASP

# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 78260 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | NONE | Depositor |
| Microscope | TFS KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/Å^2$) | 66.51 | Depositor |
| Minimum defocus (nm) | 1000 | Depositor |
| Maximum defocus (nm) | 2400 | Depositor |
| Magnification | 130000 | Depositor |
| Image detector | GATAN K3 BIOQUANTUM (6k x 4k) | Depositor |
| Maximum map value | 0.774 | Depositor |
| Minimum map value | -0.454 | Depositor |
| Average map value | -0.000 | Depositor |
| Map value standard deviation | 0.015 | Depositor |
| Recommended contour level | 0.07 | Depositor |
| Map size (Å) | 312.0, 312.0, 312.0 | wwPDB |
| Map dimensions | 480, 480, 480 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.65, 0.65, 0.65 | 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 | B | 0.34 | 0/1081 | 0.50 | 0/1452 |
| 1 | C | 0.47 | 0/1119 | 0.59 | 0/1504 |
| 1 | J | 0.33 | 0/1141 | 0.49 | 0/1533 |
| 2 | D | 0.45 | 0/1570 | 0.61 | 0/2110 |
| 2 | E | 0.36 | 0/1646 | 0.55 | 0/2216 |
| 2 | F | 0.31 | 0/1646 | 0.50 | 0/2216 |
| 2 | I | 0.42 | 0/1646 | 0.57 | 0/2216 |
| 3 | G | 0.35 | 0/2389 | 0.50 | 0/3219 |
| 4 | R | 0.70 | 0/915 | 1.24 | 2/1426 (0.1%) |
| 5 | T | 0.71 | 0/824 | 1.10 | 0/1281 |
| 6 | H | 0.35 | 0/2565 | 0.53 | 0/3456 |
| 7 | A | 0.33 | 0/5323 | 0.49 | 0/7178 |
| All | All | 0.40 | 0/21865 | 0.61 | 2/29807 (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 |
| 2 | F | 0 | 1 |
| 2 | I | 0 | 1 |
| All | All | 0 | 3 |

There are no bond length outliers.

All (2) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 4 | R | 20 | A | OP2-P-O3' | 5.37 | 117.02 | 105.20 |
| 4 | R | 7 | G | C1'-O4'-C4' | -5.05 | 105.86 | 109.90 |

There are no chirality outliers.

All (3) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|---|---|---|---|---|
| 2 | D | 187 | ARG | Sidechain |
| 2 | F | 144 | ARG | Sidechain |
| 2 | I | 193 | ARG | Sidechain |

## 5.2 Too-close contacts (i)

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | B | 1065 | 0 | 1097 | 20 | 0 |
| 1 | C | 1102 | 0 | 1127 | 35 | 0 |
| 1 | J | 1124 | 0 | 1156 | 20 | 0 |
| 2 | D | 1548 | 0 | 1567 | 43 | 0 |
| 2 | E | 1620 | 0 | 1634 | 40 | 0 |
| 2 | F | 1620 | 0 | 1634 | 34 | 0 |
| 2 | I | 1620 | 0 | 1634 | 40 | 0 |
| 3 | G | 2341 | 0 | 2340 | 51 | 0 |
| 4 | R | 816 | 0 | 416 | 28 | 0 |
| 5 | T | 740 | 0 | 376 | 7 | 0 |
| 6 | H | 2510 | 0 | 2566 | 73 | 0 |
| 7 | A | 5227 | 0 | 5237 | 78 | 0 |
| All | All | 21333 | 0 | 20784 | 410 | 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 410 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) |
|---|---|---|---|
| 7:A:413:ILE:HG21 | 7:A:421:CYS:SG | 1.63 | 1.38 |
| 7:A:413:ILE:CG2 | 7:A:421:CYS:SG | 2.40 | 1.09 |
| 1:C:113:LYS:HG2 | 1:C:118:ILE:HG13 | 1.51 | 0.91 |
| 7:A:413:ILE:HG21 | 7:A:421:CYS:HG | 1.12 | 0.86 |
| 3:G:281:GLY:HA3 | 3:G:299:LYS:HA | 1.57 | 0.85 |

There are no symmetry-related clashes.

## 5.3 Torsion angles (i)

### 5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|---|---|---|---|---|---|---|---|
| 1 | B | 124/140 (89%) | 123 (99%) | 1 (1%) | 0 | 100 | 100 |
| 1 | C | 130/140 (93%) | 129 (99%) | 1 (1%) | 0 | 100 | 100 |
| 1 | J | 133/140 (95%) | 129 (97%) | 4 (3%) | 0 | 100 | 100 |
| 2 | D | 194/214 (91%) | 189 (97%) | 5 (3%) | 0 | 100 | 100 |
| 2 | E | 208/214 (97%) | 204 (98%) | 4 (2%) | 0 | 100 | 100 |
| 2 | F | 208/214 (97%) | 204 (98%) | 4 (2%) | 0 | 100 | 100 |
| 2 | I | 208/214 (97%) | 201 (97%) | 7 (3%) | 0 | 100 | 100 |
| 3 | G | 292/307 (95%) | 289 (99%) | 3 (1%) | 0 | 100 | 100 |
| 6 | H | 300/379 (79%) | 294 (98%) | 6 (2%) | 0 | 100 | 100 |
| 7 | A | 643/774 (83%) | 632 (98%) | 11 (2%) | 0 | 100 | 100 |
| All | All | 2440/2736 (89%) | 2394 (98%) | 46 (2%) | 0 | 100 | 100 |

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|---|---|---|---|---|---|---|
| 1 | B | 118/128 (92%) | 116 (98%) | 2 (2%) | 56 | 83 |
| 1 | C | 122/128 (95%) | 120 (98%) | 2 (2%) | 58 | 84 |
| 1 | J | 124/128 (97%) | 124 (100%) | 0 | 100 | 100 |
| 2 | D | 169/180 (94%) | 167 (99%) | 2 (1%) | 67 | 89 |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|---|---|---|---|---|---|
| 2 | E | 176/180 (98%) | 176 (100%) | 0 | 100 100 |
| 2 | F | 176/180 (98%) | 175 (99%) | 1 (1%) | 84 95 |
| 2 | I | 176/180 (98%) | 174 (99%) | 2 (1%) | 70 90 |
| 3 | G | 253/262 (97%) | 250 (99%) | 3 (1%) | 67 89 |
| 6 | H | 274/330 (83%) | 271 (99%) | 3 (1%) | 70 90 |
| 7 | A | 582/688 (85%) | 576 (99%) | 6 (1%) | 73 91 |
| All | All | 2170/2384 (91%) | 2149 (99%) | 21 (1%) | 71 91 |

5 of 21 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 6 | H | 284 | TYR |
| 7 | A | 292 | ASP |
| 7 | A | 704 | GLN |
| 7 | A | 408 | CYS |
| 7 | A | 281 | PHE |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 2 | I | 92 | GLN |
| 6 | H | 80 | GLN |
| 7 | A | 678 | GLN |
| 6 | H | 78 | GLN |
| 6 | H | 187 | ASN |

### 5.3.3 RNA (i)

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|---|---|---|---|---|
| 4 | R | 37/45 (82%) | 22 (59%) | 8 (21%) |
| 5 | T | 34/47 (72%) | 8 (23%) | 2 (5%) |
| All | All | 71/92 (77%) | 30 (42%) | 10 (14%) |

5 of 30 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 4 | R | -6 | C |
| 4 | R | -1 | A |

*Continued on next page...*

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 4 | R | 0 | C |
| 4 | R | 1 | A |
| 4 | R | 2 | U |

5 of 10 RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 4 | R | 29 | C |
| 5 | T | 11 | U |
| 5 | T | 32 | G |
| 4 | R | 7 | G |
| 4 | R | 17 | A |

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

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

## 5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry (i)

There are no ligands in this entry.

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

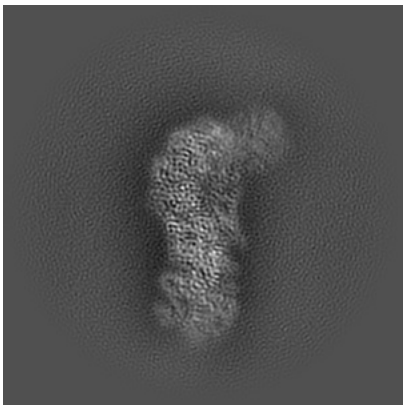
# 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-51148. These allow visual inspection of the internal detail of the map and identification of artifacts.

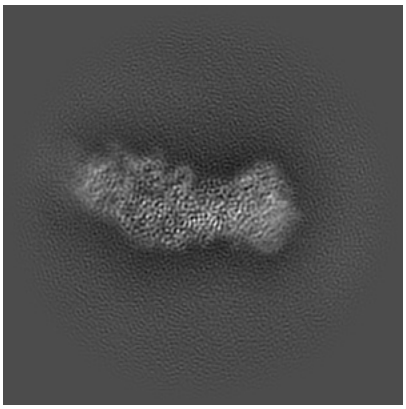
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

## 6.1 Orthogonal projections

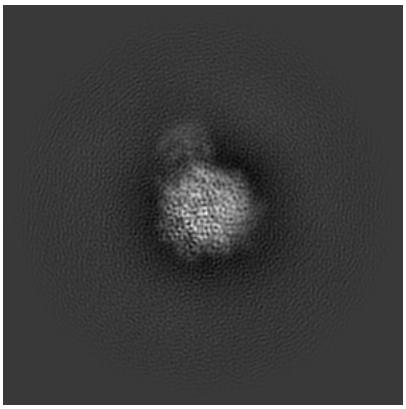
### 6.1.1 Primary map



X

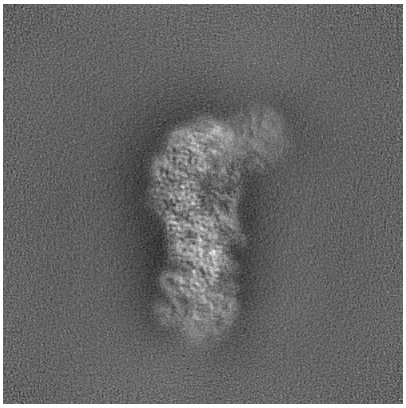


Y

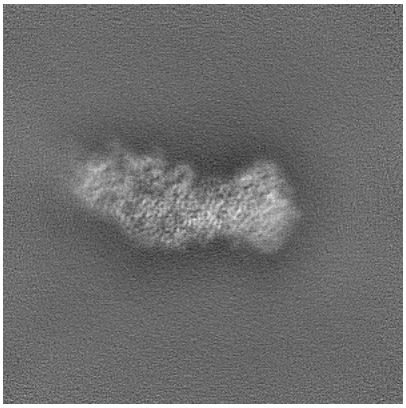


Z

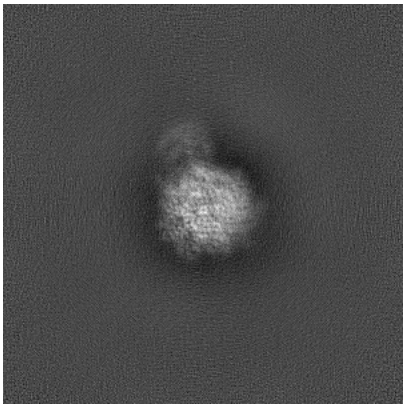
### 6.1.2 Raw map



X



Y

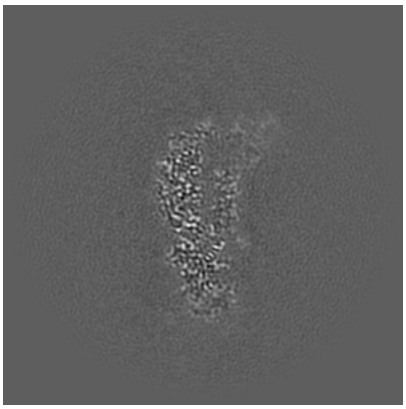


Z

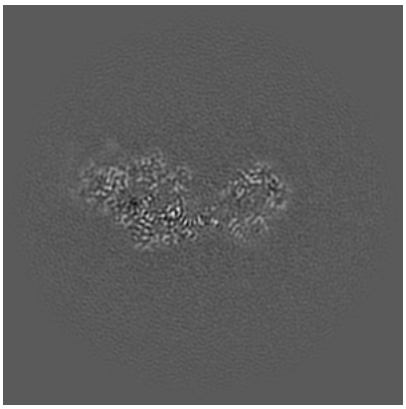
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices (i)

### 6.2.1 Primary map



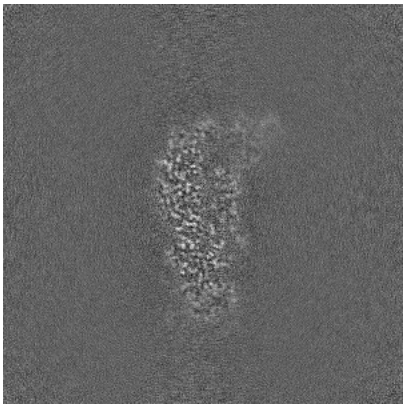
X Index: 240



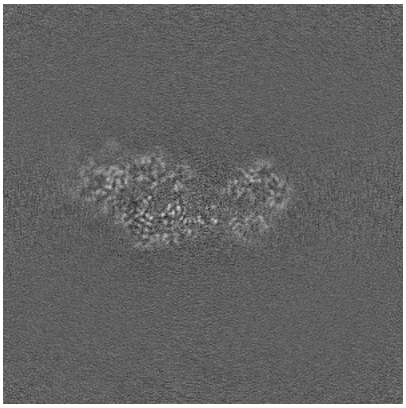
Y Index: 240

Z Index: 240

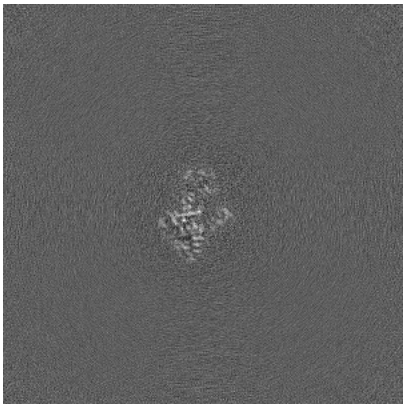
### 6.2.2 Raw map



X Index: 240



Y Index: 240

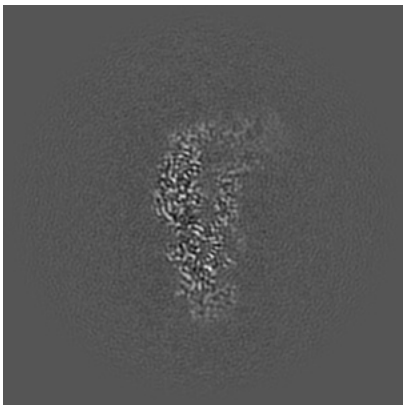


Z Index: 240

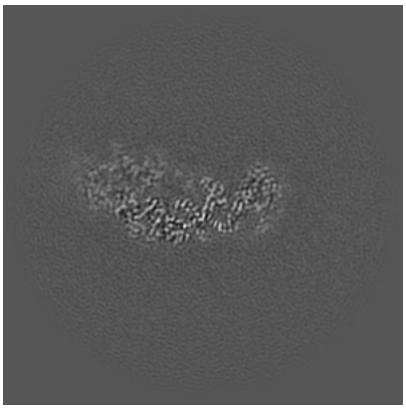
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices (i)

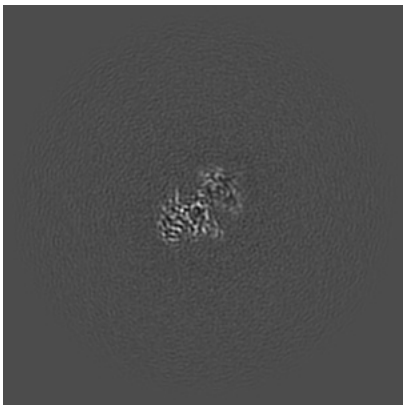
### 6.3.1 Primary map



X Index: 237

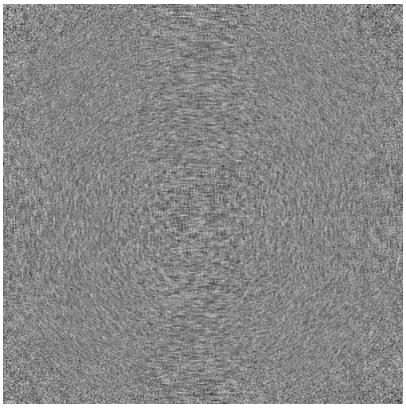


Y Index: 229

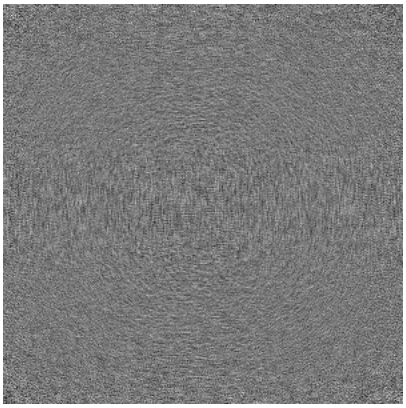


Z Index: 210

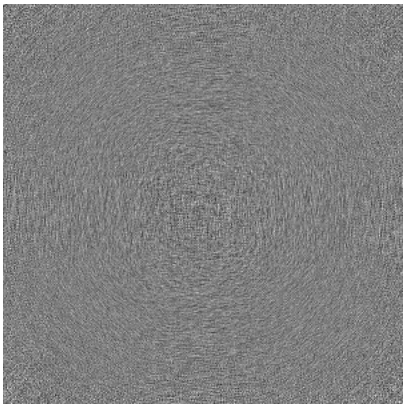
### 6.3.2 Raw map



X Index: 0



Y Index: 0

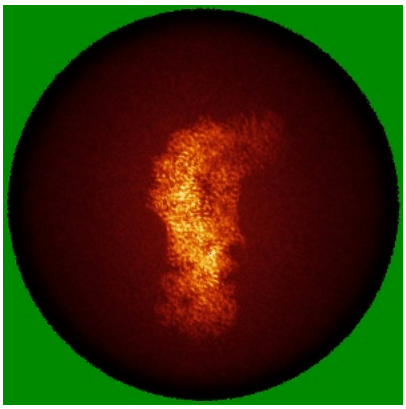


Z Index: 0

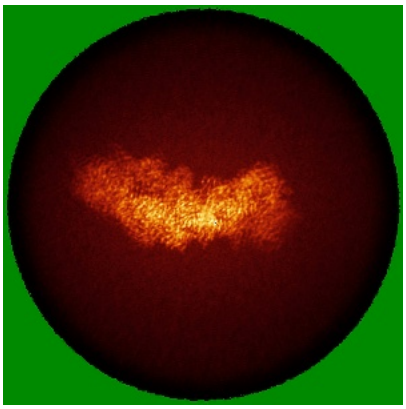
The images above show the largest variance slices of the map in three orthogonal directions.

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

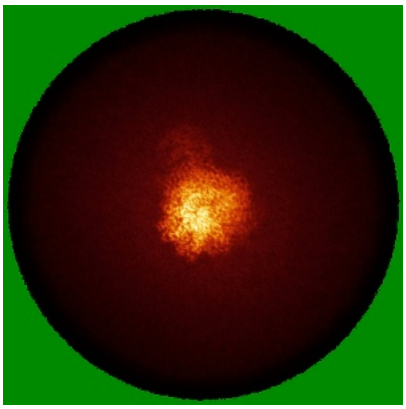
### 6.4.1 Primary map



X

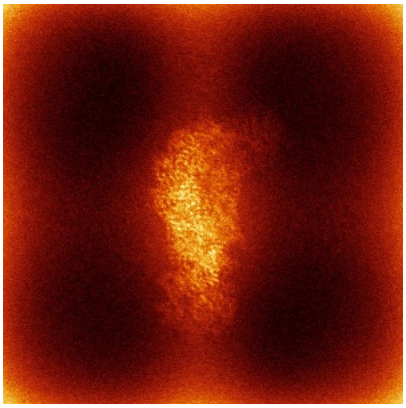


Y

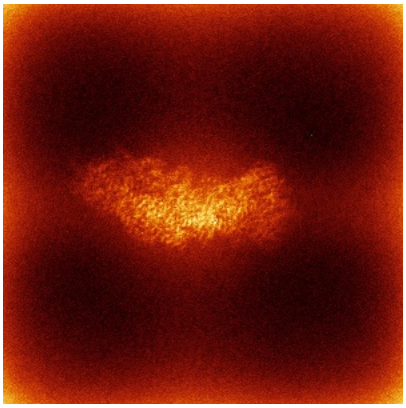


Z

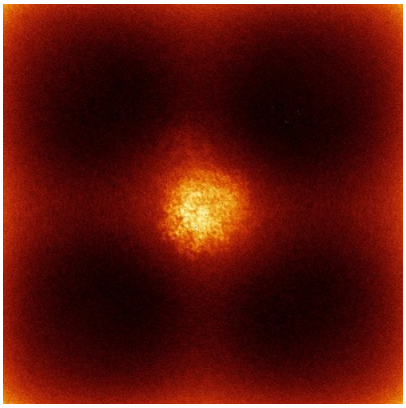
### 6.4.2 Raw map



X



Y



Z

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

## 6.5 Orthogonal surface views (i)

### 6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.07. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map

X Y Z

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

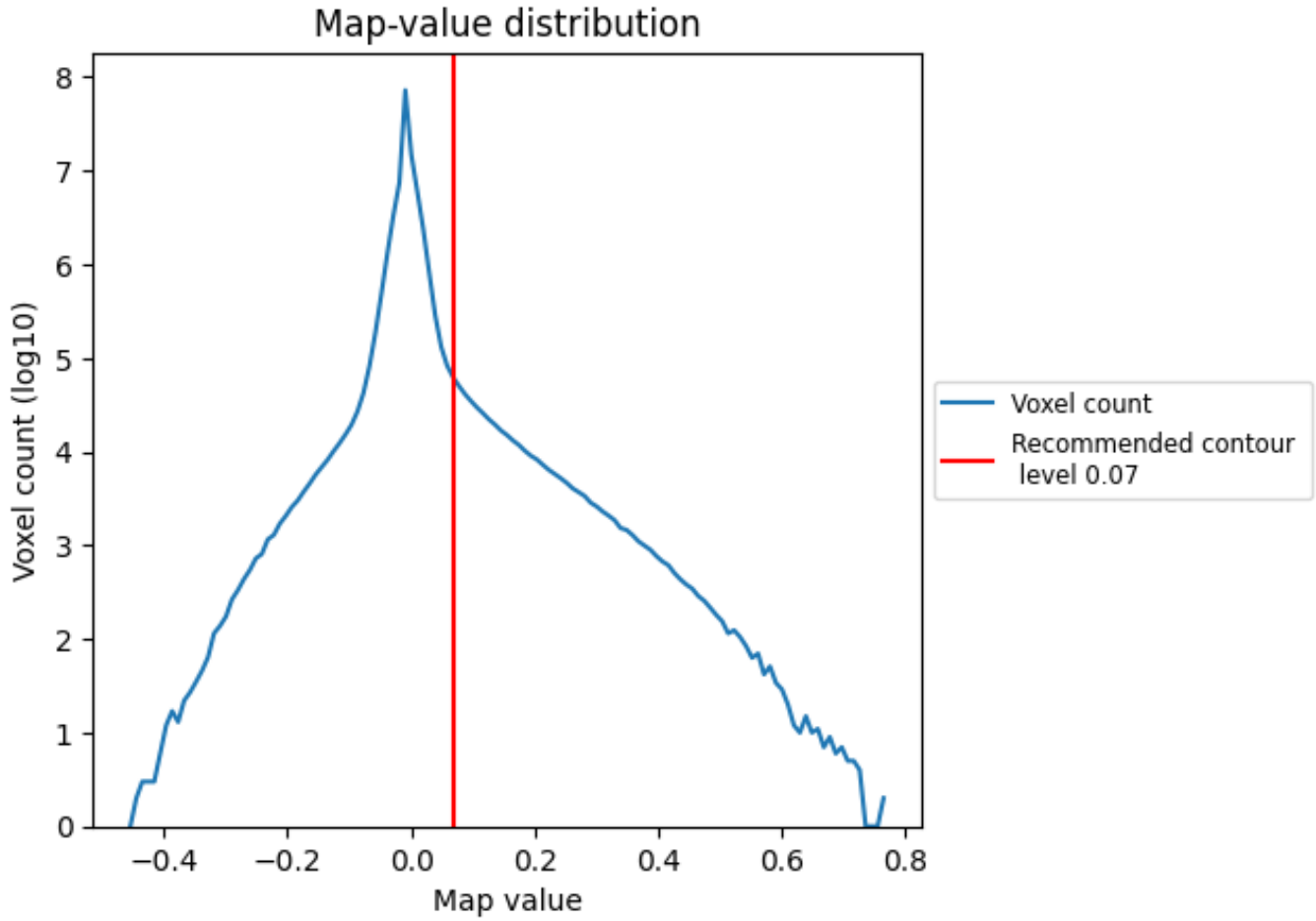
## 6.6 Mask visualisation (i)

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

# 7 Map analysis

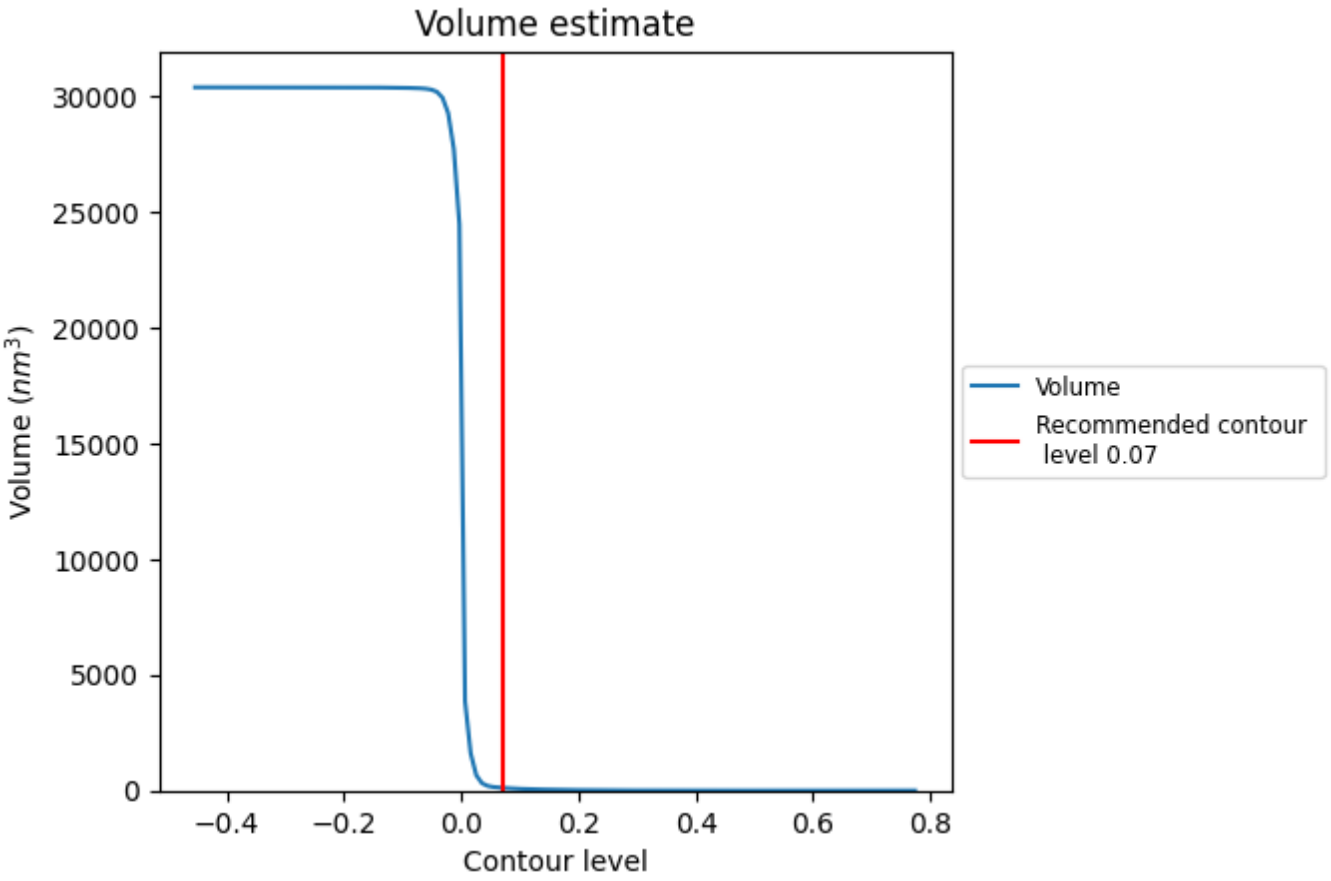
This section contains the results of statistical analysis of the map.

## 7.1 Map-value distribution




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

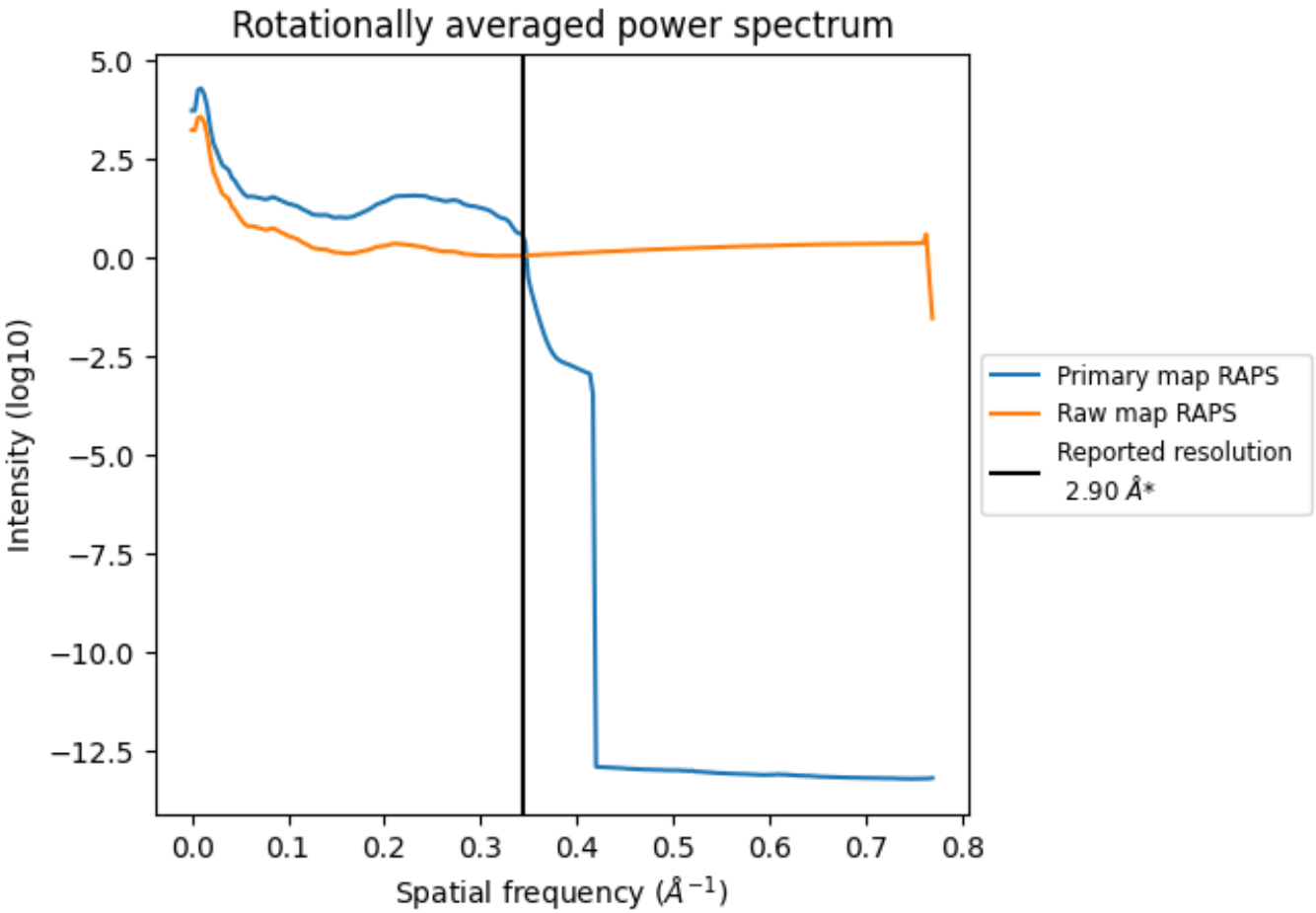
## 7.2 Volume estimate (i)




The volume at the recommended contour level is 116 $nm^3$; this corresponds to an approximate mass of 105 kDa.

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

## 7.3 Rotationally averaged power spectrum (i)

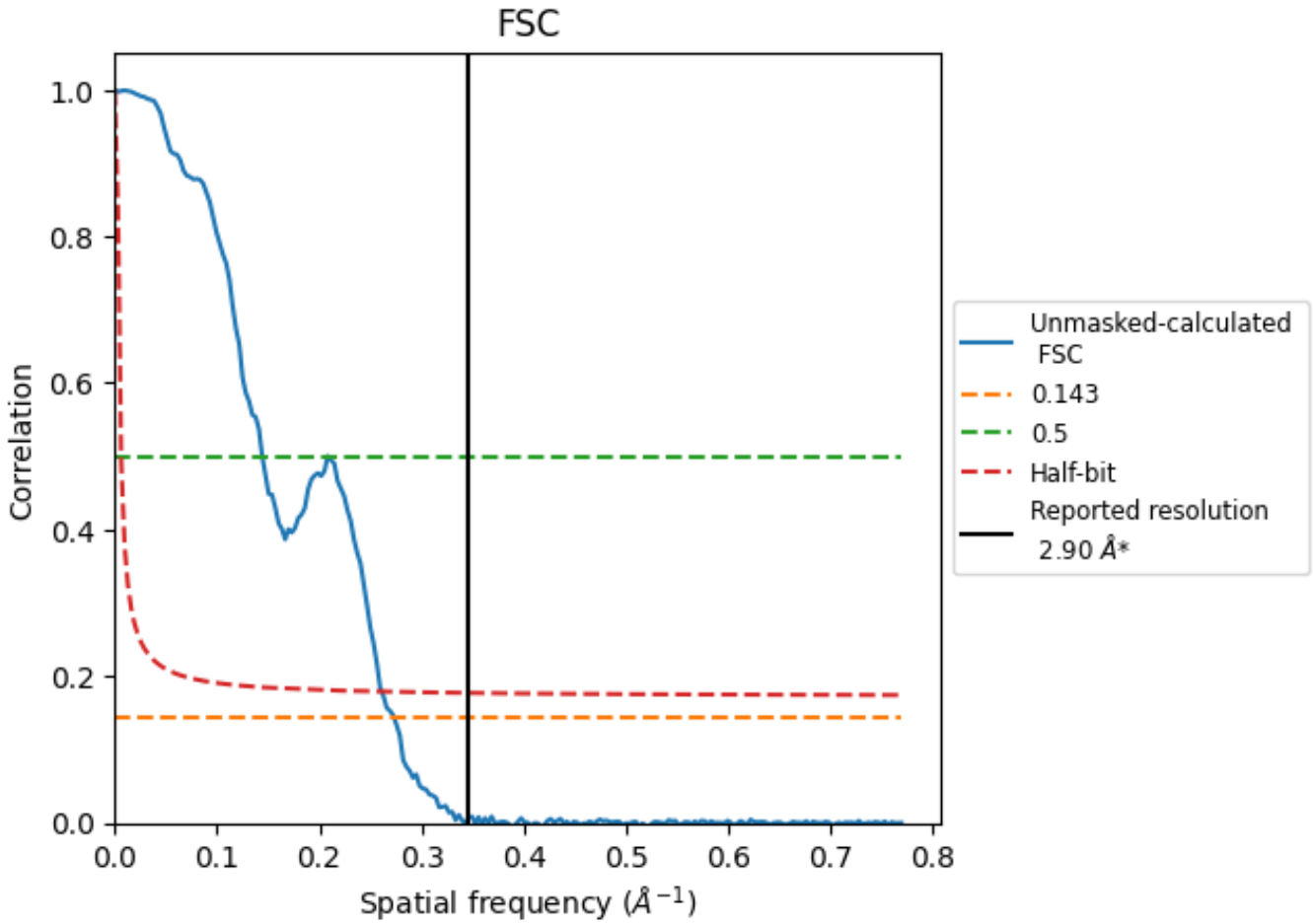



*Reported resolution corresponds to spatial frequency of 0.345 $Å^{-1}$

# 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 0.345 Å$^{-1}$

## 8.2 Resolution estimates (i)

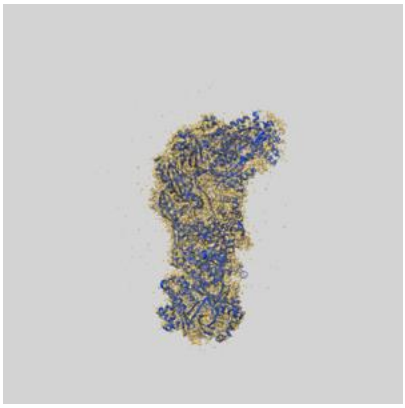
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 2.90 | - | - |
| Author-provided FSC curve | - | - | - |
| Unmasked-calculated* | 3.66 | 6.93 | 3.83 |

*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 3.66 differs from the reported value 2.9 by more than 10 %

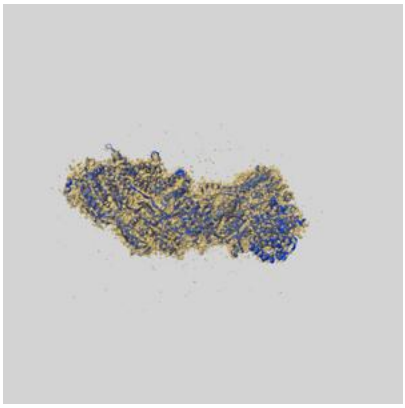
# 9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-51148 and PDB model 9G9D. Per-residue inclusion information can be found in section 3 on page 7.

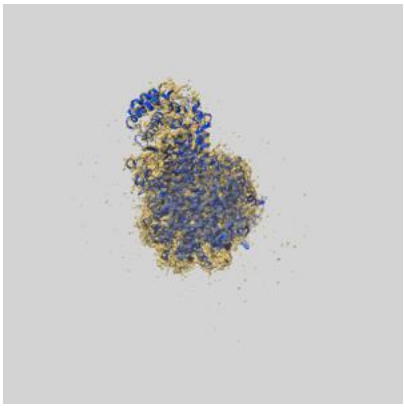
## 9.1 Map-model overlay



X



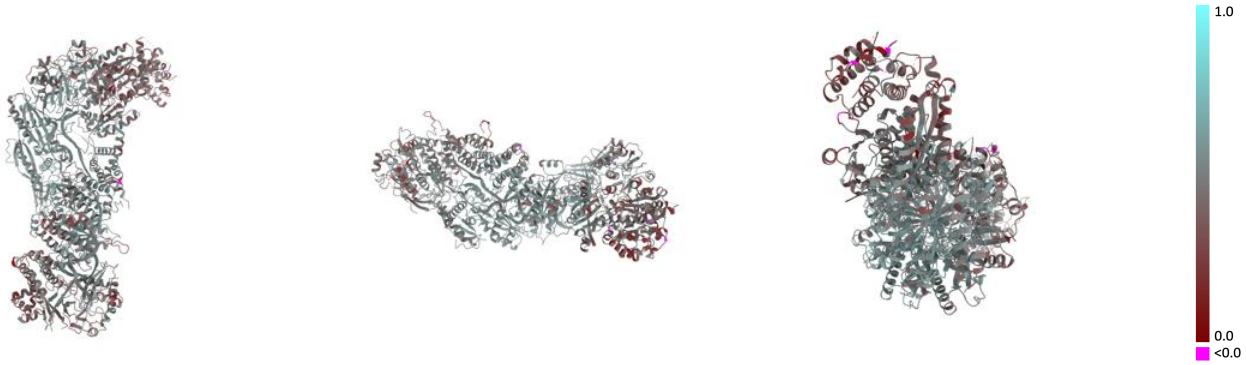
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.07 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

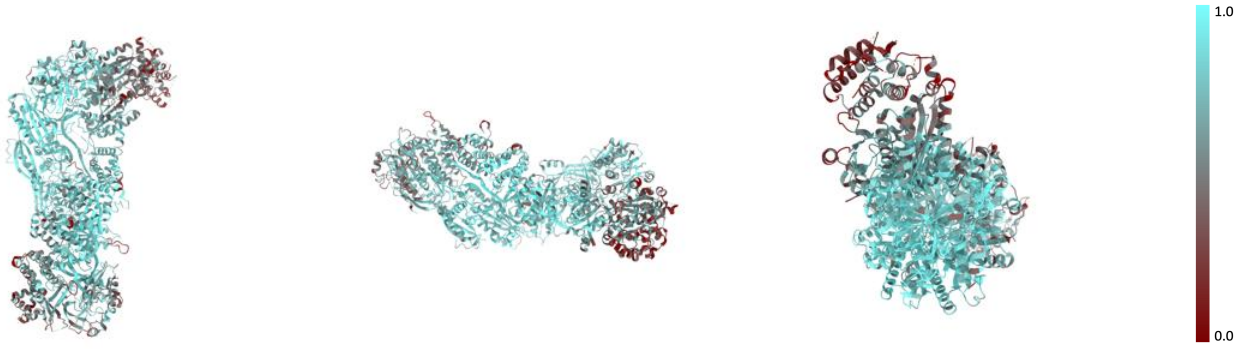
## 9.2 Q-score mapped to coordinate model (i)




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.

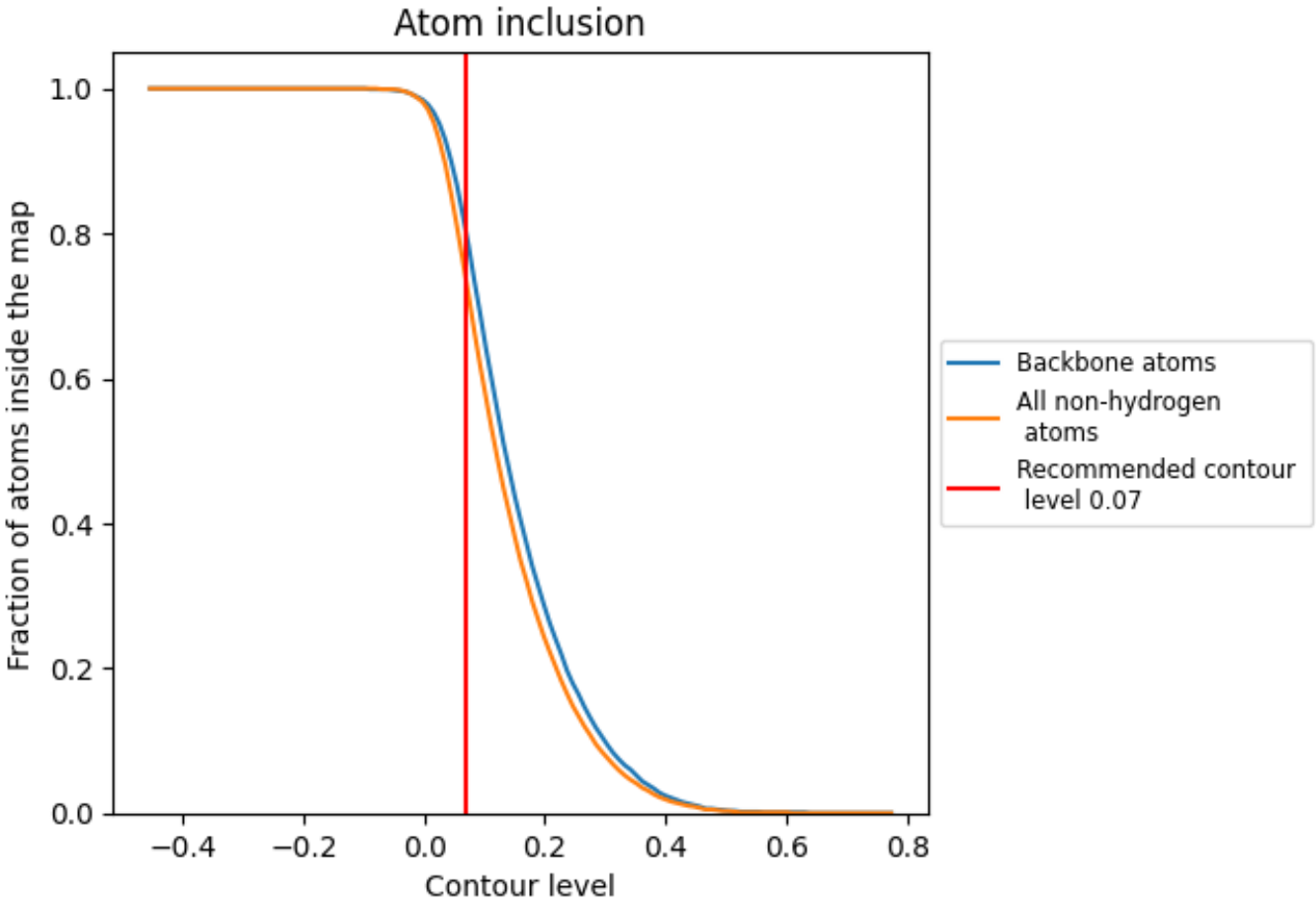
## 9.3 Atom inclusion mapped to coordinate model (i)




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 (0.07).

## 9.4 Atom inclusion (i)




At the recommended contour level, 80% of all backbone atoms, 74% 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 (0.07) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|---|---|---|
| All | 0.7350 | 0.4830 |
| A | 0.5830 | 0.4240 |
| B | 0.8130 | 0.5040 |
| C | 0.6890 | 0.4370 |
| D | 0.8580 | 0.5340 |
| E | 0.8970 | 0.5630 |
| F | 0.8870 | 0.5640 |
| G | 0.7910 | 0.4970 |
| H | 0.6040 | 0.4340 |
| I | 0.8440 | 0.5360 |
| J | 0.5630 | 0.4050 |
| R | 0.9250 | 0.5440 |
| T | 0.8810 | 0.5230 |