# Full wwPDB EM Validation Report ⓘ

May 21, 2026 – 11:03 am BST

| | | |
|---|---|---|
| PDB ID | : | 30QZ / pdb_000030qz |
| EMDB ID | : | EMD-57973 |
| Title | : | E. coli 50S ribosome with peptidyl-tRNA and Hsp15 |
| Authors | : | Larsson, D.S.D.; Akbar, S.; Selmer, M. |
| Deposited on | : | 2026-05-10 |
| Resolution | : | 2.23 Å(reported) |
| Based on initial models | : | ., 7K00 |

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

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

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

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

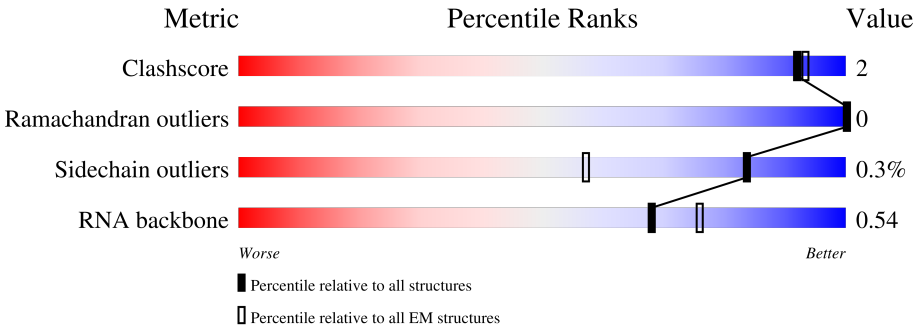
| | | |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev132 |
| Mogul | : | 1.8.4, CSD as541be (2020) |
| MolProbity | : | 4-5-2 with Phenix2.0 |
| Percentile statistics | : | 20250101.v01 (using entries in the PDB archive January 1st 2025) |
| EM percentile statistics | : | 202505.v01 (Using 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 |

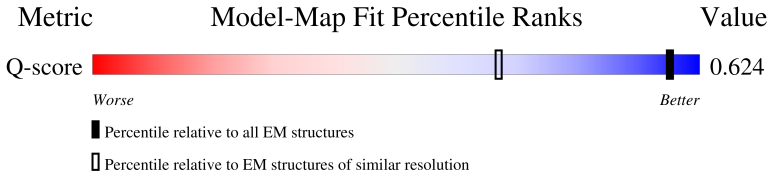
# 1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.23 Å.

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




| Metric | Whole archive (#Entries) | EM structures (#Entries) | Similar EM resolution (#Entries, resolution range(Å)) |
|---|---|---|---|
| Clashscore | 229148 | 23984 | - |
| Ramachandran outliers | 224038 | 23583 | - |
| Sidechain outliers | 223484 | 23102 | - |
| RNA backbone | 8273 | 3508 | - |
| Q-score | - | 25397 | 3335 ( 1.73 - 2.73 ) |

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 | 2904 | 69% 22% • 6% |
| 2 | b | 120 | 81% 15% • • |
| 3 | c | 273 | 88% 11% •• |

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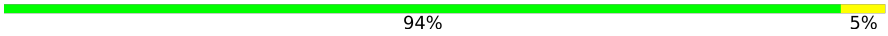
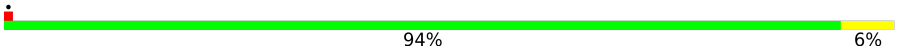
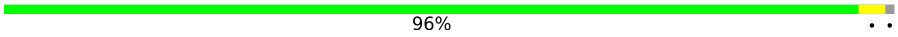
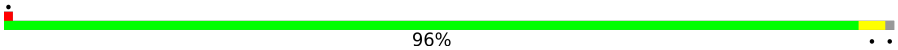
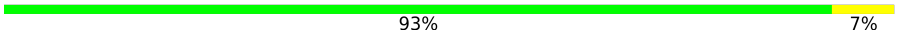
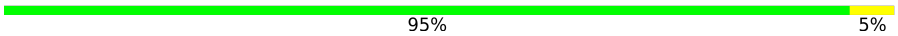
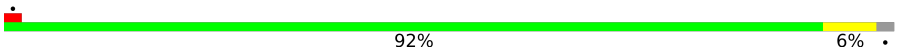
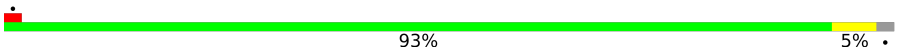
| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 4 | d | 209 |   |
| 5 | e | 201 |   |
| 6 | f | 179 |   |
| 7 | g | 177 |   |
| 8 | h | 149 |   |
| 9 | i | 142 |   |
| 10 | j | 123 |   |
| 11 | k | 144 |   |
| 12 | l | 136 |   |
| 13 | m | 127 |   |
| 14 | n | 117 |   |
| 15 | o | 115 |   |
| 16 | p | 118 |   |
| 17 | q | 103 |   |
| 18 | r | 110 |   |
| 19 | s | 100 |   |
| 20 | t | 104 |   |
| 21 | u | 94 |   |
| 22 | v | 85 |   |
| 23 | w | 78 |   |
| 24 | x | 63 |   |
| 25 | y | 59 |   |
| 26 | z | 57 |   |
| 27 | 0 | 55 |   |
| 28 | 1 | 46 |   |

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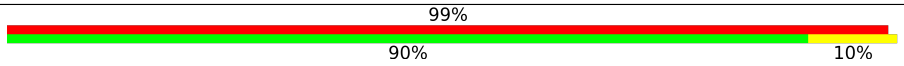
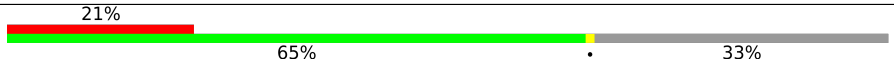
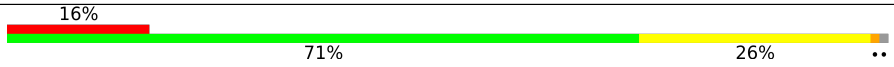
| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 29 | 2 | 65 |   |
| 30 | 3 | 38 |   |
| 31 | 6 | 105 |   |
| 32 | V | 142 |   |
| 33 | Z | 77 |   |

# 2 Entry composition (i)

There are 36 unique types of molecules in this entry. The entry contains 144501 atoms, of which 55465 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 23S rRNA.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | P | | |
| 1 | a | 2737 | 85621 | 26232 | 26827 | 10839 | 18986 | 2737 | 0 | 0 |

- Molecule 2 is a RNA chain called 5S rRNA.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | P | | |
| 2 | b | 119 | 3720 | 1135 | 1171 | 466 | 829 | 119 | 0 | 0 |

- Molecule 3 is a protein called Large ribosomal subunit protein uL2.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 3 | c | 271 | 4196 | 1288 | 2114 | 423 | 364 | 7 | 0 | 0 |

- Molecule 4 is a protein called Large ribosomal subunit protein uL3.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 4 | d | 209 | 3152 | 980 | 1586 | 288 | 294 | 4 | 0 | 0 |

- Molecule 5 is a protein called Large ribosomal subunit protein uL4.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 5 | e | 201 | 3142 | 974 | 1590 | 283 | 290 | 5 | 0 | 0 |

- Molecule 6 is a protein called Large ribosomal subunit protein uL5.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 6 | f | 177 | 2831 | 899 | 1421 | 249 | 256 | 6 | 0 | 0 |

- Molecule 7 is a protein called Large ribosomal subunit protein uL6.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | g | 176 | Total | C | H | N | O | S | 0 | 0 |
| | | | 2670 | 832 | 1347 | 243 | 246 | 2 | | |

- Molecule 8 is a protein called Large ribosomal subunit protein bL9.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | h | 41 | Total | C | H | N | O | S | 0 | 0 |
| | | | 627 | 194 | 324 | 54 | 54 | 1 | | |

- Molecule 9 is a protein called Large ribosomal subunit protein uL13.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 9 | i | 142 | Total | C | H | N | O | S | 0 | 0 |
| | | | 2266 | 714 | 1137 | 212 | 199 | 4 | | |

- Molecule 10 is a protein called Large ribosomal subunit protein uL14.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | j | 123 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1946 | 591 | 1004 | 181 | 164 | 6 | | |

- Molecule 11 is a protein called Large ribosomal subunit protein uL15.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | k | 144 | Total | C | H | N | O | S | 0 | 0 |
| | | | 2164 | 654 | 1111 | 207 | 190 | 2 | | |

- Molecule 12 is a protein called Large ribosomal subunit protein uL16.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | l | 136 | Total | C | H | N | O | S | 0 | 0 |
| | | | 2217 | 686 | 1142 | 205 | 177 | 7 | | |

- Molecule 13 is a protein called Large ribosomal subunit protein bL17.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | m | 118 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1916 | 585 | 971 | 194 | 161 | 5 | | |

- Molecule 14 is a protein called Large ribosomal subunit protein uL18.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 14 | n | 116 | Total | C | H | N | O | 0 | 0 |
| | | | 1800 | 552 | 908 | 178 | 162 | | |

- Molecule 15 is a protein called Large ribosomal subunit protein bL19.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | o | 114 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1864 | 574 | 947 | 179 | 163 | 1 | | |

- Molecule 16 is a protein called Large ribosomal subunit protein bL20.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 16 | p | 117 | Total | C | H | N | O | 0 | 0 |
| | | | 1955 | 604 | 1008 | 192 | 151 | | |

- Molecule 17 is a protein called Large ribosomal subunit protein bL21.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 17 | q | 103 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1641 | 516 | 825 | 153 | 145 | 2 | | |

- Molecule 18 is a protein called Large ribosomal subunit protein uL22.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 18 | r | 110 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1761 | 532 | 904 | 166 | 156 | 3 | | |

- Molecule 19 is a protein called Large ribosomal subunit protein uL23.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | s | 93 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1533 | 466 | 795 | 139 | 131 | 2 | | |

- Molecule 20 is a protein called Large ribosomal subunit protein uL24.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 20 | t | 102 | Total | C | H | N | O | 0 | 0 |
| | | | 1602 | 492 | 823 | 146 | 141 | | |

- Molecule 21 is a protein called Large ribosomal subunit protein bL25.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | u | 94 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1523 | 479 | 770 | 137 | 134 | 3 | | |

- Molecule 22 is a protein called Large ribosomal subunit protein bL27.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | v | 78 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1172 | 362 | 586 | 116 | 107 | 1 | | |

- Molecule 23 is a protein called Large ribosomal subunit protein bL28.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 | w | 77 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1263 | 388 | 638 | 129 | 106 | 2 | | |

- Molecule 24 is a protein called Large ribosomal subunit protein uL29.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 24 | x | 62 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1027 | 308 | 526 | 98 | 94 | 1 | | |

- Molecule 25 is a protein called Large ribosomal subunit protein uL30.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | y | 58 | Total | C | H | N | O | S | 0 | 0 |
| | | | 928 | 281 | 479 | 87 | 79 | 2 | | |

- Molecule 26 is a protein called Large ribosomal subunit protein bL32.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | z | 56 | Total | C | H | N | O | S | 0 | 0 |
| | | | 887 | 269 | 443 | 94 | 80 | 1 | | |

- Molecule 27 is a protein called Large ribosomal subunit protein bL33.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 27 | 0 | 51 | Total | C | H | N | O | 0 | 0 |
| | | | 858 | 269 | 441 | 76 | 72 | | |

- Molecule 28 is a protein called Large ribosomal subunit protein bL34.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | 1 | 46 | Total | C | H | N | O | S | 0 | 0 |
| | | | 788 | 228 | 411 | 90 | 57 | 2 | | |

- Molecule 29 is a protein called Large ribosomal subunit protein bL35.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 2 | 64 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1065 | 323 | 561 | 105 | 74 | 2 | | |

- Molecule 30 is a protein called Large ribosomal subunit protein bL36A.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 3 | 38 | Total | C | H | N | O | S | 0 | 0 |
| | | | 639 | 185 | 337 | 65 | 48 | 4 | | |

- Molecule 31 is a protein called Ribosomal silencing factor RsfS.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 | 6 | 105 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1593 | 502 | 788 | 137 | 160 | 6 | | |

- Molecule 32 is a protein called Heat shock protein 15.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 32 | V | 95 | Total | C | H | N | O | S | 0 | 0 |
| | | | 1552 | 481 | 781 | 146 | 142 | 2 | | |

There are 10 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| V | -8 | MET | - | initiating methionine | UNP P0ACG8 |
| V | -7 | HIS | - | expression tag | UNP P0ACG8 |
| V | -6 | HIS | - | expression tag | UNP P0ACG8 |
| V | -5 | HIS | - | expression tag | UNP P0ACG8 |
| V | -4 | HIS | - | expression tag | UNP P0ACG8 |
| V | -3 | HIS | - | expression tag | UNP P0ACG8 |
| V | -2 | HIS | - | expression tag | UNP P0ACG8 |
| V | -1 | GLY | - | expression tag | UNP P0ACG8 |
| V | 0 | SER | - | expression tag | UNP P0ACG8 |
| V | 1 | GLY | - | expression tag | UNP P0ACG8 |

- Molecule 33 is a RNA chain called tRNA Asp.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 33 | Z | 76 | Total | C | H | N | O | P | 0 | 0 |
| | | | 2363 | 721 | 743 | 285 | 538 | 76 | | |

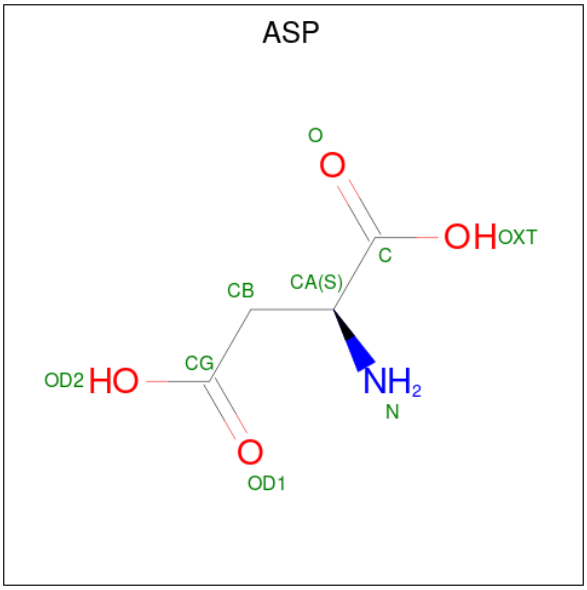
- Molecule 34 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 34 | a | 195 | Total | Mg | 0 |
| | | | 195 | 195 | |
| 34 | b | 5 | Total | Mg | 0 |
| | | | 5 | 5 | |
| 34 | d | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 34 | k | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 34 | p | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 34 | z | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |

- Molecule 35 is ZINC ION (CCD ID: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 35 | 3 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |

- Molecule 36 is ASPARTIC ACID (CCD ID: ASP) (formula: $C_4H_7NO_4$).



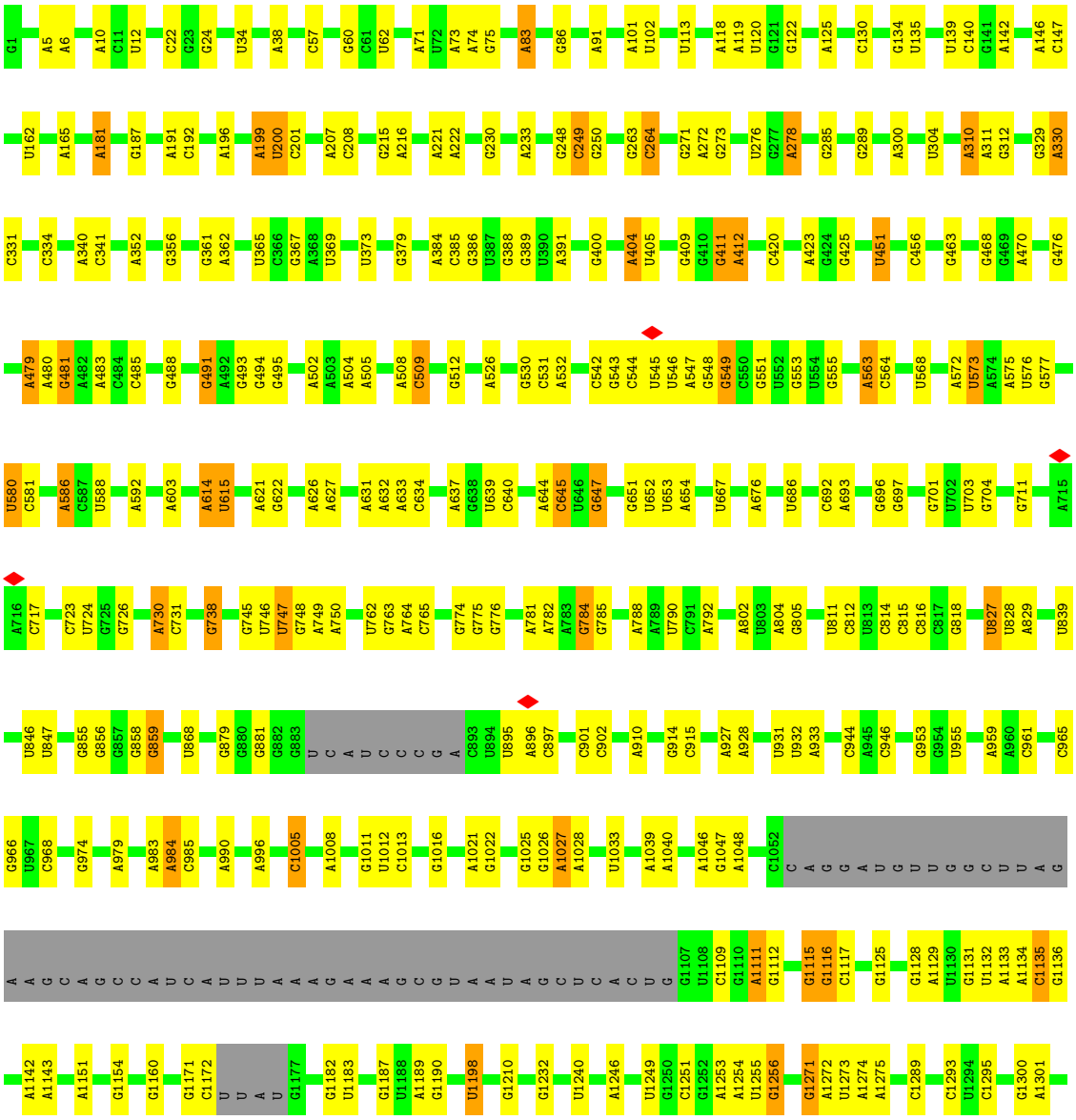
| Mol | Chain | Residues | Atoms | | | | | AltConf |
|---|---|---|---|---|---|---|---|---|
| 36 | Z | 1 | Total | C | H | N | O | 0 |
| | | | 14 | 4 | 6 | 1 | 3 | |

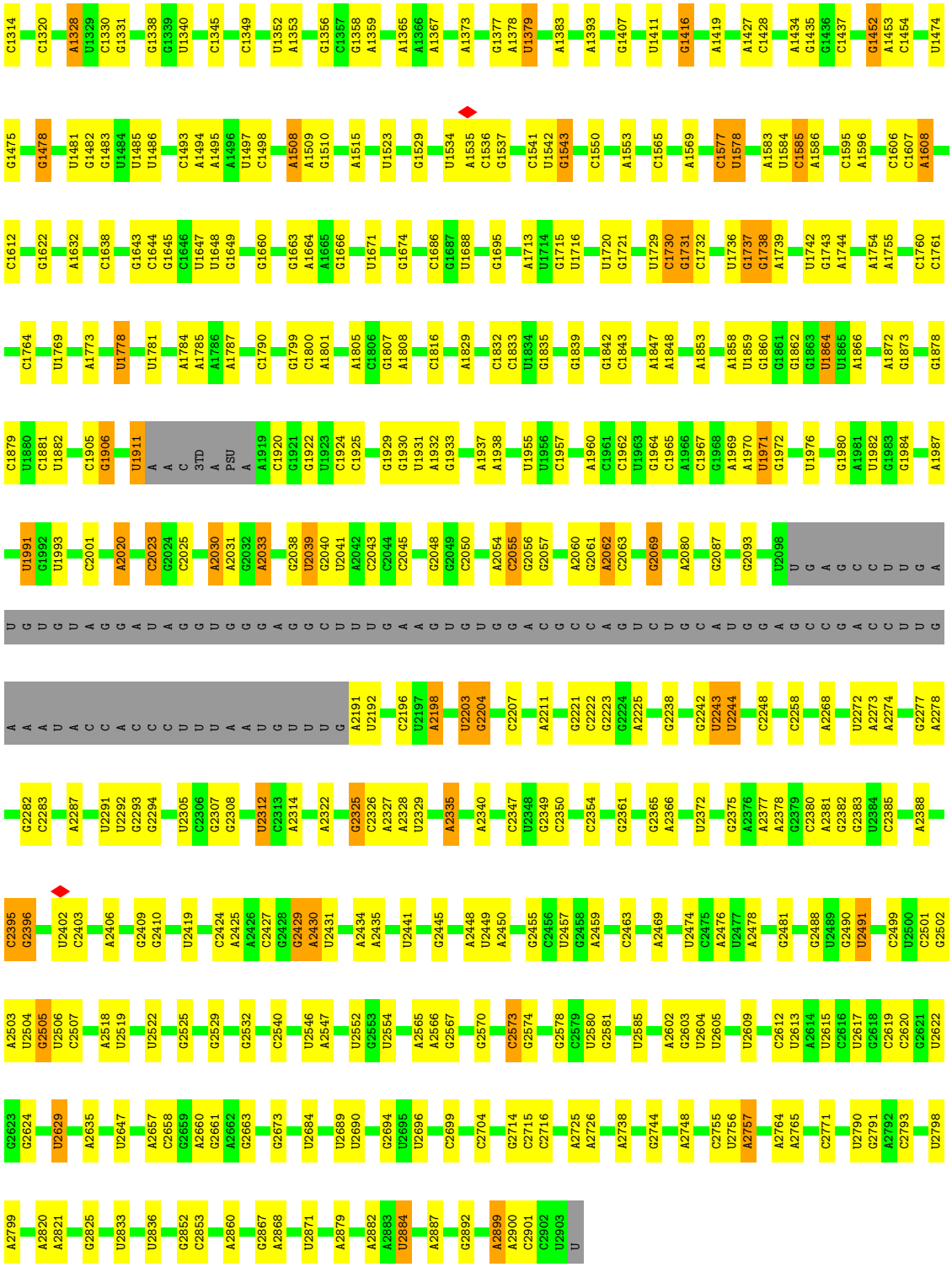
# 3 Residue-property plots (i)

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

- Molecule 1: 23S rRNA

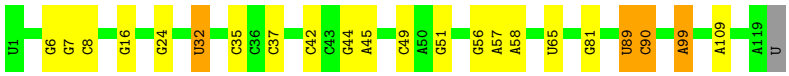
Chain a:



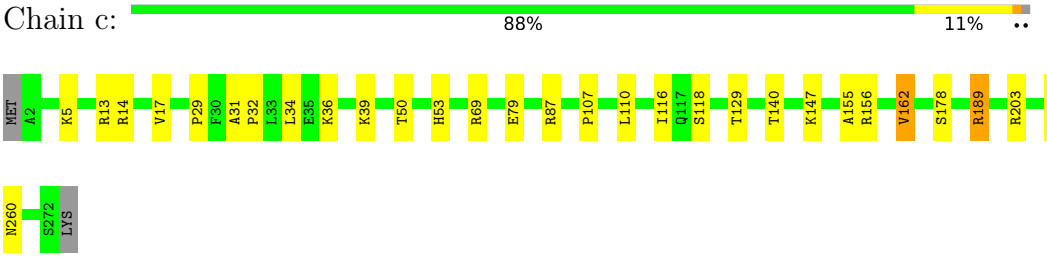
• Molecule 2: 5S rRNA

Chain b:

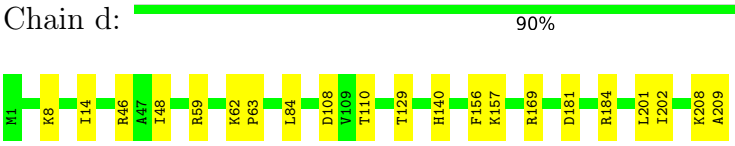
• Molecule 3: Large ribosomal subunit protein uL2

Chain c:



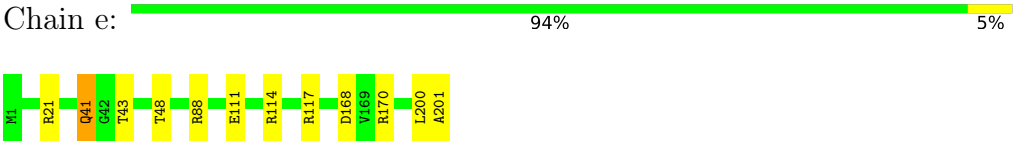

• Molecule 4: Large ribosomal subunit protein uL3

Chain d:



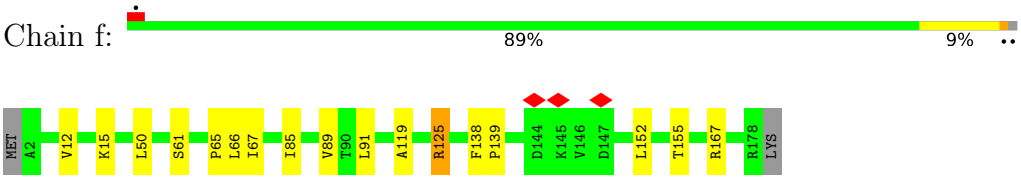

• Molecule 5: Large ribosomal subunit protein uL4

Chain e:



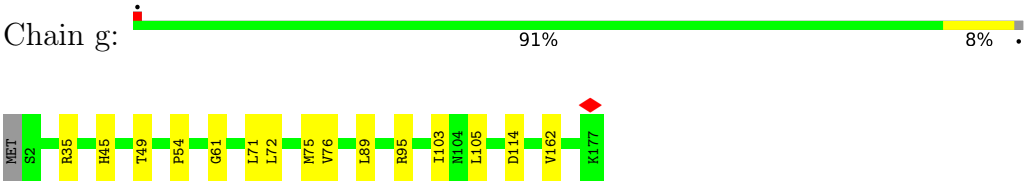

• Molecule 6: Large ribosomal subunit protein uL5

Chain f:



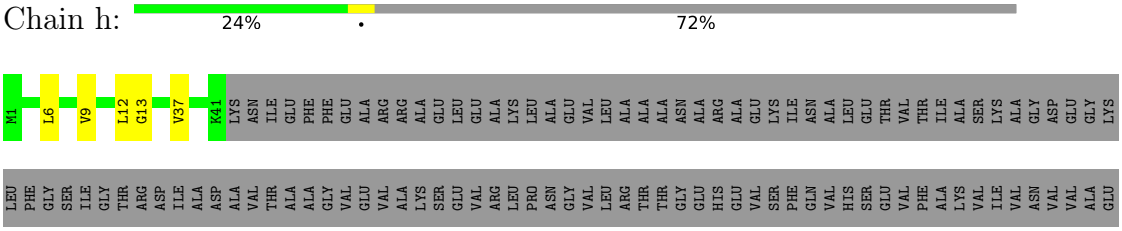

• Molecule 7: Large ribosomal subunit protein uL6

Chain g:



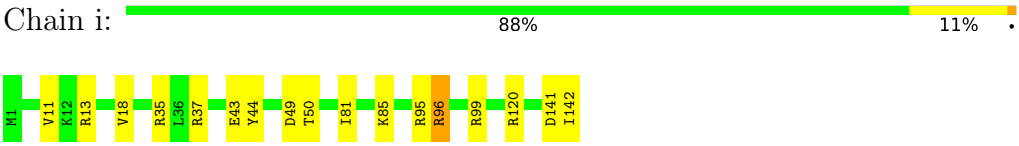

• Molecule 8: Large ribosomal subunit protein bL9

Chain h:



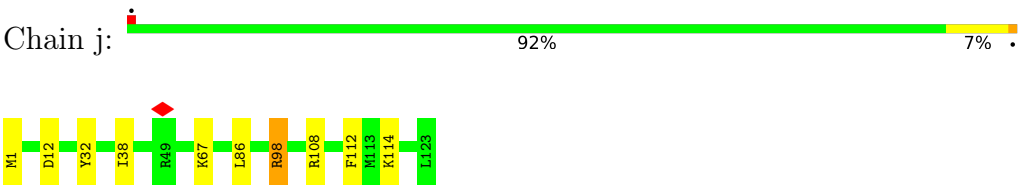

• Molecule 9: Large ribosomal subunit protein uL13

Chain i:



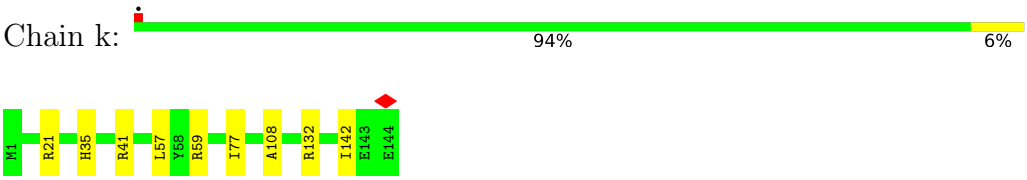

• Molecule 10: Large ribosomal subunit protein uL14

Chain j:



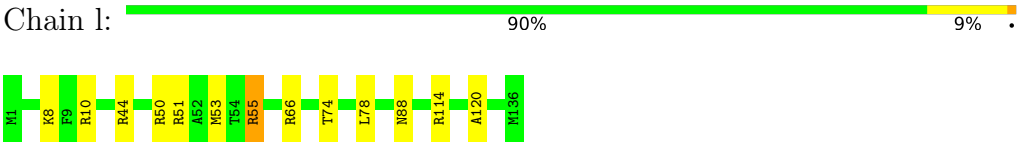

• Molecule 11: Large ribosomal subunit protein uL15

Chain k:



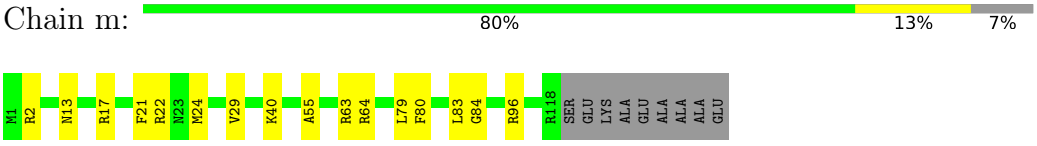

• Molecule 12: Large ribosomal subunit protein uL16

Chain l:



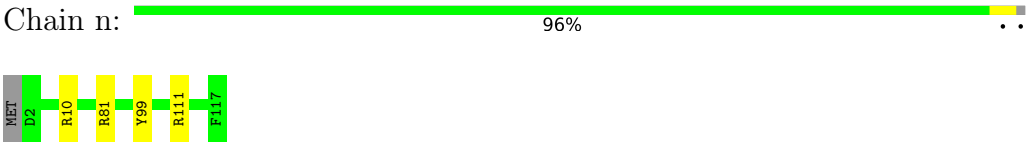

• Molecule 13: Large ribosomal subunit protein bL17

Chain m:



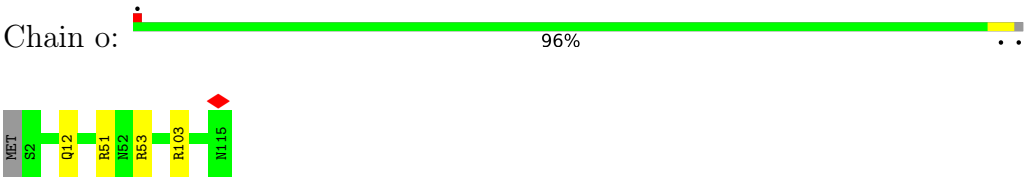

• Molecule 14: Large ribosomal subunit protein uL18

Chain n:



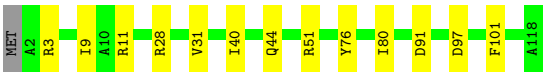

• Molecule 15: Large ribosomal subunit protein bL19

Chain o:



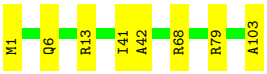

• Molecule 16: Large ribosomal subunit protein bL20

Chain p:

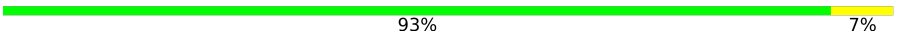

• Molecule 17: Large ribosomal subunit protein bL21

Chain q:


• Molecule 18: Large ribosomal subunit protein uL22

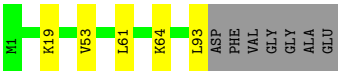
Chain r:





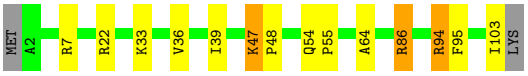
• Molecule 19: Large ribosomal subunit protein uL23

Chain s:

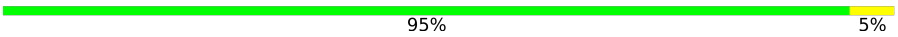

• Molecule 20: Large ribosomal subunit protein uL24

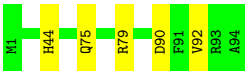
Chain t:


• Molecule 21: Large ribosomal subunit protein bL25

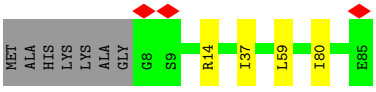
Chain u:



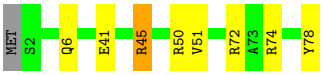

• Molecule 22: Large ribosomal subunit protein bL27

Chain v:

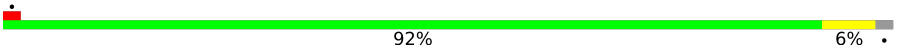

• Molecule 23: Large ribosomal subunit protein bL28

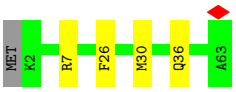
Chain w:


• Molecule 24: Large ribosomal subunit protein uL29

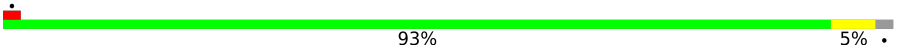
Chain x:




• Molecule 25: Large ribosomal subunit protein uL30

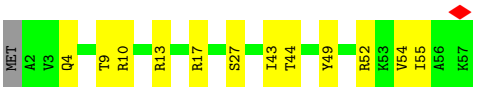
Chain y:





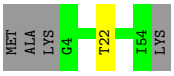
• Molecule 26: Large ribosomal subunit protein bL32

Chain z:

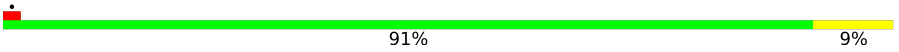

• Molecule 27: Large ribosomal subunit protein bL33

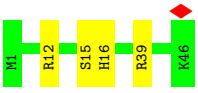
Chain 0:


• Molecule 28: Large ribosomal subunit protein bL34

Chain 1:



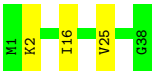




• Molecule 29: Large ribosomal subunit protein bL35

Chain 2:

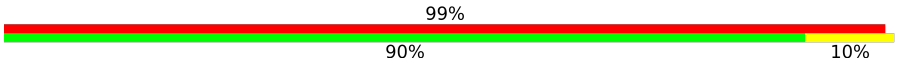

• Molecule 30: Large ribosomal subunit protein bL36A

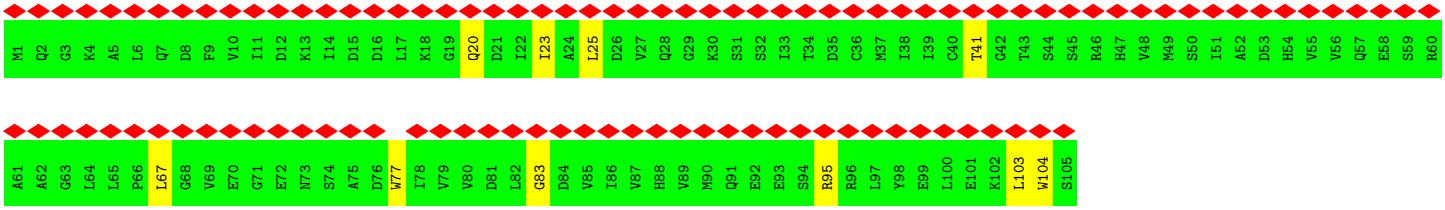
Chain 3:


• Molecule 31: Ribosomal silencing factor RsfS

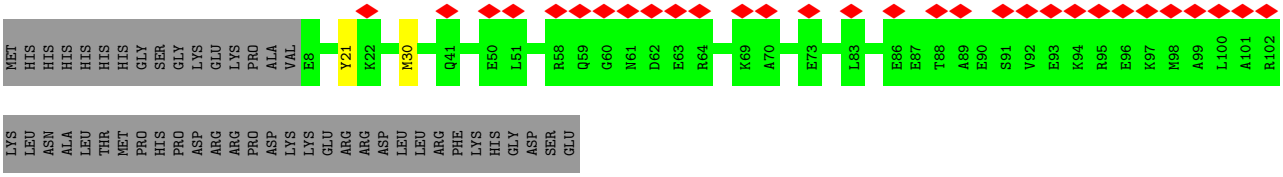
Chain 6:



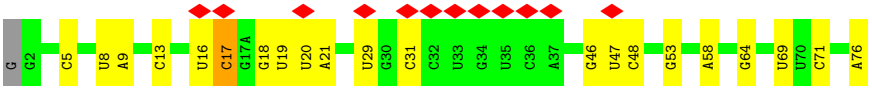

• Molecule 32: Heat shock protein 15

Chain V:


• Molecule 33: tRNA Asp

Chain Z:

# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, C1 | Depositor |
| Number of particles used | 514726 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | TFS GLACIOS | Depositor |
| Voltage (kV) | 200 | Depositor |
| Electron dose ($e^-/Å^2$) | 32.3 | Depositor |
| Minimum defocus (nm) | 500 | Depositor |
| Maximum defocus (nm) | 1500 | Depositor |
| Magnification | 165000 | Depositor |
| Image detector | FEI FALCON IV (4k x 4k) | Depositor |
| Maximum map value | 0.407 | Depositor |
| Minimum map value | -0.083 | Depositor |
| Average map value | -0.000 | Depositor |
| Map value standard deviation | 0.013 | Depositor |
| Recommended contour level | 0.04 | Depositor |
| Map size (Å) | 411.36, 411.36, 411.36 | wwPDB |
| Map dimensions | 512, 512, 512 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.8034375, 0.8034375, 0.8034375 | Depositor |

# 5 Model quality

## 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PSU, OMG, OMC, MG, 2MG, 5MC, G7M, 2MA, 5MU, 6MZ, 1MG, 4D4, OMU, H2U, ZN, MEQ, MS6

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 | 0.61 | 1/65320 (0.0%) | 1.14 | 288/101896 (0.3%) |
| 2 | b | 0.55 | 0/2850 | 1.05 | 12/4444 (0.3%) |
| 3 | c | 0.74 | 1/2121 (0.0%) | 1.19 | 7/2852 (0.2%) |
| 4 | d | 0.74 | 0/1576 | 1.09 | 4/2119 (0.2%) |
| 5 | e | 0.70 | 0/1571 | 1.10 | 3/2113 (0.1%) |
| 6 | f | 0.50 | 0/1434 | 1.04 | 1/1926 (0.1%) |
| 7 | g | 0.55 | 0/1343 | 1.06 | 1/1816 (0.1%) |
| 8 | h | 0.61 | 0/306 | 1.05 | 0/413 |
| 9 | i | 0.71 | 0/1152 | 1.09 | 1/1551 (0.1%) |
| 10 | j | 0.63 | 0/951 | 1.10 | 1/1274 (0.1%) |
| 11 | k | 0.75 | 0/1062 | 1.13 | 1/1413 (0.1%) |
| 12 | l | 0.62 | 0/1073 | 1.12 | 1/1433 (0.1%) |
| 13 | m | 0.80 | 0/958 | 1.26 | 6/1281 (0.5%) |
| 14 | n | 0.55 | 0/902 | 1.03 | 1/1209 (0.1%) |
| 15 | o | 0.65 | 0/929 | 1.07 | 0/1242 |
| 16 | p | 0.84 | 0/960 | 1.19 | 3/1278 (0.2%) |
| 17 | q | 0.65 | 0/829 | 1.10 | 2/1107 (0.2%) |
| 18 | r | 0.78 | 0/864 | 1.13 | 1/1156 (0.1%) |
| 19 | s | 0.64 | 0/744 | 1.06 | 0/994 |
| 20 | t | 0.64 | 0/787 | 1.12 | 1/1051 (0.1%) |
| 21 | u | 0.57 | 0/766 | 1.07 | 2/1025 (0.2%) |
| 22 | v | 0.74 | 0/593 | 1.06 | 0/785 |
| 23 | w | 0.73 | 0/635 | 1.16 | 2/848 (0.2%) |
| 24 | x | 0.55 | 0/502 | 1.11 | 1/667 (0.1%) |
| 25 | y | 0.69 | 0/453 | 1.12 | 0/605 |
| 26 | z | 0.75 | 0/450 | 1.19 | 2/599 (0.3%) |
| 27 | 0 | 0.59 | 0/424 | 1.05 | 0/565 |
| 28 | 1 | 0.86 | 0/380 | 1.35 | 2/498 (0.4%) |
| 29 | 2 | 0.86 | 0/513 | 1.15 | 0/676 |
| 30 | 3 | 0.64 | 0/303 | 1.18 | 0/397 |
| 31 | 6 | 0.51 | 0/814 | 0.95 | 0/1098 |

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | $\#\|Z\|>5$ | RMSZ | $\#\|Z\|>5$ |
| 32 | V | 0.48 | 0/781 | 0.93 | 0/1048 |
| 33 | Z | 0.60 | 0/1808 | 0.80 | 0/2817 |
| All | All | 0.62 | 2/96154 (0.0%) | 1.13 | 343/144196 (0.2%) |

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

| Mol | Chain | #Chirality outliers | #Planarity outliers |
|---|---|---|---|
| 1 | a | 0 | 4 |
| 3 | c | 0 | 6 |
| 4 | d | 0 | 3 |
| 5 | e | 0 | 4 |
| 6 | f | 0 | 1 |
| 7 | g | 0 | 1 |
| 9 | i | 0 | 5 |
| 10 | j | 0 | 2 |
| 11 | k | 0 | 2 |
| 12 | l | 0 | 7 |
| 13 | m | 0 | 4 |
| 14 | n | 0 | 1 |
| 15 | o | 0 | 2 |
| 16 | p | 0 | 3 |
| 17 | q | 0 | 1 |
| 18 | r | 0 | 3 |
| 20 | t | 0 | 4 |
| 21 | u | 0 | 1 |
| 22 | v | 0 | 1 |
| 23 | w | 0 | 2 |
| 24 | x | 0 | 1 |
| 25 | y | 0 | 1 |
| 26 | z | 0 | 2 |
| 29 | 2 | 0 | 2 |
| 31 | 6 | 0 | 1 |
| All | All | 0 | 64 |

All (2) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 3 | c | 53 | HIS | CG-CD2 | -6.61 | 1.28 | 1.35 |
| 1 | a | 2069 | G7M | O3'-P | 5.84 | 1.62 | 1.56 |

All (343) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 621 | A | O3'-P-O5' | -8.27 | 91.60 | 104.00 |
| 1 | a | 551 | G | O3'-P-O5' | -8.26 | 91.61 | 104.00 |
| 1 | a | 57 | C | O3'-P-O5' | -8.23 | 91.66 | 104.00 |
| 1 | a | 2771 | C | O3'-P-O5' | -8.20 | 91.70 | 104.00 |
| 1 | a | 1643 | G | O3'-P-O5' | -8.10 | 91.85 | 104.00 |
| 1 | a | 2764 | A | O3'-P-O5' | -8.04 | 91.95 | 104.00 |
| 1 | a | 577 | G | O3'-P-O5' | -8.03 | 91.96 | 104.00 |
| 1 | a | 542 | C | O3'-P-O5' | -7.87 | 92.20 | 104.00 |
| 1 | a | 2871 | U | O3'-P-O5' | -7.78 | 92.34 | 104.00 |
| 1 | a | 400 | G | O3'-P-O5' | -7.76 | 92.36 | 104.00 |
| 1 | a | 1969 | A | O3'-P-O5' | -7.72 | 92.42 | 104.00 |
| 2 | b | 90 | C | O3'-P-O5' | -7.64 | 92.54 | 104.00 |
| 1 | a | 2884 | U | C2'-C3'-O3' | -7.64 | 102.24 | 113.70 |
| 1 | a | 62 | U | O3'-P-O5' | -7.56 | 92.66 | 104.00 |
| 1 | a | 816 | C | O3'-P-O5' | -7.55 | 92.68 | 104.00 |
| 1 | a | 1131 | G | O3'-P-O5' | -7.47 | 92.79 | 104.00 |
| 1 | a | 310 | A | O3'-P-O5' | -7.46 | 92.81 | 104.00 |
| 1 | a | 1632 | A | O3'-P-O5' | -7.43 | 92.85 | 104.00 |
| 3 | c | 189 | ARG | NE-CZ-NH1 | -7.39 | 114.11 | 121.50 |
| 1 | a | 1565 | C | O3'-P-O5' | -7.37 | 92.94 | 104.00 |
| 17 | q | 6 | GLN | CB-CA-C | 7.36 | 121.90 | 109.75 |
| 1 | a | 2062 | A | O3'-P-O5' | -7.35 | 92.97 | 104.00 |
| 1 | a | 404 | A | C2'-C3'-O3' | 7.20 | 120.31 | 109.50 |
| 1 | a | 1606 | C | C2'-C3'-O3' | -7.17 | 102.95 | 113.70 |
| 1 | a | 731 | C | O3'-P-O5' | -7.16 | 93.26 | 104.00 |
| 1 | a | 1485 | U | O3'-P-O5' | -7.15 | 93.27 | 104.00 |
| 1 | a | 1198 | U | O3'-P-O5' | -7.14 | 93.29 | 104.00 |
| 1 | a | 1025 | G | O3'-P-O5' | 7.12 | 114.68 | 104.00 |
| 1 | a | 1011 | G | O3'-P-O5' | -7.11 | 93.33 | 104.00 |
| 4 | d | 157 | LYS | N-CA-CB | 7.11 | 120.49 | 110.04 |
| 1 | a | 2378 | A | O3'-P-O5' | -7.10 | 93.35 | 104.00 |
| 1 | a | 73 | A | O3'-P-O5' | -7.05 | 93.42 | 104.00 |
| 4 | d | 129 | THR | CA-CB-OG1 | -7.05 | 99.03 | 109.60 |
| 1 | a | 2243 | U | O3'-P-O5' | 7.04 | 114.57 | 104.00 |
| 1 | a | 1358 | G | O3'-P-O5' | -7.04 | 93.44 | 104.00 |
| 1 | a | 2023 | C | C4'-C3'-O3' | -7.02 | 102.47 | 113.00 |
| 1 | a | 2025 | C | C2'-C3'-O3' | -7.01 | 103.18 | 113.70 |
| 1 | a | 60 | G | O3'-P-O5' | -7.01 | 93.48 | 104.00 |
| 1 | a | 134 | G | O3'-P-O5' | -7.01 | 93.48 | 104.00 |
| 28 | 1 | 12 | ARG | NE-CZ-NH2 | 7.00 | 125.50 | 119.20 |
| 1 | a | 1550 | C | O3'-P-O5' | -6.99 | 93.51 | 104.00 |
| 1 | a | 1274 | A | C4'-C3'-O3' | -6.97 | 102.54 | 113.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 1359 | A | O3'-P-O5' | -6.97 | 93.55 | 104.00 |
| 1 | a | 2198 | A | O3'-P-O5' | -6.95 | 93.57 | 104.00 |
| 1 | a | 508 | A | O3'-P-O5' | -6.92 | 93.63 | 104.00 |
| 1 | a | 1866 | A | O3'-P-O5' | -6.91 | 93.64 | 104.00 |
| 3 | c | 246 | THR | CA-CB-OG1 | -6.90 | 99.24 | 109.60 |
| 1 | a | 2546 | U | O3'-P-O5' | -6.89 | 93.66 | 104.00 |
| 1 | a | 763 | G | O3'-P-O5' | -6.88 | 93.69 | 104.00 |
| 1 | a | 1452 | G | O3'-P-O5' | -6.87 | 93.70 | 104.00 |
| 2 | b | 8 | C | O3'-P-O5' | -6.86 | 93.71 | 104.00 |
| 1 | a | 1367 | A | O3'-P-O5' | -6.84 | 93.74 | 104.00 |
| 4 | d | 108 | ASP | CA-CB-CG | 6.81 | 119.41 | 112.60 |
| 1 | a | 83 | A | C2'-C3'-O3' | -6.77 | 103.54 | 113.70 |
| 1 | a | 2882 | A | O3'-P-O5' | -6.77 | 93.84 | 104.00 |
| 1 | a | 2635 | A | O3'-P-O5' | -6.76 | 93.85 | 104.00 |
| 1 | a | 2222 | C | O3'-P-O5' | -6.75 | 93.87 | 104.00 |
| 1 | a | 2048 | G | O3'-P-O5' | -6.68 | 93.97 | 104.00 |
| 1 | a | 2429 | G | O3'-P-O5' | -6.67 | 94.00 | 104.00 |
| 1 | a | 2899 | A | O3'-P-O5' | -6.66 | 94.01 | 104.00 |
| 1 | a | 1349 | C | O3'-P-O5' | -6.65 | 94.03 | 104.00 |
| 23 | w | 45 | ARG | NE-CZ-NH1 | -6.62 | 114.88 | 121.50 |
| 1 | a | 631 | A | C2'-C3'-O3' | -6.59 | 103.82 | 113.70 |
| 1 | a | 1454 | C | O3'-P-O5' | -6.59 | 94.12 | 104.00 |
| 1 | a | 1743 | G | O3'-P-O5' | -6.59 | 94.12 | 104.00 |
| 1 | a | 2001 | C | O3'-P-O5' | -6.58 | 94.12 | 104.00 |
| 1 | a | 1254 | A | C4'-C3'-O3' | -6.58 | 103.13 | 113.00 |
| 1 | a | 1660 | G | C1'-C2'-O2' | 6.58 | 118.27 | 108.40 |
| 1 | a | 1760 | C | C2'-C3'-O3' | -6.58 | 103.83 | 113.70 |
| 1 | a | 855 | G | O3'-P-O5' | -6.58 | 94.14 | 104.00 |
| 1 | a | 856 | G | O3'-P-O5' | -6.56 | 94.16 | 104.00 |
| 1 | a | 1612 | C | O3'-P-O5' | -6.56 | 94.16 | 104.00 |
| 1 | a | 634 | C | O3'-P-O5' | -6.55 | 94.17 | 104.00 |
| 1 | a | 563 | A | O3'-P-O5' | -6.55 | 94.18 | 104.00 |
| 1 | a | 1645 | G | C4'-C3'-O3' | -6.55 | 103.17 | 113.00 |
| 1 | a | 586 | A | C2'-C3'-O3' | -6.53 | 103.91 | 113.70 |
| 1 | a | 1293 | C | O3'-P-O5' | -6.50 | 94.25 | 104.00 |
| 1 | a | 2278 | A | O3'-P-O5' | -6.47 | 94.29 | 104.00 |
| 1 | a | 2434 | A | O3'-P-O5' | -6.47 | 94.29 | 104.00 |
| 2 | b | 32 | U | O3'-P-O5' | -6.46 | 94.32 | 104.00 |
| 1 | a | 932 | U | O3'-P-O5' | -6.45 | 94.32 | 104.00 |
| 1 | a | 632 | A | O3'-P-O5' | -6.42 | 94.38 | 104.00 |
| 1 | a | 676 | A | O3'-P-O5' | -6.40 | 94.41 | 104.00 |
| 1 | a | 1785 | A | O3'-P-O5' | -6.39 | 94.42 | 104.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 22 | C | O3'-P-O5' | -6.37 | 94.45 | 104.00 |
| 1 | a | 1373 | A | O3'-P-O5' | -6.34 | 94.49 | 104.00 |
| 1 | a | 495 | G | O3'-P-O5' | -6.29 | 94.56 | 104.00 |
| 1 | a | 781 | A | O3'-P-O5' | -6.29 | 94.56 | 104.00 |
| 1 | a | 2505 | G | C2'-C3'-O3' | -6.29 | 104.27 | 113.70 |
| 18 | r | 72 | THR | CA-CB-OG1 | -6.29 | 100.17 | 109.60 |
| 1 | a | 1016 | G | O3'-P-O5' | -6.28 | 94.57 | 104.00 |
| 1 | a | 2554 | U | O3'-P-O5' | -6.28 | 94.57 | 104.00 |
| 1 | a | 1232 | G | O3'-P-O5' | -6.26 | 94.61 | 104.00 |
| 1 | a | 2080 | A | O3'-P-O5' | -6.26 | 94.61 | 104.00 |
| 1 | a | 2658 | C | O3'-P-O5' | -6.25 | 94.63 | 104.00 |
| 13 | m | 21 | PHE | CA-CB-CG | -6.24 | 107.56 | 113.80 |
| 1 | a | 2463 | C | O3'-P-O5' | -6.23 | 94.65 | 104.00 |
| 1 | a | 388 | G | O3'-P-O5' | -6.23 | 94.66 | 104.00 |
| 1 | a | 1843 | C | O3'-P-O5' | -6.22 | 94.66 | 104.00 |
| 1 | a | 573 | U | O3'-P-O5' | -6.22 | 94.67 | 104.00 |
| 1 | a | 162 | U | O3'-P-O5' | -6.22 | 94.67 | 104.00 |
| 1 | a | 2684 | U | O3'-P-O5' | -6.21 | 94.68 | 104.00 |
| 1 | a | 1964 | G | O3'-P-O5' | 6.20 | 113.30 | 104.00 |
| 13 | m | 17 | ARG | CB-CA-C | -6.20 | 100.51 | 110.79 |
| 1 | a | 200 | U | O3'-P-O5' | -6.18 | 94.73 | 104.00 |
| 13 | m | 96 | ARG | N-CA-CB | -6.17 | 100.09 | 111.13 |
| 1 | a | 479 | A | P-O5'-C5' | -6.13 | 111.70 | 120.90 |
| 1 | a | 1553 | A | O3'-P-O5' | -6.13 | 94.80 | 104.00 |
| 1 | a | 2519 | U | O3'-P-O5' | -6.12 | 94.82 | 104.00 |
| 13 | m | 17 | ARG | N-CA-CB | 6.10 | 119.09 | 110.12 |
| 1 | a | 622 | G | C4'-C3'-O3' | -6.10 | 103.86 | 113.00 |
| 1 | a | 1135 | C | C2'-C3'-O3' | -6.09 | 104.56 | 113.70 |
| 1 | a | 1991 | U | C4'-C3'-O3' | -6.09 | 103.86 | 113.00 |
| 1 | a | 509 | C | C4'-C3'-O3' | -6.07 | 103.90 | 113.00 |
| 1 | a | 2884 | U | C1'-C2'-O2' | -6.06 | 99.31 | 108.40 |
| 1 | a | 409 | G | O3'-P-O5' | -6.05 | 94.92 | 104.00 |
| 1 | a | 2892 | G | O3'-P-O5' | -6.04 | 94.95 | 104.00 |
| 1 | a | 818 | G | O3'-P-O5' | -6.03 | 94.95 | 104.00 |
| 1 | a | 2354 | C | C4'-C3'-C2' | -6.03 | 96.57 | 102.60 |
| 1 | a | 1246 | A | O3'-P-O5' | -6.02 | 94.97 | 104.00 |
| 1 | a | 701 | G | O3'-P-O5' | -6.00 | 94.99 | 104.00 |
| 1 | a | 1151 | A | O3'-P-O5' | -6.00 | 94.99 | 104.00 |
| 1 | a | 1416 | G | O3'-P-O5' | -5.97 | 95.05 | 104.00 |
| 1 | a | 2629 | U | O3'-P-O5' | -5.96 | 95.05 | 104.00 |
| 6 | f | 125 | ARG | NE-CZ-NH1 | -5.96 | 115.54 | 121.50 |
| 2 | b | 16 | G | O3'-P-O5' | -5.96 | 95.06 | 104.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 1543 | G | C4'-C3'-O3' | -5.96 | 104.06 | 113.00 |
| 3 | c | 39 | LYS | N-CA-CB | -5.96 | 100.93 | 110.46 |
| 1 | a | 1585 | C | O3'-P-O5' | -5.96 | 95.07 | 104.00 |
| 2 | b | 65 | U | O3'-P-O5' | -5.95 | 95.08 | 104.00 |
| 1 | a | 1778 | U | C4'-C3'-O3' | -5.94 | 104.09 | 113.00 |
| 1 | a | 2565 | A | C2'-C3'-O3' | -5.91 | 104.84 | 113.70 |
| 1 | a | 199 | A | C1'-O4'-C4' | -5.91 | 103.79 | 109.70 |
| 1 | a | 1638 | C | O3'-P-O5' | -5.90 | 95.14 | 104.00 |
| 26 | z | 44 | THR | CA-CB-OG1 | -5.90 | 100.75 | 109.60 |
| 1 | a | 1289 | C | O3'-P-O5' | -5.89 | 95.16 | 104.00 |
| 1 | a | 696 | G | C4'-C3'-C2' | -5.89 | 96.71 | 102.60 |
| 1 | a | 2377 | A | O3'-P-O5' | -5.88 | 95.18 | 104.00 |
| 1 | a | 2054 | A | C2'-C3'-O3' | -5.88 | 104.88 | 113.70 |
| 3 | c | 140 | THR | CA-CB-OG1 | -5.88 | 100.79 | 109.60 |
| 1 | a | 2673 | G | O3'-P-O5' | -5.87 | 95.19 | 104.00 |
| 1 | a | 748 | G | C1'-O4'-C4' | -5.87 | 104.03 | 109.90 |
| 1 | a | 334 | C | O3'-P-O5' | -5.87 | 95.20 | 104.00 |
| 1 | a | 804 | A | O3'-P-O5' | -5.86 | 95.20 | 104.00 |
| 4 | d | 140 | HIS | CA-CB-CG | -5.86 | 107.94 | 113.80 |
| 1 | a | 990 | A | C2'-C3'-O3' | -5.86 | 104.92 | 113.70 |
| 1 | a | 747 | 5MU | O3'-P-O5' | -5.86 | 95.22 | 104.00 |
| 1 | a | 1781 | U | O3'-P-O5' | -5.85 | 95.23 | 104.00 |
| 1 | a | 2501 | C | O3'-P-O5' | -5.83 | 95.26 | 104.00 |
| 1 | a | 1864 | U | C4'-C3'-O3' | -5.82 | 104.28 | 113.00 |
| 1 | a | 1971 | U | C4'-C3'-O3' | -5.80 | 104.29 | 113.00 |
| 1 | a | 1671 | U | C3'-C2'-O2' | 5.80 | 119.40 | 110.70 |
| 20 | t | 47 | LYS | CB-CA-C | -5.79 | 99.94 | 109.27 |
| 1 | a | 1377 | G | C4'-C3'-O3' | -5.78 | 104.33 | 113.00 |
| 1 | a | 1356 | G | O3'-P-O5' | -5.77 | 95.34 | 104.00 |
| 2 | b | 81 | G | O3'-P-O5' | -5.77 | 95.34 | 104.00 |
| 1 | a | 2427 | C | O3'-P-O5' | -5.77 | 95.35 | 104.00 |
| 1 | a | 2738 | A | O3'-P-O5' | -5.76 | 95.37 | 104.00 |
| 1 | a | 1437 | C | O3'-P-O5' | -5.75 | 95.37 | 104.00 |
| 1 | a | 1008 | A | O3'-P-O5' | -5.74 | 95.39 | 104.00 |
| 1 | a | 2624 | G | C2'-C3'-O3' | -5.74 | 105.09 | 113.70 |
| 1 | a | 379 | G | O3'-P-O5' | -5.74 | 95.39 | 104.00 |
| 3 | c | 189 | ARG | NE-CZ-NH2 | 5.74 | 124.36 | 119.20 |
| 1 | a | 181 | A | C4'-C3'-C2' | -5.73 | 96.87 | 102.60 |
| 11 | k | 35 | HIS | CB-CG-CD2 | -5.73 | 123.75 | 131.20 |
| 1 | a | 1481 | U | O3'-P-O5' | -5.71 | 95.43 | 104.00 |
| 5 | e | 41 | GLN | N-CA-CB | -5.71 | 101.75 | 110.26 |
| 1 | a | 2057 | G | C4'-C3'-O3' | -5.71 | 104.44 | 113.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 2039 | U | C2'-C3'-O3' | -5.70 | 105.15 | 113.70 |
| 1 | a | 839 | U | C4'-C3'-O3' | -5.69 | 104.47 | 113.00 |
| 1 | a | 485 | C | O3'-P-O5' | -5.69 | 95.47 | 104.00 |
| 1 | a | 543 | G | O3'-P-O5' | -5.68 | 95.48 | 104.00 |
| 1 | a | 1761 | C | C2'-C3'-O3' | -5.67 | 105.19 | 113.70 |
| 1 | a | 187 | G | O3'-P-O5' | -5.67 | 95.50 | 104.00 |
| 1 | a | 2409 | G | O3'-P-O5' | -5.67 | 95.50 | 104.00 |
| 24 | x | 36 | GLN | N-CA-CB | -5.67 | 101.85 | 111.20 |
| 13 | m | 29 | VAL | N-CA-CB | 5.67 | 117.18 | 110.55 |
| 1 | a | 2836 | U | C2'-C3'-O3' | -5.65 | 105.22 | 113.70 |
| 1 | a | 91 | A | O3'-P-O5' | -5.65 | 95.53 | 104.00 |
| 1 | a | 814 | C | C2'-C3'-O3' | -5.64 | 105.24 | 113.70 |
| 1 | a | 2381 | A | C1'-C2'-O2' | 5.63 | 116.84 | 108.40 |
| 16 | p | 101 | PHE | CA-CB-CG | -5.63 | 108.17 | 113.80 |
| 1 | a | 1606 | C | O3'-P-O5' | -5.61 | 95.59 | 104.00 |
| 1 | a | 2395 | C | C2'-C3'-O3' | -5.61 | 105.29 | 113.70 |
| 1 | a | 667 | U | O3'-P-O5' | -5.61 | 95.59 | 104.00 |
| 1 | a | 2050 | C | O3'-P-O5' | -5.60 | 95.59 | 104.00 |
| 26 | z | 10 | ARG | NE-CZ-NH1 | -5.59 | 115.91 | 121.50 |
| 1 | a | 271 | G | C2'-C3'-O3' | 5.59 | 117.88 | 109.50 |
| 1 | a | 784 | G | O3'-P-O5' | -5.58 | 95.62 | 104.00 |
| 1 | a | 300 | A | O3'-P-O5' | 5.58 | 112.37 | 104.00 |
| 1 | a | 815 | C | O3'-P-O5' | -5.58 | 95.63 | 104.00 |
| 2 | b | 6 | G | O3'-P-O5' | -5.58 | 95.64 | 104.00 |
| 1 | a | 470 | A | C4'-C3'-O3' | -5.57 | 104.65 | 113.00 |
| 1 | a | 2525 | G | C4'-C3'-C2' | -5.56 | 97.04 | 102.60 |
| 1 | a | 633 | A | O3'-P-O5' | 5.56 | 112.34 | 104.00 |
| 1 | a | 271 | G | O3'-P-O5' | -5.55 | 95.68 | 104.00 |
| 1 | a | 1005 | C | C4'-C3'-O3' | -5.54 | 104.68 | 113.00 |
| 1 | a | 2573 | C | O3'-P-O5' | -5.54 | 95.68 | 104.00 |
| 1 | a | 1976 | U | C3'-C2'-O2' | 5.53 | 118.99 | 110.70 |
| 1 | a | 526 | A | C3'-C2'-C1' | 5.52 | 106.82 | 101.30 |
| 21 | u | 44 | HIS | CA-CB-CG | -5.51 | 108.29 | 113.80 |
| 9 | i | 85 | LYS | CB-CA-C | -5.50 | 100.20 | 109.50 |
| 1 | a | 2203 | U | C4'-C3'-O3' | -5.50 | 104.75 | 113.00 |
| 1 | a | 588 | U | C4'-C3'-O3' | -5.49 | 104.76 | 113.00 |
| 1 | a | 750 | A | C4'-C3'-O3' | -5.48 | 104.77 | 113.00 |
| 1 | a | 697 | G | O3'-P-O5' | -5.48 | 95.78 | 104.00 |
| 1 | a | 1251 | C | O3'-P-O5' | -5.48 | 95.78 | 104.00 |
| 1 | a | 1039 | A | O3'-P-O5' | -5.48 | 95.78 | 104.00 |
| 1 | a | 2620 | C | C3'-C2'-O2' | 5.48 | 118.91 | 110.70 |
| 1 | a | 1240 | U | C4'-C3'-O3' | -5.47 | 104.79 | 113.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 28 | 1 | 12 | ARG | NE-CZ-NH1 | -5.47 | 116.03 | 121.50 |
| 1 | a | 1543 | G | O3'-P-O5' | -5.46 | 95.80 | 104.00 |
| 1 | a | 330 | A | O3'-P-O5' | -5.46 | 95.81 | 104.00 |
| 1 | a | 2272 | U | O3'-P-O5' | -5.46 | 95.81 | 104.00 |
| 1 | a | 2325 | G | O3'-P-O5' | -5.45 | 95.82 | 104.00 |
| 1 | a | 1787 | A | C4'-C3'-O3' | -5.45 | 104.82 | 113.00 |
| 1 | a | 352 | A | O3'-P-O5' | -5.44 | 95.84 | 104.00 |
| 1 | a | 2277 | G | O3'-P-O5' | -5.44 | 95.84 | 104.00 |
| 1 | a | 389 | G | O3'-P-O5' | -5.44 | 95.84 | 104.00 |
| 1 | a | 2612 | C | C2'-C3'-O3' | -5.44 | 105.54 | 113.70 |
| 1 | a | 738 | G | O5'-P-OP2 | -5.44 | 91.69 | 108.00 |
| 1 | a | 2725 | A | O3'-P-O5' | -5.44 | 95.85 | 104.00 |
| 1 | a | 966 | G | O3'-P-O5' | -5.43 | 95.85 | 104.00 |
| 1 | a | 480 | A | O3'-P-O5' | -5.43 | 95.86 | 104.00 |
| 1 | a | 2481 | G | C4'-C3'-O3' | -5.42 | 104.87 | 113.00 |
| 1 | a | 2546 | U | C4'-C3'-O3' | -5.41 | 104.88 | 113.00 |
| 1 | a | 2326 | C | C2'-C3'-O3' | -5.41 | 105.58 | 113.70 |
| 1 | a | 2704 | C | O3'-P-O5' | -5.41 | 95.88 | 104.00 |
| 1 | a | 2349 | G | O3'-P-O5' | -5.40 | 95.89 | 104.00 |
| 1 | a | 2578 | G | C4'-C3'-C2' | -5.40 | 97.20 | 102.60 |
| 2 | b | 7 | G | O3'-P-O5' | -5.40 | 95.90 | 104.00 |
| 1 | a | 868 | U | O3'-P-O5' | -5.39 | 95.91 | 104.00 |
| 1 | a | 1379 | U | C4'-C3'-O3' | -5.39 | 104.92 | 113.00 |
| 1 | a | 1190 | G | O4'-C4'-C3' | -5.39 | 98.61 | 104.00 |
| 1 | a | 827 | U | C2'-C3'-O3' | -5.37 | 105.65 | 113.70 |
| 1 | a | 2033 | A | C4'-C3'-O3' | 5.35 | 117.43 | 109.40 |
| 5 | e | 48 | THR | CA-CB-OG1 | -5.35 | 101.58 | 109.60 |
| 1 | a | 1769 | U | C4'-C3'-C2' | -5.34 | 97.26 | 102.60 |
| 1 | a | 2382 | G | O3'-P-O5' | -5.34 | 96.00 | 104.00 |
| 1 | a | 555 | G | N9-C1'-C2' | -5.33 | 106.00 | 114.00 |
| 1 | a | 1189 | A | O4'-C4'-C3' | -5.32 | 98.68 | 104.00 |
| 1 | a | 652 | U | O3'-P-O5' | -5.32 | 96.02 | 104.00 |
| 1 | a | 1249 | U | C4'-C3'-O3' | -5.32 | 105.03 | 113.00 |
| 1 | a | 2833 | U | O3'-P-O5' | -5.31 | 96.04 | 104.00 |
| 1 | a | 1256 | G | O3'-P-O5' | -5.31 | 96.04 | 104.00 |
| 12 | l | 8 | LYS | N-CA-CB | 5.31 | 118.50 | 110.28 |
| 1 | a | 1378 | A | O3'-P-O5' | -5.30 | 96.04 | 104.00 |
| 1 | a | 312 | G | O3'-P-O5' | -5.30 | 96.05 | 104.00 |
| 1 | a | 2499 | C | C4'-C3'-O3' | -5.29 | 105.06 | 113.00 |
| 1 | a | 412 | A | C2'-C3'-O3' | -5.28 | 105.77 | 113.70 |
| 1 | a | 1663 | G | C4'-C3'-C2' | -5.28 | 97.32 | 102.60 |
| 1 | a | 576 | U | C4'-C3'-O3' | -5.28 | 105.08 | 113.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 774 | G | O5'-C5'-C4' | -5.28 | 103.78 | 111.70 |
| 1 | a | 1255 | U | C4'-C3'-O3' | -5.28 | 105.09 | 113.00 |
| 1 | a | 1695 | G | O3'-P-O5' | -5.28 | 96.09 | 104.00 |
| 1 | a | 979 | A | C4'-C3'-C2' | -5.26 | 97.34 | 102.60 |
| 10 | j | 12 | ASP | CA-CB-CG | 5.26 | 117.86 | 112.60 |
| 1 | a | 2396 | G | C4'-C3'-C2' | -5.25 | 97.35 | 102.60 |
| 1 | a | 2716 | C | C4'-C3'-O3' | -5.25 | 105.12 | 113.00 |
| 1 | a | 384 | A | O3'-P-O5' | 5.25 | 111.88 | 104.00 |
| 1 | a | 1666 | G | C4'-C3'-C2' | -5.25 | 97.35 | 102.60 |
| 1 | a | 553 | G | C4'-C3'-C2' | -5.25 | 97.35 | 102.60 |
| 1 | a | 2490 | G | O3'-P-O5' | -5.25 | 96.13 | 104.00 |
| 1 | a | 2755 | C | O3'-P-O5' | -5.25 | 96.13 | 104.00 |
| 1 | a | 784 | G | C2'-C3'-O3' | -5.25 | 105.83 | 113.70 |
| 1 | a | 2242 | G | O3'-P-O5' | -5.25 | 96.13 | 104.00 |
| 1 | a | 1117 | C | O3'-P-O5' | -5.24 | 96.14 | 104.00 |
| 1 | a | 2335 | A | C4'-C3'-O3' | -5.23 | 105.15 | 113.00 |
| 3 | c | 36 | LYS | CB-CA-C | 5.23 | 118.59 | 109.65 |
| 3 | c | 162 | VAL | N-CA-CB | -5.23 | 103.69 | 112.47 |
| 23 | w | 51 | VAL | N-CA-CB | -5.22 | 102.88 | 111.45 |
| 1 | a | 726 | G | O3'-P-O5' | -5.22 | 96.17 | 104.00 |
| 1 | a | 1761 | C | C1'-C2'-O2' | -5.22 | 100.57 | 108.40 |
| 1 | a | 1755 | A | O3'-P-O5' | 5.22 | 111.83 | 104.00 |
| 17 | q | 79 | ARG | CD-NE-CZ | -5.22 | 117.09 | 124.40 |
| 1 | a | 451 | U | C1'-O4'-C4' | -5.21 | 104.69 | 109.90 |
| 1 | a | 859 | G | O3'-P-O5' | -5.21 | 96.19 | 104.00 |
| 1 | a | 2860 | A | O3'-P-O5' | 5.21 | 111.81 | 104.00 |
| 1 | a | 230 | G | O3'-P-O5' | -5.20 | 96.20 | 104.00 |
| 1 | a | 1577 | C | O3'-P-O5' | -5.20 | 96.21 | 104.00 |
| 1 | a | 369 | U | O3'-P-O5' | -5.19 | 96.21 | 104.00 |
| 1 | a | 626 | A | C4'-C3'-C2' | -5.19 | 97.41 | 102.60 |
| 1 | a | 2619 | C | C3'-C2'-O2' | 5.19 | 118.49 | 110.70 |
| 1 | a | 1027 | A | O3'-P-O5' | -5.19 | 96.22 | 104.00 |
| 1 | a | 572 | A | O3'-P-O5' | -5.17 | 96.24 | 104.00 |
| 1 | a | 2620 | C | O3'-P-O5' | -5.17 | 96.25 | 104.00 |
| 1 | a | 2696 | U | O3'-P-O5' | -5.17 | 96.25 | 104.00 |
| 1 | a | 200 | U | C4'-C3'-O3' | -5.17 | 105.25 | 113.00 |
| 1 | a | 1160 | G | O3'-P-O5' | -5.17 | 96.25 | 104.00 |
| 1 | a | 1688 | U | O3'-P-O5' | -5.16 | 96.26 | 104.00 |
| 1 | a | 692 | C | C1'-C2'-O2' | -5.16 | 100.66 | 108.40 |
| 1 | a | 2388 | A | C4'-C3'-O3' | -5.16 | 105.26 | 113.00 |
| 1 | a | 2879 | A | O3'-P-O5' | -5.16 | 96.26 | 104.00 |
| 1 | a | 130 | C | O3'-P-O5' | -5.16 | 96.27 | 104.00 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 2 | b | 89 | U | C3'-C2'-C1' | -5.16 | 96.34 | 101.50 |
| 1 | a | 2258 | C | O3'-P-O5' | -5.15 | 96.27 | 104.00 |
| 21 | u | 90 | ASP | CA-CB-CG | 5.15 | 117.75 | 112.60 |
| 1 | a | 2617 | U | C4'-C3'-O3' | -5.15 | 105.28 | 113.00 |
| 5 | e | 111 | GLU | CB-CA-C | -5.15 | 102.25 | 110.79 |
| 16 | p | 3 | ARG | NE-CZ-NH1 | -5.14 | 116.36 | 121.50 |
| 1 | a | 1407 | G | C4'-C3'-C2' | -5.14 | 97.46 | 102.60 |
| 1 | a | 1314 | C | C4'-C3'-O3' | -5.14 | 105.29 | 113.00 |
| 1 | a | 2196 | C | O3'-P-O5' | -5.13 | 96.30 | 104.00 |
| 1 | a | 331 | C | O3'-P-O5' | -5.13 | 96.31 | 104.00 |
| 1 | a | 580 | U | C3'-C2'-O2' | 5.13 | 118.39 | 110.70 |
| 1 | a | 1695 | G | C4'-C3'-O3' | -5.13 | 105.31 | 113.00 |
| 1 | a | 2055 | C | C2'-C3'-O3' | -5.13 | 106.01 | 113.70 |
| 1 | a | 2715 | C | C4'-C3'-O3' | -5.12 | 105.32 | 113.00 |
| 1 | a | 385 | C | O3'-P-O5' | -5.11 | 96.34 | 104.00 |
| 1 | a | 1486 | U | O3'-P-O5' | -5.11 | 96.34 | 104.00 |
| 1 | a | 2350 | C | O5'-C5'-C4' | -5.10 | 103.85 | 111.50 |
| 1 | a | 2699 | C | O3'-P-O5' | 5.09 | 111.63 | 104.00 |
| 1 | a | 1328 | A | O3'-P-O5' | -5.08 | 96.39 | 104.00 |
| 16 | p | 31 | VAL | N-CA-CB | -5.07 | 105.05 | 111.64 |
| 1 | a | 1737 | G | O3'-P-O5' | -5.07 | 96.40 | 104.00 |
| 1 | a | 2540 | C | C4'-C3'-C2' | -5.06 | 97.54 | 102.60 |
| 1 | a | 944 | C | C4'-C3'-C2' | -5.06 | 97.54 | 102.60 |
| 1 | a | 1790 | C | C4'-C3'-O3' | -5.06 | 105.41 | 113.00 |
| 1 | a | 1478 | G | C4'-C3'-C2' | -5.06 | 97.54 | 102.60 |
| 2 | b | 99 | A | C2'-C3'-O3' | -5.06 | 106.11 | 113.70 |
| 1 | a | 730 | A | C1'-C2'-O2' | 5.05 | 115.98 | 108.40 |
| 1 | a | 1154 | G | O3'-P-O5' | -5.05 | 96.42 | 104.00 |
| 2 | b | 24 | G | O3'-P-O5' | -5.05 | 96.43 | 104.00 |
| 1 | a | 2694 | G | C2'-C3'-O3' | -5.04 | 106.13 | 113.70 |
| 1 | a | 965 | C | C4'-C3'-O3' | -5.04 | 105.44 | 113.00 |
| 1 | a | 953 | G | C4'-C3'-C2' | -5.04 | 97.56 | 102.60 |
| 1 | a | 2430 | A | P-O5'-C5' | -5.04 | 113.34 | 120.90 |
| 2 | b | 49 | C | O3'-P-O5' | -5.04 | 96.44 | 104.00 |
| 1 | a | 113 | U | C4'-C3'-O3' | -5.04 | 105.45 | 113.00 |
| 1 | a | 2445 | 2MG | O3'-P-O5' | -5.03 | 96.45 | 104.00 |
| 1 | a | 38 | A | O3'-P-O5' | -5.03 | 96.45 | 104.00 |
| 1 | a | 762 | U | C1'-C2'-O2' | -5.03 | 104.25 | 111.80 |
| 1 | a | 2349 | G | C4'-C3'-O3' | -5.03 | 105.45 | 113.00 |
| 1 | a | 959 | A | C4'-C3'-O3' | -5.03 | 105.46 | 113.00 |
| 1 | a | 2207 | C | O3'-P-O5' | -5.03 | 96.46 | 104.00 |
| 13 | m | 29 | VAL | N-CA-C | -5.03 | 105.59 | 110.42 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 1835 | 2MG | O3'-P-O5' | -5.02 | 96.47 | 104.00 |
| 1 | a | 2045 | C | O3'-P-O5' | -5.02 | 96.47 | 104.00 |
| 14 | n | 10 | ARG | N-CA-CB | -5.02 | 102.06 | 110.39 |
| 1 | a | 2455 | G | C4'-C3'-O3' | -5.01 | 105.49 | 113.00 |
| 1 | a | 1378 | A | C2'-C3'-O3' | 5.00 | 117.01 | 109.50 |
| 7 | g | 114 | ASP | CA-CB-CG | 5.00 | 117.60 | 112.60 |
| 1 | a | 122 | G | C1'-C2'-O2' | 5.00 | 115.90 | 108.40 |

There are no chirality outliers.

All (64) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|---|---|---|---|---|
| 29 | 2 | 13 | ARG | Sidechain |
| 29 | 2 | 40 | ARG | Sidechain |
| 31 | 6 | 95 | ARG | Sidechain |
| 1 | a | 2375 | G | Sidechain |
| 1 | a | 249 | C | Sidechain |
| 1 | a | 463 | G | Sidechain |
| 1 | a | 512 | G | Sidechain |
| 3 | c | 156 | ARG | Sidechain |
| 3 | c | 189 | ARG | Sidechain |
| 3 | c | 203 | ARG | Sidechain |
| 3 | c | 217 | ARG | Sidechain |
| 3 | c | 69 | ARG | Sidechain |
| 3 | c | 87 | ARG | Sidechain |
| 4 | d | 169 | ARG | Sidechain |
| 4 | d | 46 | ARG | Sidechain |
| 4 | d | 59 | ARG | Sidechain |
| 5 | e | 114 | ARG | Sidechain |
| 5 | e | 117 | ARG | Sidechain |
| 5 | e | 21 | ARG | Sidechain |
| 5 | e | 88 | ARG | Sidechain |
| 6 | f | 125 | ARG | Sidechain |
| 7 | g | 95 | ARG | Sidechain |
| 9 | i | 120 | ARG | Sidechain |
| 9 | i | 35 | ARG | Sidechain |
| 9 | i | 37 | ARG | Sidechain |
| 9 | i | 95 | ARG | Sidechain |
| 9 | i | 96 | ARG | Sidechain |
| 10 | j | 108 | ARG | Sidechain |
| 10 | j | 98 | ARG | Sidechain |
| 11 | k | 41 | ARG | Sidechain |

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| Mol | Chain | Res | Type | Group |
|---|---|---|---|---|
| 11 | k | 59 | ARG | Sidechain |
| 12 | l | 10 | ARG | Sidechain |
| 12 | l | 114 | ARG | Sidechain |
| 12 | l | 44 | ARG | Sidechain |
| 12 | l | 50 | ARG | Sidechain |
| 12 | l | 51 | ARG | Sidechain |
| 12 | l | 55 | ARG | Sidechain |
| 12 | l | 66 | ARG | Sidechain |
| 13 | m | 2 | ARG | Sidechain |
| 13 | m | 22 | ARG | Sidechain |
| 13 | m | 63 | ARG | Sidechain |
| 13 | m | 64 | ARG | Sidechain |
| 14 | n | 81 | ARG | Sidechain |
| 15 | o | 51 | ARG | Sidechain |
| 15 | o | 53 | ARG | Sidechain |
| 16 | p | 11 | ARG | Sidechain |
| 16 | p | 28 | ARG | Sidechain |
| 16 | p | 51 | ARG | Sidechain |
| 17 | q | 68 | ARG | Sidechain |
| 18 | r | 110 | ARG | Sidechain |
| 18 | r | 8 | ARG | Sidechain |
| 18 | r | 84 | ARG | Sidechain |
| 20 | t | 22 | ARG | Sidechain |
| 20 | t | 7 | ARG | Sidechain |
| 20 | t | 86 | ARG | Sidechain |
| 20 | t | 94 | ARG | Sidechain |
| 21 | u | 79 | ARG | Sidechain |
| 22 | v | 14 | ARG | Sidechain |
| 23 | w | 45 | ARG | Sidechain |
| 23 | w | 74 | ARG | Sidechain |
| 24 | x | 7 | ARG | Sidechain |
| 25 | y | 38 | ARG | Sidechain |
| 26 | z | 13 | ARG | Sidechain |
| 26 | z | 17 | ARG | Sidechain |

## 5.2 Too-close contacts (i)

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | a | 58794 | 26827 | 29597 | 116 | 0 |
| 2 | b | 2549 | 1171 | 1291 | 2 | 0 |
| 3 | c | 2082 | 2114 | 2154 | 11 | 0 |
| 4 | d | 1566 | 1586 | 1618 | 9 | 0 |
| 5 | e | 1552 | 1590 | 1619 | 3 | 0 |
| 6 | f | 1410 | 1421 | 1444 | 10 | 0 |
| 7 | g | 1323 | 1347 | 1371 | 6 | 0 |
| 8 | h | 303 | 324 | 327 | 4 | 0 |
| 9 | i | 1129 | 1137 | 1162 | 8 | 0 |
| 10 | j | 942 | 1004 | 1019 | 5 | 0 |
| 11 | k | 1053 | 1111 | 1129 | 6 | 0 |
| 12 | l | 1075 | 1142 | 1145 | 3 | 0 |
| 13 | m | 945 | 971 | 989 | 5 | 0 |
| 14 | n | 892 | 908 | 923 | 1 | 0 |
| 15 | o | 917 | 947 | 962 | 2 | 0 |
| 16 | p | 947 | 1008 | 1019 | 5 | 0 |
| 17 | q | 816 | 825 | 839 | 3 | 0 |
| 18 | r | 857 | 904 | 922 | 3 | 0 |
| 19 | s | 738 | 795 | 807 | 4 | 0 |
| 20 | t | 779 | 823 | 831 | 7 | 0 |
| 21 | u | 753 | 770 | 780 | 1 | 0 |
| 22 | v | 586 | 586 | 596 | 2 | 0 |
| 23 | w | 625 | 638 | 652 | 2 | 0 |
| 24 | x | 501 | 526 | 531 | 1 | 0 |
| 25 | y | 449 | 479 | 488 | 1 | 0 |
| 26 | z | 444 | 443 | 458 | 6 | 0 |
| 27 | 0 | 417 | 441 | 451 | 1 | 0 |
| 28 | 1 | 377 | 411 | 418 | 2 | 0 |
| 29 | 2 | 504 | 561 | 572 | 3 | 0 |
| 30 | 3 | 302 | 337 | 340 | 2 | 0 |
| 31 | 6 | 805 | 788 | 806 | 6 | 0 |
| 32 | V | 771 | 781 | 794 | 1 | 0 |
| 33 | Z | 1620 | 743 | 819 | 2 | 0 |
| 34 | a | 195 | 0 | 0 | 0 | 0 |
| 34 | b | 5 | 0 | 0 | 0 | 0 |
| 34 | d | 1 | 0 | 0 | 0 | 0 |
| 34 | k | 1 | 0 | 0 | 0 | 0 |
| 34 | p | 1 | 0 | 0 | 0 | 0 |
| 34 | z | 1 | 0 | 0 | 0 | 0 |
| 35 | 3 | 1 | 0 | 0 | 0 | 0 |
| 36 | Z | 8 | 6 | 3 | 0 | 0 |
| All | All | 89036 | 55465 | 58876 | 215 | 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.

All (215) 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:568:U:H1' | 1:a:2030:6MZ:H9C1 | 1.78 | 0.65 |
| 8:h:9:VAL:HB | 8:h:12:LEU:HD11 | 1.81 | 0.61 |
| 5:e:200:LEU:O | 5:e:201:ALA:C | 2.46 | 0.59 |
| 1:a:1182:G:H2' | 1:a:1183:U:O4' | 2.04 | 0.57 |
| 9:i:18:VAL:HG21 | 9:i:142:ILE:HD12 | 1.87 | 0.57 |
| 1:a:2478:A:OP2 | 30:3:2:LYS:NZ | 2.36 | 0.56 |
| 5:e:41:GLN:HG2 | 5:e:43:THR:HG23 | 1.86 | 0.56 |
| 9:i:142:ILE:OXT | 9:i:142:ILE:HG22 | 2.05 | 0.56 |
| 1:a:788:A:OP1 | 1:a:790:U:H5 | 1.88 | 0.56 |
| 21:u:75:GLN:HB2 | 21:u:92:VAL:HG23 | 1.88 | 0.55 |
| 8:h:12:LEU:HD12 | 8:h:13:GLY:N | 2.21 | 0.55 |
| 1:a:2900:A:H2' | 1:a:2901:C:O4' | 2.07 | 0.54 |
| 1:a:1980:G:O2' | 1:a:1982:U:OP2 | 2.26 | 0.54 |
| 11:k:77:ILE:HD13 | 11:k:108:ALA:HB1 | 1.90 | 0.54 |
| 1:a:1320:C:N3 | 1:a:1331:G:O6 | 2.42 | 0.53 |
| 9:i:141:ASP:O | 9:i:142:ILE:C | 2.52 | 0.53 |
| 19:s:61:LEU:HD12 | 19:s:61:LEU:C | 2.33 | 0.53 |
| 1:a:1115:G:O2' | 1:a:1116:G:O5' | 2.27 | 0.52 |
| 1:a:1607:C:H42 | 1:a:1622:G:P | 2.33 | 0.52 |
| 13:m:55:ALA:HB1 | 13:m:79:LEU:O | 2.11 | 0.51 |
| 7:g:103:ILE:HG22 | 7:g:105:LEU:CD2 | 2.41 | 0.51 |
| 1:a:1778:U:H2' | 1:a:1784:A:N6 | 2.25 | 0.51 |
| 2:b:42:C:C5 | 6:f:66:LEU:HD22 | 2.46 | 0.51 |
| 11:k:132:ARG:HG3 | 11:k:142:ILE:HD12 | 1.93 | 0.50 |
| 3:c:107:PRO:HD2 | 3:c:110:LEU:HD22 | 1.94 | 0.50 |
| 1:a:1338:G:O2' | 1:a:1393:A:N1 | 2.39 | 0.50 |
| 1:a:1932:A:H2' | 1:a:1933:G:O4' | 2.12 | 0.49 |
| 1:a:1275:A:N1 | 1:a:1295:C:O2' | 2.38 | 0.49 |
| 4:d:208:LYS:O | 4:d:209:ALA:C | 2.56 | 0.49 |
| 3:c:31:ALA:N | 3:c:32:PRO:CD | 2.76 | 0.49 |
| 1:a:2243:U:H2' | 1:a:2244:U:C6 | 2.48 | 0.49 |
| 12:l:74:THR:HA | 12:l:88:ASN:O | 2.13 | 0.49 |
| 1:a:2756:U:H1' | 1:a:2757:A:H5" | 1.94 | 0.49 |
| 1:a:1508:A:O2' | 1:a:1509:A:O4' | 2.31 | 0.48 |
| 7:g:54:PRO:HB3 | 7:g:61:GLY:HA3 | 1.93 | 0.48 |
| 1:a:273:G:N2 | 1:a:365:U:C2 | 2.82 | 0.48 |
| 4:d:110:THR:HG23 | 4:d:202:ILE:HB | 1.95 | 0.48 |
| 9:i:11:VAL:HG21 | 9:i:50:THR:HA | 1.95 | 0.48 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 4:d:181:ASP:OD2 | 4:d:184:ARG:HD2 | 2.14 | 0.48 |
| 26:z:43:ILE:HG22 | 26:z:49:TYR:HB2 | 1.95 | 0.48 |
| 28:1:15:SER:OG | 28:1:16:HIS:CD2 | 2.67 | 0.48 |
| 4:d:110:THR:CG2 | 4:d:202:ILE:HB | 2.43 | 0.48 |
| 1:a:1720:U:H2' | 1:a:1721:G:O4' | 2.14 | 0.48 |
| 23:w:6:GLN:HE21 | 23:w:50:ARG:H | 1.62 | 0.48 |
| 23:w:72:ARG:NH1 | 23:w:78:TYR:OH | 2.44 | 0.48 |
| 1:a:1494:A:H2' | 1:a:1495:A:C8 | 2.49 | 0.47 |
| 6:f:119:ALA:O | 6:f:167:ARG:NH1 | 2.45 | 0.47 |
| 10:j:114:LYS:HE3 | 31:6:77:TRP:CE3 | 2.50 | 0.47 |
| 1:a:1738:G:HO2' | 1:a:1739:A:H8 | 1.63 | 0.47 |
| 1:a:1864:U:OP1 | 1:a:2410:G:O2' | 2.29 | 0.47 |
| 20:t:33:LYS:HB3 | 20:t:64:ALA:HB1 | 1.96 | 0.47 |
| 29:2:45:ARG:N | 29:2:46:PRO:HD2 | 2.29 | 0.47 |
| 31:6:103:LEU:HD23 | 31:6:104:TRP:NE1 | 2.30 | 0.47 |
| 1:a:1027:A:C2 | 1:a:2488:G:H5' | 2.50 | 0.47 |
| 30:3:16:ILE:HD13 | 30:3:25:VAL:HG22 | 1.97 | 0.47 |
| 3:c:29:PRO:HG2 | 3:c:34:LEU:HD11 | 1.97 | 0.47 |
| 16:p:91:ASP:C | 16:p:91:ASP:OD1 | 2.57 | 0.47 |
| 22:v:37:ILE:HG21 | 22:v:80:ILE:HG21 | 1.97 | 0.47 |
| 1:a:191:A:H2' | 1:a:192:C:C6 | 2.50 | 0.46 |
| 1:a:468:G:N7 | 28:1:39:ARG:NH2 | 2.56 | 0.46 |
| 1:a:2312:U:H5' | 6:f:85:ILE:HD11 | 1.96 | 0.46 |
| 10:j:98:ARG:CZ | 31:6:103:LEU:HD13 | 2.45 | 0.46 |
| 11:k:77:ILE:HD12 | 11:k:77:ILE:N | 2.30 | 0.46 |
| 1:a:645:C:H2' | 1:a:647:G:C8 | 2.51 | 0.46 |
| 1:a:1028:A:N6 | 1:a:1125:G:H2' | 2.31 | 0.46 |
| 1:a:479:A:N3 | 1:a:481:G:H5" | 2.30 | 0.46 |
| 2:b:32:U:C2 | 2:b:51:G:N2 | 2.83 | 0.46 |
| 1:a:1924:C:H2' | 1:a:1925:C:O4' | 2.16 | 0.46 |
| 1:a:2291:U:OP1 | 1:a:2380:C:O2' | 2.32 | 0.46 |
| 1:a:2327:A:H2' | 1:a:2328:A:C8 | 2.51 | 0.46 |
| 1:a:2615:U:C2 | 26:z:4:GLN:HA | 2.50 | 0.46 |
| 25:y:5:ILE:HG22 | 25:y:59:GLU:HB3 | 1.96 | 0.46 |
| 1:a:2328:A:H2' | 1:a:2329:U:C6 | 2.50 | 0.46 |
| 1:a:1340:U:OP1 | 19:s:19:LYS:NZ | 2.43 | 0.46 |
| 33:Z:8:U:C5 | 33:Z:13:C:C5 | 3.03 | 0.46 |
| 1:a:1595:C:H2' | 1:a:1596:A:O4' | 2.16 | 0.46 |
| 13:m:13:ASN:C | 13:m:13:ASN:OD1 | 2.58 | 0.46 |
| 1:a:703:U:H2' | 1:a:704:G:O4' | 2.16 | 0.46 |
| 1:a:984:A:N3 | 1:a:984:A:H2' | 2.31 | 0.46 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:a:2532:G:O2' | 1:a:2657:A:N1 | 2.44 | 0.46 |
| 18:r:7:HIS:HB2 | 18:r:50:VAL:HG22 | 1.98 | 0.46 |
| 1:a:2273:A:H2' | 1:a:2274:A:C8 | 2.51 | 0.46 |
| 7:g:45:HIS:O | 7:g:49:THR:O | 2.34 | 0.46 |
| 20:t:36:VAL:HB | 20:t:39:ILE:HG12 | 1.97 | 0.46 |
| 31:6:23:ILE:HD12 | 31:6:25:LEU:HD21 | 1.97 | 0.46 |
| 1:a:693:A:O2' | 1:a:1353:A:N3 | 2.45 | 0.45 |
| 1:a:2522:U:O2' | 1:a:2647:U:OP1 | 2.26 | 0.45 |
| 1:a:1542:U:H2' | 1:a:1543:G:O4' | 2.15 | 0.45 |
| 1:a:1577:C:H2' | 1:a:1578:U:O4' | 2.17 | 0.45 |
| 1:a:1754:A:O3' | 15:o:103:ARG:NH2 | 2.48 | 0.45 |
| 1:a:1853:A:N1 | 1:a:2087:G:H1' | 2.30 | 0.45 |
| 1:a:580:U:H2' | 1:a:581:C:C6 | 2.52 | 0.45 |
| 1:a:1115:G:O2' | 1:a:1116:G:H8 | 2.00 | 0.45 |
| 1:a:483:A:H5" | 20:t:47:LYS:HD2 | 1.99 | 0.45 |
| 4:d:14:ILE:HA | 15:o:12:GLN:HE22 | 1.81 | 0.45 |
| 16:p:97:ASP:OD2 | 17:q:13:ARG:NE | 2.48 | 0.45 |
| 1:a:2314:A:H1' | 6:f:155:THR:HG21 | 1.98 | 0.45 |
| 1:a:2585:U:O2 | 1:a:2585:U:O4' | 2.35 | 0.45 |
| 13:m:24:MET:HE1 | 13:m:40:LYS:HD3 | 1.98 | 0.45 |
| 32:V:21:TYR:CE1 | 32:V:30:MET:HG3 | 2.52 | 0.45 |
| 3:c:155:ALA:HB2 | 3:c:162:VAL:HG23 | 1.98 | 0.45 |
| 1:a:1048:A:C8 | 1:a:1111:A:N1 | 2.85 | 0.45 |
| 1:a:1905:C:H5" | 1:a:1906:G:OP1 | 2.17 | 0.45 |
| 9:i:43:GLU:O | 9:i:44:TYR:C | 2.60 | 0.45 |
| 1:a:644:A:H2' | 1:a:645:C:O4' | 2.17 | 0.44 |
| 3:c:5:LYS:HD2 | 3:c:17:VAL:HG22 | 2.00 | 0.44 |
| 12:l:53:MET:HG3 | 12:l:120:ALA:HB2 | 1.99 | 0.44 |
| 1:a:263:G:H2' | 1:a:264:C:O4' | 2.16 | 0.44 |
| 20:t:47:LYS:HE3 | 20:t:48:PRO:HD2 | 1.98 | 0.44 |
| 1:a:548:G:H2' | 1:a:549:G:C1' | 2.46 | 0.44 |
| 1:a:1474:U:C4 | 1:a:1475:G:C6 | 3.06 | 0.44 |
| 1:a:2191:A:N3 | 1:a:2191:A:H2' | 2.32 | 0.44 |
| 5:e:168:ASP:OD2 | 5:e:170:ARG:NH1 | 2.50 | 0.44 |
| 1:a:1198:U:H5' | 16:p:9:ILE:HD11 | 1.99 | 0.44 |
| 1:a:1859:U:H2' | 1:a:1860:G:O4' | 2.18 | 0.44 |
| 1:a:2491:U:H5" | 1:a:2570:G:H5" | 2.00 | 0.44 |
| 1:a:2293:G:H2' | 1:a:2294:G:O4' | 2.18 | 0.44 |
| 1:a:1048:A:C8 | 1:a:1111:A:C6 | 3.06 | 0.43 |
| 1:a:2469:A:H4' | 12:l:55:ARG:CD | 2.48 | 0.43 |
| 7:g:72:LEU:HD23 | 7:g:75:MET:SD | 2.58 | 0.43 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:a:12:U:O2 | 1:a:12:U:H2' | 2.17 | 0.43 |
| 1:a:2581:G:N3 | 1:a:2581:G:H2' | 2.33 | 0.43 |
| 1:a:1021:A:H3' | 1:a:1021:A:N3 | 2.32 | 0.43 |
| 1:a:1832:C:N4 | 1:a:1833:C:C4 | 2.87 | 0.43 |
| 1:a:5:A:H2' | 1:a:6:A:C8 | 2.53 | 0.43 |
| 4:d:8:LYS:HB2 | 4:d:201:LEU:HD11 | 2.00 | 0.43 |
| 17:q:1:MET:HA | 17:q:42:ALA:O | 2.18 | 0.43 |
| 1:a:723:C:H2' | 1:a:724:U:O4' | 2.17 | 0.43 |
| 1:a:811:U:H2' | 11:k:21:ARG:HA | 1.99 | 0.43 |
| 6:f:50:LEU:HD11 | 6:f:67:ILE:HD12 | 2.00 | 0.43 |
| 1:a:1434:A:H2' | 1:a:1435:G:C8 | 2.54 | 0.43 |
| 24:x:26:PHE:CE1 | 24:x:30:MET:HE3 | 2.53 | 0.43 |
| 1:a:276:U:O2' | 1:a:278:A:N7 | 2.52 | 0.43 |
| 1:a:1328:A:H2' | 1:a:1330:C:C5 | 2.54 | 0.43 |
| 1:a:1607:C:H4' | 1:a:1608:A:O5' | 2.19 | 0.43 |
| 6:f:12:VAL:HA | 6:f:15:LYS:HE3 | 2.01 | 0.43 |
| 20:t:94:ARG:HB3 | 20:t:103:ILE:HD12 | 2.00 | 0.43 |
| 1:a:493:G:H2' | 1:a:494:G:O4' | 2.19 | 0.43 |
| 1:a:2063:C:O2 | 1:a:2450:A:N1 | 2.52 | 0.43 |
| 1:a:2291:U:H2' | 1:a:2292:U:C6 | 2.54 | 0.43 |
| 16:p:76:TYR:CZ | 16:p:80:ILE:HG13 | 2.54 | 0.43 |
| 1:a:24:G:O2' | 18:r:77:ASP:HB3 | 2.19 | 0.43 |
| 1:a:829:A:N7 | 1:a:2248:C:H5' | 2.34 | 0.42 |
| 6:f:65:PRO:HA | 6:f:89:VAL:HG22 | 2.00 | 0.42 |
| 9:i:13:ARG:NH1 | 9:i:49:ASP:O | 2.42 | 0.42 |
| 1:a:476:G:H4' | 1:a:502:A:N1 | 2.34 | 0.42 |
| 7:g:89:LEU:HD22 | 7:g:162:VAL:HG22 | 2.01 | 0.42 |
| 10:j:1:MET:HE3 | 10:j:32:TYR:CE2 | 2.54 | 0.42 |
| 1:a:207:A:H2' | 1:a:208:C:O4' | 2.20 | 0.42 |
| 1:a:1730:C:O2' | 1:a:1731:G:P | 2.77 | 0.42 |
| 1:a:1799:G:N7 | 3:c:178:SER:OG | 2.46 | 0.42 |
| 3:c:118:SER:HB2 | 3:c:129:THR:HB | 2.00 | 0.42 |
| 26:z:55:ILE:O | 26:z:55:ILE:HG13 | 2.19 | 0.42 |
| 4:d:48:ILE:HG23 | 4:d:84:LEU:HD11 | 2.01 | 0.42 |
| 6:f:138:PHE:HA | 6:f:139:PRO:HD3 | 1.95 | 0.42 |
| 1:a:2365:G:N7 | 29:2:39:LYS:NZ | 2.58 | 0.42 |
| 1:a:1541:C:H2' | 1:a:1542:U:O4' | 2.20 | 0.42 |
| 9:i:96:ARG:HD2 | 9:i:99:ARG:HG3 | 2.02 | 0.42 |
| 11:k:57:LEU:HD22 | 29:2:54:ASP:HB3 | 2.00 | 0.42 |
| 22:v:59:LEU:HD12 | 22:v:80:ILE:HD12 | 2.00 | 0.42 |
| 1:a:340:A:H2' | 1:a:341:C:O4' | 2.19 | 0.42 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 6:f:61:SER:HB2 | 6:f:91:LEU:HD21 | 2.00 | 0.42 |
| 13:m:55:ALA:HA | 13:m:80:PHE:CE2 | 2.55 | 0.42 |
| 14:n:99:TYR:OH | 14:n:111:ARG:NH2 | 2.49 | 0.41 |
| 19:s:53:VAL:HG11 | 19:s:93:LEU:HB2 | 2.01 | 0.41 |
| 1:a:2552:OMU:H6 | 1:a:2552:OMU:O5' | 2.19 | 0.41 |
| 1:a:2887:A:N3 | 26:z:27:SER:OG | 2.50 | 0.41 |
| 1:a:639:U:H2' | 1:a:640:C:C6 | 2.55 | 0.41 |
| 1:a:1736:U:H2' | 1:a:1737:G:O4' | 2.20 | 0.41 |
| 8:h:6:LEU:HD11 | 8:h:37:VAL:HG13 | 2.02 | 0.41 |
| 1:a:1664:A:N3 | 10:j:67:LYS:NZ | 2.68 | 0.41 |
| 1:a:2020:A:H5' | 26:z:9:THR:CG2 | 2.50 | 0.41 |
| 4:d:156:PHE:CE1 | 9:i:81:ILE:HD13 | 2.56 | 0.41 |
| 1:a:391:A:H1' | 1:a:411:G:O4' | 2.21 | 0.41 |
| 1:a:1721:G:H1' | 1:a:1739:A:H61 | 1.86 | 0.41 |
| 1:a:2419:U:H4' | 27:0:22:THR:HG21 | 2.03 | 0.41 |
| 6:f:152:LEU:HD12 | 6:f:152:LEU:C | 2.45 | 0.41 |
| 26:z:52:ARG:CZ | 26:z:54:VAL:HG12 | 2.50 | 0.41 |
| 1:a:488:G:O2' | 1:a:491:G:N7 | 2.41 | 0.41 |
| 8:h:12:LEU:HD12 | 8:h:12:LEU:C | 2.45 | 0.41 |
| 1:a:614:A:H3' | 1:a:615:U:C5' | 2.51 | 0.41 |
| 1:a:749:A:H4' | 1:a:1271:G:N3 | 2.36 | 0.41 |
| 1:a:927:A:H2' | 1:a:928:A:C8 | 2.55 | 0.41 |
| 1:a:1878:G:H2' | 1:a:1879:C:O4' | 2.21 | 0.41 |
| 1:a:1957:C:H5' | 1:a:1984:G:O2' | 2.21 | 0.41 |
| 7:g:35:ARG:NE | 7:g:71:LEU:HD13 | 2.36 | 0.41 |
| 11:k:77:ILE:CD1 | 11:k:108:ALA:HB1 | 2.50 | 0.41 |
| 16:p:40:ILE:HG22 | 16:p:44:GLN:HE21 | 1.86 | 0.41 |
| 20:t:86:ARG:HG3 | 20:t:95:PHE:CD1 | 2.56 | 0.41 |
| 1:a:373:U:O2' | 1:a:423:A:H1' | 2.21 | 0.41 |
| 1:a:1721:G:H1' | 1:a:1739:A:N6 | 2.35 | 0.41 |
| 1:a:2204:G:OP2 | 3:c:147:LYS:HE2 | 2.21 | 0.41 |
| 3:c:260:ASN:OD1 | 3:c:260:ASN:C | 2.63 | 0.41 |
| 19:s:64:LYS:HD2 | 19:s:64:LYS:N | 2.35 | 0.41 |
| 1:a:2395:C:H2' | 1:a:2396:G:O4' | 2.21 | 0.40 |
| 1:a:2622:U:O2' | 1:a:2825:G:N7 | 2.53 | 0.40 |
| 17:q:41:ILE:HD12 | 17:q:103:ALA:HA | 2.03 | 0.40 |
| 33:Z:16:U:H3' | 33:Z:17:C:C5 | 2.56 | 0.40 |
| 1:a:146:A:H2' | 1:a:147:C:O4' | 2.21 | 0.40 |
| 1:a:1805:A:N3 | 3:c:50:THR:HB | 2.36 | 0.40 |
| 1:a:2040:G:H2' | 1:a:2041:U:O4' | 2.21 | 0.40 |
| 1:a:2852:G:H2' | 1:a:2853:C:O4' | 2.21 | 0.40 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 4:d:62:LYS:N | 4:d:63:PRO:CD | 2.84 | 0.40 |
| 10:j:38:ILE:HD11 | 10:j:112:PHE:CZ | 2.57 | 0.40 |
| 20:t:54:GLN:N | 20:t:55:PRO:CD | 2.84 | 0.40 |
| 31:6:67:LEU:HD11 | 31:6:83:GLY:HA2 | 2.04 | 0.40 |
| 1:a:901:C:H2' | 1:a:902:C:O4' | 2.21 | 0.40 |
| 1:a:1730:C:HO2' | 1:a:1731:G:P | 2.43 | 0.40 |
| 3:c:13:ARG:O | 3:c:14:ARG:C | 2.64 | 0.40 |
| 1:a:2038:G:H2' | 1:a:2039:U:O4' | 2.22 | 0.40 |
| 13:m:83:LEU:O | 13:m:84:GLY:C | 2.64 | 0.40 |
| 31:6:20:GLN:HB2 | 31:6:41:THR:HB | 2.03 | 0.40 |
| 1:a:494:G:H4' | 18:r:6:LYS:HB2 | 2.02 | 0.40 |
| 1:a:1713:A:C6 | 1:a:1716:U:H1' | 2.57 | 0.40 |
| 1:a:1881:C:H2' | 1:a:1882:U:O4' | 2.22 | 0.40 |

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 | |
|---|---|---|---|---|---|---|---|
| 3 | c | 269/273 (98%) | 261 (97%) | 8 (3%) | 0 | 100 | 100 |
| 4 | d | 206/209 (99%) | 198 (96%) | 8 (4%) | 0 | 100 | 100 |
| 5 | e | 199/201 (99%) | 195 (98%) | 4 (2%) | 0 | 100 | 100 |
| 6 | f | 175/179 (98%) | 167 (95%) | 8 (5%) | 0 | 100 | 100 |
| 7 | g | 174/177 (98%) | 163 (94%) | 11 (6%) | 0 | 100 | 100 |
| 8 | h | 39/149 (26%) | 36 (92%) | 3 (8%) | 0 | 100 | 100 |
| 9 | i | 140/142 (99%) | 139 (99%) | 1 (1%) | 0 | 100 | 100 |
| 10 | j | 121/123 (98%) | 118 (98%) | 3 (2%) | 0 | 100 | 100 |
| 11 | k | 142/144 (99%) | 138 (97%) | 4 (3%) | 0 | 100 | 100 |
| 12 | l | 132/136 (97%) | 129 (98%) | 3 (2%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|---|---|---|---|---|---|---|---|
| 13 | m | 116/127 (91%) | 112 (97%) | 4 (3%) | 0 | 100 | 100 |
| 14 | n | 114/117 (97%) | 111 (97%) | 3 (3%) | 0 | 100 | 100 |
| 15 | o | 112/115 (97%) | 108 (96%) | 4 (4%) | 0 | 100 | 100 |
| 16 | p | 115/118 (98%) | 114 (99%) | 1 (1%) | 0 | 100 | 100 |
| 17 | q | 101/103 (98%) | 99 (98%) | 2 (2%) | 0 | 100 | 100 |
| 18 | r | 108/110 (98%) | 108 (100%) | 0 | 0 | 100 | 100 |
| 19 | s | 91/100 (91%) | 86 (94%) | 5 (6%) | 0 | 100 | 100 |
| 20 | t | 100/104 (96%) | 93 (93%) | 7 (7%) | 0 | 100 | 100 |
| 21 | u | 92/94 (98%) | 89 (97%) | 3 (3%) | 0 | 100 | 100 |
| 22 | v | 76/85 (89%) | 75 (99%) | 1 (1%) | 0 | 100 | 100 |
| 23 | w | 75/78 (96%) | 75 (100%) | 0 | 0 | 100 | 100 |
| 24 | x | 60/63 (95%) | 59 (98%) | 1 (2%) | 0 | 100 | 100 |
| 25 | y | 56/59 (95%) | 55 (98%) | 1 (2%) | 0 | 100 | 100 |
| 26 | z | 54/57 (95%) | 52 (96%) | 2 (4%) | 0 | 100 | 100 |
| 27 | 0 | 49/55 (89%) | 49 (100%) | 0 | 0 | 100 | 100 |
| 28 | 1 | 44/46 (96%) | 43 (98%) | 1 (2%) | 0 | 100 | 100 |
| 29 | 2 | 62/65 (95%) | 60 (97%) | 2 (3%) | 0 | 100 | 100 |
| 30 | 3 | 36/38 (95%) | 36 (100%) | 0 | 0 | 100 | 100 |
| 31 | 6 | 103/105 (98%) | 97 (94%) | 6 (6%) | 0 | 100 | 100 |
| 32 | V | 93/142 (66%) | 89 (96%) | 4 (4%) | 0 | 100 | 100 |
| All | All | 3254/3514 (93%) | 3154 (97%) | 100 (3%) | 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 | |
|---|---|---|---|---|---|---|
| 3 | c | 216/218 (99%) | 214 (99%) | 2 (1%) | 70 | 78 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|---|---|---|---|---|---|---|
| 4 | d | 163/163 (100%) | 163 (100%) | 0 | 100 | 100 |
| 5 | e | 165/165 (100%) | 165 (100%) | 0 | 100 | 100 |
| 6 | f | 148/150 (99%) | 148 (100%) | 0 | 100 | 100 |
| 7 | g | 137/138 (99%) | 136 (99%) | 1 (1%) | 76 | 81 |
| 8 | h | 32/114 (28%) | 32 (100%) | 0 | 100 | 100 |
| 9 | i | 116/116 (100%) | 116 (100%) | 0 | 100 | 100 |
| 10 | j | 103/104 (99%) | 102 (99%) | 1 (1%) | 68 | 76 |
| 11 | k | 103/103 (100%) | 103 (100%) | 0 | 100 | 100 |
| 12 | l | 107/107 (100%) | 106 (99%) | 1 (1%) | 70 | 78 |
| 13 | m | 98/103 (95%) | 98 (100%) | 0 | 100 | 100 |
| 14 | n | 86/87 (99%) | 86 (100%) | 0 | 100 | 100 |
| 15 | o | 99/100 (99%) | 99 (100%) | 0 | 100 | 100 |
| 16 | p | 89/90 (99%) | 89 (100%) | 0 | 100 | 100 |
| 17 | q | 84/84 (100%) | 84 (100%) | 0 | 100 | 100 |
| 18 | r | 93/93 (100%) | 93 (100%) | 0 | 100 | 100 |
| 19 | s | 80/84 (95%) | 80 (100%) | 0 | 100 | 100 |
| 20 | t | 83/85 (98%) | 83 (100%) | 0 | 100 | 100 |
| 21 | u | 78/78 (100%) | 78 (100%) | 0 | 100 | 100 |
| 22 | v | 58/63 (92%) | 58 (100%) | 0 | 100 | 100 |
| 23 | w | 67/68 (98%) | 66 (98%) | 1 (2%) | 57 | 66 |
| 24 | x | 54/55 (98%) | 54 (100%) | 0 | 100 | 100 |
| 25 | y | 48/49 (98%) | 48 (100%) | 0 | 100 | 100 |
| 26 | z | 47/48 (98%) | 47 (100%) | 0 | 100 | 100 |
| 27 | 0 | 46/49 (94%) | 46 (100%) | 0 | 100 | 100 |
| 28 | 1 | 38/38 (100%) | 38 (100%) | 0 | 100 | 100 |
| 29 | 2 | 51/52 (98%) | 51 (100%) | 0 | 100 | 100 |
| 30 | 3 | 34/34 (100%) | 34 (100%) | 0 | 100 | 100 |
| 31 | 6 | 90/91 (99%) | 90 (100%) | 0 | 100 | 100 |
| 32 | V | 79/121 (65%) | 79 (100%) | 0 | 100 | 100 |
| All | All | 2692/2850 (94%) | 2686 (100%) | 6 (0%) | 84 | 92 |

All (6) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 3 | c | 79 | GLU |
| 3 | c | 116 | ILE |
| 7 | g | 76 | VAL |
| 10 | j | 86 | LEU |
| 12 | l | 78 | LEU |
| 23 | w | 41 | GLU |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 3 | c | 134 | ASN |
| 5 | e | 136 | GLN |
| 7 | g | 22 | GLN |
| 7 | g | 30 | ASN |
| 8 | h | 2 | GLN |
| 9 | i | 47 | HIS |
| 9 | i | 80 | HIS |
| 9 | i | 128 | ASN |
| 12 | l | 13 | HIS |
| 12 | l | 60 | GLN |
| 15 | o | 12 | GLN |
| 16 | p | 44 | GLN |
| 17 | q | 66 | HIS |
| 18 | r | 7 | HIS |
| 18 | r | 31 | GLN |
| 18 | r | 40 | ASN |
| 20 | t | 54 | GLN |
| 21 | u | 24 | ASN |
| 21 | u | 49 | ASN |
| 23 | w | 6 | GLN |
| 23 | w | 17 | ASN |
| 24 | x | 27 | ASN |
| 26 | z | 6 | ASN |
| 29 | 2 | 31 | HIS |
| 32 | V | 74 | GLN |

### 5.3.3 RNA (i)

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|---|---|---|---|---|
| 1 | a | 2731/2904 (94%) | 334 (12%) | 0 |
| 2 | b | 118/120 (98%) | 11 (9%) | 0 |

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| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|---|---|---|---|---|
| 33 | Z | 75/77 (97%) | 17 (22%) | 3 (4%) |
| All | All | 2924/3101 (94%) | 362 (12%) | 3 (0%) |

All (362) RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 10 | A |
| 1 | a | 34 | U |
| 1 | a | 71 | A |
| 1 | a | 74 | A |
| 1 | a | 75 | G |
| 1 | a | 83 | A |
| 1 | a | 86 | G |
| 1 | a | 101 | A |
| 1 | a | 102 | U |
| 1 | a | 118 | A |
| 1 | a | 119 | A |
| 1 | a | 120 | U |
| 1 | a | 125 | A |
| 1 | a | 135 | U |
| 1 | a | 139 | U |
| 1 | a | 140 | C |
| 1 | a | 142 | A |
| 1 | a | 165 | A |
| 1 | a | 181 | A |
| 1 | a | 196 | A |
| 1 | a | 199 | A |
| 1 | a | 200 | U |
| 1 | a | 201 | C |
| 1 | a | 215 | G |
| 1 | a | 216 | A |
| 1 | a | 221 | A |
| 1 | a | 222 | A |
| 1 | a | 233 | A |
| 1 | a | 248 | G |
| 1 | a | 249 | C |
| 1 | a | 250 | G |
| 1 | a | 264 | C |
| 1 | a | 272 | A |
| 1 | a | 278 | A |
| 1 | a | 285 | G |
| 1 | a | 289 | G |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 304 | U |
| 1 | a | 310 | A |
| 1 | a | 311 | A |
| 1 | a | 329 | G |
| 1 | a | 330 | A |
| 1 | a | 356 | G |
| 1 | a | 361 | G |
| 1 | a | 362 | A |
| 1 | a | 367 | G |
| 1 | a | 386 | G |
| 1 | a | 404 | A |
| 1 | a | 405 | U |
| 1 | a | 411 | G |
| 1 | a | 412 | A |
| 1 | a | 420 | C |
| 1 | a | 425 | G |
| 1 | a | 451 | U |
| 1 | a | 456 | C |
| 1 | a | 481 | G |
| 1 | a | 491 | G |
| 1 | a | 504 | A |
| 1 | a | 505 | A |
| 1 | a | 509 | C |
| 1 | a | 530 | G |
| 1 | a | 531 | C |
| 1 | a | 532 | A |
| 1 | a | 544 | C |
| 1 | a | 545 | U |
| 1 | a | 546 | U |
| 1 | a | 547 | A |
| 1 | a | 549 | G |
| 1 | a | 563 | A |
| 1 | a | 564 | C |
| 1 | a | 573 | U |
| 1 | a | 575 | A |
| 1 | a | 586 | A |
| 1 | a | 592 | A |
| 1 | a | 603 | A |
| 1 | a | 614 | A |
| 1 | a | 615 | U |
| 1 | a | 627 | A |
| 1 | a | 637 | A |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 645 | C |
| 1 | a | 647 | G |
| 1 | a | 651 | G |
| 1 | a | 653 | U |
| 1 | a | 654 | A |
| 1 | a | 686 | U |
| 1 | a | 711 | G |
| 1 | a | 717 | C |
| 1 | a | 730 | A |
| 1 | a | 738 | G |
| 1 | a | 747 | 5MU |
| 1 | a | 764 | A |
| 1 | a | 765 | C |
| 1 | a | 775 | G |
| 1 | a | 776 | G |
| 1 | a | 782 | A |
| 1 | a | 784 | G |
| 1 | a | 785 | G |
| 1 | a | 792 | A |
| 1 | a | 802 | A |
| 1 | a | 805 | G |
| 1 | a | 812 | C |
| 1 | a | 827 | U |
| 1 | a | 828 | U |
| 1 | a | 846 | U |
| 1 | a | 847 | U |
| 1 | a | 858 | G |
| 1 | a | 859 | G |
| 1 | a | 879 | G |
| 1 | a | 881 | G |
| 1 | a | 895 | U |
| 1 | a | 896 | A |
| 1 | a | 897 | C |
| 1 | a | 910 | A |
| 1 | a | 914 | G |
| 1 | a | 915 | C |
| 1 | a | 931 | U |
| 1 | a | 933 | A |
| 1 | a | 946 | C |
| 1 | a | 961 | C |
| 1 | a | 968 | C |
| 1 | a | 974 | G |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 983 | A |
| 1 | a | 984 | A |
| 1 | a | 985 | C |
| 1 | a | 996 | A |
| 1 | a | 1005 | C |
| 1 | a | 1012 | U |
| 1 | a | 1013 | C |
| 1 | a | 1022 | G |
| 1 | a | 1026 | G |
| 1 | a | 1033 | U |
| 1 | a | 1040 | A |
| 1 | a | 1046 | A |
| 1 | a | 1047 | G |
| 1 | a | 1109 | C |
| 1 | a | 1111 | A |
| 1 | a | 1112 | G |
| 1 | a | 1115 | G |
| 1 | a | 1116 | G |
| 1 | a | 1128 | G |
| 1 | a | 1129 | A |
| 1 | a | 1132 | U |
| 1 | a | 1133 | A |
| 1 | a | 1134 | A |
| 1 | a | 1135 | C |
| 1 | a | 1136 | G |
| 1 | a | 1142 | A |
| 1 | a | 1143 | A |
| 1 | a | 1171 | G |
| 1 | a | 1172 | C |
| 1 | a | 1187 | G |
| 1 | a | 1210 | G |
| 1 | a | 1253 | A |
| 1 | a | 1256 | G |
| 1 | a | 1271 | G |
| 1 | a | 1272 | A |
| 1 | a | 1273 | U |
| 1 | a | 1300 | G |
| 1 | a | 1301 | A |
| 1 | a | 1345 | C |
| 1 | a | 1352 | U |
| 1 | a | 1365 | A |
| 1 | a | 1379 | U |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 1383 | A |
| 1 | a | 1411 | U |
| 1 | a | 1416 | G |
| 1 | a | 1419 | A |
| 1 | a | 1427 | A |
| 1 | a | 1428 | C |
| 1 | a | 1452 | G |
| 1 | a | 1453 | A |
| 1 | a | 1478 | G |
| 1 | a | 1482 | G |
| 1 | a | 1483 | G |
| 1 | a | 1493 | C |
| 1 | a | 1497 | U |
| 1 | a | 1498 | C |
| 1 | a | 1508 | A |
| 1 | a | 1510 | G |
| 1 | a | 1515 | A |
| 1 | a | 1523 | U |
| 1 | a | 1529 | G |
| 1 | a | 1534 | U |
| 1 | a | 1535 | A |
| 1 | a | 1536 | C |
| 1 | a | 1537 | G |
| 1 | a | 1569 | A |
| 1 | a | 1578 | U |
| 1 | a | 1583 | A |
| 1 | a | 1584 | U |
| 1 | a | 1585 | C |
| 1 | a | 1586 | A |
| 1 | a | 1608 | A |
| 1 | a | 1644 | C |
| 1 | a | 1647 | U |
| 1 | a | 1648 | U |
| 1 | a | 1649 | G |
| 1 | a | 1674 | G |
| 1 | a | 1686 | C |
| 1 | a | 1715 | G |
| 1 | a | 1729 | U |
| 1 | a | 1730 | C |
| 1 | a | 1731 | G |
| 1 | a | 1732 | C |
| 1 | a | 1738 | G |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 1742 | U |
| 1 | a | 1744 | A |
| 1 | a | 1764 | C |
| 1 | a | 1773 | A |
| 1 | a | 1800 | C |
| 1 | a | 1801 | A |
| 1 | a | 1807 | G |
| 1 | a | 1808 | A |
| 1 | a | 1816 | C |
| 1 | a | 1829 | A |
| 1 | a | 1839 | G |
| 1 | a | 1842 | G |
| 1 | a | 1847 | A |
| 1 | a | 1848 | A |
| 1 | a | 1858 | A |
| 1 | a | 1862 | G |
| 1 | a | 1872 | A |
| 1 | a | 1873 | G |
| 1 | a | 1906 | G |
| 1 | a | 1911 | PSU |
| 1 | a | 1920 | C |
| 1 | a | 1922 | G |
| 1 | a | 1929 | G |
| 1 | a | 1930 | G |
| 1 | a | 1931 | U |
| 1 | a | 1937 | A |
| 1 | a | 1938 | A |
| 1 | a | 1955 | U |
| 1 | a | 1960 | A |
| 1 | a | 1965 | C |
| 1 | a | 1967 | C |
| 1 | a | 1970 | A |
| 1 | a | 1971 | U |
| 1 | a | 1972 | G |
| 1 | a | 1987 | A |
| 1 | a | 1991 | U |
| 1 | a | 1993 | U |
| 1 | a | 2020 | A |
| 1 | a | 2023 | C |
| 1 | a | 2031 | A |
| 1 | a | 2033 | A |
| 1 | a | 2043 | C |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 2055 | C |
| 1 | a | 2056 | G |
| 1 | a | 2060 | A |
| 1 | a | 2061 | G |
| 1 | a | 2062 | A |
| 1 | a | 2069 | G7M |
| 1 | a | 2093 | G |
| 1 | a | 2192 | U |
| 1 | a | 2198 | A |
| 1 | a | 2203 | U |
| 1 | a | 2204 | G |
| 1 | a | 2211 | A |
| 1 | a | 2221 | G |
| 1 | a | 2223 | G |
| 1 | a | 2225 | A |
| 1 | a | 2238 | G |
| 1 | a | 2244 | U |
| 1 | a | 2268 | A |
| 1 | a | 2282 | G |
| 1 | a | 2283 | C |
| 1 | a | 2287 | A |
| 1 | a | 2305 | U |
| 1 | a | 2307 | G |
| 1 | a | 2308 | G |
| 1 | a | 2312 | U |
| 1 | a | 2322 | A |
| 1 | a | 2325 | G |
| 1 | a | 2335 | A |
| 1 | a | 2340 | A |
| 1 | a | 2347 | C |
| 1 | a | 2361 | G |
| 1 | a | 2366 | A |
| 1 | a | 2372 | U |
| 1 | a | 2383 | G |
| 1 | a | 2385 | C |
| 1 | a | 2402 | U |
| 1 | a | 2403 | C |
| 1 | a | 2406 | A |
| 1 | a | 2424 | C |
| 1 | a | 2425 | A |
| 1 | a | 2429 | G |
| 1 | a | 2430 | A |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 2431 | U |
| 1 | a | 2435 | A |
| 1 | a | 2441 | U |
| 1 | a | 2448 | A |
| 1 | a | 2459 | A |
| 1 | a | 2474 | U |
| 1 | a | 2476 | A |
| 1 | a | 2491 | U |
| 1 | a | 2502 | G |
| 1 | a | 2505 | G |
| 1 | a | 2506 | U |
| 1 | a | 2507 | C |
| 1 | a | 2518 | A |
| 1 | a | 2529 | G |
| 1 | a | 2547 | A |
| 1 | a | 2566 | A |
| 1 | a | 2567 | G |
| 1 | a | 2573 | C |
| 1 | a | 2574 | G |
| 1 | a | 2602 | A |
| 1 | a | 2603 | G |
| 1 | a | 2609 | U |
| 1 | a | 2613 | U |
| 1 | a | 2629 | U |
| 1 | a | 2660 | A |
| 1 | a | 2661 | G |
| 1 | a | 2663 | G |
| 1 | a | 2689 | U |
| 1 | a | 2690 | U |
| 1 | a | 2714 | G |
| 1 | a | 2726 | A |
| 1 | a | 2744 | G |
| 1 | a | 2748 | A |
| 1 | a | 2757 | A |
| 1 | a | 2765 | A |
| 1 | a | 2790 | U |
| 1 | a | 2791 | G |
| 1 | a | 2793 | C |
| 1 | a | 2798 | U |
| 1 | a | 2799 | A |
| 1 | a | 2820 | A |
| 1 | a | 2821 | A |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | a | 2867 | G |
| 1 | a | 2868 | A |
| 1 | a | 2884 | U |
| 1 | a | 2899 | A |
| 2 | b | 35 | C |
| 2 | b | 37 | C |
| 2 | b | 44 | G |
| 2 | b | 45 | A |
| 2 | b | 56 | G |
| 2 | b | 57 | A |
| 2 | b | 58 | A |
| 2 | b | 89 | U |
| 2 | b | 90 | C |
| 2 | b | 99 | A |
| 2 | b | 109 | A |
| 33 | Z | 5 | C |
| 33 | Z | 9 | A |
| 33 | Z | 17 | C |
| 33 | Z | 18 | G |
| 33 | Z | 19 | U |
| 33 | Z | 20 | U |
| 33 | Z | 21 | A |
| 33 | Z | 29 | U |
| 33 | Z | 31 | C |
| 33 | Z | 46 | G |
| 33 | Z | 47 | U |
| 33 | Z | 53 | G |
| 33 | Z | 58 | A |
| 33 | Z | 64 | G |
| 33 | Z | 69 | U |
| 33 | Z | 71 | C |
| 33 | Z | 76 | A |

All (3) RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 33 | Z | 18 | G |
| 33 | Z | 19 | U |
| 33 | Z | 48 | C |

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

25 non-standard protein/DNA/RNA residues are modelled in this entry.

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 | $\#\|Z\| > 2$ |
| 1 | 5MU | a | 747 | 1 | 19,22,23 | 0.50 | 0 | 28,32,35 | 0.60 | 1 (3%) |
| 1 | PSU | a | 2605 | 1 | 18,21,22 | 0.88 | 2 (11%) | 22,30,33 | 0.89 | 1 (4%) |
| 1 | PSU | a | 1911 | 1 | 18,21,22 | 0.94 | 1 (5%) | 22,30,33 | 0.65 | 0 |
| 1 | OMU | a | 2552 | 1 | 19,22,23 | 0.41 | 0 | 26,31,34 | 0.59 | 0 |
| 1 | H2U | a | 2449 | 1 | 18,21,22 | 0.92 | 2 (11%) | 21,30,33 | 1.11 | 2 (9%) |
| 1 | OMC | a | 2498 | 34,1 | 19,22,23 | 0.46 | 0 | 26,31,34 | 0.68 | 0 |
| 1 | PSU | a | 2504 | 1 | 18,21,22 | 1.08 | 1 (5%) | 22,30,33 | 0.92 | 1 (4%) |
| 1 | PSU | a | 2457 | 1 | 18,21,22 | 1.02 | 2 (11%) | 22,30,33 | 0.64 | 0 |
| 12 | 4D4 | l | 81 | 12 | 9,11,12 | 0.72 | 0 | 8,13,15 | 0.74 | 0 |
| 1 | 6MZ | a | 1618 | 1 | 22,25,26 | 0.58 | 0 | 30,36,39 | 0.74 | 0 |
| 1 | OMG | a | 2251 | 33,1 | 23,26,27 | 0.41 | 0 | 33,38,41 | 0.52 | 0 |
| 1 | 2MG | a | 1835 | 1 | 23,26,27 | 0.40 | 0 | 32,38,41 | 0.60 | 0 |
| 1 | PSU | a | 2604 | 1 | 18,21,22 | 0.82 | 1 (5%) | 22,30,33 | 0.83 | 1 (4%) |
| 1 | PSU | a | 746 | 34,1 | 18,21,22 | 1.13 | 2 (11%) | 22,30,33 | 0.88 | 0 |
| 1 | 1MG | a | 745 | 1 | 22,26,27 | 0.81 | 1 (4%) | 33,39,42 | 0.75 | 1 (3%) |
| 12 | MS6 | l | 82 | 12 | 5,7,8 | 0.42 | 0 | 2,7,9 | 1.17 | 0 |
| 1 | 2MA | a | 2503 | 34,1 | 22,25,26 | 0.98 | 3 (13%) | 33,37,40 | 1.42 | 5 (15%) |
| 4 | MEQ | d | 150 | 4 | 8,9,10 | 0.64 | 0 | 5,10,12 | 0.68 | 0 |
| 1 | 5MC | a | 1962 | 1 | 18,22,23 | 0.41 | 0 | 26,32,35 | 0.89 | 1 (3%) |
| 1 | 2MG | a | 2445 | 1 | 23,26,27 | 0.60 | 0 | 32,38,41 | 0.62 | 0 |
| 1 | PSU | a | 955 | 1 | 18,21,22 | 0.91 | 0 | 22,30,33 | 0.92 | 1 (4%) |
| 1 | PSU | a | 2580 | 1 | 18,21,22 | 0.93 | 0 | 22,30,33 | 1.05 | 1 (4%) |
| 1 | 6MZ | a | 2030 | 1 | 22,25,26 | 0.94 | 1 (4%) | 30,36,39 | 0.90 | 1 (3%) |
| 1 | G7M | a | 2069 | 1 | 23,26,27 | 0.96 | 1 (4%) | 35,39,42 | 0.91 | 2 (5%) |
| 1 | 5MU | a | 1939 | 1 | 19,22,23 | 0.44 | 0 | 28,32,35 | 0.53 | 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.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|---|---|---|---|---|---|---|---|
| 1 | 5MU | a | 747 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | PSU | a | 2605 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | PSU | a | 1911 | 1 | - | 2/7/25/26 | 0/2/2/2 |
| 1 | OMU | a | 2552 | 1 | - | 0/9/27/28 | 0/2/2/2 |
| 1 | H2U | a | 2449 | 1 | - | 0/7/38/39 | 0/2/2/2 |
| 1 | OMC | a | 2498 | 34,1 | - | 0/9/27/28 | 0/2/2/2 |
| 1 | PSU | a | 2504 | 1 | - | 1/7/25/26 | 0/2/2/2 |
| 1 | PSU | a | 2457 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 12 | 4D4 | l | 81 | 12 | - | 2/11/12/14 | - |
| 1 | 6MZ | a | 1618 | 1 | - | 0/9/27/28 | 0/3/3/3 |
| 1 | OMG | a | 2251 | 33,1 | - | 0/9/27/28 | 0/3/3/3 |
| 1 | 2MG | a | 1835 | 1 | - | 0/9/27/28 | 0/3/3/3 |
| 1 | PSU | a | 2604 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | PSU | a | 746 | 34,1 | - | 1/7/25/26 | 0/2/2/2 |
| 1 | 1MG | a | 745 | 1 | - | 0/7/25/26 | 0/3/3/3 |
| 12 | MS6 | l | 82 | 12 | - | 1/4/6/8 | - |
| 1 | 2MA | a | 2503 | 34,1 | - | 3/7/25/26 | 0/3/3/3 |
| 4 | MEQ | d | 150 | 4 | - | 5/8/9/11 | - |
| 1 | 5MC | a | 1962 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | 2MG | a | 2445 | 1 | - | 0/9/27/28 | 0/3/3/3 |
| 1 | PSU | a | 955 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | PSU | a | 2580 | 1 | - | 0/7/25/26 | 0/2/2/2 |
| 1 | 6MZ | a | 2030 | 1 | - | 2/9/27/28 | 0/3/3/3 |
| 1 | G7M | a | 2069 | 1 | - | 2/7/25/26 | 0/3/3/3 |
| 1 | 5MU | a | 1939 | 1 | - | 0/7/25/26 | 0/2/2/2 |

All (17) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 1 | a | 1911 | PSU | C6-C5 | 3.66 | 1.39 | 1.35 |
| 1 | a | 2069 | G7M | C8-N7 | 3.49 | 1.39 | 1.33 |
| 1 | a | 2030 | 6MZ | C8-N9 | -3.33 | 1.31 | 1.37 |
| 1 | a | 2504 | PSU | C6-C5 | 3.09 | 1.38 | 1.35 |
| 1 | a | 746 | PSU | C6-C5 | 3.00 | 1.38 | 1.35 |
| 1 | a | 2457 | PSU | C6-C5 | 2.88 | 1.38 | 1.35 |
| 1 | a | 2449 | H2U | C2-N3 | -2.76 | 1.33 | 1.38 |
| 1 | a | 2604 | PSU | C6-C5 | 2.74 | 1.38 | 1.35 |
| 1 | a | 745 | 1MG | C1'-N9 | -2.63 | 1.40 | 1.47 |
| 1 | a | 2605 | PSU | C6-C5 | 2.43 | 1.38 | 1.35 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 1 | a | 2503 | 2MA | C6-N6 | -2.41 | 1.28 | 1.34 |
| 1 | a | 2457 | PSU | C4-C5 | -2.25 | 1.37 | 1.44 |
| 1 | a | 2605 | PSU | C4-C5 | -2.25 | 1.37 | 1.44 |
| 1 | a | 746 | PSU | C6-N1 | -2.08 | 1.32 | 1.36 |
| 1 | a | 2449 | H2U | C2-N1 | -2.06 | 1.32 | 1.35 |
| 1 | a | 2503 | 2MA | C5-C6 | -2.06 | 1.35 | 1.41 |
| 1 | a | 2503 | 2MA | C6-N1 | 2.02 | 1.37 | 1.35 |

All (18) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | a | 2503 | 2MA | CM2-C2-N1 | 4.30 | 123.86 | 117.15 |
| 1 | a | 2449 | H2U | N3-C2-N1 | 3.30 | 120.14 | 116.65 |
| 1 | a | 2503 | 2MA | C5-C4-N3 | -3.16 | 123.63 | 127.19 |
| 1 | a | 2580 | PSU | C3'-C2'-C1' | 2.73 | 104.81 | 101.64 |
| 1 | a | 1962 | 5MC | C5-C6-N1 | -2.64 | 120.62 | 123.34 |
| 1 | a | 2449 | H2U | O2-C2-N1 | -2.64 | 119.80 | 123.11 |
| 1 | a | 2605 | PSU | C2'-C3'-C4' | -2.46 | 97.85 | 102.64 |
| 1 | a | 2069 | G7M | N9-C8-N7 | -2.40 | 106.28 | 112.21 |
| 1 | a | 2030 | 6MZ | C4-C5-N7 | -2.29 | 107.83 | 110.62 |
| 1 | a | 2504 | PSU | C5-C6-N1 | -2.23 | 118.77 | 122.11 |
| 1 | a | 2069 | G7M | CN7-N7-C5 | -2.19 | 124.05 | 126.77 |
| 1 | a | 2604 | PSU | C2'-C3'-C4' | -2.18 | 98.40 | 102.64 |
| 1 | a | 2503 | 2MA | N3-C4-N9 | 2.12 | 129.93 | 126.99 |
| 1 | a | 2503 | 2MA | CM2-C2-N3 | -2.11 | 113.86 | 117.15 |
| 1 | a | 2503 | 2MA | O3'-C3'-C2' | -2.10 | 105.02 | 111.82 |
| 1 | a | 745 | 1MG | O3'-C3'-C4' | -2.06 | 105.08 | 111.05 |
| 1 | a | 747 | 5MU | O3'-C3'-C4' | -2.04 | 105.14 | 111.05 |
| 1 | a | 955 | PSU | C2'-C3'-C4' | -2.02 | 98.72 | 102.64 |

There are no chirality outliers.

All (19) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 1 | a | 1911 | PSU | C3'-C4'-C5'-O5' |
| 1 | a | 1911 | PSU | O4'-C4'-C5'-O5' |
| 4 | d | 150 | MEQ | OE1-CD-NE2-CE |
| 4 | d | 150 | MEQ | OE1-CD-CG-CB |
| 4 | d | 150 | MEQ | NE2-CD-CG-CB |
| 1 | a | 2030 | 6MZ | O4'-C4'-C5'-O5' |
| 4 | d | 150 | MEQ | CG-CD-NE2-CE |
| 1 | a | 2069 | G7M | C4'-C5'-O5'-P |

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| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 12 | l | 82 | MS6 | CB-CG-SD-CE |
| 12 | l | 81 | 4D4 | CG-CD-NE-CZ |
| 4 | d | 150 | MEQ | CA-CB-CG-CD |
| 1 | a | 2030 | 6MZ | C3'-C4'-C5'-O5' |
| 1 | a | 2503 | 2MA | O4'-C1'-N9-C8 |
| 1 | a | 2504 | PSU | O4'-C4'-C5'-O5' |
| 1 | a | 746 | PSU | O4'-C1'-C5-C6 |
| 1 | a | 2069 | G7M | O4'-C4'-C5'-O5' |
| 1 | a | 2503 | 2MA | O4'-C4'-C5'-O5' |
| 1 | a | 2503 | 2MA | C4'-C5'-O5'-P |
| 12 | l | 81 | 4D4 | O-C-CA-CB |

There are no ring outliers.

2 monomers are involved in 2 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|---|---|---|---|---|---|
| 1 | a | 2552 | OMU | 1 | 0 |
| 1 | a | 2030 | 6MZ | 1 | 0 |

## 5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry (i)

Of 206 ligands modelled in this entry, 205 are monoatomic - leaving 1 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 | $\#\|Z\| > 2$ |
| 36 | ASP | Z | 101 | 33 | 6,7,8 | 0.96 | 0 | 5,8,10 | 0.91 | 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.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|---|---|---|---|---|---|---|---|
| 36 | ASP | Z | 101 | 33 | - | 4/5/6/8 | - |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 36 | Z | 101 | ASP | C-CA-CB-CG |
| 36 | Z | 101 | ASP | N-CA-CB-CG |
| 36 | Z | 101 | ASP | CA-CB-CG-OD1 |
| 36 | Z | 101 | ASP | CA-CB-CG-OD2 |

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

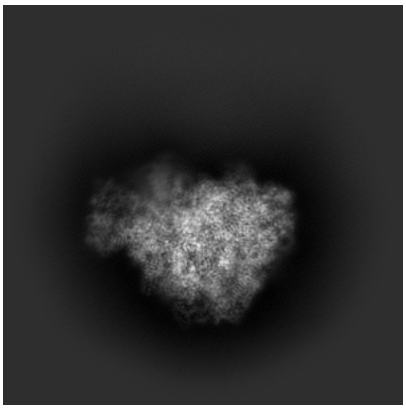
# 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-57973. These allow visual inspection of the internal detail of the map and identification of artifacts.

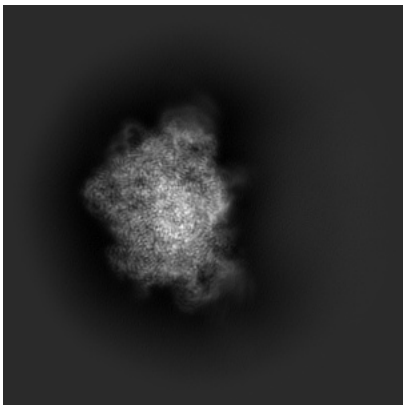
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

## 6.1 Orthogonal projections

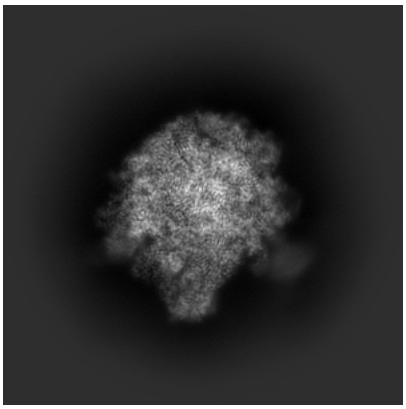
### 6.1.1 Primary map



X

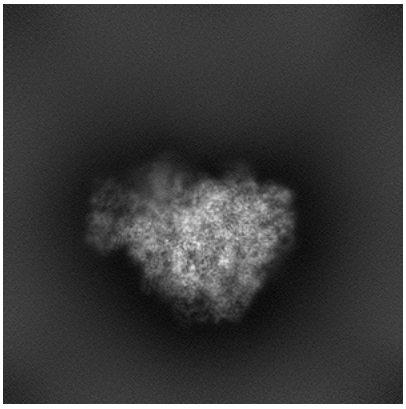


Y

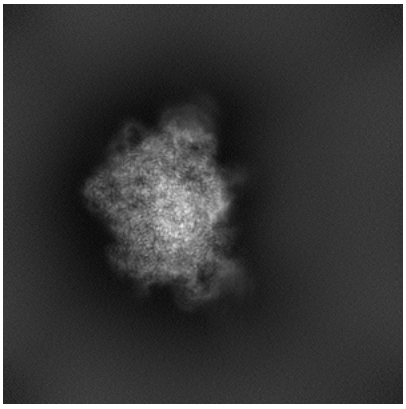


Z

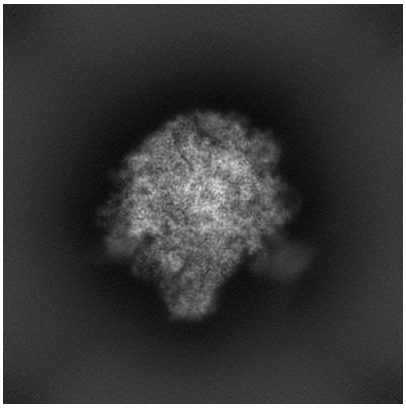
### 6.1.2 Raw map



X



Y

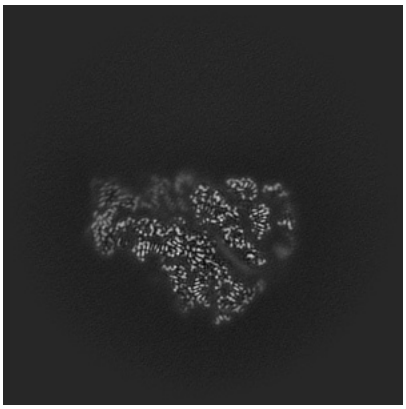


Z

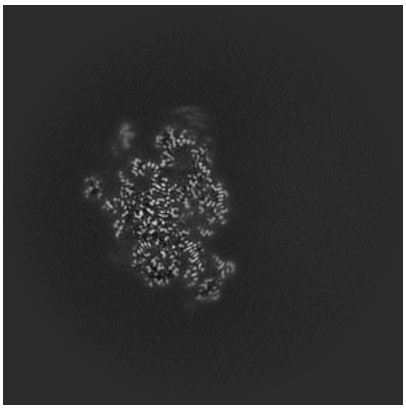
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices (i)

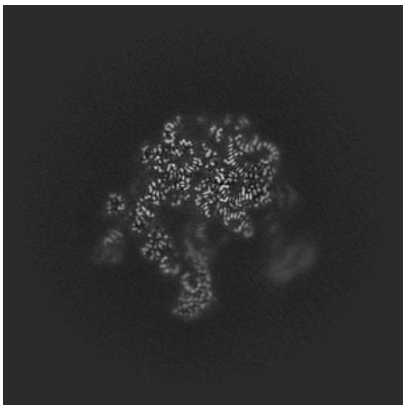
### 6.2.1 Primary map



X Index: 256

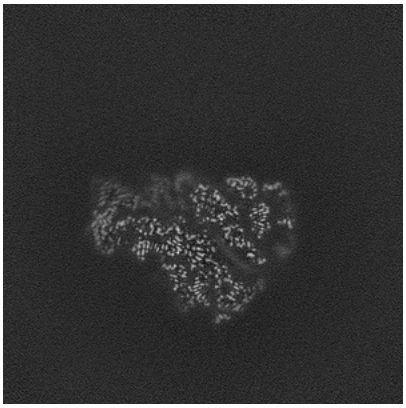


Y Index: 256

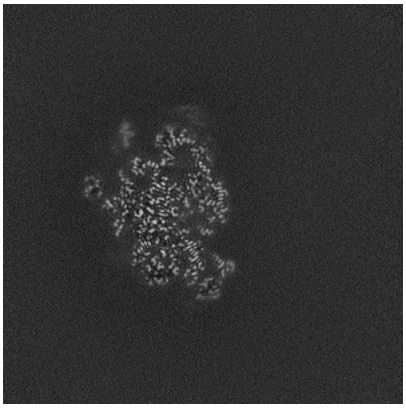


Z Index: 256

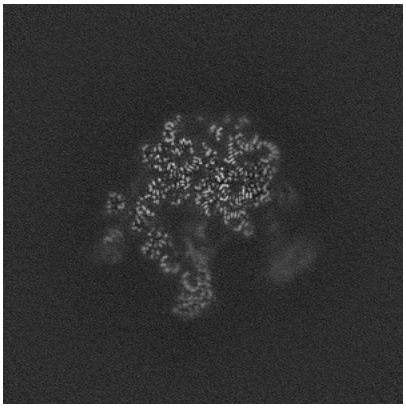
### 6.2.2 Raw map



X Index: 256



Y Index: 256

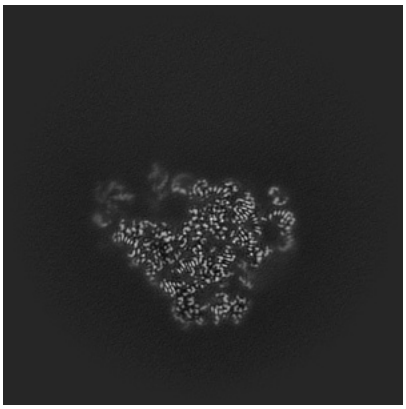


Z Index: 256

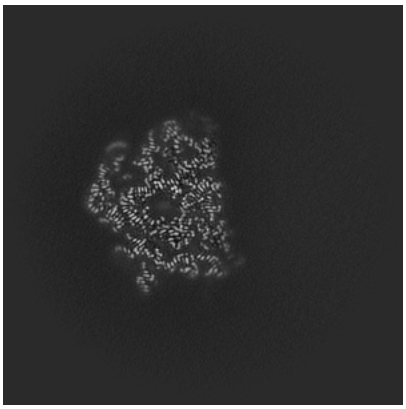
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices (i)

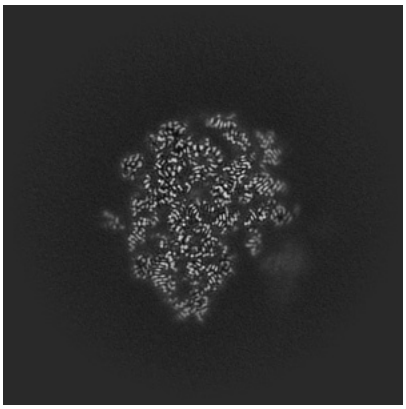
### 6.3.1 Primary map



X Index: 269

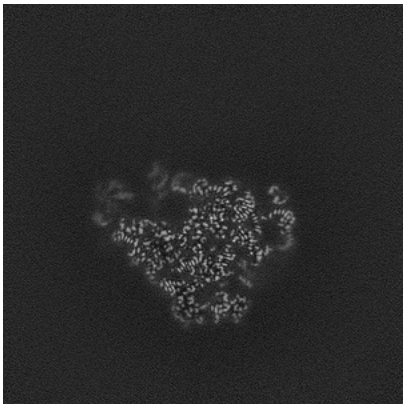


Y Index: 278

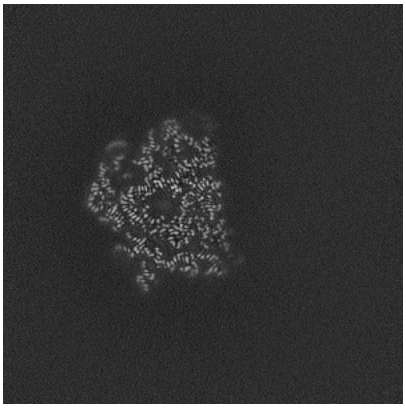


Z Index: 221

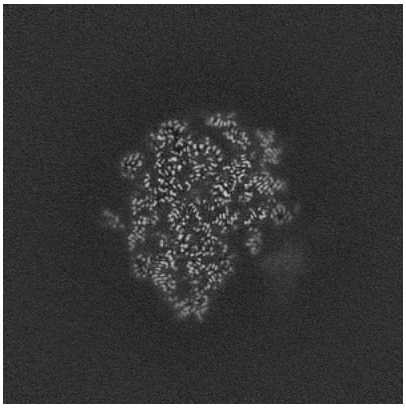
### 6.3.2 Raw map



X Index: 269



Y Index: 278

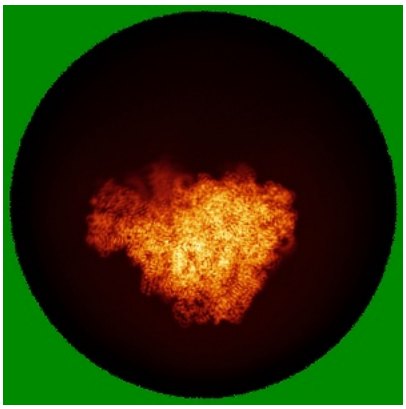


Z Index: 221

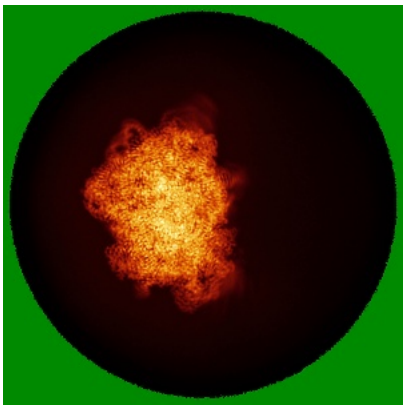
The images above show the largest variance slices of the map in three orthogonal directions.

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

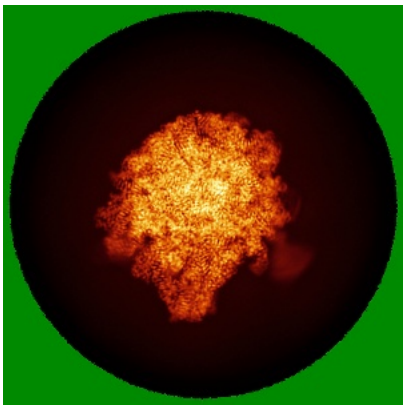
### 6.4.1 Primary map



X

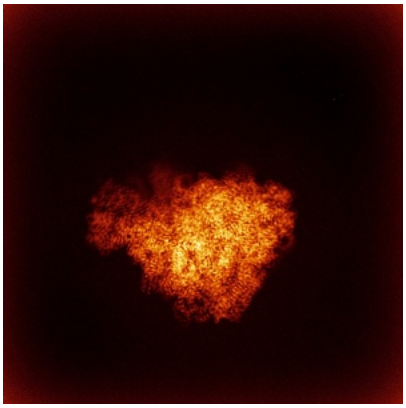


Y

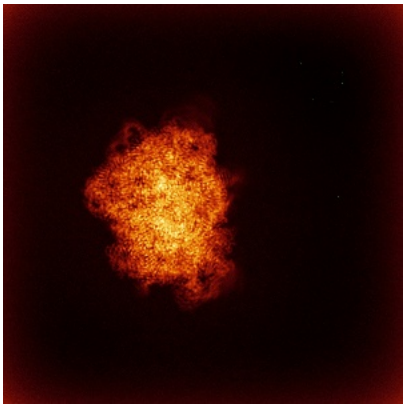


Z

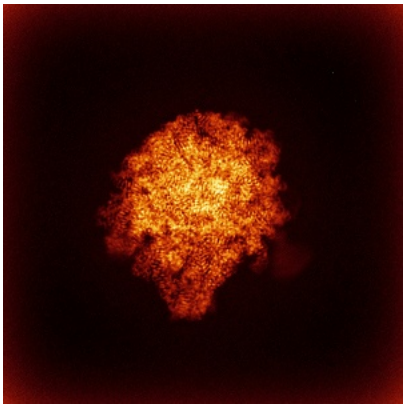
### 6.4.2 Raw map



X



Y

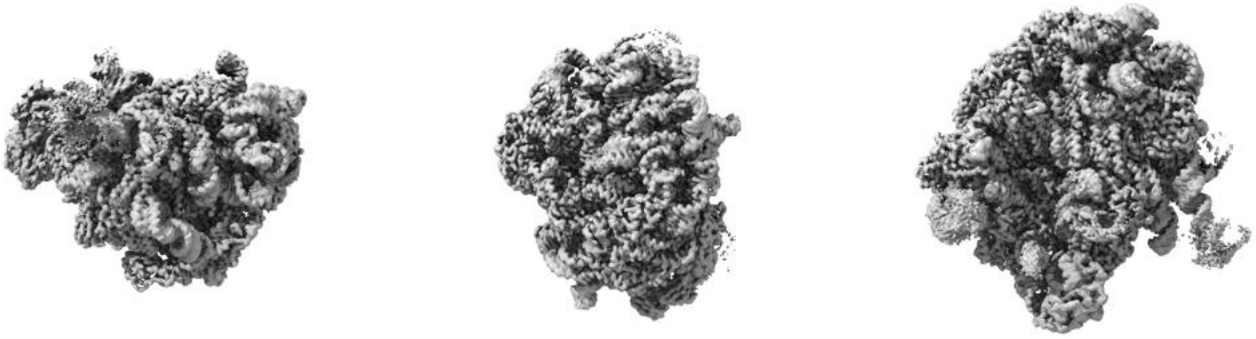


Z

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

## 6.5 Orthogonal surface views (i)

### 6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.04. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map

X Y Z

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

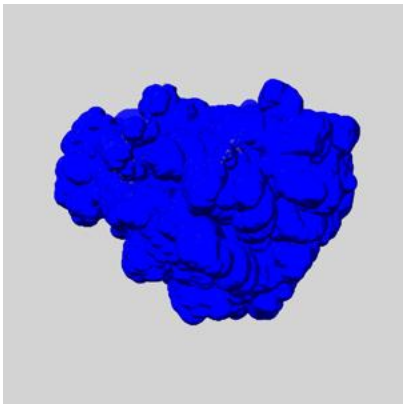
## 6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

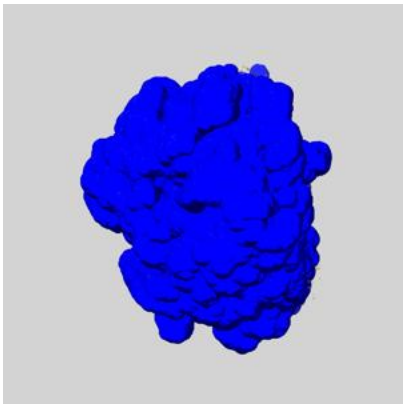
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

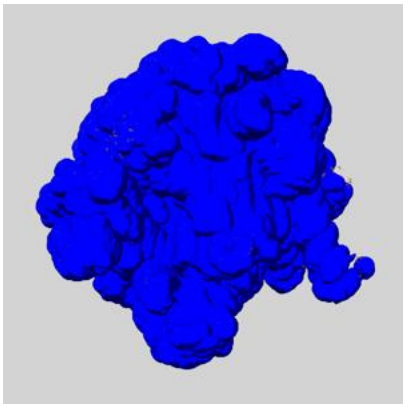
### 6.6.1 emd_57973_msk_1.map (i)



X

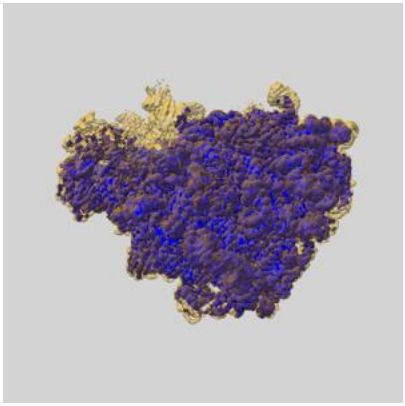


Y

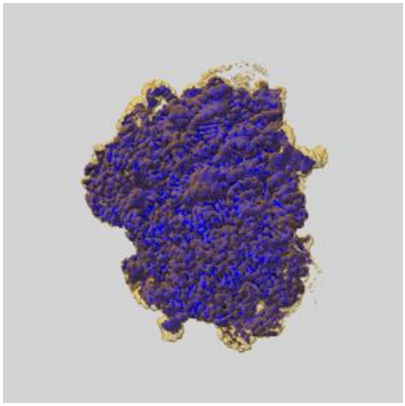


Z

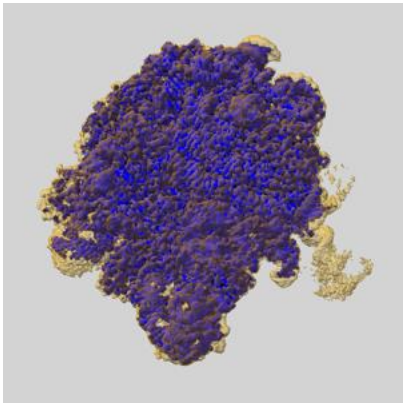
### 6.6.2 emd_57973_msk_2.map (i)



X



Y

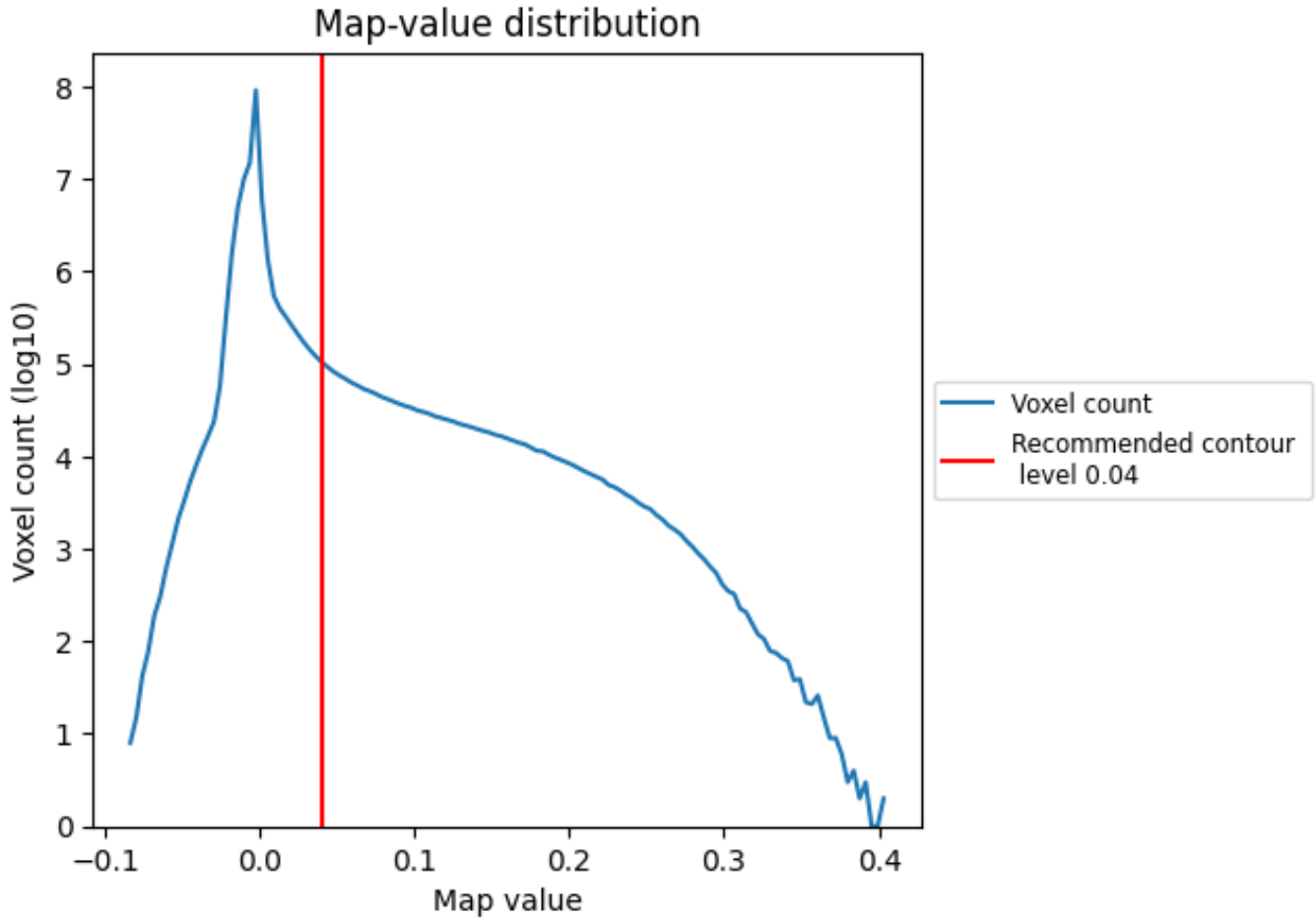


Z

# 7 Map analysis

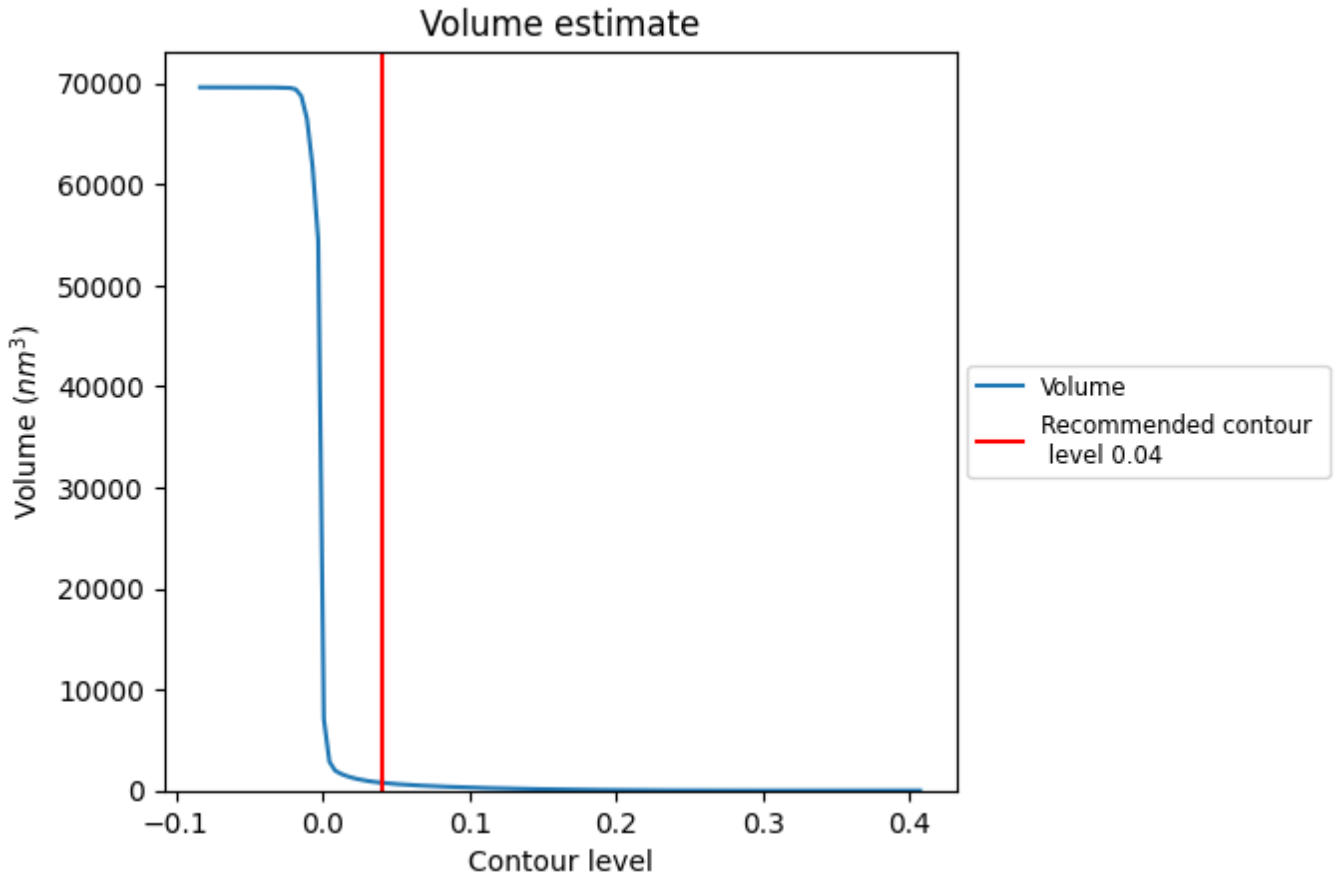
This section contains the results of statistical analysis of the map.

## 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.

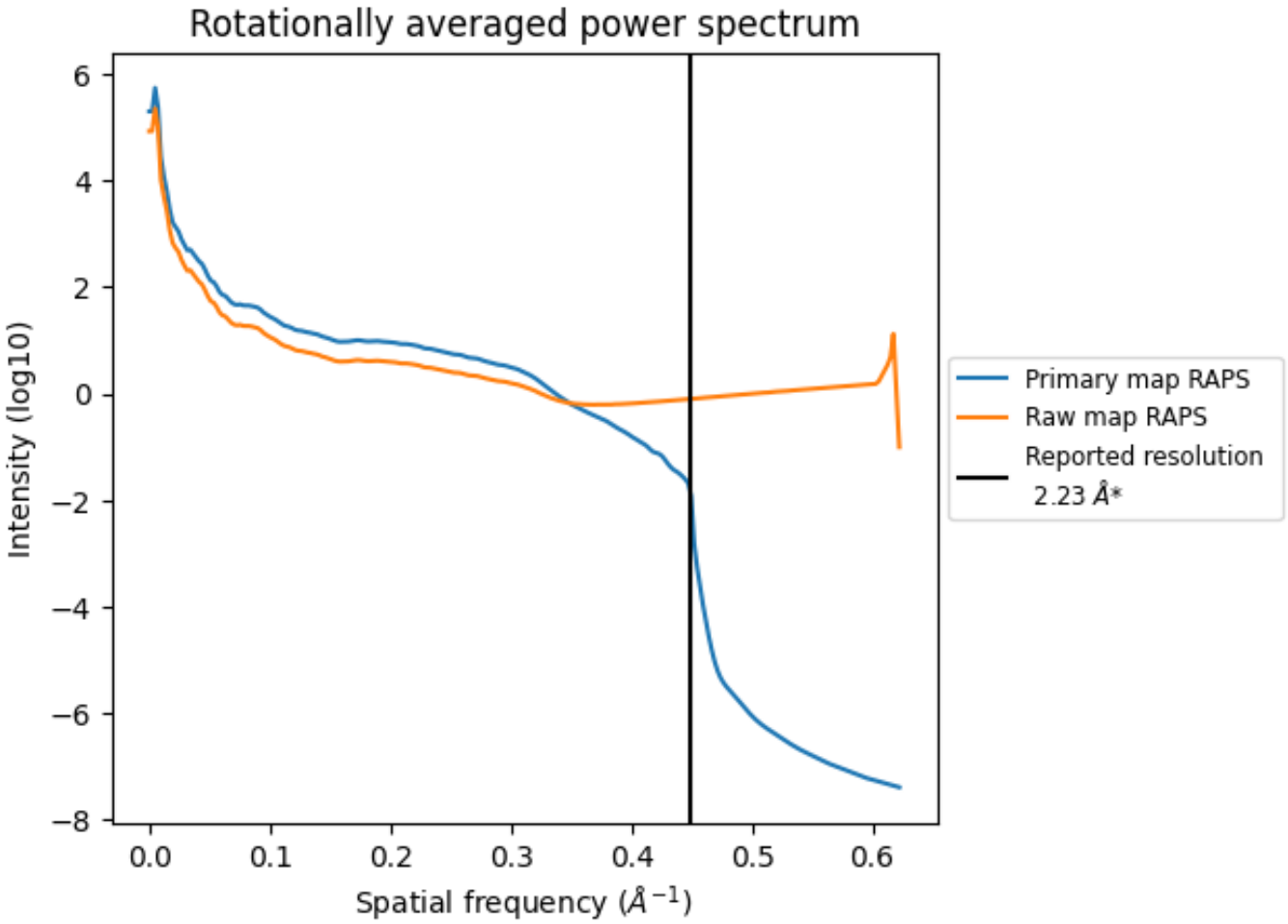
## 7.2 Volume estimate




The volume at the recommended contour level is 778 $nm^3$; this corresponds to an approximate mass of 703 kDa.

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

## 7.3 Rotationally averaged power spectrum (i)

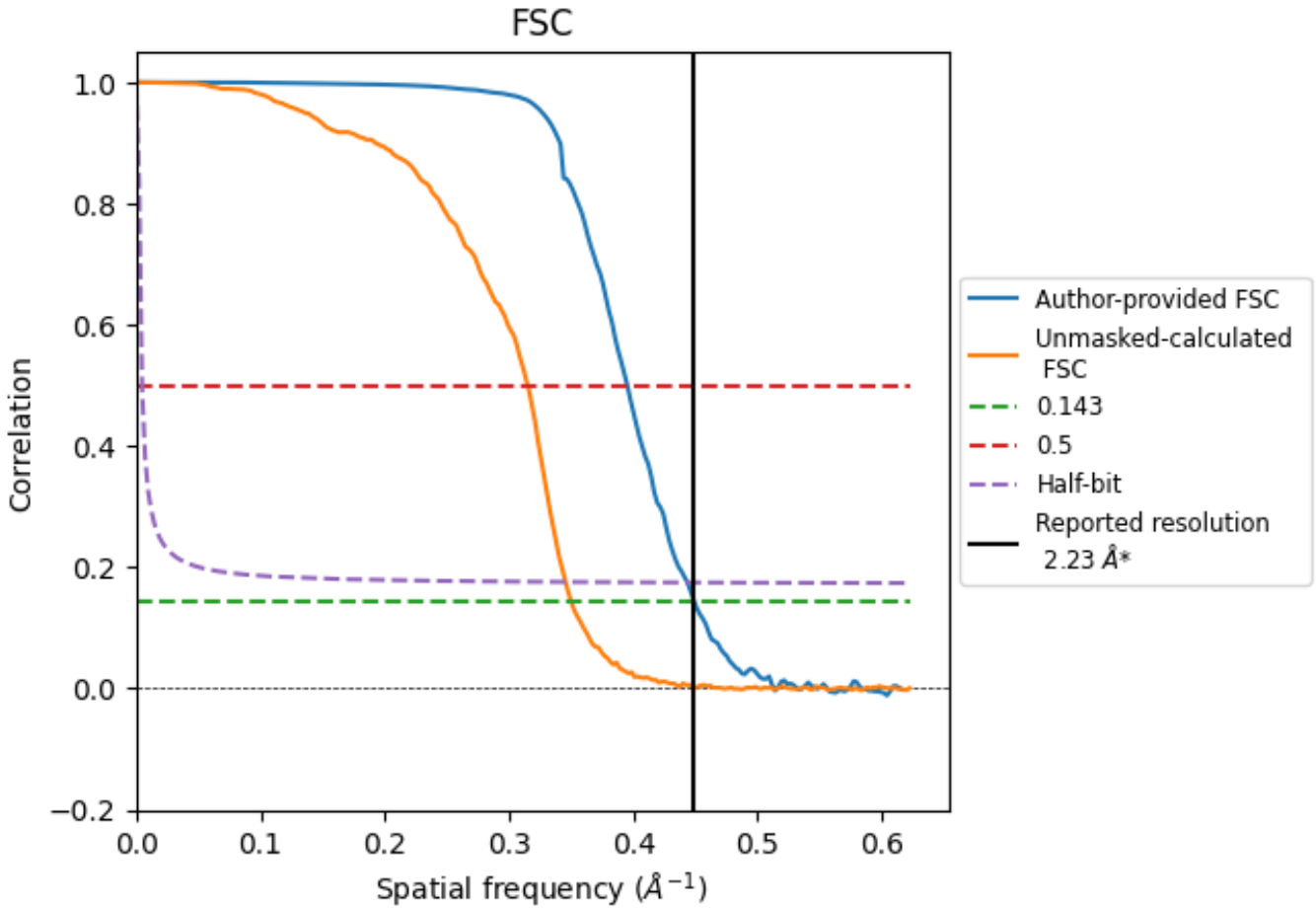



*Reported resolution corresponds to spatial frequency of 0.448 Å$^{-1}$

# 8 Fourier-Shell correlation

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

## 8.1 FSC




*Reported resolution corresponds to spatial frequency of 0.448 Å$^{-1}$

## 8.2 Resolution estimates (i)

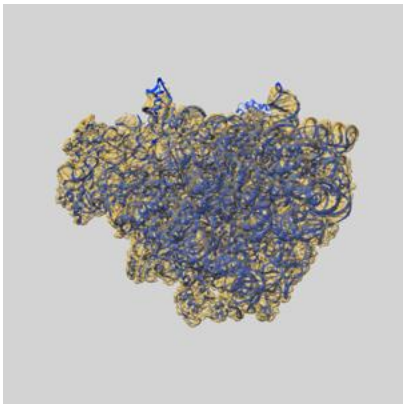
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 2.23 | - | - |
| Author-provided FSC curve | 2.23 | 2.53 | 2.25 |
| Unmasked-calculated* | 2.86 | 3.17 | 2.89 |

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.86 differs from the reported value 2.23 by more than 10 %

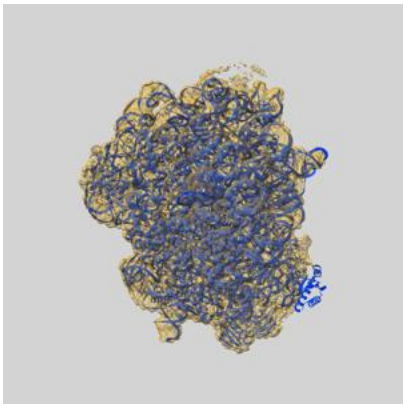
# 9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-57973 and PDB model 30QZ. Per-residue inclusion information can be found in section 3 on page 12.

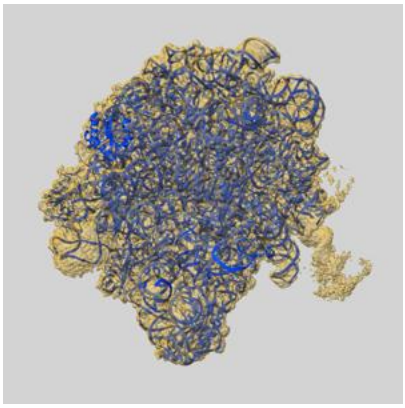
## 9.1 Map-model overlay



X



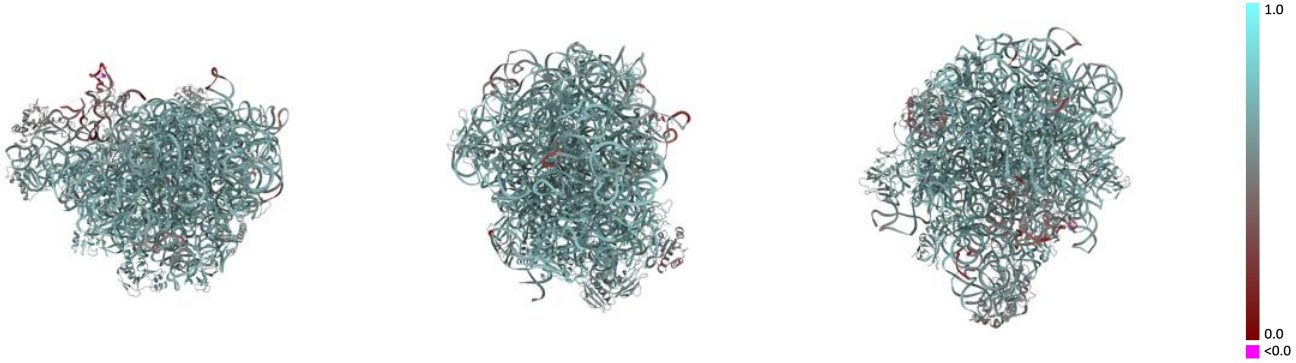
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.04 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.

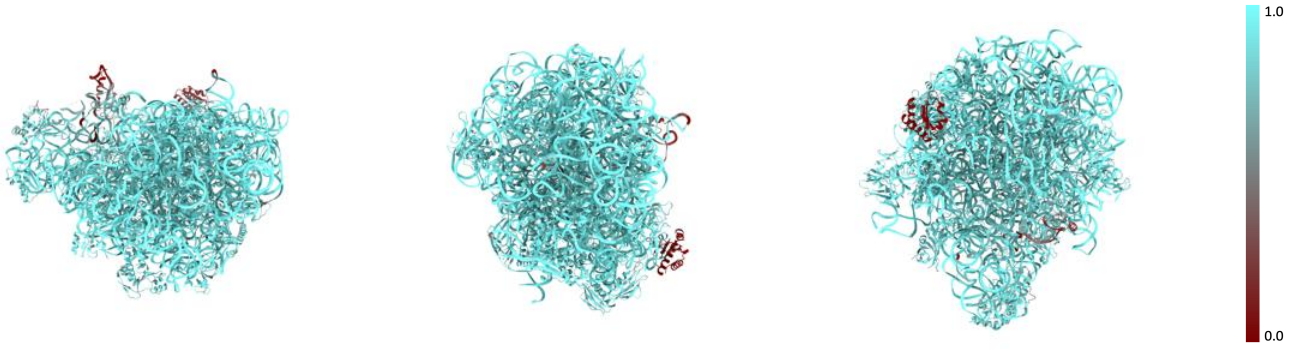
## 9.2 Q-score mapped to coordinate model (i)




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.

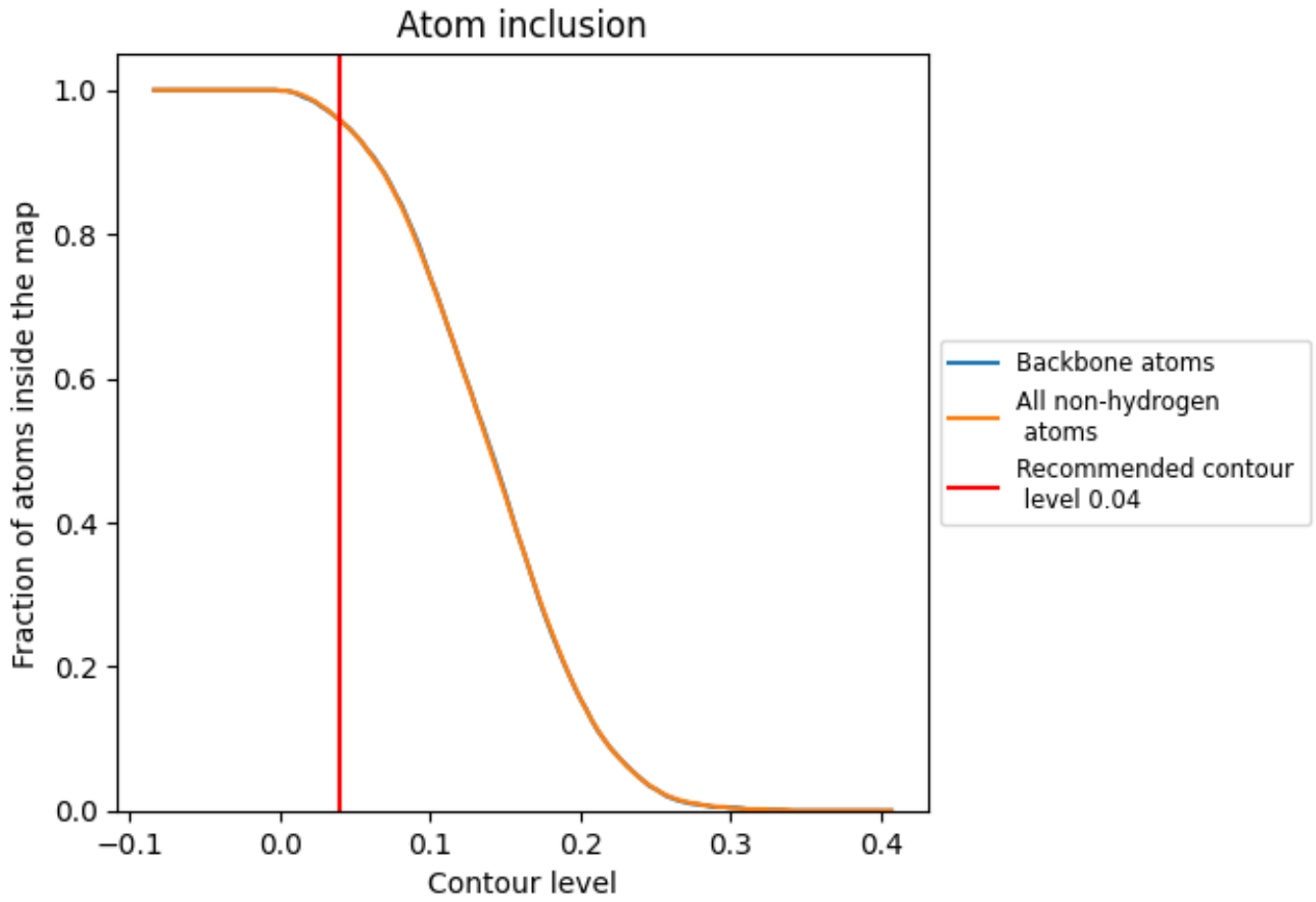
## 9.3 Atom inclusion mapped to coordinate model (i)




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 (0.04).

## 9.4 Atom inclusion (i)




At the recommended contour level, 96% of all backbone atoms, 96% 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 (0.04) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|---|---|---|
| All | 0.9590 | 0.6240 |
| 0 | 0.9240 | 0.6170 |
| 1 | 0.9690 | 0.6640 |
| 2 | 0.9820 | 0.6630 |
| 3 | 0.9560 | 0.6390 |
| 6 | 0.0300 | 0.4280 |
| V | 0.5650 | 0.4080 |
| Z | 0.6820 | 0.4060 |
| a | 0.9930 | 0.6390 |
| b | 0.9970 | 0.6070 |
| c | 0.9700 | 0.6470 |
| d | 0.9590 | 0.6420 |
| e | 0.9330 | 0.6230 |
| f | 0.8140 | 0.4830 |
| g | 0.8870 | 0.5560 |
| h | 0.8730 | 0.5550 |
| i | 0.9590 | 0.6440 |
| j | 0.9320 | 0.6230 |
| k | 0.9590 | 0.6390 |
| l | 0.9520 | 0.6350 |
| m | 0.9840 | 0.6530 |
| n | 0.9300 | 0.5910 |
| o | 0.9170 | 0.6220 |
| p | 0.9810 | 0.6620 |
| q | 0.9410 | 0.6330 |
| r | 0.9430 | 0.6340 |
| s | 0.9270 | 0.6220 |
| t | 0.9110 | 0.5870 |
| u | 0.9130 | 0.6100 |
| v | 0.9370 | 0.6450 |
| w | 0.9620 | 0.6410 |
| x | 0.8920 | 0.5820 |
| y | 0.9310 | 0.6250 |
| z | 0.9490 | 0.6400 |