



## wwPDB EM Validation Summary Report ⓘ

Mar 6, 2025 – 02:21 pm GMT

PDB ID : 8QBT  
EMDB ID : EMD-18320  
Title : E. coli ApdP-stalled ribosomal complex  
Authors : Morici, M.; Wilson, D.N.  
Deposited on : 2023-08-25  
Resolution : 2.20 Å (reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

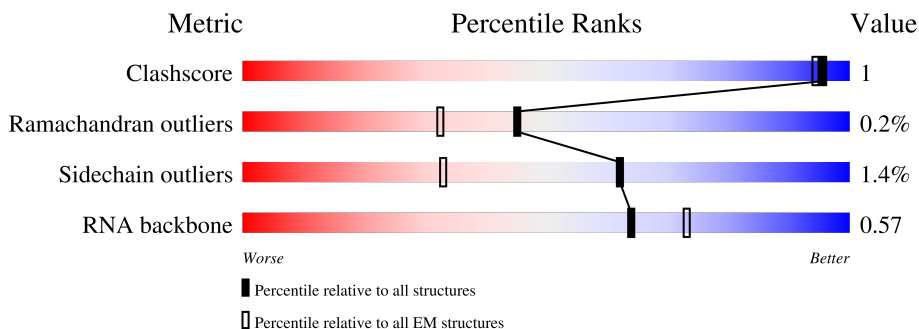
EMDB validation analysis : **FAILED**  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : **FAILED**  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.41

# 1 Overall quality at a glance

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

The reported resolution of this entry is 2.20 Å.

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




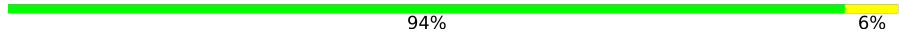
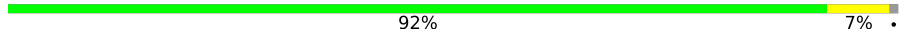

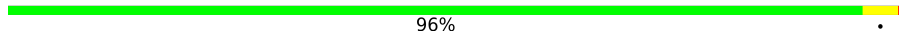

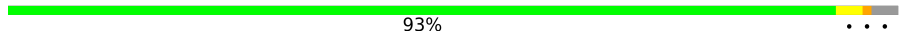

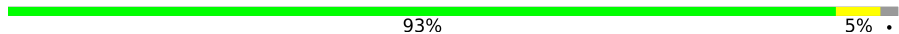



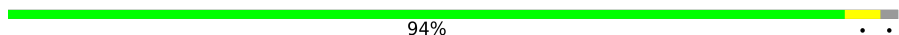
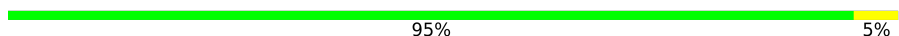


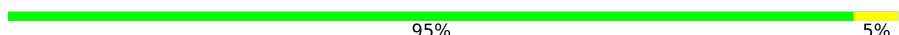
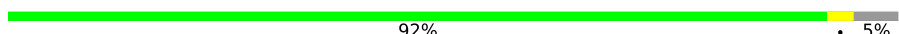
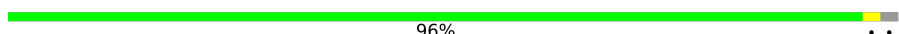

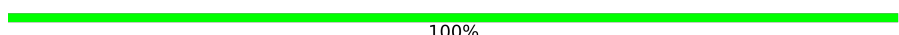
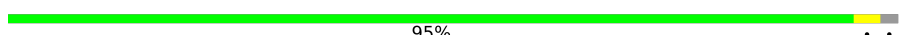



| Metric                | Whole archive (#Entries) | EM structures (#Entries) |
|-----------------------|--------------------------|--------------------------|
| Clashscore            | 210492                   | 15764                    |
| Ramachandran outliers | 207382                   | 16835  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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1   | A     | 2903   | 77% 18% ..       |
| 2   | B     | 120    | 82% 15% ..       |
| 3   | C     | 273    | 95% .. ..        |
| 4   | D     | 209    | 95% 5%           |
| 5   | E     | 201    | 96% .            |
| 6   | F     | 179    | 97% ..           |
| 7   | G     | 177    | 93% .. .         |


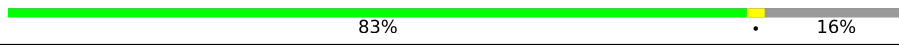
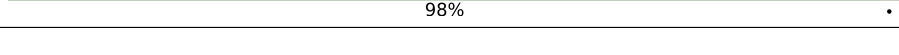
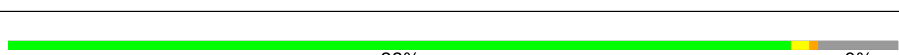

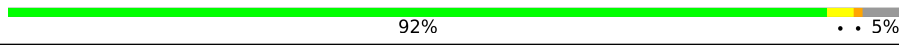
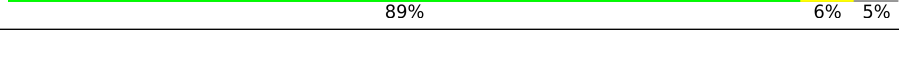
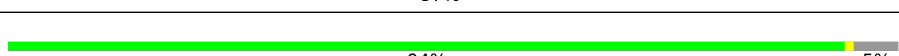

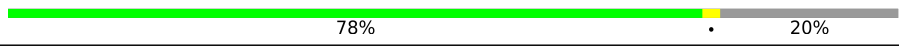
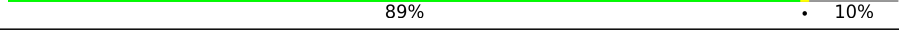
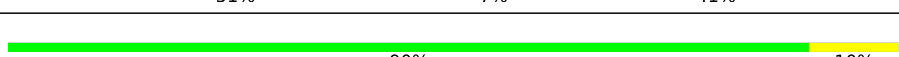


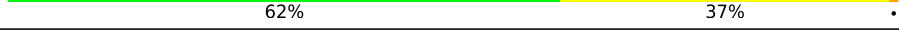
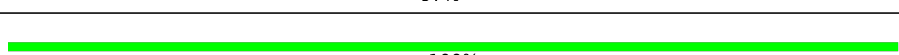




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| Mol | Chain | Length | Quality of chain  |
|-----|-------|--------|---|
| 8   | H     | 149    |  30% .. 68%   |
| 9   | J     | 142    |  94% 6%       |
| 10  | K     | 123    |  92% 7% .     |
| 11  | L     | 144    |  90% 8% ..    |
| 12  | M     | 136    |  96% . .      |
| 13  | N     | 127    |  91% . 7%     |
| 14  | O     | 117    |  93% . . .    |
| 15  | P     | 115    |  90% 6% . .   |
| 16  | Q     | 118    |  93% 5% .     |
| 17  | R     | 103    |  89% 10% .    |
| 18  | S     | 110    |  88% 12%      |
| 19  | T     | 100    |  91% . 8%    |
| 20  | U     | 104    |  94% . .    |
| 21  | V     | 94     |  95% 5%     |
| 22  | W     | 85     |  92% 6% ..  |
| 23  | X     | 78     |  92% 6% .   |
| 24  | Y     | 63     |  95% 5%     |
| 25  | Z     | 59     |  92% . 5%   |
| 26  | a     | 57     |  96% . .    |
| 27  | b     | 55     |  80% 7% 13% |
| 28  | c     | 46     |  100%       |
| 29  | d     | 65     |  95% . .    |
| 30  | i     | 1540   |  78% 20% .  |
| 31  | j     | 241    |  87% . 11%  |
| 32  | m     | 167    |  88% . 10%  |

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| Mol | Chain | Length | Quality of chain  |
|-----|-------|--------|---|
| 33  | n     | 135    |  72% 26%      |
| 34  | o     | 179    |  83% 16%      |
| 35  | p     | 130    |  98%          |
| 36  | q     | 130    |  86% 10%      |
| 37  | s     | 129    |  88% 9%       |
| 38  | t     | 124    |  89% 6%       |
| 39  | u     | 118    |  92% 5%       |
| 40  | v     | 101    |  89% 6% 5%    |
| 41  | w     | 89     |  97%          |
| 42  | y     | 84     |  94% 5%      |
| 43  | z     | 75     |  72% 27%    |
| 44  | 1     | 92     |  78% 20%    |
| 45  | 2     | 87     |  89% 10%    |
| 46  | 3     | 71     |  51% 7% 41% |
| 47  | 4     | 10     |  90% 10%    |
| 48  | 5     | 77     |  75% 21%    |
| 48  | 6     | 77     |  83% 10% 6% |
| 49  | 7     | 76     |  62% 37%    |
| 50  | e     | 38     |  97%        |
| 51  | f     | 6      |  100%       |

## 2 Entry composition [i](#)

There are 56 unique types of molecules in this entry. The entry contains 141132 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a RNA chain called 23S rRNA.

| Mol | Chain | Residues | Atoms |       |       |       |      | AltConf | Trace |
|-----|-------|----------|-------|-------|-------|-------|------|---------|-------|
|     |       |          | Total | C     | N     | O     | P    |         |       |
| 1   | A     | 2841     | 60998 | 27210 | 11227 | 19720 | 2841 | 0       | 0     |

There are 2 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment  | Reference    |
|-------|---------|----------|--------|----------|--------------|
| A     | 2209    | C        | G      | conflict | GB 991970073 |
| A     | 2215    | G        | C      | conflict | GB 991970073 |

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

| Mol | Chain | Residues | Atoms |      |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|-----|---------|-------|
|     |       |          | Total | C    | N   | O   | P   |         |       |
| 2   | B     | 118      | 2529  | 1126 | 464 | 821 | 118 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
|     |       |          | Total | C    | N   | O   | S |         |       |
| 3   | C     | 271      | 2082  | 1288 | 423 | 364 | 7 | 0       | 0     |

- Molecule 4 is a protein called 50S ribosomal protein L3.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 4   | D     | 209      | 1565  | 979 | 288 | 294 | 4 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 5   | E     | 201      | 1552  | 974 | 283 | 290 | 5 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 6   | F     | 177      | 1410  | 899 | 249 | 256 | 6 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 7   | G     | 171      | 1285  | 811 | 235 | 237 | 2 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 8   | H     | 47       | 359   | 233 | 62 | 63 | 1 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 9   | J     | 142      | 1129  | 714 | 212 | 199 | 4 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 10  | K     | 122      | 938   | 587 | 180 | 165 | 6 | 0       | 0     |

- Molecule 11 is a protein called 50S ribosomal protein L15.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 11  | L     | 143      | 1045  | 649 | 206 | 189 | 1 | 0       | 0     |

- Molecule 12 is a protein called 50S ribosomal protein L16.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 12  | M     | 136      | 1074  | 686 | 205 | 177 | 6 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 13  | N     | 118      | 945   | 585 | 194 | 161 | 5 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 14  | O     | 114      | 875   | 542 | 175 | 158 |   | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 15  | P     | 112      | 900   | 564 | 176 | 159 | 1 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 16  | Q     | 116      | 941   | 601 | 191 | 149 |   | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 17  | R     | 103      | 816   | 516 | 153 | 145 | 2 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 18  | S     | 110      | 857   | 532 | 166 | 156 | 3 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 19  | T     | 92       | 730   | 461 | 138 | 130 | 1 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 20  | U     | 102      | Total | C   | N   | O   |         |       |
|     |       |          | 779   | 492 | 146 | 141 | 0       | 0     |

- Molecule 21 is a protein called 50S ribosomal protein L25.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 21  | V     | 94       | Total | C   | N   | O   | S |         |       |
|     |       |          | 753   | 479 | 137 | 134 | 3 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 22  | W     | 84       | Total | C   | N   | O   | S |         |       |
|     |       |          | 628   | 388 | 126 | 113 | 1 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 23  | X     | 77       | Total | C   | N   | O   | S |         |       |
|     |       |          | 625   | 388 | 129 | 106 | 2 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 24  | Y     | 63       | Total | C   | N  | O  | S |         |       |
|     |       |          | 509   | 313 | 99 | 95 | 2 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 25  | Z     | 56       | Total | C   | N  | O  | S |         |       |
|     |       |          | 435   | 272 | 84 | 77 | 2 | 0       | 0     |

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

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 26  | a     | 56       | Total | C   | N  | O  | S |         |       |
|     |       |          | 444   | 269 | 94 | 80 | 1 | 0       | 0     |

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



| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 27  | b     | 48       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 395   | 254 | 72 | 69 |         |       |

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

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 28  | c     | 46       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 377   | 228 | 90 | 57 | 2 |         |       |

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

| Mol | Chain | Residues | Atoms |     |     |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 29  | d     | 64       | Total | C   | N   | O  | S | 0       | 0     |
|     |       |          | 504   | 323 | 105 | 74 | 2 |         |       |

- Molecule 30 is a RNA chain called 16S rRNA.

| Mol | Chain | Residues | Atoms |       |      |       |      | AltConf | Trace |
|-----|-------|----------|-------|-------|------|-------|------|---------|-------|
| 30  | i     | 1539     | Total | C     | N    | O     | P    | 0       | 0     |
|     |       |          | 33015 | 14725 | 6052 | 10699 | 1539 |         |       |

- Molecule 31 is a protein called 30S ribosomal protein S2.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 31  | j     | 215      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 1679  | 1067 | 299 | 307 | 6 |         |       |

- Molecule 32 is a protein called Small ribosomal subunit protein uS5.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 32  | m     | 150      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1105  | 687 | 211 | 201 | 6 |         |       |

- Molecule 33 is a protein called 30S ribosomal protein S6, fully modified isoform.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 33  | n     | 100      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 817   | 515 | 148 | 148 | 6 |         |       |

- Molecule 34 is a protein called 30S ribosomal protein S7.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 34  | o     | 151      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1181  | 735 | 227 | 215 | 4 |         |       |

- Molecule 35 is a protein called Small ribosomal subunit protein uS8.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 35  | p     | 129      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 979   | 616 | 173 | 184 | 6 |         |       |

- Molecule 36 is a protein called Small ribosomal subunit protein uS9.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 36  | q     | 125      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1001  | 622 | 200 | 176 | 3 |         |       |

- Molecule 37 is a protein called 30S ribosomal protein S11.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 37  | s     | 117      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 877   | 540 | 174 | 160 | 3 |         |       |

- Molecule 38 is a protein called 30S ribosomal protein S12.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 38  | t     | 119      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 922   | 570 | 188 | 160 | 4 |         |       |

- Molecule 39 is a protein called Small ribosomal subunit protein uS13.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 39  | u     | 112      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 867   | 535 | 175 | 154 | 3 |         |       |

- Molecule 40 is a protein called Small ribosomal subunit protein uS14.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 40  | v     | 96       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 774   | 483 | 160 | 128 | 3 |         |       |

- Molecule 41 is a protein called Small ribosomal subunit protein uS15.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 41  | w     | 86       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 687   | 425 | 135 | 126 | 1 |         |       |

- Molecule 42 is a protein called Small ribosomal subunit protein uS17.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 42  | y     | 80       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 648   | 411 | 121 | 113 | 3 |         |       |

- Molecule 43 is a protein called Small ribosomal subunit protein bS18.

| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 43  | z     | 55       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 455   | 288 | 86 | 81 |         |       |

- Molecule 44 is a protein called Small ribosomal subunit protein uS19.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 44  | 1     | 74       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 594   | 381 | 110 | 101 | 2 |         |       |

- Molecule 45 is a protein called 30S ribosomal protein S20.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 45  | 2     | 78       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 612   | 376 | 126 | 107 | 3 |         |       |

- Molecule 46 is a protein called Small ribosomal subunit protein bS21.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 46  | 3     | 42       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 346   | 214 | 72 | 59 | 1 |         |       |

- Molecule 47 is a RNA chain called mRNA.

| Mol | Chain | Residues | Atoms |    |    |    |    | AltConf | Trace |
|-----|-------|----------|-------|----|----|----|----|---------|-------|
| 47  | 4     | 10       | Total | C  | N  | O  | P  | 0       | 0     |
|     |       |          | 214   | 95 | 40 | 69 | 10 |         |       |

- Molecule 48 is a RNA chain called Pro-tRNA.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
| 48  | 5     | 77       | Total | C   | N   | O   | P  | 0       | 0     |
|     |       |          | 1644  | 733 | 295 | 540 | 76 |         |       |
| 48  | 6     | 77       | Total | C   | N   | O   | P  | 0       | 0     |
|     |       |          | 1648  | 733 | 295 | 543 | 77 |         |       |

- Molecule 49 is a RNA chain called Ala-tRNA.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
| 49  | 7     | 76       | Total | C   | N   | O   | P  | 0       | 0     |
|     |       |          | 1618  | 722 | 289 | 532 | 75 |         |       |

- Molecule 50 is a protein called Large ribosomal subunit protein bL36A.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 50  | e     | 38       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 302   | 185 | 65 | 48 | 4 |         |       |

- Molecule 51 is a protein called ApdP nascent chain.

| Mol | Chain | Residues | Atoms |    |    |   |   | AltConf | Trace |
|-----|-------|----------|-------|----|----|---|---|---------|-------|
| 51  | f     | 6        | Total | C  | N  | O | S | 0       | 0     |
|     |       |          | 46    | 29 | 10 | 6 | 1 |         |       |

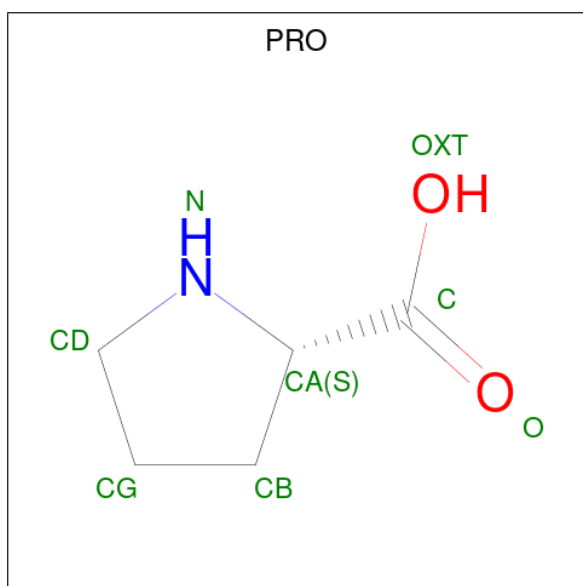
- Molecule 52 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms |     | AltConf |
|-----|-------|----------|-------|-----|---------|
| 52  | A     | 178      | Total | Mg  | 0       |
|     |       |          | 178   | 178 |         |
| 52  | B     | 5        | Total | Mg  | 0       |
|     |       |          | 5     | 5   |         |
| 52  | C     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 52  | D     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 52  | a     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 52  | i     | 61       | Total | Mg  | 0       |
|     |       |          | 61    | 61  |         |
| 52  | 6     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |

- Molecule 53 is POTASSIUM ION (three-letter code: K) (formula: K).

| Mol | Chain | Residues | Atoms            | AltConf |
|-----|-------|----------|------------------|---------|
| 53  | A     | 83       | Total K<br>83 83 | 0       |
| 53  | C     | 3        | Total K<br>3 3   | 0       |
| 53  | E     | 1        | Total K<br>1 1   | 0       |
| 53  | U     | 1        | Total K<br>1 1   | 0       |
| 53  | i     | 37       | Total K<br>37 37 | 0       |
| 53  | n     | 1        | Total K<br>1 1   | 0       |
| 53  | u     | 1        | Total K<br>1 1   | 0       |

- Molecule 54 is PROLINE (three-letter code: PRO) (formula:  $C_5H_9NO_2$ ).



| Mol | Chain | Residues | Atoms                  | AltConf |
|-----|-------|----------|------------------------|---------|
| 54  | 5     | 1        | Total C N O<br>7 5 1 1 | 0       |

- Molecule 55 is ZINC ION (three-letter code: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms           | AltConf |
|-----|-------|----------|-----------------|---------|
| 55  | e     | 1        | Total Zn<br>1 1 | 0       |

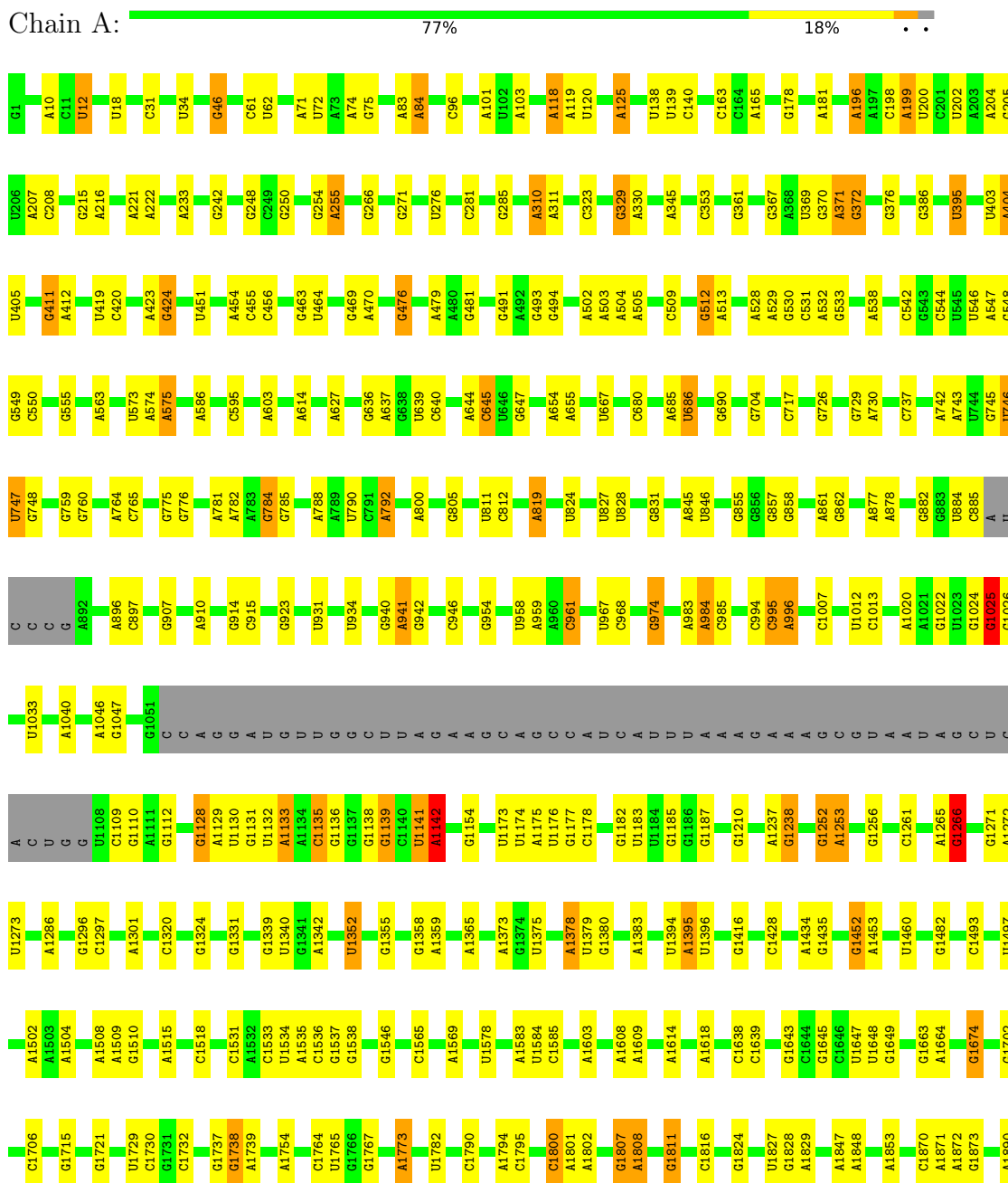
- Molecule 56 is water.

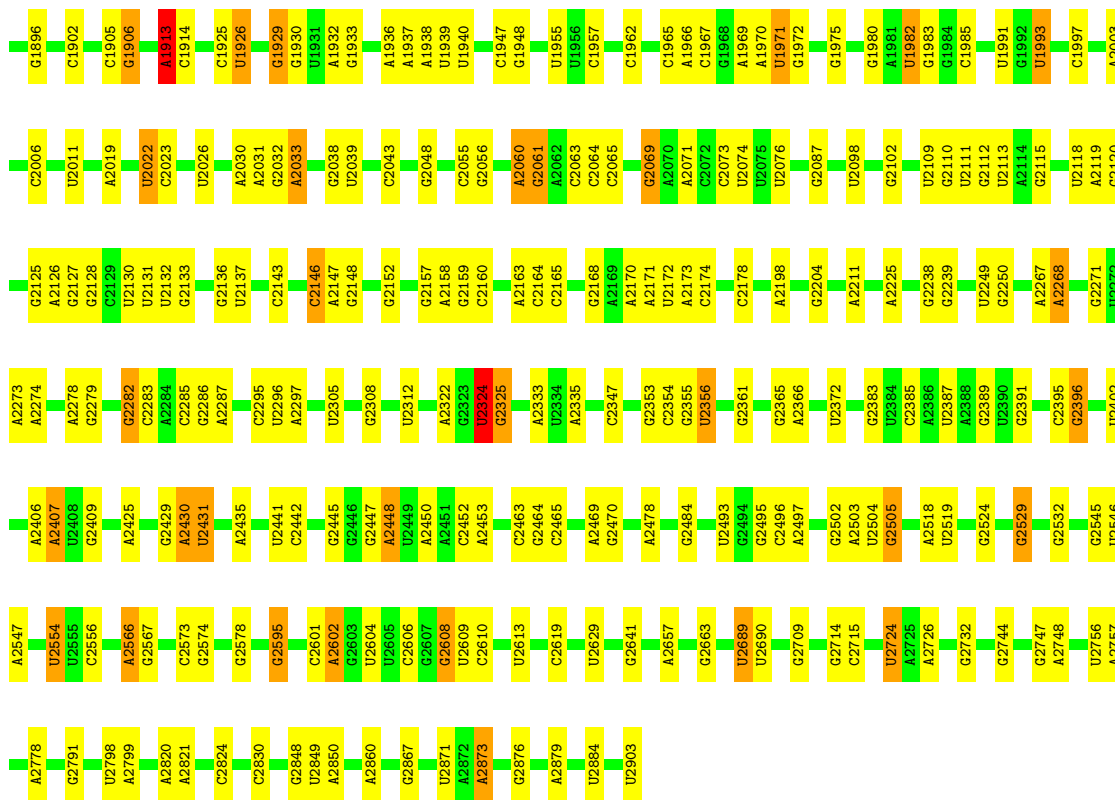
| Mol | Chain | Residues | Atoms         |           | AltConf |
|-----|-------|----------|---------------|-----------|---------|
| 56  | A     | 1006     | Total<br>1006 | O<br>1006 | 0       |
| 56  | B     | 10       | Total<br>10   | O<br>10   | 0       |
| 56  | C     | 14       | Total<br>14   | O<br>14   | 0       |
| 56  | D     | 2        | Total<br>2    | O<br>2    | 0       |
| 56  | E     | 3        | Total<br>3    | O<br>3    | 0       |
| 56  | L     | 4        | Total<br>4    | O<br>4    | 0       |
| 56  | N     | 3        | Total<br>3    | O<br>3    | 0       |
| 56  | T     | 1        | Total<br>1    | O<br>1    | 0       |
| 56  | a     | 4        | Total<br>4    | O<br>4    | 0       |
| 56  | d     | 4        | Total<br>4    | O<br>4    | 0       |
| 56  | i     | 176      | Total<br>176  | O<br>176  | 0       |
| 56  | s     | 1        | Total<br>1    | O<br>1    | 0       |
| 56  | 4     | 3        | Total<br>3    | O<br>3    | 0       |
| 56  | 5     | 3        | Total<br>3    | O<br>3    | 0       |
| 56  | 6     | 2        | Total<br>2    | O<br>2    | 0       |
| 56  | f     | 3        | Total<br>3    | O<br>3    | 0       |

### 3 Residue-property plots

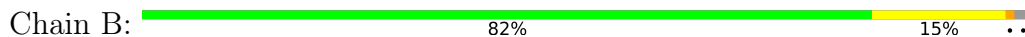
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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





• Molecule 2: 5S rRNA



• Molecule 3: Large ribosomal subunit protein uL2



• Molecule 4: 50S ribosomal protein L3



• Molecule 5: Large ribosomal subunit protein uL4







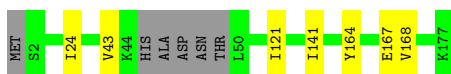
- Molecule 6: Large ribosomal subunit protein uL5

Chain F: 97%



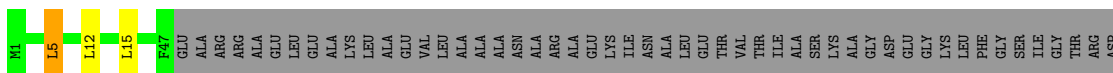
- Molecule 7: Large ribosomal subunit protein uL6

Chain G: 93%



- Molecule 8: Large ribosomal subunit protein bL9

Chain H: 30% 68%



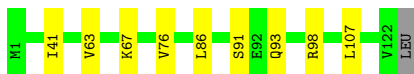
- Molecule 9: Large ribosomal subunit protein uL13

Chain J: 94% 6%



- Molecule 10: Large ribosomal subunit protein uL14

Chain K: 92% 7%



- Molecule 11: 50S ribosomal protein L15

Chain L: 90% 8%



- Molecule 12: 50S ribosomal protein L16

Chain M:  96%



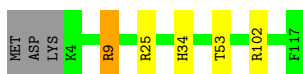
- Molecule 13: Large ribosomal subunit protein bL17

Chain N:  91% 7%




- Molecule 14: Large ribosomal subunit protein uL18

Chain O:  93%



- Molecule 15: Large ribosomal subunit protein bL19

Chain P:  90% 6%



- Molecule 16: Large ribosomal subunit protein bL20

Chain Q:  93% 5%




- Molecule 17: Large ribosomal subunit protein bL21

Chain R:  89% 10%




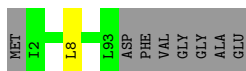
- Molecule 18: Large ribosomal subunit protein uL22

Chain S:  88% 12%



- Molecule 19: Large ribosomal subunit protein uL23

Chain T:  91% 8%



- Molecule 20: Large ribosomal subunit protein uL24

Chain U:  94%



- Molecule 21: 50S ribosomal protein L25

Chain V:  95% 5%



- Molecule 22: Large ribosomal subunit protein bL27

Chain W:  92% 6%



- Molecule 23: Large ribosomal subunit protein bL28

Chain X:  92% 6%



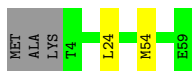
- Molecule 24: Large ribosomal subunit protein uL29

Chain Y:  95% 5%



- Molecule 25: Large ribosomal subunit protein uL30

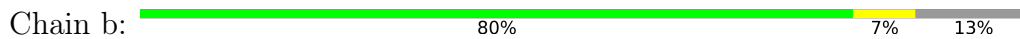
Chain Z:  92% 5%



- Molecule 26: Large ribosomal subunit protein bL32



- Molecule 27: Large ribosomal subunit protein bL33



- Molecule 28: Large ribosomal subunit protein bL34

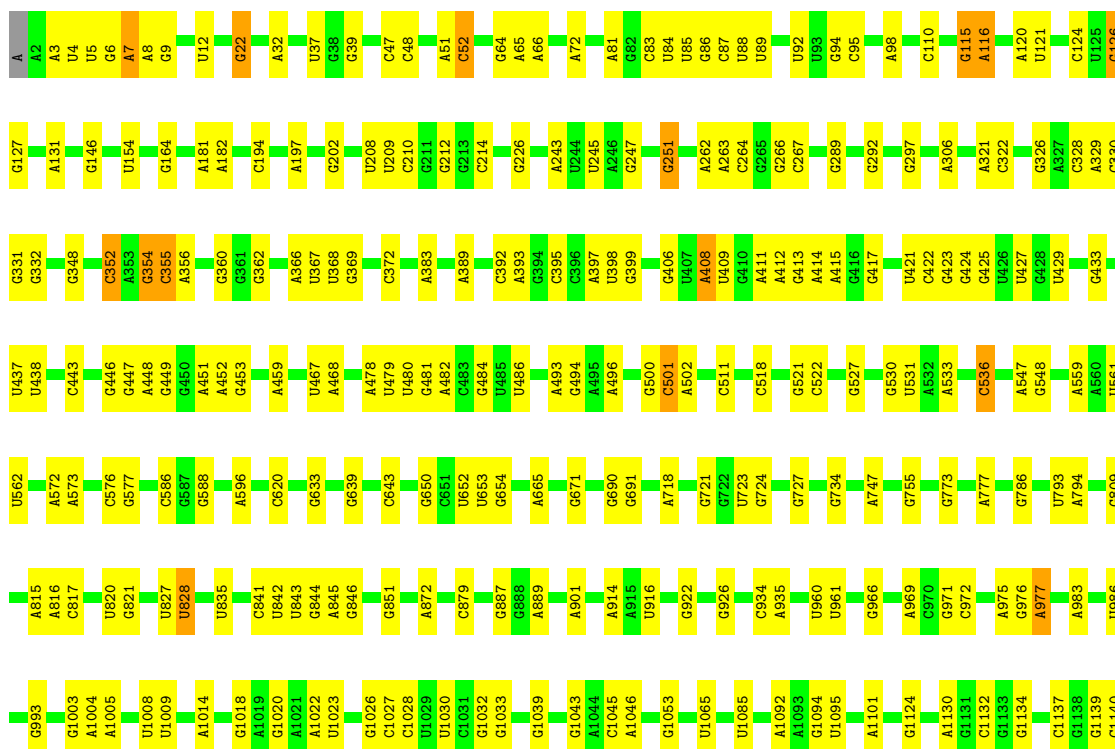
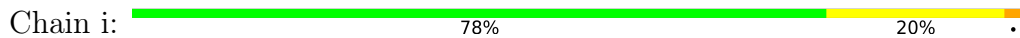


There are no outlier residues recorded for this chain.

- Molecule 29: Large ribosomal subunit protein bL35



- Molecule 30: 16S rRNA





- Molecule 31: 30S ribosomal protein S2

Chain j: 87% 11%



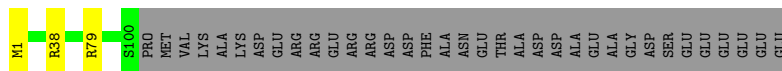
- Molecule 32: Small ribosomal subunit protein uS5

Chain m: 88% 10%



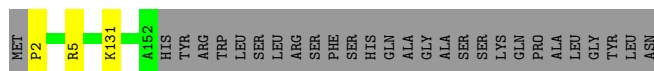
- Molecule 33: 30S ribosomal protein S6, fully modified isoform

Chain n: 72% 26%



- Molecule 34: 30S ribosomal protein S7

Chain o: 83% 16%



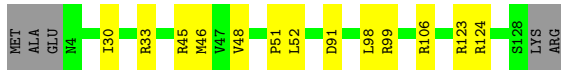
- Molecule 35: Small ribosomal subunit protein uS8

Chain p: 98%



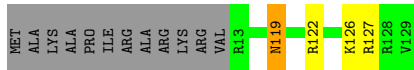
- Molecule 36: Small ribosomal subunit protein uS9

Chain q: 86% 10%



- Molecule 37: 30S ribosomal protein S11

Chain s: 88% .. 9%



- Molecule 38: 30S ribosomal protein S12

Chain t: 89% 6% ..



- Molecule 39: Small ribosomal subunit protein uS13

Chain u: 92% .. 5%



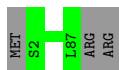
- Molecule 40: Small ribosomal subunit protein uS14

Chain v: 89% 6% 5%



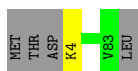
- Molecule 41: Small ribosomal subunit protein uS15

Chain w: 97% .



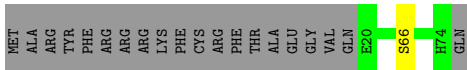
- Molecule 42: Small ribosomal subunit protein uS17

Chain y: 94% . 5%

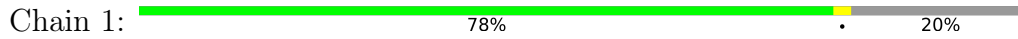


- Molecule 43: Small ribosomal subunit protein bS18

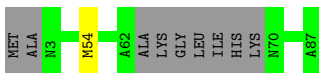
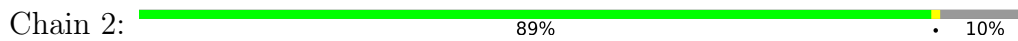
Chain z: 72% . 27%



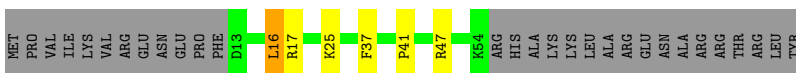
- Molecule 44: Small ribosomal subunit protein uS19



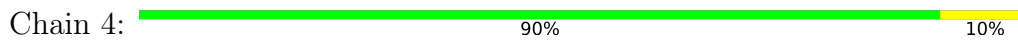
- Molecule 45: 30S ribosomal protein S20



- Molecule 46: Small ribosomal subunit protein bS21



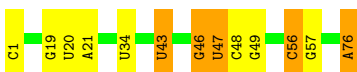
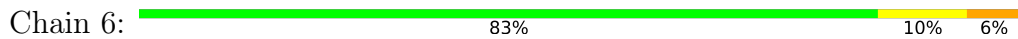
- Molecule 47: mRNA



- Molecule 48: Pro-tRNA

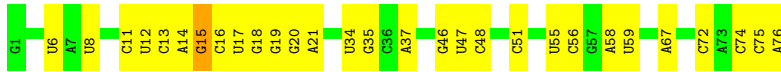


- Molecule 48: Pro-tRNA



- Molecule 49: Ala-tRNA





- Molecule 50: Large ribosomal subunit protein bL36A

Chain e:  97%



- Molecule 51: ApdP nascent chain

Chain f:  100%

There are no outlier residues recorded for this chain.



## 4 Experimental information

| Property                             | Value                                   | Source    |
|--------------------------------------|---|-----------|
| EM reconstruction method             | SINGLE PARTICLE                         | Depositor |
| Imposed symmetry                     | POINT, Not provided                     |           |
| Number of particles used             | 205838                                  | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF                       | Depositor |
| CTF correction method                | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope                           | TFS KRIOS                               | Depositor |
| Voltage (kV)                         | 300                                     | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 75.6                                    | Depositor |
| Minimum defocus (nm)                 | 600                                     | Depositor |
| Maximum defocus (nm)                 | 1800                                    | Depositor |
| Magnification                        | Not provided                            |           |
| Image detector                       | GATAN K3 BIOQUANTUM (6k x 4k)           | Depositor |

## 5 Model quality i

### 5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, MG, PSU, K, 2MA

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         | 1/68247 (0.0%) | 1.29        | 302/106469 (0.3%) |
| 2   | B     | 0.51         | 0/2828         | 1.17        | 7/4410 (0.2%)     |
| 3   | C     | 0.42         | 0/2121         | 0.87        | 4/2852 (0.1%)     |
| 4   | D     | 0.41         | 0/1586         | 0.72        | 0/2134            |
| 5   | E     | 0.38         | 0/1571         | 0.68        | 0/2113            |
| 6   | F     | 0.29         | 0/1434         | 0.64        | 0/1926            |
| 7   | G     | 0.31         | 0/1303         | 0.65        | 0/1759            |
| 8   | H     | 0.31         | 0/364          | 0.66        | 0/490             |
| 9   | J     | 0.35         | 0/1152         | 0.67        | 0/1551            |
| 10  | K     | 0.36         | 0/947          | 0.81        | 0/1268            |
| 11  | L     | 0.40         | 0/1054         | 0.76        | 0/1403            |
| 12  | M     | 0.37         | 0/1093         | 0.76        | 1/1460 (0.1%)     |
| 13  | N     | 0.38         | 0/958          | 0.77        | 0/1281            |
| 14  | O     | 0.32         | 0/885          | 0.70        | 1/1187 (0.1%)     |
| 15  | P     | 0.37         | 0/912          | 0.77        | 0/1220            |
| 16  | Q     | 0.41         | 0/954          | 0.75        | 1/1271 (0.1%)     |
| 17  | R     | 0.40         | 0/829          | 0.80        | 1/1107 (0.1%)     |
| 18  | S     | 0.38         | 0/864          | 0.71        | 0/1156            |
| 19  | T     | 0.32         | 0/736          | 0.67        | 0/984             |
| 20  | U     | 0.30         | 0/787          | 0.71        | 0/1051            |
| 21  | V     | 0.31         | 0/766          | 0.67        | 0/1025            |
| 22  | W     | 0.41         | 0/636          | 0.76        | 0/841             |
| 23  | X     | 0.38         | 0/635          | 0.79        | 1/848 (0.1%)      |
| 24  | Y     | 0.29         | 0/510          | 0.63        | 0/677             |
| 25  | Z     | 0.33         | 0/439          | 0.68        | 0/587             |
| 26  | a     | 0.41         | 0/450          | 0.81        | 0/599             |
| 27  | b     | 0.37         | 0/402          | 0.73        | 0/536             |
| 28  | c     | 0.44         | 0/380          | 0.90        | 0/498             |
| 29  | d     | 0.41         | 0/513          | 0.77        | 0/676             |
| 30  | i     | 0.55         | 0/36966        | 1.20        | 85/57666 (0.1%)   |
| 31  | j     | 0.30         | 0/1710         | 0.69        | 0/2306            |
| 32  | m     | 0.33         | 0/1118         | 0.69        | 0/1504            |

| Mol | Chain | Bond lengths |                 | Bond angles |                   |
|-----|-------|--------------|-----------------|-------------|-------------------|
|     |       | RMSZ         | # Z  >5         | RMSZ        | # Z  >5           |
| 33  | n     | 0.29         | 0/835           | 0.67        | 0/1128            |
| 34  | o     | 0.30         | 0/1195          | 0.70        | 1/1602 (0.1%)     |
| 35  | p     | 0.29         | 0/989           | 0.65        | 0/1326            |
| 36  | q     | 0.38         | 0/1013          | 0.76        | 0/1350            |
| 37  | s     | 0.34         | 0/893           | 0.79        | 2/1205 (0.2%)     |
| 38  | t     | 0.32         | 0/935           | 0.80        | 0/1256            |
| 39  | u     | 0.31         | 0/875           | 0.74        | 0/1170            |
| 40  | v     | 0.33         | 0/785           | 0.68        | 0/1043            |
| 41  | w     | 0.31         | 0/695           | 0.58        | 0/931             |
| 42  | y     | 0.28         | 0/657           | 0.71        | 0/881             |
| 43  | z     | 0.30         | 0/462           | 0.65        | 0/621             |
| 44  | 1     | 0.32         | 0/609           | 0.67        | 0/822             |
| 45  | 2     | 0.30         | 0/616           | 0.69        | 0/814             |
| 46  | 3     | 0.40         | 0/349           | 0.86        | 0/461             |
| 47  | 4     | 0.61         | 0/238           | 1.16        | 0/369             |
| 48  | 5     | 0.56         | 0/1837          | 1.20        | 3/2864 (0.1%)     |
| 48  | 6     | 0.60         | 1/1841 (0.1%)   | 1.20        | 4/2868 (0.1%)     |
| 49  | 7     | 0.61         | 0/1807          | 1.10        | 1/2816 (0.0%)     |
| 50  | e     | 0.36         | 0/303           | 0.91        | 0/397             |
| 51  | f     | 0.39         | 0/46            | 0.81        | 0/60              |
| All | All   | 0.54         | 2/152130 (0.0%) | 1.15        | 414/228839 (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                   | 6                   |
| 3   | C     | 0                   | 6                   |
| 4   | D     | 0                   | 2                   |
| 5   | E     | 0                   | 1                   |
| 9   | J     | 0                   | 1                   |
| 11  | L     | 0                   | 1                   |
| 12  | M     | 0                   | 2                   |
| 13  | N     | 0                   | 1                   |
| 14  | O     | 0                   | 1                   |
| 15  | P     | 0                   | 1                   |
| 16  | Q     | 0                   | 1                   |
| 17  | R     | 0                   | 2                   |
| 22  | W     | 0                   | 4                   |
| 23  | X     | 0                   | 2                   |

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| Mol | Chain | #Chirality outliers | #Planarity outliers |
|-----|-------|---------------------|---------------------|
| 26  | a     | 0                   | 1                   |
| 27  | b     | 0                   | 2                   |
| 29  | d     | 0                   | 1                   |
| 32  | m     | 0                   | 2                   |
| 33  | n     | 0                   | 2                   |
| 36  | q     | 0                   | 5                   |
| 38  | t     | 0                   | 4                   |
| 39  | u     | 0                   | 3                   |
| All | All   | 0                   | 51                  |

All (2) bond length outliers are listed below:

| Mol | Chain | Res  | Type | Atoms | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|-------|-------------|----------|
| 48  | 6     | 1    | C    | OP3-P | -7.30 | 1.52        | 1.61     |
| 1   | A     | 2069 | G    | C8-N7 | 5.36  | 1.34        | 1.30     |

The worst 5 of 414 bond angle outliers are listed below:

| Mol | Chain | Res  | Type | Atoms     | Z      | Observed(°) | Ideal(°) |
|-----|-------|------|------|-----------|--------|-------------|----------|
| 1   | A     | 2061 | G    | O5'-P-OP2 | -28.61 | 76.37       | 110.70   |
| 1   | A     | 575  | A    | O5'-P-OP1 | -20.21 | 86.45       | 110.70   |
| 1   | A     | 1139 | G    | O5'-P-OP2 | -18.09 | 88.99       | 110.70   |
| 1   | A     | 1395 | A    | O5'-P-OP1 | -17.95 | 89.16       | 110.70   |
| 1   | A     | 2250 | G    | O5'-P-OP2 | -17.42 | 89.80       | 110.70   |

There are no chirality outliers.

5 of 51 planarity outliers are listed below:

| Mol | Chain | Res  | Type | Group     |
|-----|-------|------|------|-----------|
| 1   | A     | 1025 | G    | Sidechain |
| 1   | A     | 250  | G    | Sidechain |
| 1   | A     | 395  | U    | Sidechain |
| 1   | A     | 463  | G    | Sidechain |
| 1   | A     | 512  | G    | Sidechain |

## 5.2 Too-close contacts

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1   | A     | 60998 | 0        | 30646    | 50      | 0            |
| 2   | B     | 2529  | 0        | 1281     | 1       | 0            |
| 3   | C     | 2082  | 0        | 2153     | 3       | 0            |
| 4   | D     | 1565  | 0        | 1616     | 9       | 0            |
| 5   | E     | 1552  | 0        | 1619     | 4       | 0            |
| 6   | F     | 1410  | 0        | 1444     | 2       | 0            |
| 7   | G     | 1285  | 0        | 1341     | 3       | 0            |
| 8   | H     | 359   | 0        | 381      | 1       | 0            |
| 9   | J     | 1129  | 0        | 1162     | 4       | 0            |
| 10  | K     | 938   | 0        | 1012     | 5       | 0            |
| 11  | L     | 1045  | 0        | 1117     | 13      | 0            |
| 12  | M     | 1074  | 0        | 1157     | 2       | 0            |
| 13  | N     | 945   | 0        | 989      | 1       | 0            |
| 14  | O     | 875   | 0        | 906      | 2       | 0            |
| 15  | P     | 900   | 0        | 945      | 5       | 0            |
| 16  | Q     | 941   | 0        | 1014     | 3       | 0            |
| 17  | R     | 816   | 0        | 839      | 5       | 0            |
| 18  | S     | 857   | 0        | 922      | 8       | 0            |
| 19  | T     | 730   | 0        | 795      | 1       | 0            |
| 20  | U     | 779   | 0        | 830      | 2       | 0            |
| 21  | V     | 753   | 0        | 780      | 3       | 0            |
| 22  | W     | 628   | 0        | 642      | 3       | 0            |
| 23  | X     | 625   | 0        | 652      | 1       | 0            |
| 24  | Y     | 509   | 0        | 543      | 2       | 0            |
| 25  | Z     | 435   | 0        | 470      | 1       | 0            |
| 26  | a     | 444   | 0        | 458      | 0       | 0            |
| 27  | b     | 395   | 0        | 422      | 0       | 0            |
| 28  | c     | 377   | 0        | 418      | 0       | 0            |
| 29  | d     | 504   | 0        | 572      | 0       | 0            |
| 30  | i     | 33015 | 0        | 16604    | 0       | 0            |
| 31  | j     | 1679  | 0        | 1705     | 0       | 0            |
| 32  | m     | 1105  | 0        | 1148     | 0       | 0            |
| 33  | n     | 817   | 0        | 808      | 0       | 0            |
| 34  | o     | 1181  | 0        | 1238     | 0       | 0            |
| 35  | p     | 979   | 0        | 1031     | 0       | 0            |
| 36  | q     | 1001  | 0        | 1044     | 0       | 0            |
| 37  | s     | 877   | 0        | 887      | 0       | 0            |
| 38  | t     | 922   | 0        | 978      | 0       | 0            |
| 39  | u     | 867   | 0        | 921      | 0       | 0            |
| 40  | v     | 774   | 0        | 824      | 0       | 0            |
| 41  | w     | 687   | 0        | 702      | 0       | 0            |
| 42  | y     | 648   | 0        | 691      | 0       | 0            |
| 43  | z     | 455   | 0        | 478      | 0       | 0            |

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| Mol | Chain | Non-H  | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|--------|----------|----------|---------|--------------|
| 44  | 1     | 594    | 0        | 610      | 1       | 0            |
| 45  | 2     | 612    | 0        | 650      | 0       | 0            |
| 46  | 3     | 346    | 0        | 369      | 3       | 0            |
| 47  | 4     | 214    | 0        | 111      | 1       | 0            |
| 48  | 5     | 1644   | 0        | 832      | 4       | 0            |
| 48  | 6     | 1648   | 0        | 831      | 2       | 0            |
| 49  | 7     | 1618   | 0        | 823      | 0       | 0            |
| 50  | e     | 302    | 0        | 340      | 0       | 0            |
| 51  | f     | 46     | 0        | 53       | 0       | 0            |
| 52  | 6     | 1      | 0        | 0        | 0       | 0            |
| 52  | A     | 178    | 0        | 0        | 0       | 0            |
| 52  | B     | 5      | 0        | 0        | 0       | 0            |
| 52  | C     | 1      | 0        | 0        | 0       | 0            |
| 52  | D     | 1      | 0        | 0        | 0       | 0            |
| 52  | a     | 1      | 0        | 0        | 0       | 0            |
| 52  | i     | 61     | 0        | 0        | 0       | 0            |
| 53  | A     | 83     | 0        | 0        | 0       | 0            |
| 53  | C     | 3      | 0        | 0        | 0       | 0            |
| 53  | E     | 1      | 0        | 0        | 0       | 0            |
| 53  | U     | 1      | 0        | 0        | 0       | 0            |
| 53  | i     | 37     | 0        | 0        | 0       | 0            |
| 53  | n     | 1      | 0        | 0        | 0       | 0            |
| 53  | u     | 1      | 0        | 0        | 0       | 0            |
| 54  | 5     | 7      | 0        | 7        | 1       | 0            |
| 55  | e     | 1      | 0        | 0        | 0       | 0            |
| 56  | 4     | 3      | 0        | 0        | 0       | 0            |
| 56  | 5     | 3      | 0        | 0        | 0       | 0            |
| 56  | 6     | 2      | 0        | 0        | 0       | 0            |
| 56  | A     | 1006   | 0        | 0        | 0       | 0            |
| 56  | B     | 10     | 0        | 0        | 0       | 0            |
| 56  | C     | 14     | 0        | 0        | 0       | 0            |
| 56  | D     | 2      | 0        | 0        | 0       | 0            |
| 56  | E     | 3      | 0        | 0        | 0       | 0            |
| 56  | L     | 4      | 0        | 0        | 0       | 0            |
| 56  | N     | 3      | 0        | 0        | 0       | 0            |
| 56  | T     | 1      | 0        | 0        | 0       | 0            |
| 56  | a     | 4      | 0        | 0        | 0       | 0            |
| 56  | d     | 4      | 0        | 0        | 0       | 0            |
| 56  | f     | 3      | 0        | 0        | 0       | 0            |
| 56  | i     | 176    | 0        | 0        | 0       | 0            |
| 56  | s     | 1      | 0        | 0        | 0       | 0            |
| All | All   | 141132 | 0        | 90811    | 119     | 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 1.

The worst 5 of 119 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) |
|-----------------|------------------|--------------------------|-------------------|
| 46:3:37:PHE:O   | 46:3:41:PRO:HD2  | 1.76                     | 0.84              |
| 48:5:8:U:H5     | 48:5:14:A:N7     | 1.86                     | 0.73              |
| 18:S:59:GLU:HB3 | 18:S:66:ILE:HD11 | 1.78                     | 0.65              |
| 1:A:1824:G:O2'  | 3:C:252:THR:HG21 | 1.97                     | 0.64              |
| 54:5:101:PRO:N  | 48:6:76:A:HO2'   | 1.97                     | 0.62              |

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%) | 256 (95%) | 13 (5%) | 0        | 100         | 100 |
| 4   | D     | 207/209 (99%) | 200 (97%) | 7 (3%)  | 0        | 100         | 100 |
| 5   | E     | 199/201 (99%) | 188 (94%) | 10 (5%) | 1 (0%)   | 25          | 28  |
| 6   | F     | 175/179 (98%) | 165 (94%) | 10 (6%) | 0        | 100         | 100 |
| 7   | G     | 167/177 (94%) | 158 (95%) | 9 (5%)  | 0        | 100         | 100 |
| 8   | H     | 45/149 (30%)  | 42 (93%)  | 2 (4%)  | 1 (2%)   | 5           | 3   |
| 9   | J     | 140/142 (99%) | 138 (99%) | 2 (1%)  | 0        | 100         | 100 |
| 10  | K     | 120/123 (98%) | 115 (96%) | 5 (4%)  | 0        | 100         | 100 |
| 11  | L     | 141/144 (98%) | 133 (94%) | 7 (5%)  | 1 (1%)   | 19          | 19  |
| 12  | M     | 134/136 (98%) | 128 (96%) | 6 (4%)  | 0        | 100         | 100 |
| 13  | N     | 116/127 (91%) | 109 (94%) | 7 (6%)  | 0        | 100         | 100 |
| 14  | O     | 112/117 (96%) | 107 (96%) | 5 (4%)  | 0        | 100         | 100 |

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| Mol | Chain | Analysed      | Favoured  | Allowed  | Outliers | Percentiles |     |
|-----|-------|---------------|-----------|----------|----------|-------------|-----|
| 15  | P     | 110/115 (96%) | 107 (97%) | 3 (3%)   | 0        | 100         | 100 |
| 16  | Q     | 114/118 (97%) | 112 (98%) | 2 (2%)   | 0        | 100         | 100 |
| 17  | R     | 101/103 (98%) | 93 (92%)  | 8 (8%)   | 0        | 100         | 100 |
| 18  | S     | 108/110 (98%) | 104 (96%) | 4 (4%)   | 0        | 100         | 100 |
| 19  | T     | 90/100 (90%)  | 88 (98%)  | 2 (2%)   | 0        | 100         | 100 |
| 20  | U     | 100/104 (96%) | 94 (94%)  | 6 (6%)   | 0        | 100         | 100 |
| 21  | V     | 92/94 (98%)   | 91 (99%)  | 1 (1%)   | 0        | 100         | 100 |
| 22  | W     | 82/85 (96%)   | 80 (98%)  | 2 (2%)   | 0        | 100         | 100 |
| 23  | X     | 75/78 (96%)   | 74 (99%)  | 1 (1%)   | 0        | 100         | 100 |
| 24  | Y     | 61/63 (97%)   | 55 (90%)  | 6 (10%)  | 0        | 100         | 100 |
| 25  | Z     | 54/59 (92%)   | 52 (96%)  | 2 (4%)   | 0        | 100         | 100 |
| 26  | a     | 54/57 (95%)   | 51 (94%)  | 3 (6%)   | 0        | 100         | 100 |
| 27  | b     | 46/55 (84%)   | 46 (100%) | 0        | 0        | 100         | 100 |
| 28  | c     | 44/46 (96%)   | 43 (98%)  | 1 (2%)   | 0        | 100         | 100 |
| 29  | d     | 62/65 (95%)   | 60 (97%)  | 2 (3%)   | 0        | 100         | 100 |
| 31  | j     | 213/241 (88%) | 187 (88%) | 25 (12%) | 1 (0%)   | 25          | 28  |
| 32  | m     | 148/167 (89%) | 139 (94%) | 9 (6%)   | 0        | 100         | 100 |
| 33  | n     | 98/135 (73%)  | 88 (90%)  | 10 (10%) | 0        | 100         | 100 |
| 34  | o     | 149/179 (83%) | 136 (91%) | 13 (9%)  | 0        | 100         | 100 |
| 35  | p     | 127/130 (98%) | 121 (95%) | 6 (5%)   | 0        | 100         | 100 |
| 36  | q     | 123/130 (95%) | 105 (85%) | 16 (13%) | 2 (2%)   | 8           | 6   |
| 37  | s     | 115/129 (89%) | 106 (92%) | 8 (7%)   | 1 (1%)   | 14          | 14  |
| 38  | t     | 117/124 (94%) | 103 (88%) | 13 (11%) | 1 (1%)   | 14          | 14  |
| 39  | u     | 110/118 (93%) | 100 (91%) | 10 (9%)  | 0        | 100         | 100 |
| 40  | v     | 92/101 (91%)  | 87 (95%)  | 3 (3%)   | 2 (2%)   | 5           | 3   |
| 41  | w     | 84/89 (94%)   | 82 (98%)  | 2 (2%)   | 0        | 100         | 100 |
| 42  | y     | 78/84 (93%)   | 68 (87%)  | 10 (13%) | 0        | 100         | 100 |
| 43  | z     | 53/75 (71%)   | 52 (98%)  | 1 (2%)   | 0        | 100         | 100 |
| 44  | 1     | 72/92 (78%)   | 71 (99%)  | 1 (1%)   | 0        | 100         | 100 |
| 45  | 2     | 74/87 (85%)   | 71 (96%)  | 3 (4%)   | 0        | 100         | 100 |
| 46  | 3     | 40/71 (56%)   | 39 (98%)  | 1 (2%)   | 0        | 100         | 100 |

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| Mol | Chain | Analysed        | Favoured   | Allowed  | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|----------|----------|-------------|-----|
| 50  | e     | 36/38 (95%)     | 33 (92%)   | 2 (6%)   | 1 (3%)   | 4           | 2   |
| 51  | f     | 4/6 (67%)       | 3 (75%)    | 1 (25%)  | 0        | 100         | 100 |
| All | All   | 4751/5225 (91%) | 4480 (94%) | 260 (6%) | 11 (0%)  | 45          | 52  |

5 of 11 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | E     | 190 | ALA  |
| 11  | L     | 111 | ILE  |
| 37  | s     | 119 | ASN  |
| 40  | v     | 23  | LYS  |
| 36  | q     | 51  | PRO  |

### 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%)  | 215 (100%) | 1 (0%)   | 86          | 93  |
| 4   | D     | 164/164 (100%) | 164 (100%) | 0        | 100         | 100 |
| 5   | E     | 165/165 (100%) | 164 (99%)  | 1 (1%)   | 84          | 91  |
| 6   | F     | 148/150 (99%)  | 147 (99%)  | 1 (1%)   | 81          | 90  |
| 7   | G     | 133/138 (96%)  | 132 (99%)  | 1 (1%)   | 79          | 88  |
| 8   | H     | 38/114 (33%)   | 37 (97%)   | 1 (3%)   | 41          | 54  |
| 9   | J     | 116/116 (100%) | 115 (99%)  | 1 (1%)   | 75          | 86  |
| 10  | K     | 103/104 (99%)  | 102 (99%)  | 1 (1%)   | 73          | 84  |
| 11  | L     | 102/103 (99%)  | 102 (100%) | 0        | 100         | 100 |
| 12  | M     | 109/109 (100%) | 107 (98%)  | 2 (2%)   | 54          | 69  |
| 13  | N     | 98/103 (95%)   | 98 (100%)  | 0        | 100         | 100 |
| 14  | O     | 84/87 (97%)    | 83 (99%)   | 1 (1%)   | 67          | 80  |
| 15  | P     | 97/100 (97%)   | 96 (99%)   | 1 (1%)   | 73          | 84  |
| 16  | Q     | 89/90 (99%)    | 89 (100%)  | 0        | 100         | 100 |

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| Mol | Chain | Analysed      | Rotameric | Outliers | Percentiles |     |
|-----|-------|---------------|-----------|----------|-------------|-----|
| 17  | R     | 84/84 (100%)  | 83 (99%)  | 1 (1%)   | 67          | 80  |
| 18  | S     | 93/93 (100%)  | 91 (98%)  | 2 (2%)   | 47          | 61  |
| 19  | T     | 79/84 (94%)   | 79 (100%) | 0        | 100         | 100 |
| 20  | U     | 83/85 (98%)   | 83 (100%) | 0        | 100         | 100 |
| 21  | V     | 78/78 (100%)  | 78 (100%) | 0        | 100         | 100 |
| 22  | W     | 61/63 (97%)   | 61 (100%) | 0        | 100         | 100 |
| 23  | X     | 67/68 (98%)   | 67 (100%) | 0        | 100         | 100 |
| 24  | Y     | 55/55 (100%)  | 55 (100%) | 0        | 100         | 100 |
| 25  | Z     | 47/49 (96%)   | 47 (100%) | 0        | 100         | 100 |
| 26  | a     | 47/48 (98%)   | 47 (100%) | 0        | 100         | 100 |
| 27  | b     | 44/49 (90%)   | 42 (96%)  | 2 (4%)   | 23          | 30  |
| 28  | c     | 38/38 (100%)  | 38 (100%) | 0        | 100         | 100 |
| 29  | d     | 51/52 (98%)   | 50 (98%)  | 1 (2%)   | 50          | 65  |
| 31  | j     | 177/199 (89%) | 172 (97%) | 5 (3%)   | 38          | 51  |
| 32  | m     | 113/126 (90%) | 112 (99%) | 1 (1%)   | 75          | 86  |
| 33  | n     | 87/116 (75%)  | 86 (99%)  | 1 (1%)   | 70          | 82  |
| 34  | o     | 124/147 (84%) | 122 (98%) | 2 (2%)   | 58          | 73  |
| 35  | p     | 104/105 (99%) | 102 (98%) | 2 (2%)   | 52          | 67  |
| 36  | q     | 103/107 (96%) | 97 (94%)  | 6 (6%)   | 17          | 20  |
| 37  | s     | 90/99 (91%)   | 88 (98%)  | 2 (2%)   | 47          | 61  |
| 38  | t     | 100/104 (96%) | 95 (95%)  | 5 (5%)   | 20          | 26  |
| 39  | u     | 90/96 (94%)   | 88 (98%)  | 2 (2%)   | 47          | 61  |
| 40  | v     | 79/84 (94%)   | 75 (95%)  | 4 (5%)   | 20          | 25  |
| 41  | w     | 73/77 (95%)   | 73 (100%) | 0        | 100         | 100 |
| 42  | y     | 74/78 (95%)   | 73 (99%)  | 1 (1%)   | 62          | 77  |
| 43  | z     | 48/65 (74%)   | 47 (98%)  | 1 (2%)   | 48          | 63  |
| 44  | 1     | 65/79 (82%)   | 65 (100%) | 0        | 100         | 100 |
| 45  | 2     | 60/66 (91%)   | 59 (98%)  | 1 (2%)   | 56          | 71  |
| 46  | 3     | 35/61 (57%)   | 31 (89%)  | 4 (11%)  | 4           | 4   |
| 50  | e     | 34/34 (100%)  | 34 (100%) | 0        | 100         | 100 |
| 51  | f     | 5/5 (100%)    | 5 (100%)  | 0        | 100         | 100 |

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| Mol | Chain | Analysed        | Rotameric  | Outliers | Percentiles |
|-----|-------|-----------------|------------|----------|-------------|
| All | All   | 3950/4255 (93%) | 3896 (99%) | 54 (1%)  | 62 77       |

5 of 54 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 36  | q     | 30  | ILE  |
| 37  | s     | 126 | LYS  |
| 45  | 2     | 54  | MET  |
| 36  | q     | 46  | MET  |
| 36  | q     | 98  | LEU  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 40  | v     | 43  | ASN  |
| 41  | w     | 37  | ASN  |
| 50  | e     | 35  | GLN  |
| 21  | V     | 49  | ASN  |
| 20  | U     | 66  | GLN  |

### 5.3.3 RNA [i](#)

| Mol | Chain | Analysed        | Backbone Outliers | Pucker Outliers |
|-----|-------|-----------------|-------------------|-----------------|
| 1   | A     | 2837/2903 (97%) | 345 (12%)         | 55 (1%)         |
| 2   | B     | 117/120 (97%)   | 13 (11%)          | 1 (0%)          |
| 30  | i     | 1538/1540 (99%) | 280 (18%)         | 0               |
| 47  | 4     | 9/10 (90%)      | 0                 | 0               |
| 48  | 5     | 76/77 (98%)     | 15 (19%)          | 4 (5%)          |
| 48  | 6     | 76/77 (98%)     | 11 (14%)          | 4 (5%)          |
| 49  | 7     | 75/76 (98%)     | 28 (37%)          | 3 (4%)          |
| All | All   | 4728/4803 (98%) | 692 (14%)         | 67 (1%)         |

5 of 692 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 10  | A    |
| 1   | A     | 12  | U    |
| 1   | A     | 34  | U    |
| 1   | A     | 46  | G    |
| 1   | A     | 61  | C    |

5 of 67 RNA pucker outliers are listed below:

| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 48  | 5     | 20   | G    |
| 48  | 5     | 57   | C    |
| 49  | 7     | 74   | C    |
| 1   | A     | 1135 | C    |
| 1   | A     | 1133 | A    |

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

3 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   | PSU  | A     | 2504 | 53,1    | 18,21,22     | 1.04 | 1 (5%)   | 22,30,33    | 1.00 | 1 (4%)   |
| 1   | 2MA  | A     | 2503 | 53,1,52 | 19,25,26     | 0.91 | 0        | 21,37,40    | 2.14 | 4 (19%)  |
| 1   | PSU  | A     | 746  | 1,52    | 18,21,22     | 0.96 | 1 (5%)   | 22,30,33    | 1.59 | 4 (18%)  |

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   | PSU  | A     | 2504 | 53,1    | -       | 0/7/25/26 | 0/2/2/2 |
| 1   | 2MA  | A     | 2503 | 53,1,52 | -       | 1/3/25/26 | 0/3/3/3 |
| 1   | PSU  | A     | 746  | 1,52    | -       | 1/7/25/26 | 0/2/2/2 |

All (2) bond length outliers are listed below:

| Mol | Chain | Res  | Type | Atoms | Z    | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|------|-------------|----------|
| 1   | A     | 2504 | PSU  | C6-C5 | 3.55 | 1.39        | 1.35     |
| 1   | A     | 746  | PSU  | C6-C5 | 3.35 | 1.39        | 1.35     |

The worst 5 of 9 bond angle outliers are listed below:

| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 1   | A     | 2503 | 2MA  | C5-C6-N1    | -7.57 | 116.04      | 121.01   |
| 1   | A     | 746  | PSU  | O3'-C3'-C4' | 4.47  | 123.98      | 111.05   |
| 1   | A     | 2503 | 2MA  | C5-C6-N6    | 3.93  | 126.33      | 120.35   |
| 1   | A     | 746  | PSU  | C3'-C2'-C1' | 3.42  | 105.62      | 101.64   |
| 1   | A     | 2503 | 2MA  | CM2-C2-N1   | 3.08  | 121.97      | 117.15   |

There are no chirality outliers.

All (2) torsion outliers are listed below:

| Mol | Chain | Res  | Type | Atoms           |
|-----|-------|------|------|-----------------|
| 1   | A     | 746  | PSU  | O4'-C1'-C5-C6   |
| 1   | A     | 2503 | 2MA  | O4'-C4'-C5'-O5' |

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 377 ligands modelled in this entry, 376 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 |
| 54  | PRO  | 5     | 101 | 48   | 5,7,8        | 0.54 | 0        | 7,8,10      | 0.99 | 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   |
|-----|------|-------|-----|------|---------|----------|---------|
| 54  | PRO  | 5     | 101 | 48   | -       | 0/0/9/11 | 0/1/1/1 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 54  | 5     | 101 | PRO  | 1       | 0            |

## 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.