



Full wwPDB EM Validation Report ⓘ

Dec 31, 2024 – 10:04 PM EST

PDB ID : 8Q5Y
EMDB ID : EMD-18180
Title : cryoEM structure of SARS-CoV2 Spike trimer in complex with Fab23
Authors : Hallberg, M.; Das, H.
Deposited on : 2023-08-10
Resolution : 2.60 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

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>.

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

EMDB validation analysis : 0.0.1.dev113
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

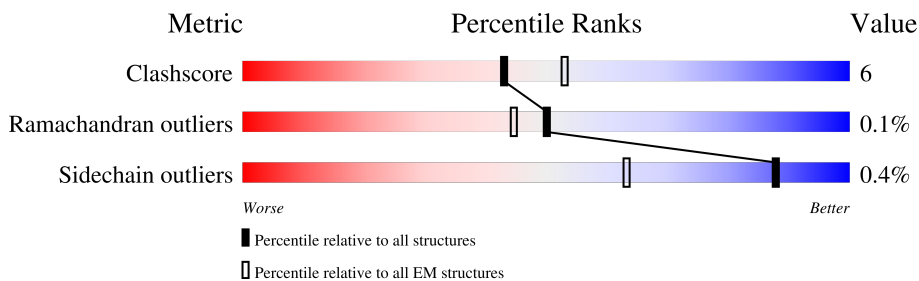
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.60 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	214	
1	H	214	
1	L	214	
2	B	447	
2	G	447	
2	R	447	
3	C	1288	
3	D	1288	

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Mol	Chain	Length	Quality of chain
3	E	1288	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment (72%), a green segment (67%), a yellow segment (10%), and a grey segment (22%). The segments are stacked from left to right in the order: red, green, yellow, grey. The percentages are labeled above or below the corresponding segments.</p>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 28689 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 Monoclonal antibody Mab 23 (Light chain).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	L	106	798	505	133	157	3	0	0
1	H	104	778	491	131	153	3	0	0
1	A	106	798	505	133	157	3	0	0

- Molecule 2 is a protein called Monoclonal antibody Mab 23 (Heavy Chain).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	R	115	896	567	151	174	4	0	0
2	G	115	896	567	151	174	4	0	0
2	B	116	902	570	152	176	4	0	0

- Molecule 3 is a protein called Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	D	1002	7825	4998	1300	1492	35	0	0
3	E	1001	7818	4993	1299	1491	35	0	0
3	C	1022	7978	5095	1327	1521	35	0	0

There are 267 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	682	GLY	ARG	conflict	UNP P0DTC2
D	683	SER	ARG	conflict	UNP P0DTC2
D	685	SER	ARG	conflict	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
D	817	PRO	PHE	conflict	UNP P0DTC2
D	899	PRO	ALA	conflict	UNP P0DTC2
D	942	PRO	ALA	conflict	UNP P0DTC2
D	944	PRO	ALA	conflict	UNP P0DTC2
D	986	PRO	LYS	conflict	UNP P0DTC2
D	987	PRO	VAL	conflict	UNP P0DTC2
D	1209	GLY	-	expression tag	UNP P0DTC2
D	1210	SER	-	expression tag	UNP P0DTC2
D	1211	GLY	-	expression tag	UNP P0DTC2
D	1212	TYR	-	expression tag	UNP P0DTC2
D	1213	ILE	-	expression tag	UNP P0DTC2
D	1214	PRO	-	expression tag	UNP P0DTC2
D	1215	GLU	-	expression tag	UNP P0DTC2
D	1216	ALA	-	expression tag	UNP P0DTC2
D	1217	PRO	-	expression tag	UNP P0DTC2
D	1218	ARG	-	expression tag	UNP P0DTC2
D	1219	ASP	-	expression tag	UNP P0DTC2
D	1220	GLY	-	expression tag	UNP P0DTC2
D	1221	GLN	-	expression tag	UNP P0DTC2
D	1222	ALA	-	expression tag	UNP P0DTC2
D	1223	TYR	-	expression tag	UNP P0DTC2
D	1224	VAL	-	expression tag	UNP P0DTC2
D	1225	ARG	-	expression tag	UNP P0DTC2
D	1226	LYS	-	expression tag	UNP P0DTC2
D	1227	ASP	-	expression tag	UNP P0DTC2
D	1228	GLY	-	expression tag	UNP P0DTC2
D	1229	GLU	-	expression tag	UNP P0DTC2
D	1230	TRP	-	expression tag	UNP P0DTC2
D	1231	VAL	-	expression tag	UNP P0DTC2
D	1232	LEU	-	expression tag	UNP P0DTC2
D	1233	LEU	-	expression tag	UNP P0DTC2
D	1234	SER	-	expression tag	UNP P0DTC2
D	1235	THR	-	expression tag	UNP P0DTC2
D	1236	PHE	-	expression tag	UNP P0DTC2
D	1237	LEU	-	expression tag	UNP P0DTC2
D	1238	GLY	-	expression tag	UNP P0DTC2
D	1239	ARG	-	expression tag	UNP P0DTC2
D	1240	SER	-	expression tag	UNP P0DTC2
D	1241	LEU	-	expression tag	UNP P0DTC2
D	1242	GLU	-	expression tag	UNP P0DTC2
D	1243	VAL	-	expression tag	UNP P0DTC2
D	1244	LEU	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1245	PHE	-	expression tag	UNP P0DTC2
D	1246	GLN	-	expression tag	UNP P0DTC2
D	1247	GLY	-	expression tag	UNP P0DTC2
D	1248	PRO	-	expression tag	UNP P0DTC2
D	1249	GLY	-	expression tag	UNP P0DTC2
D	1250	HIS	-	expression tag	UNP P0DTC2
D	1251	HIS	-	expression tag	UNP P0DTC2
D	1252	HIS	-	expression tag	UNP P0DTC2
D	1253	HIS	-	expression tag	UNP P0DTC2
D	1254	HIS	-	expression tag	UNP P0DTC2
D	1255	HIS	-	expression tag	UNP P0DTC2
D	1256	HIS	-	expression tag	UNP P0DTC2
D	1257	HIS	-	expression tag	UNP P0DTC2
D	1258	SER	-	expression tag	UNP P0DTC2
D	1259	ALA	-	expression tag	UNP P0DTC2
D	1260	TRP	-	expression tag	UNP P0DTC2
D	1261	SER	-	expression tag	UNP P0DTC2
D	1262	HIS	-	expression tag	UNP P0DTC2
D	1263	PRO	-	expression tag	UNP P0DTC2
D	1264	GLN	-	expression tag	UNP P0DTC2
D	1265	PHE	-	expression tag	UNP P0DTC2
D	1266	GLU	-	expression tag	UNP P0DTC2
D	1267	LYS	-	expression tag	UNP P0DTC2
D	1268	GLY	-	expression tag	UNP P0DTC2
D	1269	GLY	-	expression tag	UNP P0DTC2
D	1270	GLY	-	expression tag	UNP P0DTC2
D	1271	SER	-	expression tag	UNP P0DTC2
D	1272	GLY	-	expression tag	UNP P0DTC2
D	1273	GLY	-	expression tag	UNP P0DTC2
D	1274	GLY	-	expression tag	UNP P0DTC2
D	1275	GLY	-	expression tag	UNP P0DTC2
D	1276	SER	-	expression tag	UNP P0DTC2
D	1277	GLY	-	expression tag	UNP P0DTC2
D	1278	GLY	-	expression tag	UNP P0DTC2
D	1279	SER	-	expression tag	UNP P0DTC2
D	1280	ALA	-	expression tag	UNP P0DTC2
D	1281	TRP	-	expression tag	UNP P0DTC2
D	1282	SER	-	expression tag	UNP P0DTC2
D	1283	HIS	-	expression tag	UNP P0DTC2
D	1284	PRO	-	expression tag	UNP P0DTC2
D	1285	GLN	-	expression tag	UNP P0DTC2
D	1286	PHE	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1287	GLU	-	expression tag	UNP P0DTC2
D	1288	LYS	-	expression tag	UNP P0DTC2
E	682	GLY	ARG	conflict	UNP P0DTC2
E	683	SER	ARG	conflict	UNP P0DTC2
E	685	SER	ARG	conflict	UNP P0DTC2
E	817	PRO	PHE	conflict	UNP P0DTC2
E	899	PRO	ALA	conflict	UNP P0DTC2
E	942	PRO	ALA	conflict	UNP P0DTC2
E	944	PRO	ALA	conflict	UNP P0DTC2
E	986	PRO	LYS	conflict	UNP P0DTC2
E	987	PRO	VAL	conflict	UNP P0DTC2
E	1209	GLY	-	expression tag	UNP P0DTC2
E	1210	SER	-	expression tag	UNP P0DTC2
E	1211	GLY	-	expression tag	UNP P0DTC2
E	1212	TYR	-	expression tag	UNP P0DTC2
E	1213	ILE	-	expression tag	UNP P0DTC2
E	1214	PRO	-	expression tag	UNP P0DTC2
E	1215	GLU	-	expression tag	UNP P0DTC2
E	1216	ALA	-	expression tag	UNP P0DTC2
E	1217	PRO	-	expression tag	UNP P0DTC2
E	1218	ARG	-	expression tag	UNP P0DTC2
E	1219	ASP	-	expression tag	UNP P0DTC2
E	1220	GLY	-	expression tag	UNP P0DTC2
E	1221	GLN	-	expression tag	UNP P0DTC2
E	1222	ALA	-	expression tag	UNP P0DTC2
E	1223	TYR	-	expression tag	UNP P0DTC2
E	1224	VAL	-	expression tag	UNP P0DTC2
E	1225	ARG	-	expression tag	UNP P0DTC2
E	1226	LYS	-	expression tag	UNP P0DTC2
E	1227	ASP	-	expression tag	UNP P0DTC2
E	1228	GLY	-	expression tag	UNP P0DTC2
E	1229	GLU	-	expression tag	UNP P0DTC2
E	1230	TRP	-	expression tag	UNP P0DTC2
E	1231	VAL	-	expression tag	UNP P0DTC2
E	1232	LEU	-	expression tag	UNP P0DTC2
E	1233	LEU	-	expression tag	UNP P0DTC2
E	1234	SER	-	expression tag	UNP P0DTC2
E	1235	THR	-	expression tag	UNP P0DTC2
E	1236	PHE	-	expression tag	UNP P0DTC2
E	1237	LEU	-	expression tag	UNP P0DTC2
E	1238	GLY	-	expression tag	UNP P0DTC2
E	1239	ARG	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
E	1240	SER	-	expression tag	UNP P0DTC2
E	1241	LEU	-	expression tag	UNP P0DTC2
E	1242	GLU	-	expression tag	UNP P0DTC2
E	1243	VAL	-	expression tag	UNP P0DTC2
E	1244	LEU	-	expression tag	UNP P0DTC2
E	1245	PHE	-	expression tag	UNP P0DTC2
E	1246	GLN	-	expression tag	UNP P0DTC2
E	1247	GLY	-	expression tag	UNP P0DTC2
E	1248	PRO	-	expression tag	UNP P0DTC2
E	1249	GLY	-	expression tag	UNP P0DTC2
E	1250	HIS	-	expression tag	UNP P0DTC2
E	1251	HIS	-	expression tag	UNP P0DTC2
E	1252	HIS	-	expression tag	UNP P0DTC2
E	1253	HIS	-	expression tag	UNP P0DTC2
E	1254	HIS	-	expression tag	UNP P0DTC2
E	1255	HIS	-	expression tag	UNP P0DTC2
E	1256	HIS	-	expression tag	UNP P0DTC2
E	1257	HIS	-	expression tag	UNP P0DTC2
E	1258	SER	-	expression tag	UNP P0DTC2
E	1259	ALA	-	expression tag	UNP P0DTC2
E	1260	TRP	-	expression tag	UNP P0DTC2
E	1261	SER	-	expression tag	UNP P0DTC2
E	1262	HIS	-	expression tag	UNP P0DTC2
E	1263	PRO	-	expression tag	UNP P0DTC2
E	1264	GLN	-	expression tag	UNP P0DTC2
E	1265	PHE	-	expression tag	UNP P0DTC2
E	1266	GLU	-	expression tag	UNP P0DTC2
E	1267	LYS	-	expression tag	UNP P0DTC2
E	1268	GLY	-	expression tag	UNP P0DTC2
E	1269	GLY	-	expression tag	UNP P0DTC2
E	1270	GLY	-	expression tag	UNP P0DTC2
E	1271	SER	-	expression tag	UNP P0DTC2
E	1272	GLY	-	expression tag	UNP P0DTC2
E	1273	GLY	-	expression tag	UNP P0DTC2
E	1274	GLY	-	expression tag	UNP P0DTC2
E	1275	GLY	-	expression tag	UNP P0DTC2
E	1276	SER	-	expression tag	UNP P0DTC2
E	1277	GLY	-	expression tag	UNP P0DTC2
E	1278	GLY	-	expression tag	UNP P0DTC2
E	1279	SER	-	expression tag	UNP P0DTC2
E	1280	ALA	-	expression tag	UNP P0DTC2
E	1281	TRP	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
E	1282	SER	-	expression tag	UNP P0DTC2
E	1283	HIS	-	expression tag	UNP P0DTC2
E	1284	PRO	-	expression tag	UNP P0DTC2
E	1285	GLN	-	expression tag	UNP P0DTC2
E	1286	PHE	-	expression tag	UNP P0DTC2
E	1287	GLU	-	expression tag	UNP P0DTC2
E	1288	LYS	-	expression tag	UNP P0DTC2
C	682	GLY	ARG	conflict	UNP P0DTC2
C	683	SER	ARG	conflict	UNP P0DTC2
C	685	SER	ARG	conflict	UNP P0DTC2
C	817	PRO	PHE	conflict	UNP P0DTC2
C	899	PRO	ALA	conflict	UNP P0DTC2
C	942	PRO	ALA	conflict	UNP P0DTC2
C	944	PRO	ALA	conflict	UNP P0DTC2
C	986	PRO	LYS	conflict	UNP P0DTC2
C	987	PRO	VAL	conflict	UNP P0DTC2
C	1209	GLY	-	expression tag	UNP P0DTC2
C	1210	SER	-	expression tag	UNP P0DTC2
C	1211	GLY	-	expression tag	UNP P0DTC2
C	1212	TYR	-	expression tag	UNP P0DTC2
C	1213	ILE	-	expression tag	UNP P0DTC2
C	1214	PRO	-	expression tag	UNP P0DTC2
C	1215	GLU	-	expression tag	UNP P0DTC2
C	1216	ALA	-	expression tag	UNP P0DTC2
C	1217	PRO	-	expression tag	UNP P0DTC2
C	1218	ARG	-	expression tag	UNP P0DTC2
C	1219	ASP	-	expression tag	UNP P0DTC2
C	1220	GLY	-	expression tag	UNP P0DTC2
C	1221	GLN	-	expression tag	UNP P0DTC2
C	1222	ALA	-	expression tag	UNP P0DTC2
C	1223	TYR	-	expression tag	UNP P0DTC2
C	1224	VAL	-	expression tag	UNP P0DTC2
C	1225	ARG	-	expression tag	UNP P0DTC2
C	1226	LYS	-	expression tag	UNP P0DTC2
C	1227	ASP	-	expression tag	UNP P0DTC2
C	1228	GLY	-	expression tag	UNP P0DTC2
C	1229	GLU	-	expression tag	UNP P0DTC2
C	1230	TRP	-	expression tag	UNP P0DTC2
C	1231	VAL	-	expression tag	UNP P0DTC2
C	1232	LEU	-	expression tag	UNP P0DTC2
C	1233	LEU	-	expression tag	UNP P0DTC2
C	1234	SER	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1235	THR	-	expression tag	UNP P0DTC2
C	1236	PHE	-	expression tag	UNP P0DTC2
C	1237	LEU	-	expression tag	UNP P0DTC2
C	1238	GLY	-	expression tag	UNP P0DTC2
C	1239	ARG	-	expression tag	UNP P0DTC2
C	1240	SER	-	expression tag	UNP P0DTC2
C	1241	LEU	-	expression tag	UNP P0DTC2
C	1242	GLU	-	expression tag	UNP P0DTC2
C	1243	VAL	-	expression tag	UNP P0DTC2
C	1244	LEU	-	expression tag	UNP P0DTC2
C	1245	PHE	-	expression tag	UNP P0DTC2
C	1246	GLN	-	expression tag	UNP P0DTC2
C	1247	GLY	-	expression tag	UNP P0DTC2
C	1248	PRO	-	expression tag	UNP P0DTC2
C	1249	GLY	-	expression tag	UNP P0DTC2
C	1250	HIS	-	expression tag	UNP P0DTC2
C	1251	HIS	-	expression tag	UNP P0DTC2
C	1252	HIS	-	expression tag	UNP P0DTC2
C	1253	HIS	-	expression tag	UNP P0DTC2
C	1254	HIS	-	expression tag	UNP P0DTC2
C	1255	HIS	-	expression tag	UNP P0DTC2
C	1256	HIS	-	expression tag	UNP P0DTC2
C	1257	HIS	-	expression tag	UNP P0DTC2
C	1258	SER	-	expression tag	UNP P0DTC2
C	1259	ALA	-	expression tag	UNP P0DTC2
C	1260	TRP	-	expression tag	UNP P0DTC2
C	1261	SER	-	expression tag	UNP P0DTC2
C	1262	HIS	-	expression tag	UNP P0DTC2
C	1263	PRO	-	expression tag	UNP P0DTC2
C	1264	GLN	-	expression tag	UNP P0DTC2
C	1265	PHE	-	expression tag	UNP P0DTC2
C	1266	GLU	-	expression tag	UNP P0DTC2
C	1267	LYS	-	expression tag	UNP P0DTC2
C	1268	GLY	-	expression tag	UNP P0DTC2
C	1269	GLY	-	expression tag	UNP P0DTC2
C	1270	GLY	-	expression tag	UNP P0DTC2
C	1271	SER	-	expression tag	UNP P0DTC2
C	1272	GLY	-	expression tag	UNP P0DTC2
C	1273	GLY	-	expression tag	UNP P0DTC2
C	1274	GLY	-	expression tag	UNP P0DTC2
C	1275	GLY	-	expression tag	UNP P0DTC2
C	1276	SER	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1277	GLY	-	expression tag	UNP P0DTC2
C	1278	GLY	-	expression tag	UNP P0DTC2
C	1279	SER	-	expression tag	UNP P0DTC2
C	1280	ALA	-	expression tag	UNP P0DTC2
C	1281	TRP	-	expression tag	UNP P0DTC2
C	1282	SER	-	expression tag	UNP P0DTC2
C	1283	HIS	-	expression tag	UNP P0DTC2
C	1284	PRO	-	expression tag	UNP P0DTC2
C	1285	GLN	-	expression tag	UNP P0DTC2
C	1286	PHE	-	expression tag	UNP P0DTC2
C	1287	GLU	-	expression tag	UNP P0DTC2
C	1288	LYS	-	expression tag	UNP P0DTC2

N121	N122	A123	T124	N125	V126	V127	I128	K129	V130	C131	E132	F133	O134	F135	C136	N137	D138	P139	F140	L141	G142	V143	TYR	TRR	HIS	LYS	ASN	ASN	LYS	SER	TRP	MET	GLU	SER	PHE	ARG	VAL	TYR	SER	SER	ALA	ASN	M165	C166	T167	F168	E169	Y170	V171	S172	GLN	PRO	PHE	ARG	LEU	MET	ASP	LEU	LEU	GLU
L241	L242	A243	L244	H245	F186	K187	N188	L189	R190	E191	F192	V193	F194	K195	N196	I197	D198	N199	Y200	F201	K202	I203	Y204	S205	K206	H207	T208	P209	L210	SER	R211	L212	F213	R214	L215	L216	K217	Q218	G219	F220	G221	A222	L223	E224	P225	L226	V227	D228	L229	P230	L231	G232	I233	N234	I235	T236	R237	F238	Q239	T240
C301	T302	L303	K304	S305	F306	V307	V308	E309	K310	G311	I312	Y313	Q314	T315	S316	N317	F318	R319	V320	Q321	P322	T323	E324	G325	V326	I326	V327	R328	F329	P330	N331	I332	T333	N334	L335	C336	F337	F338	G339	E340	V341	F342	N343	A344	T345	V346	R347	A348	S349	L350	V351	A352	N353	G354	R355	K356	R357	S358	S359	N360
C361	V362	A363	D364	Y365	S366	V367	L368	Y369	N370	S371	A372	S373	F374	S375	T376	F377	K378	C379	Y380	G381	V382	S383	P384	T385	K386	L387	N388	D389	L390	C391	F392	T393	N394	V395	Y396	A397	D398	S399	F400	V401	I402	R403	G404	D405	E406	Y407	R408	Q409	I410	I411	P412	G413	Q414	T415	G416	K417	I418	A419	D420	
Y421	M422	Y423	K424	L425	P426	D427	D428	F429	T430	G431	C432	V433	I434	A435	N436	M437	S438	M439	N440	L441	D442	S443	K444	Y445	G446	G447	N448	Y449	N450	Y451	L452	Y453	R454	L455	F456	R457	L458	K458	S459	N460	L461	K462	P463	F464	A465	E466	D467	I468	S469	T470	E471	I472	Y473	Q474	A475	G476	S477	T478	P479	C480
M481	G482	V483	E484	G485	F486	M487	C488	Y489	F490	P491	L492	Q493	S494	Y495	G496	F497	Q498	P499	T500	M501	G502	V503	G504	Y505	Q506	P507	Y508	R509	V510	D511	V512	L513	S514	F515	E516	L517	L518	H519	A520	P521	A522	T523	V524	G525	C526	P527	K528	K529	S530	T531	N532	L533	V534	K535	N536	V537	C538	V539	N540	
F541	N542	F543	N544	G545	L546	T547	G548	T549	G550	V551	L552	T553	S554	E555	S556	N557	K558	F559	L560	P561	F562	Q563	Q564	F565	G566	R567	D568	I569	A570	D571	T572	T573	D574	A575	V576	R577	D578	P579	Q580	T581	L582	E583	L584	L585	D586	L587	T588	P589	C590	S591	F592	G593	G594	V595	S596	V597	L598	T599	P600	
G601	T602	N603	T604	S605	N606	V607	V608	A609	V610	L611	V612	N613	D614	V615	N616	C617	T618	E619	V620	VAL	ALA	ILE	HIS	ALA	ASP	GLN	LEU	PRO	THR	TRP	ARG	VAL	TYR	THR	GLY	SER	N641	V642	F643	Q644	R645	A647	G648	C649	L650	L651	G652	A653	E654	H655	V656	N657	M658	S659	V660					
E661	C662	D663	T664	P665	L666	G667	A668	G669	L670	S671	A672	S673	K674	T675	A676	T676	GLN	THR	ASN	PRO	GLY	SER	VAL	ALA	S689	O690	S691	L692	L693	A694	V695	T696	M697	L699	G700	A701	E702	N703	S704	V705	A706	Y707	S708	N709	N710	S711	I712	A713	I714	P715	T716	M658	S659	F718	T719	I720				
S721	W722	T723	A724	E725	L726	L727	F728	W729	S730	M731	T732	K733	T734	S735	V736	D737	C738	T739	M740	Y741	I742	C743	G744	D745	S746	T747	E748	C749	S750	N751	L752	L753	L754	Q755	Y756	G757	S758	F759	C760	T761	Q762	L763	N764	R765	A766	L767	T768	G769	I770	A771	V772	E773	Q774	D775	K776	N777	T778	Q779	E780	
W781	F782	A783	Q784	W785	K786	Q787	L788	Y789	K790	T791	F792	F793	L794	K795	D796	F797	G798	G799	F800	N801	F802	S803	Q804	L805	L806	P807	D808	P809	S810	R811	P812	S813	K814	R815	S816	P817	I818	E819	D820	L821	L822	F823	N824	R825	H826	T827	LEU	ALA	ASP	ALA	GLY	PHE	ILE	LYS	GLN	TYR	ASP	CYS		
L905	F906	I909	G910	V911	T912	N914	V915	L916	Y917	E918	N919	Q920	K921	L922	I923	A924	N925	Q926	F927	N928	S929	A930	I931	G932	K933	I934	Q935	D936	L938	S939	S940	T941	P942	S943	P944	L945	G946	K947	L948	Q949	D950	V951	V952	N953	I954	P955	A956	Q957	A958	L959	N960	T961	L962	V963	K964	Q965				

L966	S967	S968	R969	F970	G971	A972	I973	S974	S975	S976	L977	R978	D979	I980	L981	S982	R983	L984	D985	P986	E988	A989	E990	V991	Q992	I993	D994	R995	L996	I997	T998	G999	R1000	L1001	Q1002	S1003	L1004	Q1005	T1006	L1007	Y1007	V1008	T1009	Q1010	L1012	L1013	R1014	E1017	I1018	L1034	K1038	D1041	F1042										
K1045	G1046	L1049	S1055	A1056	H1058	L1063	H1064	V1065	T1066	Y1067	Y1068	P1069	A1070	Q1071	E1072	K1073	N1074	F1075	T1076	T1077	A1078	P1079	A1080	I1081	C1082	H1083	D1084	G1085	K1086	A1087	H1088	F1089	P1090	R1091	E1092	G1093	V1094	F1095	V1096	S1097	N1098	G1099	T1100	H1101	W1102	F1103	V1104	T1105	Q1106	R1107	F1109	Y1110	E1111	P1112									
Q1113	I1114	I1115	T1116	T1117	D1118	M1119	T1120	F1121	V1122	S1123	G1124	M1125	C1126	D1127	V1128	I1129	I1130	G1131	I1132	M1133	L1134	M1135	T1136	V1137	Y1138	D1139	P1140	L1141	Q1142	P1143	E1144	L1145	D1146	S1147	PHE	LYS	GLU	GLN	LEU	ASP	TRP	VAL	TYR	PHE	LYS	ASN	HIS	THR	PRO	THR	ASP	VAL	ASP	GLY	ILE	ILE	GLY	GLY	ILE	SER	GLY	ILE	
ASN	ALA	SER	VAL	ASN	ILE	GLN	LEU	ASP	ARG	LEU	ASN	VAL	ALA	LYS	ASN	ASN	GLN	SER	LEU	ILE	ASP	LEU	GLN	LEU	GLY	TYR	GLU	GLN	GLY	SER	GLY	TYR	ALA	PRO	ARG	ASP	LYS	ASP	ALA	GLN	TRP	VAL	ASN	GLY	ASN	GLY	GLU	THR	VAL	ASP	VAL	ASP	GLY	LYS	GLY	GLY	ILE	SER	GLY	ILE			
LEU	SER	THR	PHE	LEU	GLY	ARG	SER	LEU	VAL	PHE	GLN	GLY	PRO	ASN	HIS	HIS	HIS	HIS	HIS	SER	ALA	TRP	SER	HIS	PRO	GLN	GLY	GLY	SER	SER	GLY	ILE	GLY	GLY	ALA	PRO	GLY	ARG	ASP	ALA	GLY	ALA	TRP	SER	HIS	PRO	PHE	GLY	GLY	GLY	ILE	GLY	GLY	ILE	GLY	GLY	ILE	GLY	GLY	ILE	GLY	GLY	ILE

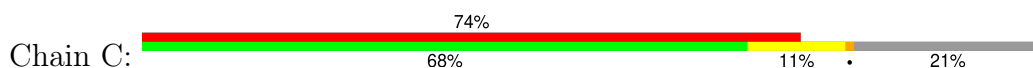
• Molecule 3: Spike glycoprotein



MET	PHE	VAL	PHE	VAL	VAL	LEU	LEU	LEU	PRO	LEU	VAL	SER	GLN	CYS	VAL	LEU	THR	THR	THR	THR	PRO	A27	Y28	T29	N30	S31	F32	T33	R34	G35	V36	Y37	Y38	P39	G40	K41	W42	F43	R44	S45	S46	V47	L48	H49	S50	T51	Q52	D53	L54	F55	L56	P57	F58	F59	S60								
M61	V62	T63	W64	F65	H66	A67	I68	H69	VAL	E191	GLY	THR	ASN	THR	LYS	ARG	PHE	D80	N81	W82	L84	P85	F86	N87	D88	G89	V90	Y91	F92	A93	S94	T95	E96	K97	S98	N99	I100	R101	R102	G103	W104	I105	F106	E169	Y170	V171	T108	T109	L110	D111	S112	K113	T114	Q115	S116	L117	I119	V120					
N121	N122	A123	T124	N125	V126	V127	I128	K129	V130	C131	E132	F133	Q134	F135	I136	C136	N137	D138	P139	F140	L141	G142	V143	TYR	HIS	LYS	ASN	ASN	LYS	TRP	MET	GLU	SER	GLU	PHE	VAL	TYR	SER	SER	ALA	ASN	M165	C166	T167	F168	E169	Y170	V171	S172	GLN	PRO	PHE	LEU	MET	ASP	LEU	GLU						
GLY	LYS	GLN	GLY	ASN	F186	K187	N188	L189	R190	E191	F192	V193	F194	K195	N196	I197	D198	G199	Y200	F201	K202	I203	Y204	S205	K206	H207	T208	P209	I210	N211	L212	V213	R214	L216	P217	Q218	G219	F220	S221	A222	L223	E224	P225	L226	V227	D228	L229	P230	I231	G232	I233	N234	I235	T236	R237	F238	Q239	T240					
L241	L242	A243	L244	H245	SER	TYR	LEU	THR	PRO	ASP	SER	SER	SER	TRP	THR	ALA	GLY	ALA	A263	A264	Y265	Y266	V267	C268	Y269	L270	Q271	P272	R273	T274	F275	L276	L277	K278	Y279	N280	E281	N282	G283	T284	I285	D286	A288	V289	D290	C291	A292	L293	D294	P295	L296	E297	E298	T299	K300								
C301	T302	L303	K304	S305	F306	T307	V308	E309	K310	G311	I312	S313	Q314	T315	S316	N317	F318	R319	V320	Q321	P322	S323	E324	S325	P326	I326	V327	R328	F329	P330	N331	I332	S333	N334	L335	C336	P337	F338	G339	E340	V341	I342	N343	G344	T345	S346	R346	F347	A348	Q349	S349	V350	Y351	A352	W353	N354	R355	T356	K356	R357	I358	S359	N360
C361	V362	A363	D364	Y365	S366	V367	L368	Y369	N370	S371	A372	S373	F374	S375	T376	F377	K378	C379	Y380	G381	V382	S383	P384	T385	K386	L387	N388	D389	L390	C391	F392	T393	N394	V395	Y396	A397	D398	S399	F400	V401	I402	R403	G404	D405	E406	V407	R408	Q409	I410	A411	P412	G413	Q414	T415	G416	K417	I418	A419	D420				
Y421	N422	Y423	K424	L425	P426	D427	D428	F429	T430	G431	C432	V433	I434	A435	W436	N437	S438	N439	N440	L441	D442	S443	K444	V445	G446	G447	N448	Y449	N450	Y451	L452	Y453	R454	L455	F456	R457	K458	S459	N460	L461	K462	P463	F464	E465	R466	D467	I468	S469	T470	E471	I472	Y473	G474	A475	G476	S477	T478	F479	C480				

N481	G482	V483	E484	G485	F486	N487	C488	F489	F490	P491	L492	Q493	S494	Y495	G496	F497	Q498	P499	T500	N501	G502	V503	G504	Y505	Y506	P507	Y508	R509	V510	V511	V512	L513	S514	F515	E516	L517	L518	H519	A520	P521	A522	T523	V524	C525	G526	PRO	K528	K529	S530	T531	L533	V534	K535	N536	C538	V539	N540						
F541	N542	F543	N544	G545	L546	T547	G548	T549	G550	V551	L552	T553	E554	S555	N556	K557	K558	F559	L560	P561	F562	Q563	Q564	F565	G566	R567	D568	I569	A570	D571	T572	T573	D574	A575	V576	R577	D578	P579	Q580	T581	L582	E583	I584	L585	L586	I587	T588	P589	C590	S591	F592	G593	V594	V595	S596	V597	I598	T599	P600				
G601	T602	N603	T604	S605	N606	Q607	V608	A609	G610	L611	Y612	T613	E614	S615	M616	C617	T618	E619	V620	PRO	VAL	ALA	ILE	HIS	ASP	GLN	LEU	THR	PRO	THR	TRP	ARG	VAL	TYR	THR	GLY	SER	N641	V642	F643	Q644	T645	R646	A647	G648	C649	L650	L651	G652	A653	E654	H655	F656	G599	N658	S659	Y660						
E661	C662	D663	I664	P665	I666	G667	A668	G669	G670	C671	A672	S673	Y674	Q675	T676	GLN	THR	ASN	SER	PRO	GLY	SER	ALA	SER	VAL	ALA	S689	Q690	S691	I692	A693	I694	Y695	T696	M697	S698	L699	G700	A701	E702	N703	S704	V705	A706	Y707	S708	N709	N710	I711	I712	E713	I714	V715	T716	N717	F718	I719	I720					
S721	V722	T723	T724	E725	I726	L727	M731	T732	K733	T734	S735	V736	D737	C738	T739	M740	Y741	I742	C743	G744	D745	S746	T747	E748	C749	S750	N751	L752	L753	L754	Q755	Y756	G757	S758	F759	C760	A761	Q762	L763	N764	R765	A766	L767	T768	G769	I770	A771	V772	E773	Q774	D775	K776	Q779	E780	V781	F782	A783						
Q784	V785	K786	Q787	I788	Y789	K790	T791	F792	P793	I794	K795	D796	F797	G798	G799	F800	N801	F802	S803	Q804	I805	D806	P807	D808	P809	S810	K811	P812	S813	K814	R815	S816	P817	I818	E819	D820	L821	L822	F823	N824	K825	V826	T827	LEU	ALA	ASP	ALA	GLY	PHE	ILE	LYS	GLN	TYR	GLY	ASP	LEU	GLY	ASP					
ILE	ALA	ALA	ARG	ASP	LEU	ILE	CYS	ALA	GLN	K854	F855	N856	L858	T859	V860	L861	P862	L864	L865	T866	D867	E868	M869	L870	A871	Q872	L873	L877	L878	L882	T883	M886	T887	F888	G889	A890	G891	A892	A893	L894	Q895	L896	F897	F898	P899	N900	Q901	N902	A903	Y904	R905	F906	G908										
I909	G910	V911	T912	Q913	N914	Y915	L916	Y917	E918	N919	Q920	K921	L922	I923	A924	N925	Q926	F927	N928	S929	A930	I931	G932	K933	I934	Q935	D936	L937	L938	S939	S940	T941	P942	S943	P944	L945	G946	K947	L948	Q949	D950	Y951	V952	N953	Q954	N955	A956	Q957	A958	L959	N960	T961	L962	V963	K964	Q965	S967	S968					
N969	F970	G971	A972	G1045	G1046	Y1047	H1048	L1049	M1050	A1056	F1057	H1058	L1063	H1064	V1065	T1066	Y1067	V1068	F1069	A1070	Q1071	E1072	K1073	M1074	F1075	T1076	T1077	A1078	P1079	I1081	C1082	H1083	D1084	G1085	K1086	A1087	H1088	F1089	P1090	R1091	E1092	G1093	V1094	S1097	M1098	G1099	T1100	H1101	V1102	V1104	T1105	Q1106	M1108	R1107	F1109								
Y1110	E1111	P1112	Q1113	I1114	I1115	T1116	T1117	D1118	N1119	T1120	F1121	V1122	S1123	G1124	N1125	C1126	D1127	V1128	V1129	I1130	G1131	I1132	V1133	N1134	N1135	T1136	V1137	Y1138	D1139	P1140	L1141	Q1142	P1143	E1144	L1145	D1146	PHE	LYS	GLU	GLU	GLU	GLU	ASP	PRO	ALA	ARG	ASP	GLY	TRP	SER	ALA	TRP	SER	HIS	VAL	PRO	GLN	ARG	LYS	ASP	PHE	GLY	LYS
SER	GLY	ILE	ASN	ALA	VAL	ASN	ILE	GLN	LYS	GLU	ASP	ARG	ASN	LEU	VAL	ALA	LYS	ASN	ASN	ASN	GLU	SER	LEU	GLU	SER	LEU	GLY	GLY	TYR	GLN	GLY	GLY	PRO	GLY	GLY	ALA	ALA	PRO	ARG	ASP	GLY	ALA	GLY	ALA	ALA	GLY	TRP	SER	HIS	VAL	PRO	GLN	ARG	LYS	ASP	PHE	GLY	LYS					
TRP	VAL	LEU	LEU	SER	PHE	LEU	GLY	ARG	SER	GLU	LEU	VAL	LEU	GLN	PRO	HIS	HIS	HIS	HIS	HIS	HIS	SER	ALA	TRP	SER	HIS	PRO	GLN	PHE	GLY	GLY	GLY	GLY	GLY	GLY	SER	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	ILE						

● Molecule 3: Spike glycoprotein



F782	F783	F784	F785	F786	F787	F788	F789	F790	F791	F792	F793	F794	F795	F796	F797	F798	F799	F800	F801	F802	F803	F804	F805	F806	F807	F808	F809	F810	F811	F812	F813	F814	F815	F816	F817	F818	F819	F820	F821	F822	F823	F824	F825	F826	F827	F828	F829	F830	F831	F832	F833	F834	F835	F836	F837	F838	F839	F840	F841	F842	F843	F844	F845	F846	F847	F848	F849	F850	F851	F852	F853	F854	F855	F856	F857	F858	F859	F860																																																																																																																										
S721	V722	T723	T724	E725	I726	L727	S730	M731	T732	K733	T734	S735	V736	D737	C738	T739	M740	Y741	I742	C743	G744	D745	S746	T747	E748	C749	S810	K811	P812	L752	L753	L754	Q755	Y756	G757	S758	F759	C760	T761	Q762	L763	N764	F765	A766	L767	T768	G769	I770	A771	V772	E773	Q774	D775	K776	N777	T778	Q779	E780	F781																																																																																																																																													
E861	C862	D863	I864	P865	I866	G867	A868	G869	I870	C871	A872	S873	S874	Q875	G876	G877	G878	ASN	THR	GLN	P821	P822	A823	I824	H825	A826	D827	D828	S829	I830	L831	T832	W833	R834	V835	Y836	S837	T838	G839	S840	M841	V842	F843	Q844	T845	L846	R847	T848	C849	I850	M851	G852	A853	E854	H855	V856	I857	T858	I859	I860	F861	G862	L863	T864	D865	E866	R867	A868	K869	S870	T871	I872	C873	F874	G875	G876	T877	L878	T879	F880	F881	F882	F883	F884	F885	F886	F887	F888	F889	F890	F891	F892	F893	F894	F895	F896	F897	F898	F899	F900	F901	F902	F903	F904	F905	F906	F907	F908	F909	F910	F911	F912	F913	F914	F915	F916	F917	F918	F919	F920	F921	F922	F923	F924	F925	F926	F927	F928	F929	F930	F931	F932	F933	F934	F935	F936	F937	F938	F939	F940	F941	F942	F943	F944	F945	F946	F947	F948	F949	F950	F951	F952	F953	F954	F955	F956	F957	F958	F959	F960	F961	F962	F963	F964	F965	F966	F967	F968	F969	F970	F971	F972	F973	F974	F975	F976	F977	F978	F979	F980	F981	F982	F983	F984	F985	F986	F987	F988	F989	F990	F991	F992	F993	F994	F995	F996	F997	F998	F999	F1000
M61	V62	T63	M64	F65	K66	A67	L68	H69	V610	S611	E612	F613	Q614	T615	L616	Y617	T618	T619	T620	F201	K202	L203	Y204	S205	K206	H207	T208	P209	L210	N211	L212	V213	R214	D215	L216	P217	Q218	G219	F220	S221	A222	L223	E224	P225	L226	V227	D228	P229	L230	I231	G232	T233	M234	P235	L236	E237	T238	K239	T240																																																																																																																																													
M121	M122	L123	T124	M125	V126	L127	I128	K129	V130	C131	E132	F133	Q134	T135	L136	C137	D138	P139	F140	L141	G142	V143	T144	H145	L146	S147	P148	L149	M150	L151	V152	R153	D154	L155	P156	Q157	G158	F159	L160	V161	D162	P163	L164	T165	C166	T167	F168	E169	G170	V171	S172	G173	P174	L175	M176	T177	L178	I179	V180																																																																																																																																													
GLY	LYS	GLN	GLY	ASN	F186	M188	L189	R190	E191	GLY	F192	V193	F194	K195	L196	I197	D198	G199	Y200	F201	K202	L203	Y204	S205	K206	H207	T208	P209	L210	N211	L212	V213	R214	D215	L216	P217	Q218	G219	F220	S221	A222	L223	E224	P225	L226	V227	D228	P229	L230	I231	G232	T233	M234	P235	L236	E237	T238	K239	T240																																																																																																																																													
L241	L242	A243	L244	H245	ARG	TYR	L189	LEU	THR	PRO	GLY	ASP	SER	SER	SER	GLY	TRP	THR	ALA	ALA	A263	A264	Y265	Y266	V267	G268	Y269	L270	Q271	P272	R273	T274	F275	L276	L277	K278	Y279	N280	E281	M282	G283	T284	A222	I285	T286	D287	A288	V289	D290	C291	A292	L293	D294	P295	L296	S297	E298	K300																																																																																																																																														
C301	T302	L303	K304	S305	F306	T307	V308	E309	K310	G311	I312	Y313	Q314	T315	T316	S317	N317	F318	R319	V320	Q321	P322	T323	E324	S325	I326	V327	R328	F329	P330	N331	I332	T333	N334	L335	C336	P337	F338	G339	E340	F341	F342	N343	A344	T345	T346	F347	A348	S349	V350	Y351	A352	W353	N354	R355	K356	R357	S358	N359																																																																																																																																													
C361	V362	A363	D364	Y365	S366	V367	L368	Y369	N370	S371	A372	S373	F374	S375	T376	F377	K378	C379	Y380	G381	V382	S383	P384	T385	K386	L387	N388	D389	L390	C391	F392	T393	N394	V395	Y396	A397	D398	S399	F400	V401	I402	R403	G404	D405	E406	V407	R408	Q409	S409	I410	A411	P412	G413	Q414	T415	Q416	K417	I418	A419	D420																																																																																																																																												
Y421	N422	Y423	K424	L425	P426	D427	D428	F429	T430	G431	A432	V433	I434	A435	W436	M437	S438	M439	N440	D441	D442	S443	K444	V445	G446	G447	N448	Y449	M450	Y451	L452	Y453	R454	L455	F456	R457	K458	S459	M460	L461	K462	P463	F464	E465	E466	D467	I468	S469	M470	E471	I472	Y473	Q474	A475	Q476	S477	F478	P479	C480																																																																																																																																													
M481	Q482	V483	E484	G485	F486	M487	C488	Y489	F490	P491	L492	Q493	S494	Y495	Q496	F497	Q498	P499	T500	N501	G502	V503	G504	Y505	Q506	P507	Y508	S509	V510	V511	V512	L513	S514	F515	E516	L517	L518	H519	A520	P521	A522	T523	V524	C525	G526	P527	K528	M529	S530	T531	N532	L533	V534	K535	M536	K537	C538	V539	N540																																																																																																																																													
F541	N542	F543	M544	G545	L546	T547	G548	T549	G550	V551	L552	T553	E554	S555	G556	K557	K558	F559	L560	P561	F562	Q563	Q564	F565	G566	R567	D568	I569	A570	D571	T572	T573	D574	A575	V576	F577	D578	P579	Q580	T581	L582	E583	I584	L585	D586	L587	T588	P589	C590	M591	F592	G593	G594	H595	V596	I597	T598	T599	P600																																																																																																																																													
G601	T602	M603	T604	S605	M606	Q607	V608	A609	V610	L611	Y612	Q613	D614	V615	M616	C617	T618	E619	V620	G621	V622	A623	I624	H625	A626	D627	D628	S629	I630	L631	T632	W633	R634	V635	Y636	S637	T638	G639	S640	M641	V642	F643	Q644	T645	L646	R647	T648	C649	I650	M651	G652	A653	E654	H655	V656	I657	T658	S659	Y660																																																																																																																																													
E661	C662	D663	I664	P665	I666	G667	A668	G669	I670	C671	A672	S673	S674	Q675	G676	G677	GLN	THR	ASN	P801	P802	Q803	Q804	I805	L806	P807	D808	P809	S810	K811	P812	L752	L753	L754	Q755	Y756	G757	S758	F759	C760	T761	Q762	L763	N764	F765	A766	L767	T768	G769	I770	A771	V772	E773	Q774	D775	K776	N777	T778	Q779	E780	F781																																																																																																																																											

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	135612	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 ($e^-/\text{\AA}^2$)	48	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	165000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	4.808	Depositor
Minimum map value	-3.324	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.037	Depositor
Recommended contour level	1.9	Depositor
Map size (Å)	517.12, 517.12, 517.12	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.01, 1.01, 1.01	Depositor

5 Model quality i

5.1 Standard geometry i

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	0.31	0/816	0.67	0/1106
1	H	0.38	0/795	0.64	0/1078
1	L	0.35	0/816	0.68	0/1106
2	B	0.31	0/922	0.61	0/1251
2	G	0.31	0/916	0.63	0/1243
2	R	0.30	0/916	0.59	0/1243
3	C	0.35	0/8163	0.65	9/11118 (0.1%)
3	D	0.38	2/8004 (0.0%)	0.63	6/10896 (0.1%)
3	E	0.35	0/7995	0.63	7/10881 (0.1%)
All	All	0.36	2/29343 (0.0%)	0.64	22/39922 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	131	CYS	CB-SG	-5.41	1.73	1.81
3	D	760	CYS	CB-SG	-5.15	1.73	1.81

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	E	942	PRO	CA-N-CD	-9.04	98.85	111.50
3	E	944	PRO	CA-N-CD	-9.00	98.90	111.50
3	E	899	PRO	CA-N-CD	-8.98	98.93	111.50
3	E	88	ASP	CB-CG-OD1	8.83	126.24	118.30
3	C	944	PRO	CA-N-CD	-8.81	99.17	111.50
3	C	942	PRO	CA-N-CD	-8.78	99.21	111.50
3	D	817	PRO	CA-N-CD	-8.76	99.23	111.50
3	D	944	PRO	CA-N-CD	-8.73	99.28	111.50
3	E	817	PRO	CA-N-CD	-8.73	99.28	111.50
3	C	817	PRO	CA-N-CD	-8.71	99.31	111.50
3	D	899	PRO	CA-N-CD	-8.69	99.34	111.50
3	D	942	PRO	CA-N-CD	-8.66	99.38	111.50
3	C	899	PRO	CA-N-CD	-8.57	99.51	111.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	916	LEU	CB-CG-CD1	-8.41	96.70	111.00
3	C	1126	CYS	CA-CB-SG	6.41	125.54	114.00
3	E	216	LEU	CA-CB-CG	6.29	129.77	115.30
3	C	527	PRO	N-CA-CB	5.85	110.31	103.30
3	C	636	TYR	CA-CB-CG	5.59	124.01	113.40
3	D	90	VAL	CG1-CB-CG2	-5.58	101.98	110.90
3	D	916	LEU	CB-CG-CD1	-5.56	101.55	111.00
3	C	131	CYS	CA-CB-SG	5.33	123.60	114.00
3	E	90	VAL	CG1-CB-CG2	-5.25	102.51	110.90

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	798	0	778	9	0
1	H	778	0	763	13	0
1	L	798	0	778	11	0
2	B	902	0	866	10	0
2	G	896	0	861	9	0
2	R	896	0	861	5	0
3	C	7978	0	7788	113	0
3	D	7825	0	7644	98	0
3	E	7818	0	7636	112	0
All	All	28689	0	27975	363	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 6.

All (363) 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)
3:E:804:GLN:O	3:E:817:PRO:CD	1.82	1.26
3:C:804:GLN:O	3:C:817:PRO:CD	1.92	1.16

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:899:PRO:HD2	3:C:900:MET:H	1.10	1.15
3:D:944:PRO:HD2	3:D:945:LEU:H	1.10	1.15
3:E:899:PRO:HD2	3:E:900:MET:H	1.11	1.15
3:E:817:PRO:HD2	3:E:818:ILE:H	1.12	1.14
3:D:804:GLN:O	3:D:817:PRO:CD	1.95	1.13
3:D:817:PRO:HD2	3:D:818:ILE:H	1.13	1.13
3:E:944:PRO:HD2	3:E:945:LEU:H	1.12	1.13
3:D:899:PRO:HD2	3:D:900:MET:H	1.12	1.09
3:C:944:PRO:HD2	3:C:945:LEU:H	1.14	1.08
3:C:817:PRO:HD2	3:C:818:ILE:H	1.14	1.08
3:E:804:GLN:O	3:E:817:PRO:HD3	1.54	1.04
3:E:804:GLN:O	3:E:817:PRO:HD2	1.63	0.99
3:E:942:PRO:C	3:E:944:PRO:HD3	1.85	0.97
3:C:942:PRO:C	3:C:944:PRO:HD3	1.87	0.95
3:D:804:GLN:O	3:D:817:PRO:HD3	1.64	0.95
3:D:942:PRO:C	3:D:944:PRO:HD3	1.88	0.93
3:C:804:GLN:O	3:C:817:PRO:HD2	1.68	0.92
3:C:804:GLN:O	3:C:817:PRO:HD3	1.69	0.91
3:D:804:GLN:HA	3:D:817:PRO:HG2	1.53	0.91
3:D:899:PRO:HD2	3:D:900:MET:N	1.88	0.88
3:C:899:PRO:HD2	3:C:900:MET:N	1.87	0.88
3:D:944:PRO:HD2	3:D:945:LEU:N	1.88	0.87
3:E:899:PRO:HD2	3:E:900:MET:N	1.87	0.87
3:D:804:GLN:O	3:D:817:PRO:HD2	1.75	0.87
3:C:944:PRO:HD2	3:C:945:LEU:N	1.90	0.87
3:D:817:PRO:HD2	3:D:818:ILE:N	1.89	0.86
3:E:804:GLN:HA	3:E:817:PRO:HG2	1.56	0.86
3:E:817:PRO:HD2	3:E:818:ILE:N	1.88	0.86
3:E:944:PRO:HD2	3:E:945:LEU:N	1.90	0.85
3:C:816:SER:HB2	3:C:817:PRO:HD3	1.58	0.84
3:D:943:SER:N	3:D:944:PRO:HD3	1.92	0.84
3:E:897:PRO:C	3:E:899:PRO:HD3	1.98	0.84
3:C:817:PRO:HD2	3:C:818:ILE:N	1.90	0.83
3:D:942:PRO:C	3:D:944:PRO:CD	2.48	0.81
3:E:804:GLN:HA	3:E:817:PRO:CG	2.10	0.81
3:E:897:PRO:C	3:E:899:PRO:CD	2.50	0.80
3:D:898:PHE:N	3:D:899:PRO:HD3	1.96	0.80
3:C:899:PRO:CD	3:C:900:MET:H	1.93	0.79
3:E:899:PRO:CD	3:E:900:MET:H	1.95	0.79
3:C:902:MET:HG3	3:C:916:LEU:HD11	1.65	0.78
3:E:898:PHE:N	3:E:899:PRO:HD3	1.97	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:899:PRO:CD	3:D:900:MET:H	1.95	0.77
3:E:817:PRO:CD	3:E:818:ILE:H	1.95	0.77
3:C:64:TRP:HE1	3:C:264:ALA:HB1	1.49	0.77
3:D:944:PRO:CD	3:D:945:LEU:H	1.94	0.77
3:C:944:PRO:CD	3:C:945:LEU:H	1.98	0.77
3:C:898:PHE:N	3:C:899:PRO:HD3	2.00	0.77
3:D:897:PRO:C	3:D:899:PRO:HD3	2.06	0.76
3:D:817:PRO:CD	3:D:818:ILE:H	1.96	0.76
3:D:804:GLN:HA	3:D:817:PRO:CG	2.15	0.76
3:C:943:SER:N	3:C:944:PRO:HD3	1.99	0.76
3:E:943:SER:N	3:E:944:PRO:HD3	2.00	0.76
3:C:817:PRO:CD	3:C:818:ILE:H	1.97	0.75
3:E:944:PRO:CD	3:E:945:LEU:H	1.96	0.74
3:C:942:PRO:C	3:C:944:PRO:CD	2.55	0.74
3:E:942:PRO:C	3:E:944:PRO:CD	2.55	0.73
3:D:897:PRO:C	3:D:899:PRO:CD	2.57	0.73
3:C:804:GLN:HA	3:C:817:PRO:HG2	1.70	0.72
3:C:897:PRO:C	3:C:899:PRO:HD3	2.10	0.72
3:C:897:PRO:C	3:C:899:PRO:CD	2.60	0.70
3:E:1076:THR:HB	3:E:1097:SER:HB3	1.74	0.70
3:D:816:SER:HB2	3:D:817:PRO:HD3	1.73	0.69
3:C:816:SER:HB2	3:C:817:PRO:CD	2.23	0.69
3:E:825:LYS:HZ3	3:E:944:PRO:HG2	1.58	0.68
3:E:816:SER:HB2	3:E:817:PRO:HD3	1.75	0.67
3:D:944:PRO:CD	3:D:945:LEU:N	2.57	0.67
3:C:804:GLN:HA	3:C:817:PRO:CG	2.24	0.67
2:G:47:TRP:HZ2	2:G:50:ILE:HG22	1.60	0.66
3:D:899:PRO:CD	3:D:900:MET:N	2.56	0.66
3:E:899:PRO:CD	3:E:900:MET:N	2.56	0.66
1:H:33:LEU:HD11	1:H:88:CYS:HB2	1.76	0.66
1:H:94:ALA:HA	3:E:445:VAL:HG11	1.78	0.66
3:D:354:ASN:HB3	3:D:399:SER:HB2	1.78	0.66
3:C:944:PRO:CD	3:C:945:LEU:N	2.59	0.66
2:G:104:ASP:OD1	3:E:346:ARG:NH2	2.28	0.65
3:C:117:LEU:HD11	3:C:128:ILE:HD12	1.78	0.65
3:D:943:SER:N	3:D:944:PRO:CD	2.59	0.65
3:C:899:PRO:CD	3:C:900:MET:N	2.55	0.65
3:C:817:PRO:CD	3:C:818:ILE:N	2.59	0.65
3:E:817:PRO:CD	3:E:818:ILE:N	2.57	0.64
3:E:898:PHE:N	3:E:899:PRO:CD	2.61	0.64
3:C:126:VAL:H	3:C:172:SER:HB3	1.62	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:898:PHE:N	3:D:899:PRO:CD	2.60	0.64
3:C:103:GLY:HA3	3:C:241:LEU:HB2	1.80	0.64
3:D:817:PRO:CD	3:D:818:ILE:N	2.58	0.64
3:E:804:GLN:CA	3:E:817:PRO:HG2	2.26	0.63
3:E:396:TYR:HB2	3:E:514:SER:HB2	1.79	0.63
3:E:93:ALA:HB3	3:E:266:TYR:HB2	1.80	0.63
3:E:825:LYS:NZ	3:E:944:PRO:HG2	2.14	0.62
3:E:804:GLN:O	3:E:817:PRO:CG	2.45	0.62
3:C:89:GLY:HA3	3:C:270:LEU:HD12	1.82	0.61
3:C:898:PHE:N	3:C:899:PRO:CD	2.63	0.61
3:D:32:PHE:HB3	3:D:218:GLN:HA	1.82	0.60
3:D:280:ASN:HD21	3:D:284:THR:HB	1.67	0.59
3:C:742:ILE:HA	3:C:1000:ARG:HD2	1.84	0.59
3:C:804:GLN:O	3:C:817:PRO:CG	2.50	0.59
3:D:1076:THR:HB	3:D:1097:SER:HB3	1.83	0.59
3:D:132:GLU:OE1	3:D:165:ASN:ND2	2.35	0.59
3:E:376:THR:HG23	3:E:378:LYS:HD3	1.84	0.59
3:E:944:PRO:CD	3:E:945:LEU:N	2.59	0.58
3:C:393:THR:HA	3:C:522:ALA:HA	1.84	0.58
2:B:35:HIS:CD2	2:B:100:LEU:H	2.22	0.58
2:G:35:HIS:HB2	2:G:97:ALA:HB3	1.85	0.58
3:E:297:SER:HA	3:E:300:LYS:HD2	1.85	0.58
3:C:733:LYS:HG2	3:C:771:ALA:HA	1.86	0.58
3:E:102:ARG:HG3	3:E:121:ASN:H	1.67	0.58
3:C:100:ILE:HD11	3:C:263:ALA:HB2	1.84	0.58
1:A:6:GLN:HG3	1:A:101:GLY:H	1.68	0.58
3:C:130:VAL:HG21	3:C:168:PHE:HB3	1.85	0.58
2:G:101:GLY:HA2	1:H:34:ALA:HB2	1.85	0.57
3:D:804:GLN:CA	3:D:817:PRO:HG2	2.31	0.57
3:C:131:CYS:HB3	3:C:166:CYS:HA	1.86	0.57
1:L:36:TYR:OH	1:L:89:GLN:NE2	2.38	0.57
3:C:620:VAL:HG11	3:C:651:ILE:HD11	1.87	0.57
3:C:943:SER:N	3:C:944:PRO:CD	2.67	0.56
3:E:943:SER:N	3:E:944:PRO:CD	2.68	0.56
3:E:34:ARG:HE	3:E:216:LEU:HD13	1.71	0.56
3:E:37:TYR:HA	3:E:223:LEU:H	1.70	0.56
3:D:412:PRO:HB3	3:D:427:ASP:HA	1.87	0.55
1:A:8:PRO:HG2	1:A:102:THR:HG21	1.89	0.55
2:B:61:ALA:HB3	2:B:64:VAL:HG22	1.88	0.55
3:C:93:ALA:HB3	3:C:266:TYR:HB2	1.88	0.55
3:E:193:VAL:HG13	3:E:270:LEU:HD11	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:382:VAL:HG13	3:C:430:THR:HB	1.89	0.55
3:E:357:ARG:NH2	3:E:396:TYR:OH	2.40	0.54
3:E:362:VAL:HG13	3:E:526:GLY:HA2	1.89	0.54
1:L:6:GLN:HG3	1:L:101:GLY:H	1.71	0.54
3:D:930:ALA:HA	3:D:933:LYS:HE2	1.89	0.54
3:C:403:ARG:NH2	3:C:406:GLU:OE2	2.40	0.54
3:D:398:ASP:HB2	3:D:512:VAL:HB	1.89	0.54
3:E:376:THR:HB	3:E:435:ALA:HB3	1.89	0.54
3:D:350:VAL:HG11	3:D:418:ILE:HD11	1.89	0.54
3:E:666:ILE:HD11	3:E:672:ALA:HB2	1.89	0.54
1:L:53:ARG:NH1	3:D:343:ASN:O	2.41	0.54
3:C:412:PRO:HB3	3:C:427:ASP:HA	1.89	0.53
3:E:930:ALA:HA	3:E:933:LYS:HE2	1.90	0.53
3:C:722:VAL:HG22	3:C:1065:VAL:HG22	1.91	0.53
1:H:52:SER:OG	1:H:53:ARG:NH1	2.42	0.53
3:D:310:LYS:HG3	3:D:600:PRO:HA	1.89	0.53
3:E:731:MET:HB2	3:E:955:ASN:HD21	1.72	0.53
3:E:897:PRO:HB2	3:E:899:PRO:CD	2.38	0.53
3:C:97:LYS:HB3	3:C:187:LYS:H	1.72	0.52
3:D:206:LYS:HB2	3:D:223:LEU:HA	1.91	0.52
3:C:106:PHE:HB3	3:C:235:ILE:HG12	1.92	0.52
3:C:193:VAL:HG13	3:C:270:LEU:HD11	1.91	0.52
3:D:393:THR:HA	3:D:522:ALA:HA	1.91	0.52
3:C:379:CYS:HB3	3:C:382:VAL:HG23	1.91	0.52
3:D:214:ARG:NH1	3:D:215:ASP:OD2	2.43	0.52
3:E:444:LYS:HE2	3:E:448:ASN:HA	1.90	0.52
3:E:722:VAL:HG22	3:E:1065:VAL:HG22	1.91	0.52
3:D:722:VAL:HG22	3:D:1065:VAL:HG22	1.90	0.52
3:C:212:LEU:HG	3:C:215:ASP:H	1.74	0.52
3:E:1048:HIS:HA	3:E:1066:THR:HG22	1.91	0.52
3:C:376:THR:HG22	3:C:435:ALA:HB3	1.91	0.52
2:R:102:THR:HG21	3:D:444:LYS:HE2	1.91	0.52
3:E:101:ILE:O	3:E:190:ARG:NH2	2.42	0.52
3:E:37:TYR:OH	3:E:195:LYS:NZ	2.39	0.51
3:C:1076:THR:HB	3:C:1097:SER:HB3	1.92	0.51
2:R:12:VAL:HG11	2:R:86:LEU:HD13	1.90	0.51
2:B:12:VAL:HG11	2:B:86:LEU:HD13	1.92	0.51
3:C:806:LEU:HD23	3:C:878:LEU:HD23	1.93	0.51
2:B:91:THR:HG23	2:B:114:THR:HA	1.92	0.51
3:D:424:LYS:HB3	3:D:463:PRO:HA	1.93	0.51
3:C:498:GLN:HB3	3:C:501:ASN:HB2	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:598:ILE:HG23	3:C:664:ILE:HG21	1.92	0.51
3:C:1086:LYS:HA	3:C:1125:ASN:HA	1.93	0.51
3:E:616:ASN:HB3	3:E:619:GLU:HG2	1.93	0.51
3:E:560:LEU:HB2	3:E:563:GLN:HG3	1.93	0.51
3:C:101:ILE:HG12	3:C:242:LEU:HG	1.93	0.51
3:C:115:GLN:HA	3:C:132:GLU:HB3	1.91	0.51
3:C:954:GLN:OE1	3:C:1014:ARG:NH1	2.43	0.51
3:D:140:PHE:HD1	3:D:244:LEU:HB2	1.75	0.50
3:C:816:SER:CB	3:C:817:PRO:CD	2.88	0.50
3:D:562:PHE:HD2	3:E:41:LYS:HD2	1.76	0.50
3:E:1116:THR:HG22	3:E:1138:TYR:HD2	1.75	0.50
3:C:346:ARG:NH2	2:B:104:ASP:OD1	2.42	0.50
2:G:64:VAL:HG13	2:G:68:PHE:HB2	1.93	0.50
3:E:96:GLU:HG3	3:E:99:ASN:HA	1.92	0.50
3:E:204:TYR:HA	3:E:225:PRO:HA	1.93	0.50
2:R:91:THR:HG23	2:R:114:THR:HA	1.93	0.50
3:D:44:ARG:HE	3:C:567:ARG:HD2	1.75	0.50
3:E:902:MET:HG3	3:E:916:LEU:HD11	1.94	0.50
1:H:33:LEU:HD22	1:H:71:PHE:CG	2.47	0.49
3:E:39:PRO:HB3	3:E:51:THR:HG21	1.94	0.49
3:D:742:ILE:HA	3:D:1000:ARG:HD3	1.94	0.49
3:D:804:GLN:O	3:D:817:PRO:CG	2.56	0.49
2:B:38:ARG:NE	2:B:46:GLU:OE1	2.43	0.49
3:E:347:PHE:HB2	3:E:401:VAL:HG23	1.95	0.49
3:C:186:PHE:HB2	3:C:213:VAL:HG13	1.94	0.49
3:C:231:ILE:HD12	3:C:233:ILE:HG12	1.94	0.49
3:E:962:LEU:HD11	3:E:1004:LEU:HD23	1.95	0.49
3:C:108:THR:HA	3:C:236:THR:H	1.77	0.49
3:D:347:PHE:CD1	3:D:399:SER:HB3	2.47	0.49
3:E:942:PRO:CA	3:E:944:PRO:HD3	2.43	0.49
2:R:98:ARG:NH2	2:R:104:ASP:O	2.44	0.49
3:D:319:ARG:HH11	3:D:592:PHE:HB2	1.76	0.49
3:C:1116:THR:HG22	3:C:1138:TYR:HD2	1.78	0.49
3:D:816:SER:CB	3:D:817:PRO:HD3	2.41	0.48
3:E:426:PRO:HG2	3:E:429:PHE:HB2	1.94	0.48
3:E:897:PRO:C	3:E:899:PRO:HD2	2.33	0.48
3:C:280:ASN:ND2	3:C:286:THR:OG1	2.46	0.48
3:C:316:SER:HB3	3:C:595:VAL:HB	1.96	0.48
3:D:666:ILE:HD11	3:D:672:ALA:HB2	1.94	0.48
3:D:906:PHE:CD2	3:D:916:LEU:HB2	2.48	0.48
3:C:941:THR:OG1	3:C:942:PRO:CD	2.61	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:310:LYS:HG3	3:E:600:PRO:HA	1.95	0.48
2:G:91:THR:HG23	2:G:114:THR:HA	1.96	0.48
3:D:379:CYS:HB2	3:D:384:PRO:HD3	1.96	0.48
3:E:567:ARG:HD2	3:C:42:VAL:HG11	1.96	0.48
3:D:662:CYS:HB2	3:D:697:MET:HE3	1.96	0.48
3:E:417:LYS:HE2	3:E:417:LYS:HB2	1.67	0.48
1:A:93:SER:OG	1:A:95:PRO:O	2.30	0.48
3:E:1040:VAL:HG21	3:C:1035:GLY:HA3	1.95	0.48
3:C:552:LEU:HB3	3:C:585:LEU:HD23	1.95	0.48
3:D:942:PRO:CA	3:D:944:PRO:HD3	2.43	0.47
3:D:379:CYS:HB3	3:D:382:VAL:HG13	1.96	0.47
3:E:102:ARG:HH21	3:E:120:VAL:HG13	1.79	0.47
3:D:902:MET:HG3	3:D:916:LEU:HD11	1.96	0.47
3:D:901:GLN:O	3:D:905:ARG:HG2	2.15	0.47
3:D:816:SER:CB	3:D:817:PRO:CD	2.93	0.47
1:L:89:GLN:HE22	2:R:100:LEU:HB3	1.79	0.47
3:E:88:ASP:OD1	3:E:89:GLY:N	2.48	0.47
3:D:776:LYS:NZ	3:D:780:GLU:OE2	2.46	0.47
3:E:143:VAL:HB	3:E:245:HIS:HA	1.96	0.47
3:C:433:VAL:HG22	3:C:512:VAL:HG22	1.96	0.47
1:L:103:LYS:HD2	1:L:103:LYS:HA	1.76	0.46
1:H:35:TRP:HB2	1:H:48:ILE:HB	1.97	0.46
3:C:529:LYS:HD2	3:C:531:THR:H	1.80	0.46
1:A:46:LEU:HD22	1:A:55:GLN:HE21	1.80	0.46
3:D:1049:LEU:HD11	3:D:1067:TYR:HB2	1.97	0.46
3:E:825:LYS:HE3	3:E:942:PRO:HA	1.98	0.46
3:D:362:VAL:HG13	3:D:526:GLY:HA2	1.98	0.46
1:L:75:ILE:HD11	1:L:86:TYR:HE2	1.81	0.46
3:D:406:GLU:HB3	3:D:418:ILE:HG21	1.96	0.46
3:E:391:CYS:HA	3:E:525:CYS:HA	1.98	0.46
3:C:27:ALA:HB3	3:C:64:TRP:HB3	1.98	0.46
1:H:83:PHE:HD1	1:H:104:VAL:HG12	1.80	0.46
3:D:932:GLY:O	3:D:935:GLN:HG2	2.16	0.46
3:E:897:PRO:CB	3:E:899:PRO:HD3	2.46	0.46
3:C:1082:CYS:HB2	3:C:1126:CYS:HB3	1.56	0.46
3:C:395:VAL:HG22	3:C:515:PHE:HD1	1.80	0.45
3:E:804:GLN:CA	3:E:817:PRO:CG	2.89	0.45
3:E:102:ARG:HA	3:E:190:ARG:HH22	1.80	0.45
3:D:106:PHE:HB2	3:D:117:LEU:HB3	1.97	0.45
3:D:379:CYS:HA	3:D:432:CYS:HA	1.99	0.45
3:E:119:ILE:HG13	3:E:128:ILE:HG23	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:28:ASN:ND2	1:A:30:ASP:OD1	2.49	0.45
1:L:83:PHE:HD1	1:L:104:VAL:HG12	1.82	0.45
3:C:350:VAL:HG11	3:C:418:ILE:HD11	1.99	0.45
3:C:945:LEU:HD12	3:C:948:LEU:HD12	1.99	0.45
3:D:139:PRO:HG2	3:D:241:LEU:HA	1.98	0.45
3:E:350:VAL:HG22	3:E:422:ASN:HB3	1.99	0.45
3:E:804:GLN:HA	3:E:817:PRO:HG3	1.92	0.45
3:C:402:ILE:HB	3:C:406:GLU:HB2	1.99	0.45
2:G:12:VAL:HG11	2:G:86:LEU:HD13	1.98	0.45
2:G:87:LYS:N	2:G:90:ASP:OD2	2.45	0.45
3:C:897:PRO:HB2	3:C:900:MET:HG3	1.98	0.45
1:L:24:ARG:HE	1:L:69:THR:HB	1.82	0.45
3:E:411:ALA:HB3	3:E:414:GLN:HG3	1.98	0.45
3:D:44:ARG:HH21	3:C:567:ARG:HH11	1.64	0.45
3:D:193:VAL:HG13	3:D:270:LEU:HD11	1.99	0.45
3:D:903:ALA:HB1	3:D:913:GLN:HG3	1.98	0.45
3:E:647:ALA:HA	3:C:862:PRO:HG3	1.99	0.45
3:D:411:ALA:HB3	3:D:414:GLN:HG3	1.98	0.44
3:C:763:LEU:HD22	3:C:1008:VAL:HG21	1.99	0.44
1:H:34:ALA:HB1	1:H:46:LEU:HD11	1.98	0.44
3:E:129:LYS:HB2	3:E:129:LYS:HE2	1.58	0.44
3:E:106:PHE:HA	3:E:238:PHE:HA	1.99	0.44
3:D:996:LEU:HD13	3:D:1000:ARG:HH12	1.83	0.44
2:B:98:ARG:NH2	2:B:104:ASP:O	2.45	0.44
3:D:129:LYS:HD3	3:D:131:CYS:SG	2.58	0.44
3:D:903:ALA:HB2	3:D:916:LEU:HD22	1.99	0.44
3:D:1090:PRO:HD3	3:D:1095:PHE:CE2	2.53	0.44
3:D:362:VAL:HG22	3:D:527:PRO:HD2	2.00	0.44
3:E:816:SER:HB2	3:E:817:PRO:CD	2.46	0.44
3:C:189:LEU:HD22	3:C:210:ILE:HD12	2.00	0.44
3:C:297:SER:HA	3:C:300:LYS:HD2	2.00	0.44
3:C:897:PRO:HB2	3:C:899:PRO:HD2	1.99	0.44
1:A:2:ILE:HG23	1:A:27:GLN:H	1.82	0.44
3:D:516:GLU:HG2	3:D:518:LEU:HG	2.00	0.44
1:H:32:PHE:HB3	1:H:91:VAL:HG23	2.00	0.43
3:D:239:GLN:HG2	3:D:240:THR:H	1.83	0.43
3:D:947:LYS:HB3	3:D:947:LYS:HE2	1.80	0.43
3:D:897:PRO:C	3:D:899:PRO:HD2	2.38	0.43
3:E:103:GLY:HA3	3:E:241:LEU:HD12	1.99	0.43
3:E:816:SER:CB	3:E:817:PRO:CD	2.97	0.43
3:C:204:TYR:HB3	3:C:223:LEU:HB3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:278:LYS:HB2	3:C:278:LYS:HE3	1.83	0.43
2:G:47:TRP:CZ2	2:G:50:ILE:HG22	2.48	0.43
1:H:37:GLN:HB2	1:H:47:LEU:HD11	2.00	0.43
1:H:88:CYS:O	1:H:99:GLY:N	2.51	0.43
3:D:826:VAL:HG23	3:D:945:LEU:HD13	2.01	0.43
3:E:897:PRO:HB2	3:E:899:PRO:HD2	1.99	0.43
3:C:358:ILE:HD13	3:C:395:VAL:HG12	2.01	0.43
3:C:455:LEU:HG	3:C:493:GLN:HB3	2.01	0.43
3:C:992:GLN:HA	3:C:995:ARG:HD2	1.98	0.43
3:C:819:GLU:HA	3:C:822:LEU:HD12	2.01	0.43
3:D:576:VAL:HG22	3:D:587:ILE:HD11	2.00	0.43
3:D:790:LYS:HE3	3:C:704:SER:HB2	2.00	0.43
3:C:94:SER:OG	3:C:96:GLU:OE1	2.35	0.43
3:E:37:TYR:H	3:E:55:PHE:HE1	1.66	0.43
3:E:100:ILE:HB	3:E:243:ALA:HB3	2.00	0.43
3:E:393:THR:HA	3:E:522:ALA:HA	2.01	0.43
3:C:642:VAL:HG22	3:C:651:ILE:HG12	2.00	0.43
3:C:1073:LYS:HA	3:C:1073:LYS:HD3	1.82	0.43
3:D:350:VAL:HG22	3:D:422:ASN:HB3	2.01	0.43
3:C:347:PHE:CD1	3:C:399:SER:HB3	2.54	0.42
3:C:897:PRO:HB2	3:C:899:PRO:CD	2.49	0.42
3:E:105:ILE:HG23	3:E:241:LEU:HD11	2.02	0.42
3:C:804:GLN:CA	3:C:817:PRO:HG2	2.44	0.42
3:E:576:VAL:HG13	3:E:587:ILE:HD11	2.02	0.42
3:C:295:PRO:HG2	3:C:608:VAL:HG21	2.01	0.42
3:E:35:GLY:HA3	3:E:56:LEU:HB3	2.01	0.42
3:C:906:PHE:CD2	3:C:916:LEU:HB2	2.53	0.42
3:D:310:LYS:HE3	3:D:310:LYS:HB3	1.83	0.42
3:D:396:TYR:HB2	3:D:514:SER:HB3	2.02	0.42
3:E:366:SER:H	3:E:388:ASN:HD21	1.66	0.42
3:E:790:LYS:HE3	3:E:790:LYS:HB3	1.83	0.42
3:C:942:PRO:CA	3:C:944:PRO:HD3	2.47	0.42
3:E:105:ILE:HD12	3:E:110:LEU:HD22	2.02	0.41
3:D:403:ARG:HG3	3:D:505:TYR:HA	2.02	0.41
3:E:319:ARG:NH2	3:C:745:ASP:OD2	2.52	0.41
3:C:350:VAL:HG22	3:C:422:ASN:HB3	2.01	0.41
3:C:733:LYS:HE3	3:C:863:PRO:HA	2.02	0.41
3:E:901:GLN:O	3:E:905:ARG:HG2	2.20	0.41
3:D:942:PRO:C	3:D:944:PRO:HD2	2.38	0.41
3:D:980:ILE:HD13	3:D:992:GLN:HB3	2.02	0.41
2:B:37:VAL:HG11	2:B:45:LEU:HD23	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:966:LEU:HD23	3:D:1000:ARG:HE	1.85	0.41
3:C:293:LEU:O	3:C:632:THR:HA	2.21	0.41
1:A:11:LEU:HA	1:A:11:LEU:HD23	1.75	0.41
1:L:39:LYS:HB3	1:L:42:LYS:HB2	2.02	0.41
3:D:110:LEU:HD23	3:D:116:SER:HB3	2.02	0.41
3:E:54:LEU:HA	3:E:272:PRO:HA	2.02	0.41
1:H:33:LEU:HB3	1:H:51:ALA:HB2	2.03	0.41
3:E:897:PRO:CB	3:E:899:PRO:CD	2.98	0.41
3:E:984:LEU:HD23	3:E:984:LEU:HA	1.95	0.41
1:L:48:ILE:HG21	1:L:64:GLY:HA3	2.03	0.41
3:D:106:PHE:O	3:D:117:LEU:N	2.54	0.41
3:D:195:LYS:HB2	3:D:195:LYS:HE3	1.80	0.41
3:C:296:LEU:HG	3:C:300:LYS:HE2	2.01	0.41
1:A:96:LEU:HD12	2:B:47:TRP:CD2	2.56	0.41
1:H:94:ALA:HB3	1:H:95:PRO:HD3	2.03	0.40
3:D:897:PRO:O	3:D:899:PRO:HD2	2.21	0.40
3:E:773:GLU:HA	3:E:776:LYS:HE2	2.03	0.40
3:E:942:PRO:HD2	3:E:943:SER:N	2.36	0.40
3:C:878:LEU:HA	3:C:878:LEU:HD12	1.88	0.40
3:D:347:PHE:HD1	3:D:399:SER:HB3	1.85	0.40
3:E:104:TRP:HE3	3:E:119:ILE:HD13	1.86	0.40
3:E:743:CYS:HB3	3:E:749:CYS:HB3	1.84	0.40
3:E:905:ARG:HD2	3:E:1049:LEU:O	2.22	0.40
3:E:1084:ASP:HB2	3:E:1086:LYS:HE3	2.03	0.40
3:C:104:TRP:HH2	3:C:190:ARG:HH21	1.69	0.40
3:D:984:LEU:HD13	3:D:988:GLU:HB3	2.03	0.40
3:C:576:VAL:HG13	3:C:587:ILE:HD11	2.03	0.40
3:C:726:ILE:HG13	3:C:1061:VAL:HG22	2.03	0.40
1:A:96:LEU:HD12	2:B:47:TRP:CE2	2.57	0.40
3:E:108:THR:OG1	3:E:234:ASN:O	2.39	0.40
3:E:319:ARG:NH1	3:E:590:CYS:HB2	2.36	0.40
3:E:897:PRO:O	3:E:899:PRO:HD2	2.21	0.40
1:L:66:GLY:HA3	1:L:71:PHE:HA	2.02	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	104/214 (49%)	100 (96%)	4 (4%)	0	100	100
1	H	102/214 (48%)	93 (91%)	9 (9%)	0	100	100
1	L	104/214 (49%)	96 (92%)	8 (8%)	0	100	100
2	B	114/447 (26%)	114 (100%)	0	0	100	100
2	G	113/447 (25%)	110 (97%)	3 (3%)	0	100	100
2	R	113/447 (25%)	113 (100%)	0	0	100	100
3	C	1008/1288 (78%)	983 (98%)	25 (2%)	0	100	100
3	D	986/1288 (77%)	964 (98%)	21 (2%)	1 (0%)	48	71
3	E	983/1288 (76%)	962 (98%)	20 (2%)	1 (0%)	48	71
All	All	3627/5847 (62%)	3535 (98%)	90 (2%)	2 (0%)	50	71

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	D	942	PRO
3	E	942	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	86/183 (47%)	86 (100%)	0	100	100
1	H	84/183 (46%)	84 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	L	86/183 (47%)	86 (100%)	0	100	100
2	B	98/393 (25%)	98 (100%)	0	100	100
2	G	97/393 (25%)	97 (100%)	0	100	100
2	R	97/393 (25%)	97 (100%)	0	100	100
3	C	895/1116 (80%)	892 (100%)	3 (0%)	91	97
3	D	879/1116 (79%)	876 (100%)	3 (0%)	91	97
3	E	878/1116 (79%)	872 (99%)	6 (1%)	81	93
All	All	3200/5076 (63%)	3188 (100%)	12 (0%)	88	96

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	D	448	ASN
3	D	495	TYR
3	D	498	GLN
3	E	102	ARG
3	E	129	LYS
3	E	131	CYS
3	E	166	CYS
3	E	167	THR
3	E	916	LEU
3	C	166	CYS
3	C	169	GLU
3	C	1107	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	L	89	GLN
3	D	448	ASN
3	D	450	ASN
3	D	498	GLN
3	E	907	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

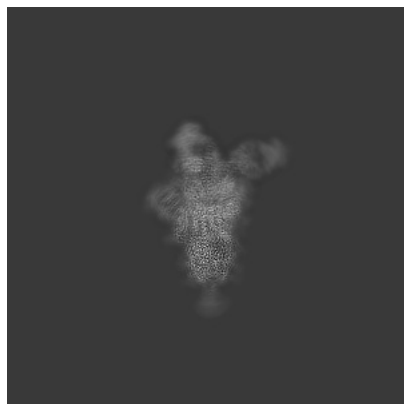
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-18180. These allow visual inspection of the internal detail of the map and identification of artifacts.

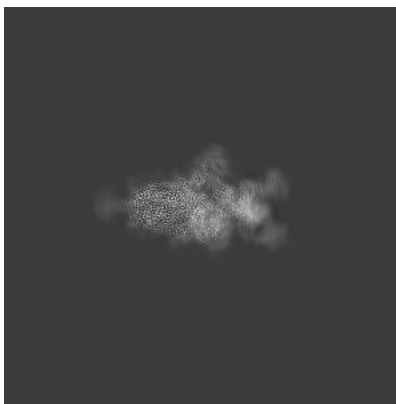
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

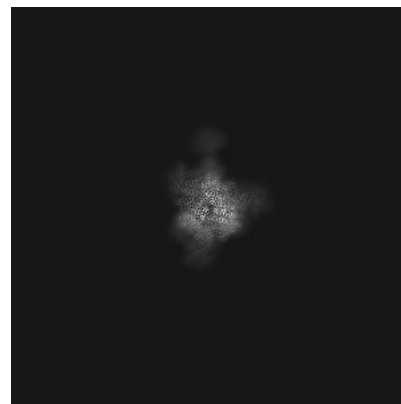
6.1.1 Primary map



X

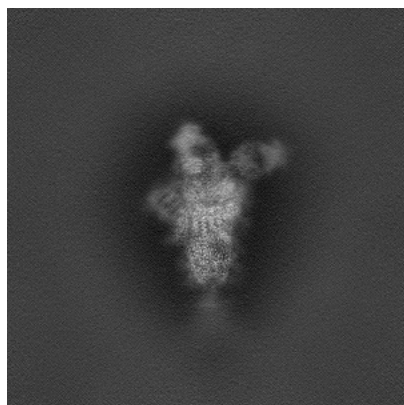


Y

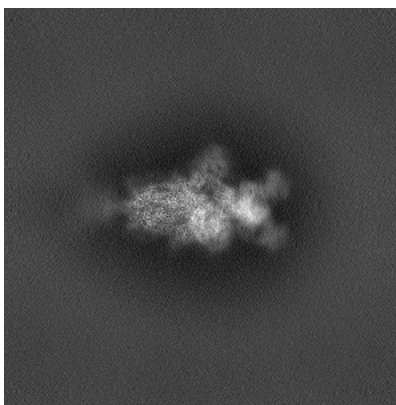


Z

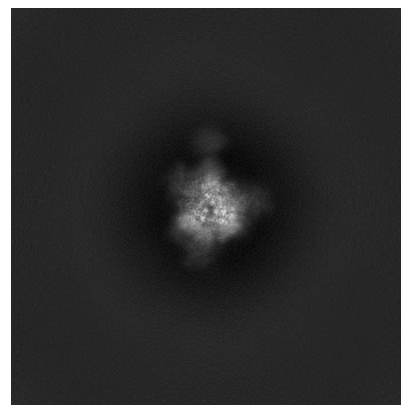
6.1.2 Raw map



X



Y



Z

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

6.2 Central slices [i](#)

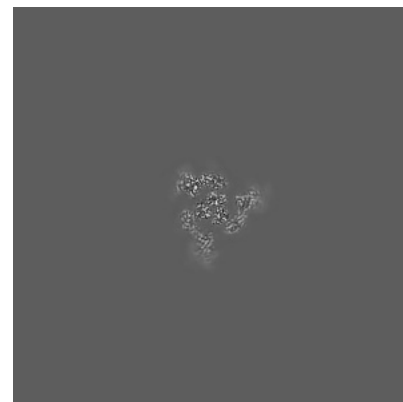
6.2.1 Primary map



X Index: 256

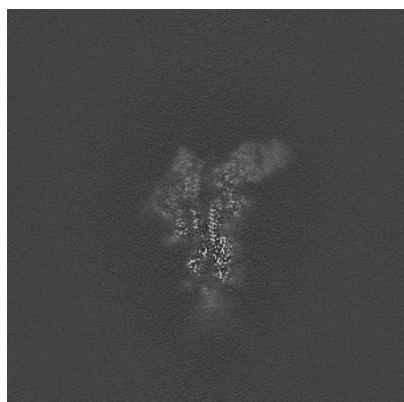


Y Index: 256



Z Index: 256

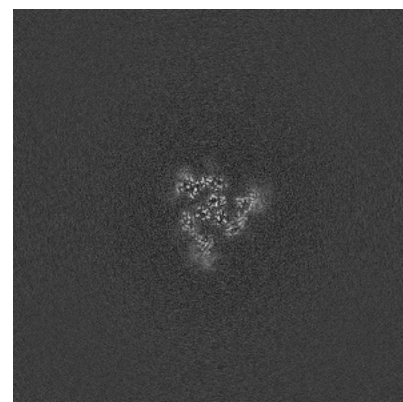
6.2.2 Raw map



X Index: 256



Y Index: 256



Z Index: 256

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

6.3 Largest variance slices [i](#)

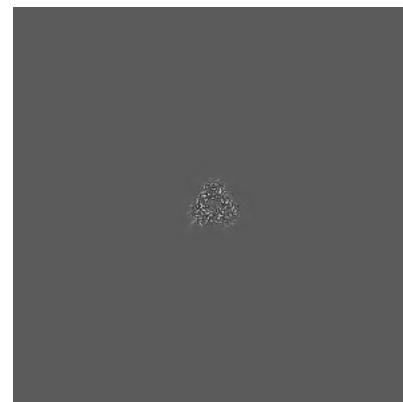
6.3.1 Primary map



X Index: 263



Y Index: 251

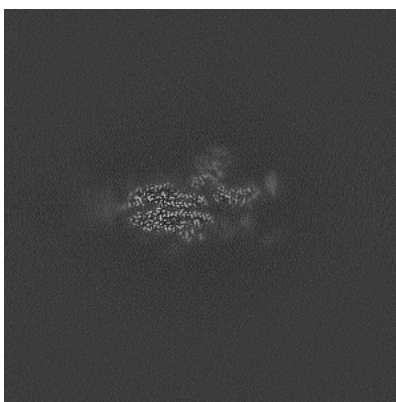


Z Index: 193

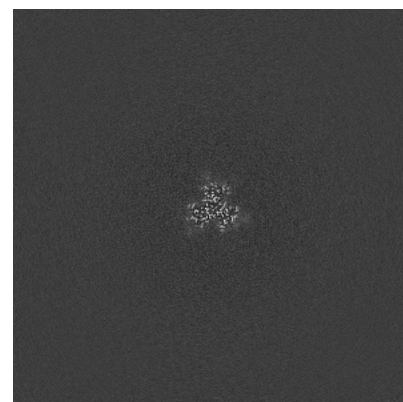
6.3.2 Raw map



X Index: 263



Y Index: 252

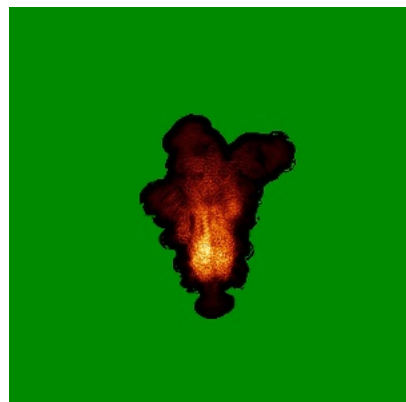


Z Index: 201

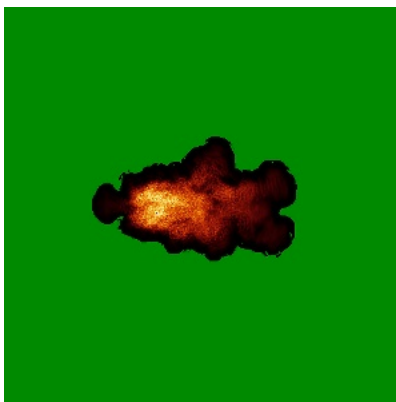
The images above show the largest variance slices of the map in three orthogonal directions.

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

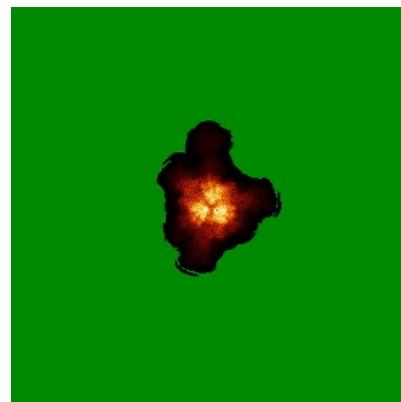
6.4.1 Primary map



X

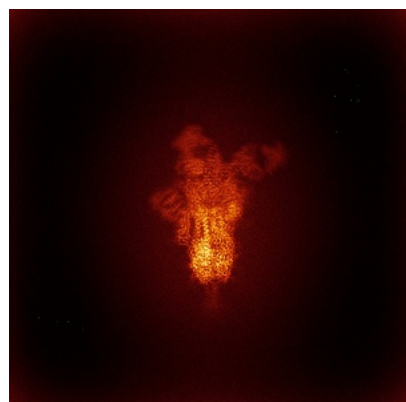


Y

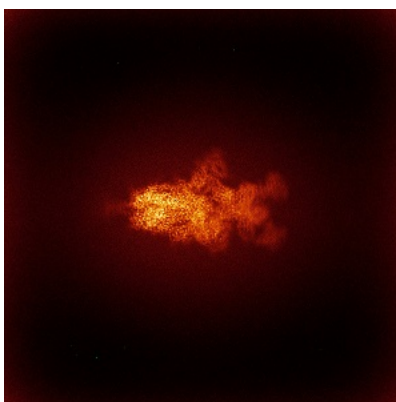


Z

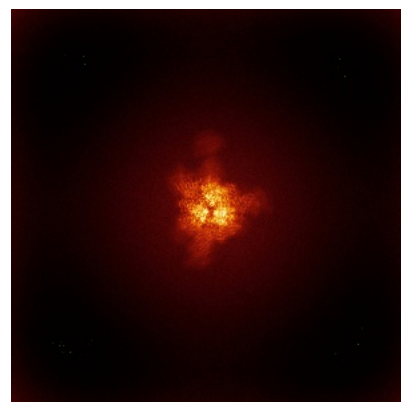
6.4.2 Raw map



X



Y

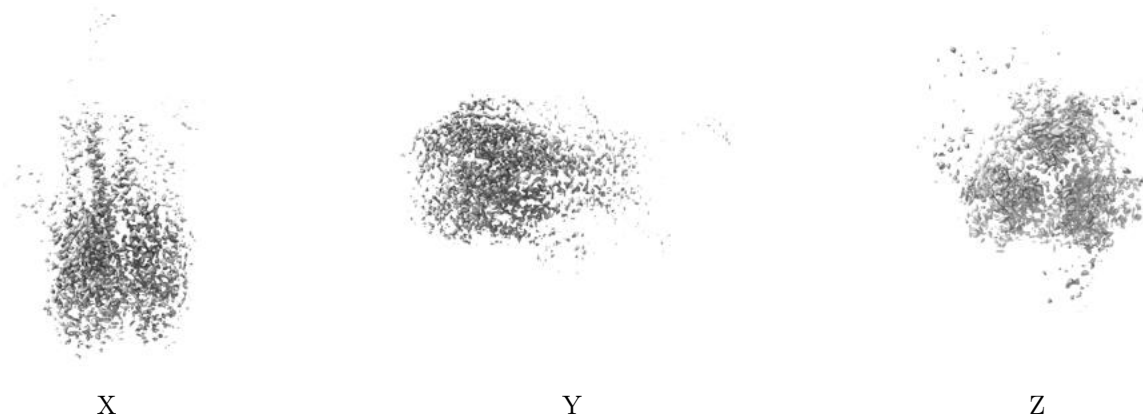


Z

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 1.9. 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.

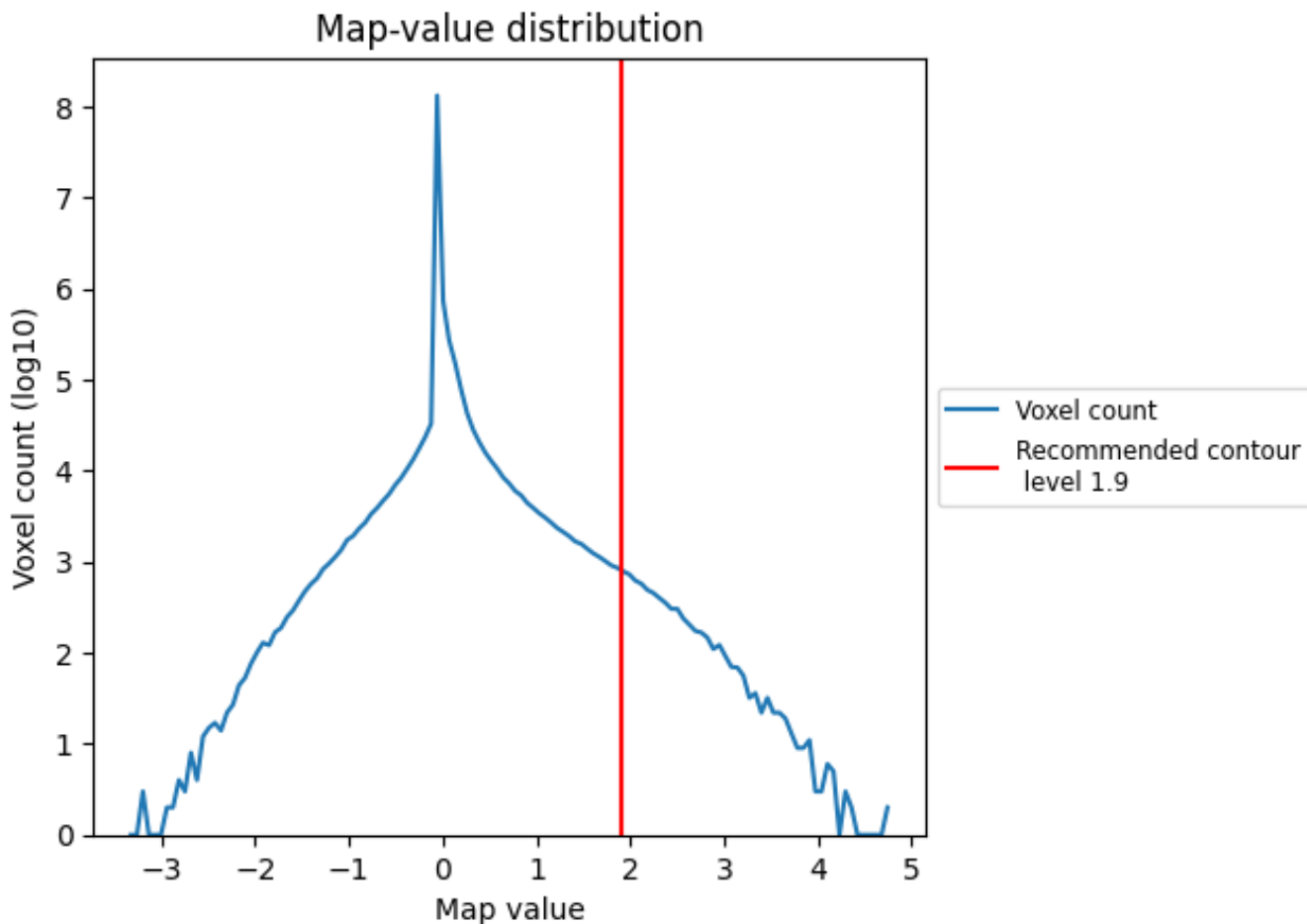
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

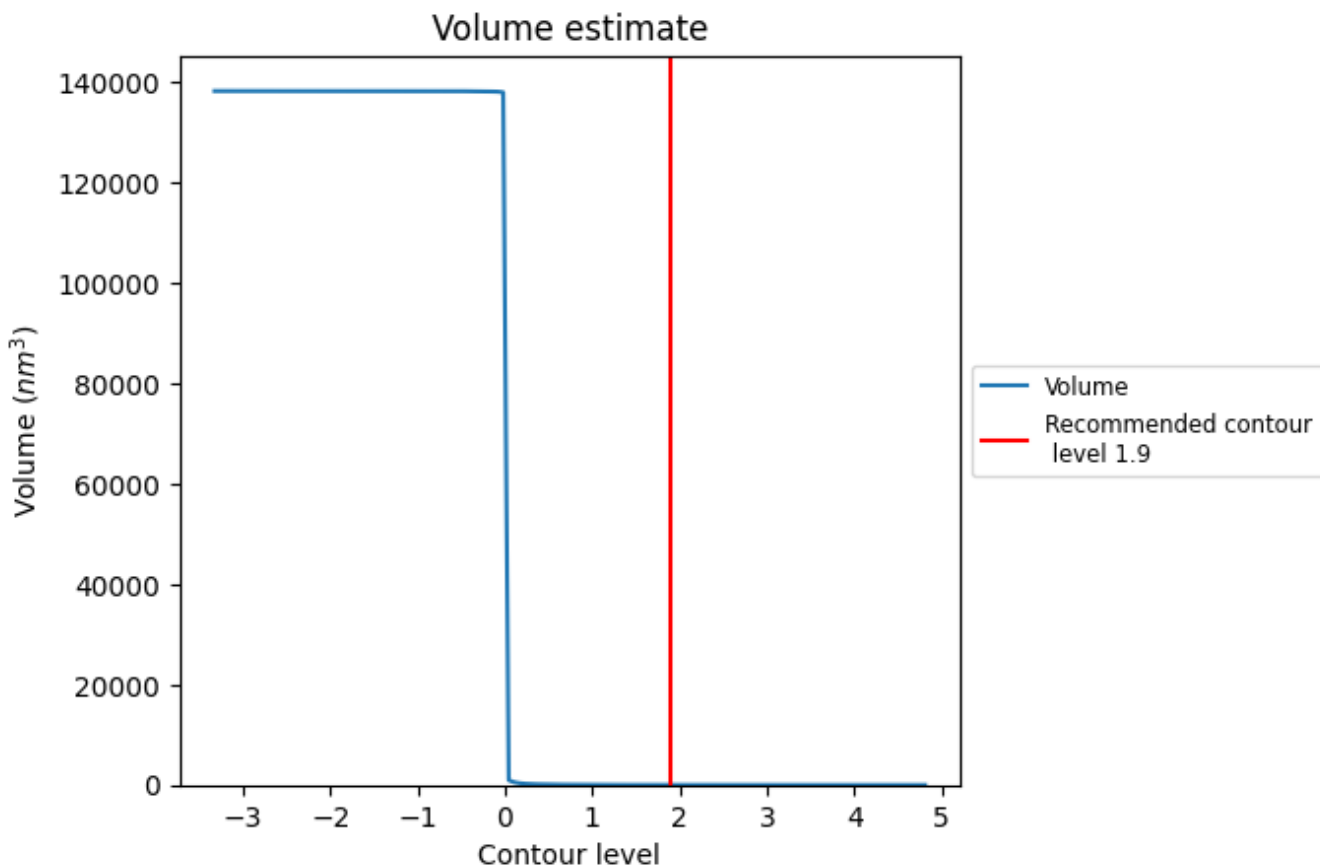
This section contains the results of statistical analysis of the map.

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.

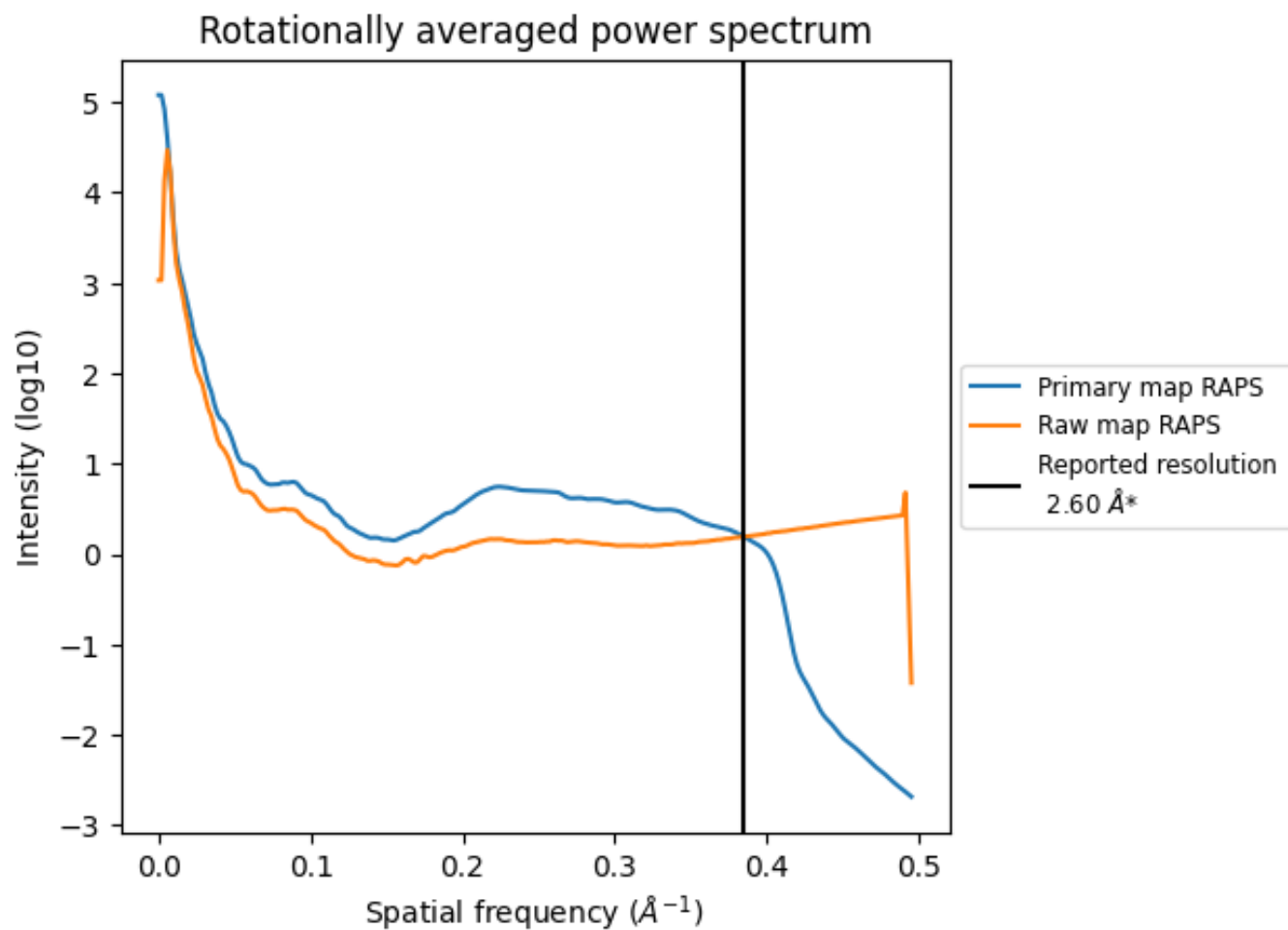
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 7 nm³; this corresponds to an approximate mass of 7 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

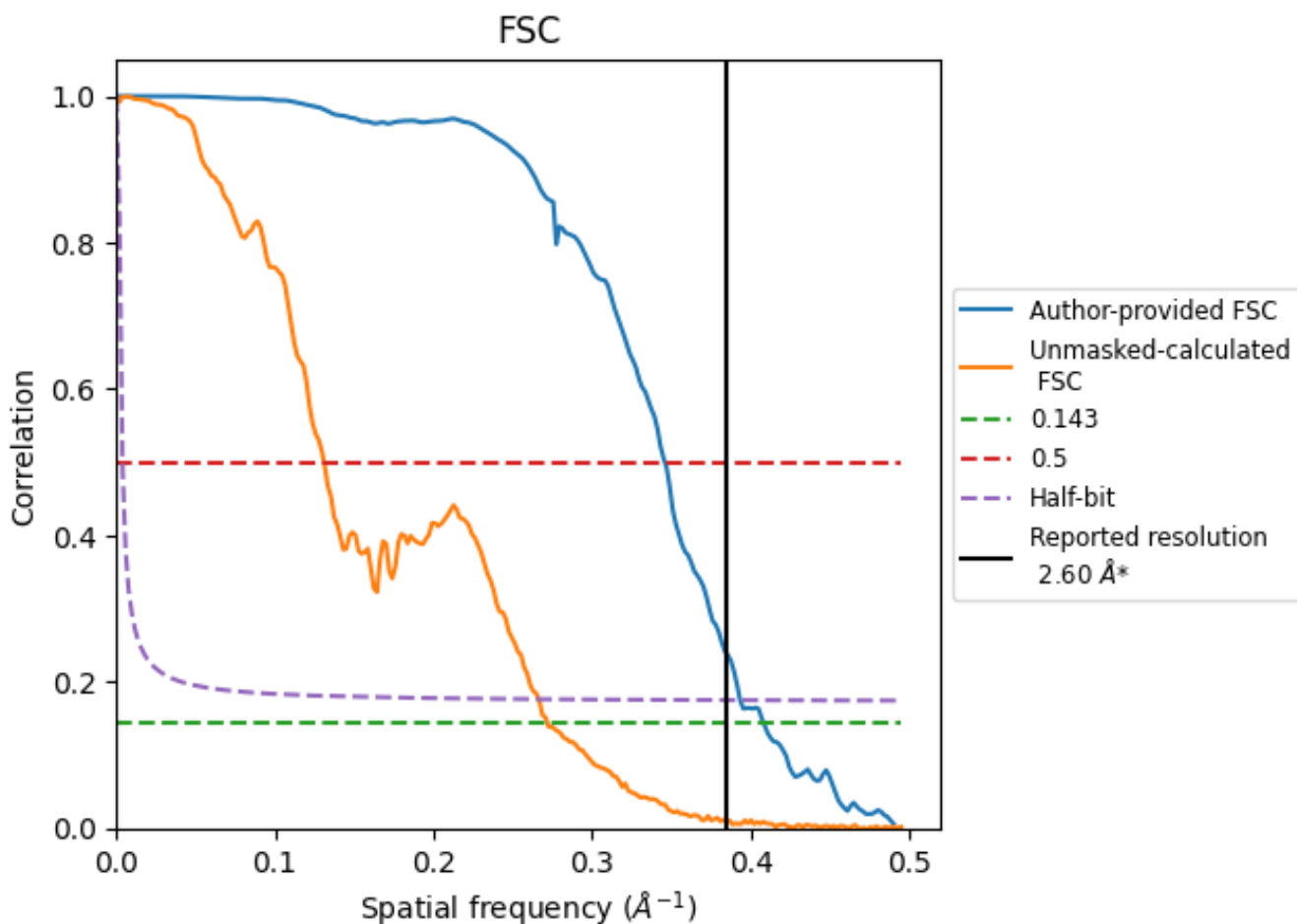


*Reported resolution corresponds to spatial frequency of 0.385 Å⁻¹

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 0.385 Å⁻¹

8.2 Resolution estimates [i](#)

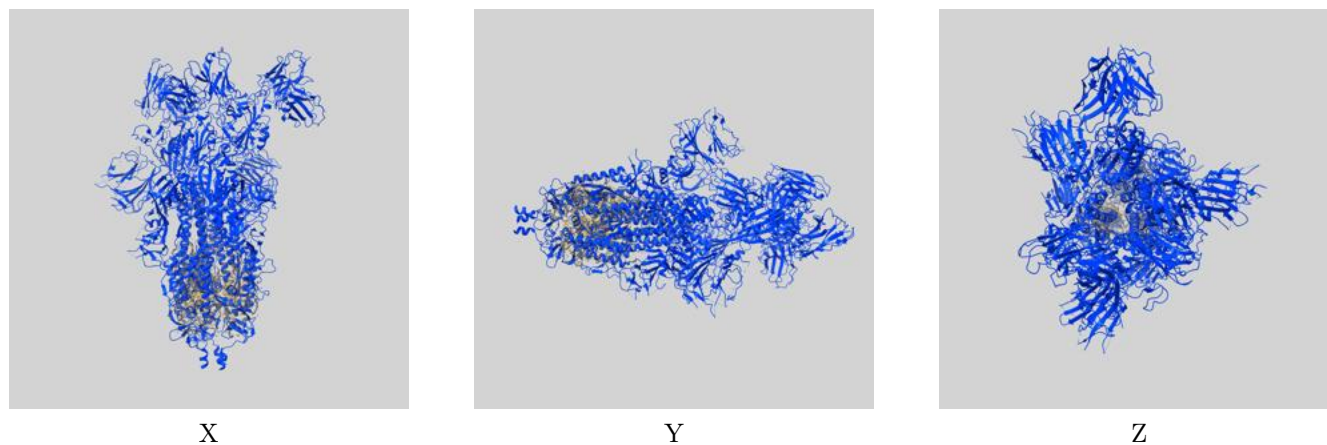
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.60	-	-
Author-provided FSC curve	2.45	2.89	2.54
Unmasked-calculated*	3.68	7.64	3.76

*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 3.68 differs from the reported value 2.6 by more than 10 %

9 Map-model fit [i](#)

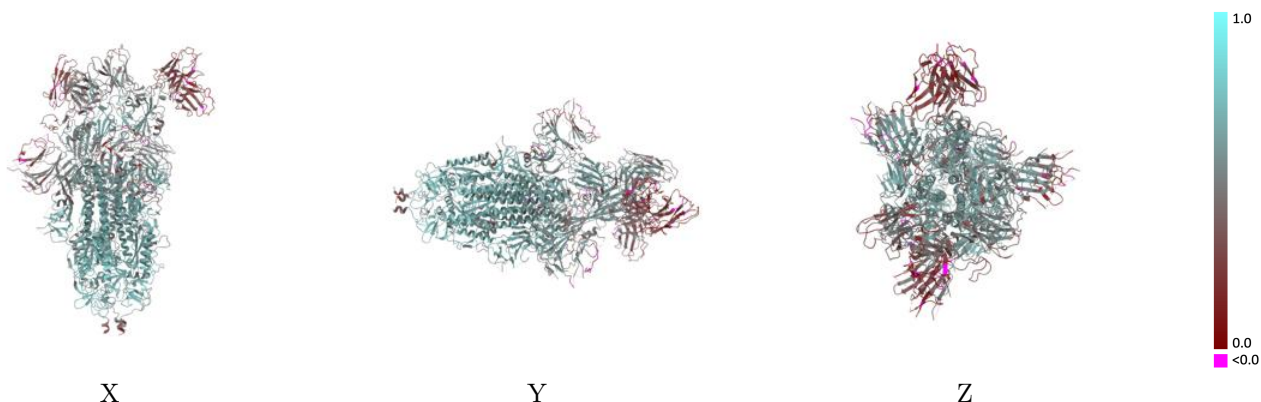
This section contains information regarding the fit between EMDB map EMD-18180 and PDB model 8Q5Y. Per-residue inclusion information can be found in section 3 on page 12.

9.1 Map-model overlay [i](#)



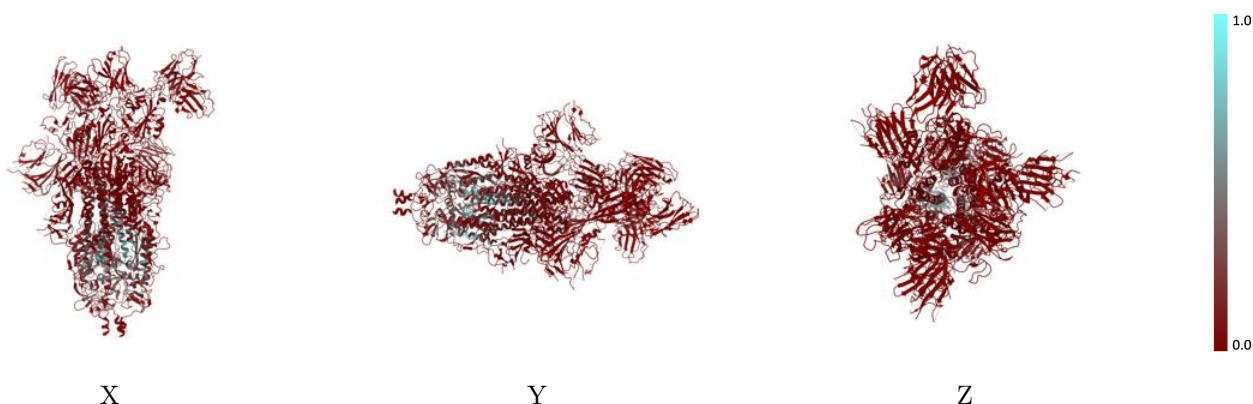
The images above show the 3D surface view of the map at the recommended contour level 1.9 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



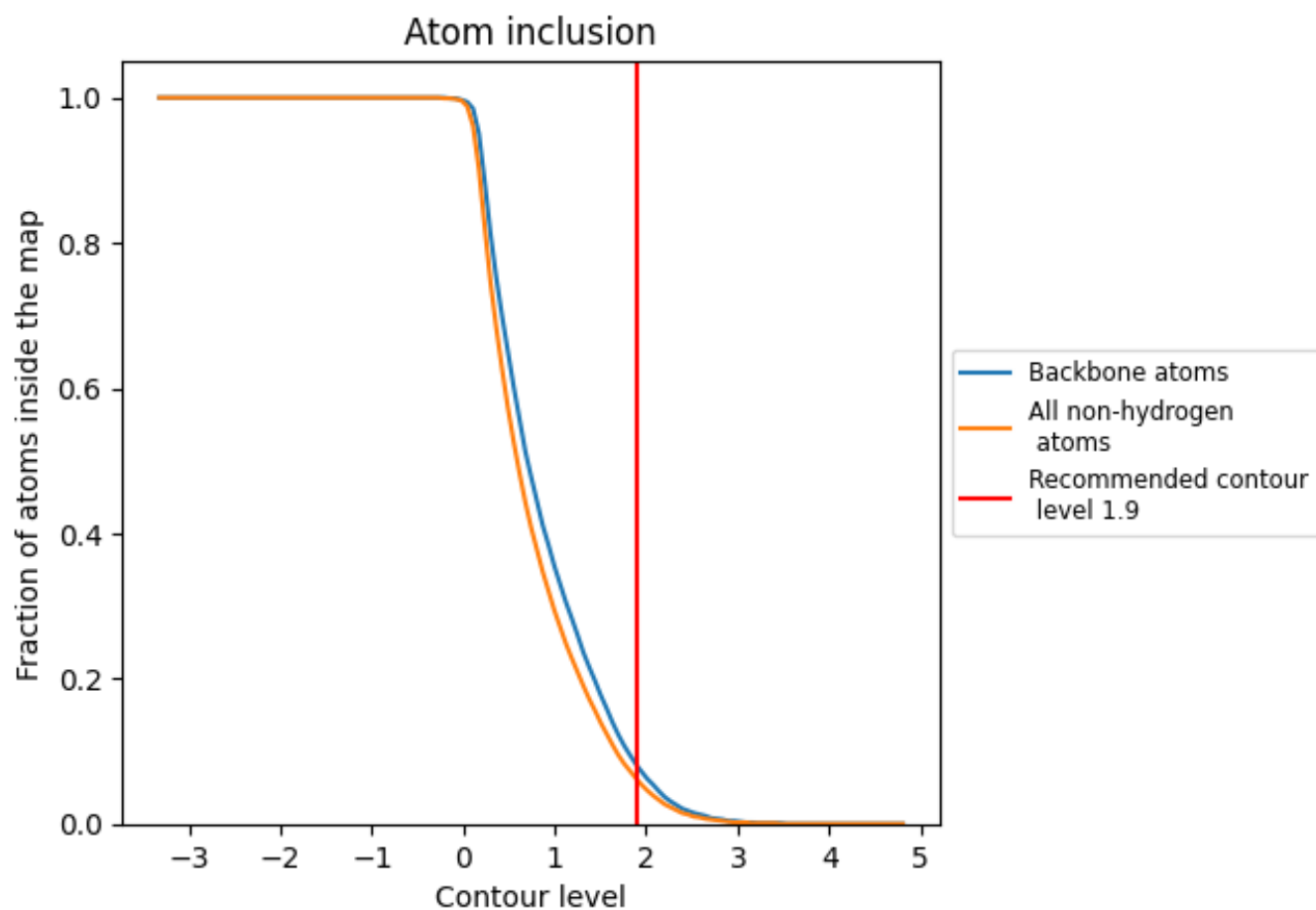
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (1.9).





















9.4 Atom inclusion [i](#)



At the recommended contour level, 8% of all backbone atoms, 6% 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 (1.9) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.0610	 0.5160
A	 0.0000	 0.2410
B	 0.0000	 0.2370
C	 0.0730	 0.5490
D	 0.0700	 0.5660
E	 0.0790	 0.5510
G	 0.0000	 0.4750
H	 0.0000	 0.4750
L	 0.0000	 0.3510
R	 0.0000	 0.2370

