



## Full wwPDB EM Validation Report ⓘ

Jan 31, 2024 – 12:31 pm GMT

PDB ID : 8ODZ  
EMDB ID : EMD-16820  
Title : Cryo-EM structure of a pre-dimerized murine IL-12 complete extracellular signaling complex (Class 1).  
Authors : Felix, J.; Bloch, Y.; Savvides, S.N.  
Deposited on : 2023-03-10  
Resolution : 3.60 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev70  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

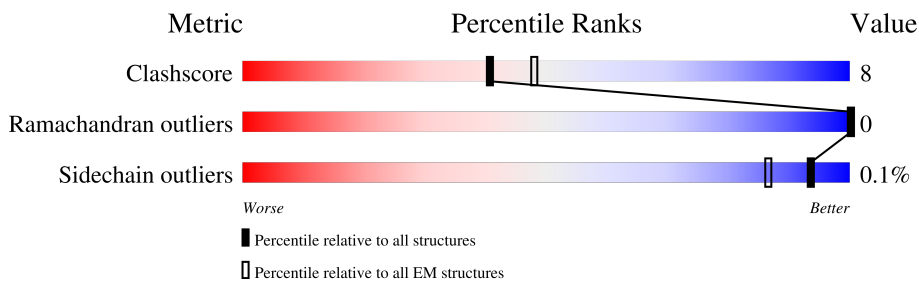
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.60 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            | 158937                   | 4297                     |
| Ramachandran outliers | 154571                   | 4023                     |
| Sidechain outliers    | 154315                   | 3826                     |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1   | A     | 231    |                  |
| 2   | B     | 313    |                  |
| 3   | C     | 572    |                  |
| 4   | D     | 769    |                  |
| 5   | E     | 4      |                  |

## 2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 12100 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 Interleukin-12 subunit alpha.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
|     |       |          | Total | C   | N   | O   | S  |         |       |
| 1   | A     | 156      | 1228  | 765 | 214 | 234 | 15 | 0       | 0     |

There are 38 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment        | Reference  |
|-------|---------|----------|--------|----------------|------------|
| A     | 216     | GLY      | -      | expression tag | UNP P43431 |
| A     | 217     | THR      | -      | expression tag | UNP P43431 |
| A     | 218     | SER      | -      | expression tag | UNP P43431 |
| A     | 219     | ASP      | -      | expression tag | UNP P43431 |
| A     | 220     | GLU      | -      | expression tag | UNP P43431 |
| A     | 221     | VAL      | -      | expression tag | UNP P43431 |
| A     | 222     | ASP      | -      | expression tag | UNP P43431 |
| A     | 223     | GLY      | -      | expression tag | UNP P43431 |
| A     | 224     | GLY      | -      | expression tag | UNP P43431 |
| A     | 225     | SER      | -      | expression tag | UNP P43431 |
| A     | 226     | GLY      | -      | expression tag | UNP P43431 |
| A     | 227     | GLY      | -      | expression tag | UNP P43431 |
| A     | 228     | SER      | -      | expression tag | UNP P43431 |
| A     | 229     | GLY      | -      | expression tag | UNP P43431 |
| A     | 230     | LEU      | -      | expression tag | UNP P43431 |
| A     | 231     | ASN      | -      | expression tag | UNP P43431 |
| A     | 232     | ASP      | -      | expression tag | UNP P43431 |
| A     | 233     | ILE      | -      | expression tag | UNP P43431 |
| A     | 234     | PHE      | -      | expression tag | UNP P43431 |
| A     | 235     | GLU      | -      | expression tag | UNP P43431 |
| A     | 236     | ALA      | -      | expression tag | UNP P43431 |
| A     | 237     | GLN      | -      | expression tag | UNP P43431 |
| A     | 238     | LYS      | -      | expression tag | UNP P43431 |
| A     | 239     | ILE      | -      | expression tag | UNP P43431 |
| A     | 240     | GLU      | -      | expression tag | UNP P43431 |
| A     | 241     | TRP      | -      | expression tag | UNP P43431 |
| A     | 242     | HIS      | -      | expression tag | UNP P43431 |
| A     | 243     | GLU      | -      | expression tag | UNP P43431 |

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| Chain | Residue | Modelled | Actual | Comment        | Reference  |
|-------|---------|----------|--------|----------------|------------|
| A     | 244     | GLY      | -      | expression tag | UNP P43431 |
| A     | 245     | ARG      | -      | expression tag | UNP P43431 |
| A     | 246     | THR      | -      | expression tag | UNP P43431 |
| A     | 247     | LYS      | -      | expression tag | UNP P43431 |
| A     | 248     | HIS      | -      | expression tag | UNP P43431 |
| A     | 249     | HIS      | -      | expression tag | UNP P43431 |
| A     | 250     | HIS      | -      | expression tag | UNP P43431 |
| A     | 251     | HIS      | -      | expression tag | UNP P43431 |
| A     | 252     | HIS      | -      | expression tag | UNP P43431 |
| A     | 253     | HIS      | -      | expression tag | UNP P43431 |

- Molecule 2 is a protein called Interleukin-12 subunit beta.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 2   | B     | 293      | 2336  | 1470 | 388 | 462 | 16 | 0       | 0     |

- Molecule 3 is a protein called Interleukin-12 receptor subunit beta-1,Death-associated protein kinase 1.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 3   | C     | 485      | 3854  | 2416 | 708 | 701 | 29 | 0       | 0     |

There are 10 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference  |
|-------|---------|----------|--------|---------|------------|
| C     | 562     | GLY      | -      | linker  | UNP Q60837 |
| C     | 563     | THR      | -      | linker  | UNP Q60837 |
| C     | 564     | GLY      | -      | linker  | UNP Q60837 |
| C     | 565     | GLY      | -      | linker  | UNP Q60837 |
| C     | 566     | SER      | -      | linker  | UNP Q60837 |
| C     | 567     | GLY      | -      | linker  | UNP Q60837 |
| C     | 568     | GLY      | -      | linker  | UNP Q60837 |
| C     | 569     | SER      | -      | linker  | UNP Q60837 |
| C     | 570     | GLY      | -      | linker  | UNP Q60837 |
| C     | 571     | GLY      | -      | linker  | UNP Q60837 |

- Molecule 4 is a protein called Interleukin-12 receptor subunit beta-2,Calmodulin-1.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 4   | D     | 582      | 4561  | 2878 | 801 | 861 | 21 | 0       | 0     |

There are 10 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference  |
|-------|---------|----------|--------|---------|------------|
| D     | 638     | GLY      | -      | linker  | UNP P97378 |
| D     | 639     | THR      | -      | linker  | UNP P97378 |
| D     | 640     | GLY      | -      | linker  | UNP P97378 |
| D     | 641     | GLY      | -      | linker  | UNP P97378 |
| D     | 642     | SER      | -      | linker  | UNP P97378 |
| D     | 643     | GLY      | -      | linker  | UNP P97378 |
| D     | 644     | GLY      | -      | linker  | UNP P97378 |
| D     | 645     | SER      | -      | linker  | UNP P97378 |
| D     | 646     | GLY      | -      | linker  | UNP P97378 |
| D     | 647     | GLY      | -      | linker  | UNP P97378 |

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-beta-D-mannopyranos e-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



| Mol | Chain | Residues | Atoms |    |   |    | AltConf | Trace |
|-----|-------|----------|-------|----|---|----|---------|-------|
|     |       |          | Total | C  | N | O  |         |       |
| 5   | E     | 4        | 50    | 28 | 2 | 20 | 0       | 0     |

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



| Mol | Chain | Residues | Atoms       |        |        |        | AltConf |
|-----|-------|----------|-------------|--------|--------|--------|---------|
|     |       |          | Total       | C      | N      | O      |         |
| 6   | C     | 1        | Total<br>14 | C<br>8 | N<br>1 | O<br>5 | 0       |
| 6   | C     | 1        | Total<br>14 | C<br>8 | N<br>1 | O<br>5 | 0       |
| 6   | C     | 1        | Total<br>14 | C<br>8 | N<br>1 | O<br>5 | 0       |
| 6   | D     | 1        | Total<br>14 | C<br>8 | N<br>1 | O<br>5 | 0       |
| 6   | D     | 1        | Total<br>14 | C<br>8 | N<br>1 | O<br>5 | 0       |

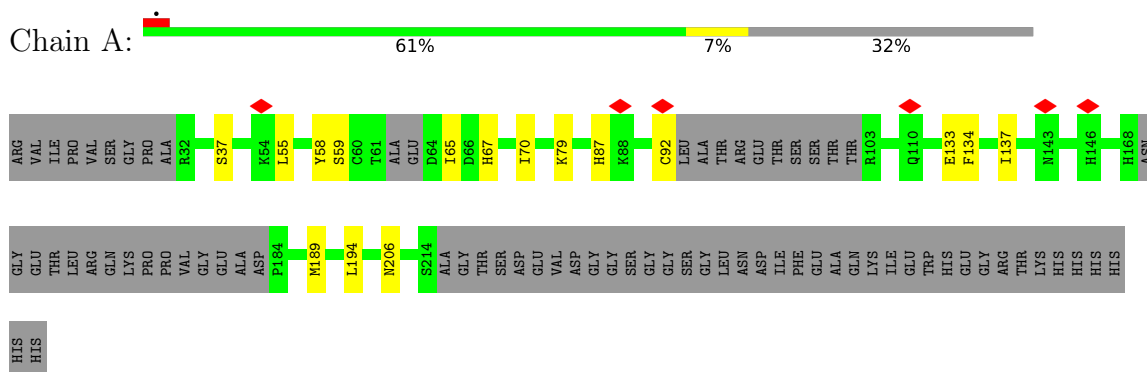
- Molecule 7 is water.

| Mol | Chain | Residues | Atoms      |        | AltConf |
|-----|-------|----------|------------|--------|---------|
|     |       |          | Total      | O      |         |
| 7   | B     | 1        | Total<br>1 | O<br>1 | 0       |

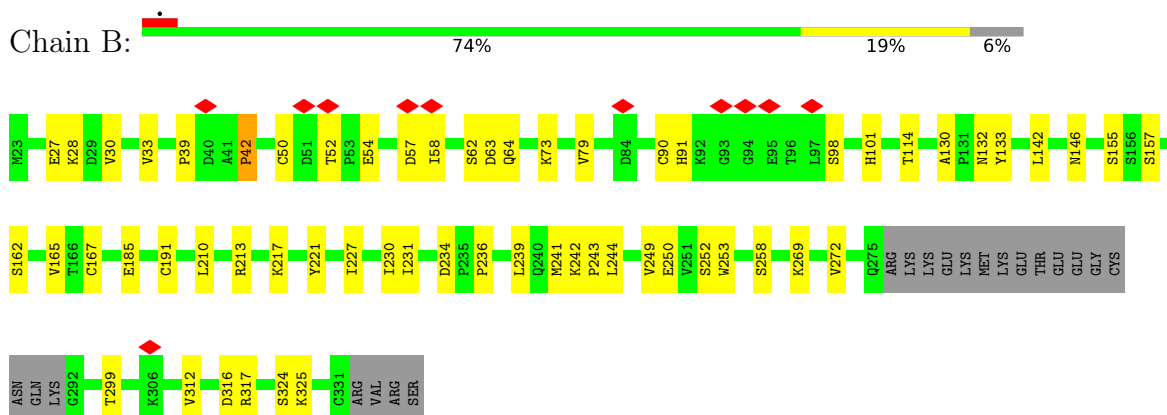
### 3 Residue-property plots [i](#)

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

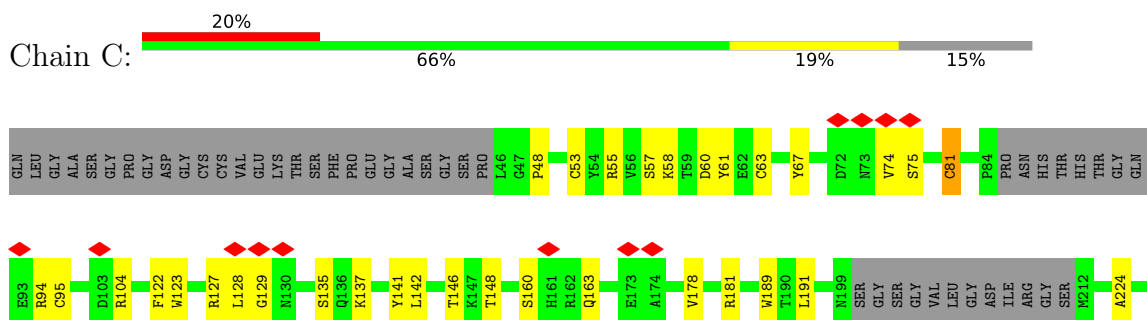
- Molecule 1: Interleukin-12 subunit alpha

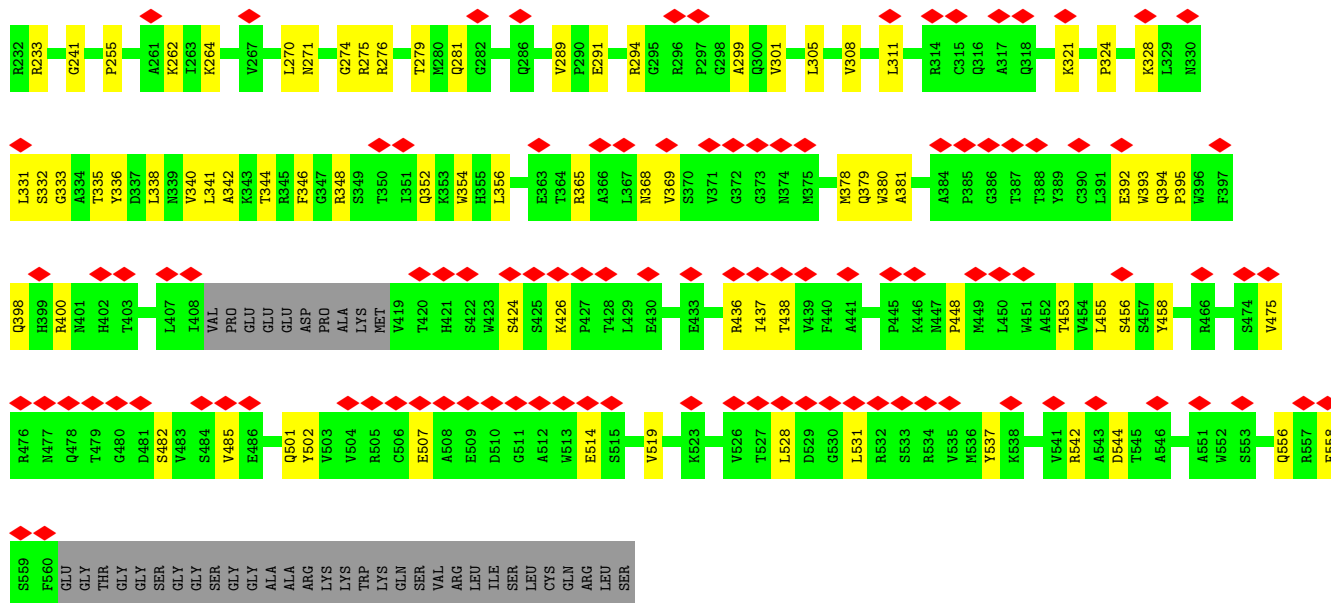


- Molecule 2: Interleukin-12 subunit beta

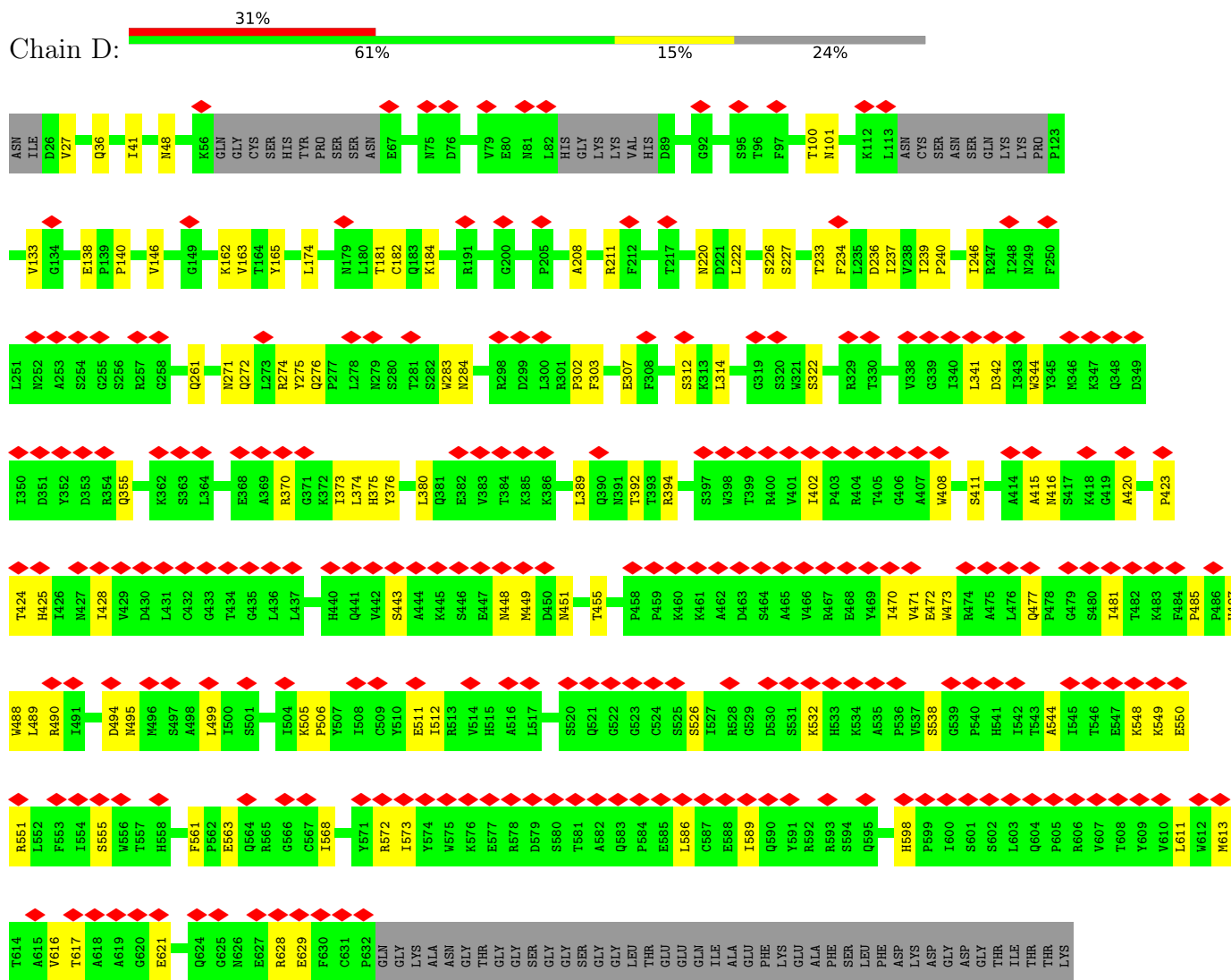


- Molecule 3: Interleukin-12 receptor subunit beta-1, Death-associated protein kinase 1





• Molecule 4: Interleukin-12 receptor subunit beta-2, Calmodulin-1





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

VAL PHE ASP LYS ASP GLY ASN GLY TYR ILE ILE ILE SER SER ALA ALA GLU LEU LEU ARG ARG VAL VAL THR THR LYS LEU THR ASP ASP GLU GLU VAL ASP ASP ILE ILE ARG ARG ALA ALA ASP ASP MET MET ASP ASP GLY GLN VAL VAL ASN ASN TYR TYR GLU GLU PHE PHE VAL VAL MET MET MET MET THR THR ALA ALA LYS

- Molecule 5: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:  50% 50%

MAG1  
 MAG2  
 BWA3  
 MAN4

## 4 Experimental information

| Property                             | Value                                   | Source    |
|--------------------------------------|---|-----------|
| EM reconstruction method             | SINGLE PARTICLE                         | Depositor |
| Imposed symmetry                     | POINT, C1                               | Depositor |
| Number of particles used             | 268498                                  | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF                       | Depositor |
| CTF correction method                | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope                           | JEOL CRYO ARM 300                       | Depositor |
| Voltage (kV)                         | 300                                     | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 61.8                                    | Depositor |
| Minimum defocus (nm)                 | 1000                                    | Depositor |
| Maximum defocus (nm)                 | 2500                                    | Depositor |
| Magnification                        | 60000                                   | Depositor |
| Image detector                       | GATAN K3 (6k x 4k)                      | Depositor |
| Maximum map value                    | 0.478                                   | Depositor |
| Minimum map value                    | -0.353                                  | Depositor |
| Average map value                    | 0.000                                   | Depositor |
| Map value standard deviation         | 0.007                                   | Depositor |
| Recommended contour level            | 0.06                                    | Depositor |
| Map size (Å)                         | 332.2, 332.2, 332.2                     | wwPDB     |
| Map dimensions                       | 440, 440, 440                           | wwPDB     |
| Map angles (°)                       | 90.0, 90.0, 90.0                        | wwPDB     |
| Pixel spacing (Å)                    | 0.75500005, 0.75500005, 0.75500005      | 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: BMA, MAN, NAG

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     | 0.27         | 0/1242  | 0.52        | 0/1670         |
| 2   | B     | 0.32         | 0/2392  | 0.58        | 1/3246 (0.0%)  |
| 3   | C     | 0.29         | 0/3957  | 0.60        | 2/5379 (0.0%)  |
| 4   | D     | 0.25         | 0/4674  | 0.55        | 0/6377         |
| All | All   | 0.28         | 0/12265 | 0.57        | 3/16672 (0.0%) |

There are no bond length outliers.

All (3) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms    | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|----------|-------|-------------|----------|
| 3   | C     | 81  | CYS  | CA-CB-SG | 11.40 | 134.52      | 114.00   |
| 2   | B     | 42  | PRO  | CA-N-CD  | -7.11 | 101.54      | 111.50   |
| 3   | C     | 311 | LEU  | CA-CB-CG | 5.18  | 127.20      | 115.30   |

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     | 1228  | 0        | 1231     | 9       | 0            |
| 2   | B     | 2336  | 0        | 2230     | 36      | 0            |
| 3   | C     | 3854  | 0        | 3749     | 67      | 0            |
| 4   | D     | 4561  | 0        | 4465     | 71      | 0            |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 5   | E     | 50    | 0        | 43       | 0       | 0            |
| 6   | C     | 42    | 0        | 39       | 0       | 0            |
| 6   | D     | 28    | 0        | 26       | 0       | 0            |
| 7   | B     | 1     | 0        | 0        | 0       | 0            |
| All | All   | 12100 | 0        | 11783    | 179     | 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 8.

All (179) 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) |
|------------------|------------------|--------------------------|-------------------|
| 4:D:246:ILE:HA   | 4:D:261:GLN:O    | 1.84                     | 0.77              |
| 2:B:146:ASN:ND2  | 2:B:185:GLU:OE2  | 2.24                     | 0.71              |
| 3:C:398:GLN:HG3  | 3:C:400:ARG:H    | 1.58                     | 0.68              |
| 3:C:340:VAL:HB   | 3:C:352:GLN:HB3  | 1.74                     | 0.68              |
| 3:C:289:VAL:HG11 | 3:C:299:ALA:HA   | 1.74                     | 0.68              |
| 4:D:146:VAL:HG23 | 4:D:239:ILE:HD13 | 1.77                     | 0.67              |
| 3:C:556:GLN:HE22 | 3:C:558:PHE:HB3  | 1.61                     | 0.66              |
| 3:C:338:LEU:HB2  | 3:C:354:TRP:HB3  | 1.77                     | 0.66              |
| 3:C:301:VAL:HG21 | 3:C:342:ALA:HB1  | 1.75                     | 0.66              |
| 3:C:233:ARG:NH2  | 3:C:241:GLY:O    | 2.29                     | 0.65              |
| 1:A:189:MET:HB3  | 4:D:27:VAL:HG21  | 1.78                     | 0.65              |
| 3:C:365:ARG:HB3  | 3:C:455:LEU:HD22 | 1.78                     | 0.65              |
| 1:A:59:SER:OG    | 1:A:189:MET:SD   | 2.54                     | 0.65              |
| 2:B:227:ILE:HG22 | 2:B:230:ILE:HD11 | 1.79                     | 0.63              |
| 2:B:90:CYS:SG    | 2:B:98:SER:OG    | 2.55                     | 0.63              |
| 4:D:138:GLU:OE1  | 4:D:162:LYS:NZ   | 2.31                     | 0.63              |
| 2:B:33:VAL:HG21  | 2:B:79:VAL:HG21  | 1.81                     | 0.63              |
| 3:C:276:ARG:HH21 | 3:C:333:GLY:HA2  | 1.63                     | 0.63              |
| 1:A:70:ILE:HD11  | 1:A:133:GLU:HG3  | 1.81                     | 0.62              |
| 2:B:269:LYS:HE3  | 2:B:317:ARG:HA   | 1.81                     | 0.61              |
| 2:B:239:LEU:HA   | 2:B:252:SER:O    | 2.01                     | 0.60              |
| 4:D:274:ARG:HG3  | 4:D:283:TRP:HB2  | 1.83                     | 0.60              |
| 3:C:48:PRO:HB2   | 3:C:135:SER:HB2  | 1.85                     | 0.59              |
| 4:D:211:ARG:HE   | 4:D:233:THR:HA   | 1.66                     | 0.59              |
| 4:D:312:SER:H    | 4:D:322:SER:HB2  | 1.68                     | 0.58              |
| 4:D:226:SER:OG   | 4:D:227:SER:N    | 2.37                     | 0.58              |
| 4:D:233:THR:OG1  | 4:D:236:ASP:OD1  | 2.20                     | 0.58              |
| 4:D:275:TYR:O    | 4:D:284:ASN:HB3  | 2.04                     | 0.58              |
| 4:D:628:ARG:HE   | 4:D:629:GLU:H    | 1.52                     | 0.57              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 3:C:224:ALA:HB2  | 3:C:255:PRO:HD3  | 1.86                     | 0.57              |
| 3:C:274:GLY:O    | 3:C:275:ARG:NE   | 2.36                     | 0.57              |
| 3:C:81:CYS:HB3   | 3:C:95:CYS:HA    | 1.86                     | 0.57              |
| 4:D:548:LYS:HB2  | 4:D:549:LYS:HZ3  | 1.68                     | 0.57              |
| 2:B:324:SER:OG   | 2:B:325:LYS:N    | 2.37                     | 0.57              |
| 2:B:50:CYS:SG    | 2:B:98:SER:OG    | 2.63                     | 0.57              |
| 2:B:242:LYS:HB3  | 2:B:250:GLU:HB2  | 1.86                     | 0.56              |
| 2:B:64:GLN:O     | 3:C:94:ARG:NH2   | 2.36                     | 0.56              |
| 3:C:270:LEU:HD13 | 3:C:274:GLY:HA2  | 1.88                     | 0.56              |
| 4:D:408:TRP:HB2  | 4:D:428:ILE:HB   | 1.87                     | 0.55              |
| 1:A:70:ILE:HD12  | 1:A:194:LEU:HD21 | 1.88                     | 0.55              |
| 3:C:74:VAL:HG12  | 3:C:128:LEU:HD21 | 1.89                     | 0.55              |
| 3:C:424:SER:O    | 3:C:426:LYS:NZ   | 2.40                     | 0.55              |
| 4:D:473:TRP:HZ3  | 4:D:489:LEU:HD22 | 1.72                     | 0.54              |
| 4:D:573:ILE:HG22 | 4:D:613:MET:HB3  | 1.87                     | 0.54              |
| 4:D:392:THR:HB   | 4:D:394:ARG:HH22 | 1.72                     | 0.54              |
| 4:D:411:SER:HA   | 4:D:424:THR:O    | 2.07                     | 0.53              |
| 3:C:291:GLU:O    | 3:C:294:ARG:NH1  | 2.42                     | 0.53              |
| 3:C:344:THR:HG23 | 3:C:346:PHE:H    | 1.73                     | 0.53              |
| 4:D:411:SER:HB3  | 4:D:425:HIS:HB3  | 1.91                     | 0.53              |
| 1:A:79:LYS:HD2   | 1:A:92:CYS:HB2   | 1.91                     | 0.53              |
| 4:D:443:SER:OG   | 4:D:455:THR:OG1  | 2.27                     | 0.53              |
| 3:C:542:ARG:NH1  | 3:C:544:ASP:OD1  | 2.43                     | 0.52              |
| 2:B:52:THR:HG22  | 2:B:54:GLU:H     | 1.74                     | 0.52              |
| 2:B:132:ASN:ND2  | 2:B:258:SER:O    | 2.43                     | 0.52              |
| 3:C:55:ARG:NH1   | 3:C:146:THR:OG1  | 2.42                     | 0.52              |
| 4:D:550:GLU:O    | 4:D:551:ARG:NH1  | 2.43                     | 0.52              |
| 4:D:373:ILE:HA   | 4:D:416:ASN:HA   | 1.92                     | 0.51              |
| 2:B:27:GLU:HG2   | 2:B:28:LYS:H     | 1.75                     | 0.51              |
| 4:D:548:LYS:HE2  | 4:D:549:LYS:HZ3  | 1.75                     | 0.51              |
| 4:D:140:PRO:HG2  | 4:D:227:SER:HB3  | 1.93                     | 0.51              |
| 3:C:321:LYS:HG2  | 3:C:448:PRO:HD3  | 1.92                     | 0.51              |
| 3:C:341:LEU:HD12 | 3:C:348:ARG:HB3  | 1.92                     | 0.51              |
| 4:D:380:LEU:HB3  | 4:D:389:LEU:HG   | 1.93                     | 0.51              |
| 4:D:611:LEU:HB2  | 4:D:628:ARG:HB3  | 1.93                     | 0.51              |
| 3:C:392:GLU:HG2  | 3:C:438:THR:HB   | 1.94                     | 0.50              |
| 4:D:208:ALA:HA   | 4:D:234:PHE:HD2  | 1.76                     | 0.50              |
| 1:A:134:PHE:HA   | 1:A:137:ILE:HG22 | 1.93                     | 0.50              |
| 2:B:167:CYS:HB2  | 2:B:191:CYS:HA   | 1.92                     | 0.50              |
| 4:D:568:ILE:HA   | 4:D:617:THR:HG22 | 1.94                     | 0.49              |
| 3:C:336:TYR:HB2  | 3:C:356:LEU:HB2  | 1.93                     | 0.49              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 3:C:160:SER:HB2  | 3:C:163:GLN:HB2  | 1.95                     | 0.49              |
| 3:C:308:VAL:HG12 | 3:C:338:LEU:HD22 | 1.93                     | 0.49              |
| 4:D:163:VAL:HG22 | 4:D:165:TYR:H    | 1.76                     | 0.49              |
| 2:B:210:LEU:HB3  | 2:B:221:TYR:HB2  | 1.93                     | 0.49              |
| 2:B:236:PRO:HG2  | 2:B:312:VAL:HG23 | 1.94                     | 0.49              |
| 1:A:37:SER:HB3   | 1:A:206:ASN:ND2  | 2.26                     | 0.49              |
| 4:D:341:LEU:H    | 4:D:424:THR:HG21 | 1.77                     | 0.49              |
| 1:A:55:LEU:HB3   | 1:A:58:TYR:HB2   | 1.95                     | 0.49              |
| 3:C:531:LEU:HB3  | 3:C:537:TYR:HE2  | 1.78                     | 0.49              |
| 4:D:477:GLN:HA   | 4:D:561:PHE:HZ   | 1.77                     | 0.49              |
| 2:B:133:TYR:OH   | 2:B:316:ASP:OD2  | 2.31                     | 0.48              |
| 3:C:122:PHE:HZ   | 3:C:142:LEU:HD11 | 1.78                     | 0.48              |
| 4:D:572:ARG:HB3  | 4:D:586:LEU:HD11 | 1.96                     | 0.48              |
| 4:D:100:THR:HG22 | 4:D:101:ASN:H    | 1.78                     | 0.48              |
| 4:D:303:PHE:HB3  | 4:D:370:ARG:HH11 | 1.79                     | 0.47              |
| 3:C:502:TYR:HB2  | 3:C:519:VAL:HB   | 1.95                     | 0.47              |
| 4:D:174:LEU:O    | 4:D:181:THR:HA   | 2.14                     | 0.47              |
| 3:C:395:PRO:HG2  | 3:C:398:GLN:HE21 | 1.79                     | 0.47              |
| 2:B:30:VAL:HG23  | 2:B:101:HIS:HB3  | 1.97                     | 0.47              |
| 3:C:123:TRP:HB3  | 3:C:137:LYS:HD3  | 1.95                     | 0.47              |
| 4:D:375:HIS:HB3  | 4:D:415:ALA:HB3  | 1.97                     | 0.47              |
| 2:B:130:ALA:HB3  | 2:B:231:ILE:HG22 | 1.97                     | 0.47              |
| 4:D:470:ILE:HG22 | 4:D:490:ARG:HD2  | 1.97                     | 0.47              |
| 3:C:81:CYS:HB2   | 3:C:94:ARG:O     | 2.15                     | 0.47              |
| 4:D:302:PRO:O    | 4:D:370:ARG:NH1  | 2.48                     | 0.47              |
| 2:B:213:ARG:HA   | 2:B:217:LYS:O    | 2.16                     | 0.46              |
| 3:C:331:LEU:HD23 | 3:C:336:TYR:HD2  | 1.79                     | 0.46              |
| 2:B:242:LYS:HD2  | 2:B:243:PRO:HD2  | 1.97                     | 0.46              |
| 4:D:342:ASP:OD2  | 4:D:490:ARG:NH2  | 2.41                     | 0.46              |
| 2:B:155:SER:HB3  | 2:B:165:VAL:HG22 | 1.97                     | 0.46              |
| 3:C:368:ASN:HB2  | 3:C:379:GLN:HG2  | 1.96                     | 0.46              |
| 3:C:75:SER:OG    | 3:C:127:ARG:HB3  | 2.14                     | 0.46              |
| 4:D:276:GLN:HB3  | 4:D:283:TRP:HA   | 1.98                     | 0.46              |
| 4:D:505:LYS:HD2  | 4:D:506:PRO:HD2  | 1.98                     | 0.46              |
| 4:D:451:ASN:HD21 | 4:D:499:LEU:HD11 | 1.81                     | 0.46              |
| 4:D:182:CYS:SG   | 4:D:184:LYS:NZ   | 2.79                     | 0.46              |
| 3:C:507:GLU:HB3  | 3:C:514:GLU:HG3  | 1.96                     | 0.46              |
| 4:D:472:GLU:HG3  | 4:D:488:TRP:HB3  | 1.98                     | 0.46              |
| 3:C:81:CYS:CB    | 3:C:95:CYS:HA    | 2.46                     | 0.46              |
| 4:D:485:PRO:HG2  | 4:D:487:HIS:HE2  | 1.80                     | 0.46              |
| 4:D:572:ARG:NH2  | 4:D:621:GLU:OE1  | 2.49                     | 0.46              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 3:C:67:TYR:HB2   | 3:C:104:ARG:HH22 | 1.81                     | 0.45              |
| 1:A:65:ILE:HD12  | 1:A:67:HIS:HB2   | 1.99                     | 0.45              |
| 3:C:57:SER:OG    | 3:C:58:LYS:N     | 2.49                     | 0.45              |
| 3:C:365:ARG:HH22 | 3:C:380:TRP:HD1  | 1.63                     | 0.45              |
| 4:D:36:GLN:HB2   | 4:D:48:ASN:HB2   | 1.99                     | 0.45              |
| 4:D:538:SER:N    | 4:D:563:GLU:OE2  | 2.50                     | 0.44              |
| 3:C:181:ARG:HG3  | 3:C:191:LEU:HD12 | 1.98                     | 0.44              |
| 4:D:449:MET:HA   | 4:D:532:LYS:HG3  | 1.98                     | 0.44              |
| 4:D:471:VAL:HG12 | 4:D:512:ILE:HD11 | 1.99                     | 0.44              |
| 2:B:241:MET:HE3  | 2:B:249:VAL:HG21 | 1.99                     | 0.44              |
| 4:D:415:ALA:HA   | 4:D:420:ALA:HA   | 1.99                     | 0.44              |
| 4:D:477:GLN:HG3  | 4:D:481:ILE:HB   | 1.99                     | 0.44              |
| 2:B:272:VAL:HG13 | 2:B:312:VAL:HG12 | 2.00                     | 0.43              |
| 3:C:127:ARG:HH12 | 3:C:129:GLY:C    | 2.21                     | 0.43              |
| 2:B:234:ASP:OD2  | 2:B:258:SER:OG   | 2.23                     | 0.43              |
| 3:C:275:ARG:NH2  | 3:C:332:SER:OG   | 2.48                     | 0.43              |
| 2:B:114:THR:O    | 2:B:114:THR:OG1  | 2.37                     | 0.43              |
| 4:D:448:ASN:OD1  | 4:D:449:MET:N    | 2.51                     | 0.43              |
| 3:C:53:CYS:HA    | 3:C:63:CYS:HA    | 2.01                     | 0.43              |
| 3:C:475:VAL:O    | 4:D:628:ARG:NH2  | 2.48                     | 0.43              |
| 4:D:220:ASN:HD21 | 4:D:222:LEU:HB2  | 1.83                     | 0.43              |
| 3:C:475:VAL:HG22 | 3:C:485:VAL:HG22 | 2.00                     | 0.43              |
| 4:D:589:ILE:HG12 | 4:D:598:HIS:CE1  | 2.54                     | 0.43              |
| 4:D:423:PRO:O    | 4:D:425:HIS:ND1  | 2.50                     | 0.43              |
| 3:C:148:THR:OG1  | 3:C:233:ARG:HB2  | 2.19                     | 0.42              |
| 3:C:178:VAL:HG22 | 3:C:231:ARG:HG2  | 2.01                     | 0.42              |
| 3:C:279:THR:HG22 | 3:C:328:LYS:HA   | 2.01                     | 0.42              |
| 4:D:344:TRP:HZ3  | 4:D:470:ILE:HD12 | 1.84                     | 0.42              |
| 4:D:494:ASP:OD1  | 4:D:495:ASN:N    | 2.52                     | 0.42              |
| 2:B:62:SER:OG    | 2:B:63:ASP:N     | 2.52                     | 0.42              |
| 3:C:333:GLY:H    | 3:C:453:THR:HG21 | 1.84                     | 0.42              |
| 3:C:369:VAL:HG12 | 3:C:378:MET:HG2  | 2.02                     | 0.42              |
| 4:D:237:ILE:HD12 | 4:D:237:ILE:HA   | 1.92                     | 0.42              |
| 4:D:511:GLU:OE2  | 4:D:526:SER:OG   | 2.36                     | 0.42              |
| 2:B:142:LEU:HA   | 2:B:142:LEU:HD23 | 1.81                     | 0.42              |
| 3:C:262:LYS:H    | 3:C:262:LYS:HD2  | 1.83                     | 0.42              |
| 2:B:42:PRO:O     | 2:B:42:PRO:HD2   | 2.19                     | 0.42              |
| 2:B:58:ILE:HD13  | 2:B:73:LYS:HZ1   | 1.85                     | 0.42              |
| 3:C:335:THR:HA   | 3:C:356:LEU:O    | 2.20                     | 0.42              |
| 4:D:376:TYR:H    | 4:D:394:ARG:HH21 | 1.67                     | 0.42              |
| 3:C:305:LEU:HD23 | 3:C:324:PRO:HA   | 2.02                     | 0.42              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 3:C:436:ARG:HG2  | 3:C:458:TYR:CE1  | 2.53                     | 0.42              |
| 3:C:437:ILE:O    | 3:C:456:SER:HA   | 2.20                     | 0.42              |
| 2:B:157:SER:HB2  | 2:B:162:SER:HB3  | 2.01                     | 0.42              |
| 3:C:60:ASP:OD1   | 3:C:61:TYR:N     | 2.53                     | 0.41              |
| 3:C:331:LEU:HD23 | 3:C:336:TYR:CD2  | 2.54                     | 0.41              |
| 3:C:365:ARG:NH2  | 3:C:381:ALA:O    | 2.53                     | 0.41              |
| 3:C:393:TRP:O    | 3:C:394:GLN:NE2  | 2.52                     | 0.41              |
| 3:C:482:SER:HA   | 3:C:528:LEU:O    | 2.20                     | 0.41              |
| 2:B:253:TRP:NE1  | 2:B:299:THR:HA   | 2.36                     | 0.41              |
| 3:C:181:ARG:HG2  | 3:C:189:TRP:CE3  | 2.54                     | 0.41              |
| 3:C:264:LYS:HB2  | 3:C:281:GLN:HE21 | 1.84                     | 0.41              |
| 2:B:58:ILE:HB    | 2:B:73:LYS:HZ2   | 1.85                     | 0.41              |
| 4:D:41:ILE:HG13  | 4:D:133:VAL:HG23 | 2.02                     | 0.41              |
| 4:D:344:TRP:CZ3  | 4:D:470:ILE:HD12 | 2.55                     | 0.41              |
| 4:D:572:ARG:HE   | 4:D:616:VAL:HG21 | 1.85                     | 0.41              |
| 4:D:275:TYR:HA   | 4:D:307:GLU:O    | 2.21                     | 0.41              |
| 2:B:57:ASP:OD1   | 2:B:57:ASP:N     | 2.50                     | 0.41              |
| 3:C:271:ASN:OD1  | 3:C:275:ARG:N    | 2.52                     | 0.41              |
| 4:D:544:ALA:HB3  | 4:D:555:SER:HB3  | 2.02                     | 0.41              |
| 4:D:355:GLN:HG3  | 4:D:402:ILE:O    | 2.20                     | 0.41              |
| 4:D:271:ASN:OD1  | 4:D:272:GLN:N    | 2.54                     | 0.40              |
| 2:B:244:LEU:HD23 | 2:B:244:LEU:HA   | 1.82                     | 0.40              |
| 4:D:240:PRO:HG3  | 4:D:314:LEU:HG   | 2.03                     | 0.40              |
| 4:D:374:LEU:HD12 | 4:D:375:HIS:HB2  | 2.03                     | 0.40              |
| 4:D:490:ARG:HA   | 4:D:490:ARG:HD3  | 1.91                     | 0.40              |
| 2:B:39:PRO:HB3   | 3:C:141:TYR:CE2  | 2.57                     | 0.40              |
| 3:C:501:GLN:OE1  | 3:C:519:VAL:N    | 2.54                     | 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     | 148/231 (64%)   | 142 (96%)  | 6 (4%)  | 0        | 100         | 100 |
| 2   | B     | 289/313 (92%)   | 272 (94%)  | 17 (6%) | 0        | 100         | 100 |
| 3   | C     | 477/572 (83%)   | 456 (96%)  | 21 (4%) | 0        | 100         | 100 |
| 4   | D     | 574/769 (75%)   | 549 (96%)  | 25 (4%) | 0        | 100         | 100 |
| All | All   | 1488/1885 (79%) | 1419 (95%) | 69 (5%) | 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     | 143/205 (70%)   | 142 (99%)   | 1 (1%)   | 84          | 93  |
| 2   | B     | 267/287 (93%)   | 266 (100%)  | 1 (0%)   | 91          | 97  |
| 3   | C     | 425/492 (86%)   | 425 (100%)  | 0        | 100         | 100 |
| 4   | D     | 514/675 (76%)   | 514 (100%)  | 0        | 100         | 100 |
| All | All   | 1349/1659 (81%) | 1347 (100%) | 2 (0%)   | 93          | 98  |

All (2) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1   | A     | 87  | HIS  |
| 2   | B     | 91  | HIS  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 3   | C     | 556 | GLN  |
| 4   | D     | 190 | ASN  |
| 4   | D     | 541 | HIS  |

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

4 monosaccharides 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 |
| 5   | NAG  | E     | 1   | 2,5  | 14,14,15     | 0.44 | 0        | 17,19,21    | 1.03 | 1 (5%)   |
| 5   | NAG  | E     | 2   | 5    | 14,14,15     | 0.30 | 0        | 17,19,21    | 0.56 | 0        |
| 5   | BMA  | E     | 3   | 5    | 11,11,12     | 0.65 | 0        | 15,15,17    | 0.72 | 0        |
| 5   | MAN  | E     | 4   | 5    | 11,11,12     | 0.67 | 0        | 15,15,17    | 0.96 | 2 (13%)  |

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   |
|-----|------|-------|-----|------|---------|-----------|---------|
| 5   | NAG  | E     | 1   | 2,5  | -       | 3/6/23/26 | 0/1/1/1 |
| 5   | NAG  | E     | 2   | 5    | -       | 4/6/23/26 | 0/1/1/1 |
| 5   | BMA  | E     | 3   | 5    | -       | 2/2/19/22 | 0/1/1/1 |
| 5   | MAN  | E     | 4   | 5    | -       | 0/2/19/22 | 0/1/1/1 |

There are no bond length outliers.

All (3) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms    | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|----------|-------|-------------|----------|
| 5   | E     | 1   | NAG  | C1-O5-C5 | 2.89  | 116.10      | 112.19   |
| 5   | E     | 4   | MAN  | O2-C2-C3 | -2.33 | 105.47      | 110.14   |
| 5   | E     | 4   | MAN  | C1-O5-C5 | 2.09  | 115.03      | 112.19   |

There are no chirality outliers.

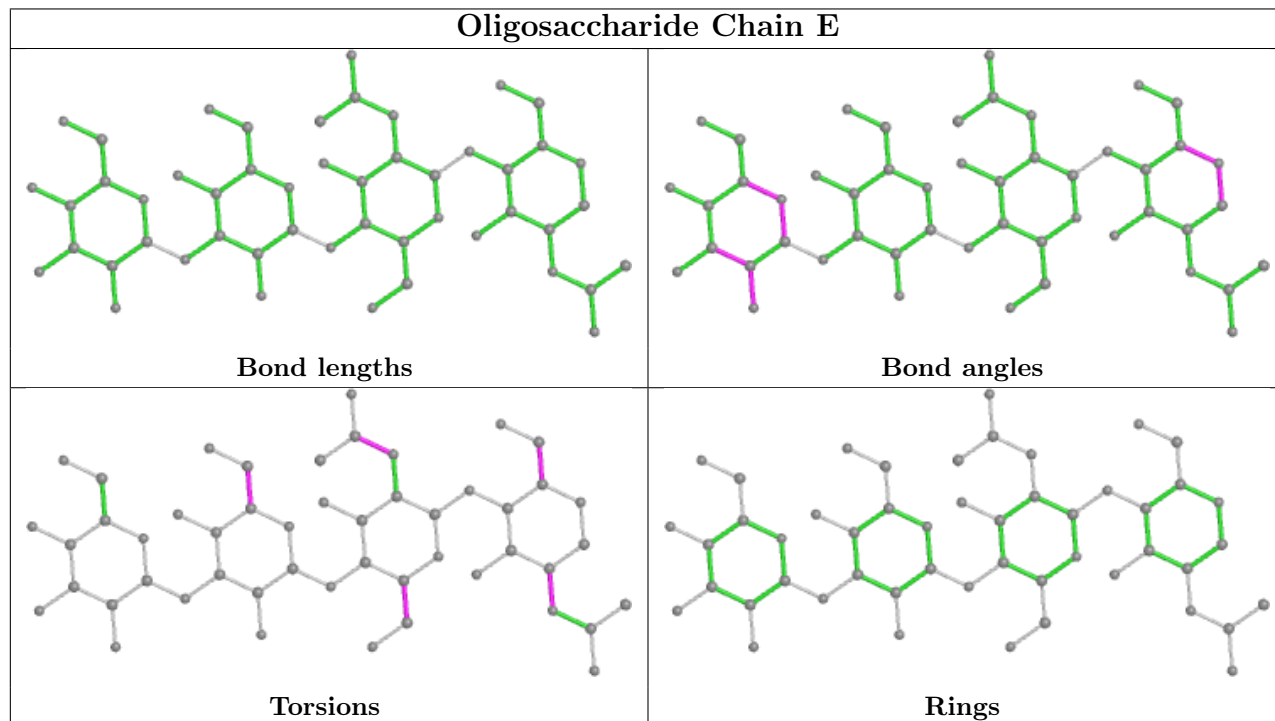
All (9) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms       |
|-----|-------|-----|------|-------------|
| 5   | E     | 3   | BMA  | O5-C5-C6-O6 |
| 5   | E     | 3   | BMA  | C4-C5-C6-O6 |
| 5   | E     | 2   | NAG  | O5-C5-C6-O6 |
| 5   | E     | 1   | NAG  | C4-C5-C6-O6 |
| 5   | E     | 2   | NAG  | C8-C7-N2-C2 |
| 5   | E     | 2   | NAG  | O7-C7-N2-C2 |
| 5   | E     | 2   | NAG  | C4-C5-C6-O6 |
| 5   | E     | 1   | NAG  | O5-C5-C6-O6 |
| 5   | E     | 1   | NAG  | C3-C2-N2-C7 |

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



## 5.6 Ligand geometry

5 ligands 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 |
| 6   | NAG  | C     | 603 | 3    | 14,14,15     | 0.25 | 0        | 17,19,21    | 0.47 | 0        |
| 6   | NAG  | C     | 601 | 3    | 14,14,15     | 0.56 | 0        | 17,19,21    | 1.74 | 2 (11%)  |
| 6   | NAG  | D     | 802 | 4    | 14,14,15     | 0.23 | 0        | 17,19,21    | 0.46 | 0        |
| 6   | NAG  | D     | 801 | 4    | 14,14,15     | 0.25 | 0        | 17,19,21    | 0.43 | 0        |
| 6   | NAG  | C     | 602 | 3    | 14,14,15     | 0.33 | 0        | 17,19,21    | 0.74 | 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   |
|-----|------|-------|-----|------|---------|-----------|---------|
| 6   | NAG  | C     | 603 | 3    | -       | 0/6/23/26 | 0/1/1/1 |
| 6   | NAG  | C     | 601 | 3    | -       | 5/6/23/26 | 0/1/1/1 |
| 6   | NAG  | D     | 802 | 4    | -       | 2/6/23/26 | 0/1/1/1 |
| 6   | NAG  | D     | 801 | 4    | -       | 2/6/23/26 | 0/1/1/1 |
| 6   | NAG  | C     | 602 | 3    | -       | 2/6/23/26 | 0/1/1/1 |

There are no bond length outliers.

All (2) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms    | Z    | Observed( $^{\circ}$ ) | Ideal( $^{\circ}$ ) |
|-----|-------|-----|------|----------|------|------------------------|---------------------|
| 6   | C     | 601 | NAG  | C2-N2-C7 | 6.15 | 131.66                 | 122.90              |
| 6   | C     | 601 | NAG  | C1-C2-N2 | 2.74 | 115.17                 | 110.49              |

There are no chirality outliers.

All (11) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms       |
|-----|-------|-----|------|-------------|
| 6   | D     | 802 | NAG  | O5-C5-C6-O6 |
| 6   | D     | 801 | NAG  | C4-C5-C6-O6 |
| 6   | C     | 601 | NAG  | O5-C5-C6-O6 |
| 6   | D     | 801 | NAG  | O5-C5-C6-O6 |
| 6   | D     | 802 | NAG  | C4-C5-C6-O6 |
| 6   | C     | 601 | NAG  | C4-C5-C6-O6 |
| 6   | C     | 601 | NAG  | C8-C7-N2-C2 |
| 6   | C     | 601 | NAG  | O7-C7-N2-C2 |
| 6   | C     | 602 | NAG  | O5-C5-C6-O6 |
| 6   | C     | 601 | NAG  | C3-C2-N2-C7 |
| 6   | C     | 602 | NAG  | C3-C2-N2-C7 |

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

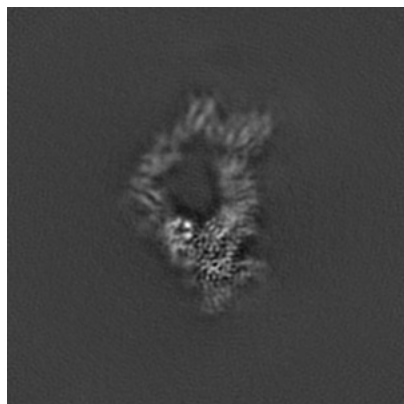
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16820. These allow visual inspection of the internal detail of the map and identification of artifacts.

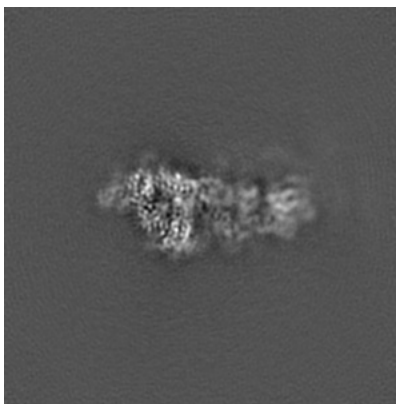
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

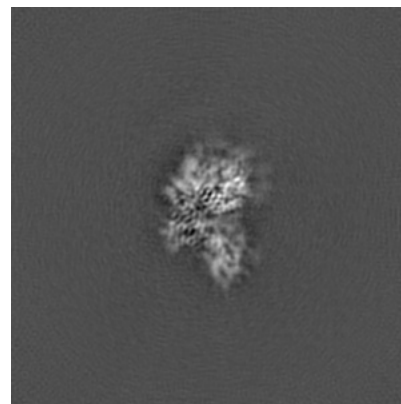
#### 6.1.1 Primary map



X

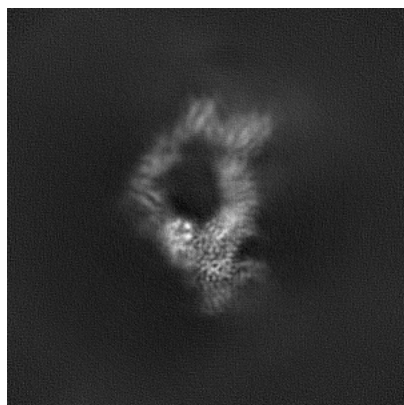


Y

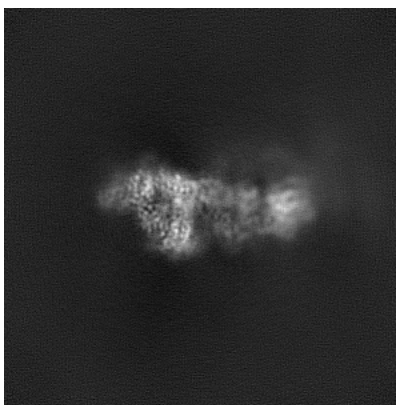


Z

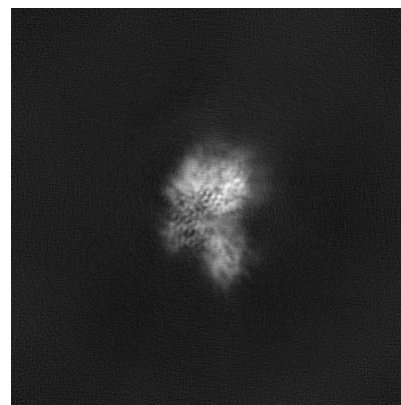
#### 6.1.2 Raw map



X



Y

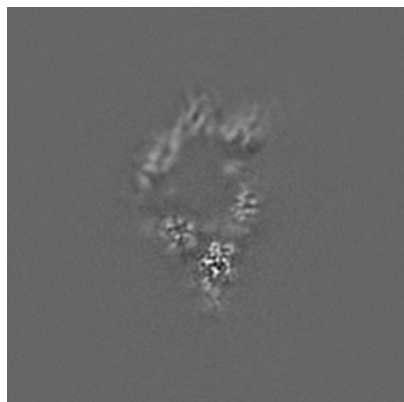


Z

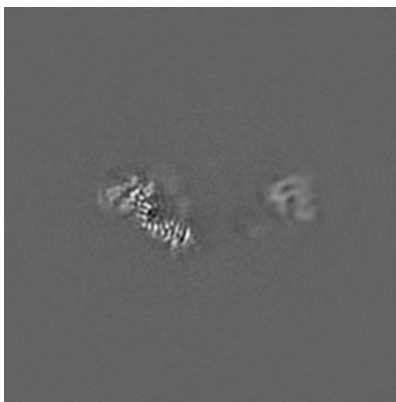
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

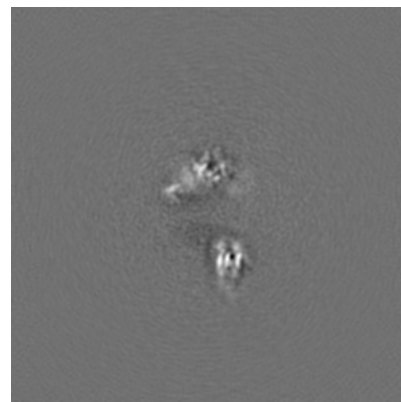
### 6.2.1 Primary map



X Index: 220



Y Index: 220

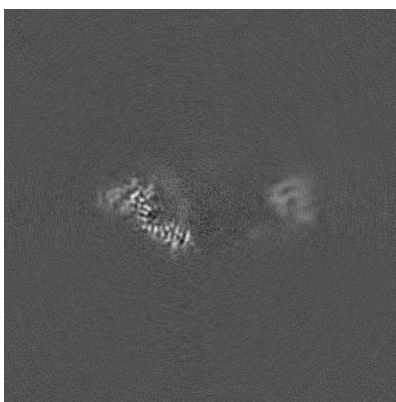


Z Index: 220

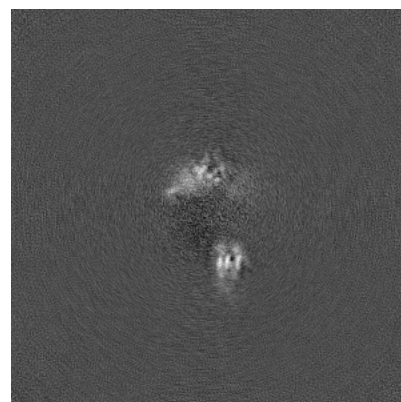
### 6.2.2 Raw map



X Index: 220



Y Index: 220

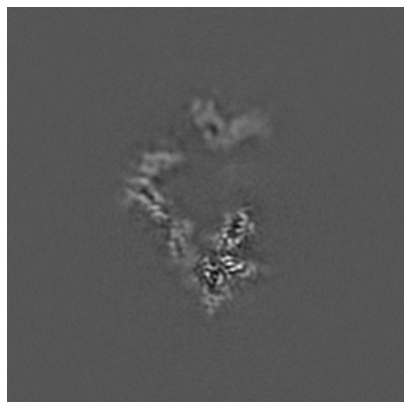


Z Index: 220

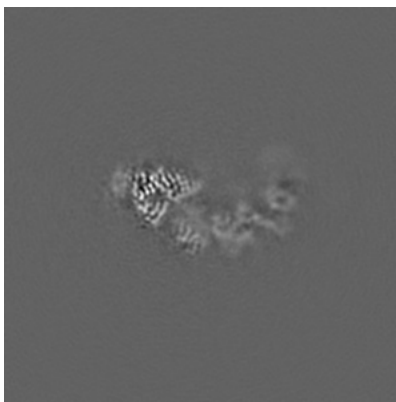
The images above show central slices of the map in three orthogonal directions.

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

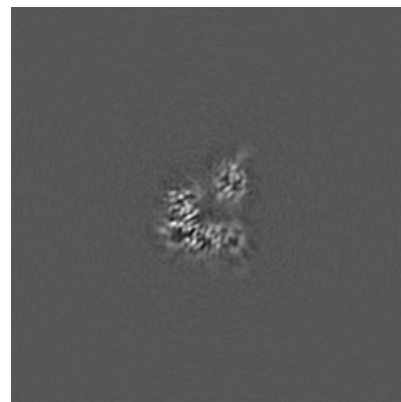
### 6.3.1 Primary map



X Index: 237



Y Index: 243

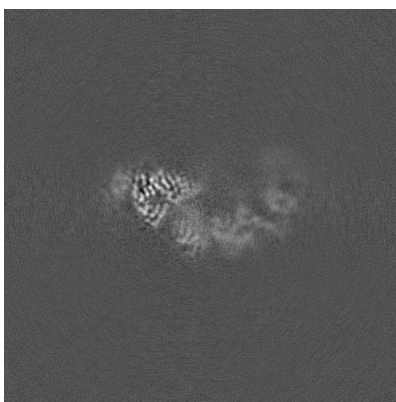


Z Index: 189

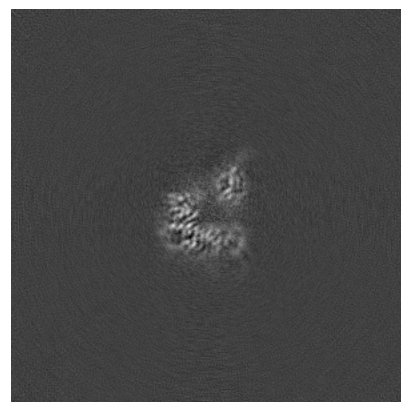
### 6.3.2 Raw map



X Index: 235



Y Index: 243



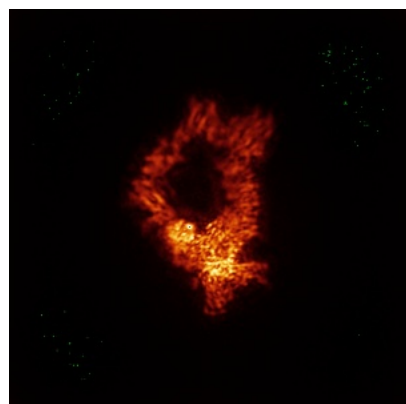
Z Index: 188

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

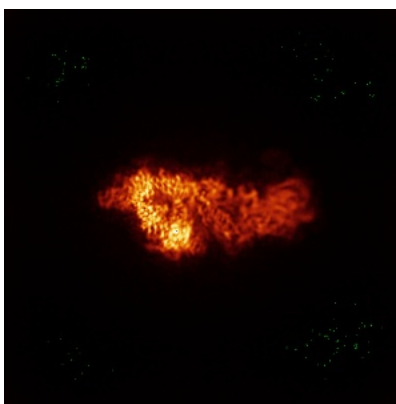


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

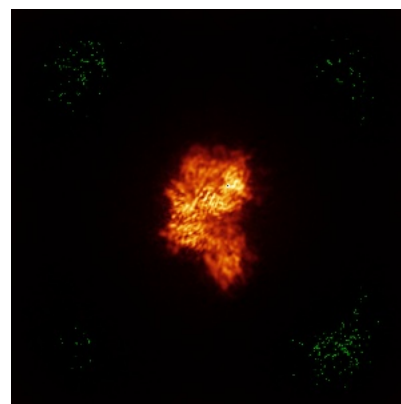
### 6.4.1 Primary map



X

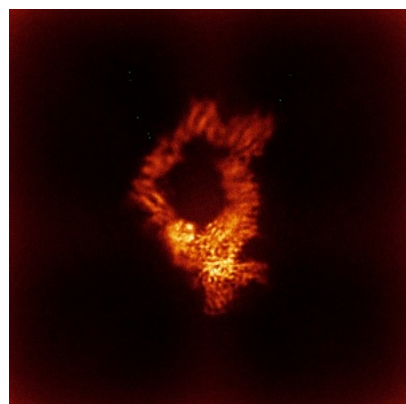


Y

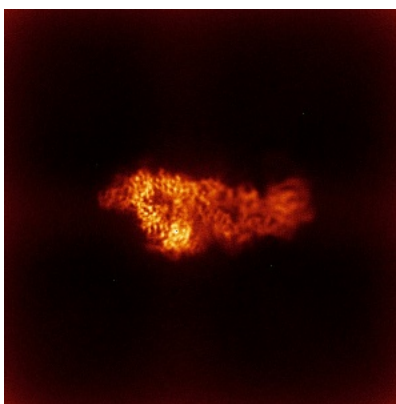


Z

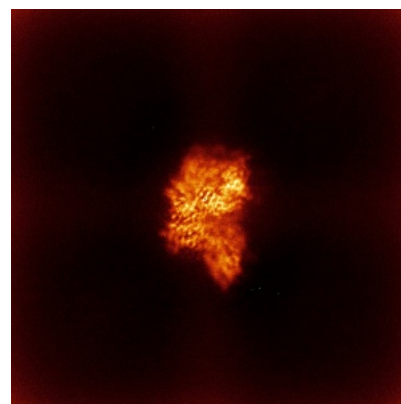
### 6.4.2 Raw map



X



Y



Z

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

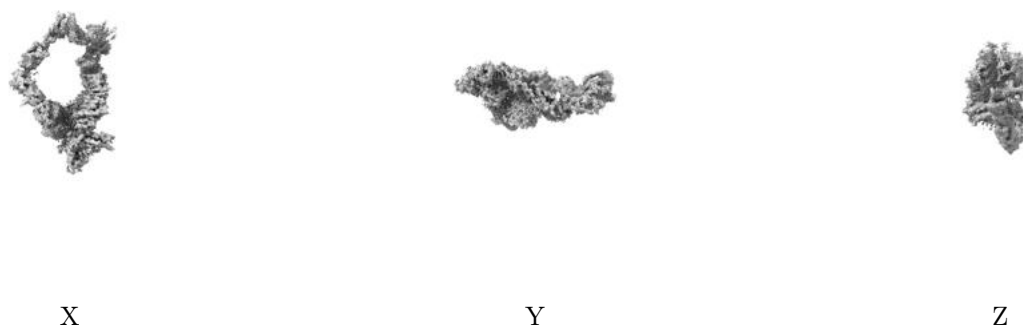
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.06. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

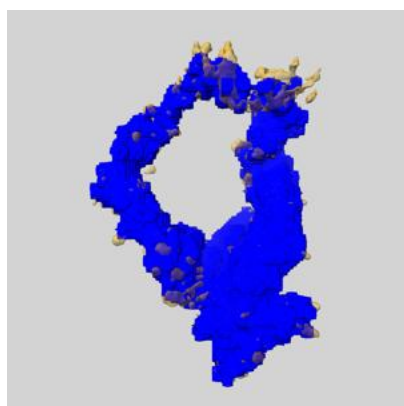
## 6.6 Mask visualisation [i](#)

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

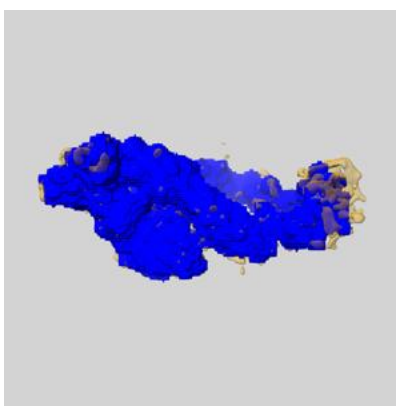
A mask typically either:

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

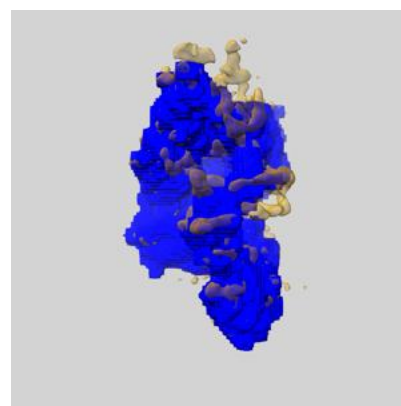
### 6.6.1 emd\_16820\_msk\_1.map [i](#)



X



Y

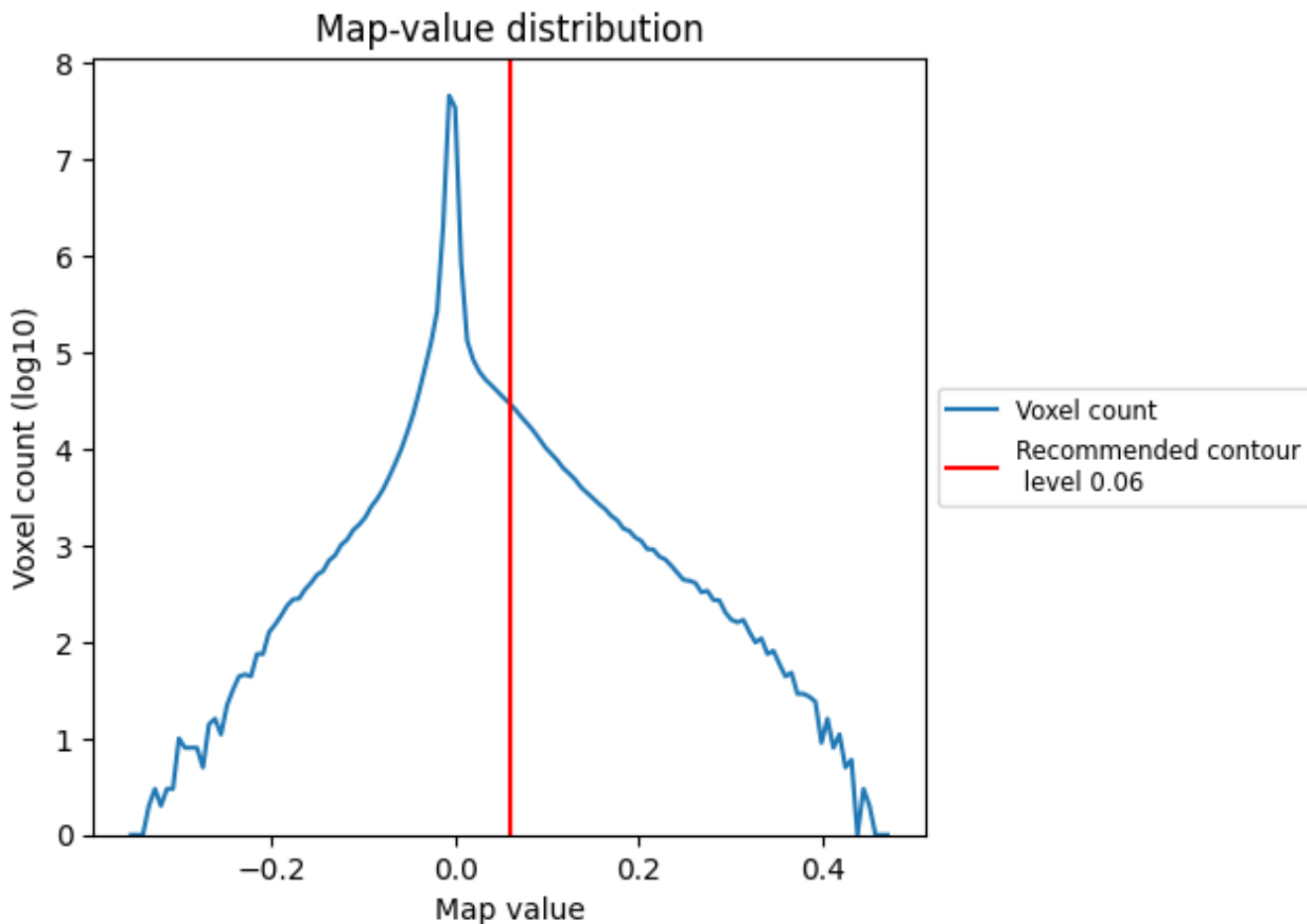


Z

## 7 Map analysis [i](#)

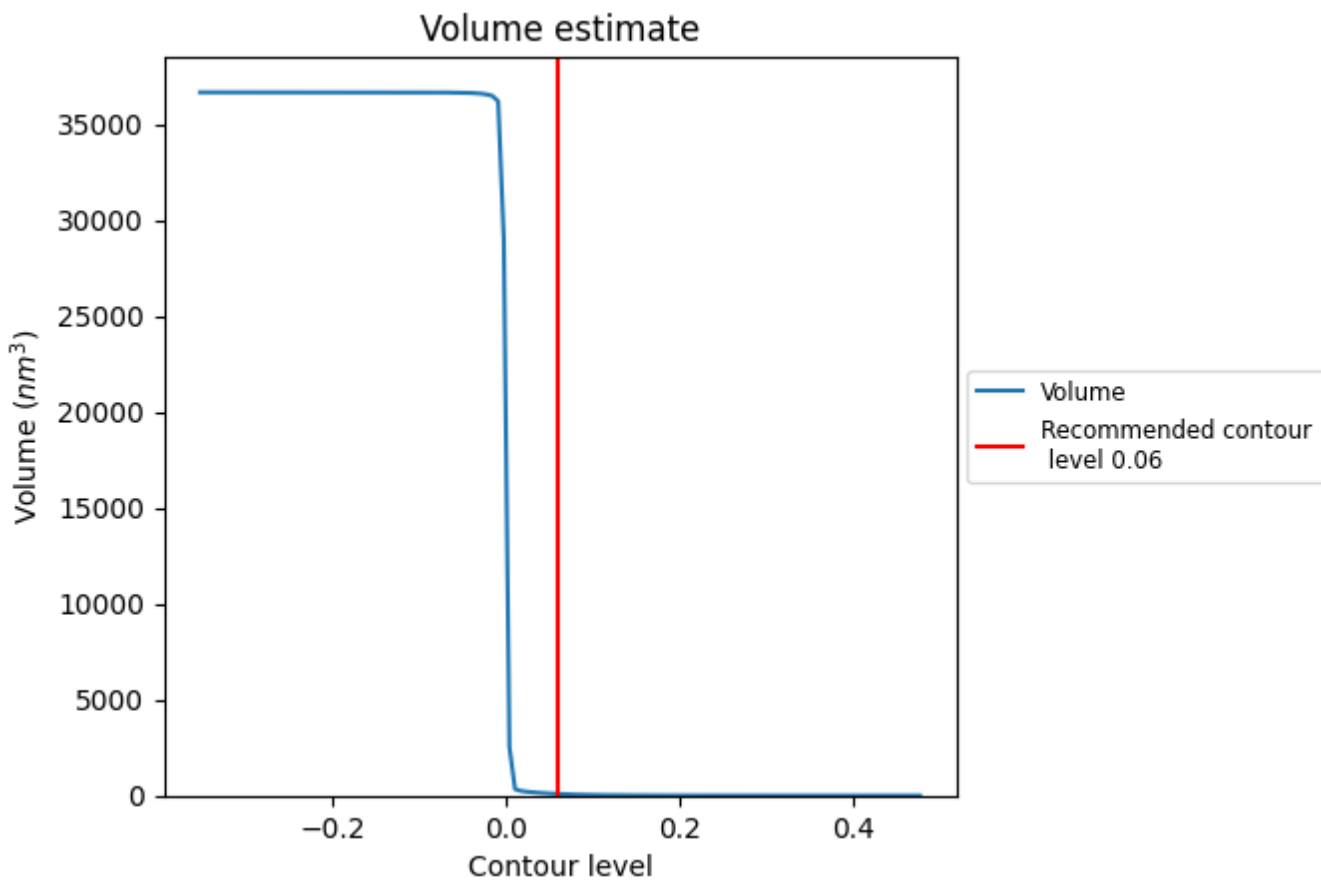
This section contains the results of statistical analysis of the map.

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



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

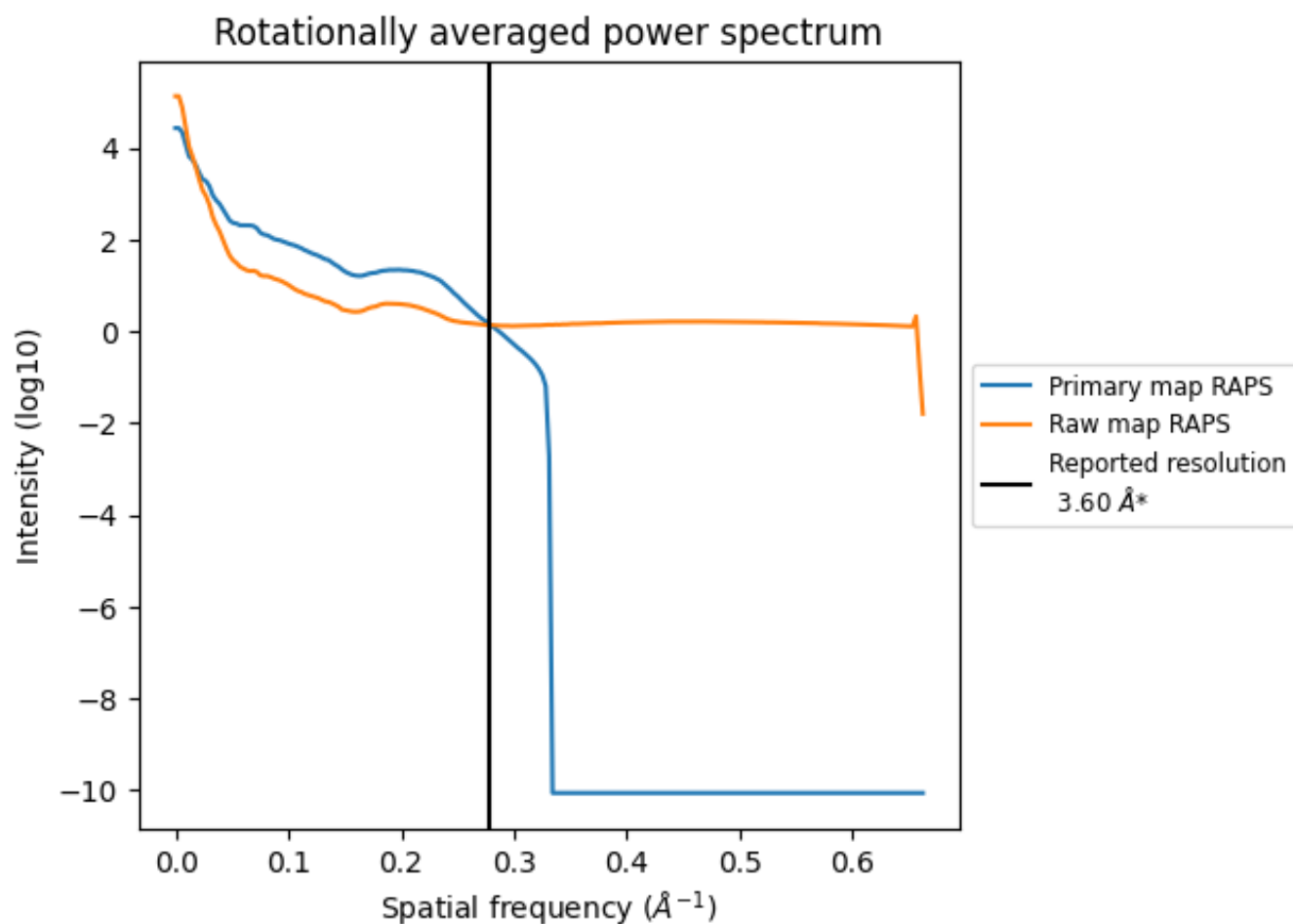
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 85 nm<sup>3</sup>; this corresponds to an approximate mass of 77 kDa.

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

### 7.3 Rotationally averaged power spectrum [\(i\)](#)

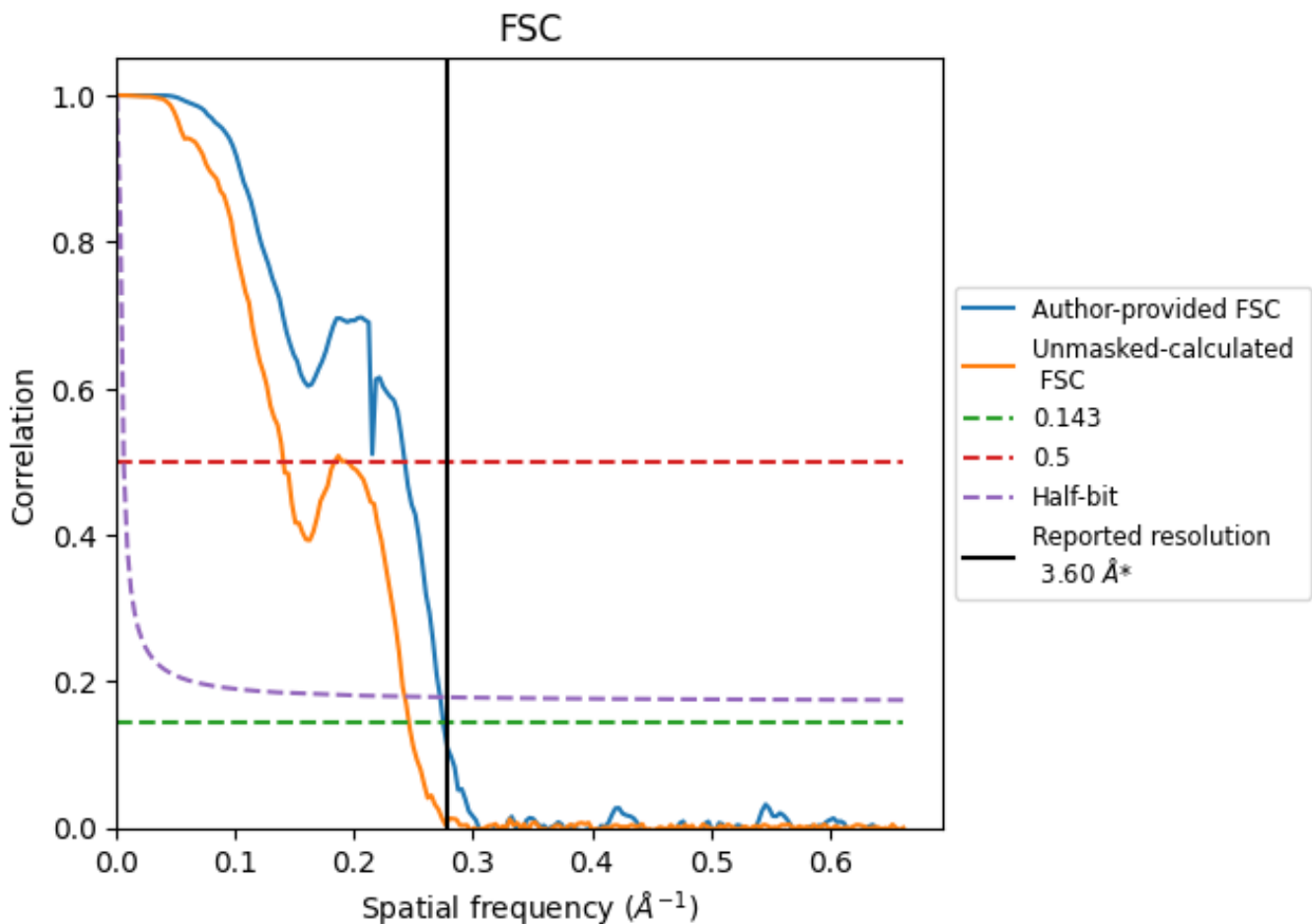


\*Reported resolution corresponds to spatial frequency of 0.278 Å<sup>-1</sup>

## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.278 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

| Resolution estimate (Å)   | Estimation criterion (FSC cut-off) |      |          |
|---------------------------|------------------------------------|------|----------|
|                           | 0.143                              | 0.5  | Half-bit |
| Reported by author        | 3.60                               | -    | -        |
| Author-provided FSC curve | 3.64                               | 4.12 | 3.67     |
| Unmasked-calculated*      | 4.06                               | 7.13 | 4.12     |

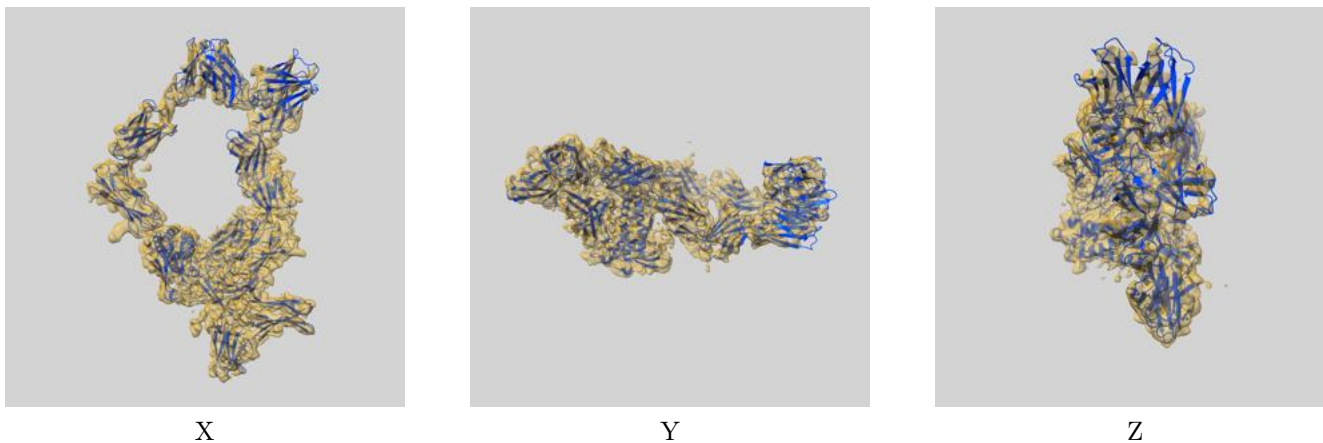
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.06 differs from the reported value 3.6 by more than 10 %



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

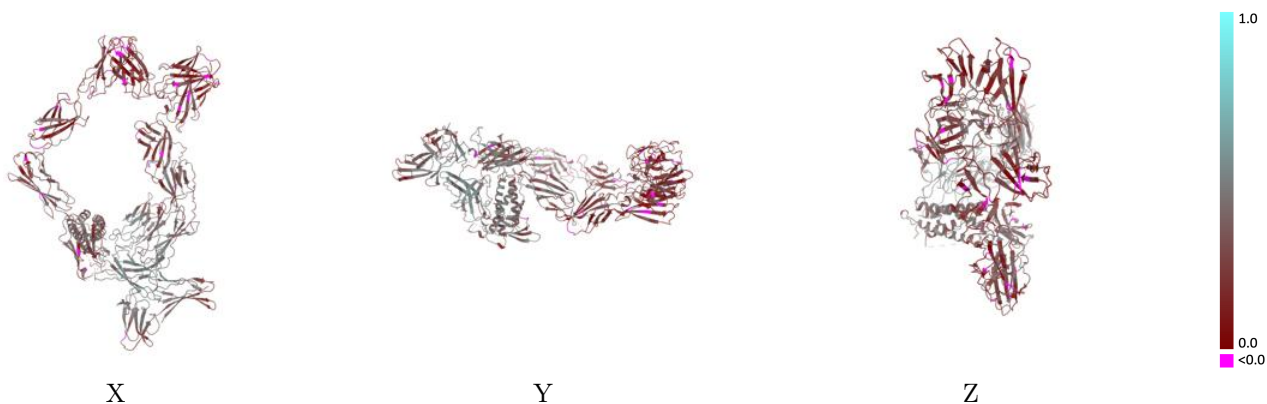
This section contains information regarding the fit between EMDB map EMD-16820 and PDB model 8ODZ. Per-residue inclusion information can be found in section 3 on page 7.

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



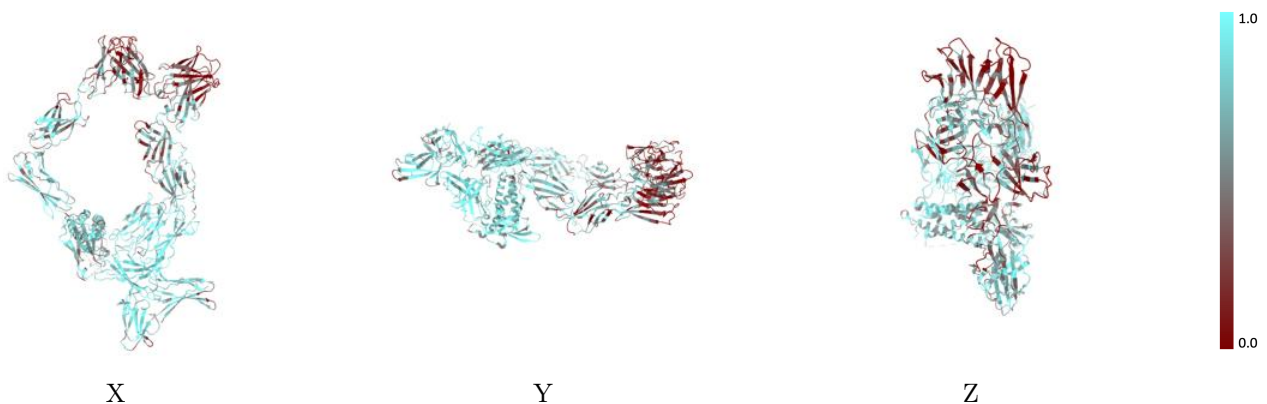
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



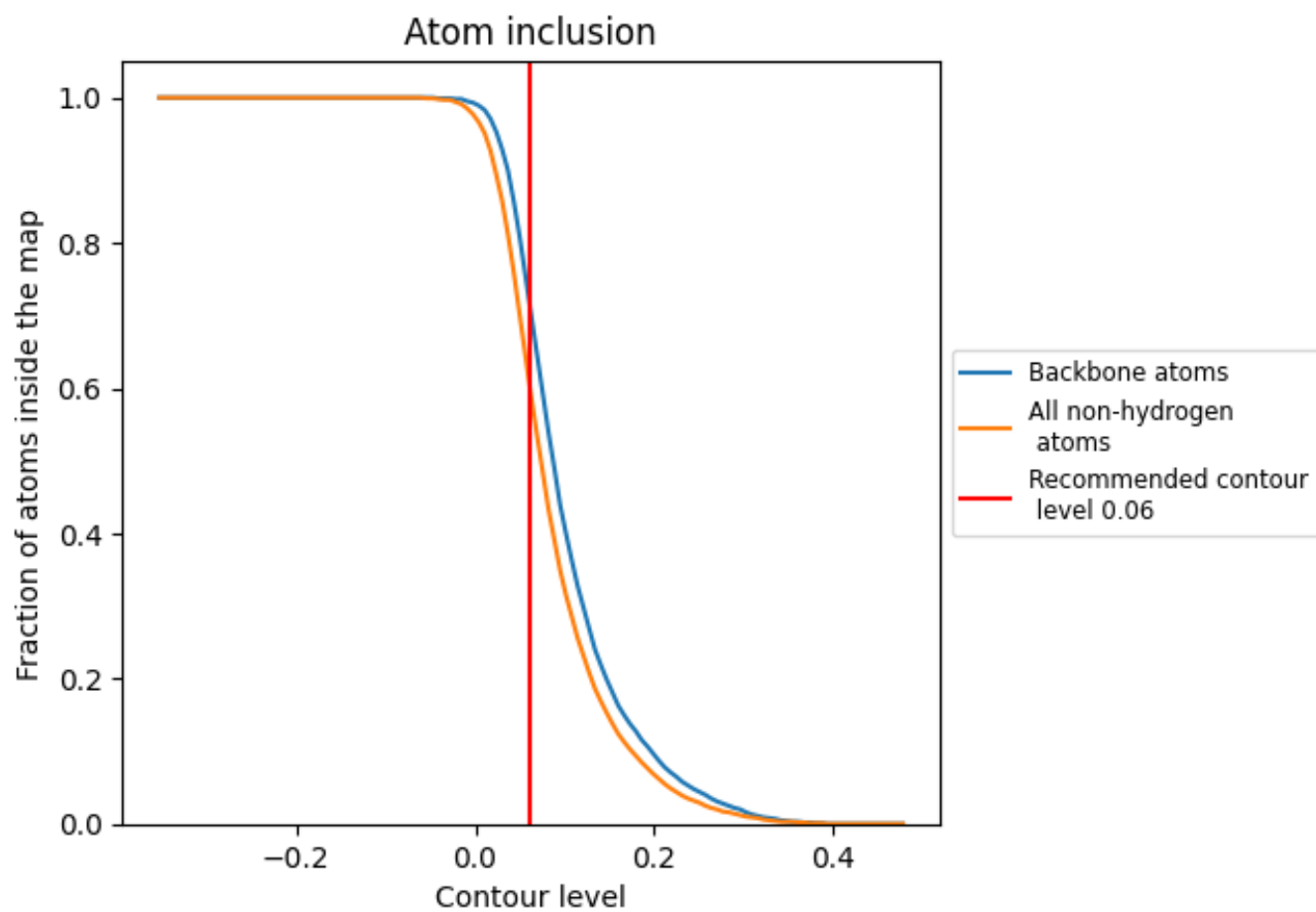
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.06).













## 9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 61% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.06) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion   | Q-score  |
|-------|--|--|
| All   |  0.6100 |  0.3290 |
| A     |  0.7580 |  0.3980 |
| B     |  0.8200 |  0.4460 |
| C     |  0.6250 |  0.3350 |
| D     |  0.4640 |  0.2440 |
| E     |  0.8800 |  0.4560 |

