



## wwPDB EM Validation Summary Report ⓘ

Mar 10, 2026 – 08:48 AM UTC

PDB ID : 3JD5 / pdb\_00003jd5  
EMDB ID : EMD-5941  
Title : Cryo-EM structure of the small subunit of the mammalian mitochondrial ribosome  
Authors : Kaushal, P.S.; Sharma, M.R.; Booth, T.M.; Haque, E.M.; Tung, C.S.; Sanbonmatsu, K.Y.; Spremulli, L.L.; Agrawal, R.K.  
Deposited on : 2016-04-08  
Resolution : 7.00 Å (reported)  
Based on initial models : 5AJ3, 3J9M

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

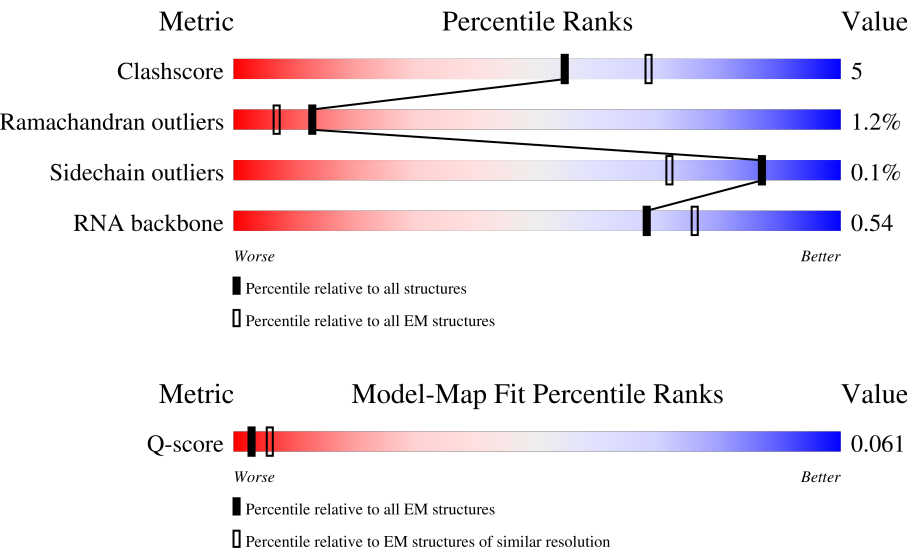
EMDB validation analysis : 0.0.1.dev132  
MolProbity : 4-5-2 with Phenix2.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:  
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 7.00 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<br>(#Entries) | EM structures<br>(#Entries) | Similar EM resolution<br>(#Entries, resolution range(Å)) |
|-----------------------|-----------------------------|-----------------------------|----------------------------------------------------------|
| Clashscore            | 229148                      | 23984                       | -                                                        |
| Ramachandran outliers | 224038                      | 23583                       | -                                                        |
| Sidechain outliers    | 223484                      | 23102                       | -                                                        |
| RNA backbone          | 8273                        | 3508                        | -                                                        |
| Q-score               | -                           | 25397                       | 483 ( 6.50 - 7.50 )                                      |

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  $\geq 3$ , 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  $\leq 5\%$ . 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     | 955    | <div><div>10%</div><div>62%</div><div>33%</div><div>5%</div></div>  |
| 2   | B     | 293    | <div><div>10%</div><div>64%</div><div>10%</div><div>26%</div></div> |
| 3   | C     | 167    | <div><div>16%</div><div>64%</div><div>15%</div><div>21%</div></div> |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 4   | E     | 430    |                  |
| 5   | F     | 124    |                  |
| 6   | G     | 242    |                  |
| 7   | I     | 396    |                  |
| 8   | J     | 201    |                  |
| 9   | K     | 197    |                  |
| 10  | L     | 139    |                  |
| 11  | N     | 128    |                  |
| 12  | O     | 256    |                  |
| 13  | P     | 135    |                  |
| 14  | Q     | 130    |                  |
| 15  | R     | 143    |                  |
| 16  | U     | 87     |                  |
| 17  | a     | 359    |                  |
| 18  | b     | 190    |                  |
| 19  | c     | 173    |                  |
| 20  | d     | 205    |                  |
| 21  | e     | 415    |                  |
| 22  | f     | 189    |                  |
| 23  | g     | 397    |                  |
| 24  | h     | 386    |                  |
| 25  | i     | 106    |                  |
| 26  | j     | 218    |                  |
| 27  | k     | 325    |                  |
| 28  | m     | 118    |                  |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 29  | n     | 199    |                  |
| 30  | o     | 575    |                  |
| 31  | p     | 258    |                  |
| 32  | s     | 17     |                  |
| 32  | z     | 17     |                  |

## 2 Entry composition

There are 32 unique types of molecules in this entry. The entry contains 64319 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 RNA chain called 28S ribosomal RNA, mitochondrial.

| Mol | Chain | Residues | Atoms |      |      |      |     | AltConf | Trace |
|-----|-------|----------|-------|------|------|------|-----|---------|-------|
| 1   | A     | 952      | Total | C    | N    | O    | P   | 0       | 0     |
|     |       |          | 20256 | 9090 | 3685 | 6529 | 952 |         |       |

- Molecule 2 is a protein called 28S ribosomal protein S2, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 2   | B     | 217      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 1726  | 1102 | 319 | 298 | 7 |         |       |

- Molecule 3 is a protein called 28S ribosomal protein S24, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 3   | C     | 132      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1072  | 692 | 197 | 179 | 4 |         |       |

- Molecule 4 is a protein called 28S ribosomal protein S5, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 4   | E     | 328      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 2613  | 1634 | 494 | 474 | 11 |         |       |

- Molecule 5 is a protein called 28S ribosomal protein S6, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 5   | F     | 124      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 991   | 627 | 179 | 179 | 6 |         |       |

- Molecule 6 is a protein called 28S ribosomal protein S7, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 6   | G     | 208      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 1720  | 1093 | 313 | 301 | 13 |         |       |

- Molecule 7 is a protein called 28S ribosomal protein S9, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 7   | I     | 311      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 2541  | 1608 | 454 | 467 | 12 |         |       |

- Molecule 8 is a protein called 28S ribosomal protein S10, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 8   | J     | 128      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1049  | 676 | 180 | 190 | 3 |         |       |

- Molecule 9 is a protein called 28S ribosomal protein S11, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 9   | K     | 136      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1001  | 628 | 193 | 177 | 3 |         |       |

- Molecule 10 is a protein called 28S ribosomal protein S12, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 10  | L     | 109      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 853   | 534 | 175 | 140 | 4 |         |       |

- Molecule 11 is a protein called 28S ribosomal protein S14, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 11  | N     | 101      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 861   | 538 | 178 | 140 | 5 |         |       |

- Molecule 12 is a protein called 28S ribosomal protein S15, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 12  | O     | 173      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1421  | 904 | 258 | 250 | 9 |         |       |

- Molecule 13 is a protein called 28S ribosomal protein S16, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 13  | P     | 116      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 916   | 580 | 180 | 151 | 5 |         |       |

- Molecule 14 is a protein called 28S ribosomal protein S17, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 14  | Q     | 109      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 857   | 555 | 153 | 145 | 4 |         |       |

- Molecule 15 is a protein called 28S ribosomal protein S18c, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 15  | R     | 97       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 788   | 507 | 136 | 138 | 7 |         |       |

- Molecule 16 is a protein called 28S ribosomal protein S21, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 16  | U     | 86       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 737   | 457 | 148 | 124 | 8 |         |       |

- Molecule 17 is a protein called 28S ribosomal protein S22, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 17  | a     | 289      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 2356  | 1505 | 400 | 443 | 8 |         |       |

- Molecule 18 is a protein called 28S ribosomal protein S23, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 18  | b     | 135      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1108  | 717 | 195 | 194 | 2 |         |       |

- Molecule 19 is a protein called 28S ribosomal protein S25, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 19  | c     | 168      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1374  | 878 | 246 | 241 | 9 |         |       |

- Molecule 20 is a protein called 28S ribosomal protein S26, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 20  | d     | 176      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1463  | 899 | 290 | 272 | 2 |         |       |

- Molecule 21 is a protein called 28S ribosomal protein S27, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 21  | e     | 344      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 2822  | 1804 | 476 | 529 | 13 |         |       |

- Molecule 22 is a protein called 28S ribosomal protein S28, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 22  | f     | 98       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 775   | 493 | 135 | 143 | 4 |         |       |

- Molecule 23 is a protein called 28S ribosomal protein S29, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 23  | g     | 338      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 2754  | 1774 | 482 | 488 | 10 |         |       |

- Molecule 24 is a protein called 28S ribosomal protein S31, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 24  | h     | 103      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 871   | 566 | 141 | 161 | 3 |         |       |

- Molecule 25 is a protein called 28S ribosomal protein S33, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 25  | i     | 98       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 818   | 519 | 153 | 143 | 3 |         |       |

- Molecule 26 is a protein called 28S ribosomal protein S34, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 26  | j     | 213      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 1792  | 1132 | 346 | 309 | 5 |         |       |

- Molecule 27 is a protein called 28S ribosomal protein S35, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 27  | k     | 275      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 2227  | 1418 | 377 | 421 | 11 |         |       |

- Molecule 28 is a protein called Coiled-coil-helix-coiled-coil-helix domain containing 1.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 28  | m     | 118      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 945   | 587 | 185 | 164 | 9 |         |       |

- Molecule 29 is a protein called Aurora kinase A interacting protein 1.

| Mol | Chain | Residues | Atoms |     |     |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 29  | n     | 72       | Total | C   | N   | O  | S | 0       | 0     |
|     |       |          | 642   | 409 | 142 | 89 | 2 |         |       |

- Molecule 30 is a protein called Pentatricopeptide repeat domain-containing protein 3, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 30  | o     | 461      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 3273  | 2082 | 573 | 605 | 13 |         |       |

- Molecule 31 is a protein called 28S ribosomal protein S18b, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 31  | p     | 187      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1531  | 968 | 288 | 267 | 8 |         |       |

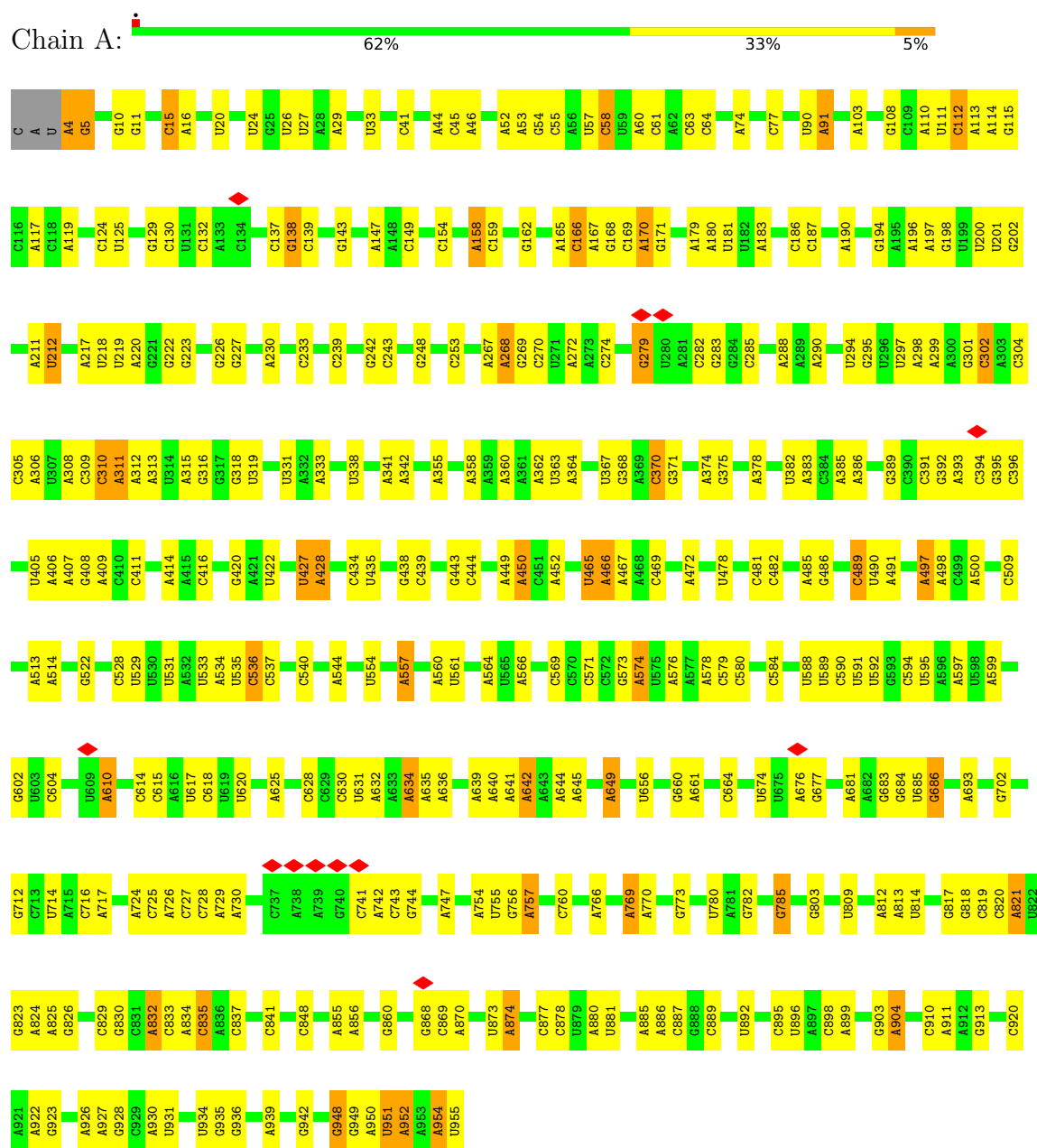
- Molecule 32 is a protein called unknown.

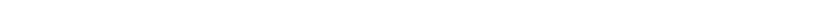
| Mol | Chain | Residues | Atoms |    |    |    | AltConf | Trace |
|-----|-------|----------|-------|----|----|----|---------|-------|
| 32  | s     | 16       | Total | C  | N  | O  | 0       | 0     |
|     |       |          | 80    | 48 | 16 | 16 |         |       |
| 32  | z     | 17       | Total | C  | N  | O  | 0       | 0     |
|     |       |          | 86    | 51 | 17 | 18 |         |       |

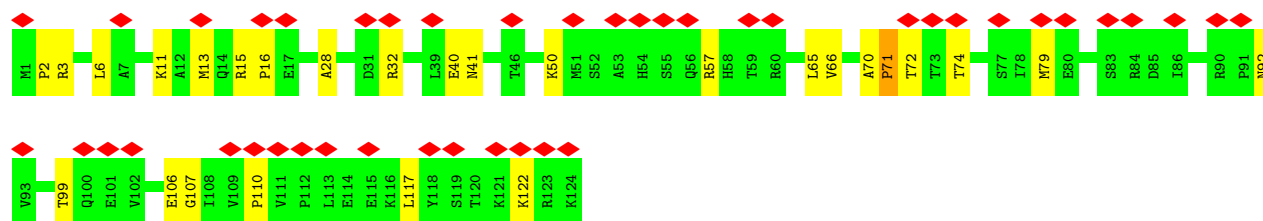
### 3 Residue-property plots

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: 28S ribosomal RNA, mitochondrial

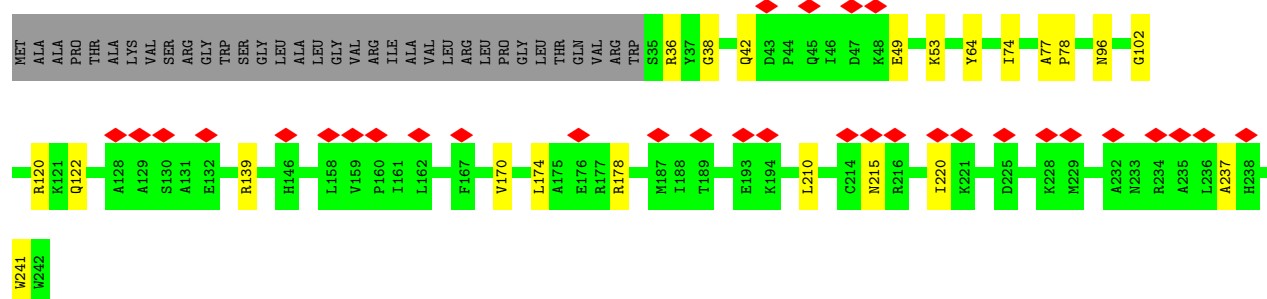


- Chain F:  35% 78% 21%



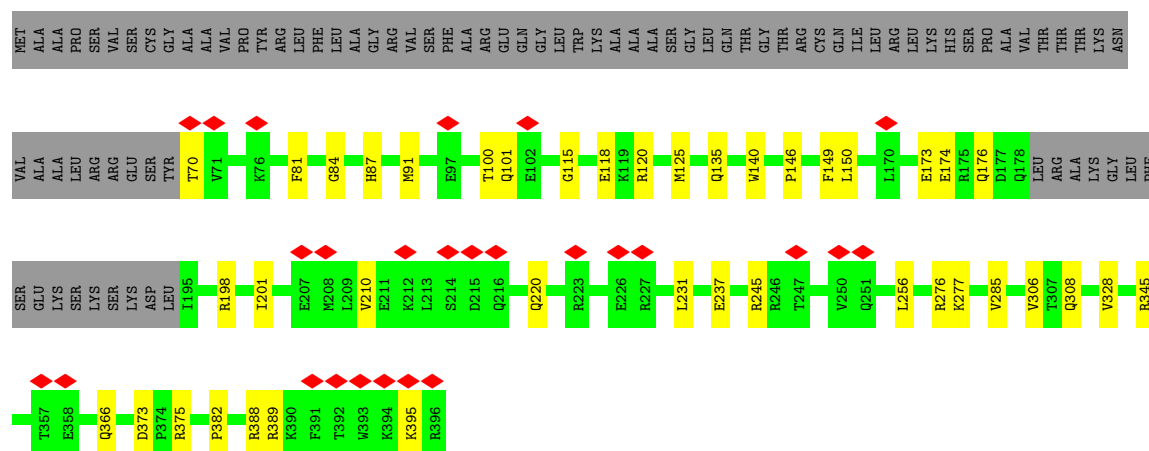
- Molecule 6: 28S ribosomal protein S7, mitochondrial

Chain G:



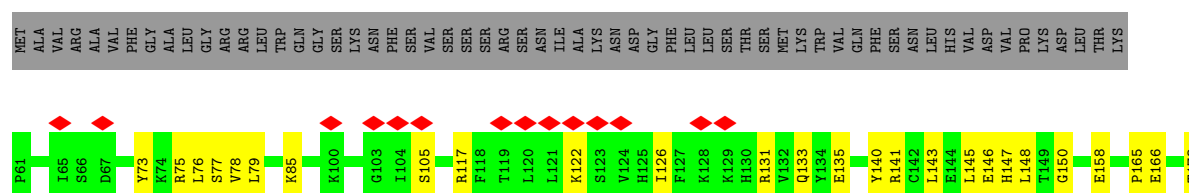
- Molecule 7: 28S ribosomal protein S9, mitochondrial

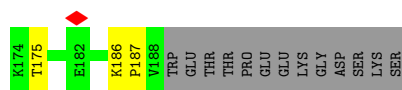
Chain I:



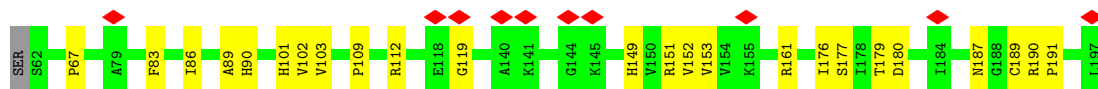
- Molecule 8: 28S ribosomal protein S10, mitochondrial

Chain J:

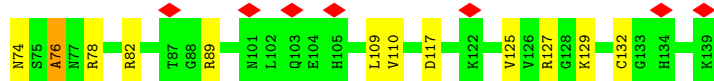
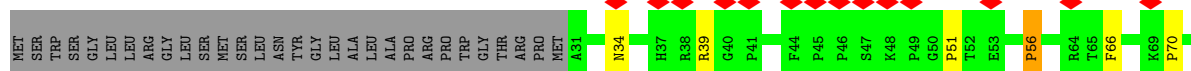




- Molecule 9: 28S ribosomal protein S11, mitochondrial



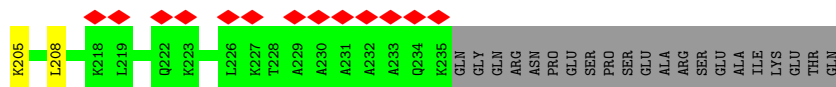
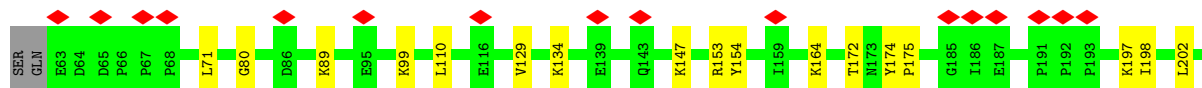
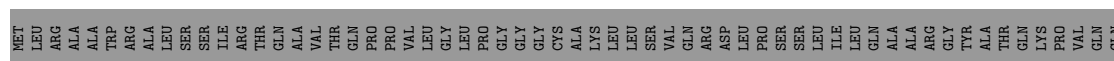
- Molecule 10: 28S ribosomal protein S12, mitochondrial



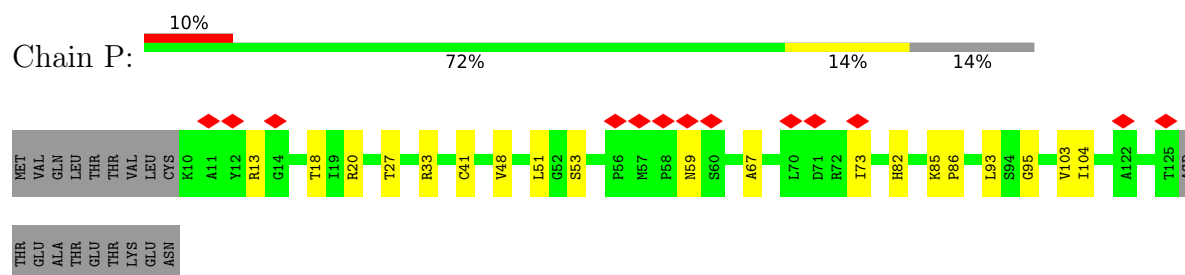
- Molecule 11: 28S ribosomal protein S14, mitochondrial



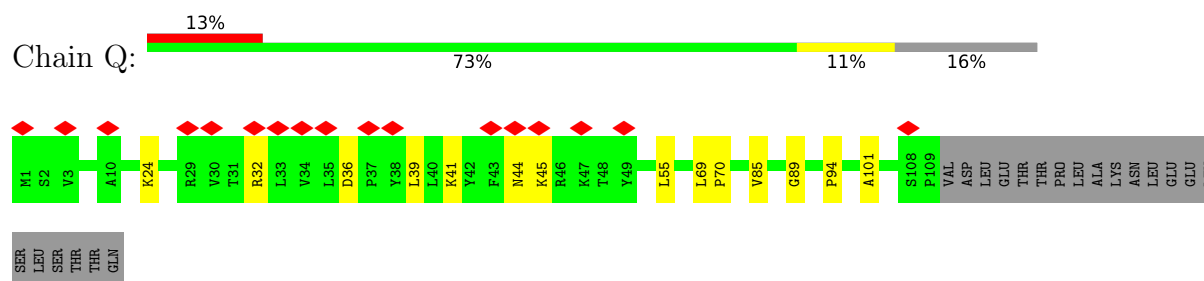
- Molecule 12: 28S ribosomal protein S15, mitochondrial



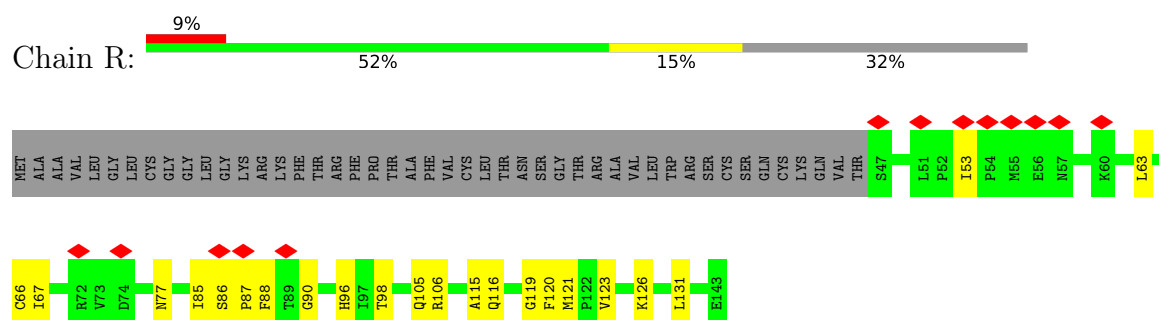
- Molecule 13: 28S ribosomal protein S16, mitochondrial



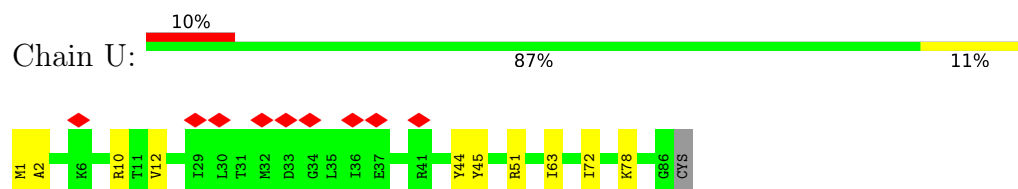
- Molecule 14: 28S ribosomal protein S17, mitochondrial



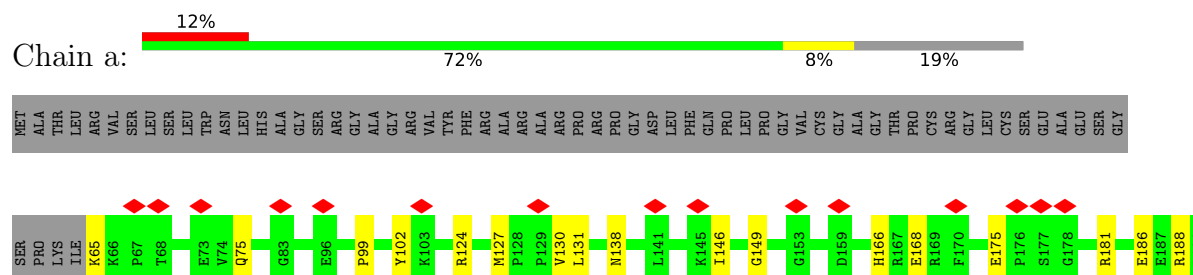
- Molecule 15: 28S ribosomal protein S18c, mitochondrial

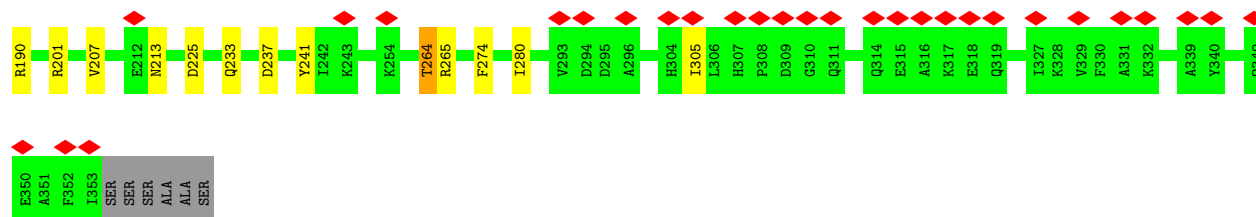


- Molecule 16: 28S ribosomal protein S21, mitochondrial



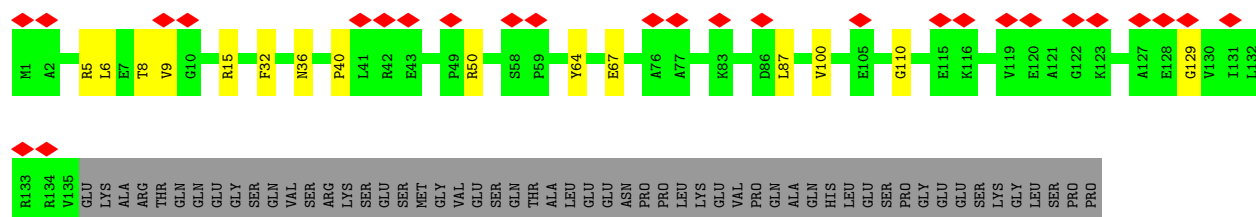
- Molecule 17: 28S ribosomal protein S22, mitochondrial





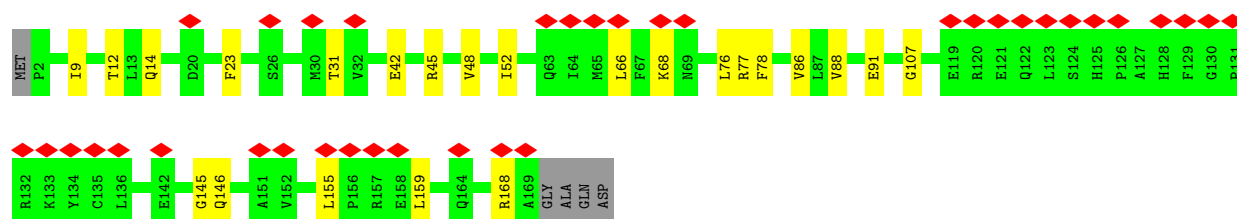
- Molecule 18: 28S ribosomal protein S23, mitochondrial

Chain b:



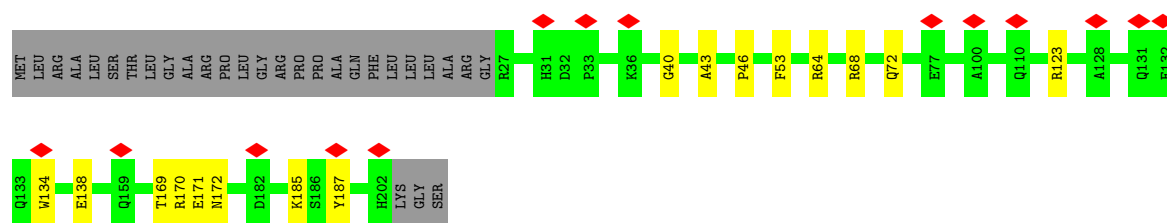
- Molecule 19: 28S ribosomal protein S25, mitochondrial

Chain c:



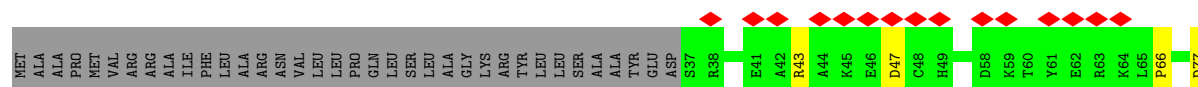
- Molecule 20: 28S ribosomal protein S26, mitochondrial

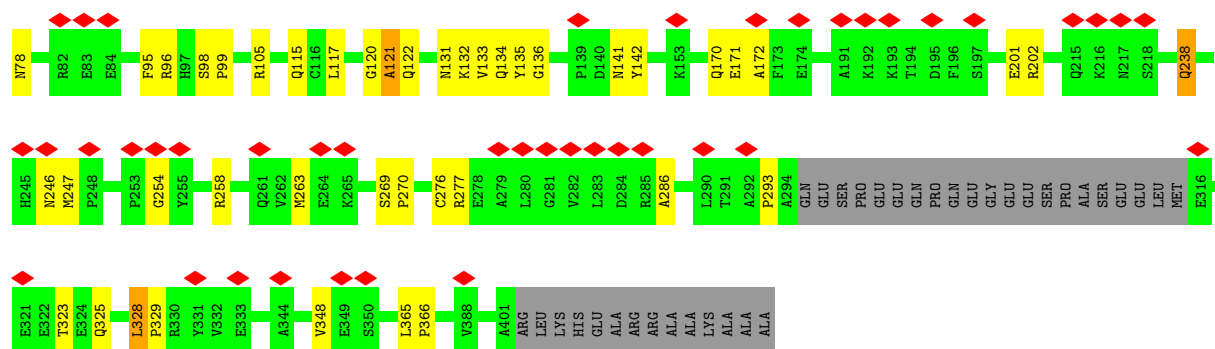
Chain d:



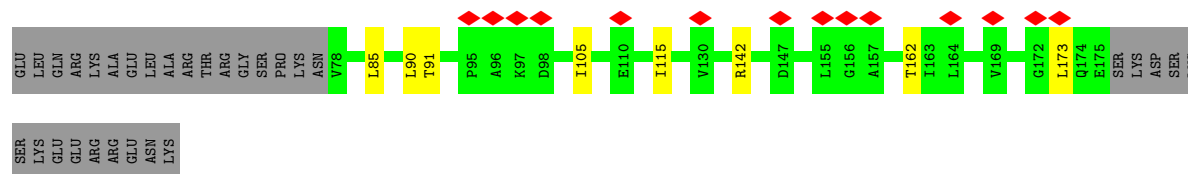
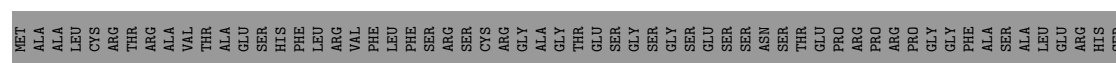
- Molecule 21: 28S ribosomal protein S27, mitochondrial

Chain e:

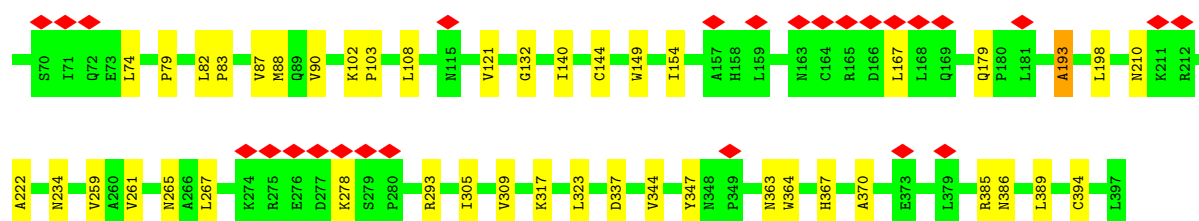
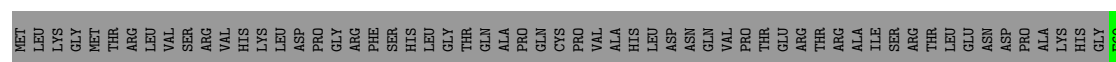
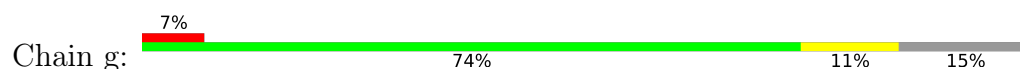




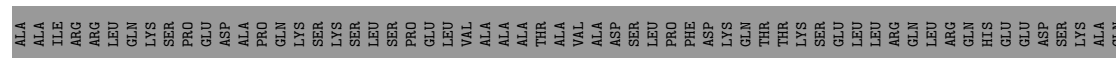
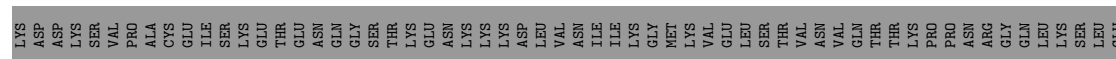
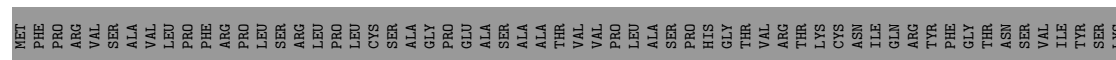
- Molecule 22: 28S ribosomal protein S28, mitochondrial

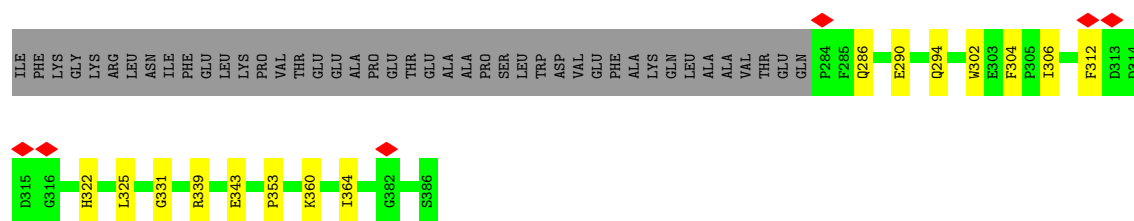


- Molecule 23: 28S ribosomal protein S29, mitochondrial

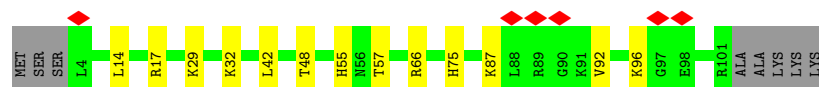
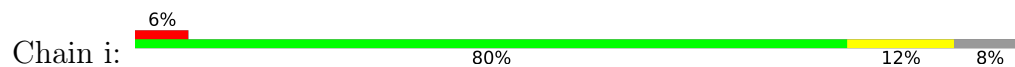


- Molecule 24: 28S ribosomal protein S31, mitochondrial

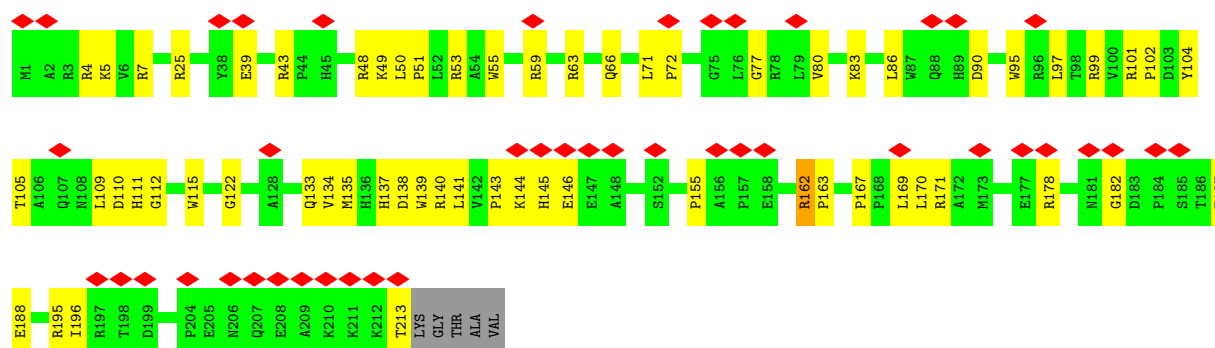




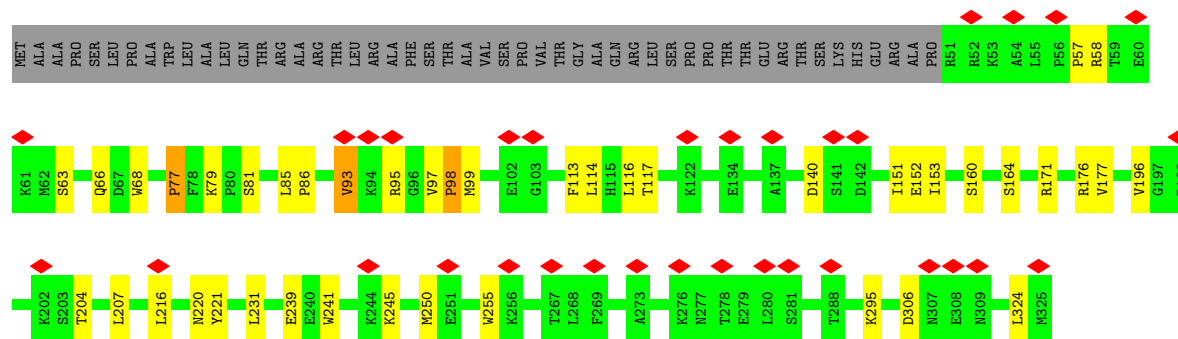
- Molecule 25: 28S ribosomal protein S33, mitochondrial



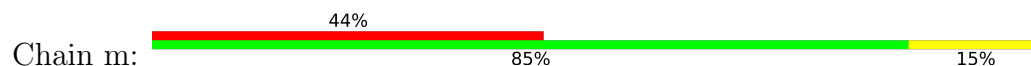
- Molecule 26: 28S ribosomal protein S34, mitochondrial

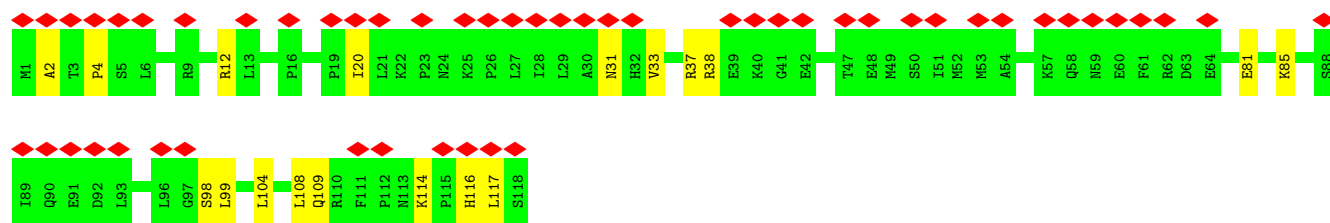


- Molecule 27: 28S ribosomal protein S35, mitochondrial

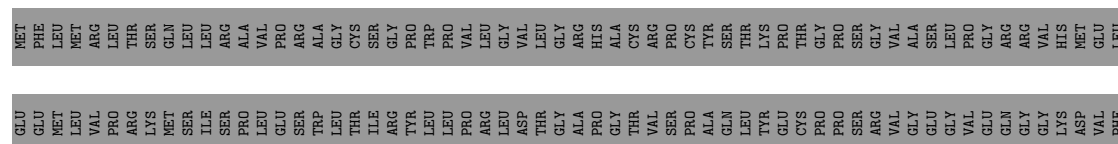


- Molecule 28: Coiled-coil-helix-coiled-coil-helix domain containing 1

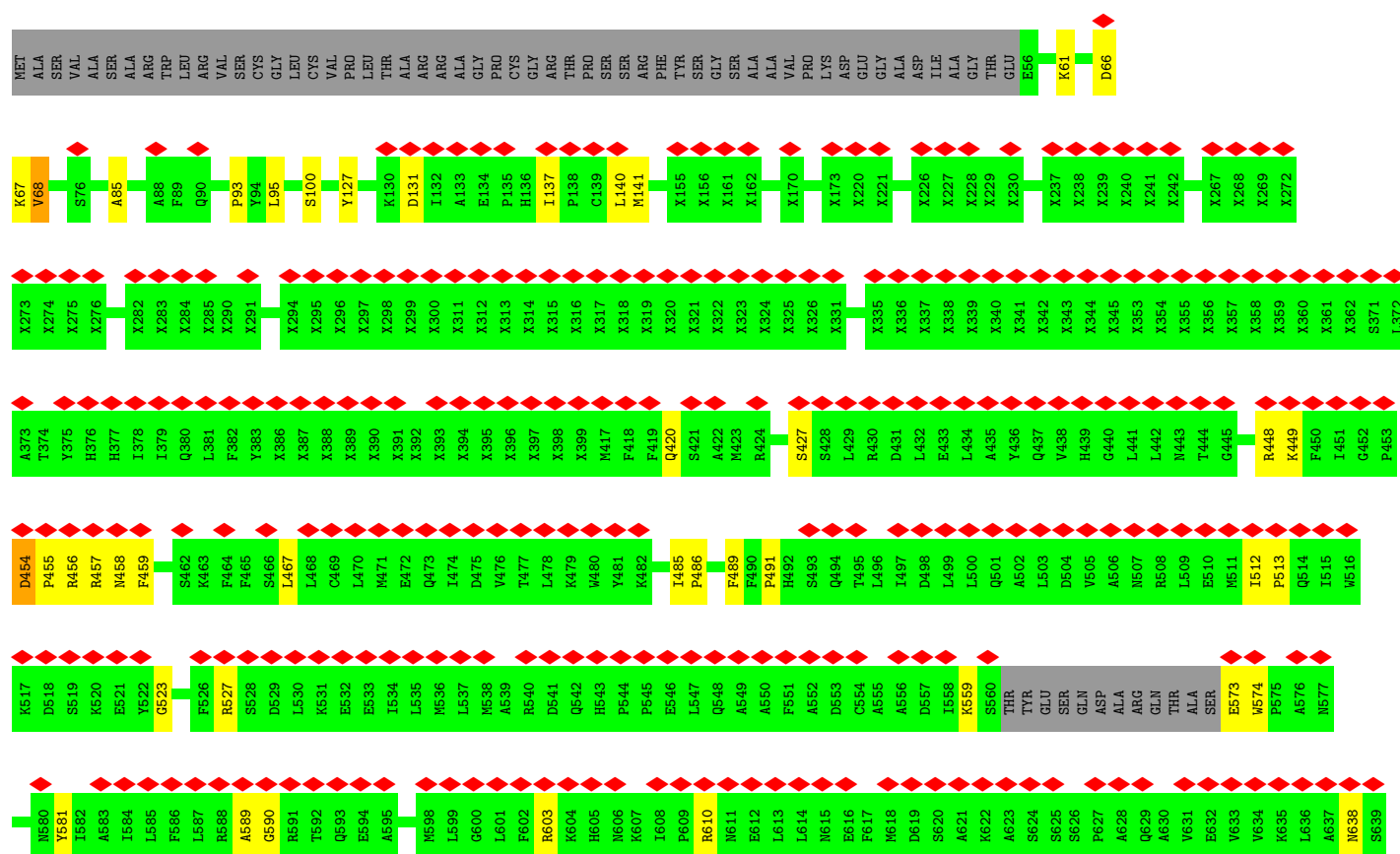
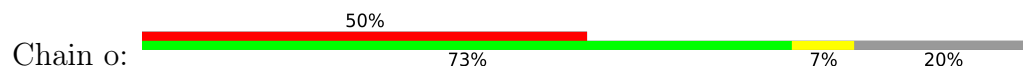


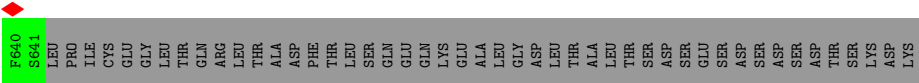


• Molecule 29: Aurora kinase A interacting protein 1

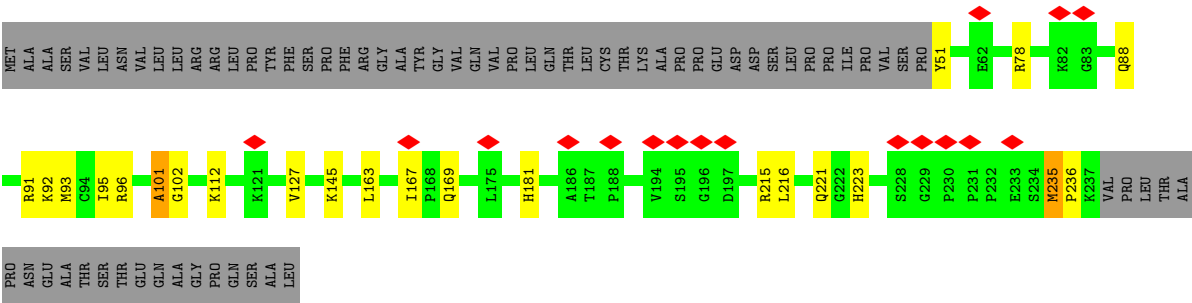


• Molecule 30: Pentatricopeptide repeat domain-containing protein 3, mitochondrial

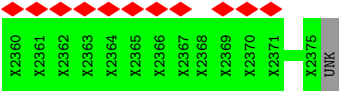
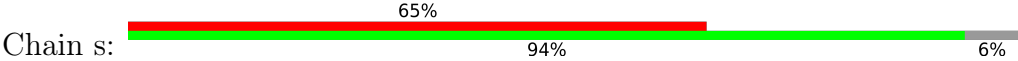




• Molecule 31: 28S ribosomal protein S18b, mitochondrial



• Molecule 32: unknown



• Molecule 32: unknown



## 4 Experimental information

| Property                             | Value                           | Source    |
|--------------------------------------|---------------------------------|-----------|
| EM reconstruction method             | SINGLE PARTICLE                 | Depositor |
| Imposed symmetry                     | POINT, C1                       | Depositor |
| Number of particles used             | 307556                          | Depositor |
| Resolution determination method      | Not provided                    |           |
| CTF correction method                | CTFFIND3                        | Depositor |
| Microscope                           | JEOL 3200FS                     | Depositor |
| Voltage (kV)                         | 300                             | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 9.0                             | Depositor |
| Minimum defocus (nm)                 | 1000                            | Depositor |
| Maximum defocus (nm)                 | 4500                            | Depositor |
| Magnification                        | 59717                           | Depositor |
| Image detector                       | GATAN ULTRASCAN 1000 (2k x 2k)  | Depositor |
| Maximum map value                    | 0.001                           | Depositor |
| Minimum map value                    | -0.000                          | Depositor |
| Average map value                    | 0.000                           | Depositor |
| Map value standard deviation         | 0.000                           | Depositor |
| Recommended contour level            | 0.00017                         | Depositor |
| Map size ( $\text{\AA}$ )            | 438.74997, 438.74997, 438.74997 | wwPDB     |
| Map dimensions                       | 375, 375, 375                   | wwPDB     |
| Map angles ( $^\circ$ )              | 90.0, 90.0, 90.0                | wwPDB     |
| Pixel spacing ( $\text{\AA}$ )       | 1.17, 1.17, 1.17                | Depositor |

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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     | 0.04         | 0/22681 | 0.07        | 0/35318 |
| 2   | B     | 0.09         | 0/1766  | 0.25        | 0/2392  |
| 3   | C     | 0.08         | 0/1100  | 0.24        | 0/1487  |
| 4   | E     | 0.09         | 0/2664  | 0.26        | 0/3578  |
| 5   | F     | 0.09         | 0/1009  | 0.24        | 0/1362  |
| 6   | G     | 0.08         | 0/1760  | 0.25        | 0/2366  |
| 7   | I     | 0.08         | 0/2598  | 0.24        | 0/3490  |
| 8   | J     | 0.08         | 0/1071  | 0.23        | 0/1447  |
| 9   | K     | 0.09         | 0/1021  | 0.26        | 0/1380  |
| 10  | L     | 0.08         | 0/872   | 0.26        | 0/1171  |
| 11  | N     | 0.09         | 0/878   | 0.28        | 0/1179  |
| 12  | O     | 0.06         | 0/1443  | 0.20        | 0/1927  |
| 13  | P     | 0.08         | 0/937   | 0.26        | 0/1262  |
| 14  | Q     | 0.07         | 0/874   | 0.22        | 0/1183  |
| 15  | R     | 0.08         | 0/805   | 0.24        | 0/1082  |
| 16  | U     | 0.08         | 0/748   | 0.26        | 0/995   |
| 17  | a     | 0.07         | 0/2403  | 0.23        | 0/3246  |
| 18  | b     | 0.08         | 0/1135  | 0.26        | 0/1528  |
| 19  | c     | 0.08         | 0/1406  | 0.24        | 0/1894  |
| 20  | d     | 0.08         | 0/1489  | 0.25        | 0/2008  |
| 21  | e     | 0.08         | 0/2881  | 0.25        | 0/3893  |
| 22  | f     | 0.07         | 0/787   | 0.22        | 0/1059  |
| 23  | g     | 0.08         | 0/2819  | 0.24        | 0/3814  |
| 24  | h     | 0.09         | 0/899   | 0.20        | 0/1209  |
| 25  | i     | 0.07         | 0/834   | 0.24        | 0/1112  |
| 26  | j     | 0.10         | 0/1841  | 0.30        | 0/2493  |
| 27  | k     | 0.07         | 0/2275  | 0.21        | 0/3075  |
| 28  | m     | 0.10         | 0/961   | 0.30        | 0/1284  |
| 29  | n     | 0.10         | 0/654   | 0.34        | 0/862   |
| 30  | o     | 0.09         | 0/2605  | 0.25        | 0/3526  |
| 31  | p     | 0.08         | 0/1583  | 0.25        | 0/2149  |
| All | All   | 0.07         | 0/66799 | 0.20        | 0/94771 |

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     | 20256 | 0        | 10258    | 176     | 0            |
| 2   | B     | 1726  | 0        | 1747     | 18      | 0            |
| 3   | C     | 1072  | 0        | 1091     | 19      | 0            |
| 4   | E     | 2613  | 0        | 2638     | 37      | 0            |
| 5   | F     | 991   | 0        | 1034     | 17      | 0            |
| 6   | G     | 1720  | 0        | 1751     | 16      | 0            |
| 7   | I     | 2541  | 0        | 2499     | 33      | 0            |
| 8   | J     | 1049  | 0        | 1088     | 17      | 0            |
| 9   | K     | 1001  | 0        | 1041     | 15      | 0            |
| 10  | L     | 853   | 0        | 904      | 11      | 0            |
| 11  | N     | 861   | 0        | 890      | 17      | 0            |
| 12  | O     | 1421  | 0        | 1526     | 15      | 0            |
| 13  | P     | 916   | 0        | 944      | 12      | 0            |
| 14  | Q     | 857   | 0        | 920      | 9       | 0            |
| 15  | R     | 788   | 0        | 823      | 20      | 0            |
| 16  | U     | 737   | 0        | 759      | 9       | 0            |
| 17  | a     | 2356  | 0        | 2371     | 19      | 0            |
| 18  | b     | 1108  | 0        | 1124     | 9       | 0            |
| 19  | c     | 1374  | 0        | 1395     | 14      | 0            |
| 20  | d     | 1463  | 0        | 1438     | 15      | 0            |
| 21  | e     | 2822  | 0        | 2816     | 26      | 0            |
| 22  | f     | 775   | 0        | 793      | 6       | 0            |
| 23  | g     | 2754  | 0        | 2793     | 26      | 0            |
| 24  | h     | 871   | 0        | 814      | 8       | 0            |
| 25  | i     | 818   | 0        | 845      | 9       | 0            |
| 26  | j     | 1792  | 0        | 1810     | 44      | 0            |
| 27  | k     | 2227  | 0        | 2267     | 28      | 0            |
| 28  | m     | 945   | 0        | 984      | 13      | 0            |
| 29  | n     | 642   | 0        | 718      | 7       | 0            |
| 30  | o     | 3273  | 0        | 2695     | 22      | 0            |
| 31  | p     | 1531  | 0        | 1495     | 20      | 0            |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 32  | s     | 80    | 0        | 18       | 0       | 0            |
| 32  | z     | 86    | 0        | 19       | 0       | 0            |
| All | All   | 64319 | 0        | 54308    | 546     | 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 5.

The worst 5 of 546 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) |
|-------------------|------------------|--------------------------|-------------------|
| 1:A:29:A:H61      | 1:A:270:C:H42    | 1.41                     | 0.67              |
| 17:a:175:GLU:OE2  | 17:a:181:ARG:NH1 | 2.30                     | 0.64              |
| 23:g:347:TYR:HB2  | 23:g:385:ARG:HB2 | 1.79                     | 0.64              |
| 8:J:76:LEU:HB2    | 8:J:145:LEU:HB2  | 1.79                     | 0.64              |
| 15:R:116:GLN:HE21 | 15:R:121:MET:HE3 | 1.62                     | 0.64              |

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 |    |
|-----|-------|---------------|-----------|----------|----------|-------------|----|
| 2   | B     | 215/293 (73%) | 197 (92%) | 17 (8%)  | 1 (0%)   | 24          | 63 |
| 3   | C     | 130/167 (78%) | 108 (83%) | 19 (15%) | 3 (2%)   | 5           | 28 |
| 4   | E     | 326/430 (76%) | 280 (86%) | 43 (13%) | 3 (1%)   | 14          | 51 |
| 5   | F     | 122/124 (98%) | 106 (87%) | 14 (12%) | 2 (2%)   | 7           | 38 |
| 6   | G     | 206/242 (85%) | 188 (91%) | 17 (8%)  | 1 (0%)   | 24          | 63 |
| 7   | I     | 309/396 (78%) | 277 (90%) | 31 (10%) | 1 (0%)   | 36          | 72 |
| 8   | J     | 126/201 (63%) | 105 (83%) | 19 (15%) | 2 (2%)   | 7           | 38 |
| 9   | K     | 134/197 (68%) | 119 (89%) | 14 (10%) | 1 (1%)   | 18          | 56 |

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| Mol | Chain | Analysed        | Favoured   | Allowed   | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|-----------|----------|-------------|-----|
| 10  | L     | 107/139 (77%)   | 86 (80%)   | 18 (17%)  | 3 (3%)   | 4           | 24  |
| 11  | N     | 99/128 (77%)    | 89 (90%)   | 9 (9%)    | 1 (1%)   | 12          | 48  |
| 12  | O     | 171/256 (67%)   | 158 (92%)  | 12 (7%)   | 1 (1%)   | 21          | 59  |
| 13  | P     | 114/135 (84%)   | 101 (89%)  | 11 (10%)  | 2 (2%)   | 6           | 34  |
| 14  | Q     | 107/130 (82%)   | 92 (86%)   | 14 (13%)  | 1 (1%)   | 14          | 51  |
| 15  | R     | 95/143 (66%)    | 85 (90%)   | 9 (10%)   | 1 (1%)   | 11          | 46  |
| 16  | U     | 84/87 (97%)     | 80 (95%)   | 4 (5%)    | 0        | 100         | 100 |
| 17  | a     | 287/359 (80%)   | 260 (91%)  | 27 (9%)   | 0        | 100         | 100 |
| 18  | b     | 133/190 (70%)   | 120 (90%)  | 10 (8%)   | 3 (2%)   | 5           | 28  |
| 19  | c     | 166/173 (96%)   | 148 (89%)  | 16 (10%)  | 2 (1%)   | 10          | 44  |
| 20  | d     | 174/205 (85%)   | 166 (95%)  | 8 (5%)    | 0        | 100         | 100 |
| 21  | e     | 340/415 (82%)   | 287 (84%)  | 46 (14%)  | 7 (2%)   | 5           | 30  |
| 22  | f     | 96/189 (51%)    | 93 (97%)   | 3 (3%)    | 0        | 100         | 100 |
| 23  | g     | 334/397 (84%)   | 302 (90%)  | 29 (9%)   | 3 (1%)   | 14          | 51  |
| 24  | h     | 101/386 (26%)   | 90 (89%)   | 9 (9%)    | 2 (2%)   | 6           | 31  |
| 25  | i     | 96/106 (91%)    | 89 (93%)   | 6 (6%)    | 1 (1%)   | 12          | 48  |
| 26  | j     | 211/218 (97%)   | 173 (82%)  | 33 (16%)  | 5 (2%)   | 4           | 27  |
| 27  | k     | 273/325 (84%)   | 243 (89%)  | 26 (10%)  | 4 (2%)   | 8           | 40  |
| 28  | m     | 116/118 (98%)   | 94 (81%)   | 22 (19%)  | 0        | 100         | 100 |
| 29  | n     | 70/199 (35%)    | 66 (94%)   | 2 (3%)    | 2 (3%)   | 3           | 23  |
| 30  | o     | 306/575 (53%)   | 273 (89%)  | 24 (8%)   | 9 (3%)   | 3           | 23  |
| 31  | p     | 185/258 (72%)   | 154 (83%)  | 29 (16%)  | 2 (1%)   | 11          | 46  |
| All | All   | 5233/7181 (73%) | 4629 (88%) | 541 (10%) | 63 (1%)  | 13          | 44  |

5 of 63 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 11  | N     | 97  | PRO  |
| 5   | F     | 71  | PRO  |
| 5   | F     | 110 | PRO  |
| 6   | G     | 102 | GLY  |
| 10  | L     | 56  | PRO  |

### 5.3.2 Protein sidechains ⓘ

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

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

| Mol | Chain | Analysed       | Rotameric  | Outliers | Percentiles |     |
|-----|-------|----------------|------------|----------|-------------|-----|
| 2   | B     | 186/230 (81%)  | 186 (100%) | 0        | 100         | 100 |
| 3   | C     | 113/142 (80%)  | 113 (100%) | 0        | 100         | 100 |
| 4   | E     | 273/346 (79%)  | 272 (100%) | 1 (0%)   | 84          | 84  |
| 5   | F     | 109/109 (100%) | 109 (100%) | 0        | 100         | 100 |
| 6   | G     | 183/208 (88%)  | 183 (100%) | 0        | 100         | 100 |
| 7   | I     | 267/333 (80%)  | 266 (100%) | 1 (0%)   | 84          | 84  |
| 8   | J     | 118/182 (65%)  | 117 (99%)  | 1 (1%)   | 73          | 80  |
| 9   | K     | 102/151 (68%)  | 102 (100%) | 0        | 100         | 100 |
| 10  | L     | 94/118 (80%)   | 94 (100%)  | 0        | 100         | 100 |
| 11  | N     | 91/113 (80%)   | 91 (100%)  | 0        | 100         | 100 |
| 12  | O     | 159/226 (70%)  | 159 (100%) | 0        | 100         | 100 |
| 13  | P     | 95/113 (84%)   | 95 (100%)  | 0        | 100         | 100 |
| 14  | Q     | 95/115 (83%)   | 95 (100%)  | 0        | 100         | 100 |
| 15  | R     | 89/126 (71%)   | 89 (100%)  | 0        | 100         | 100 |
| 16  | U     | 77/78 (99%)    | 77 (100%)  | 0        | 100         | 100 |
| 17  | a     | 255/307 (83%)  | 254 (100%) | 1 (0%)   | 84          | 84  |
| 18  | b     | 115/163 (71%)  | 115 (100%) | 0        | 100         | 100 |
| 19  | c     | 152/155 (98%)  | 152 (100%) | 0        | 100         | 100 |
| 20  | d     | 147/168 (88%)  | 147 (100%) | 0        | 100         | 100 |
| 21  | e     | 307/362 (85%)  | 307 (100%) | 0        | 100         | 100 |
| 22  | f     | 85/160 (53%)   | 85 (100%)  | 0        | 100         | 100 |
| 23  | g     | 301/352 (86%)  | 301 (100%) | 0        | 100         | 100 |
| 24  | h     | 94/341 (28%)   | 94 (100%)  | 0        | 100         | 100 |
| 25  | i     | 88/94 (94%)    | 88 (100%)  | 0        | 100         | 100 |
| 26  | j     | 190/193 (98%)  | 190 (100%) | 0        | 100         | 100 |
| 27  | k     | 252/292 (86%)  | 250 (99%)  | 2 (1%)   | 73          | 80  |

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| Mol | Chain | Analysed        | Rotameric   | Outliers | Percentiles |     |
|-----|-------|-----------------|-------------|----------|-------------|-----|
| 28  | m     | 102/102 (100%)  | 102 (100%)  | 0        | 100         | 100 |
| 29  | n     | 66/173 (38%)    | 66 (100%)   | 0        | 100         | 100 |
| 30  | o     | 277/369 (75%)   | 277 (100%)  | 0        | 100         | 100 |
| 31  | p     | 166/226 (74%)   | 166 (100%)  | 0        | 100         | 100 |
| All | All   | 4648/6047 (77%) | 4642 (100%) | 6 (0%)   | 87          | 89  |

5 of 6 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 17  | a     | 264 | THR  |
| 27  | k     | 97  | VAL  |
| 27  | k     | 204 | THR  |
| 7   | I     | 256 | LEU  |
| 4   | E     | 375 | GLU  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 110 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 17  | a     | 138 | ASN  |
| 21  | e     | 384 | HIS  |
| 31  | p     | 223 | HIS  |
| 29  | n     | 140 | HIS  |
| 17  | a     | 276 | ASN  |

### 5.3.3 RNA ⓘ

| Mol | Chain | Analysed      | Backbone Outliers | Pucker Outliers |
|-----|-------|---------------|-------------------|-----------------|
| 1   | A     | 952/955 (99%) | 170 (17%)         | 3 (0%)          |

5 of 170 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 5   | G    |
| 1   | A     | 10  | G    |
| 1   | A     | 16  | A    |
| 1   | A     | 24  | U    |
| 1   | A     | 33  | U    |

All (3) RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 4   | A    |
| 1   | A     | 15  | C    |
| 1   | A     | 363 | U    |

## 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](#)

The following chains have linkage breaks:

| Mol | Chain | Number of breaks |
|-----|-------|------------------|
| 30  | o     | 13               |
| 21  | e     | 1                |
| 23  | g     | 1                |

The worst 5 of 15 chain breaks are listed below:

| Model | Chain | Residue-1 | Atom-1 | Residue-2 | Atom-2 | Distance (Å) |
|-------|-------|-----------|--------|-----------|--------|--------------|
| 1     | o     | 383:TYR   | C      | 386:UNK   | N      | 27.66        |
| 1     | o     | 399:UNK   | C      | 417:MET   | N      | 21.54        |
| 1     | o     | 143:GLU   | C      | 145:UNK   | N      | 20.88        |
| 1     | e     | 291:THR   | C      | 292:ALA   | N      | 20.27        |
| 1     | g     | 69:ILE    | C      | 70:SER    | N      | 20.27        |

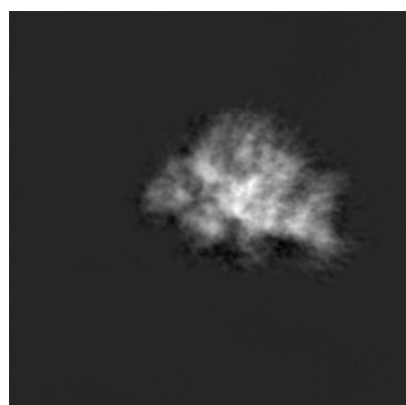
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-5941. These allow visual inspection of the internal detail of the map and identification of artifacts.

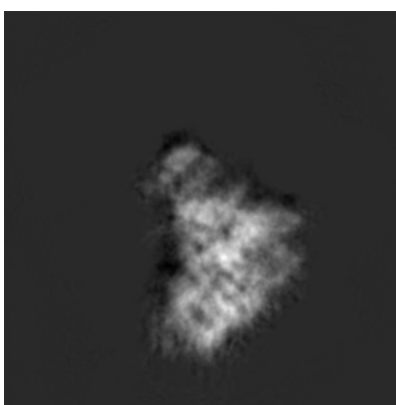
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

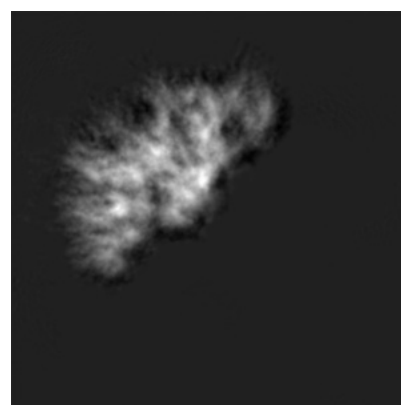
#### 6.1.1 Primary map



X



Y

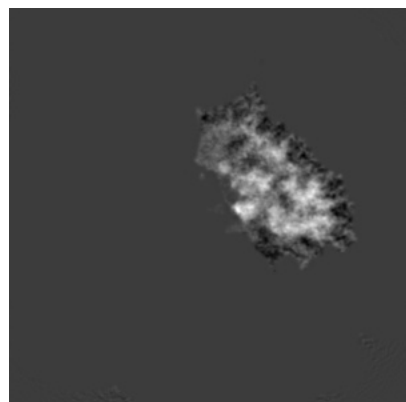


Z

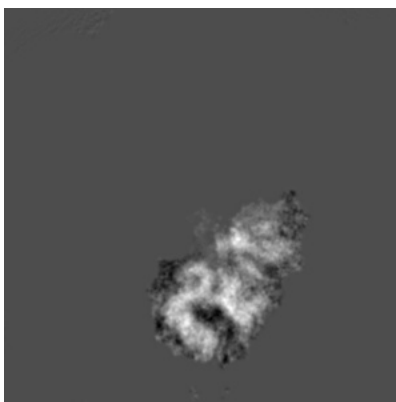
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

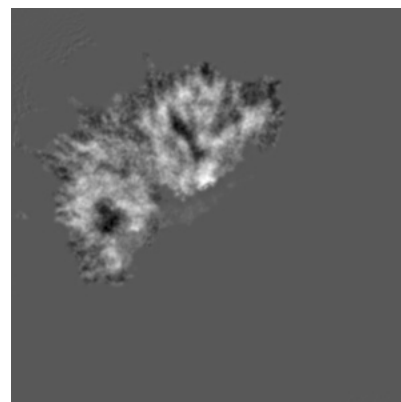
#### 6.2.1 Primary map



X Index: 187



Y Index: 187

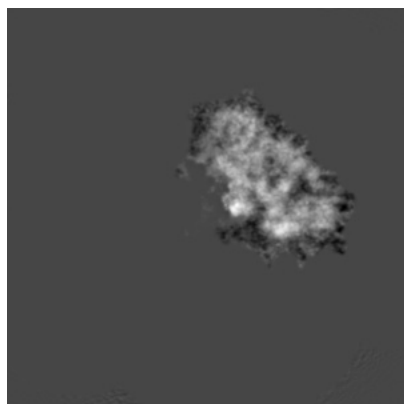


Z Index: 187

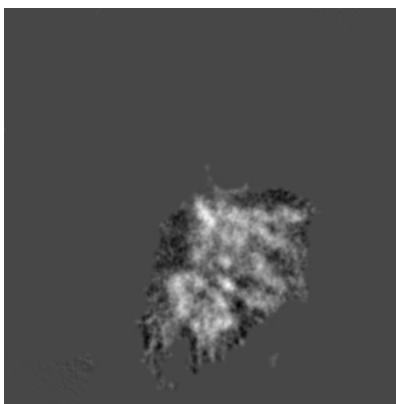
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

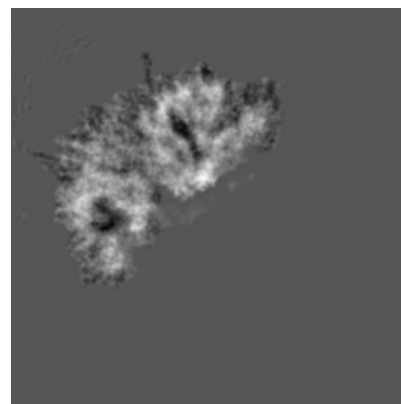
### 6.3.1 Primary map



X Index: 180



Y Index: 217

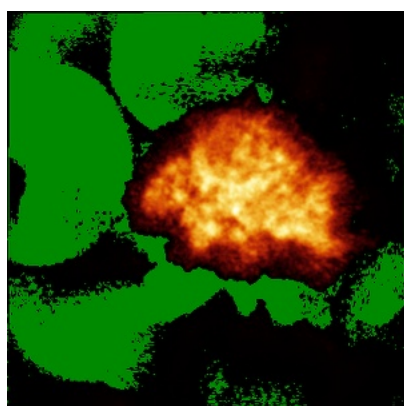


Z Index: 189

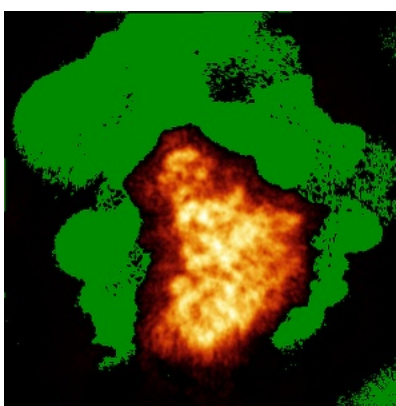
The images above show the largest variance slices of the map in three orthogonal directions.

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

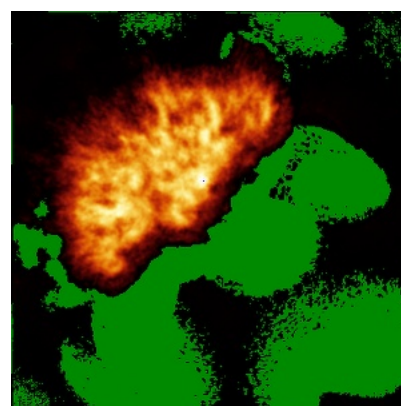
### 6.4.1 Primary map



X



Y



Z

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

This section was not generated.

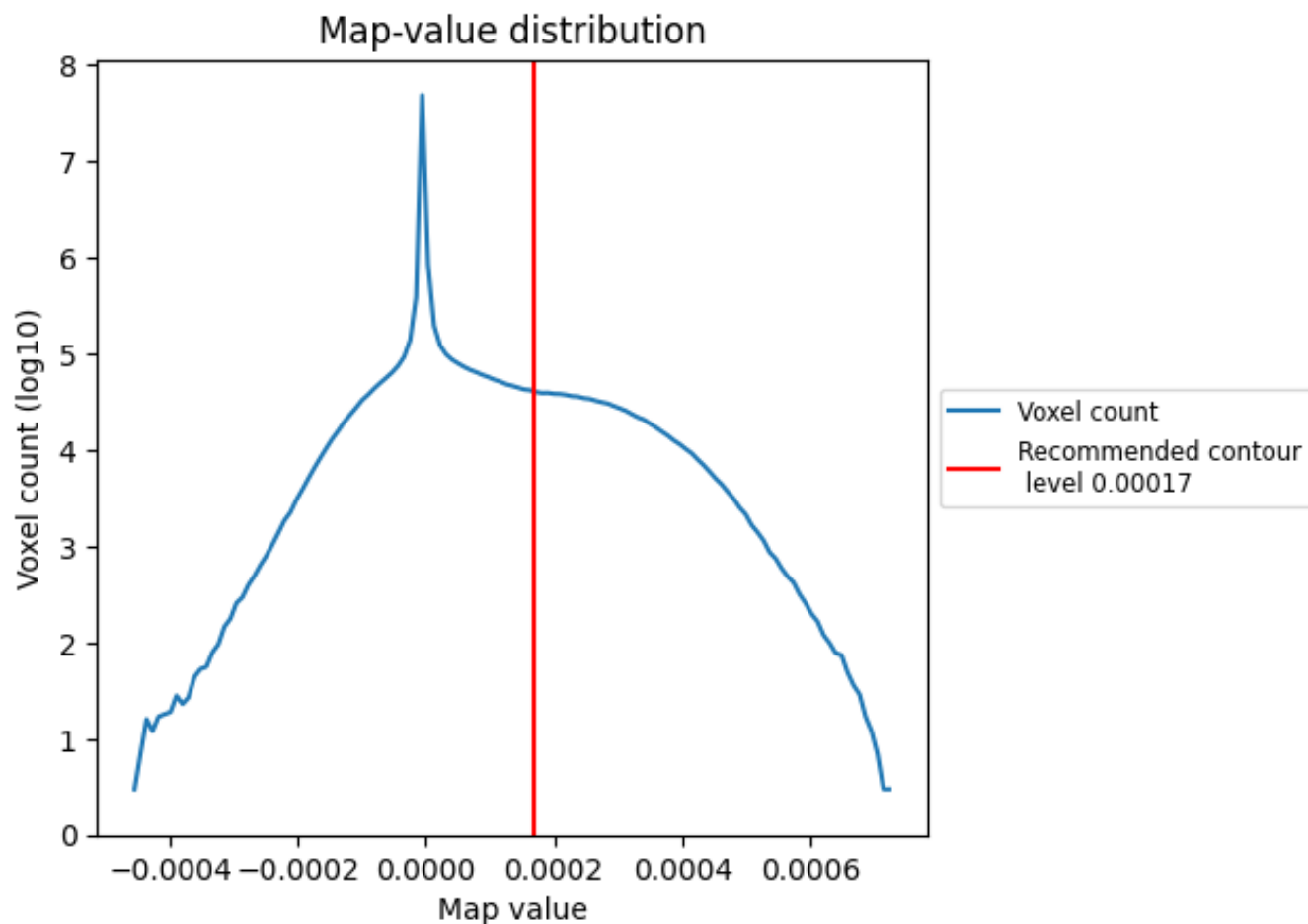
## 6.6 Mask visualisation

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

## 7 Map analysis [i](#)

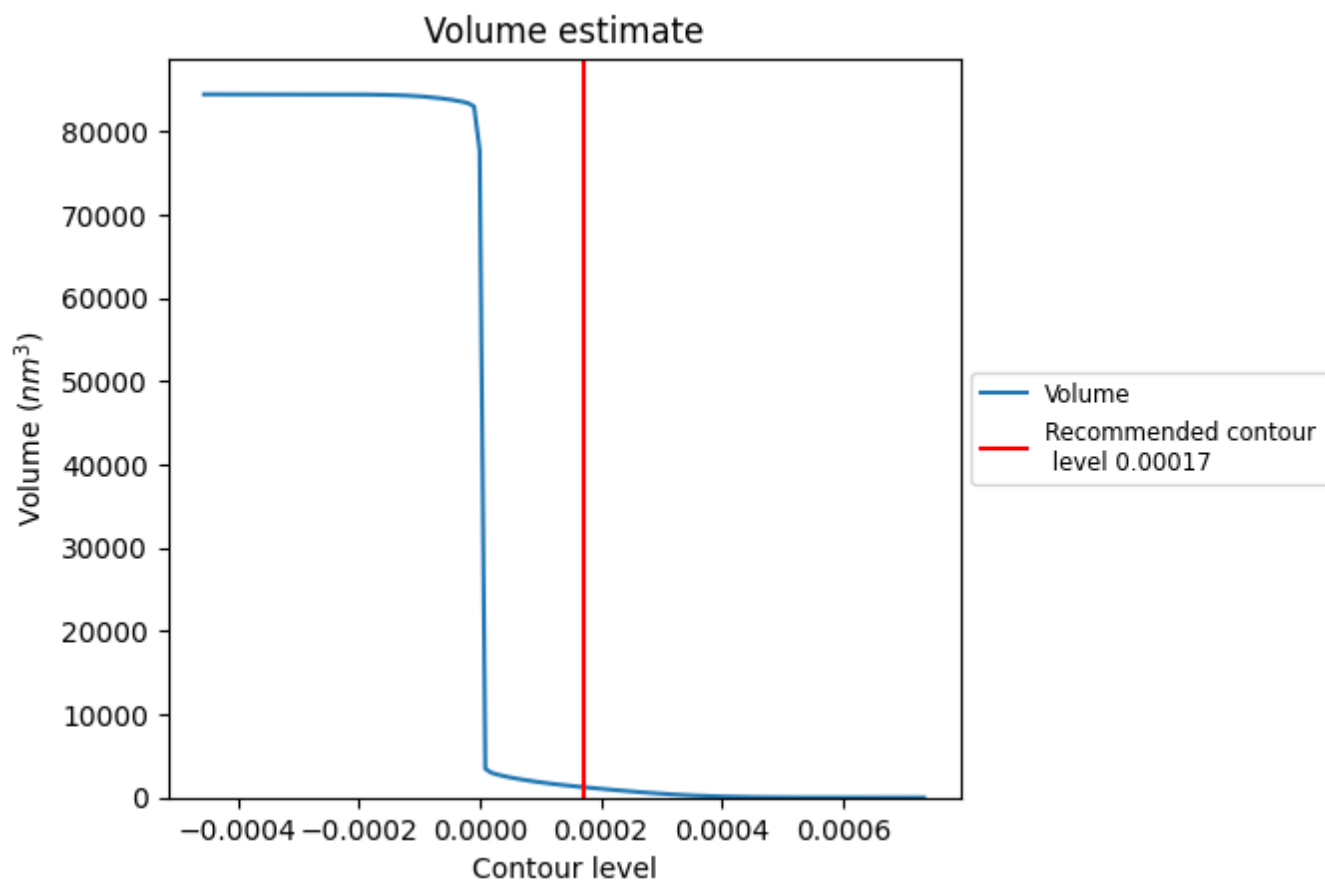
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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.

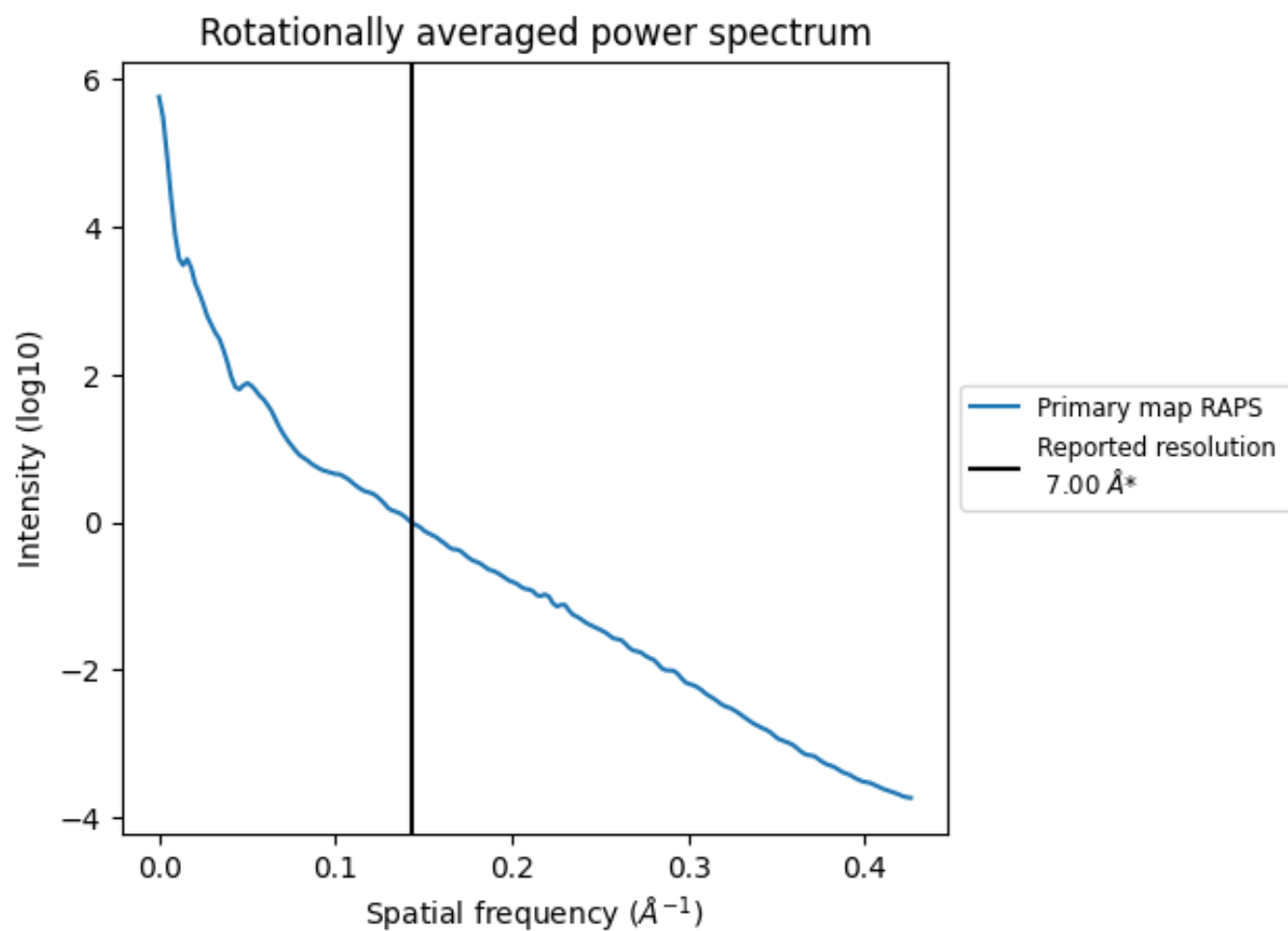
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1255 nm<sup>3</sup>; this corresponds to an approximate mass of 1134 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 0.143 Å<sup>-1</sup>

## 8 Fourier-Shell correlation ⓘ

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

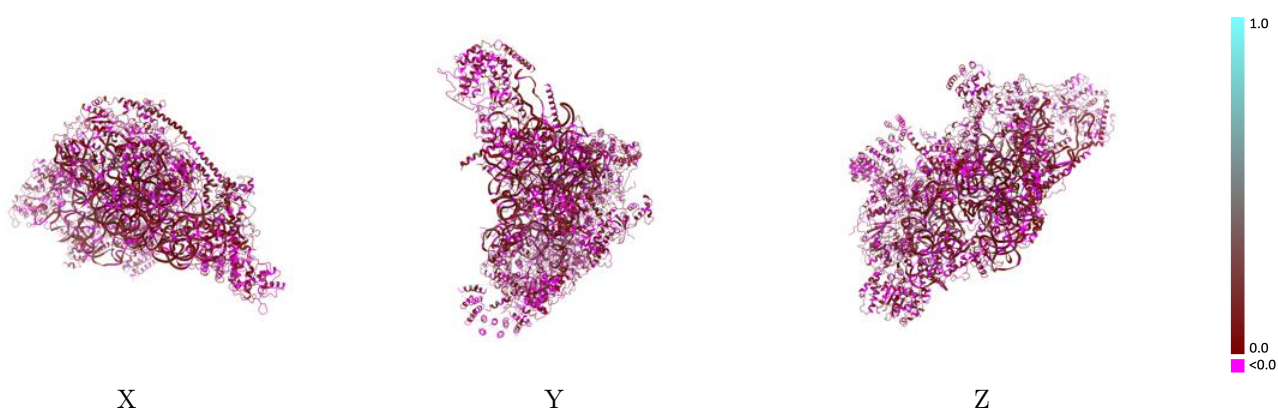
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-5941 and PDB model 3JD5. Per-residue inclusion information can be found in section 3 on page 10.

### 9.1 Map-model overlay [i](#)

This section was not generated.

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

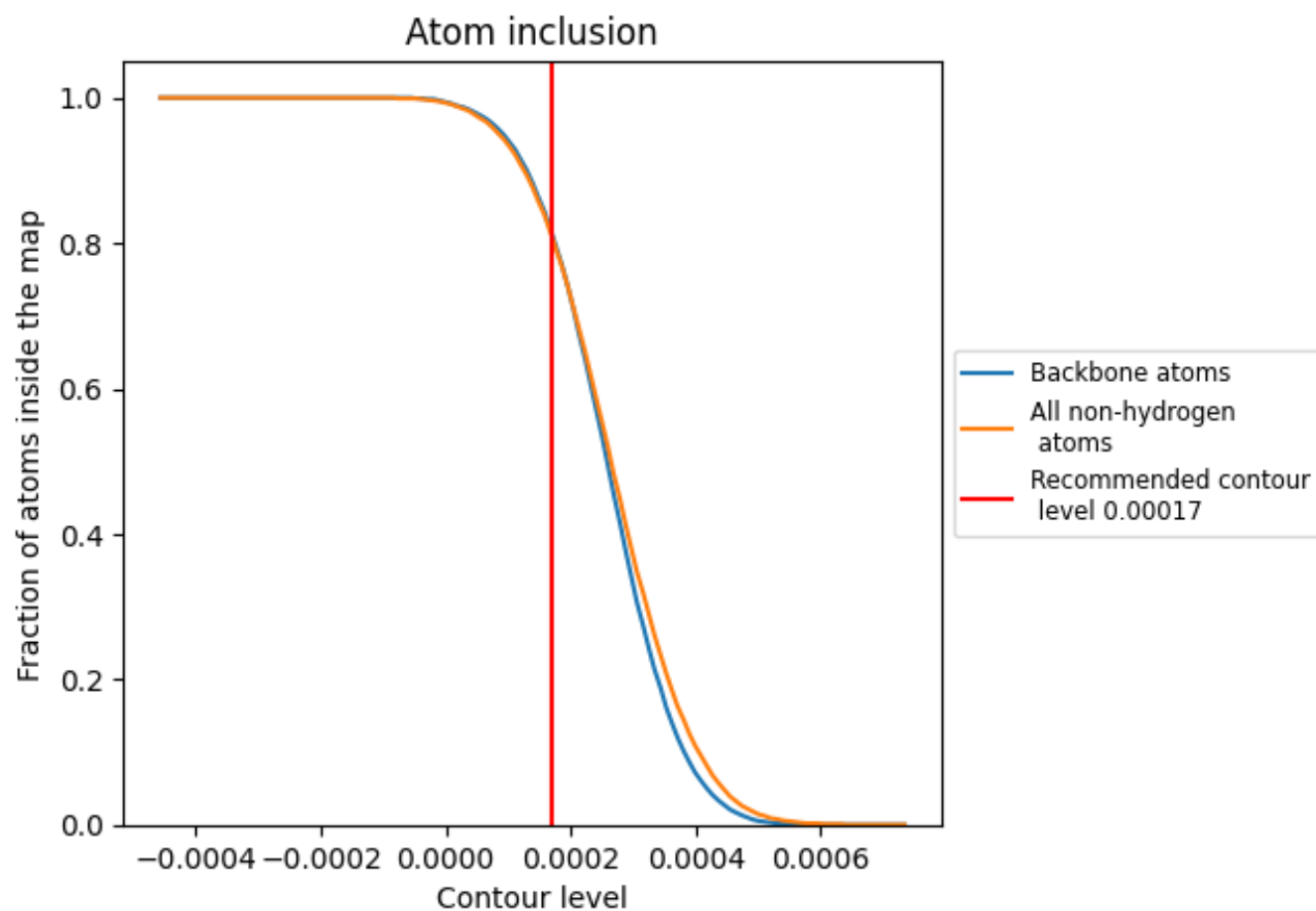


The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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](#)

This section was not generated.

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 81% of all backbone atoms, 81% 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 (0.00017) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion                                                                             | Q-score                                                                                    |
|-------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| All   |  0.8090   |  0.0610   |
| A     |  0.9200   |  0.0840   |
| B     |  0.8050   |  0.0380   |
| C     |  0.7100   |  0.0260   |
| E     |  0.7690   |  0.0560   |
| F     |  0.5770   |  0.0460   |
| G     |  0.7700   |  0.0350   |
| I     |  0.8410   |  0.0720   |
| J     |  0.8660   |  0.0430   |
| K     |  0.8660   |  0.0610   |
| L     |  0.7190   |  0.0480   |
| N     |  0.9450   |  0.0530   |
| O     |  0.7680   |  0.0560   |
| P     |  0.8020   |  0.0220   |
| Q     |  0.7590  |  0.0430  |
| R     |  0.8100 |  0.0690 |
| U     |  0.8320 |  0.0960 |
| a     |  0.8000 |  0.0620 |
| b     |  0.7120 |  0.0460 |
| c     |  0.6950 |  0.0530 |
| d     |  0.8530 |  0.0880 |
| e     |  0.7710 |  0.0360 |
| f     |  0.7920 |  0.0330 |
| g     |  0.8740 |  0.0490 |
| h     |  0.8870 |  0.0910 |
| i     |  0.8960 |  0.0640 |
| j     |  0.7220 |  0.0540 |
| k     |  0.8170 |  0.0410 |
| m     |  0.5200 |  0.0330 |
| n     |  0.8010 |  0.0430 |
| o     |  0.3520 |  0.0210 |
| p     |  0.8460 |  0.0590 |
| s     |  0.3000 |  0.0650 |
| z     |  0.9540 |  0.0690 |

