



# Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

May 3, 2019 – 03:22 PM EDT

PDB ID : 6NHV  
EMDB ID: : EMD-9374  
Title : Single particle reconstruction of DARPin and its bound GFP on a symmetric scaffold  
Authors : Liu, Y.; Huynh, D.; Yeates, T.O.  
Deposited on : 2018-12-24  
Resolution : 3.50 Å(reported)  
Based on PDB ID : 6C9K, 4W6B, 5MA8

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report for a publicly released PDB/EMDB 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.

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MolProbity : 4.02b-467  
Mogul : 1.8.0 (224370), CSD as540be (2019)  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20031633

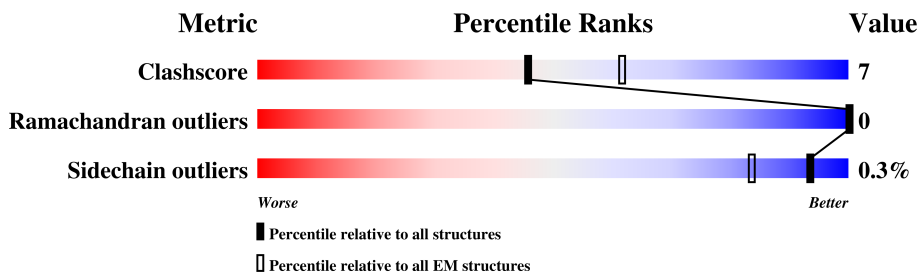
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.50 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            | 136327                   | 1886                     |
| Ramachandran outliers | 132723                   | 1663                     |
| Sidechain outliers    | 132532                   | 1531                     |

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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     | 234    | 90% 7% .         |
| 2   | N     | 131    | 73% 17% 10%      |
| 2   | O     | 131    | 76% 15% 10%      |
| 2   | X     | 131    | 77% 13% 10%      |
| 3   | R     | 319    | 83% 10% 7%       |
| 3   | S     | 319    | 39% 5% 55%       |
| 3   | T     | 319    | 40% 5% 55%       |

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 8948 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called superfolder GFP.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
|     |       |          | Total | C    | N   | O   | S |         |       |
| 1   | A     | 229      | 1828  | 1156 | 317 | 350 | 5 | 0       | 0     |

- Molecule 2 is a protein called DARP14 - Subunit B.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 2   | N     | 118      | 885   | 552 | 158 | 172 | 3 | 0       | 0     |
| 2   | O     | 118      | 885   | 552 | 158 | 172 | 3 | 0       | 0     |
| 2   | X     | 118      | 885   | 552 | 158 | 172 | 3 | 0       | 0     |

There are 48 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment             | Reference  |
|-------|---------|----------|--------|---------------------|------------|
| N     | 27      | LYS      | ALA    | engineered mutation | UNP Q9I2D8 |
| N     | 74      | ILE      | ALA    | engineered mutation | UNP Q9I2D8 |
| N     | 78      | THR      | GLN    | engineered mutation | UNP Q9I2D8 |
| N     | 79      | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| N     | 82      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| N     | 86      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| N     | 90      | GLU      | GLY    | engineered mutation | UNP Q9I2D8 |
| N     | 112     | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| N     | 124     | LEU      | -      | expression tag      | UNP Q9I2D8 |
| N     | 125     | GLU      | -      | expression tag      | UNP Q9I2D8 |
| N     | 126     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| N     | 127     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| N     | 128     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| N     | 129     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| N     | 130     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| N     | 131     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 27      | LYS      | ALA    | engineered mutation | UNP Q9I2D8 |

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| Chain | Residue | Modelled | Actual | Comment             | Reference  |
|-------|---------|----------|--------|---------------------|------------|
| O     | 74      | ILE      | ALA    | engineered mutation | UNP Q9I2D8 |
| O     | 78      | THR      | GLN    | engineered mutation | UNP Q9I2D8 |
| O     | 79      | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| O     | 82      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| O     | 86      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| O     | 90      | GLU      | GLY    | engineered mutation | UNP Q9I2D8 |
| O     | 112     | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| O     | 124     | LEU      | -      | expression tag      | UNP Q9I2D8 |
| O     | 125     | GLU      | -      | expression tag      | UNP Q9I2D8 |
| O     | 126     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 127     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 128     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 129     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 130     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| O     | 131     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 27      | LYS      | ALA    | engineered mutation | UNP Q9I2D8 |
| X     | 74      | ILE      | ALA    | engineered mutation | UNP Q9I2D8 |
| X     | 78      | THR      | GLN    | engineered mutation | UNP Q9I2D8 |
| X     | 79      | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| X     | 82      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| X     | 86      | ALA      | GLU    | engineered mutation | UNP Q9I2D8 |
| X     | 90      | GLU      | GLY    | engineered mutation | UNP Q9I2D8 |
| X     | 112     | LEU      | ALA    | engineered mutation | UNP Q9I2D8 |
| X     | 124     | LEU      | -      | expression tag      | UNP Q9I2D8 |
| X     | 125     | GLU      | -      | expression tag      | UNP Q9I2D8 |
| X     | 126     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 127     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 128     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 129     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 130     | HIS      | -      | expression tag      | UNP Q9I2D8 |
| X     | 131     | HIS      | -      | expression tag      | UNP Q9I2D8 |


- Molecule 3 is a protein called Subunit A-DARPin.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 3   | R     | 297      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 2251  | 1425 | 387 | 432 | 7 |         |       |
| 3   | S     | 143      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 1107  | 708  | 184 | 210 | 5 |         |       |
| 3   | T     | 143      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 1107  | 708  | 184 | 210 | 5 |         |       |

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: superfolder GFP

Chain A: 




- Molecule 2: DARP14 - Subunit B

Chain N: 




- Molecule 2: DARP14 - Subunit B

Chain O: 




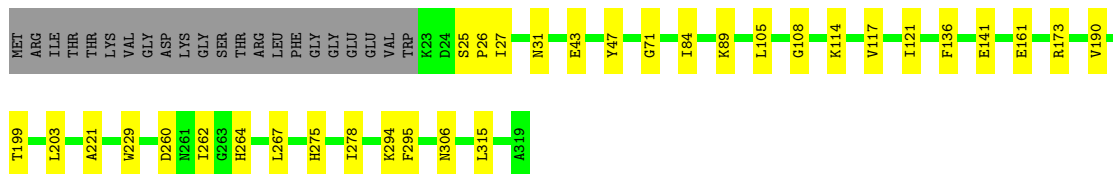
- Molecule 2: DARP14 - Subunit B

Chain X: 




- Molecule 3: Subunit A-DARPin

Chain R: 



- Molecule 3: Subunit A-DARPin

Chain S: 

MET ARG ILE THR THR LYS VAL GLY ASP LYS SER THR ARG LEU PHE GLY GLU VAL TRP K23 D24 S25 P26 I27 N31 L34 E43 Y47 D61 I66 G71 T109 K114 V117 F136 Y145 L146 Q164 G165 LYS LYS LEU LEU GLU

ALA ARG ALA GLY LYS ASP VAL ASP MET LEU ASN PHE GLY VAL ASP THR VAL ASN ALA TRP ALA ASP VAL GLY THR PRO LEU HIS E43 ALA Y47 GIN ARG GLY HIS LEU G71 ILE VAL T109 VAL V117 LEU LYS CYS GLY ALA Y145 L146 ASP VAL ASN ALA G165 ALA ASP TRP TRP GLY

GLN THR PRO LEU HIS LYS ALA THR ASP LEU ILE VAL GLU ASP THR ALA PHE GLY HIS LEU MET LEU ILE ASN PHE VAL GLY ASP VAL LEU LYS ASN ALA TRP GLY ASP VAL ASN ALA THR ASN ILE LEU HIS LEU ALA TRP ILE VAL GLY HIS LEU ALA TRP ILE VAL GLY VAL LEU LEU LYS TYR GLY ALA ASP VAL ASN

ALA GLN ASP LYS PHE GLY THR PRO PHE ASP LEU MET ILE ASN PHE VAL GLY ASP VAL ASP ILE GLU VAL LEU LYS ALA

• Molecule 3: Subunit A-DARPin

Chain T: 40% 5% 55%

MET ARG ILE THR THR LYS VAL GLY ASP LYS SER THR ARG LEU PHE GLY GLU VAL TRP K23 D24 S25 P26 I27 N31 L34 E43 Y47 D62 I66 G71 K114 V117 I121 F136 Y145 L146 G165 LYS LYS LEU LEU GLU ALA

ALA ARG ALA GLY LYS ASP VAL ASP MET LEU MET ALA ASN PHE VAL GLY ASP VAL ASN ALA TRP ALA ASP VAL GLY VAL THR PRO LEU HIS LEU E43 ALA Y47 GIN ARG GLY HIS LEU G71 ILE VAL K114 VAL V117 LEU LYS CYS GLY ALA ASP VAL ASN ALA G165 ALA ASP TRP TRP GLY

THR PRO LEU HIS LYS ALA THR VAL GLY HIS LEU MET LEU ILE VAL ASN PHE VAL GLY ASP VAL LEU LYS ASN ALA TRP GLY ASP VAL LEU HIS LEU ALA TRP ILE VAL K114 VAL V117 LEU LYS CYS GLY VAL LEU LEU LYS TYR GLY ALA ASP VAL ASN ALA

GLN ASP PHE GLY LYS THR PRO PHE ASP LEU MET LEU ILE ASP ASN PHE VAL GLY ASN GLU ASP ILE ALA GLU VAL LEU LYS ALA

## 4 Experimental information

| Property                             | Value                     | Source    |
|--------------------------------------|---------------------------|-----------|
| Reconstruction method                | SINGLE PARTICLE           | Depositor |
| Imposed symmetry                     | POINT, C1                 | Depositor |
| Number of particles used             | 91211                     | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF         | Depositor |
| CTF correction method                | PHASE FLIPPING ONLY       | Depositor |
| Microscope                           | FEI TITAN KRIOS           | Depositor |
| Voltage (kV)                         | 300                       | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 56                        | Depositor |
| Minimum defocus (nm)                 | Not provided              | Depositor |
| Maximum defocus (nm)                 | Not provided              | Depositor |
| Magnification                        | 130000                    | Depositor |
| Image detector                       | GATAN K2 SUMMIT (4k 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: CRO

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  >2 | RMSZ        | # Z  >2 |
| 1   | A     | 0.37         | 0/1846  | 0.51        | 0/2494  |
| 2   | N     | 0.56         | 0/894   | 0.54        | 0/1207  |
| 2   | O     | 0.57         | 0/894   | 0.53        | 0/1207  |
| 2   | X     | 0.53         | 0/894   | 0.52        | 0/1207  |
| 3   | R     | 0.43         | 0/2280  | 0.54        | 0/3089  |
| 3   | S     | 0.50         | 0/1118  | 0.56        | 0/1504  |
| 3   | T     | 0.50         | 0/1118  | 0.57        | 0/1504  |
| All | All   | 0.48         | 0/9044  | 0.54        | 0/12212 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [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     | 1828  | 0        | 1776     | 39      | 0            |
| 2   | N     | 885   | 0        | 896      | 17      | 0            |
| 2   | O     | 885   | 0        | 896      | 12      | 0            |
| 2   | X     | 885   | 0        | 896      | 11      | 0            |
| 3   | R     | 2251  | 0        | 2279     | 46      | 0            |
| 3   | S     | 1107  | 0        | 1148     | 16      | 0            |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 3   | T     | 1107  | 0        | 1148     | 16      | 0            |
| All | All   | 8948  | 0        | 9039     | 129     | 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 7.

All (129) 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:43:THR:HB    | 3:R:229:TRP:CE2  | 1.78                     | 1.18              |
| 1:A:42:LEU:HD11  | 1:A:222:GLU:HB3  | 1.30                     | 1.11              |
| 1:A:42:LEU:HD11  | 1:A:222:GLU:CB   | 1.98                     | 0.94              |
| 1:A:42:LEU:CD1   | 1:A:222:GLU:HB3  | 1.97                     | 0.93              |
| 1:A:41:LYS:HG3   | 1:A:223:PHE:CE1  | 2.10                     | 0.86              |
| 3:R:108:GLY:HA3  | 3:R:161:GLU:OE2  | 1.79                     | 0.82              |
| 2:X:77:ARG:NH1   | 2:X:108:GLU:OE2  | 2.12                     | 0.82              |
| 1:A:204:GLN:HB3  | 3:R:295:PHE:CZ   | 2.18                     | 0.79              |
| 2:O:77:ARG:NH1   | 2:O:108:GLU:OE2  | 2.15                     | 0.78              |
| 3:R:43:GLU:OE1   | 3:T:117:VAL:HG21 | 1.82                     | 0.78              |
| 1:A:42:LEU:O     | 1:A:42:LEU:HD12  | 1.83                     | 0.78              |
| 1:A:43:THR:HB    | 3:R:229:TRP:NE1  | 2.00                     | 0.77              |
| 1:A:204:GLN:HB3  | 3:R:295:PHE:HZ   | 1.48                     | 0.77              |
| 1:A:43:THR:HB    | 3:R:229:TRP:CZ2  | 2.19                     | 0.77              |
| 3:S:27:ILE:HD11  | 3:S:136:PHE:CD2  | 2.23                     | 0.73              |
| 3:T:27:ILE:HG12  | 3:T:136:PHE:HE2  | 1.53                     | 0.73              |
| 3:T:27:ILE:HD11  | 3:T:136:PHE:CD2  | 2.23                     | 0.73              |
| 3:S:27:ILE:HG12  | 3:S:136:PHE:HE2  | 1.53                     | 0.72              |
| 3:S:117:VAL:HG21 | 3:T:43:GLU:OE1   | 1.89                     | 0.71              |
| 3:R:117:VAL:HG21 | 3:S:43:GLU:OE1   | 1.90                     | 0.71              |
| 1:A:147:SER:OG   | 3:R:295:PHE:CE1  | 2.43                     | 0.71              |
| 3:S:47:TYR:CD2   | 3:S:114:LYS:HG3  | 2.26                     | 0.70              |
| 1:A:223:PHE:HE2  | 3:R:262:ILE:HD12 | 1.56                     | 0.70              |
| 3:S:27:ILE:HD11  | 3:S:136:PHE:HD2  | 1.56                     | 0.70              |
| 3:T:27:ILE:HD11  | 3:T:136:PHE:HD2  | 1.56                     | 0.69              |
| 1:A:206:ALA:HB2  | 3:R:262:ILE:CG1  | 2.24                     | 0.67              |
| 1:A:41:LYS:CG    | 1:A:223:PHE:CE1  | 2.78                     | 0.67              |
| 3:R:27:ILE:HG12  | 3:R:136:PHE:HE2  | 1.58                     | 0.67              |
| 1:A:40:GLY:O     | 1:A:223:PHE:HA   | 1.94                     | 0.67              |
| 1:A:147:SER:OG   | 3:R:295:PHE:HE1  | 1.79                     | 0.66              |
| 3:R:27:ILE:HD11  | 3:R:136:PHE:CD2  | 2.30                     | 0.66              |
| 3:T:47:TYR:CD2   | 3:T:114:LYS:HG3  | 2.32                     | 0.65              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:A:206:ALA:HB2  | 3:R:262:ILE:HG12 | 1.79                     | 0.65              |
| 2:N:77:ARG:NH1   | 2:N:108:GLU:OE2  | 2.30                     | 0.65              |
| 3:R:27:ILE:HD11  | 3:R:136:PHE:HD2  | 1.61                     | 0.63              |
| 1:A:147:SER:OG   | 1:A:204:GLN:HG2  | 1.98                     | 0.63              |
| 3:T:31:ASN:HD21  | 3:T:71:GLY:HA2   | 1.64                     | 0.62              |
| 3:R:275:HIS:HB2  | 3:R:278:ILE:HG12 | 1.82                     | 0.61              |
| 1:A:72:SER:HA    | 1:A:224:VAL:HB   | 1.81                     | 0.61              |
| 2:O:41:LYS:HG2   | 2:X:52:GLN:HG3   | 1.82                     | 0.61              |
| 3:R:108:GLY:CA   | 3:R:161:GLU:OE2  | 2.49                     | 0.60              |
| 3:S:47:TYR:CE2   | 3:S:114:LYS:HE3  | 2.36                     | 0.59              |
| 3:R:47:TYR:CD2   | 3:R:114:LYS:HG3  | 2.37                     | 0.59              |
| 3:T:27:ILE:CG1   | 3:T:136:PHE:HE2  | 2.16                     | 0.58              |
| 2:N:29:LEU:HD21  | 2:N:84:LEU:HD11  | 1.85                     | 0.57              |
| 3:R:84:ILE:HD11  | 3:R:141:GLU:O    | 2.05                     | 0.57              |
| 3:S:31:ASN:HD21  | 3:S:71:GLY:HA2   | 1.68                     | 0.57              |
| 1:A:42:LEU:CG    | 1:A:222:GLU:HB3  | 2.34                     | 0.57              |
| 2:N:69:LEU:O     | 2:N:72:ARG:NH1   | 2.37                     | 0.57              |
| 3:T:47:TYR:CE2   | 3:T:114:LYS:HE3  | 2.40                     | 0.57              |
| 2:N:5:VAL:HG22   | 2:N:43:ARG:HH11  | 1.69                     | 0.57              |
| 3:S:27:ILE:CG1   | 3:S:136:PHE:HE2  | 2.18                     | 0.57              |
| 1:A:42:LEU:HD12  | 1:A:42:LEU:C     | 2.26                     | 0.56              |
| 3:T:62:ASP:OD2   | 3:T:145:TYR:OH   | 2.21                     | 0.56              |
| 2:N:52:GLN:HG3   | 2:X:41:LYS:HG2   | 1.87                     | 0.56              |
| 3:R:47:TYR:CE2   | 3:R:114:LYS:HE3  | 2.40                     | 0.56              |
| 3:R:31:ASN:HD21  | 3:R:71:GLY:HA2   | 1.70                     | 0.55              |
| 1:A:73:ARG:HH22  | 3:R:306:ASN:ND2  | 2.05                     | 0.55              |
| 1:A:204:GLN:CG   | 3:R:295:PHE:CZ   | 2.89                     | 0.55              |
| 1:A:223:PHE:CE2  | 3:R:262:ILE:HD12 | 2.39                     | 0.55              |
| 3:R:262:ILE:HG21 | 3:R:295:PHE:HE2  | 1.71                     | 0.54              |
| 3:R:190:VAL:CG1  | 3:R:221:ALA:HB2  | 2.37                     | 0.54              |
| 1:A:204:GLN:CB   | 3:R:295:PHE:CZ   | 2.90                     | 0.53              |
| 1:A:204:GLN:CD   | 3:R:295:PHE:CZ   | 2.81                     | 0.53              |
| 2:N:2:PRO:HG2    | 2:N:40:ILE:HA    | 1.91                     | 0.53              |
| 2:X:29:LEU:HD21  | 2:X:84:LEU:HD11  | 1.91                     | 0.53              |
| 2:X:69:LEU:O     | 2:X:72:ARG:NH1   | 2.41                     | 0.53              |
| 2:O:72:ARG:O     | 2:O:77:ARG:NH1   | 2.41                     | 0.53              |
| 2:N:3:HIS:CE1    | 2:N:41:LYS:HE2   | 2.44                     | 0.52              |
| 3:R:27:ILE:CG1   | 3:R:136:PHE:HE2  | 2.23                     | 0.52              |
| 2:N:28:ALA:CB    | 2:N:87:VAL:HG21  | 2.39                     | 0.52              |
| 2:N:72:ARG:O     | 2:N:77:ARG:NH1   | 2.43                     | 0.52              |
| 3:T:66:ILE:HD11  | 3:T:145:TYR:CD2  | 2.44                     | 0.52              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:A:204:GLN:HG2  | 3:R:295:PHE:CE1  | 2.45                     | 0.51              |
| 3:R:105:LEU:HD11 | 3:S:61:ASN:OD1   | 2.10                     | 0.51              |
| 2:O:69:LEU:O     | 2:O:72:ARG:NH1   | 2.44                     | 0.50              |
| 2:O:29:LEU:HD21  | 2:O:84:LEU:HD11  | 1.93                     | 0.50              |
| 1:A:72:SER:OG    | 1:A:224:VAL:HG11 | 2.12                     | 0.49              |
| 1:A:73:ARG:HH22  | 3:R:306:ASN:HD21 | 1.59                     | 0.49              |
| 2:X:72:ARG:O     | 2:X:77:ARG:NH1   | 2.46                     | 0.49              |
| 2:N:68:ILE:O     | 2:N:108:GLU:HA   | 2.14                     | 0.48              |
| 2:O:3:HIS:CE1    | 2:O:41:LYS:HE2   | 2.49                     | 0.48              |
| 2:N:90:GLU:OE2   | 3:R:89:LYS:NZ    | 2.46                     | 0.48              |
| 2:X:59:ARG:NE    | 2:X:98:GLU:OE2   | 2.47                     | 0.47              |
| 1:A:48:CYS:SG    | 1:A:53:LEU:HD23  | 2.55                     | 0.47              |
| 3:R:173:ARG:HG3  | 3:R:203:LEU:HD23 | 1.96                     | 0.47              |
| 3:R:267:LEU:HD11 | 3:R:315:LEU:HD21 | 1.96                     | 0.47              |
| 1:A:41:LYS:HD3   | 1:A:223:PHE:HE1  | 1.80                     | 0.46              |
| 3:S:109:THR:HG21 | 3:S:164:GLN:HG3  | 1.98                     | 0.46              |
| 2:N:90:GLU:CD    | 3:R:89:LYS:HZ1   | 2.18                     | 0.46              |
| 1:A:42:LEU:N     | 1:A:222:GLU:O    | 2.47                     | 0.46              |
| 2:O:8:ALA:HB2    | 2:O:62:LEU:HD13  | 1.97                     | 0.45              |
| 3:S:27:ILE:HD11  | 3:S:136:PHE:CE2  | 2.51                     | 0.45              |
| 3:R:260:ASP:OD1  | 3:R:264:HIS:N    | 2.49                     | 0.45              |
| 3:S:47:TYR:HD2   | 3:S:114:LYS:HG3  | 1.81                     | 0.45              |
| 2:O:2:PRO:HG2    | 2:O:40:ILE:HA    | 1.99                     | 0.45              |
| 2:X:5:VAL:HG22   | 2:X:43:ARG:HH11  | 1.82                     | 0.45              |
| 3:T:27:ILE:HD11  | 3:T:136:PHE:CE2  | 2.52                     | 0.45              |
| 1:A:42:LEU:CD1   | 1:A:42:LEU:C     | 2.86                     | 0.44              |
| 2:N:28:ALA:HB2   | 2:N:87:VAL:HG21  | 1.97                     | 0.44              |
| 1:A:41:LYS:CD    | 1:A:223:PHE:CE1  | 3.00                     | 0.44              |
| 2:O:28:ALA:CB    | 2:O:87:VAL:HG21  | 2.47                     | 0.44              |
| 3:R:25:SER:HB2   | 3:R:26:PRO:HD3   | 2.00                     | 0.44              |
| 1:A:206:ALA:HB2  | 3:R:262:ILE:HG13 | 1.99                     | 0.44              |
| 2:X:28:ALA:CB    | 2:X:87:VAL:HG21  | 2.48                     | 0.44              |
| 2:X:21:LEU:HD13  | 2:X:91:ALA:CB    | 2.48                     | 0.43              |
| 3:R:108:GLY:N    | 3:R:161:GLU:OE2  | 2.52                     | 0.43              |
| 2:N:41:LYS:HG2   | 2:O:52:GLN:HG3   | 1.99                     | 0.43              |
| 3:R:294:LYS:HE3  | 3:R:294:LYS:HB3  | 1.87                     | 0.43              |
| 3:T:25:SER:HB2   | 3:T:26:PRO:HD3   | 2.01                     | 0.43              |
| 2:N:70:ASP:HB3   | 2:N:108:GLU:HB3  | 1.99                     | 0.43              |
| 3:S:34:LEU:HD21  | 3:S:146:LEU:HD11 | 2.01                     | 0.42              |
| 2:O:5:VAL:HG22   | 2:O:43:ARG:HH11  | 1.85                     | 0.42              |
| 3:S:66:ILE:HD11  | 3:S:145:TYR:CD2  | 2.54                     | 0.42              |

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| Atom-1          | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|-----------------|------------------|--------------------------|-------------------|
| 1:A:199:HIS:HB2 | 1:A:227:ALA:O    | 2.19                     | 0.42              |
| 1:A:221:LEU:HB2 | 3:R:229:TRP:HD1  | 1.85                     | 0.42              |
| 2:X:70:ASP:HB3  | 2:X:108:GLU:HB3  | 2.02                     | 0.42              |
| 2:N:10:ALA:HB2  | 2:N:47:LEU:O     | 2.20                     | 0.41              |
| 2:N:8:ALA:HB2   | 2:N:62:LEU:HD13  | 2.02                     | 0.41              |
| 3:T:47:TYR:HD2  | 3:T:114:LYS:HG3  | 1.83                     | 0.41              |
| 3:R:262:ILE:CG2 | 3:R:295:PHE:HE2  | 2.34                     | 0.41              |
| 1:A:42:LEU:HD12 | 1:A:222:GLU:H    | 1.84                     | 0.41              |
| 3:T:34:LEU:HD21 | 3:T:146:LEU:HD11 | 2.03                     | 0.41              |
| 1:A:42:LEU:CD1  | 1:A:222:GLU:CB   | 2.77                     | 0.40              |
| 3:R:117:VAL:O   | 3:R:121:ILE:HG12 | 2.21                     | 0.40              |
| 2:O:10:ALA:HB2  | 2:O:47:LEU:O     | 2.21                     | 0.40              |
| 3:T:117:VAL:O   | 3:T:121:ILE:HG12 | 2.22                     | 0.40              |
| 3:R:108:GLY:HA3 | 3:R:161:GLU:CD   | 2.41                     | 0.40              |
| 3:S:25:SER:HB2  | 3:S:26:PRO:HD3   | 2.03                     | 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 |     |
|-----|-------|-----------------|------------|---------|----------|-------------|-----|
| 1   | A     | 224/234 (96%)   | 220 (98%)  | 4 (2%)  | 0        | 100         | 100 |
| 2   | N     | 116/131 (88%)   | 115 (99%)  | 1 (1%)  | 0        | 100         | 100 |
| 2   | O     | 116/131 (88%)   | 115 (99%)  | 1 (1%)  | 0        | 100         | 100 |
| 2   | X     | 116/131 (88%)   | 115 (99%)  | 1 (1%)  | 0        | 100         | 100 |
| 3   | R     | 295/319 (92%)   | 287 (97%)  | 8 (3%)  | 0        | 100         | 100 |
| 3   | S     | 141/319 (44%)   | 138 (98%)  | 3 (2%)  | 0        | 100         | 100 |
| 3   | T     | 141/319 (44%)   | 138 (98%)  | 3 (2%)  | 0        | 100         | 100 |
| All | All   | 1149/1584 (72%) | 1128 (98%) | 21 (2%) | 0        | 100         | 100 |

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

| Mol | Chain | Analysed       | Rotameric  | Outliers | Percentiles |     |
|-----|-------|----------------|------------|----------|-------------|-----|
| 1   | A     | 199/204 (98%)  | 197 (99%)  | 2 (1%)   | 78          | 90  |
| 2   | N     | 90/102 (88%)   | 90 (100%)  | 0        | 100         | 100 |
| 2   | O     | 90/102 (88%)   | 90 (100%)  | 0        | 100         | 100 |
| 2   | X     | 90/102 (88%)   | 90 (100%)  | 0        | 100         | 100 |
| 3   | R     | 230/252 (91%)  | 229 (100%) | 1 (0%)   | 92          | 96  |
| 3   | S     | 116/252 (46%)  | 116 (100%) | 0        | 100         | 100 |
| 3   | T     | 116/252 (46%)  | 116 (100%) | 0        | 100         | 100 |
| All | All   | 931/1266 (74%) | 928 (100%) | 3 (0%)   | 93          | 97  |

All (3) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 3   | LYS  |
| 1   | A     | 42  | LEU  |
| 3   | R     | 199 | THR  |

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 204 | GLN  |
| 2   | O     | 3   | HIS  |
| 3   | R     | 31  | ASN  |
| 3   | R     | 231 | GLN  |
| 3   | R     | 290 | ASN  |
| 3   | R     | 306 | ASN  |
| 3   | S     | 31  | ASN  |
| 3   | T     | 31  | ASN  |

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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   | CRO  | A     | 66  | 1    | 23,23,24     | 3.13 | 6 (26%)  | 28,32,34    | 4.09 | 9 (32%)  |

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   | CRO  | A     | 66  | 1    | -       | 0/12/31/32 | 0/2/2/2 |

All (6) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms   | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 1   | A     | 66  | CRO  | C2-N3   | -5.33 | 1.27        | 1.39     |
| 1   | A     | 66  | CRO  | CA2-C2  | -4.11 | 1.44        | 1.48     |
| 1   | A     | 66  | CRO  | CA2-N2  | -3.21 | 1.31        | 1.38     |
| 1   | A     | 66  | CRO  | CA1-C1  | -2.29 | 1.48        | 1.51     |
| 1   | A     | 66  | CRO  | CA3-N3  | -2.05 | 1.43        | 1.47     |
| 1   | A     | 66  | CRO  | CB2-CA2 | 12.06 | 1.45        | 1.35     |

All (9) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms     | Z      | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-----------|--------|-------------|----------|
| 1   | A     | 66  | CRO  | O2-C2-CA2 | -14.29 | 122.94      | 130.96   |
| 1   | A     | 66  | CRO  | C2-N3-C1  | -5.68  | 105.02      | 107.97   |
| 1   | A     | 66  | CRO  | C2-CA2-N2 | -3.12  | 106.74      | 108.92   |

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| Mol | Chain | Res | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|-------|-------------|----------|
| 1   | A     | 66  | CRO  | O3-C3-CA3   | -2.72 | 118.19      | 126.39   |
| 1   | A     | 66  | CRO  | CA3-N3-C2   | 2.32  | 129.16      | 123.83   |
| 1   | A     | 66  | CRO  | OG1-CB1-CA1 | 2.35  | 114.22      | 109.10   |
| 1   | A     | 66  | CRO  | CB2-CA2-C2  | 2.87  | 125.75      | 122.28   |
| 1   | A     | 66  | CRO  | N3-C1-N2    | 3.58  | 113.93      | 111.45   |
| 1   | A     | 66  | CRO  | CA2-C2-N3   | 12.89 | 109.52      | 103.35   |

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.