



## Full wwPDB EM Validation Report ⓘ

Oct 8, 2022 – 10:20 PM EDT

PDB ID : 8D3C  
EMDB ID : EMD-27156  
Title : VWF tubule derived from monomeric D1-A1  
Authors : Anderson, J.R.; Li, J.; Springer, T.A.; Brown, A.  
Deposited on : 2022-06-01  
Resolution : 3.10 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.dev43  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.2

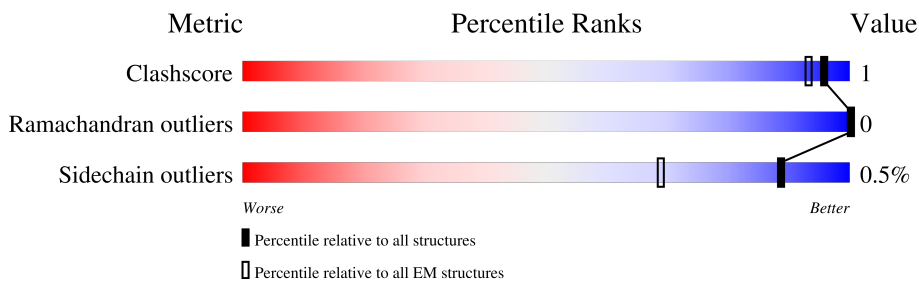
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.10 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.









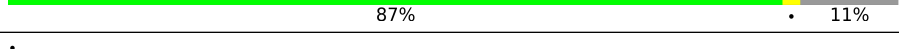
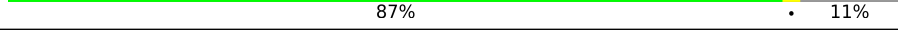
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	1469	87% 11%
1	B	1469	87% 11%
1	C	1469	87% 11%
1	D	1469	86% 11%
1	E	1469	87% 11%
1	F	1469	86% 11%
1	G	1469	87% 11%
1	H	1469	87% 11%

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Mol	Chain	Length	Quality of chain
1	I	1469	 87% 11%
1	J	1469	 87% 11%
1	K	1469	 87% 11%
1	L	1469	 86% 11%
1	M	1469	 87% 11%
1	N	1469	 87% 11%
1	O	1469	 87% 11%
1	P	1469	 87% 11%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 162720 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 von Willebrand factor.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1305	10097	6276	1747	1942	132	0	0
1	B	1305	10097	6276	1747	1942	132	0	0
1	C	1305	10097	6276	1747	1942	132	0	0
1	D	1305	10097	6276	1747	1942	132	0	0
1	E	1305	10097	6276	1747	1942	132	0	0
1	F	1305	10097	6276	1747	1942	132	0	0
1	G	1305	10097	6276	1747	1942	132	0	0
1	H	1305	10097	6276	1747	1942	132	0	0
1	I	1305	10097	6276	1747	1942	132	0	0
1	J	1305	10097	6276	1747	1942	132	0	0
1	K	1305	10097	6276	1747	1942	132	0	0
1	L	1305	10097	6276	1747	1942	132	0	0
1	M	1305	10097	6276	1747	1942	132	0	0
1	N	1305	10097	6276	1747	1942	132	0	0
1	O	1305	10097	6276	1747	1942	132	0	0
1	P	1305	10097	6276	1747	1942	132	0	0

There are 208 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	ARG	deletion	UNP P04275
A	761	ALA	SER	engineered mutation	UNP P04275
A	762	SER	LYS	engineered mutation	UNP P04275
A	763	ALA	ARG	engineered mutation	UNP P04275
A	789	ALA	THR	variant	UNP P04275
A	852	ARG	GLN	variant	UNP P04275
A	1381	ALA	THR	variant	UNP P04275
A	1465	HIS	-	expression tag	UNP P04275
A	1466	HIS	-	expression tag	UNP P04275
A	1467	HIS	-	expression tag	UNP P04275
A	1468	HIS	-	expression tag	UNP P04275
A	1469	HIS	-	expression tag	UNP P04275
A	1470	HIS	-	expression tag	UNP P04275
B	?	-	ARG	deletion	UNP P04275
B	761	ALA	SER	engineered mutation	UNP P04275
B	762	SER	LYS	engineered mutation	UNP P04275
B	763	ALA	ARG	engineered mutation	UNP P04275
B	789	ALA	THR	variant	UNP P04275
B	852	ARG	GLN	variant	UNP P04275
B	1381	ALA	THR	variant	UNP P04275
B	1465	HIS	-	expression tag	UNP P04275
B	1466	HIS	-	expression tag	UNP P04275
B	1467	HIS	-	expression tag	UNP P04275
B	1468	HIS	-	expression tag	UNP P04275
B	1469	HIS	-	expression tag	UNP P04275
B	1470	HIS	-	expression tag	UNP P04275
C	?	-	ARG	deletion	UNP P04275
C	761	ALA	SER	engineered mutation	UNP P04275
C	762	SER	LYS	engineered mutation	UNP P04275
C	763	ALA	ARG	engineered mutation	UNP P04275
C	789	ALA	THR	variant	UNP P04275
C	852	ARG	GLN	variant	UNP P04275
C	1381	ALA	THR	variant	UNP P04275
C	1465	HIS	-	expression tag	UNP P04275
C	1466	HIS	-	expression tag	UNP P04275
C	1467	HIS	-	expression tag	UNP P04275
C	1468	HIS	-	expression tag	UNP P04275
C	1469	HIS	-	expression tag	UNP P04275
C	1470	HIS	-	expression tag	UNP P04275
D	?	-	ARG	deletion	UNP P04275
D	761	ALA	SER	engineered mutation	UNP P04275
D	762	SER	LYS	engineered mutation	UNP P04275
D	763	ALA	ARG	engineered mutation	UNP P04275

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Chain	Residue	Modelled	Actual	Comment	Reference
D	789	ALA	THR	variant	UNP P04275
D	852	ARG	GLN	variant	UNP P04275
D	1381	ALA	THR	variant	UNP P04275
D	1465	HIS	-	expression tag	UNP P04275
D	1466	HIS	-	expression tag	UNP P04275
D	1467	HIS	-	expression tag	UNP P04275
D	1468	HIS	-	expression tag	UNP P04275
D	1469	HIS	-	expression tag	UNP P04275
D	1470	HIS	-	expression tag	UNP P04275
E	?	-	ARG	deletion	UNP P04275
E	761	ALA	SER	engineered mutation	UNP P04275
E	762	SER	LYS	engineered mutation	UNP P04275
E	763	ALA	ARG	engineered mutation	UNP P04275
E	789	ALA	THR	variant	UNP P04275
E	852	ARG	GLN	variant	UNP P04275
E	1381	ALA	THR	variant	UNP P04275
E	1465	HIS	-	expression tag	UNP P04275
E	1466	HIS	-	expression tag	UNP P04275
E	1467	HIS	-	expression tag	UNP P04275
E	1468	HIS	-	expression tag	UNP P04275
E	1469	HIS	-	expression tag	UNP P04275
E	1470	HIS	-	expression tag	UNP P04275
F	?	-	ARG	deletion	UNP P04275
F	761	ALA	SER	engineered mutation	UNP P04275
F	762	SER	LYS	engineered mutation	UNP P04275
F	763	ALA	ARG	engineered mutation	UNP P04275
F	789	ALA	THR	variant	UNP P04275
F	852	ARG	GLN	variant	UNP P04275
F	1381	ALA	THR	variant	UNP P04275
F	1465	HIS	-	expression tag	UNP P04275
F	1466	HIS	-	expression tag	UNP P04275
F	1467	HIS	-	expression tag	UNP P04275
F	1468	HIS	-	expression tag	UNP P04275
F	1469	HIS	-	expression tag	UNP P04275
F	1470	HIS	-	expression tag	UNP P04275
G	?	-	ARG	deletion	UNP P04275
G	761	ALA	SER	engineered mutation	UNP P04275
G	762	SER	LYS	engineered mutation	UNP P04275
G	763	ALA	ARG	engineered mutation	UNP P04275
G	789	ALA	THR	variant	UNP P04275
G	852	ARG	GLN	variant	UNP P04275
G	1381	ALA	THR	variant	UNP P04275

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Chain	Residue	Modelled	Actual	Comment	Reference
G	1465	HIS	-	expression tag	UNP P04275
G	1466	HIS	-	expression tag	UNP P04275
G	1467	HIS	-	expression tag	UNP P04275
G	1468	HIS	-	expression tag	UNP P04275
G	1469	HIS	-	expression tag	UNP P04275
G	1470	HIS	-	expression tag	UNP P04275
H	?	-	ARG	deletion	UNP P04275
H	761	ALA	SER	engineered mutation	UNP P04275
H	762	SER	LYS	engineered mutation	UNP P04275
H	763	ALA	ARG	engineered mutation	UNP P04275
H	789	ALA	THR	variant	UNP P04275
H	852	ARG	GLN	variant	UNP P04275
H	1381	ALA	THR	variant	UNP P04275
H	1465	HIS	-	expression tag	UNP P04275
H	1466	HIS	-	expression tag	UNP P04275
H	1467	HIS	-	expression tag	UNP P04275
H	1468	HIS	-	expression tag	UNP P04275
H	1469	HIS	-	expression tag	UNP P04275
H	1470	HIS	-	expression tag	UNP P04275
I	?	-	ARG	deletion	UNP P04275
I	761	ALA	SER	engineered mutation	UNP P04275
I	762	SER	LYS	engineered mutation	UNP P04275
I	763	ALA	ARG	engineered mutation	UNP P04275
I	789	ALA	THR	variant	UNP P04275
I	852	ARG	GLN	variant	UNP P04275
I	1381	ALA	THR	variant	UNP P04275
I	1465	HIS	-	expression tag	UNP P04275
I	1466	HIS	-	expression tag	UNP P04275
I	1467	HIS	-	expression tag	UNP P04275
I	1468	HIS	-	expression tag	UNP P04275
I	1469	HIS	-	expression tag	UNP P04275
I	1470	HIS	-	expression tag	UNP P04275
J	?	-	ARG	deletion	UNP P04275
J	761	ALA	SER	engineered mutation	UNP P04275
J	762	SER	LYS	engineered mutation	UNP P04275
J	763	ALA	ARG	engineered mutation	UNP P04275
J	789	ALA	THR	variant	UNP P04275
J	852	ARG	GLN	variant	UNP P04275
J	1381	ALA	THR	variant	UNP P04275
J	1465	HIS	-	expression tag	UNP P04275
J	1466	HIS	-	expression tag	UNP P04275
J	1467	HIS	-	expression tag	UNP P04275

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Chain	Residue	Modelled	Actual	Comment	Reference
J	1468	HIS	-	expression tag	UNP P04275
J	1469	HIS	-	expression tag	UNP P04275
J	1470	HIS	-	expression tag	UNP P04275
K	?	-	ARG	deletion	UNP P04275
K	761	ALA	SER	engineered mutation	UNP P04275
K	762	SER	LYS	engineered mutation	UNP P04275
K	763	ALA	ARG	engineered mutation	UNP P04275
K	789	ALA	THR	variant	UNP P04275
K	852	ARG	GLN	variant	UNP P04275
K	1381	ALA	THR	variant	UNP P04275
K	1465	HIS	-	expression tag	UNP P04275
K	1466	HIS	-	expression tag	UNP P04275
K	1467	HIS	-	expression tag	UNP P04275
K	1468	HIS	-	expression tag	UNP P04275
K	1469	HIS	-	expression tag	UNP P04275
K	1470	HIS	-	expression tag	UNP P04275
L	?	-	ARG	deletion	UNP P04275
L	761	ALA	SER	engineered mutation	UNP P04275
L	762	SER	LYS	engineered mutation	UNP P04275
L	763	ALA	ARG	engineered mutation	UNP P04275
L	789	ALA	THR	variant	UNP P04275
L	852	ARG	GLN	variant	UNP P04275
L	1381	ALA	THR	variant	UNP P04275
L	1465	HIS	-	expression tag	UNP P04275
L	1466	HIS	-	expression tag	UNP P04275
L	1467	HIS	-	expression tag	UNP P04275
L	1468	HIS	-	expression tag	UNP P04275
L	1469	HIS	-	expression tag	UNP P04275
L	1470	HIS	-	expression tag	UNP P04275
M	?	-	ARG	deletion	UNP P04275
M	761	ALA	SER	engineered mutation	UNP P04275
M	762	SER	LYS	engineered mutation	UNP P04275
M	763	ALA	ARG	engineered mutation	UNP P04275
M	789	ALA	THR	variant	UNP P04275
M	852	ARG	GLN	variant	UNP P04275
M	1381	ALA	THR	variant	UNP P04275
M	1465	HIS	-	expression tag	UNP P04275
M	1466	HIS	-	expression tag	UNP P04275
M	1467	HIS	-	expression tag	UNP P04275
M	1468	HIS	-	expression tag	UNP P04275
M	1469	HIS	-	expression tag	UNP P04275
M	1470	HIS	-	expression tag	UNP P04275

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Chain	Residue	Modelled	Actual	Comment	Reference
N	?	-	ARG	deletion	UNP P04275
N	761	ALA	SER	engineered mutation	UNP P04275
N	762	SER	LYS	engineered mutation	UNP P04275
N	763	ALA	ARG	engineered mutation	UNP P04275
N	789	ALA	THR	variant	UNP P04275
N	852	ARG	GLN	variant	UNP P04275
N	1381	ALA	THR	variant	UNP P04275
N	1465	HIS	-	expression tag	UNP P04275
N	1466	HIS	-	expression tag	UNP P04275
N	1467	HIS	-	expression tag	UNP P04275
N	1468	HIS	-	expression tag	UNP P04275
N	1469	HIS	-	expression tag	UNP P04275
N	1470	HIS	-	expression tag	UNP P04275
O	?	-	ARG	deletion	UNP P04275
O	761	ALA	SER	engineered mutation	UNP P04275
O	762	SER	LYS	engineered mutation	UNP P04275
O	763	ALA	ARG	engineered mutation	UNP P04275
O	789	ALA	THR	variant	UNP P04275
O	852	ARG	GLN	variant	UNP P04275
O	1381	ALA	THR	variant	UNP P04275
O	1465	HIS	-	expression tag	UNP P04275
O	1466	HIS	-	expression tag	UNP P04275
O	1467	HIS	-	expression tag	UNP P04275
O	1468	HIS	-	expression tag	UNP P04275
O	1469	HIS	-	expression tag	UNP P04275
O	1470	HIS	-	expression tag	UNP P04275
P	?	-	ARG	deletion	UNP P04275
P	761	ALA	SER	engineered mutation	UNP P04275
P	762	SER	LYS	engineered mutation	UNP P04275
P	763	ALA	ARG	engineered mutation	UNP P04275
P	789	ALA	THR	variant	UNP P04275
P	852	ARG	GLN	variant	UNP P04275
P	1381	ALA	THR	variant	UNP P04275
P	1465	HIS	-	expression tag	UNP P04275
P	1466	HIS	-	expression tag	UNP P04275
P	1467	HIS	-	expression tag	UNP P04275
P	1468	HIS	-	expression tag	UNP P04275
P	1469	HIS	-	expression tag	UNP P04275
P	1470	HIS	-	expression tag	UNP P04275

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
2	A	3	Total 3	Ca 3	0
2	B	3	Total 3	Ca 3	0
2	C	3	Total 3	Ca 3	0
2	D	3	Total 3	Ca 3	0
2	E	3	Total 3	Ca 3	0
2	F	3	Total 3	Ca 3	0
2	G	3	Total 3	Ca 3	0
2	H	3	Total 3	Ca 3	0
2	I	3	Total 3	Ca 3	0
2	J	3	Total 3	Ca 3	0
2	K	3	Total 3	Ca 3	0
2	L	3	Total 3	Ca 3	0
2	M	3	Total 3	Ca 3	0
2	N	3	Total 3	Ca 3	0
2	O	3	Total 3	Ca 3	0
2	P	3	Total 3	Ca 3	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



Mol	Chain	Residues	Atoms			AltConf	
			Total	C	N		O
3	A	1	70	40	5	25	0
3	A	1	70	40	5	25	0
3	A	1	70	40	5	25	0
3	A	1	70	40	5	25	0
3	A	1	70	40	5	25	0
3	B	1	70	40	5	25	0
3	B	1	70	40	5	25	0
3	B	1	70	40	5	25	0
3	B	1	70	40	5	25	0
3	B	1	70	40	5	25	0
3	C	1	70	40	5	25	0
3	C	1	70	40	5	25	0
3	C	1	70	40	5	25	0
3	C	1	70	40	5	25	0

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Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
3	C	1	70	40	5	25	0
3	D	1	70	40	5	25	0
3	D	1	70	40	5	25	0
3	D	1	70	40	5	25	0
3	D	1	70	40	5	25	0
3	D	1	70	40	5	25	0
3	E	1	70	40	5	25	0
3	E	1	70	40	5	25	0
3	E	1	70	40	5	25	0
3	E	1	70	40	5	25	0
3	E	1	70	40	5	25	0
3	F	1	70	40	5	25	0
3	F	1	70	40	5	25	0
3	F	1	70	40	5	25	0
3	F	1	70	40	5	25	0
3	F	1	70	40	5	25	0
3	G	1	70	40	5	25	0
3	G	1	70	40	5	25	0
3	G	1	70	40	5	25	0
3	G	1	70	40	5	25	0
3	G	1	70	40	5	25	0

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Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
3	H	1	70	40	5	25	0
3	H	1	70	40	5	25	0
3	H	1	70	40	5	25	0
3	H	1	70	40	5	25	0
3	H	1	70	40	5	25	0
3	I	1	70	40	5	25	0
3	I	1	70	40	5	25	0
3	I	1	70	40	5	25	0
3	I	1	70	40	5	25	0
3	I	1	70	40	5	25	0
3	J	1	70	40	5	25	0
3	J	1	70	40	5	25	0
3	J	1	70	40	5	25	0
3	J	1	70	40	5	25	0
3	J	1	70	40	5	25	0
3	K	1	70	40	5	25	0
3	K	1	70	40	5	25	0
3	K	1	70	40	5	25	0
3	K	1	70	40	5	25	0
3	K	1	70	40	5	25	0
3	L	1	70	40	5	25	0

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Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
3	L	1	70	40	5	25	0
3	L	1	70	40	5	25	0
3	L	1	70	40	5	25	0
3	L	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	M	1	70	40	5	25	0
3	N	1	70	40	5	25	0
3	N	1	70	40	5	25	0
3	N	1	70	40	5	25	0
3	N	1	70	40	5	25	0
3	N	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	O	1	70	40	5	25	0
3	P	1	70	40	5	25	0
3	P	1	70	40	5	25	0

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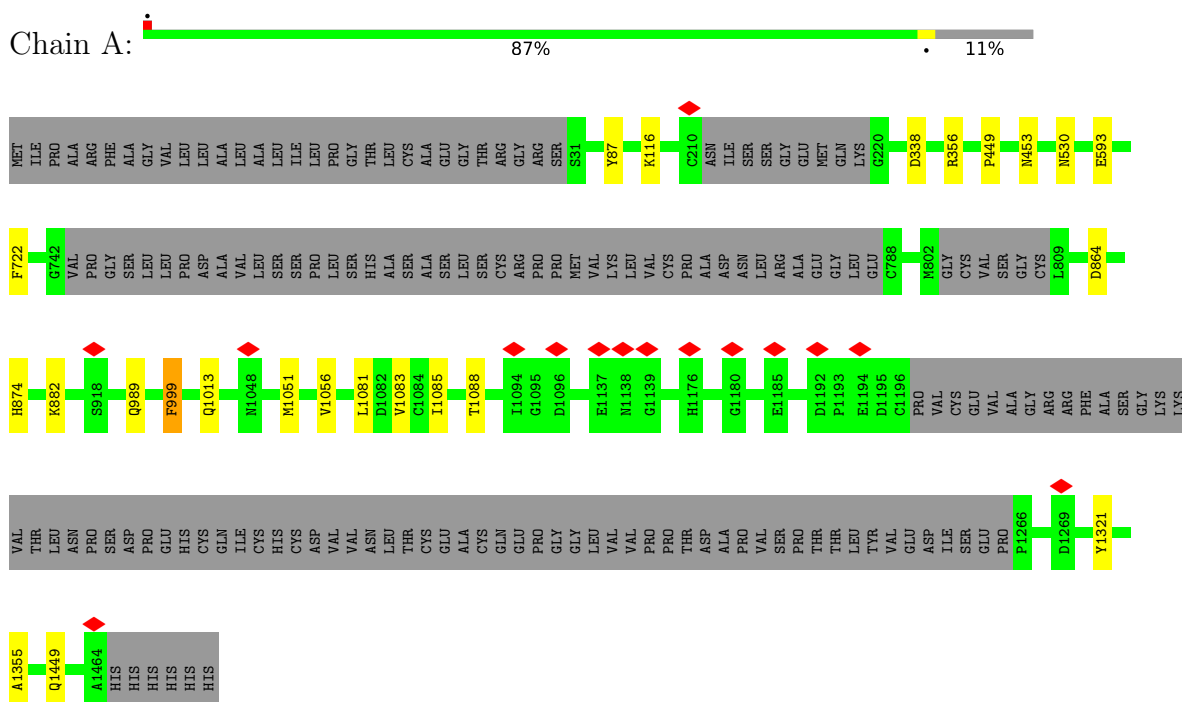
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Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
3	P	1	70	40	5	25	0
3	P	1	70	40	5	25	0
3	P	1	70	40	5	25	0

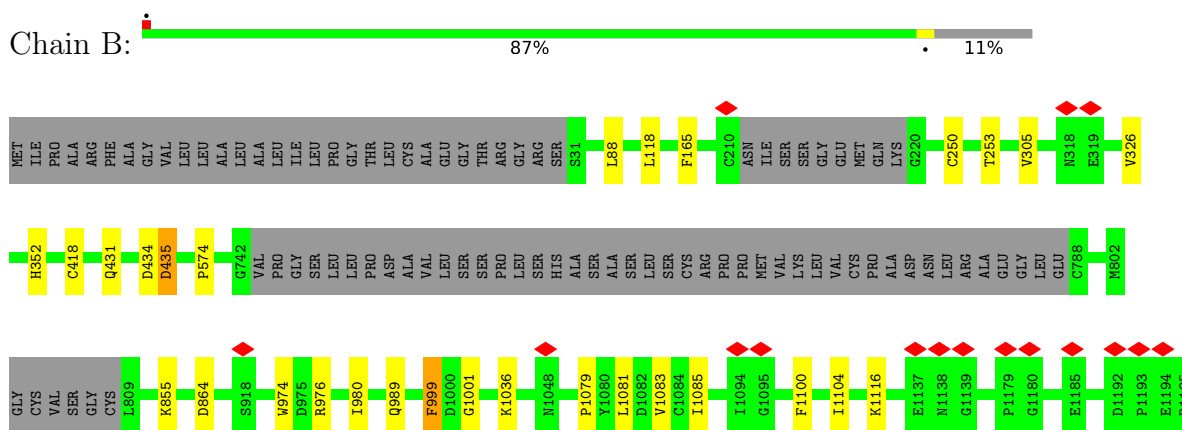
### 3 Residue-property plots i

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: von Willebrand factor



- Molecule 1: von Willebrand factor





C1196	PRD	VAL	CYS	GLU	VAL	ALA	GLY	ARG	ARG	PHE	ALA	SER	GLY	LYS	VAL	THR	LEU	ASN	PRO	SER	ASP	PRO	GLU	HIS	CYS	ILE	GLN	VAL	CYS	HIS	ASP	VAL	VAL	ASN	LEU	THR	CYS	GLU	ALA	VAL	VAL	PRO	PRO	THR
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THR	LEU	TYR	VAL	GLU	ASP	ILE	SER	PRO	P1266	D1269	L1361	T1364	R1379	A1464	HIS	HIS	HIS	HIS	HIS	HIS	HIS
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• Molecule 1: von Willebrand factor

Chain C: 87% 11%

MET	ILE	PRO	ALA	ARG	PHE	ALA	VAL	LEU	LEU	ALA	LEU	LEU	ILE	LEU	PRO	GLY	THR	S31	C210	ASN	ILE	SER	SER	GLY	GLU	MET	GLN	LYS	G220	A258	I317	N318	E319	D338	R356	P449	N453	G742	VAL
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PRO	GLY	SER	LEU	LEU	PRO	ASP	ALA	VAL	VAL	SER	LEU	LEU	SER	PRO	LEU	VAL	SER	CYS	CYS	PRO	ALA	ARG	GLY	THR	PRO	MET	VAL	VAL	GLY	LEU	GLU	G788	M602	CYS	VAL	VAL	GLY	VAL	GLY	ARG	ARG	PHE	ALA	SER	GLY	LYS	L809	D664	H674	K682
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S918	Q989	F989	N1048	M1051	V1056	L1081	D1082	V1083	C1084	I1085	T1088	D1096	E1137	N1138	G1139	Y1140	H1176	E1185	L1186	L1187	Q1188	D1192	P1193	E1194	D1195	C1196	PRO	VAL	CYS	GLU	VAL	ALA	GLY	ARG	ARG	ALA	SER	GLY	LYS	VAL	THR	PRO	PRO	SER
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ASP	PRO	GLU	HIS	CYS	GLN	ILE	CYS	VAL	VAL	ASN	THR	THR	CYS	GLU	ALA	PRO	PRO	THR	THR	TYR	VAL	GLU	ASP	ILE	P1266	L1267	H1268	D1269	Y1321	H1336	A1365	P1418
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N1421	S1441	S1442	V1443	D1444	Q1449	A1464	HIS	HIS	HIS	HIS	HIS	HIS
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• Molecule 1: von Willebrand factor

Chain D: 86% 11%

MET	ILE	PRO	ALA	ARG	PHE	ALA	VAL	VAL	LEU	LEU	ALA	ALA	ILE	LEU	PRO	GLY	THR	S31	L88	L118	F165	C210	ASN	ILE	SER	SER	GLY	GLY	GLU	MET	GLN	G220	S230	A235	R236	P239	C250	T253
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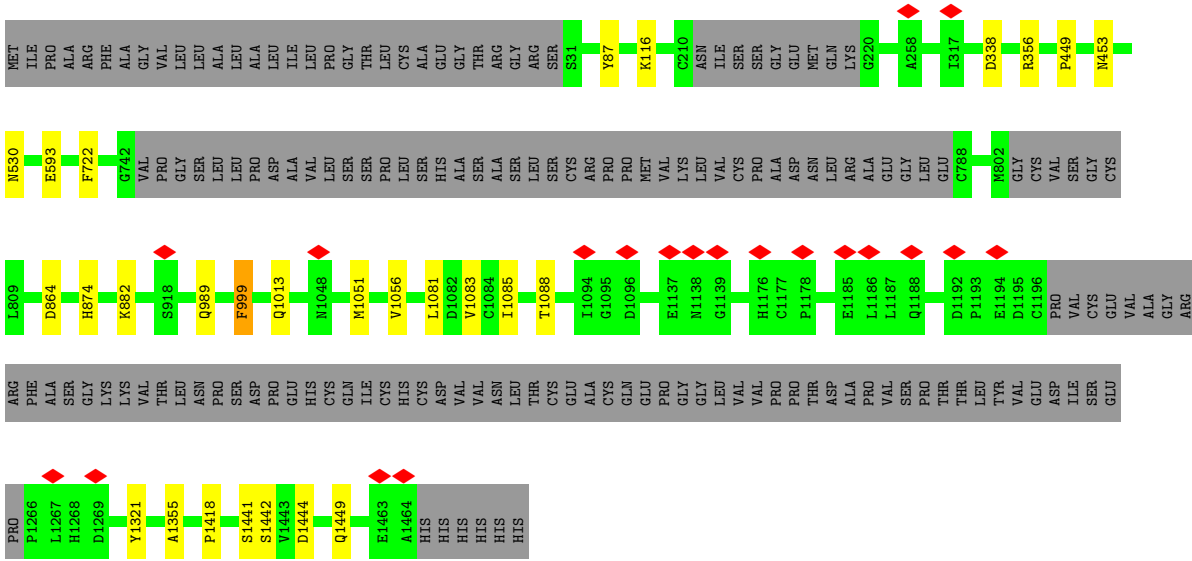
V305	N318	E319	V326	H352	C418	Q431	D434	D435	P574	G742	VAL	PRO	GLY	SER	LEU	LEU	LEU	PRO	ASP	ALA	VAL	LEU	SER	L88	N1048	P1079	Y1080	L1081	D1082	V1083	C1084	I1085	I1094	G1095	D1096	F1100	I1104	K1116	R1136	E1137	N1138	G1139	Y1140	ALA
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GLU	GLY	LEU	C788	M802	GLY	CYS	VAL	SER	GLY	CYS	L809	D864	S918	W874	D975	R976	I980	Q989	F999	D1000	G1001	K1036	N1048	P1079	Y1080	L1081	D1082	V1083	C1084	I1085	I1094	G1095	D1096	F1100	I1104	K1116	R1136	E1137	N1138	G1139	Y1140	ALA
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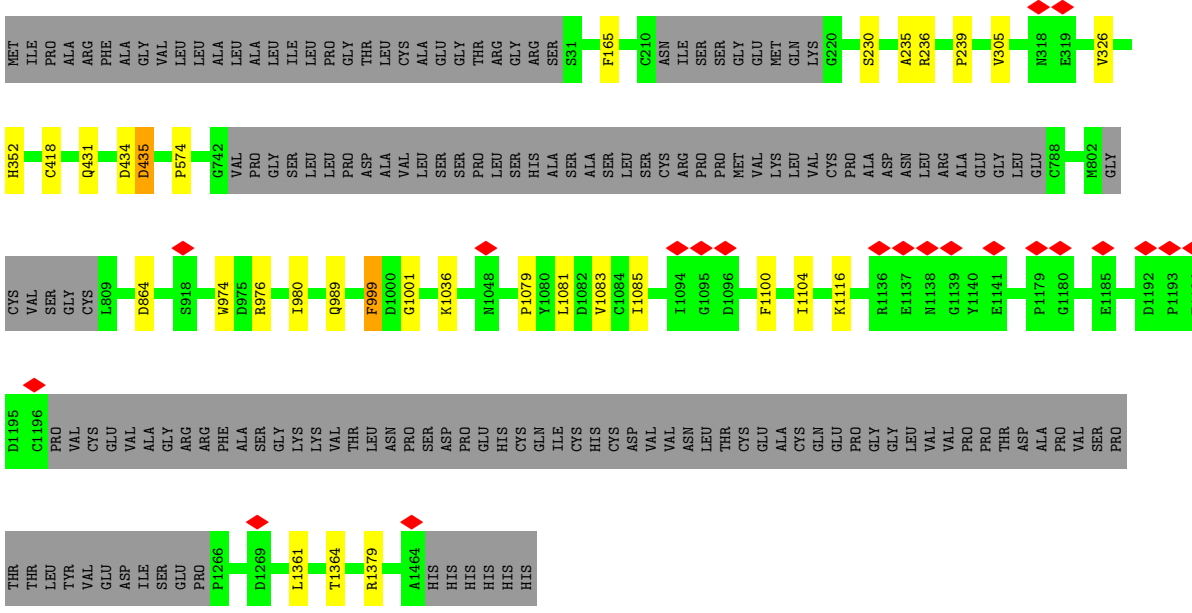
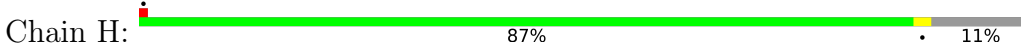
P1179	G1180	L1183	D1184	E1185	D1192	P1193	E1194	D1195	C1196	VAL	PRO	CYS	VAL	VAL	GLY	ALA	ARG	ARG	PHE	ALA	SER	GLY	LYS	VAL	THR	LEU	ASN	SER	ASP	PRO	GLU	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS
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VAL	PRO	THR	ASP	ALA	PRO	VAL	SER	PRO	THR	THR	THR	TYR	VAL	GLU	ASP	P1266	D1269	L1361	T1364	I1372	R1379	A1464	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS
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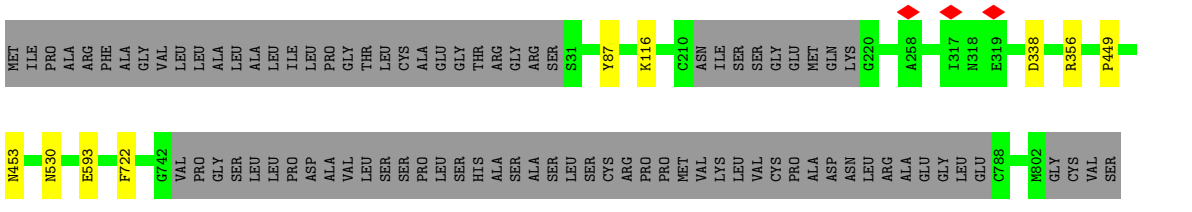
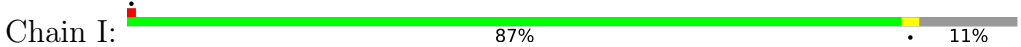


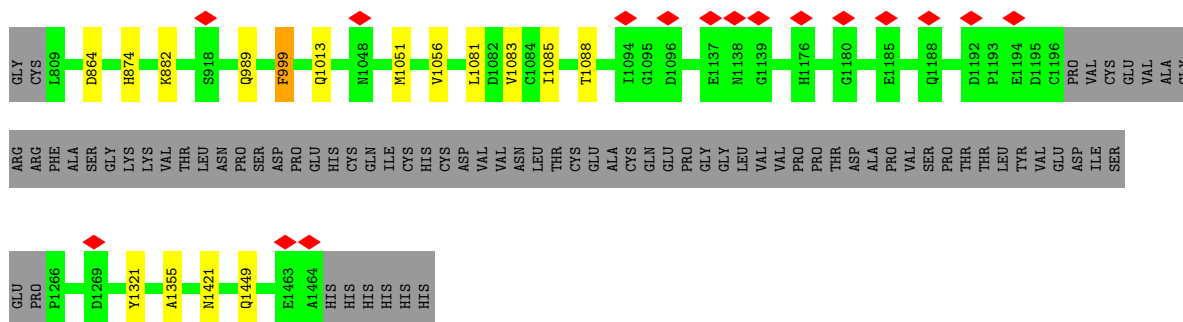


● Molecule 1: von Willebrand factor

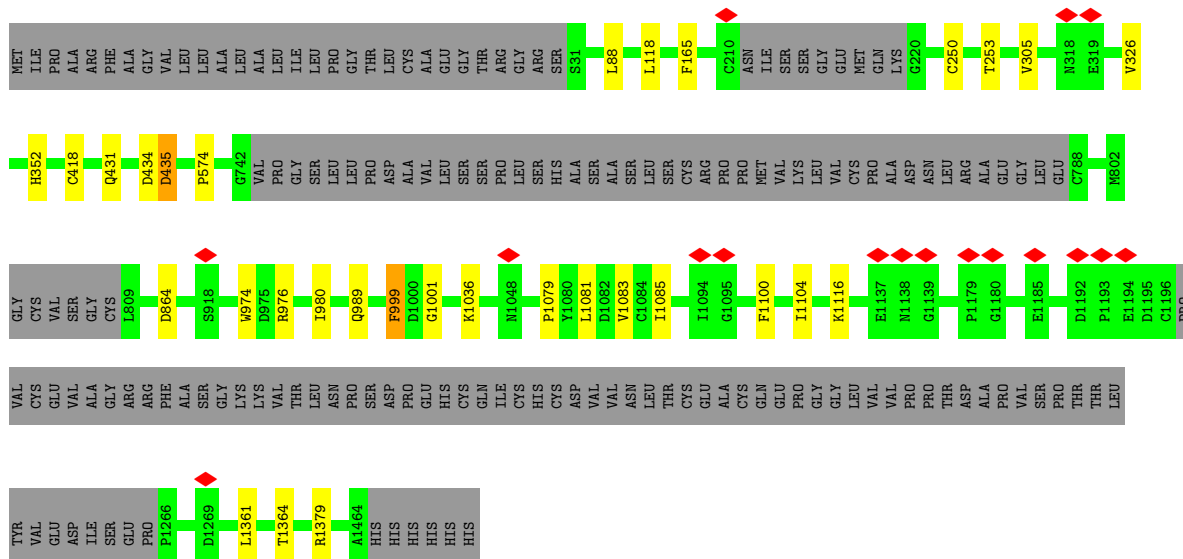
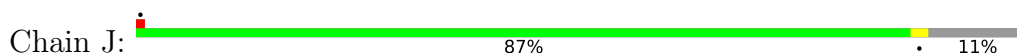


● Molecule 1: von Willebrand factor

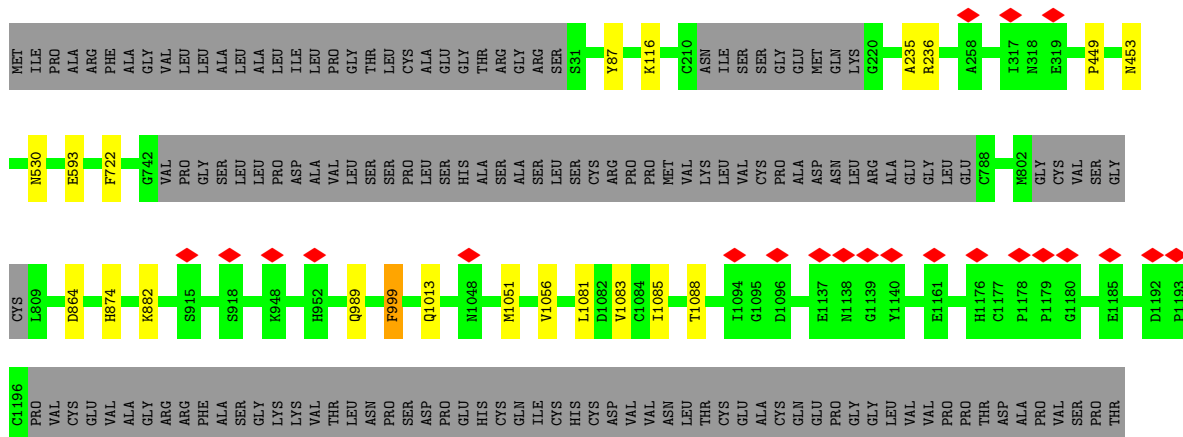
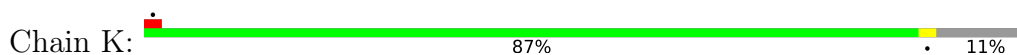




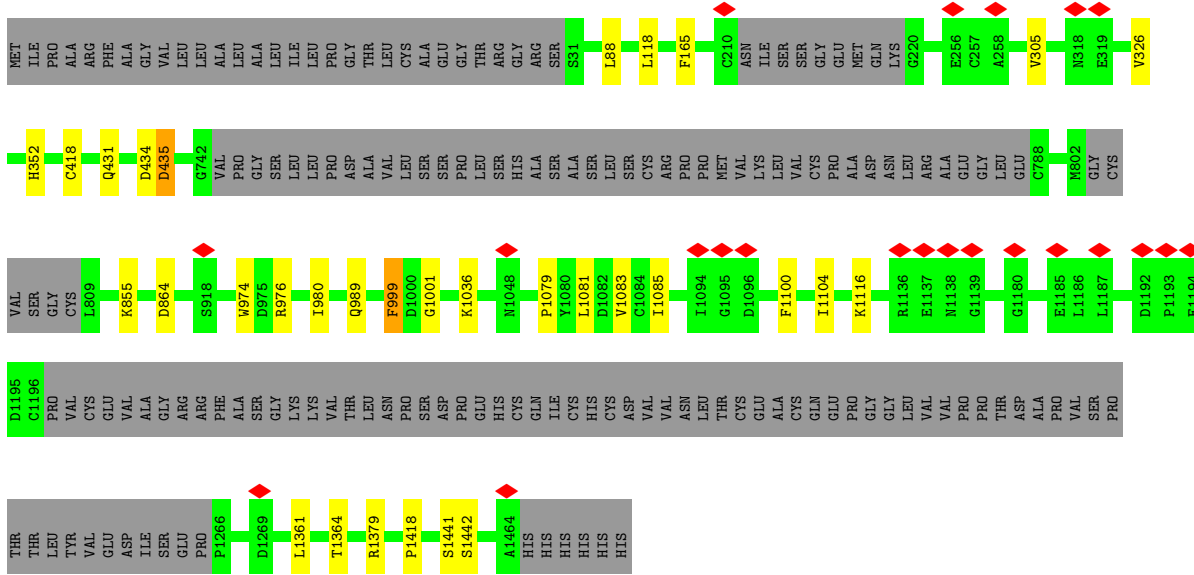
• Molecule 1: von Willebrand factor



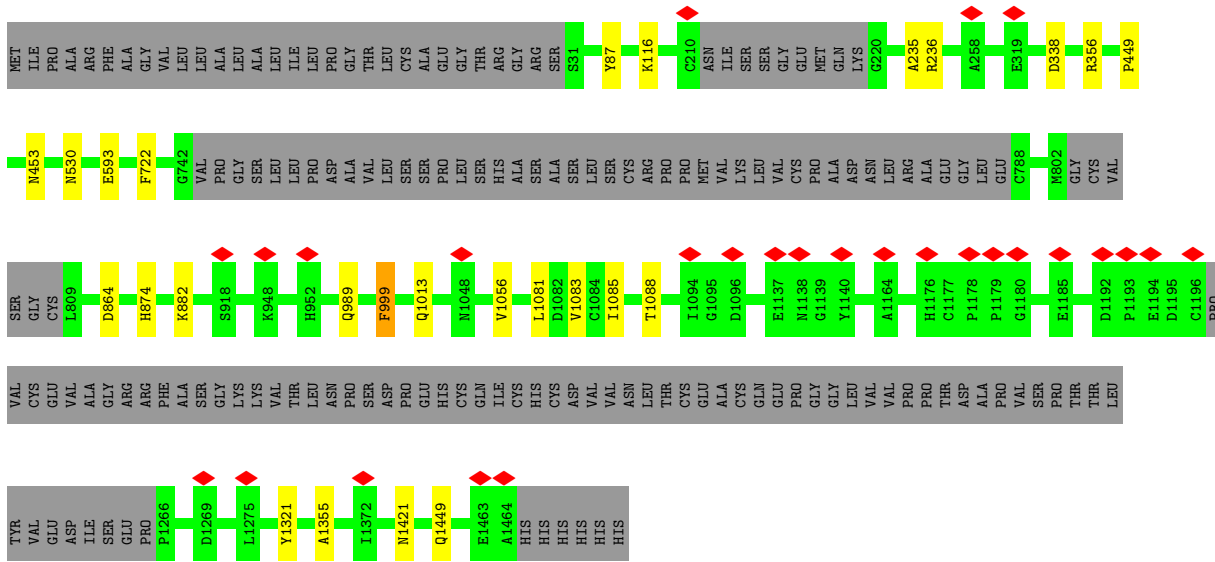
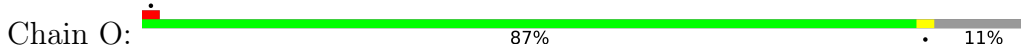
• Molecule 1: von Willebrand factor



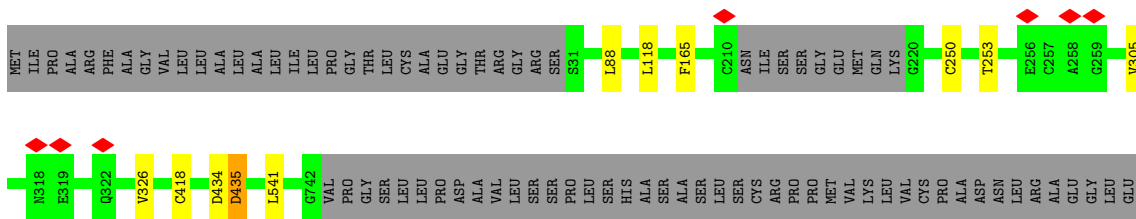
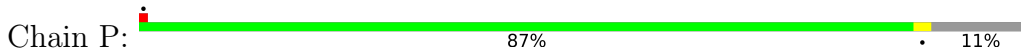


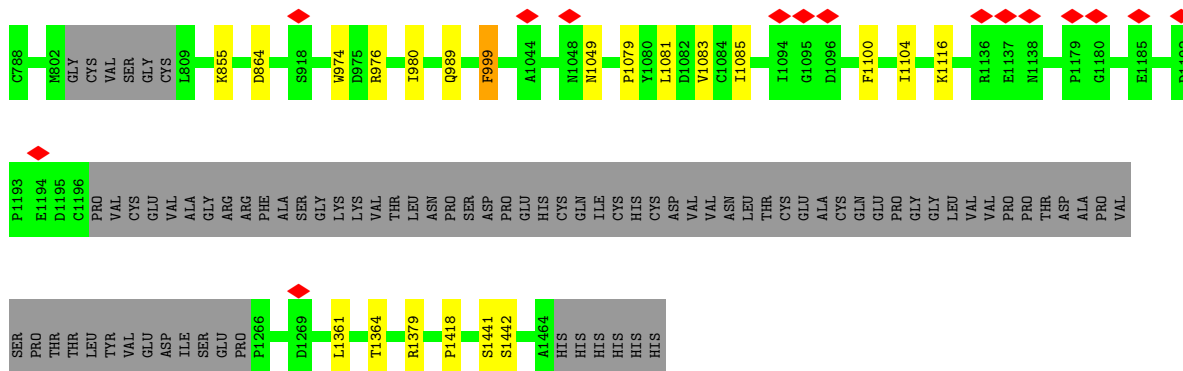


• Molecule 1: von Willebrand factor



• Molecule 1: von Willebrand factor





## 4 Experimental information

Property	Value	Source
EM reconstruction method	HELICAL	Depositor
Imposed symmetry	HELICAL, twist=83.3°, rise=26.8 Å, axial sym=C1	Depositor
Number of segments used	373304	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{Å}^2$ )	55	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	59.991	Depositor
Minimum map value	-0.006	Depositor
Average map value	0.544	Depositor
Map value standard deviation	2.300	Depositor
Recommended contour level	4.5	Depositor
Map size (Å)	423.99997, 423.99997, 423.99997	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, CA

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	0.26	0/10315	0.57	0/13969
1	B	0.26	0/10315	0.57	0/13969
1	C	0.26	0/10315	0.57	0/13969
1	D	0.26	0/10315	0.57	0/13969
1	E	0.26	0/10315	0.57	0/13969
1	F	0.26	0/10315	0.57	0/13969
1	G	0.26	0/10315	0.57	0/13969
1	H	0.26	0/10315	0.57	0/13969
1	I	0.26	0/10315	0.57	0/13969
1	J	0.26	0/10315	0.57	0/13969
1	K	0.26	0/10315	0.57	0/13969
1	L	0.26	0/10315	0.57	0/13969
1	M	0.26	0/10315	0.57	0/13969
1	N	0.26	0/10315	0.57	0/13969
1	O	0.26	0/10315	0.57	0/13969
1	P	0.26	0/10315	0.57	0/13969
All	All	0.26	0/165040	0.57	0/223504

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	10097	0	9581	17	0
1	B	10097	0	9581	20	0
1	C	10097	0	9581	21	0
1	D	10097	0	9581	30	0
1	E	10097	0	9581	26	0
1	F	10097	0	9581	31	0
1	G	10097	0	9581	27	0
1	H	10097	0	9581	28	0
1	I	10097	0	9581	18	0
1	J	10097	0	9581	19	0
1	K	10097	0	9581	26	0
1	L	10097	0	9581	31	0
1	M	10097	0	9581	26	0
1	N	10097	0	9581	29	0
1	O	10097	0	9581	26	0
1	P	10097	0	9581	28	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
2	C	3	0	0	0	0
2	D	3	0	0	0	0
2	E	3	0	0	0	0
2	F	3	0	0	0	0
2	G	3	0	0	0	0
2	H	3	0	0	0	0
2	I	3	0	0	0	0
2	J	3	0	0	0	0
2	K	3	0	0	0	0
2	L	3	0	0	0	0
2	M	3	0	0	0	0
2	N	3	0	0	0	0
2	O	3	0	0	0	0
2	P	3	0	0	0	0
3	A	70	0	65	0	0
3	B	70	0	65	0	0
3	C	70	0	65	0	0
3	D	70	0	65	0	0
3	E	70	0	65	0	0
3	F	70	0	65	0	0
3	G	70	0	65	0	0
3	H	70	0	65	0	0
3	I	70	0	65	0	0
3	J	70	0	65	0	0
3	K	70	0	65	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	L	70	0	65	0	0
3	M	70	0	65	0	0
3	N	70	0	65	0	0
3	O	70	0	65	0	0
3	P	70	0	65	0	0
All	All	162720	0	154336	292	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (292) 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:C:1441:SER:HB3	1:K:235:ALA:O	1.29	1.33
1:E:1441:SER:HB3	1:M:235:ALA:O	1.29	1.30
1:G:1441:SER:HB3	1:O:235:ALA:O	1.29	1.28
1:F:235:ALA:O	1:N:1441:SER:HB3	1.51	1.10
1:D:235:ALA:O	1:L:1441:SER:HB3	1.51	1.09
1:H:235:ALA:O	1:P:1441:SER:HB3	1.51	1.07
1:C:1418:PRO:HG3	1:K:235:ALA:HB2	1.51	0.93
1:E:1418:PRO:HG3	1:M:235:ALA:HB2	1.51	0.93
1:D:236:ARG:HG2	1:L:1442:SER:CB	2.01	0.91
1:G:1418:PRO:HG3	1:O:235:ALA:HB2	1.51	0.91
1:F:236:ARG:HG2	1:N:1442:SER:CB	2.01	0.90
1:H:236:ARG:HG2	1:P:1442:SER:CB	2.01	0.89
1:D:236:ARG:HG2	1:L:1442:SER:HB3	1.58	0.84
1:H:236:ARG:HG2	1:P:1442:SER:HB3	1.58	0.82
1:F:236:ARG:HG2	1:N:1442:SER:HB3	1.58	0.82
1:G:1442:SER:CB	1:O:236:ARG:HG2	2.10	0.82
1:E:1442:SER:CB	1:M:236:ARG:HG2	2.10	0.82
1:C:1442:SER:CB	1:K:236:ARG:HG2	2.10	0.81
1:D:235:ALA:HB2	1:L:1418:PRO:HG3	1.64	0.80
1:H:235:ALA:HB2	1:P:1418:PRO:HG3	1.64	0.80
1:F:235:ALA:HB2	1:N:1418:PRO:HG3	1.64	0.78
1:G:1418:PRO:CG	1:O:235:ALA:HB2	2.14	0.78
1:F:230:SER:O	1:N:1418:PRO:HB2	1.86	0.76
1:E:1418:PRO:CG	1:M:235:ALA:HB2	2.14	0.76
1:H:230:SER:O	1:P:1418:PRO:HB2	1.86	0.76
1:C:1418:PRO:CG	1:K:235:ALA:HB2	2.14	0.76
1:D:230:SER:O	1:L:1418:PRO:HB2	1.86	0.76
1:G:1418:PRO:HG3	1:O:235:ALA:CB	2.18	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:235:ALA:CB	1:N:1418:PRO:HG3	2.18	0.74
1:E:1418:PRO:HG3	1:M:235:ALA:CB	2.18	0.74
1:H:235:ALA:CB	1:P:1418:PRO:HG3	2.18	0.74
1:C:1418:PRO:HG3	1:K:235:ALA:CB	2.18	0.73
1:D:235:ALA:CB	1:L:1418:PRO:HG3	2.17	0.72
1:C:1442:SER:HB3	1:K:236:ARG:HG2	1.72	0.71
1:G:1442:SER:HB3	1:O:236:ARG:HG2	1.72	0.69
1:E:1442:SER:HB3	1:M:236:ARG:HG2	1.72	0.69
1:A:116:LYS:HE3	1:I:1051:MET:SD	2.35	0.67
1:K:1051:MET:SD	1:M:116:LYS:HE3	2.35	0.67
1:C:1051:MET:SD	1:E:116:LYS:HE3	2.35	0.67
1:G:1051:MET:SD	1:I:116:LYS:HE3	2.35	0.67
1:E:1051:MET:SD	1:G:116:LYS:HE3	2.35	0.67
1:M:1051:MET:SD	1:O:116:LYS:HE3	2.35	0.67
1:A:1051:MET:SD	1:K:116:LYS:HE3	2.35	0.66
1:H:230:SER:O	1:P:1418:PRO:CB	2.44	0.66
1:D:230:SER:O	1:L:1418:PRO:CB	2.44	0.66
1:F:230:SER:O	1:N:1418:PRO:CB	2.43	0.65
1:C:1418:PRO:CG	1:K:235:ALA:CB	2.76	0.63
1:E:1418:PRO:CG	1:M:235:ALA:CB	2.76	0.63
1:G:1418:PRO:CG	1:O:235:ALA:CB	2.76	0.62
1:E:1441:SER:CB	1:M:235:ALA:O	2.25	0.59
1:A:1013:GLN:HE21	1:J:352:HIS:CE1	2.22	0.57
1:D:236:ARG:CG	1:L:1442:SER:HB3	2.33	0.57
1:F:352:HIS:CE1	1:G:1013:GLN:HE21	2.22	0.57
1:H:352:HIS:CE1	1:I:1013:GLN:HE21	2.22	0.57
1:L:352:HIS:CE1	1:M:1013:GLN:HE21	2.22	0.57
1:B:352:HIS:CE1	1:K:1013:GLN:HE21	2.22	0.56
1:D:352:HIS:CE1	1:E:1013:GLN:HE21	2.22	0.56
1:F:236:ARG:CG	1:N:1442:SER:HB3	2.33	0.56
1:G:1441:SER:CB	1:O:235:ALA:O	2.25	0.56
1:N:352:HIS:CE1	1:O:1013:GLN:HE21	2.22	0.55
1:H:236:ARG:CG	1:P:1442:SER:HB3	2.33	0.55
1:H:235:ALA:CB	1:P:1418:PRO:CG	2.85	0.54
1:C:1441:SER:CB	1:K:235:ALA:O	2.25	0.54
1:D:235:ALA:CB	1:L:1418:PRO:CG	2.85	0.54
1:F:235:ALA:CB	1:N:1418:PRO:CG	2.85	0.54
1:F:235:ALA:HB2	1:N:1418:PRO:CG	2.36	0.53
1:H:235:ALA:HB2	1:P:1418:PRO:CG	2.36	0.52
1:N:1036:LYS:NZ	1:O:593:GLU:OE2	2.37	0.51
1:D:235:ALA:HB2	1:L:1418:PRO:CG	2.36	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1056:VAL:HG13	1:A:1088:THR:HB	1.93	0.50
1:K:1056:VAL:HG13	1:K:1088:THR:HB	1.93	0.50
1:C:1056:VAL:HG13	1:C:1088:THR:HB	1.93	0.50
1:M:1051:MET:SD	1:O:116:LYS:CE	3.00	0.50
1:G:1051:MET:SD	1:I:116:LYS:CE	3.00	0.50
1:D:239:PRO:HD3	1:L:1441:SER:OG	2.12	0.49
1:E:1056:VAL:HG13	1:E:1088:THR:HB	1.93	0.49
1:K:1051:MET:SD	1:M:116:LYS:CE	3.00	0.49
1:O:1056:VAL:HG13	1:O:1088:THR:HB	1.93	0.49
1:E:1051:MET:SD	1:G:116:LYS:CE	3.00	0.49
1:M:1056:VAL:HG13	1:M:1088:THR:HB	1.93	0.49
1:G:1056:VAL:HG13	1:G:1088:THR:HB	1.93	0.49
1:A:116:LYS:CE	1:I:1051:MET:SD	3.00	0.49
1:H:239:PRO:HD3	1:P:1441:SER:OG	2.12	0.49
1:H:1036:LYS:NZ	1:I:593:GLU:OE2	2.37	0.48
1:I:1056:VAL:HG13	1:I:1088:THR:HB	1.93	0.48
1:K:1321:TYR:CE2	1:K:1355:ALA:HB1	2.49	0.48
1:C:1321:TYR:CE2	1:C:1355:ALA:HB1	2.49	0.48
1:A:1051:MET:SD	1:K:116:LYS:CE	3.00	0.48
1:G:1321:TYR:CE2	1:G:1355:ALA:HB1	2.49	0.48
1:P:974:TRP:CE2	1:P:976:ARG:HA	2.49	0.48
1:D:974:TRP:CE2	1:D:976:ARG:HA	2.49	0.48
1:E:1321:TYR:CE2	1:E:1355:ALA:HB1	2.49	0.48
1:A:593:GLU:OE2	1:J:1036:LYS:NZ	2.37	0.48
1:B:974:TRP:CE2	1:B:976:ARG:HA	2.49	0.48
1:F:239:PRO:HD3	1:N:1441:SER:OG	2.12	0.48
1:N:974:TRP:CE2	1:N:976:ARG:HA	2.49	0.48
1:O:1321:TYR:CE2	1:O:1355:ALA:HB1	2.49	0.48
1:J:974:TRP:CE2	1:J:976:ARG:HA	2.49	0.48
1:L:974:TRP:CE2	1:L:976:ARG:HA	2.49	0.48
1:M:1321:TYR:CE2	1:M:1355:ALA:HB1	2.49	0.48
1:P:435:ASP:OD1	1:P:435:ASP:N	2.47	0.48
1:A:1321:TYR:CE2	1:A:1355:ALA:HB1	2.49	0.47
1:H:974:TRP:CE2	1:H:976:ARG:HA	2.49	0.47
1:N:435:ASP:OD1	1:N:435:ASP:N	2.47	0.47
1:F:974:TRP:CE2	1:F:976:ARG:HA	2.49	0.47
1:I:1321:TYR:CE2	1:I:1355:ALA:HB1	2.49	0.47
1:L:435:ASP:OD1	1:L:435:ASP:N	2.47	0.47
1:C:1051:MET:SD	1:E:116:LYS:CE	3.00	0.47
1:H:435:ASP:OD1	1:H:435:ASP:N	2.47	0.47
1:J:435:ASP:OD1	1:J:435:ASP:N	2.47	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:435:ASP:OD1	1:B:435:ASP:N	2.47	0.47
1:B:1001:GLY:O	1:K:530:ASN:ND2	2.48	0.46
1:L:1001:GLY:O	1:M:530:ASN:ND2	2.48	0.46
1:A:530:ASN:ND2	1:J:1001:GLY:O	2.48	0.46
1:D:435:ASP:N	1:D:435:ASP:OD1	2.47	0.46
1:B:305:VAL:N	1:B:326:VAL:O	2.49	0.46
1:B:1079:PRO:O	1:B:1083:VAL:HG23	2.16	0.46
1:D:1001:GLY:O	1:E:530:ASN:ND2	2.48	0.46
1:D:1079:PRO:O	1:D:1083:VAL:HG23	2.16	0.46
1:H:1001:GLY:O	1:I:530:ASN:ND2	2.48	0.46
1:J:1079:PRO:O	1:J:1083:VAL:HG23	2.16	0.46
1:F:435:ASP:N	1:F:435:ASP:OD1	2.47	0.46
1:L:305:VAL:N	1:L:326:VAL:O	2.49	0.46
1:N:305:VAL:N	1:N:326:VAL:O	2.49	0.46
1:C:1442:SER:HB3	1:K:236:ARG:CG	2.45	0.46
1:D:974:TRP:CD1	1:D:980:ILE:HG12	2.51	0.46
1:B:974:TRP:CD1	1:B:980:ILE:HG12	2.51	0.46
1:D:305:VAL:N	1:D:326:VAL:O	2.49	0.46
1:G:1444:ASP:OD2	1:O:236:ARG:NE	2.35	0.46
1:H:974:TRP:CD1	1:H:980:ILE:HG12	2.51	0.46
1:P:1079:PRO:O	1:P:1083:VAL:HG23	2.16	0.46
1:F:1079:PRO:O	1:F:1083:VAL:HG23	2.16	0.46
1:H:1079:PRO:O	1:H:1083:VAL:HG23	2.16	0.46
1:N:974:TRP:CD1	1:N:980:ILE:HG12	2.51	0.46
1:J:974:TRP:CD1	1:J:980:ILE:HG12	2.51	0.46
1:N:1001:GLY:O	1:O:530:ASN:ND2	2.48	0.46
1:P:974:TRP:CD1	1:P:980:ILE:HG12	2.51	0.46
1:J:305:VAL:N	1:J:326:VAL:O	2.49	0.46
1:F:1001:GLY:O	1:G:530:ASN:ND2	2.48	0.45
1:L:1079:PRO:O	1:L:1083:VAL:HG23	2.16	0.45
1:P:305:VAL:N	1:P:326:VAL:O	2.49	0.45
1:D:1081:LEU:O	1:D:1085:ILE:HG12	2.17	0.45
1:H:305:VAL:N	1:H:326:VAL:O	2.49	0.45
1:L:974:TRP:CD1	1:L:980:ILE:HG12	2.51	0.45
1:C:1444:ASP:OD2	1:K:236:ARG:NE	2.35	0.45
1:F:974:TRP:CD1	1:F:980:ILE:HG12	2.51	0.45
1:J:1361:LEU:HA	1:J:1364:THR:HG22	1.99	0.45
1:F:305:VAL:N	1:F:326:VAL:O	2.49	0.45
1:F:1081:LEU:O	1:F:1085:ILE:HG12	2.17	0.45
1:N:1079:PRO:O	1:N:1083:VAL:HG23	2.16	0.45
1:N:1361:LEU:HA	1:N:1364:THR:HG22	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:974:TRP:CZ2	1:H:976:ARG:HA	2.52	0.45
1:J:1081:LEU:O	1:J:1085:ILE:HG12	2.17	0.45
1:P:974:TRP:CZ2	1:P:976:ARG:HA	2.52	0.45
1:P:1081:LEU:O	1:P:1085:ILE:HG12	2.17	0.45
1:B:1081:LEU:O	1:B:1085:ILE:HG12	2.17	0.45
1:K:1081:LEU:O	1:K:1085:ILE:HG12	2.17	0.45
1:H:1081:LEU:O	1:H:1085:ILE:HG12	2.17	0.44
1:A:1081:LEU:O	1:A:1085:ILE:HG12	2.17	0.44
1:C:1081:LEU:O	1:C:1085:ILE:HG12	2.17	0.44
1:G:1442:SER:HB3	1:O:236:ARG:CG	2.45	0.44
1:L:1081:LEU:O	1:L:1085:ILE:HG12	2.17	0.44
1:E:1442:SER:HB3	1:M:236:ARG:CG	2.45	0.44
1:I:1081:LEU:O	1:I:1085:ILE:HG12	2.17	0.44
1:G:1081:LEU:O	1:G:1085:ILE:HG12	2.17	0.44
1:O:1081:LEU:O	1:O:1085:ILE:HG12	2.17	0.44
1:F:1361:LEU:HA	1:F:1364:THR:HG22	1.99	0.44
1:H:1361:LEU:HA	1:H:1364:THR:HG22	1.99	0.44
1:L:974:TRP:CZ2	1:L:976:ARG:HA	2.52	0.44
1:M:1081:LEU:O	1:M:1085:ILE:HG12	2.17	0.44
1:B:1361:LEU:HA	1:B:1364:THR:HG22	1.99	0.44
1:F:974:TRP:CZ2	1:F:976:ARG:HA	2.52	0.44
1:J:974:TRP:CZ2	1:J:976:ARG:HA	2.52	0.44
1:P:1361:LEU:HA	1:P:1364:THR:HG22	1.99	0.44
1:E:1081:LEU:O	1:E:1085:ILE:HG12	2.17	0.44
1:N:1081:LEU:O	1:N:1085:ILE:HG12	2.17	0.44
1:N:974:TRP:CZ2	1:N:976:ARG:HA	2.52	0.43
1:B:974:TRP:CZ2	1:B:976:ARG:HA	2.52	0.43
1:B:1036:LYS:NZ	1:K:593:GLU:OE2	2.37	0.43
1:L:1361:LEU:HA	1:L:1364:THR:HG22	1.99	0.43
1:D:974:TRP:CZ2	1:D:976:ARG:HA	2.52	0.43
1:M:874:HIS:CG	1:M:1083:VAL:HG22	2.54	0.43
1:A:874:HIS:CG	1:A:1083:VAL:HG22	2.54	0.43
1:G:874:HIS:CG	1:G:1083:VAL:HG22	2.54	0.43
1:E:874:HIS:CG	1:E:1083:VAL:HG22	2.54	0.43
1:O:874:HIS:CG	1:O:1083:VAL:HG22	2.54	0.43
1:D:1361:LEU:HA	1:D:1364:THR:HG22	1.99	0.43
1:K:874:HIS:CG	1:K:1083:VAL:HG22	2.54	0.43
1:C:874:HIS:CG	1:C:1083:VAL:HG22	2.54	0.43
1:M:449:PRO:HA	1:M:453:ASN:HA	2.01	0.43
1:G:449:PRO:HA	1:G:453:ASN:HA	2.01	0.43
1:H:1100:PHE:CE1	1:H:1104:ILE:HD11	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:1444:ASP:OD2	1:M:236:ARG:NE	2.35	0.42
1:E:449:PRO:HA	1:E:453:ASN:HA	2.01	0.42
1:P:1100:PHE:CE1	1:P:1104:ILE:HD11	2.54	0.42
1:K:449:PRO:HA	1:K:453:ASN:HA	2.01	0.42
1:L:1100:PHE:CE1	1:L:1104:ILE:HD11	2.54	0.42
1:N:1100:PHE:CE1	1:N:1104:ILE:HD11	2.54	0.42
1:A:87:TYR:CD2	1:H:574:PRO:HB2	2.55	0.42
1:D:1036:LYS:NZ	1:E:593:GLU:OE2	2.37	0.42
1:J:1100:PHE:CE1	1:J:1104:ILE:HD11	2.54	0.42
1:L:974:TRP:CD1	1:L:980:ILE:CG1	3.03	0.42
1:A:989:GLN:HA	1:A:999:PHE:CD2	2.55	0.42
1:B:1100:PHE:CE1	1:B:1104:ILE:HD11	2.54	0.42
1:C:338:ASP:OD1	1:C:356:ARG:NH1	2.53	0.42
1:H:974:TRP:CD1	1:H:980:ILE:CG1	3.03	0.42
1:I:338:ASP:OD1	1:I:356:ARG:NH1	2.53	0.42
1:O:449:PRO:HA	1:O:453:ASN:HA	2.01	0.42
1:B:855:LYS:HB2	1:B:855:LYS:HE2	1.89	0.42
1:B:1116:LYS:HE2	1:B:1116:LYS:HA	2.01	0.42
1:F:974:TRP:CD1	1:F:980:ILE:CG1	3.03	0.42
1:F:1036:LYS:NZ	1:G:593:GLU:OE2	2.37	0.42
1:G:989:GLN:HA	1:G:999:PHE:CD2	2.55	0.42
1:I:874:HIS:CG	1:I:1083:VAL:HG22	2.54	0.42
1:N:974:TRP:CD1	1:N:980:ILE:CG1	3.03	0.42
1:D:1100:PHE:CE1	1:D:1104:ILE:HD11	2.55	0.42
1:M:989:GLN:HA	1:M:999:PHE:CD2	2.55	0.42
1:B:974:TRP:CD1	1:B:980:ILE:CG1	3.03	0.42
1:C:989:GLN:HA	1:C:999:PHE:CD2	2.55	0.42
1:E:338:ASP:OD1	1:E:356:ARG:NH1	2.53	0.42
1:I:449:PRO:HA	1:I:453:ASN:HA	2.01	0.42
1:D:1116:LYS:HE2	1:D:1116:LYS:HA	2.01	0.41
1:F:574:PRO:HB2	1:I:87:TYR:CD2	2.55	0.41
1:G:338:ASP:OD1	1:G:356:ARG:NH1	2.53	0.41
1:J:574:PRO:HB2	1:K:87:TYR:CD2	2.55	0.41
1:J:1116:LYS:HA	1:J:1116:LYS:HE2	2.01	0.41
1:L:574:PRO:HB2	1:O:87:TYR:CD2	2.55	0.41
1:L:1036:LYS:NZ	1:M:593:GLU:OE2	2.37	0.41
1:O:989:GLN:HA	1:O:999:PHE:CD2	2.55	0.41
1:B:88:LEU:HD11	1:B:118:LEU:HG	2.02	0.41
1:C:449:PRO:HA	1:C:453:ASN:HA	2.01	0.41
1:D:974:TRP:CD1	1:D:980:ILE:CG1	3.03	0.41
1:F:1116:LYS:HE2	1:F:1116:LYS:HA	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:N:431:GLN:O	1:O:722:PHE:HA	2.21	0.41
1:A:989:GLN:HA	1:A:999:PHE:CG	2.56	0.41
1:B:574:PRO:HB2	1:M:87:TYR:CD2	2.55	0.41
1:C:989:GLN:HA	1:C:999:PHE:CG	2.56	0.41
1:F:1100:PHE:CE1	1:F:1104:ILE:HD11	2.54	0.41
1:F:431:GLN:O	1:G:722:PHE:HA	2.21	0.41
1:O:989:GLN:HA	1:O:999:PHE:CG	2.56	0.41
1:D:574:PRO:HB2	1:G:87:TYR:CD2	2.55	0.41
1:H:1116:LYS:HA	1:H:1116:LYS:HE2	2.01	0.41
1:I:989:GLN:HA	1:I:999:PHE:CD2	2.55	0.41
1:I:989:GLN:HA	1:I:999:PHE:CG	2.56	0.41
1:I:1421:ASN:OD1	1:I:1421:ASN:N	2.53	0.41
1:J:974:TRP:CD1	1:J:980:ILE:CG1	3.03	0.41
1:O:1421:ASN:OD1	1:O:1421:ASN:N	2.53	0.41
1:P:855:LYS:HB2	1:P:855:LYS:HE2	1.89	0.41
1:P:974:TRP:CD1	1:P:980:ILE:CG1	3.03	0.41
1:B:250:CYS:HA	1:B:253:THR:HG22	2.03	0.41
1:E:989:GLN:HA	1:E:999:PHE:CG	2.56	0.41
1:F:88:LEU:HD11	1:F:118:LEU:HG	2.02	0.41
1:L:88:LEU:HD11	1:L:118:LEU:HG	2.02	0.41
1:L:1116:LYS:HE2	1:L:1116:LYS:HA	2.01	0.41
1:N:855:LYS:HB2	1:N:855:LYS:HE2	1.89	0.41
1:P:1116:LYS:HE2	1:P:1116:LYS:HA	2.01	0.41
1:A:338:ASP:OD1	1:A:356:ARG:NH1	2.53	0.41
1:C:1421:ASN:OD1	1:C:1421:ASN:N	2.53	0.41
1:D:250:CYS:HA	1:D:253:THR:HG22	2.03	0.41
1:F:989:GLN:HA	1:F:999:PHE:CD2	2.56	0.41
1:K:989:GLN:HA	1:K:999:PHE:CD2	2.55	0.41
1:H:431:GLN:O	1:I:722:PHE:HA	2.21	0.41
1:A:449:PRO:HA	1:A:453:ASN:HA	2.01	0.41
1:B:431:GLN:O	1:K:722:PHE:HA	2.21	0.41
1:J:989:GLN:HA	1:J:999:PHE:CD2	2.56	0.41
1:E:989:GLN:HA	1:E:999:PHE:CD2	2.55	0.41
1:G:989:GLN:HA	1:G:999:PHE:CG	2.56	0.41
1:K:989:GLN:HA	1:K:999:PHE:CG	2.56	0.41
1:L:250:CYS:HA	1:L:253:THR:HG22	2.03	0.41
1:L:431:GLN:O	1:M:722:PHE:HA	2.21	0.41
1:N:989:GLN:HA	1:N:999:PHE:CD2	2.56	0.41
1:N:88:LEU:HD11	1:N:118:LEU:HG	2.02	0.40
1:A:722:PHE:HA	1:J:431:GLN:O	2.21	0.40
1:D:88:LEU:HD11	1:D:118:LEU:HG	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:989:GLN:HA	1:D:999:PHE:CD2	2.56	0.40
1:H:989:GLN:HA	1:H:999:PHE:CD2	2.56	0.40
1:J:250:CYS:HA	1:J:253:THR:HG22	2.03	0.40
1:M:989:GLN:HA	1:M:999:PHE:CG	2.56	0.40
1:N:1116:LYS:HE2	1:N:1116:LYS:HA	2.01	0.40
1:O:338:ASP:OD1	1:O:356:ARG:NH1	2.53	0.40
1:P:88:LEU:HD11	1:P:118:LEU:HG	2.02	0.40
1:D:431:GLN:O	1:E:722:PHE:HA	2.21	0.40
1:F:250:CYS:HA	1:F:253:THR:HG22	2.03	0.40
1:J:88:LEU:HD11	1:J:118:LEU:HG	2.02	0.40
1:P:541:LEU:HD23	1:P:541:LEU:HA	1.98	0.40
1:P:989:GLN:HA	1:P:999:PHE:CD2	2.56	0.40
1:B:989:GLN:HA	1:B:999:PHE:CD2	2.56	0.40
1:F:855:LYS:HE2	1:F:855:LYS:HB2	1.89	0.40
1:L:855:LYS:HE2	1:L:855:LYS:HB2	1.89	0.40
1:L:989:GLN:HA	1:L:999:PHE:CD2	2.56	0.40
1:P:250:CYS:HA	1:P:253:THR:HG22	2.03	0.40
1:P:1049:ASN:OD1	1:P:1049:ASN: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	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	B	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	C	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	D	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	E	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	F	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	H	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	I	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	J	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	K	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	L	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	M	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	N	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
1	O	1295/1469 (88%)	1240 (96%)	55 (4%)	0	100	100
1	P	1295/1469 (88%)	1248 (96%)	47 (4%)	0	100	100
All	All	20720/23504 (88%)	19904 (96%)	816 (4%)	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	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	B	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	C	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	D	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	E	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	F	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	G	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	H	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	I	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	J	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	K	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	L	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	M	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	N	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
1	O	1133/1270 (89%)	1129 (100%)	4 (0%)	91	96
1	P	1133/1270 (89%)	1126 (99%)	7 (1%)	86	94
All	All	18128/20320 (89%)	18040 (100%)	88 (0%)	89	94

All (88) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	864	ASP
1	A	882	LYS
1	A	999	PHE
1	A	1449	GLN
1	B	165	PHE
1	B	418	CYS
1	B	434	ASP
1	B	435	ASP
1	B	864	ASP
1	B	999	PHE
1	B	1379	ARG
1	C	864	ASP
1	C	882	LYS
1	C	999	PHE
1	C	1449	GLN
1	D	165	PHE
1	D	418	CYS
1	D	434	ASP
1	D	435	ASP
1	D	864	ASP
1	D	999	PHE
1	D	1379	ARG
1	E	864	ASP
1	E	882	LYS
1	E	999	PHE
1	E	1449	GLN
1	F	165	PHE
1	F	418	CYS
1	F	434	ASP
1	F	435	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	F	864	ASP
1	F	999	PHE
1	F	1379	ARG
1	G	864	ASP
1	G	882	LYS
1	G	999	PHE
1	G	1449	GLN
1	H	165	PHE
1	H	418	CYS
1	H	434	ASP
1	H	435	ASP
1	H	864	ASP
1	H	999	PHE
1	H	1379	ARG
1	I	864	ASP
1	I	882	LYS
1	I	999	PHE
1	I	1449	GLN
1	J	165	PHE
1	J	418	CYS
1	J	434	ASP
1	J	435	ASP
1	J	864	ASP
1	J	999	PHE
1	J	1379	ARG
1	K	864	ASP
1	K	882	LYS
1	K	999	PHE
1	K	1449	GLN
1	L	165	PHE
1	L	418	CYS
1	L	434	ASP
1	L	435	ASP
1	L	864	ASP
1	L	999	PHE
1	L	1379	ARG
1	M	864	ASP
1	M	882	LYS
1	M	999	PHE
1	M	1449	GLN
1	N	165	PHE
1	N	418	CYS

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Mol	Chain	Res	Type
1	N	434	ASP
1	N	435	ASP
1	N	864	ASP
1	N	999	PHE
1	N	1379	ARG
1	O	864	ASP
1	O	882	LYS
1	O	999	PHE
1	O	1449	GLN
1	P	165	PHE
1	P	418	CYS
1	P	434	ASP
1	P	435	ASP
1	P	864	ASP
1	P	999	PHE
1	P	1379	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (50) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	176	GLN
1	A	277	GLN
1	A	725	HIS
1	A	1013	GLN
1	B	277	GLN
1	B	452	HIS
1	B	989	GLN
1	C	176	GLN
1	C	277	GLN
1	D	277	GLN
1	D	989	GLN
1	E	176	GLN
1	E	277	GLN
1	E	725	HIS
1	E	1013	GLN
1	F	277	GLN
1	F	452	HIS
1	F	989	GLN
1	G	176	GLN
1	G	277	GLN
1	G	725	HIS
1	G	1013	GLN

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Mol	Chain	Res	Type
1	H	277	GLN
1	H	989	GLN
1	I	176	GLN
1	I	277	GLN
1	I	725	HIS
1	I	1013	GLN
1	J	277	GLN
1	J	989	GLN
1	K	176	GLN
1	K	277	GLN
1	K	725	HIS
1	K	1013	GLN
1	L	277	GLN
1	L	989	GLN
1	M	176	GLN
1	M	277	GLN
1	M	725	HIS
1	M	1013	GLN
1	N	277	GLN
1	N	452	HIS
1	N	989	GLN
1	O	176	GLN
1	O	277	GLN
1	O	725	HIS
1	O	1013	GLN
1	P	277	GLN
1	P	831	HIS
1	P	989	GLN

### 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](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 128 ligands modelled in this entry, 48 are monoatomic - leaving 80 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	M	2006	1	14,14,15	0.26	0	17,19,21	0.74	1 (5%)
3	NAG	N	2006	1	14,14,15	0.31	0	17,19,21	0.60	0
3	NAG	J	2005	1	14,14,15	0.21	0	17,19,21	0.56	0
3	NAG	E	2007	1	14,14,15	0.45	0	17,19,21	0.78	1 (5%)
3	NAG	I	2004	1	14,14,15	0.40	0	17,19,21	0.69	1 (5%)
3	NAG	F	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	J	2004	1	14,14,15	0.35	0	17,19,21	0.69	1 (5%)
3	NAG	M	2007	1	14,14,15	0.44	0	17,19,21	0.78	1 (5%)
3	NAG	C	2006	1	14,14,15	0.27	0	17,19,21	0.74	1 (5%)
3	NAG	L	2005	1	14,14,15	0.20	0	17,19,21	0.57	0
3	NAG	B	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	C	2007	1	14,14,15	0.44	0	17,19,21	0.78	1 (5%)
3	NAG	I	2003	1	14,14,15	0.39	0	17,19,21	1.00	1 (5%)
3	NAG	O	2007	1	14,14,15	0.44	0	17,19,21	0.77	1 (5%)
3	NAG	F	2004	1	14,14,15	0.36	0	17,19,21	0.69	1 (5%)
3	NAG	H	2006	1	14,14,15	0.29	0	17,19,21	0.60	0
3	NAG	O	2006	1	14,14,15	0.25	0	17,19,21	0.74	1 (5%)
3	NAG	N	2004	1	14,14,15	0.36	0	17,19,21	0.68	1 (5%)
3	NAG	J	2003	1	14,14,15	0.16	0	17,19,21	0.76	1 (5%)
3	NAG	B	2004	1	14,14,15	0.35	0	17,19,21	0.69	1 (5%)
3	NAG	E	2005	1	14,14,15	0.21	0	17,19,21	0.63	1 (5%)
3	NAG	F	2003	1	14,14,15	0.15	0	17,19,21	0.77	1 (5%)
3	NAG	P	2006	1	14,14,15	0.31	0	17,19,21	0.60	0
3	NAG	P	2003	1	14,14,15	0.16	0	17,19,21	0.76	1 (5%)
3	NAG	C	2004	1	14,14,15	0.41	0	17,19,21	0.70	1 (5%)
3	NAG	G	2003	1	14,14,15	0.40	0	17,19,21	1.00	1 (5%)
3	NAG	O	2005	1	14,14,15	0.22	0	17,19,21	0.62	1 (5%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	D	2006	1	14,14,15	0.31	0	17,19,21	0.60	0
3	NAG	P	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	O	2003	1	14,14,15	0.39	0	17,19,21	1.00	1 (5%)
3	NAG	L	2004	1	14,14,15	0.34	0	17,19,21	0.69	1 (5%)
3	NAG	E	2006	1	14,14,15	0.27	0	17,19,21	0.74	1 (5%)
3	NAG	P	2007	1	14,14,15	0.95	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	K	2004	1	14,14,15	0.41	0	17,19,21	0.70	1 (5%)
3	NAG	B	2003	1	14,14,15	0.16	0	17,19,21	0.77	1 (5%)
3	NAG	G	2004	1	14,14,15	0.41	0	17,19,21	0.69	1 (5%)
3	NAG	A	2005	1	14,14,15	0.21	0	17,19,21	0.62	1 (5%)
3	NAG	B	2006	1	14,14,15	0.30	0	17,19,21	0.60	0
3	NAG	D	2007	1	14,14,15	0.95	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	G	2006	1	14,14,15	0.27	0	17,19,21	0.74	1 (5%)
3	NAG	E	2004	1	14,14,15	0.39	0	17,19,21	0.69	1 (5%)
3	NAG	A	2007	1	14,14,15	0.44	0	17,19,21	0.78	1 (5%)
3	NAG	I	2005	1	14,14,15	0.21	0	17,19,21	0.62	1 (5%)
3	NAG	J	2006	1	14,14,15	0.32	0	17,19,21	0.59	0
3	NAG	K	2005	1	14,14,15	0.21	0	17,19,21	0.62	1 (5%)
3	NAG	C	2005	1	14,14,15	0.20	0	17,19,21	0.62	1 (5%)
3	NAG	D	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	A	2006	1	14,14,15	0.26	0	17,19,21	0.74	1 (5%)
3	NAG	G	2005	1	14,14,15	0.21	0	17,19,21	0.63	1 (5%)
3	NAG	H	2004	1	14,14,15	0.34	0	17,19,21	0.69	1 (5%)
3	NAG	M	2004	1	14,14,15	0.40	0	17,19,21	0.69	1 (5%)
3	NAG	N	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	E	2003	1	14,14,15	0.40	0	17,19,21	1.00	1 (5%)
3	NAG	O	2004	1	14,14,15	0.40	0	17,19,21	0.69	1 (5%)
3	NAG	F	2007	1	14,14,15	0.94	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	H	2007	1	14,14,15	0.94	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	A	2004	1	14,14,15	0.40	0	17,19,21	0.69	1 (5%)
3	NAG	L	2007	1	14,14,15	0.95	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	L	2003	1	14,14,15	0.16	0	17,19,21	0.76	1 (5%)
3	NAG	M	2003	1	14,14,15	0.39	0	17,19,21	1.00	1 (5%)
3	NAG	H	2003	1	14,14,15	0.15	0	17,19,21	0.76	1 (5%)
3	NAG	B	2007	1	14,14,15	0.95	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	I	2007	1	14,14,15	0.44	0	17,19,21	0.78	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	M	2005	1	14,14,15	0.20	0	17,19,21	0.63	1 (5%)
3	NAG	K	2003	1	14,14,15	0.38	0	17,19,21	0.99	1 (5%)
3	NAG	D	2004	1	14,14,15	0.35	0	17,19,21	0.69	1 (5%)
3	NAG	D	2003	1	14,14,15	0.15	0	17,19,21	0.76	1 (5%)
3	NAG	K	2007	1	14,14,15	0.44	0	17,19,21	0.78	1 (5%)
3	NAG	A	2003	1	14,14,15	0.39	0	17,19,21	1.00	1 (5%)
3	NAG	J	2007	1	14,14,15	0.96	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	H	2005	1	14,14,15	0.20	0	17,19,21	0.56	0
3	NAG	C	2003	1	14,14,15	0.39	0	17,19,21	1.00	1 (5%)
3	NAG	P	2004	1	14,14,15	0.35	0	17,19,21	0.69	1 (5%)
3	NAG	L	2006	1	14,14,15	0.31	0	17,19,21	0.59	0
3	NAG	N	2003	1	14,14,15	0.15	0	17,19,21	0.76	1 (5%)
3	NAG	G	2007	1	14,14,15	0.44	0	17,19,21	0.77	1 (5%)
3	NAG	N	2007	1	14,14,15	0.96	2 (14%)	17,19,21	1.25	1 (5%)
3	NAG	I	2006	1	14,14,15	0.25	0	17,19,21	0.74	1 (5%)
3	NAG	F	2006	1	14,14,15	0.30	0	17,19,21	0.60	0
3	NAG	K	2006	1	14,14,15	0.26	0	17,19,21	0.74	1 (5%)

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
3	NAG	M	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	N	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	J	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	E	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	I	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	F	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	J	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	M	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	C	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	L	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	B	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	C	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	I	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	O	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	F	2004	1	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	H	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	O	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	N	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	J	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	B	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	E	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	F	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	P	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	P	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	C	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	G	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	O	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	D	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	P	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	O	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	L	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	E	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	P	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	K	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	B	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	G	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	A	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	B	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	D	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	G	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	E	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	A	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	I	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	J	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	K	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	C	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	D	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	A	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	G	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	H	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	M	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	N	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	E	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	O	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	F	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	H	2007	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	L	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	L	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	M	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	H	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	B	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	I	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	M	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	K	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	D	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	D	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	K	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	A	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	J	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	H	2005	1	-	0/6/23/26	0/1/1/1
3	NAG	C	2003	1	-	0/6/23/26	0/1/1/1
3	NAG	P	2004	1	-	0/6/23/26	0/1/1/1
3	NAG	L	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	N	2003	1	-	1/6/23/26	0/1/1/1
3	NAG	G	2007	1	-	1/6/23/26	0/1/1/1
3	NAG	N	2007	1	-	2/6/23/26	0/1/1/1
3	NAG	I	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	F	2006	1	-	0/6/23/26	0/1/1/1
3	NAG	K	2006	1	-	0/6/23/26	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	N	2007	NAG	O5-C1	2.74	1.48	1.43
3	H	2007	NAG	O5-C1	2.74	1.48	1.43
3	P	2007	NAG	O5-C1	2.73	1.48	1.43
3	B	2007	NAG	O5-C1	2.73	1.48	1.43
3	D	2007	NAG	O5-C1	2.73	1.48	1.43
3	J	2007	NAG	O5-C1	2.73	1.48	1.43
3	F	2007	NAG	O5-C1	2.72	1.48	1.43
3	L	2007	NAG	O5-C1	2.72	1.48	1.43
3	N	2007	NAG	C1-C2	2.18	1.55	1.52
3	J	2007	NAG	C1-C2	2.16	1.55	1.52
3	P	2007	NAG	C1-C2	2.16	1.55	1.52
3	B	2007	NAG	C1-C2	2.13	1.55	1.52
3	D	2007	NAG	C1-C2	2.13	1.55	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	L	2007	NAG	C1-C2	2.13	1.55	1.52
3	F	2007	NAG	C1-C2	2.10	1.55	1.52
3	H	2007	NAG	C1-C2	2.08	1.55	1.52

All (64) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	2007	NAG	C1-O5-C5	4.98	118.94	112.19
3	H	2007	NAG	C1-O5-C5	4.98	118.94	112.19
3	B	2007	NAG	C1-O5-C5	4.97	118.93	112.19
3	L	2007	NAG	C1-O5-C5	4.97	118.93	112.19
3	F	2007	NAG	C1-O5-C5	4.97	118.93	112.19
3	P	2007	NAG	C1-O5-C5	4.97	118.92	112.19
3	J	2007	NAG	C1-O5-C5	4.96	118.92	112.19
3	N	2007	NAG	C1-O5-C5	4.96	118.91	112.19
3	E	2003	NAG	C1-O5-C5	3.90	117.47	112.19
3	O	2003	NAG	C1-O5-C5	3.89	117.46	112.19
3	C	2003	NAG	C1-O5-C5	3.89	117.46	112.19
3	I	2003	NAG	C1-O5-C5	3.88	117.45	112.19
3	M	2003	NAG	C1-O5-C5	3.88	117.45	112.19
3	A	2003	NAG	C1-O5-C5	3.88	117.45	112.19
3	K	2003	NAG	C1-O5-C5	3.87	117.44	112.19
3	G	2003	NAG	C1-O5-C5	3.87	117.43	112.19
3	E	2006	NAG	C1-O5-C5	2.75	115.91	112.19
3	K	2006	NAG	C1-O5-C5	2.74	115.91	112.19
3	G	2006	NAG	C1-O5-C5	2.73	115.89	112.19
3	A	2006	NAG	C1-O5-C5	2.73	115.89	112.19
3	C	2006	NAG	C1-O5-C5	2.73	115.89	112.19
3	F	2003	NAG	C1-O5-C5	2.73	115.89	112.19
3	M	2006	NAG	C1-O5-C5	2.73	115.89	112.19
3	P	2003	NAG	C1-O5-C5	2.73	115.89	112.19
3	I	2006	NAG	C1-O5-C5	2.73	115.89	112.19
3	O	2006	NAG	C1-O5-C5	2.72	115.88	112.19
3	B	2003	NAG	C1-O5-C5	2.72	115.88	112.19
3	D	2003	NAG	C1-O5-C5	2.72	115.88	112.19
3	L	2003	NAG	C1-O5-C5	2.72	115.88	112.19
3	H	2003	NAG	C1-O5-C5	2.71	115.86	112.19
3	J	2003	NAG	C1-O5-C5	2.71	115.86	112.19
3	N	2003	NAG	C1-O5-C5	2.71	115.86	112.19
3	K	2007	NAG	C1-O5-C5	2.63	115.76	112.19
3	C	2004	NAG	C1-O5-C5	2.62	115.74	112.19
3	K	2004	NAG	C1-O5-C5	2.61	115.73	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2007	NAG	C1-O5-C5	2.61	115.73	112.19
3	A	2007	NAG	C1-O5-C5	2.61	115.73	112.19
3	E	2004	NAG	C1-O5-C5	2.61	115.73	112.19
3	M	2007	NAG	C1-O5-C5	2.60	115.72	112.19
3	E	2007	NAG	C1-O5-C5	2.60	115.71	112.19
3	A	2004	NAG	C1-O5-C5	2.60	115.71	112.19
3	G	2004	NAG	C1-O5-C5	2.59	115.70	112.19
3	O	2007	NAG	C1-O5-C5	2.59	115.70	112.19
3	O	2004	NAG	C1-O5-C5	2.59	115.70	112.19
3	I	2007	NAG	C1-O5-C5	2.59	115.70	112.19
3	I	2004	NAG	C1-O5-C5	2.59	115.70	112.19
3	M	2004	NAG	C1-O5-C5	2.58	115.69	112.19
3	G	2007	NAG	C1-O5-C5	2.58	115.69	112.19
3	J	2004	NAG	C1-O5-C5	2.55	115.65	112.19
3	P	2004	NAG	C1-O5-C5	2.54	115.63	112.19
3	D	2004	NAG	C1-O5-C5	2.54	115.63	112.19
3	F	2004	NAG	C1-O5-C5	2.53	115.62	112.19
3	L	2004	NAG	C1-O5-C5	2.53	115.62	112.19
3	B	2004	NAG	C1-O5-C5	2.53	115.62	112.19
3	H	2004	NAG	C1-O5-C5	2.52	115.60	112.19
3	N	2004	NAG	C1-O5-C5	2.52	115.60	112.19
3	M	2005	NAG	C1-O5-C5	2.20	115.17	112.19
3	E	2005	NAG	C1-O5-C5	2.19	115.16	112.19
3	C	2005	NAG	C1-O5-C5	2.19	115.16	112.19
3	G	2005	NAG	C1-O5-C5	2.19	115.15	112.19
3	A	2005	NAG	C1-O5-C5	2.18	115.14	112.19
3	K	2005	NAG	C1-O5-C5	2.17	115.13	112.19
3	I	2005	NAG	C1-O5-C5	2.16	115.12	112.19
3	O	2005	NAG	C1-O5-C5	2.16	115.12	112.19

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	H	2003	NAG	O5-C5-C6-O6
3	D	2003	NAG	O5-C5-C6-O6
3	N	2003	NAG	O5-C5-C6-O6
3	B	2003	NAG	O5-C5-C6-O6
3	F	2003	NAG	O5-C5-C6-O6
3	J	2003	NAG	O5-C5-C6-O6
3	P	2003	NAG	O5-C5-C6-O6
3	L	2003	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
3	A	2007	NAG	C3-C2-N2-C7
3	C	2007	NAG	C3-C2-N2-C7
3	E	2007	NAG	C3-C2-N2-C7
3	G	2007	NAG	C3-C2-N2-C7
3	I	2007	NAG	C3-C2-N2-C7
3	K	2007	NAG	C3-C2-N2-C7
3	M	2007	NAG	C3-C2-N2-C7
3	O	2007	NAG	C3-C2-N2-C7
3	B	2007	NAG	C3-C2-N2-C7
3	D	2007	NAG	C3-C2-N2-C7
3	F	2007	NAG	C3-C2-N2-C7
3	H	2007	NAG	C3-C2-N2-C7
3	J	2007	NAG	C3-C2-N2-C7
3	L	2007	NAG	C3-C2-N2-C7
3	N	2007	NAG	C3-C2-N2-C7
3	P	2007	NAG	C3-C2-N2-C7
3	D	2007	NAG	O5-C5-C6-O6
3	J	2007	NAG	O5-C5-C6-O6
3	B	2007	NAG	O5-C5-C6-O6
3	F	2007	NAG	O5-C5-C6-O6
3	H	2007	NAG	O5-C5-C6-O6
3	N	2007	NAG	O5-C5-C6-O6
3	P	2007	NAG	O5-C5-C6-O6
3	L	2007	NAG	O5-C5-C6-O6

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.

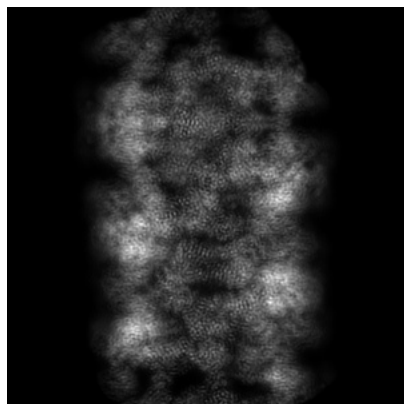
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-27156. These allow visual inspection of the internal detail of the map and identification of artifacts.

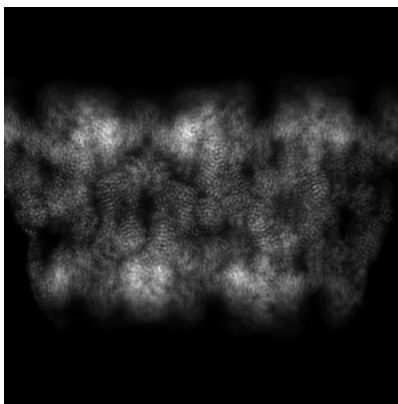
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

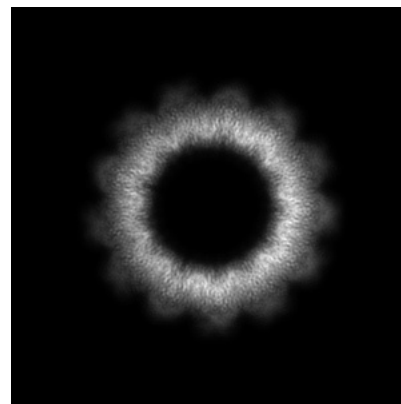
#### 6.1.1 Primary map



X

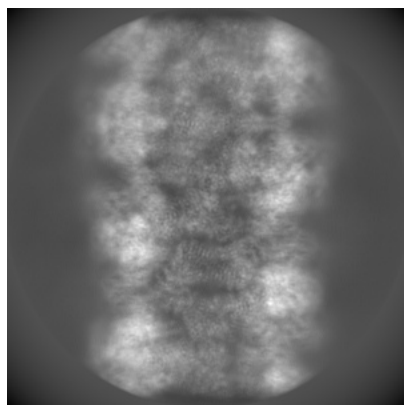


Y

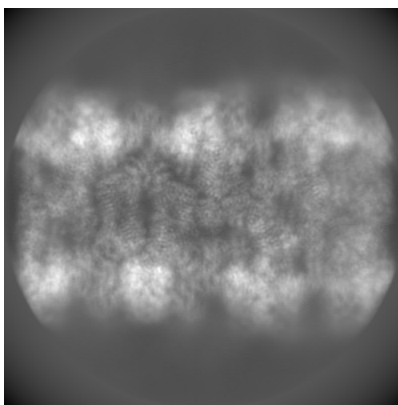


Z

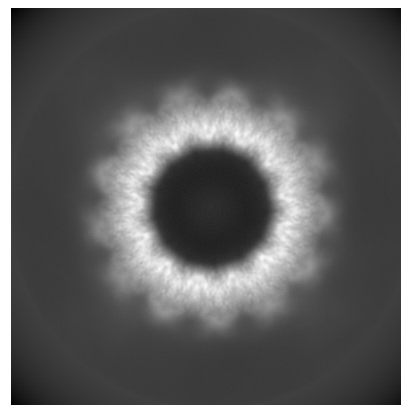
#### 6.1.2 Raw map



X



Y



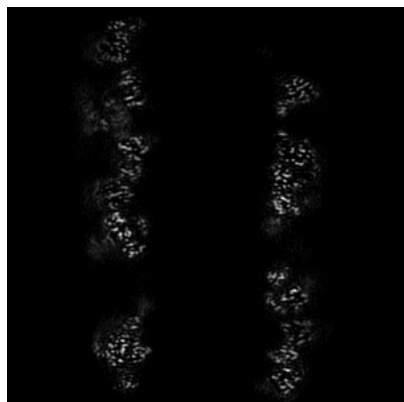
Z

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

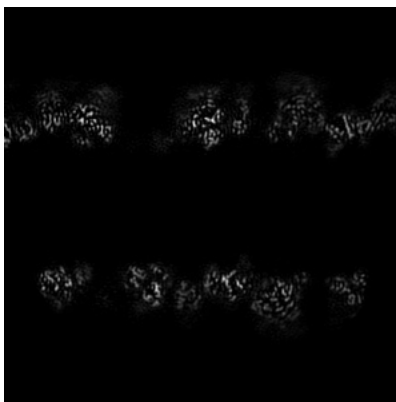


## 6.2 Central slices [i](#)

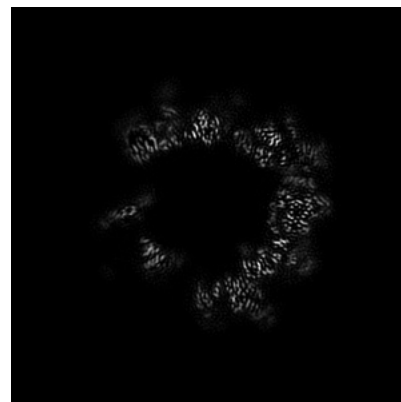
### 6.2.1 Primary map



X Index: 200

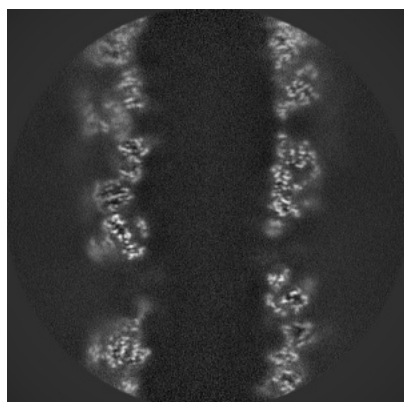


Y Index: 200

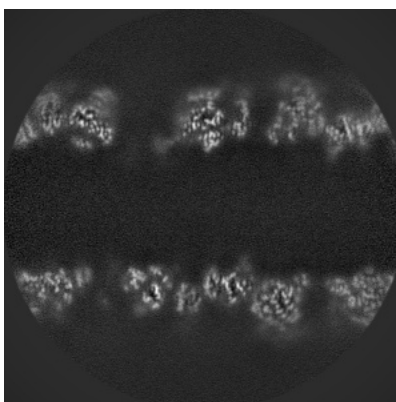


Z Index: 200

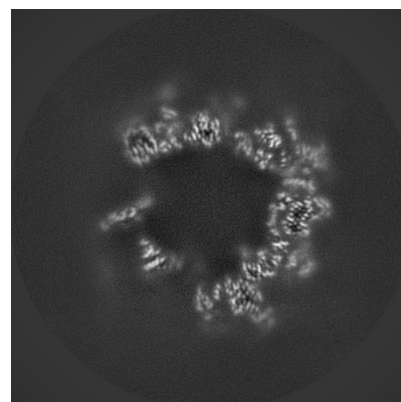
### 6.2.2 Raw map



X Index: 200



Y Index: 200

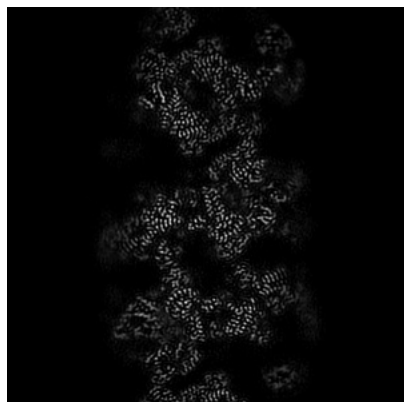


Z Index: 200

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

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

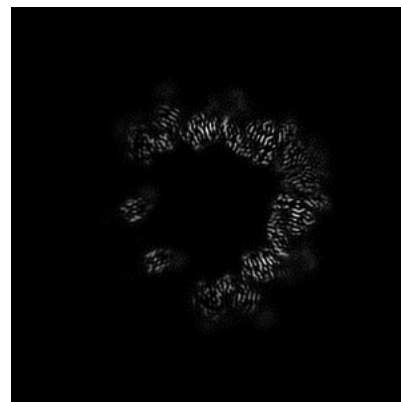
### 6.3.1 Primary map



X Index: 272

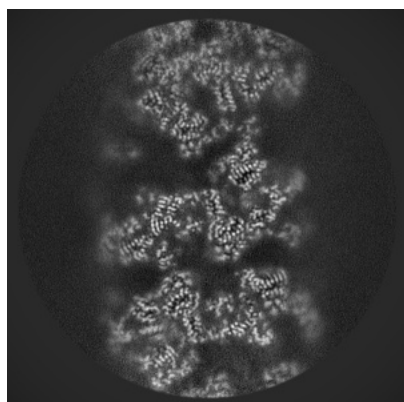


Y Index: 125

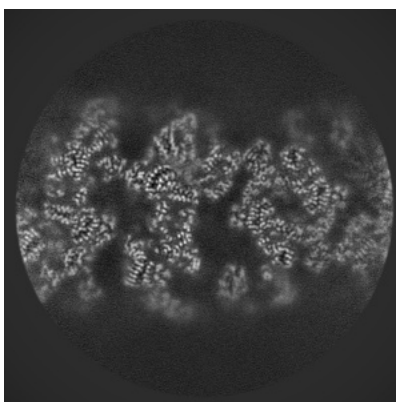


Z Index: 207

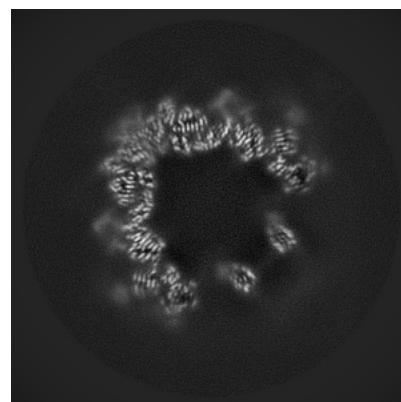
### 6.3.2 Raw map



X Index: 269



Y Index: 129

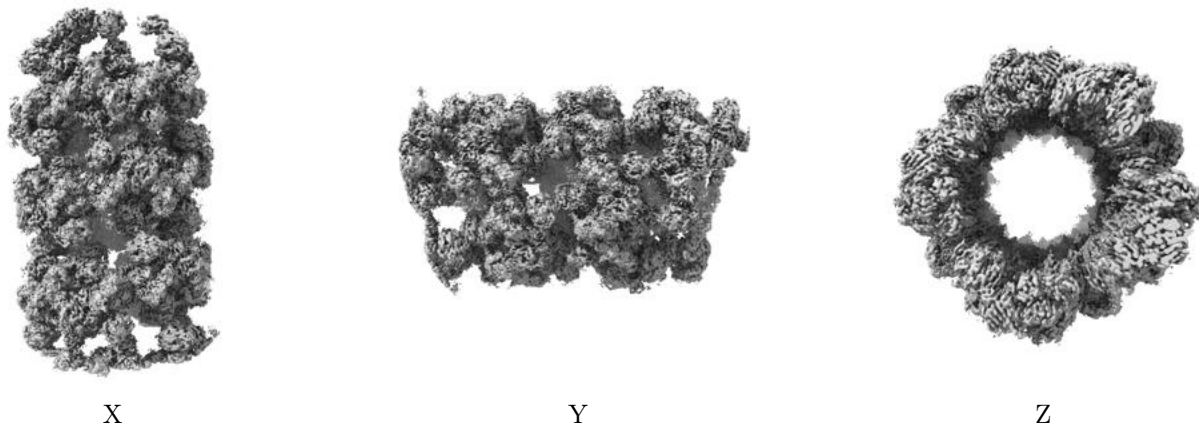


Z Index: 129

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

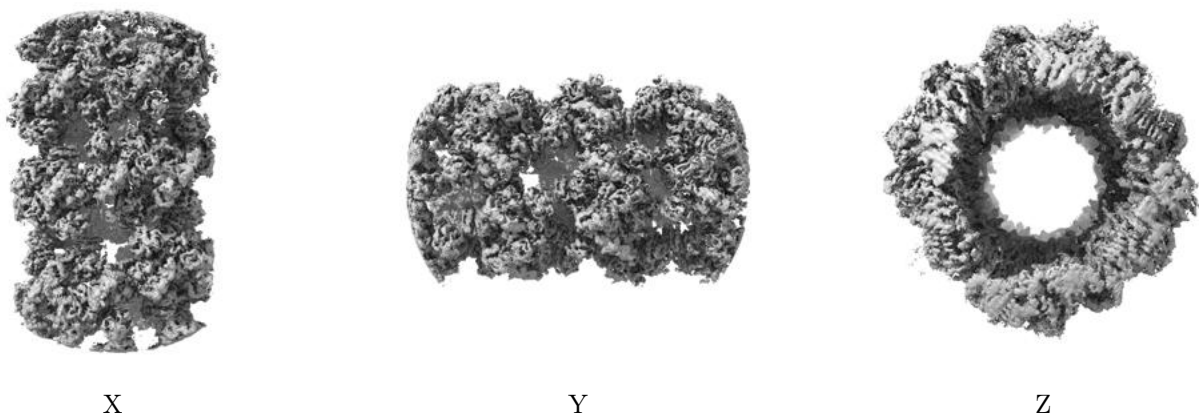
## 6.4 Orthogonal surface views [i](#)

### 6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 4.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 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.

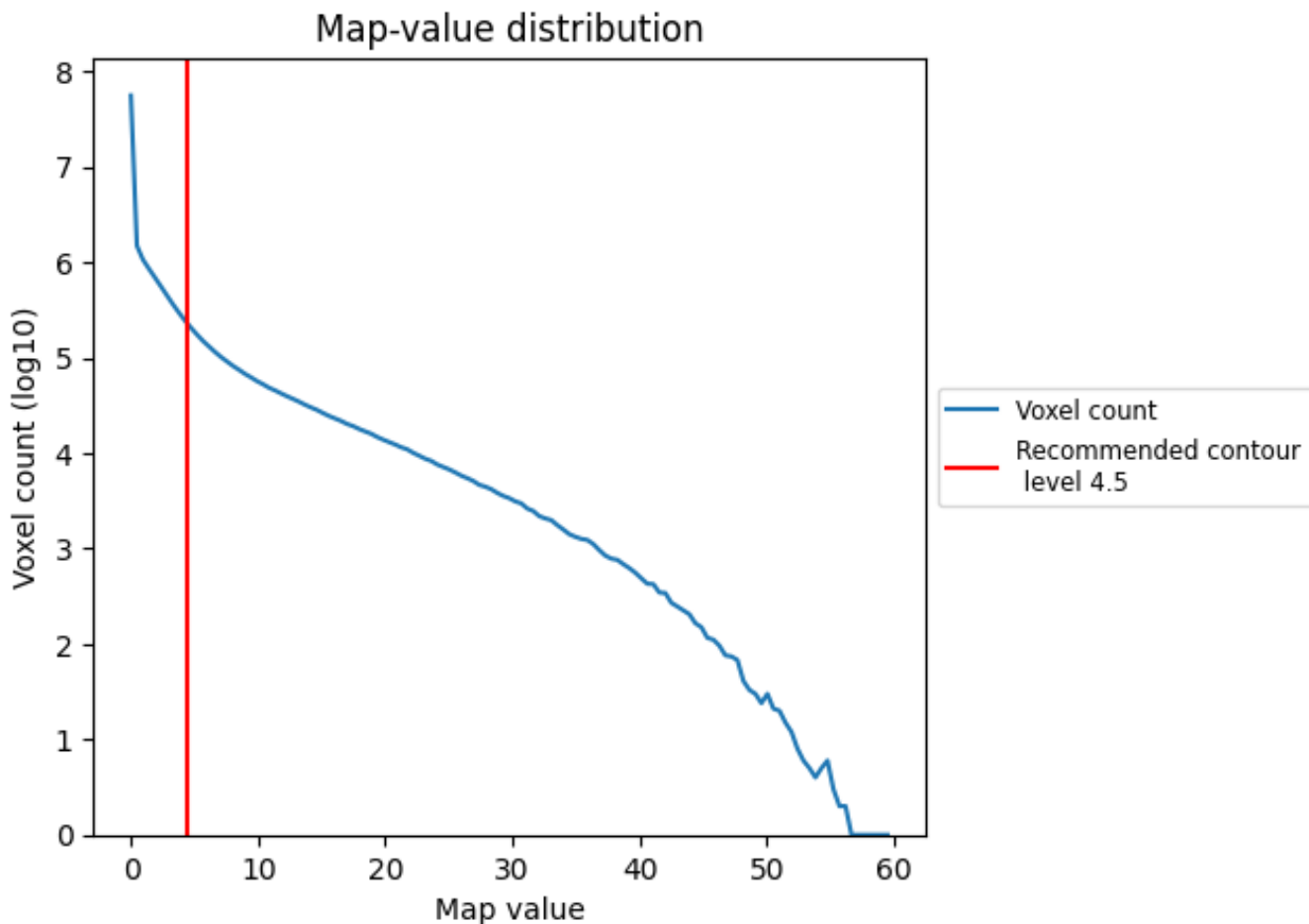
## 6.5 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

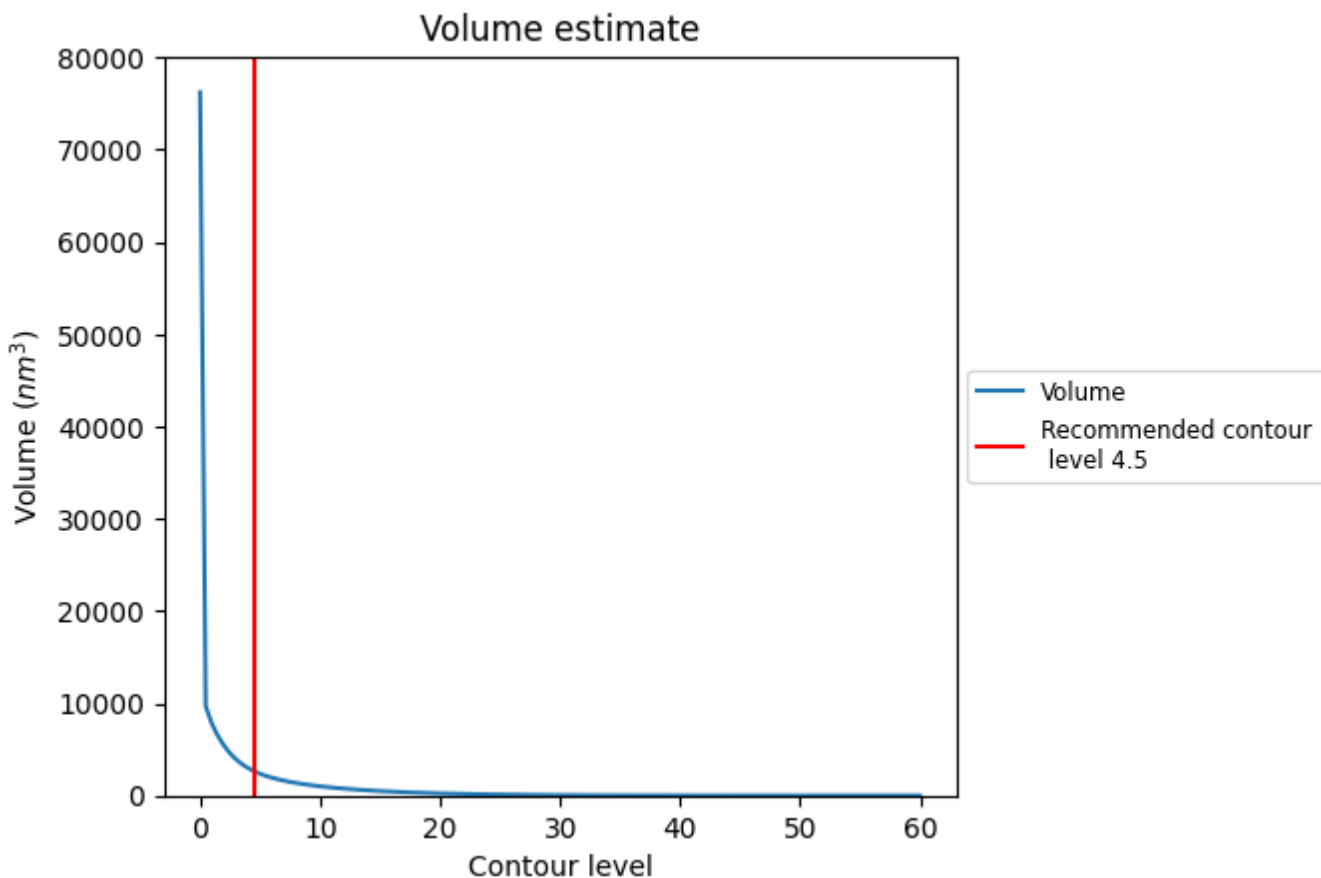
This section contains the results of statistical analysis of the map.

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



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

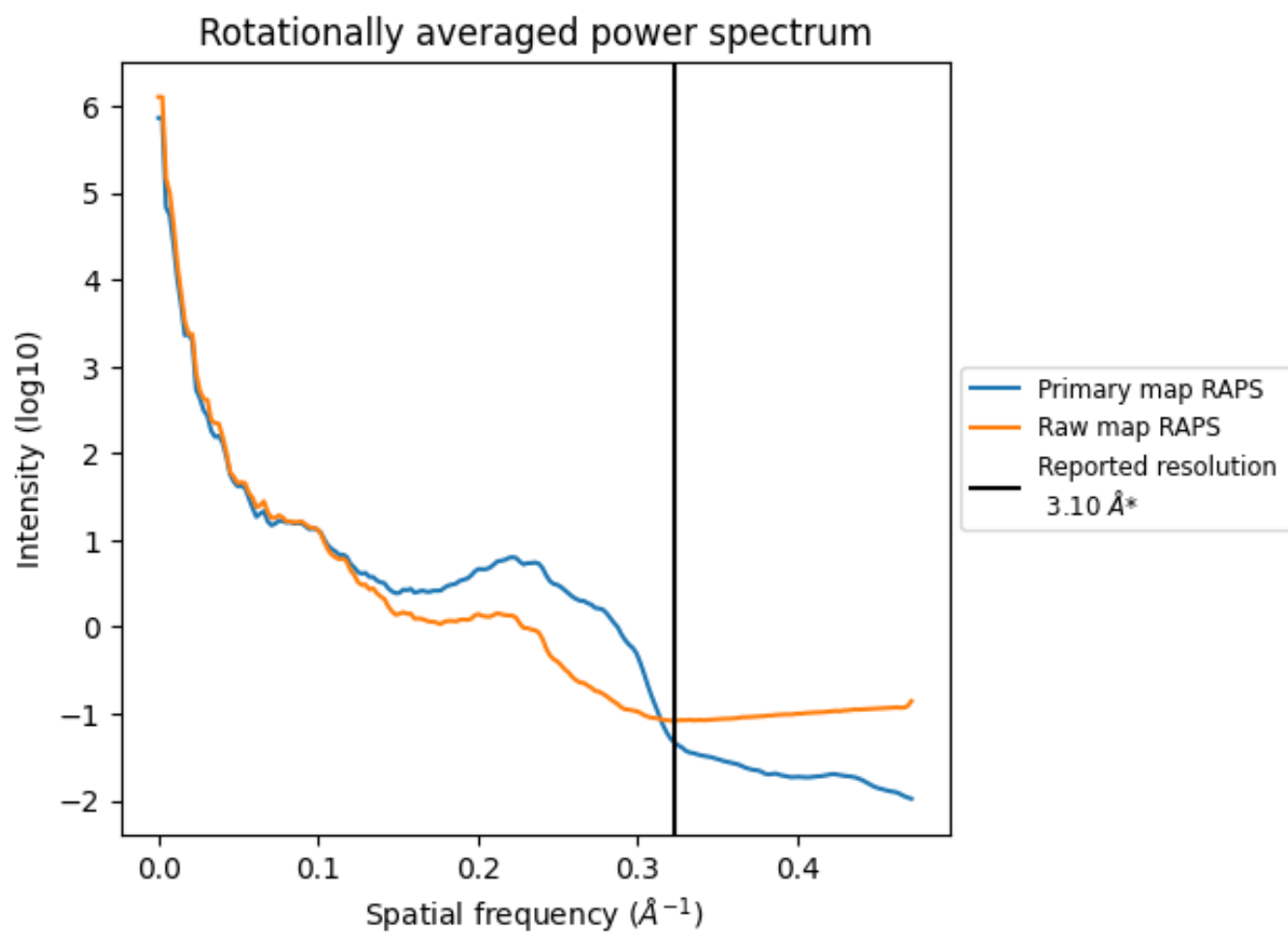
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 2643  $\text{nm}^3$ ; this corresponds to an approximate mass of 2388 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

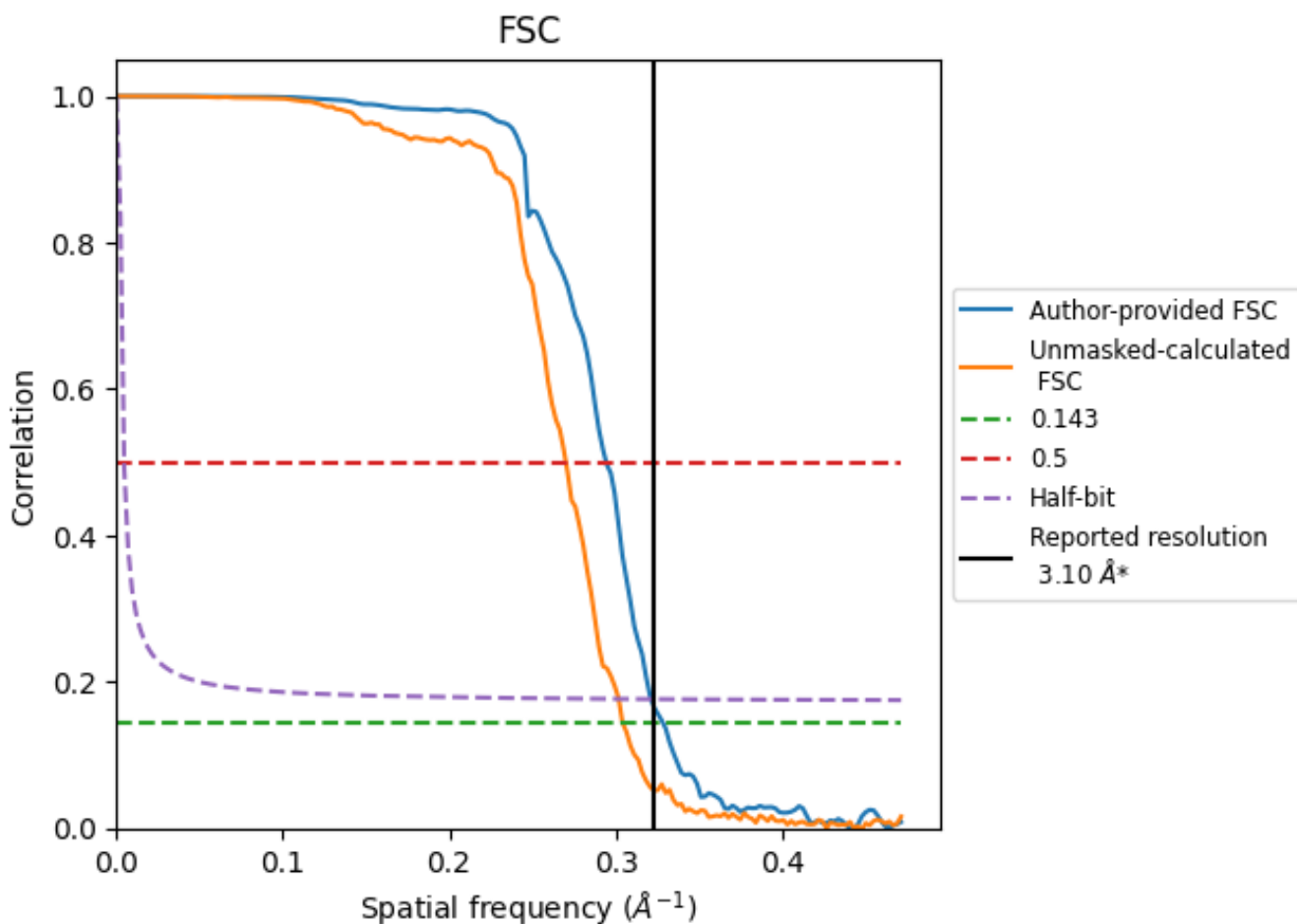


\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 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 0.323  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.04	3.40	3.11
Unmasked-calculated*	3.29	3.70	3.31

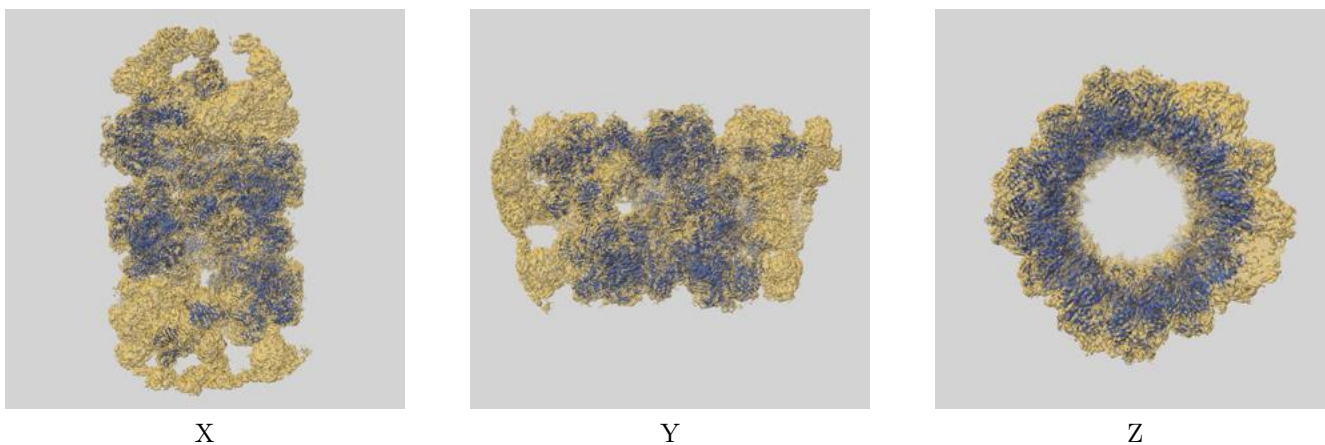
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.



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

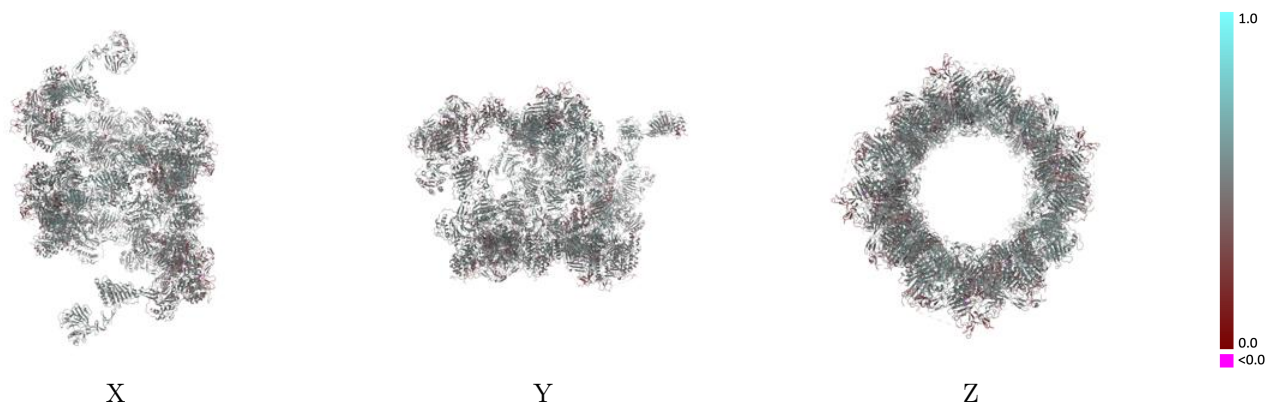
This section contains information regarding the fit between EMDB map EMD-27156 and PDB model 8D3C. Per-residue inclusion information can be found in section 3 on page 16.

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



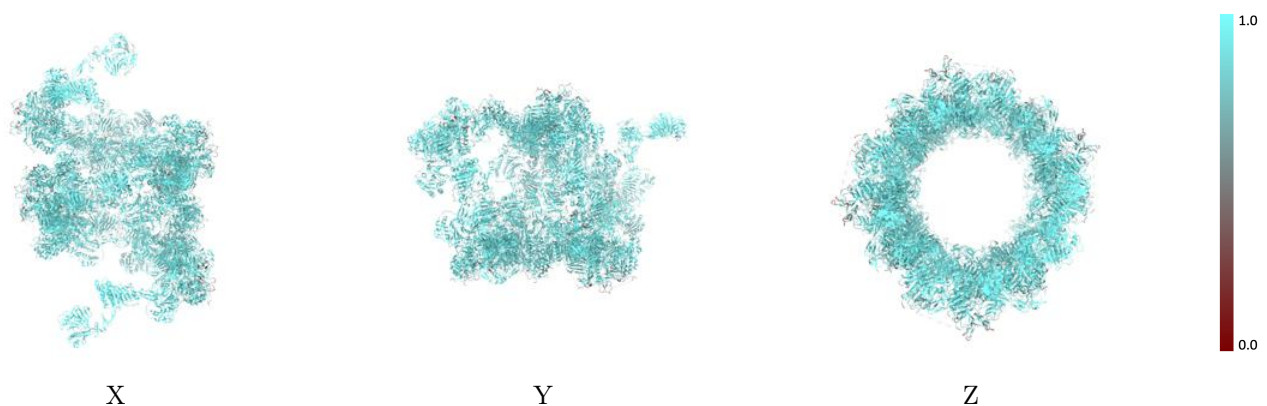
The images above show the 3D surface view of the map at the recommended contour level 4.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



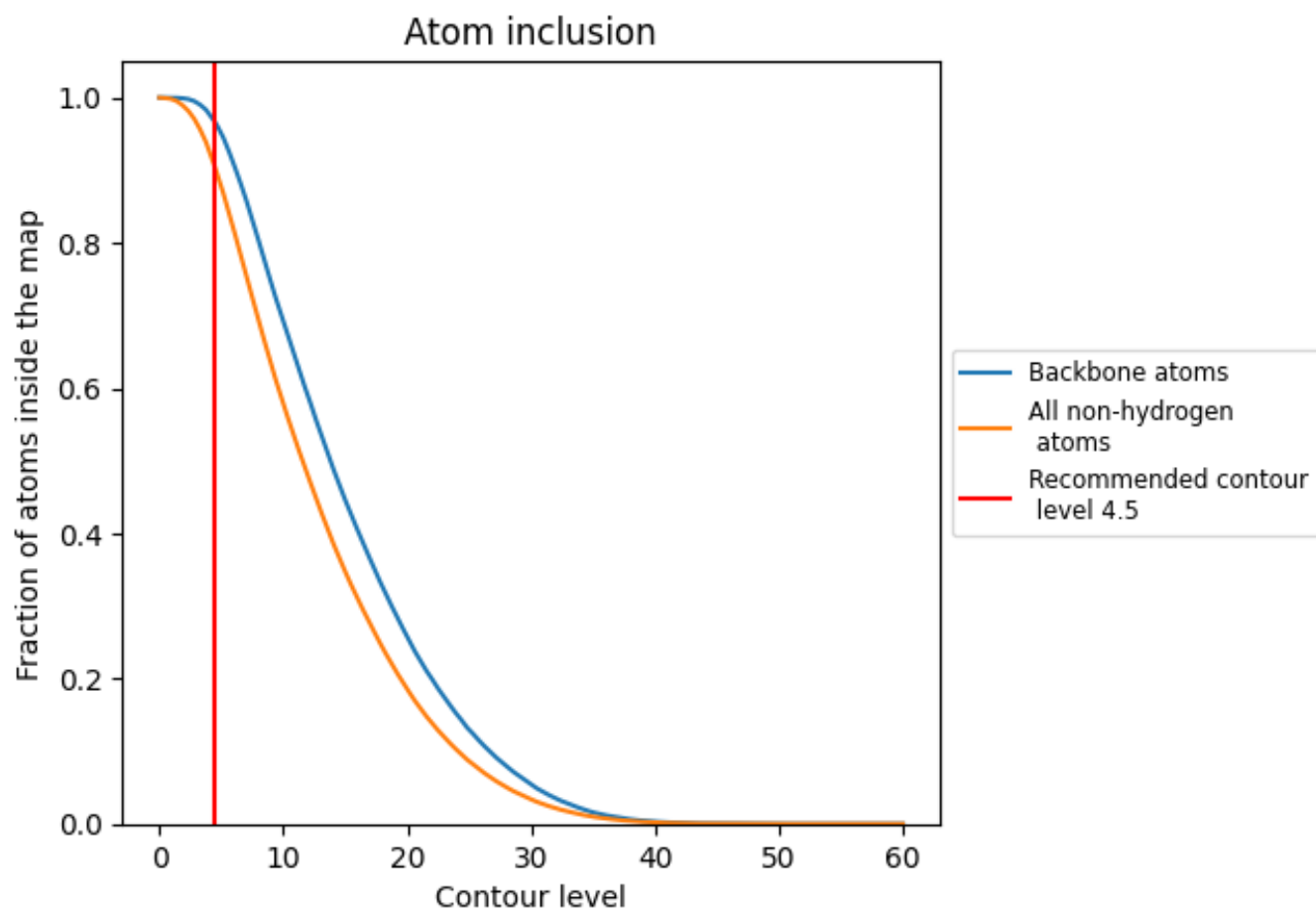
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.5).



































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 90% 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 (4.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9029	 0.4690
A	 0.9167	 0.4850
B	 0.9109	 0.4850
C	 0.8968	 0.4540
D	 0.8984	 0.4580
E	 0.8990	 0.4570
F	 0.9101	 0.4650
G	 0.9093	 0.4770
H	 0.9085	 0.4700
I	 0.9090	 0.4690
J	 0.9171	 0.4800
K	 0.8971	 0.4790
L	 0.9012	 0.4700
M	 0.8885	 0.4660
N	 0.8983	 0.4670
O	 0.8920	 0.4630
P	 0.8939	 0.4660

