# WORLDWIDE PDB
## PROTEIN DATA BANK

# wwPDB EM Validation Summary Report ⓘ

Jan 21, 2024 – 07:51 am GMT

|  |  |  |
|---|---|---|
| PDB ID | : | 8OM4 |
| EMDB ID | : | EMD-16968 |
| Title | : | Small subunit of yeast mitochondrial ribosome. |
| Authors | : | Itoh, Y.; Chicherin, I.; Kamenski, P.; Amunts, A. |
| Deposited on | : | 2023-03-31 |
| Resolution | : | 2.32 Å(reported) |
| Based on initial model | : | 5MRC |

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# 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 2.32 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.
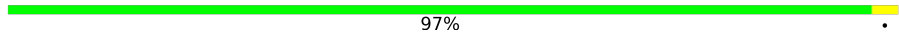
| Metric | Percentile Ranks | Value |
|---|---|---|
| Clashscore | | 2 |
| Ramachandran outliers | | 0 |
| Sidechain outliers | | 0.2% |
| RNA backbone | | 0.65 |

*Worse*            *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures
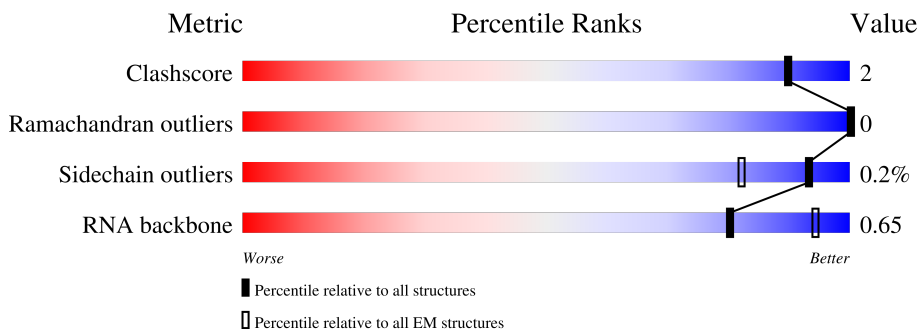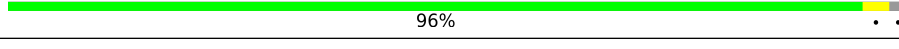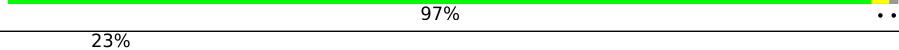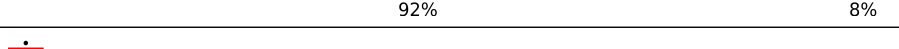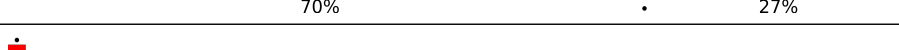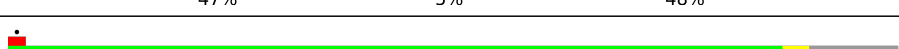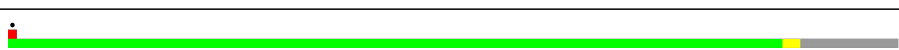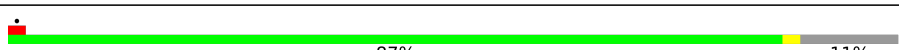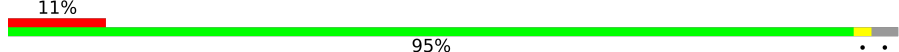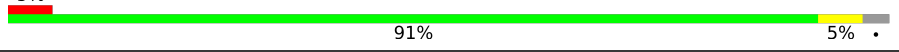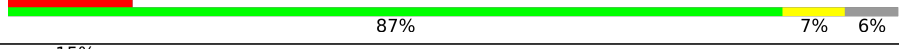
| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 158937 | 4297 |
| Ramachandran outliers | 154571 | 4023 |
| Sidechain outliers | 154315 | 3826 |
| RNA backbone | 4643 | 859 |

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 | 344 | 28% — 78% / 10% / 13% |
| 2 | B | 394 | 15% — 84% / · / 13% |
| 3 | C | 398 | 19% — 88% / 6% / 7% |
| 4 | D | 486 | 8% — 67% / · / 30% |
| 5 | E | 307 | · — 93% / · · |
| 6 | F | 131 | · — 96% / · |
| 7 | G | 247 | 17% — 76% / 6% / 18% |
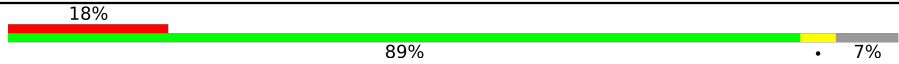
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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 8 | H | 155 | 97% |
| 9 | I | 278 | 6%   80%   17% |
| 10 | J | 203 | 75%   20% |
| 11 | K | 217 | 5%   68%   30% |
| 12 | L | 153 | 79%   20% |
| 13 | M | 143 | 81%   17% |
| 14 | N | 115 | 96% |
| 15 | O | 286 | 73%   5%   22% |
| 16 | P | 121 | 97% |
| 17 | Q | 237 | 23%   92%   8% |
| 18 | R | 138 | 70%   27% |
| 19 | S | 91 | 82%   13% |
| 20 | T | 177 | 5%   47%   5%   48% |
| 21 | U | 264 | 87%   10% |
| 22 | V | 318 | 12%   88%   10% |
| 23 | W | 450 | 87%   11% |
| 24 | X | 110 | 87%   11% |
| 25 | Y | 319 | 6%   83%   15% |
| 26 | Z | 95 | 11%   95% |
| 27 | 1 | 111 | 28%   72% |
| 28 | 2 | 130 | 75%   22% |
| 29 | 3 | 266 | 5%   91%   5% |
| 30 | 4 | 321 | 14%   87%   7%   6% |
| 31 | 5 | 339 | 15%   78%   7%   14% |
| 32 | 6 | 345 | 91%   8% |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 33 | 8 | 500 | 18% ▬ 89% · 7% |
| 34 | r | 1647 | · 80% 10% 10% |

# 2    Entity composition  ⓘ

There are 39 unique types of molecules in this entry. The entry contains 166964 atoms, of which 74046 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 37S ribosomal protein MRP51, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 1 | A | 300 | Total 4908 | C 1552 | H 2481 | N 427 | O 441 | S 7 | 1 | 0 |

- Molecule 2 is a protein called 37S ribosomal protein MRP4, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 2 | B | 342 | Total 5436 | C 1709 | H 2722 | N 467 | O 535 | S 3 | 0 | 0 |

- Molecule 3 is a protein called Ribosomal protein VAR1, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 3 | C | 372 | Total 6181 | C 1930 | H 3091 | N 553 | O 574 | S 33 | 0 | 0 |

- Molecule 4 is a protein called 37S ribosomal protein NAM9, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 4 | D | 341 | Total 5729 | C 1842 | H 2896 | N 499 | O 487 | S 5 | 0 | 0 |

- Molecule 5 is a protein called 37S ribosomal protein S5, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 5 | E | 294 | Total 4708 | C 1494 | H 2360 | N 418 | O 428 | S 8 | 0 | 0 |

- Molecule 6 is a protein called 37S ribosomal protein MRP17, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---------|-------|
| 6 | F | 131 | Total 2184 | C 671 | H 1129 | N 189 | O 191 | S 4 | 0 | 0 |

- Molecule 7 is a protein called 37S ribosomal protein S7, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | G | 203 | Total | C | H | N | O | S | 0 | 0 |
| | | | 3272 | 1019 | 1660 | 289 | 299 | 5 | | |

- Molecule 8 is a protein called 37S ribosomal protein S8, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | H | 155 | Total | C | H | N | O | S | 1 | 0 |
| | | | 2509 | 774 | 1286 | 219 | 221 | 9 | | |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| H | 1 | ACE | - | acetylation | UNP Q03799 |

- Molecule 9 is a protein called 37S ribosomal protein S9, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 9 | I | 231 | Total | C | H | N | O | S | 1 | 0 |
| | | | 3783 | 1181 | 1925 | 334 | 338 | 5 | | |

- Molecule 10 is a protein called 37S ribosomal protein S10, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | J | 162 | Total | C | H | N | O | S | 0 | 0 |
| | | | 2655 | 853 | 1334 | 227 | 237 | 4 | | |

- Molecule 11 is a protein called 37S ribosomal protein S18, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | K | 151 | Total | C | H | N | O | S | 1 | 0 |
| | | | 2475 | 775 | 1266 | 213 | 215 | 6 | | |

- Molecule 12 is a protein called 37S ribosomal protein S12, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | L | 123 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1932 | 579 | 993 | 192 | 164 | 4 | | |

- Molecule 13 is a protein called 37S ribosomal protein SWS2, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | M | 119 | Total 1937 | C 591 | H 1002 | N 178 | O 160 | S 6 | 0 | 0 |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| M | 41 | LEU | PHE | variant | UNP P53937 |

- Molecule 14 is a protein called 37S ribosomal protein MRP2, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | N | 113 | Total 1917 | C 596 | H 986 | N 179 | O 152 | S 4 | 0 | 0 |

- Molecule 15 is a protein called 37S ribosomal protein S28, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | O | 223 | Total 3668 | C 1134 | H 1853 | N 334 | O 339 | S 8 | 0 | 0 |

- Molecule 16 is a protein called 37S ribosomal protein S16, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | P | 120 | Total 1963 | C 604 | H 1011 | N 178 | O 168 | S 2 | 0 | 0 |

- Molecule 17 is a protein called 37S ribosomal protein S17, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 17 | Q | 235 | Total 3944 | C 1208 | H 2014 | N 356 | O 361 | S 5 | 1 | 0 |

- Molecule 18 is a protein called 37S ribosomal protein RSM18, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 18 | R | 101 | Total 1671 | C 507 | H 853 | N 162 | O 145 | S 4 | 0 | 0 |

- Molecule 19 is a protein called 37S ribosomal protein S19, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | S | 79 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1277 | 404 | 648 | 114 | 109 | 2 | | |

- Molecule 20 is a protein called 37S ribosomal protein MRP21, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | T | 92 | Total | C | H | N | O | S | 1 | 0 |
| | | | 1569 | 483 | 800 | 150 | 131 | 5 | | |

- Molecule 21 is a protein called 37S ribosomal protein S25, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | U | 237 | Total | C | H | N | O | S | 0 | 0 |
| | | | 3868 | 1228 | 1929 | 339 | 365 | 7 | | |

- Molecule 22 is a protein called 37S ribosomal protein PET123, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | V | 286 | Total | C | H | N | O | S | 0 | 0 |
| | | | 4692 | 1450 | 2398 | 406 | 434 | 4 | | |

- Molecule 23 is a protein called 37S ribosomal protein S23, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 | W | 402 | Total | C | H | N | O | S | 0 | 0 |
| | | | 6555 | 2078 | 3329 | 542 | 598 | 8 | | |

- Molecule 24 is a protein called Mitochondrial 37S ribosomal protein S27.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 24 | X | 98 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1619 | 503 | 832 | 142 | 139 | 3 | | |

- Molecule 25 is a protein called 37S ribosomal protein S24, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Y | 272 | Total | C | H | N | O | S | 0 | 0 |
| | | | 4514 | 1436 | 2241 | 408 | 425 | 4 | | |

- Molecule 26 is a protein called 37S ribosomal protein MRP10, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | Z | 92 | Total 1487 | C 459 | H 758 | N 137 | O 127 | S 6 | 0 | 0 |

- Molecule 27 is a protein called Mitochondrial mRNA-processing protein COX24.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 27 | 1 | 31 | Total 613 | C 170 | H 334 | N 68 | O 39 | S 2 | 0 | 0 |

- Molecule 28 is a protein called Protein FYV4, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | 2 | 102 | Total 1724 | C 544 | H 866 | N 161 | O 152 | S 1 | 0 | 0 |

- Molecule 29 is a protein called 37S ribosomal protein S26, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 3 | 257 | Total 4103 | C 1326 | H 2040 | N 349 | O 383 | S 5 | 0 | 0 |

- Molecule 30 is a protein called 37S ribosomal protein MRP1, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 4 | 303 | Total 4859 | C 1538 | H 2423 | N 422 | O 466 | S 10 | 0 | 0 |

- Molecule 31 is a protein called 37S ribosomal protein MRP13, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 | 5 | 291 | Total 4770 | C 1524 | H 2409 | N 404 | O 429 | S 4 | 0 | 0 |

- Molecule 32 is a protein called 37S ribosomal protein S35, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 6 | 319 | Total 5208 | C 1646 | H 2615 | N 467 | O 474 | S 6 | 0 | 0 |

- Molecule 33 is a protein called 3-hydroxyisobutyryl-CoA hydrolase, mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 8 | 467 | Total 7371 | C 2341 | H 3681 | N 621 | O 708 | S 20 | 0 | 0 |

- Molecule 34 is a RNA chain called 15S mitochondrial rRNA.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 | r | 1487 | Total 47450 | C 14212 | H 15844 | N 5580 | O 10326 | P 1488 | 1 | 0 |

- Molecule 35 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 35 | B | 1 | Total 1 | Mg 1 | 0 |
| 35 | K | 1 | Total 1 | Mg 1 | 0 |
| 35 | W | 1 | Total 1 | Mg 1 | 0 |
| 35 | r | 86 | Total 86 | Mg 86 | 0 |

- Molecule 36 is POTASSIUM ION (three-letter code: K) (formula: K).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 36 | D | 1 | Total 1 | K 1 | 0 |
| 36 | M | 1 | Total 1 | K 1 | 0 |
| 36 | r | 35 | Total 35 | K 35 | 0 |

- Molecule 37 is DODECYL-BETA-D-MALTOSIDE (three-letter code: LMT) (formula: $C_{24}H_{46}O_{11}$).
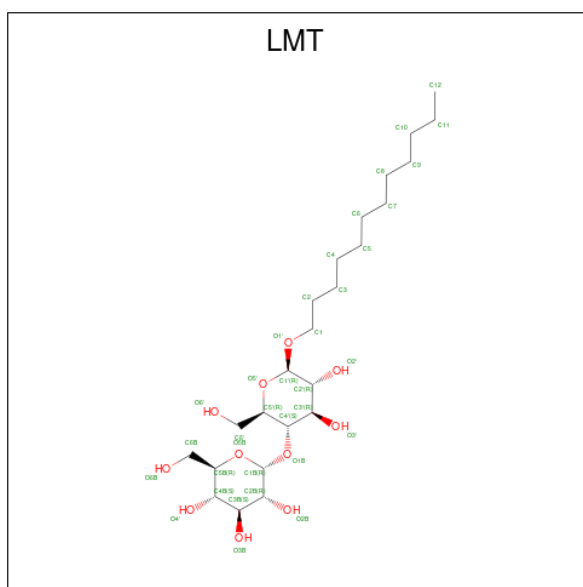
| Mol | Chain | Residues | Atoms | | | | AltConf |
|---|---|---|---|---|---|---|---|
| 37 | O | 1 | Total | C | H | O | 0 |
| | | | 38 | 12 | 25 | 1 | |

- Molecule 38 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).
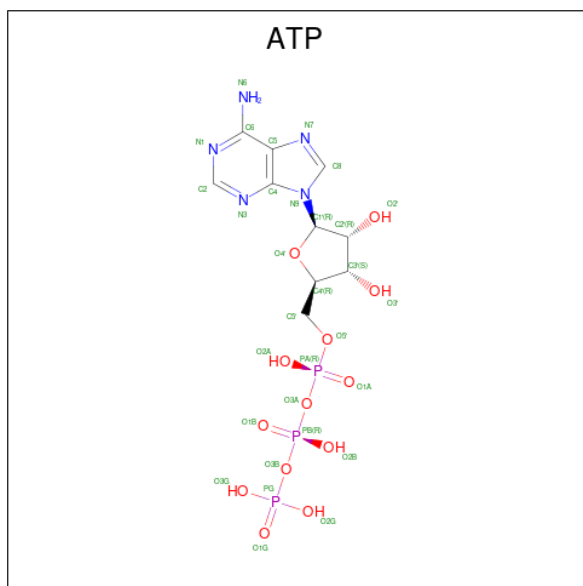


| Mol | Chain | Residues | Atoms | | | | | | AltConf |
|---|---|---|---|---|---|---|---|---|---|
| 38 | W | 1 | Total | C | H | N | O | P | 0 |
| | | | 43 | 10 | 12 | 5 | 13 | 3 | |

- Molecule 39 is water.

| Mol | Chain | Residues | Atoms | | AltConf |
|-----|-------|----------|-------|-------|---------|
| 39 | A | 58 | Total 58 | O 58 | 0 |
| 39 | B | 148 | Total 148 | O 148 | 0 |
| 39 | C | 19 | Total 19 | O 19 | 0 |
| 39 | D | 112 | Total 112 | O 112 | 0 |
| 39 | E | 144 | Total 144 | O 144 | 0 |
| 39 | F | 18 | Total 18 | O 18 | 0 |
| 39 | G | 24 | Total 24 | O 24 | 0 |
| 39 | H | 83 | Total 83 | O 83 | 0 |
| 39 | I | 58 | Total 58 | O 58 | 0 |
| 39 | J | 42 | Total 42 | O 42 | 0 |
| 39 | K | 11 | Total 11 | O 11 | 0 |
| 39 | L | 38 | Total 38 | O 38 | 0 |
| 39 | M | 12 | Total 12 | O 12 | 0 |
| 39 | N | 39 | Total 39 | O 39 | 0 |
| 39 | O | 55 | Total 55 | O 55 | 0 |
| 39 | P | 70 | Total 70 | O 70 | 0 |
| 39 | Q | 20 | Total 20 | O 20 | 0 |
| 39 | R | 15 | Total 15 | O 15 | 0 |
| 39 | S | 8 | Total 8 | O 8 | 0 |
| 39 | T | 44 | Total 44 | O 44 | 0 |
| 39 | U | 87 | Total 87 | O 87 | 0 |
| 39 | V | 34 | Total 34 | O 34 | 0 |

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| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 39 | W | 93 | Total 93 | O 93 | 0 |
| 39 | X | 9 | Total 9 | O 9 | 0 |
| 39 | Y | 46 | Total 46 | O 46 | 0 |
| 39 | Z | 25 | Total 25 | O 25 | 0 |
| 39 | 1 | 14 | Total 14 | O 14 | 0 |
| 39 | 2 | 22 | Total 22 | O 22 | 0 |
| 39 | 3 | 31 | Total 31 | O 31 | 0 |
| 39 | 4 | 3 | Total 3 | O 3 | 0 |
| 39 | 5 | 3 | Total 3 | O 3 | 0 |
| 39 | 6 | 69 | Total 69 | O 69 | 0 |
| 39 | 8 | 41 | Total 41 | O 41 | 0 |
| 39 | r | 2711 | Total 2711 | O 2711 | 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: 37S ribosomal protein MRP51, mitochondrial



- Molecule 2: 37S ribosomal protein MRP4, mitochondrial



- Molecule 3: Ribosomal protein VAR1, mitochondrial

• Molecule 4: 37S ribosomal protein NAM9, mitochondrial
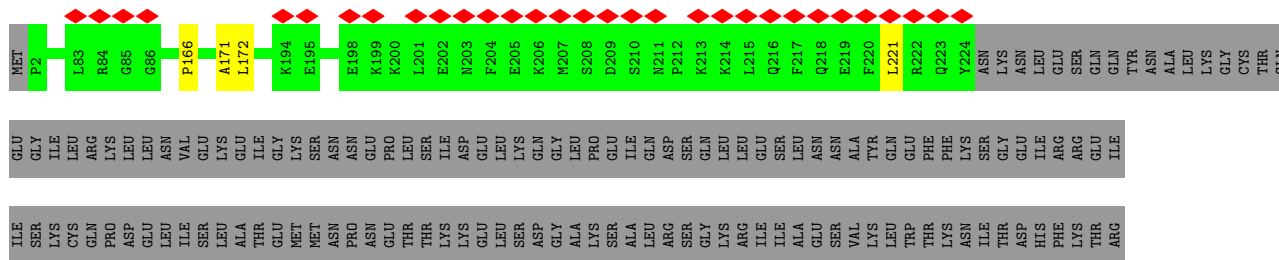
Chain D:



• Molecule 5: 37S ribosomal protein S5, mitochondrial

Chain E:



• Molecule 6: 37S ribosomal protein MRP17, mitochondrial

Chain F:



• Molecule 7: 37S ribosomal protein S7, mitochondrial
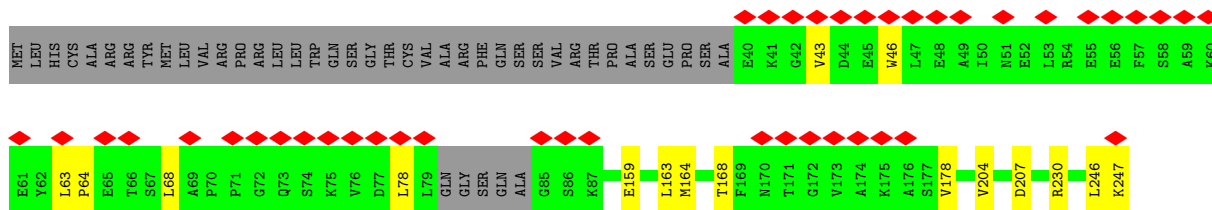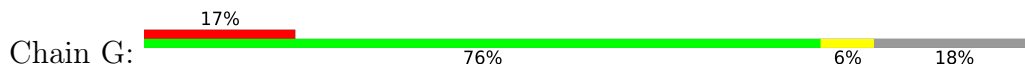
Chain G:



• Molecule 8: 37S ribosomal protein S8, mitochondrial

Chain H:

97%

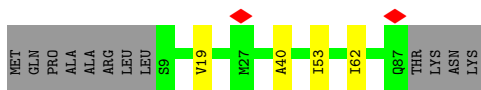ACE1 L86 I99 I118 V154 K155

• Molecule 9: 37S ribosomal protein S9, mitochondrial

Chain I:

6%

80%                    17%

MET PHE SER ARG LEU SER LEU PHE ARG ARG ALA ALA LEU ALA PRO ALA PRO MET ARG MET SER PHE ARG THR ILE TYR GLN LYS THR GLU ASP GLU L33 P39 F44 N72 N73 N74 E75 A76 Q77 Q78 T79 K80 K135 S136 S137 M138 L139 S140 N141 N142 I143 V170 R171

K191 L200 I211 R261 K262 K263 PRO GLY LYS LYS LYS ALA ARG LYS MET PRO THR TRP VAL LYS ARG
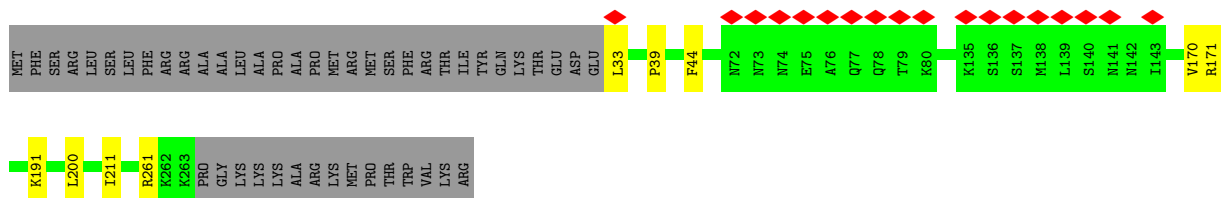
• Molecule 10: 37S ribosomal protein S10, mitochondrial

Chain J:

75%                    20%

MET LEU ARG ASN THR ILE ALA ALA LEU ARG SER PHE ILE ARG THR GLN S16 A43 D51 L55 V94 H95 R109 L121 M133 D151 L152 G153 S154 ASP ALA ASN GLY LEU GLU LYS SER LEU SER ASN ILE ASP GLU LEU TYR SER LEU ARG ASN ASP ASP LYS ALA

GLN T180 V183 L200 E201 K202 LYS
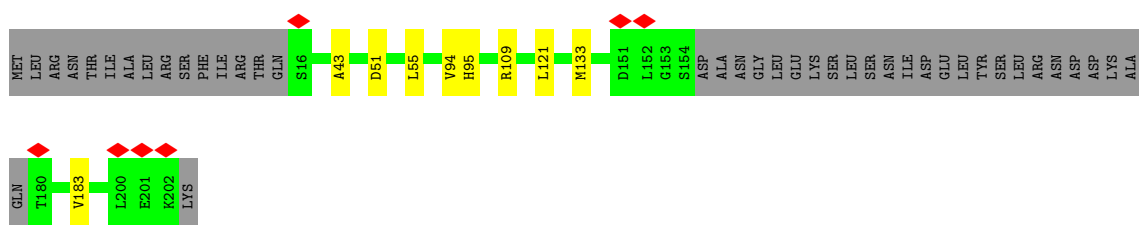
• Molecule 11: 37S ribosomal protein S18, mitochondrial

Chain K:

5%

68%                    30%

MET LEU LEU GLN PRO VAL TRP LYS GLY CYS ARG TRP THR GLN PHE VAL ARG PRO ILE ARG ARG TRP ASN SER THR GLY THR ASN ARG GLY VAL PRO PHE PHE LYS ASP ILE SER ASN GLN GLU ASP ILE THR ASN ILE SER TYR PRO SER SER ASP SER VAL LEU THR LYS SER

ASN GLY SER SER GLU VAL Y67 K68 P69 K70 E96 N99 F100 H101 K102 N103 K104 G105 L106 I180 V184 L217
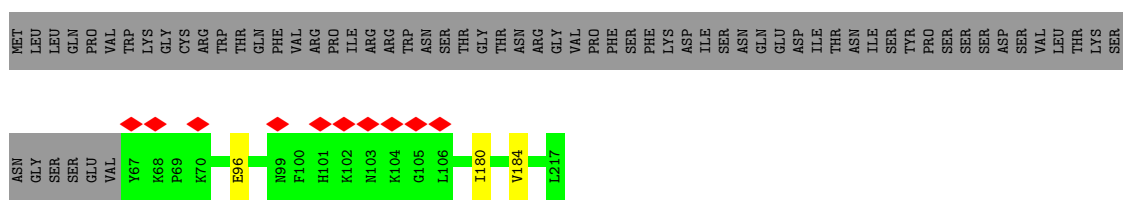
• Molecule 12: 37S ribosomal protein S12, mitochondrial

Chain L:

79%                    20%

MET LEU SER ARG PHE MET SER ASN THR TRP CYS THR PRO LEU ARG GLN ALA GLN LEU ARG PHE SER SER THR THR THR MET GLN A29 T30 L31 R43 S151 LYS SER
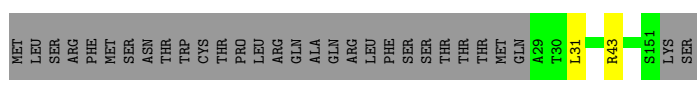
• Molecule 13: 37S ribosomal protein SWS2, mitochondrial

Chain M:

81%                    17%

MET V2 T66 R92 V99 R120 GLY ILE HIS THR PHE SER GLN ALA LYS VAL GLN HIS ASN PRO SER LEU TRP SER CYS ILE PHE GLY LYS
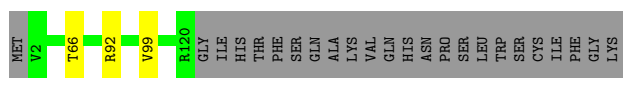
• Molecule 14: 37S ribosomal protein MRP2, mitochondrial

Chain N: 96%

MET G2 K39 F86 P108 I114 TRP

• Molecule 15: 37S ribosomal protein S28, mitochondrial

Chain O: 73% 5% 22%

MET SER ILE VAL GLY ARG ASN ALA ILE LEU LEU ASN LEU ARG ILE SER LEU CYS PRO LEU PHE MET GLY LYS ARG SER PHE VAL SER SER PRO VAL SER ASN S34 I76 L83 L87 I95 L102 R110 E114 L115 S116 G117 L118 ASN THR GLU VAL V123 G124 I125 E126

E148 N151 A156 R161 T171 V183 D198 N201 D260 LYS ILE LEU ILE ARG ASP SER LYS LYS VAL ALA ASN GLN LYS ARG GLU ILE ARG LYS GLN LYS ARG ALA THR PHE
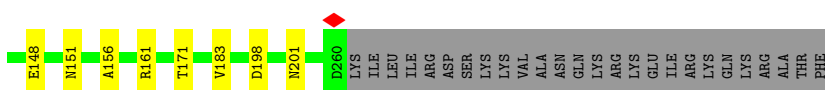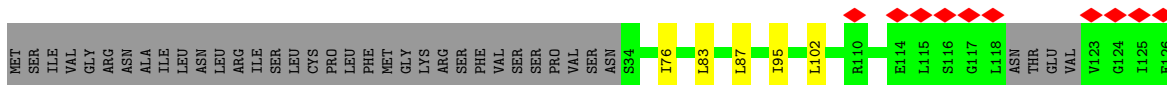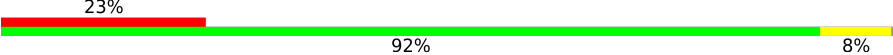
• Molecule 16: 37S ribosomal protein S16, mitochondrial

Chain P: 97%

MET T2 R71 T119 L120 E121

• Molecule 17: 37S ribosomal protein S17, mitochondrial

Chain Q: 23% 92% 8%

MET A2 I33 H39 V58 I77 N80 Q84 L118 N119 E120 K121 T122 I128 I131 Q132 D133 A134 L135 S136 S137 G138 S139 T140 P141 K142 E143 L144 L145 E146 I147 K148 Q149 R150 Y151 G152 I153 Q154 D155 F156 S157 Q158 N196 D197 L198 K199 C200 D201 Q202 F203

L204 K205 D206 H207 G208 V209 E210 D211 P212 L213 T214 L215 K216 K217 N218 L224 M230 Q234 P235 S236 GLN
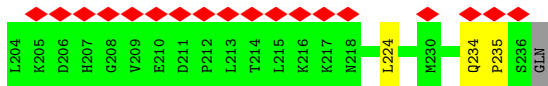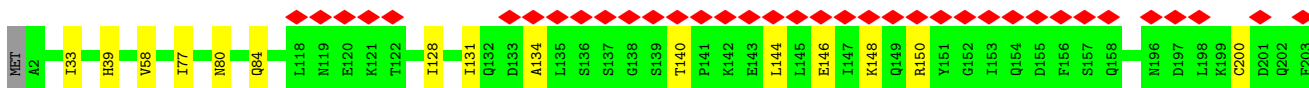
• Molecule 18: 37S ribosomal protein RSM18, mitochondrial

Chain R: 70% 27%

MET GLN PRO ILE ILE LYS GLY ALA VAL SER SER THR PHE LYS ARG ALA LEU TYR ASN PHE GLY ILE LYS GLU LYS SER VAL ASN ILE GLU MET GLY ARG THR GLN GLN T38 D42 Q43 N74 K75 N76 S77 N78 R79 N80 D81 M138
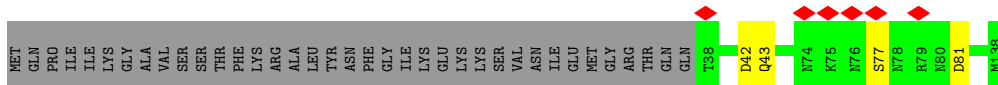
• Molecule 19: 37S ribosomal protein S19, mitochondrial

Chain S: 82% 13%

• Molecule 20: 37S ribosomal protein MRP21, mitochondrial



• Molecule 21: 37S ribosomal protein S25, mitochondrial
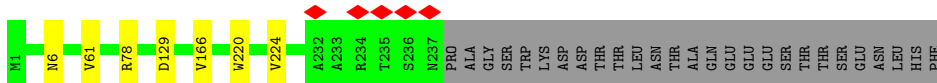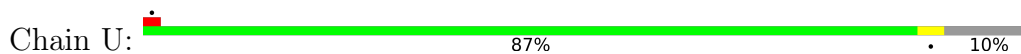


• Molecule 22: 37S ribosomal protein PET123, mitochondrial
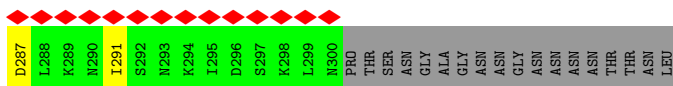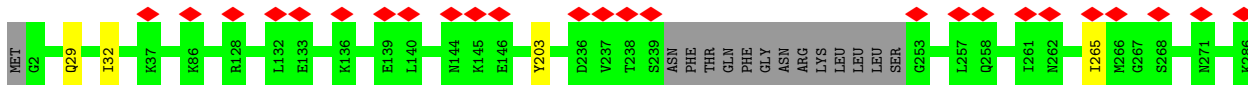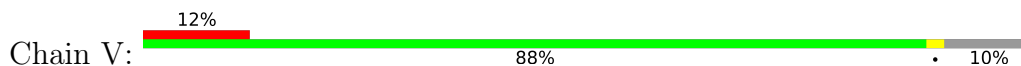


• Molecule 23: 37S ribosomal protein S23, mitochondrial
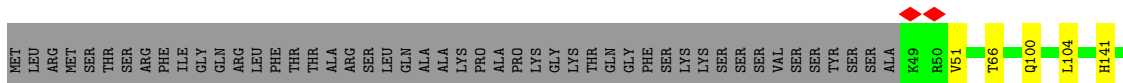


• Molecule 24: Mitochondrial 37S ribosomal protein S27
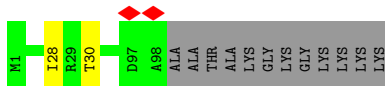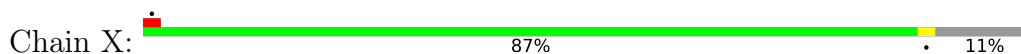
• Molecule 25: 37S ribosomal protein S24, mitochondrial

Chain Y:
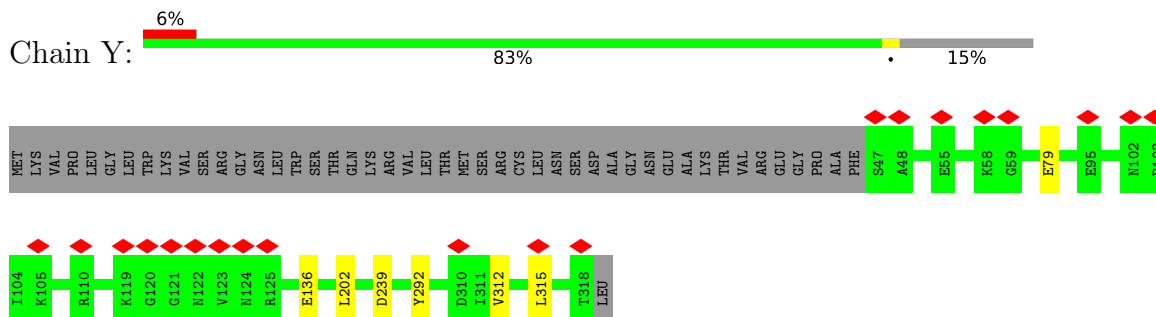
• Molecule 26: 37S ribosomal protein MRP10, mitochondrial

Chain Z:
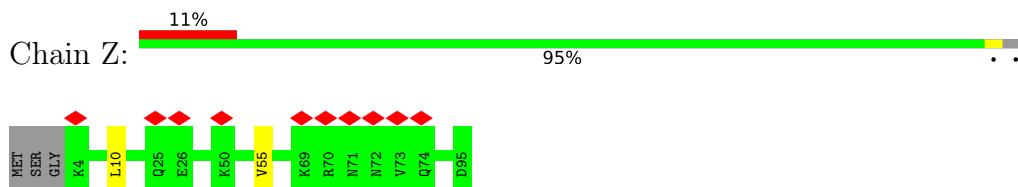
• Molecule 27: Mitochondrial mRNA-processing protein COX24

Chain 1:
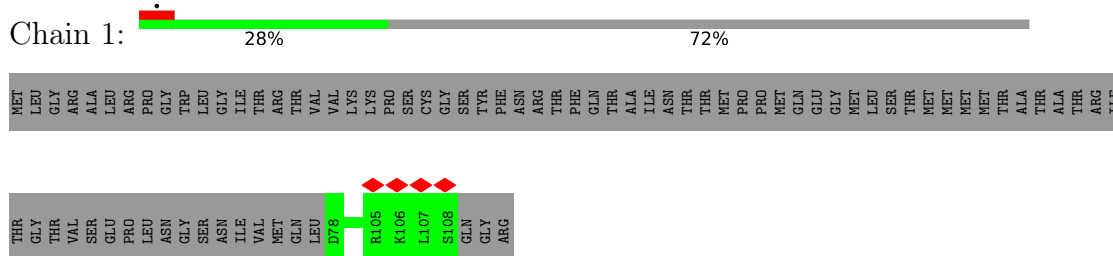
• Molecule 28: Protein FYV4, mitochondrial

Chain 2:
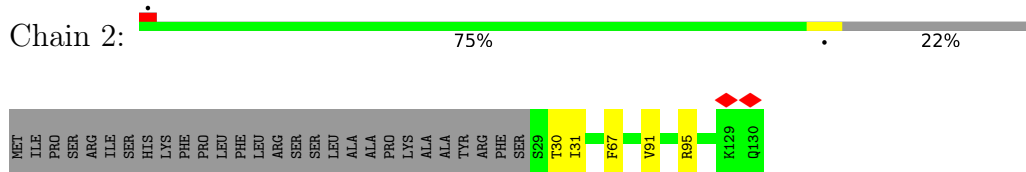
• Molecule 29: 37S ribosomal protein S26, mitochondrial

Chain 3:
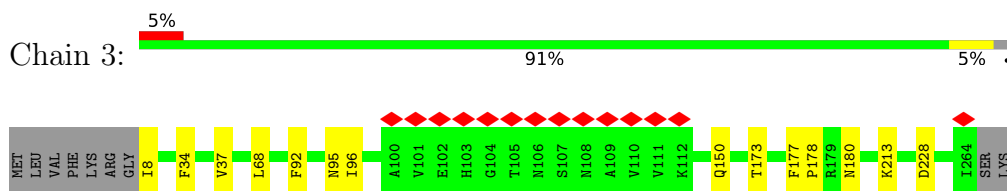
• Molecule 30: 37S ribosomal protein MRP1, mitochondrial

Chain 4:
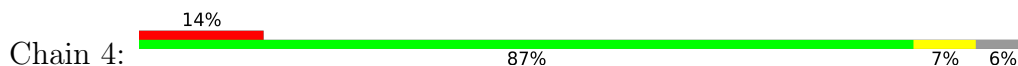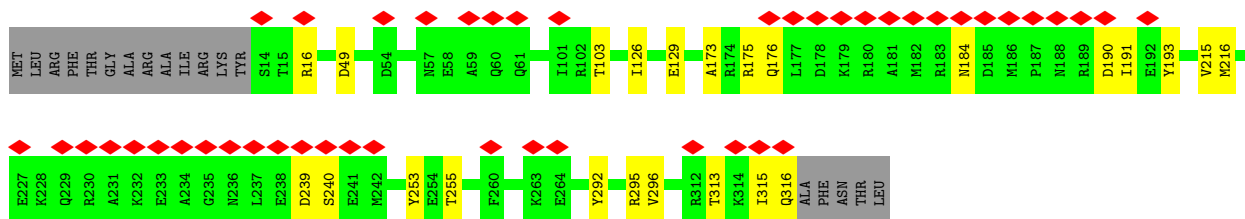
• Molecule 31: 37S ribosomal protein MRP13, mitochondrial

Chain 5:

15%

78% 7% 14%
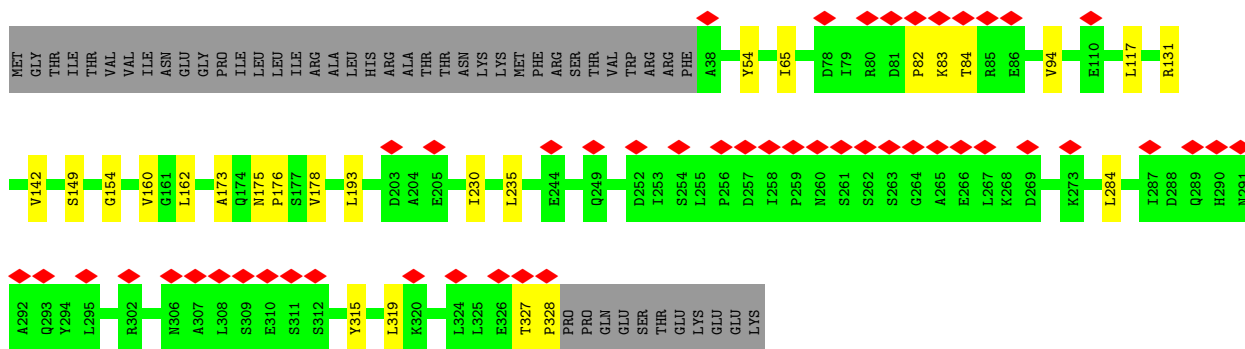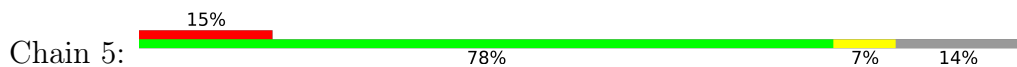
• Molecule 32: 37S ribosomal protein S35, mitochondrial

Chain 6:

91% 8%
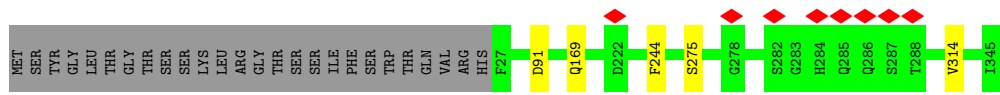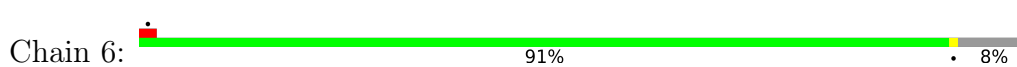
• Molecule 33: 3-hydroxyisobutyryl-CoA hydrolase, mitochondrial

Chain 8:

18%

89% 7%
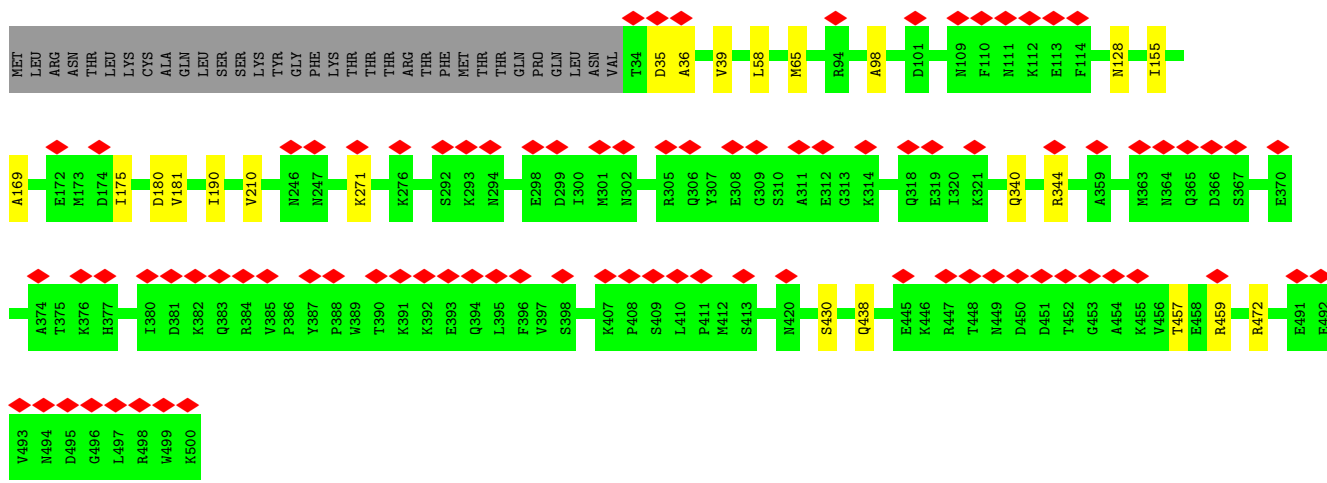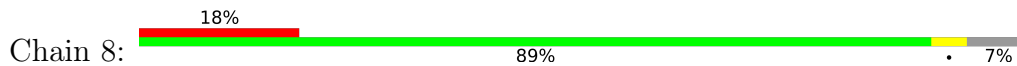
• Molecule 34: 15S mitochondrial rRNA

Chain r:

# 4 Experimental information ⓘ

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, C1 | Depositor |
| Number of particles used | 778978 | 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 $(e^-/\text{Å}^2)$ | 32 | Depositor |
| Minimum defocus (nm) | 500 | Depositor |
| Maximum defocus (nm) | 2800 | Depositor |
| Magnification | 165000 | Depositor |
| Image detector | GATAN K3 (6k x 4k) | Depositor |
| Maximum map value | 1.124 | Depositor |
| Minimum map value | -0.125 | Depositor |
| Average map value | 0.001 | Depositor |
| Map value standard deviation | 0.016 | Depositor |
| Recommended contour level | 0.05 | Depositor |
| Map size (Å) | 398.3976, 398.3976, 398.3976 | wwPDB |
| Map dimensions | 720, 720, 720 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.55333, 0.55333, 0.55333 | Depositor |

# 5 Model quality ⓘ

## 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: K, ATP, LMT, ACE, 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 | 0.24 | 0/2483 | 0.46 | 0/3345 |
| 2 | B | 0.24 | 0/2764 | 0.45 | 0/3746 |
| 3 | C | 0.24 | 0/3133 | 0.41 | 0/4215 |
| 4 | D | 0.25 | 0/2913 | 0.46 | 0/3923 |
| 5 | E | 0.25 | 0/2403 | 0.47 | 0/3237 |
| 6 | F | 0.24 | 0/1068 | 0.48 | 0/1430 |
| 7 | G | 0.23 | 0/1641 | 0.45 | 0/2216 |
| 8 | H | 0.24 | 0/1244 | 0.46 | 0/1677 |
| 9 | I | 0.24 | 0/1895 | 0.46 | 0/2552 |
| 10 | J | 0.24 | 0/1355 | 0.46 | 0/1834 |
| 11 | K | 0.25 | 0/1232 | 0.47 | 0/1642 |
| 12 | L | 0.24 | 0/954 | 0.55 | 0/1281 |
| 13 | M | 0.24 | 0/949 | 0.50 | 0/1267 |
| 14 | N | 0.26 | 0/948 | 0.52 | 0/1267 |
| 15 | O | 0.24 | 0/1837 | 0.48 | 0/2457 |
| 16 | P | 0.25 | 0/968 | 0.55 | 0/1307 |
| 17 | Q | 0.24 | 0/1953 | 0.48 | 0/2609 |
| 18 | R | 0.24 | 0/830 | 0.52 | 0/1106 |
| 19 | S | 0.26 | 0/645 | 0.50 | 0/872 |
| 20 | T | 0.25 | 0/784 | 0.50 | 0/1035 |
| 21 | U | 0.24 | 0/1982 | 0.46 | 0/2679 |
| 22 | V | 0.24 | 0/2325 | 0.43 | 0/3112 |
| 23 | W | 0.24 | 0/3292 | 0.42 | 0/4449 |
| 24 | X | 0.25 | 0/801 | 0.46 | 0/1070 |
| 25 | Y | 0.23 | 0/2329 | 0.46 | 0/3142 |
| 26 | Z | 0.23 | 0/745 | 0.45 | 0/1004 |
| 27 | 1 | 0.23 | 0/279 | 0.62 | 0/355 |
| 28 | 2 | 0.24 | 0/877 | 0.45 | 0/1173 |
| 29 | 3 | 0.25 | 0/2114 | 0.44 | 0/2872 |
| 30 | 4 | 0.24 | 0/2485 | 0.46 | 0/3354 |
| 31 | 5 | 0.24 | 0/2417 | 0.43 | 0/3275 |
| 32 | 6 | 0.25 | 0/2655 | 0.47 | 0/3583 |

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | $\#\|Z\|>5$ | RMSZ | $\#\|Z\|>5$ |
| 33 | 8 | 0.24 | 0/3766 | 0.45 | 0/5099 |
| 34 | r | 0.23 | 0/35392 | 0.68 | 0/55064 |
| All | All | 0.24 | 0/93458 | 0.56 | 0/133249 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

## 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 | 2427 | 2481 | 2480 | 24 | 0 |
| 2 | B | 2714 | 2722 | 2721 | 12 | 0 |
| 3 | C | 3090 | 3091 | 3085 | 19 | 0 |
| 4 | D | 2833 | 2896 | 2895 | 11 | 0 |
| 5 | E | 2348 | 2360 | 2359 | 5 | 0 |
| 6 | F | 1055 | 1129 | 1129 | 3 | 0 |
| 7 | G | 1612 | 1660 | 1658 | 16 | 0 |
| 8 | H | 1223 | 1286 | 1288 | 2 | 0 |
| 9 | I | 1858 | 1925 | 1925 | 6 | 0 |
| 10 | J | 1321 | 1334 | 1332 | 6 | 0 |
| 11 | K | 1209 | 1266 | 1266 | 2 | 0 |
| 12 | L | 939 | 993 | 992 | 2 | 0 |
| 13 | M | 935 | 1002 | 1000 | 2 | 0 |
| 14 | N | 931 | 986 | 985 | 2 | 0 |
| 15 | O | 1815 | 1853 | 1851 | 8 | 0 |
| 16 | P | 952 | 1011 | 1010 | 2 | 0 |
| 17 | Q | 1930 | 2014 | 2014 | 12 | 0 |
| 18 | R | 818 | 853 | 852 | 2 | 0 |
| 19 | S | 629 | 648 | 647 | 2 | 0 |
| 20 | T | 769 | 800 | 800 | 5 | 0 |
| 21 | U | 1939 | 1929 | 1929 | 8 | 0 |
| 22 | V | 2294 | 2398 | 2396 | 5 | 0 |
| 23 | W | 3226 | 3329 | 3327 | 5 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 24 | X | 787 | 832 | 832 | 1 | 0 |
| 25 | Y | 2273 | 2241 | 2240 | 8 | 0 |
| 26 | Z | 729 | 758 | 757 | 2 | 0 |
| 27 | 1 | 279 | 334 | 333 | 0 | 0 |
| 28 | 2 | 858 | 866 | 865 | 3 | 0 |
| 29 | 3 | 2063 | 2040 | 2039 | 7 | 0 |
| 30 | 4 | 2436 | 2423 | 2422 | 12 | 0 |
| 31 | 5 | 2361 | 2409 | 2408 | 14 | 0 |
| 32 | 6 | 2593 | 2615 | 2613 | 4 | 0 |
| 33 | 8 | 3690 | 3681 | 3680 | 14 | 0 |
| 34 | r | 31606 | 15844 | 15848 | 0 | 0 |
| 35 | B | 1 | 0 | 0 | 0 | 0 |
| 35 | K | 1 | 0 | 0 | 0 | 0 |
| 35 | W | 1 | 0 | 0 | 0 | 0 |
| 35 | r | 86 | 0 | 0 | 0 | 0 |
| 36 | D | 1 | 0 | 0 | 0 | 0 |
| 36 | M | 1 | 0 | 0 | 0 | 0 |
| 36 | r | 35 | 0 | 0 | 0 | 0 |
| 37 | O | 13 | 25 | 25 | 2 | 0 |
| 38 | W | 31 | 12 | 12 | 0 | 0 |
| 39 | 1 | 14 | 0 | 0 | 0 | 0 |
| 39 | 2 | 22 | 0 | 0 | 0 | 0 |
| 39 | 3 | 31 | 0 | 0 | 1 | 0 |
| 39 | 4 | 3 | 0 | 0 | 0 | 0 |
| 39 | 5 | 3 | 0 | 0 | 0 | 0 |
| 39 | 6 | 69 | 0 | 0 | 0 | 0 |
| 39 | 8 | 41 | 0 | 0 | 1 | 0 |
| 39 | A | 58 | 0 | 0 | 2 | 0 |
| 39 | B | 148 | 0 | 0 | 1 | 0 |
| 39 | C | 19 | 0 | 0 | 1 | 0 |
| 39 | D | 112 | 0 | 0 | 1 | 0 |
| 39 | E | 144 | 0 | 0 | 2 | 0 |
| 39 | F | 18 | 0 | 0 | 1 | 0 |
| 39 | G | 24 | 0 | 0 | 1 | 0 |
| 39 | H | 83 | 0 | 0 | 0 | 0 |
| 39 | I | 58 | 0 | 0 | 1 | 0 |
| 39 | J | 42 | 0 | 0 | 2 | 0 |
| 39 | K | 11 | 0 | 0 | 0 | 0 |
| 39 | L | 38 | 0 | 0 | 1 | 0 |
| 39 | M | 12 | 0 | 0 | 0 | 0 |
| 39 | N | 39 | 0 | 0 | 0 | 0 |
| 39 | O | 55 | 0 | 0 | 0 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 39 | P | 70 | 0 | 0 | 0 | 0 |
| 39 | Q | 20 | 0 | 0 | 0 | 0 |
| 39 | R | 15 | 0 | 0 | 0 | 0 |
| 39 | S | 8 | 0 | 0 | 0 | 0 |
| 39 | T | 44 | 0 | 0 | 0 | 0 |
| 39 | U | 87 | 0 | 0 | 2 | 0 |
| 39 | V | 34 | 0 | 0 | 0 | 0 |
| 39 | W | 93 | 0 | 0 | 0 | 0 |
| 39 | X | 9 | 0 | 0 | 0 | 0 |
| 39 | Y | 46 | 0 | 0 | 1 | 0 |
| 39 | Z | 25 | 0 | 0 | 0 | 0 |
| 39 | r | 2711 | 0 | 0 | 0 | 0 |
| All | All | 92918 | 74046 | 74015 | 193 | 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 2.

The worst 5 of 193 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:I:200:LEU:HD11 | 9:I:211:ILE:HD11 | 1.77 | 0.67 |
| 1:A:289:GLY:O | 39:A:401:HOH:O | 2.13 | 0.66 |
| 10:J:133:MET:O | 39:J:301:HOH:O | 2.13 | 0.66 |
| 3:C:255:ASN:OD1 | 3:C:256:ILE:N | 2.30 | 0.64 |
| 16:P:71:ARG:HG2 | 32:6:314:VAL:HG21 | 1.80 | 0.64 |

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 | 299/344 (87%) | 286 (96%) | 13 (4%) | 0 | 100 | 100 |
| 2 | B | 338/394 (86%) | 329 (97%) | 9 (3%) | 0 | 100 | 100 |
| 3 | C | 362/398 (91%) | 353 (98%) | 9 (2%) | 0 | 100 | 100 |
| 4 | D | 337/486 (69%) | 334 (99%) | 3 (1%) | 0 | 100 | 100 |
| 5 | E | 292/307 (95%) | 285 (98%) | 7 (2%) | 0 | 100 | 100 |
| 6 | F | 129/131 (98%) | 127 (98%) | 2 (2%) | 0 | 100 | 100 |
| 7 | G | 199/247 (81%) | 196 (98%) | 3 (2%) | 0 | 100 | 100 |
| 8 | H | 154/155 (99%) | 152 (99%) | 2 (1%) | 0 | 100 | 100 |
| 9 | I | 230/278 (83%) | 226 (98%) | 4 (2%) | 0 | 100 | 100 |
| 10 | J | 158/203 (78%) | 152 (96%) | 6 (4%) | 0 | 100 | 100 |
| 11 | K | 150/217 (69%) | 148 (99%) | 2 (1%) | 0 | 100 | 100 |
| 12 | L | 121/153 (79%) | 120 (99%) | 1 (1%) | 0 | 100 | 100 |
| 13 | M | 117/143 (82%) | 115 (98%) | 2 (2%) | 0 | 100 | 100 |
| 14 | N | 111/115 (96%) | 111 (100%) | 0 | 0 | 100 | 100 |
| 15 | O | 219/286 (77%) | 217 (99%) | 2 (1%) | 0 | 100 | 100 |
| 16 | P | 118/121 (98%) | 115 (98%) | 3 (2%) | 0 | 100 | 100 |
| 17 | Q | 234/237 (99%) | 232 (99%) | 2 (1%) | 0 | 100 | 100 |
| 18 | R | 99/138 (72%) | 98 (99%) | 1 (1%) | 0 | 100 | 100 |
| 19 | S | 77/91 (85%) | 74 (96%) | 3 (4%) | 0 | 100 | 100 |
| 20 | T | 91/177 (51%) | 90 (99%) | 1 (1%) | 0 | 100 | 100 |
| 21 | U | 235/264 (89%) | 230 (98%) | 5 (2%) | 0 | 100 | 100 |
| 22 | V | 282/318 (89%) | 278 (99%) | 4 (1%) | 0 | 100 | 100 |
| 23 | W | 400/450 (89%) | 390 (98%) | 10 (2%) | 0 | 100 | 100 |
| 24 | X | 96/110 (87%) | 96 (100%) | 0 | 0 | 100 | 100 |
| 25 | Y | 270/319 (85%) | 267 (99%) | 3 (1%) | 0 | 100 | 100 |
| 26 | Z | 90/95 (95%) | 87 (97%) | 3 (3%) | 0 | 100 | 100 |
| 27 | 1 | 29/111 (26%) | 29 (100%) | 0 | 0 | 100 | 100 |
| 28 | 2 | 100/130 (77%) | 98 (98%) | 2 (2%) | 0 | 100 | 100 |
| 29 | 3 | 255/266 (96%) | 246 (96%) | 9 (4%) | 0 | 100 | 100 |
| 30 | 4 | 301/321 (94%) | 289 (96%) | 12 (4%) | 0 | 100 | 100 |
| 31 | 5 | 289/339 (85%) | 281 (97%) | 8 (3%) | 0 | 100 | 100 |
| 32 | 6 | 317/345 (92%) | 310 (98%) | 7 (2%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|----------|----------|---------|----------|-----|-----|
| 33 | 8 | 465/500 (93%) | 451 (97%) | 14 (3%) | 0 | 100 | 100 |
| All | All | 6964/8189 (85%) | 6812 (98%) | 152 (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 | A | 270/309 (87%) | 270 (100%) | 0 | 100 | 100 |
| 2 | B | 307/350 (88%) | 307 (100%) | 0 | 100 | 100 |
| 3 | C | 361/385 (94%) | 361 (100%) | 0 | 100 | 100 |
| 4 | D | 306/437 (70%) | 304 (99%) | 2 (1%) | 84 | 92 |
| 5 | E | 253/266 (95%) | 252 (100%) | 1 (0%) | 91 | 96 |
| 6 | F | 120/120 (100%) | 120 (100%) | 0 | 100 | 100 |
| 7 | G | 174/211 (82%) | 173 (99%) | 1 (1%) | 86 | 93 |
| 8 | H | 142/141 (101%) | 142 (100%) | 0 | 100 | 100 |
| 9 | I | 205/245 (84%) | 204 (100%) | 1 (0%) | 88 | 95 |
| 10 | J | 146/183 (80%) | 146 (100%) | 0 | 100 | 100 |
| 11 | K | 131/192 (68%) | 131 (100%) | 0 | 100 | 100 |
| 12 | L | 102/131 (78%) | 102 (100%) | 0 | 100 | 100 |
| 13 | M | 100/121 (83%) | 100 (100%) | 0 | 100 | 100 |
| 14 | N | 101/103 (98%) | 100 (99%) | 1 (1%) | 76 | 87 |
| 15 | O | 192/250 (77%) | 192 (100%) | 0 | 100 | 100 |
| 16 | P | 105/106 (99%) | 105 (100%) | 0 | 100 | 100 |
| 17 | Q | 217/218 (100%) | 215 (99%) | 2 (1%) | 78 | 89 |
| 18 | R | 89/121 (74%) | 89 (100%) | 0 | 100 | 100 |
| 19 | S | 68/78 (87%) | 68 (100%) | 0 | 100 | 100 |
| 20 | T | 82/159 (52%) | 82 (100%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|---|---|---|---|---|---|---|
| 21 | U | 212/236 (90%) | 212 (100%) | 0 | 100 | 100 |
| 22 | V | 260/287 (91%) | 260 (100%) | 0 | 100 | 100 |
| 23 | W | 369/409 (90%) | 368 (100%) | 1 (0%) | 92 | 96 |
| 24 | X | 85/92 (92%) | 85 (100%) | 0 | 100 | 100 |
| 25 | Y | 249/289 (86%) | 248 (100%) | 1 (0%) | 91 | 96 |
| 26 | Z | 83/85 (98%) | 83 (100%) | 0 | 100 | 100 |
| 27 | 1 | 30/98 (31%) | 30 (100%) | 0 | 100 | 100 |
| 28 | 2 | 93/117 (80%) | 93 (100%) | 0 | 100 | 100 |
| 29 | 3 | 232/240 (97%) | 231 (100%) | 1 (0%) | 91 | 96 |
| 30 | 4 | 267/281 (95%) | 266 (100%) | 1 (0%) | 91 | 96 |
| 31 | 5 | 259/303 (86%) | 259 (100%) | 0 | 100 | 100 |
| 32 | 6 | 289/312 (93%) | 289 (100%) | 0 | 100 | 100 |
| 33 | 8 | 413/444 (93%) | 412 (100%) | 1 (0%) | 93 | 97 |
| All | All | 6312/7319 (86%) | 6299 (100%) | 13 (0%) | 93 | 97 |

5 of 13 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 17 | Q | 39[B] | HIS |
| 23 | W | 141 | HIS |
| 33 | 8 | 472 | ARG |
| 29 | 3 | 95 | ASN |
| 30 | 4 | 253 | TYR |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 30 | 4 | 69 | HIS |
| 31 | 5 | 143 | GLN |
| 33 | 8 | 128 | ASN |
| 32 | 6 | 169 | GLN |
| 23 | W | 449 | HIS |

### 5.3.3   RNA ⓘ

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|-----|-------|----------|-------------------|-----------------|
| 34 | r | 1476/1647 (89%) | 167 (11%) | 0 |

5 of 167 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 34 | r | 13 | U |
| 34 | r | 16 | G |
| 34 | r | 29 | G |
| 34 | r | 39 | A |
| 34 | r | 46 | A |

There are no RNA pucker outliers to report.

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

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

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

Of 128 ligands modelled in this entry, 126 are monoatomic - leaving 2 for Mogul analysis.

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

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|-----|------|--------|------|----------|--------|------|----------|
| | | | | | Counts | RMSZ | $\#|Z| > 2$ | Counts | RMSZ | $\#|Z| > 2$ |
| 37 | LMT | O | 301 | - | 12,12,36 | 0.15 | 0 | 11,11,47 | 0.20 | 0 |
| 38 | ATP | W | 501 | 35 | 26,33,33 | 0.75 | 0 | 31,52,52 | 0.67 | 0 |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|-----|------|---------|----------|-------|
| 37 | LMT | O | 301 | - | - | 0/10/10/61 | - |
| 38 | ATP | W | 501 | 35 | - | 0/18/38/38 | 0/3/3/3 |

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.

1 monomer is involved in 2 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 37 | O | 301 | LMT | 2 | 0 |

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

**Ligand ATP W 501**



Bond lengths

Bond angles

Torsions

Rings
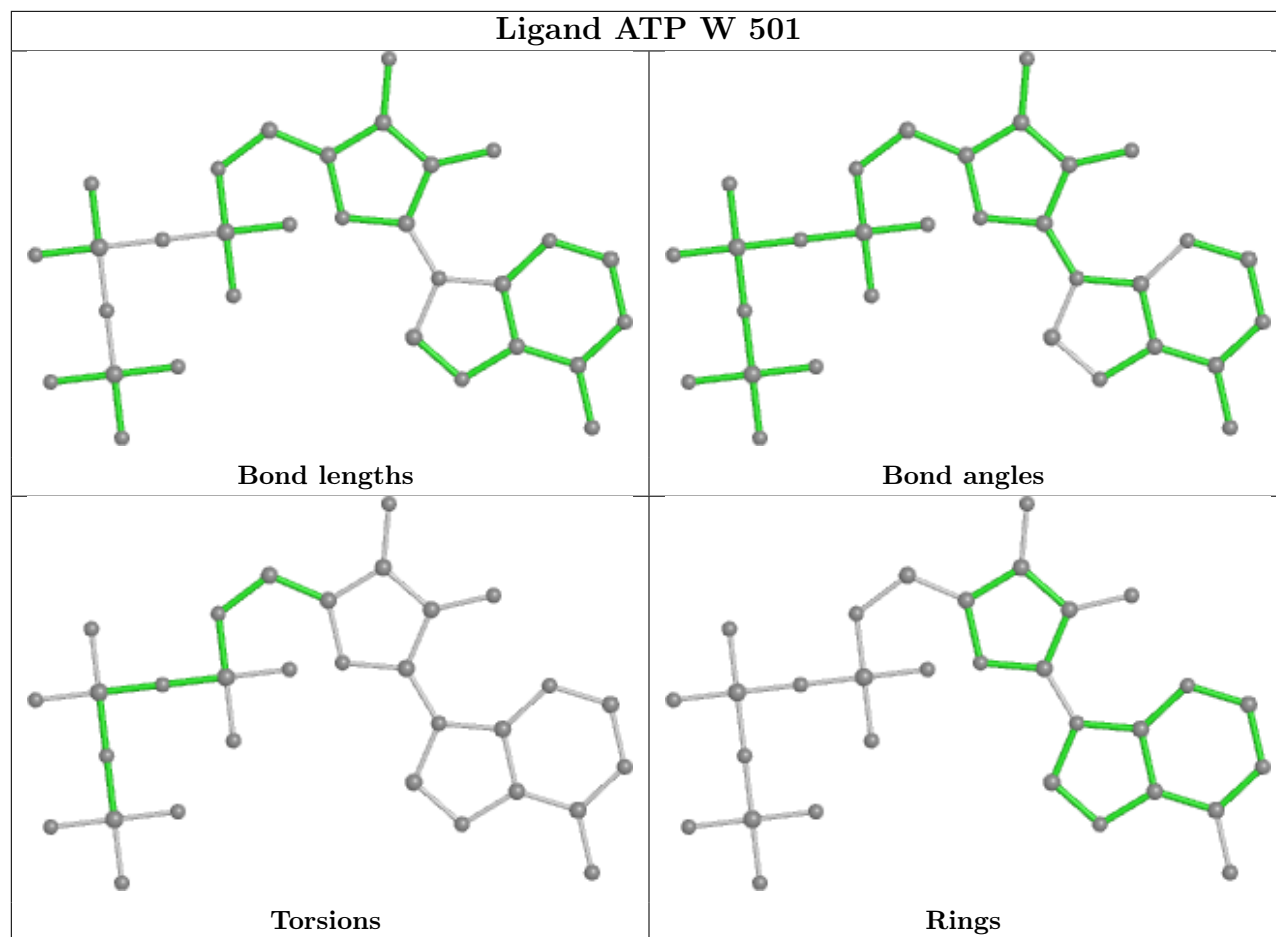
## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

# 6   Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-16968. 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
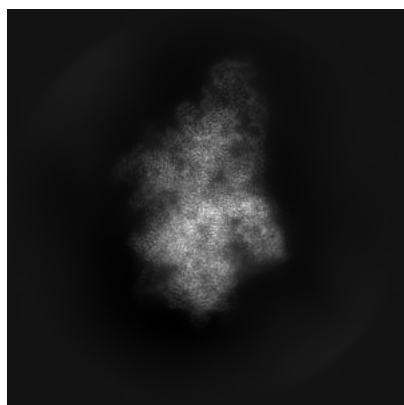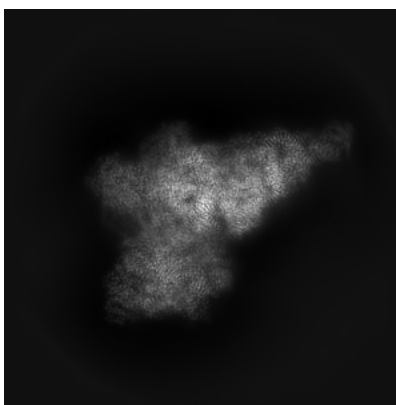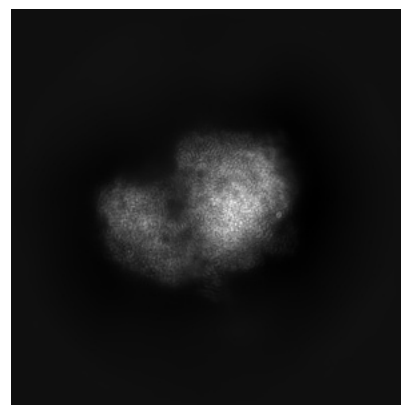
The images above show the map projected in three orthogonal directions.

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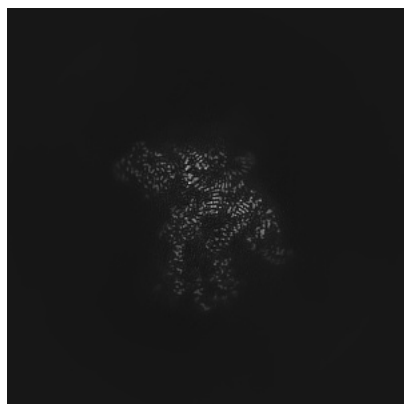
### 6.2.1   Primary map
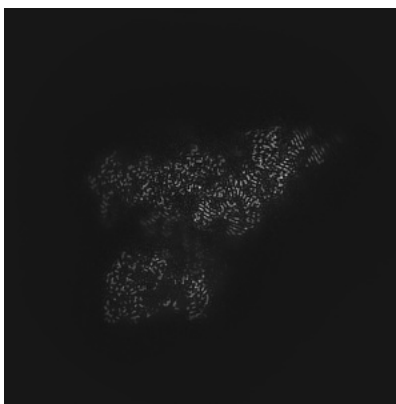


X Index: 360           Y Index: 360           Z Index: 360
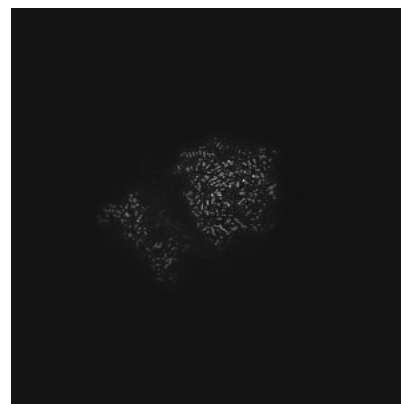
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices ⓘ
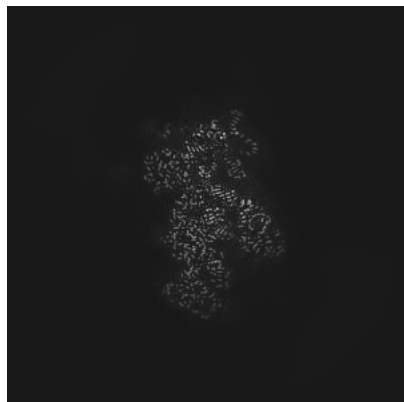
### 6.3.1 Primary map
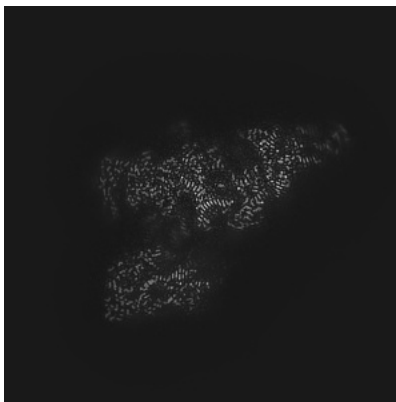


| X Index: 396 | Y Index: 369 | Z Index: 358 |
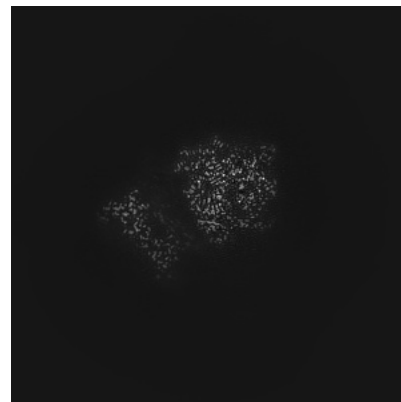
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



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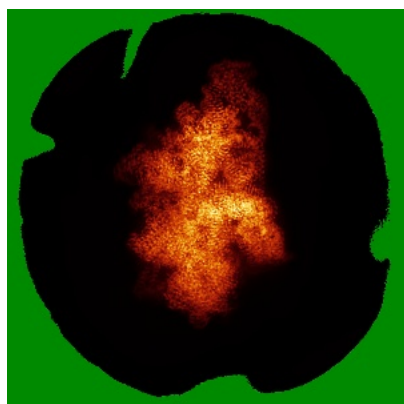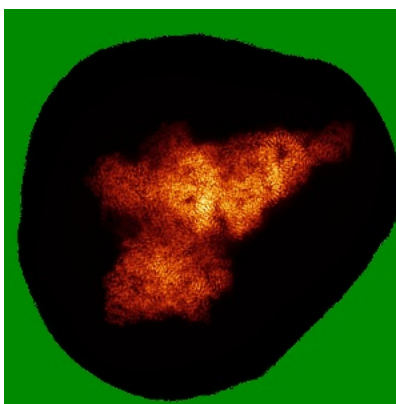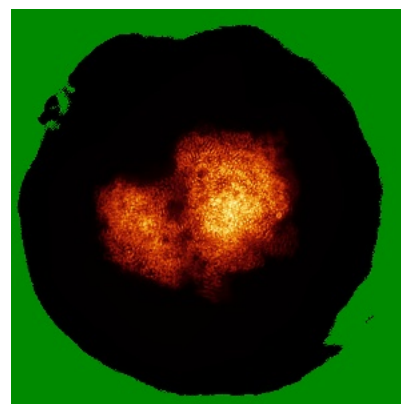
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5    Orthogonal surface views ⓘ
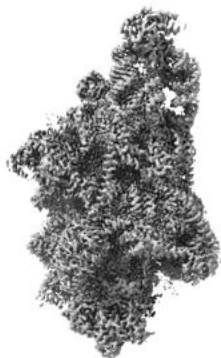
### 6.5.1    Primary map



X             Y             Z
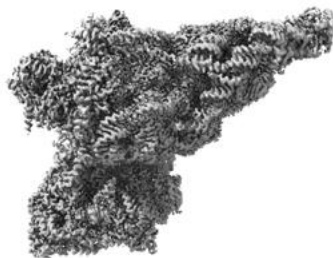
The images above show the 3D surface view of the map at the recommended contour level 0.05. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

## 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 ⓘ
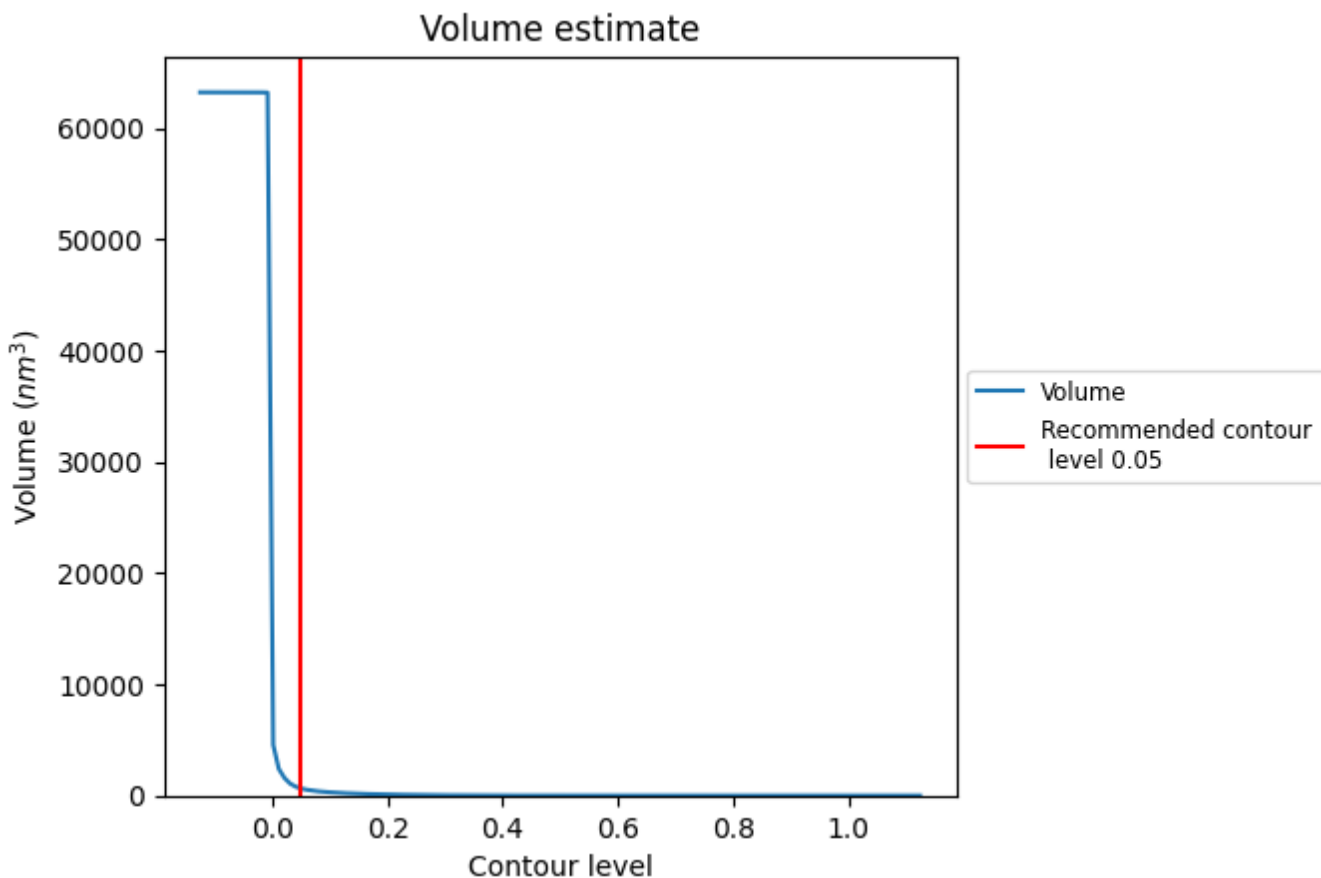


The volume at the recommended contour level is 643 nm$^3$; this corresponds to an approximate mass of 581 kDa.

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 ⓘ
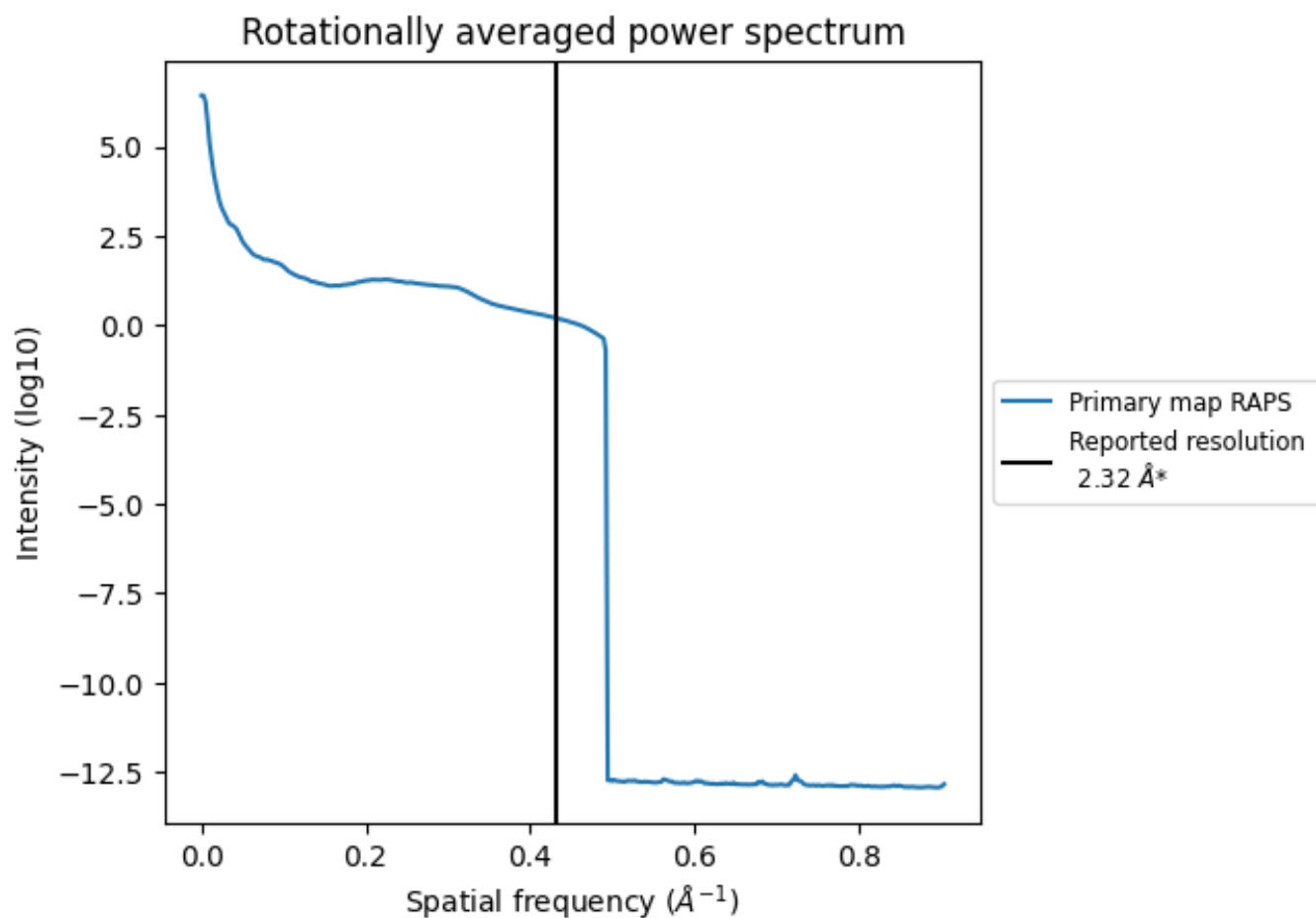


*Reported resolution corresponds to spatial frequency of 0.431 $\text{Å}^{-1}$

# 8 Fourier-Shell correlation ⓘ

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

# 9   Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-16968 and PDB model 8OM4. Per-residue inclusion information can be found in section 3 on page 14.

## 9.1   Map-model overlay (i)



X            Y            Z
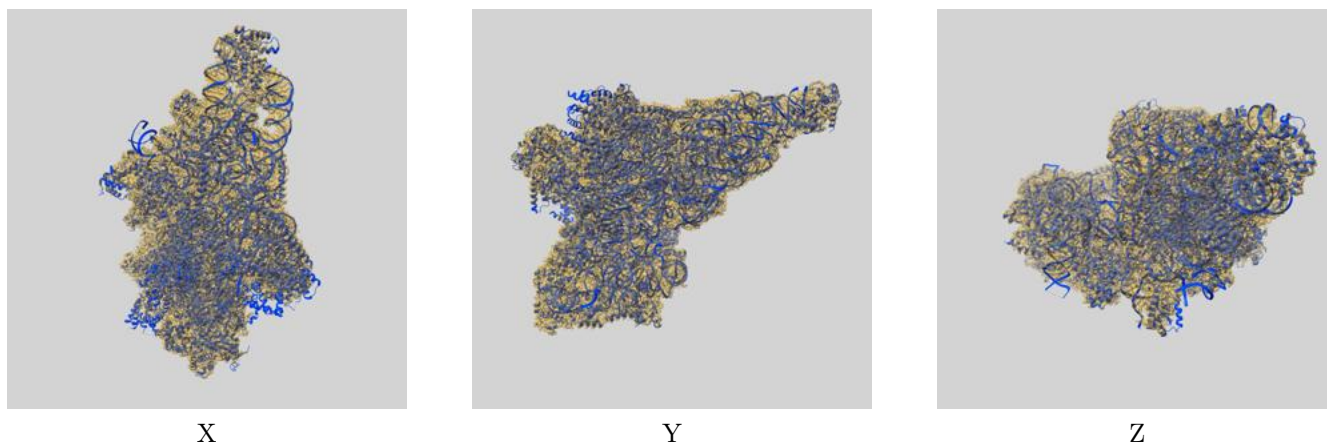
The images above show the 3D surface view of the map at the recommended contour level 0.05 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



X            Y            Z
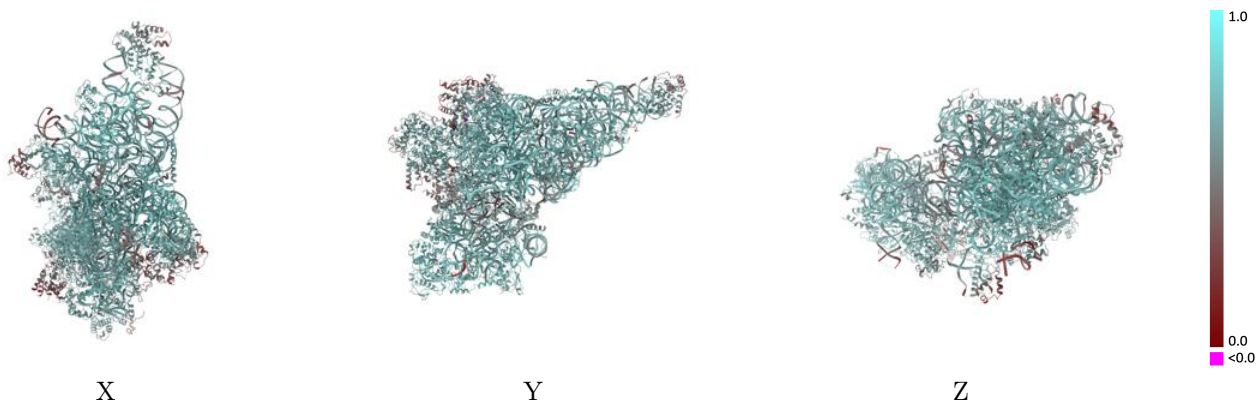
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
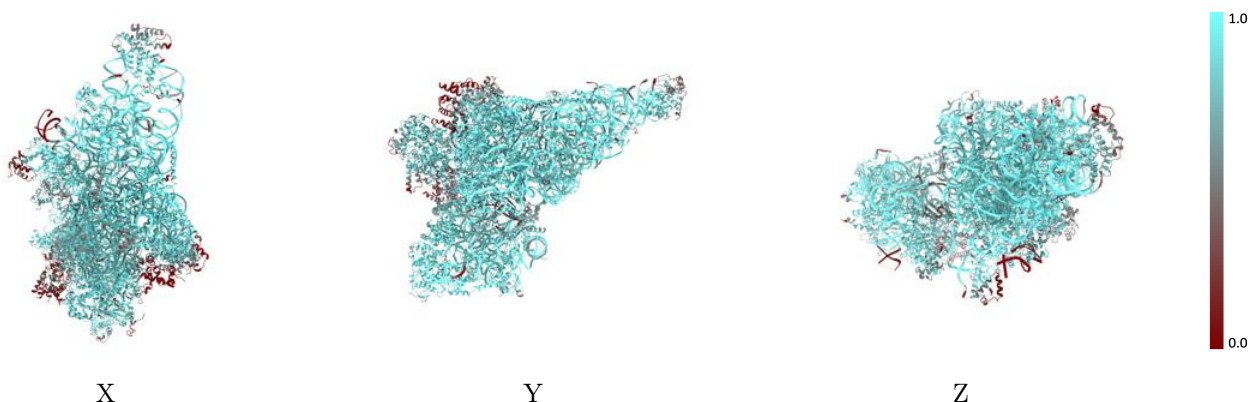
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.05).

## 9.4   Atom inclusion ⓘ
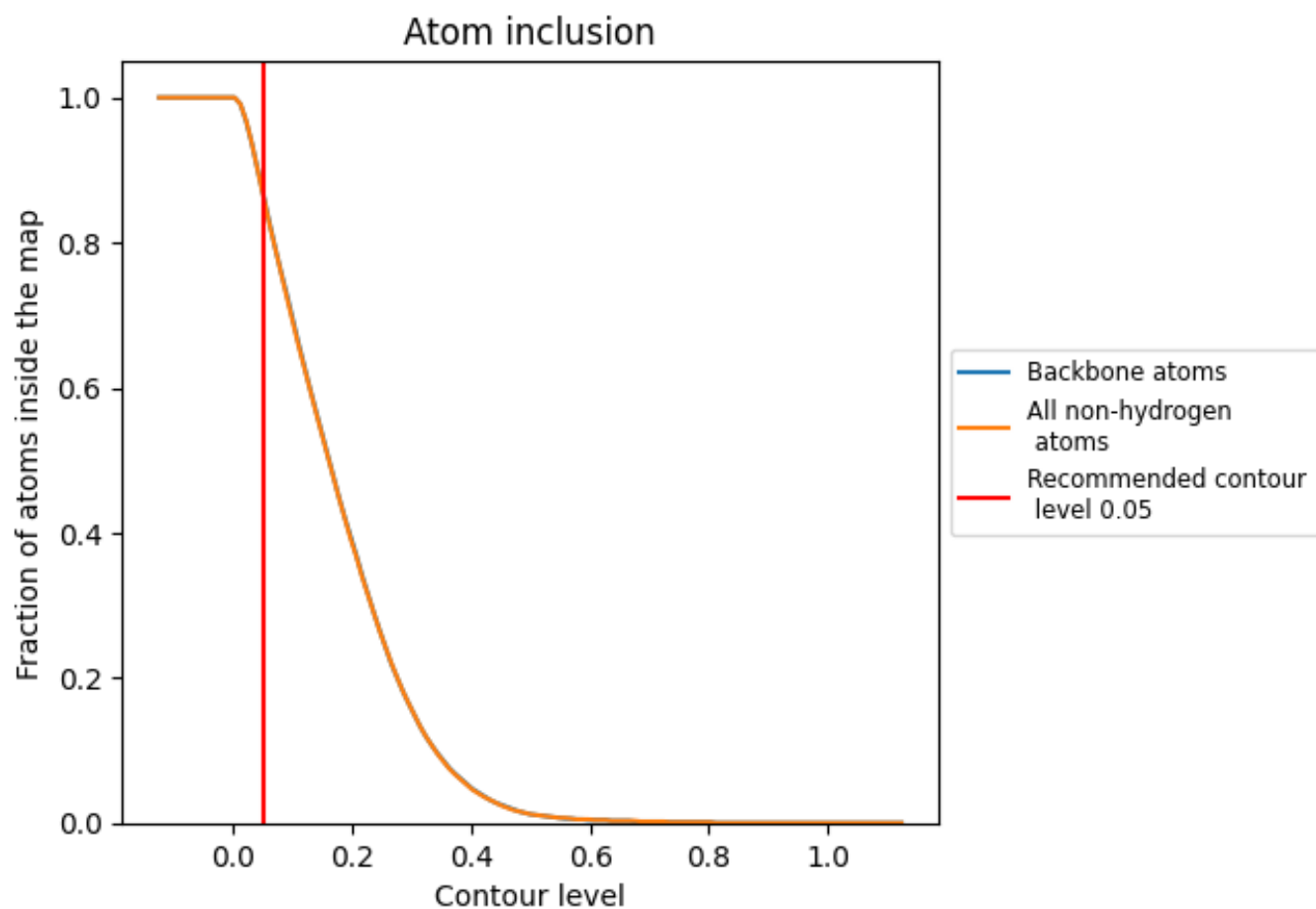


At the recommended contour level, 87% of all backbone atoms, 86% of all non-hydrogen atoms, are inside the map.

## 9.5    Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.05) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|:-----:|:--------------:|:-------:|
| All | 0.8650 | 0.6540 |
| 1 | 0.8440 | 0.6710 |
| 2 | 0.9240 | 0.6840 |
| 3 | 0.8870 | 0.6630 |
| 4 | 0.7350 | 0.5700 |
| 5 | 0.7020 | 0.5420 |
| 6 | 0.9040 | 0.6740 |
| 8 | 0.6950 | 0.6370 |
| A | 0.6350 | 0.5690 |
| B | 0.7950 | 0.6580 |
| C | 0.7170 | 0.5860 |
| D | 0.8290 | 0.6520 |
| E | 0.9350 | 0.7060 |
| F | 0.9010 | 0.6680 |
| G | 0.7440 | 0.6060 |
| H | 0.9790 | 0.7530 |
| I | 0.9000 | 0.6840 |
| J | 0.9080 | 0.7040 |
| K | 0.8560 | 0.6370 |
| L | 0.9780 | 0.7230 |
| M | 0.9440 | 0.6990 |
| N | 0.9670 | 0.7300 |
| O | 0.8990 | 0.6970 |
| P | 0.9440 | 0.7150 |
| Q | 0.6910 | 0.5710 |
| R | 0.8940 | 0.6750 |
| S | 0.8920 | 0.6660 |
| T | 0.8470 | 0.6420 |
| U | 0.9310 | 0.7010 |
| V | 0.7770 | 0.6240 |
| W | 0.9300 | 0.6990 |
| X | 0.9020 | 0.6650 |
| Y | 0.8400 | 0.6450 |
| Z | 0.7920 | 0.6070 |
| r | 0.9330 | 0.6610 |

1.0

0.0
<0.0