wwPDB EM Validation Summary Report

Nov 23, 2022 – 02:47 AM EST

PDB ID	:	7N9B
EMDB ID	:	EMD-24255
Title	:	Potent neutralizing nanobodies resist convergent circulating variants of SARS-CoV-2 by targeting novel and conserved epitopes-CovS with NB21
Authors	:	Sun, D.; Zhang, C.; Shi, Y.
Deposited on	:	2021-06-17
Resolution	:	3.80 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
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:

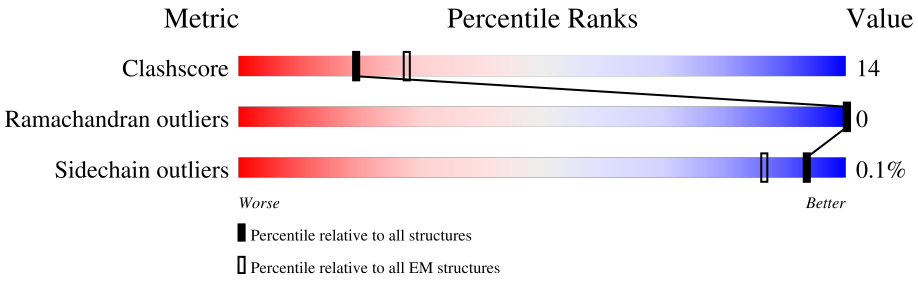
EMDB validation analysis	:	0.0.1.dev43
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.80 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 >=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 <=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	1380	51% 20% 28%
1	B	1380	11% 53% 18% 29%
1	C	1380	51% 20% 28%
2	D	146	36% 42% 38% 20%
2	F	146	42% 45% 35% 20%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 24575 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	989	Total	C	N	O	S	0	0
			7631	4888	1264	1446	33		
1	B	986	Total	C	N	O	S	0	0
			7560	4837	1258	1431	34		
1	C	988	Total	C	N	O	S	0	0
			7618	4875	1266	1444	33		

There are 543 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP P0DTC2
A	2	GLY	-	expression tag	UNP P0DTC2
A	3	GLY	-	expression tag	UNP P0DTC2
A	4	GLU	-	expression tag	UNP P0DTC2
A	5	GLY	-	expression tag	UNP P0DTC2
A	6	LEU	-	expression tag	UNP P0DTC2
A	7	ARG	-	expression tag	UNP P0DTC2
A	8	ALA	-	expression tag	UNP P0DTC2
A	9	SER	-	expression tag	UNP P0DTC2
A	10	PRO	-	expression tag	UNP P0DTC2
A	11	ARG	-	expression tag	UNP P0DTC2
A	12	ARG	-	expression tag	UNP P0DTC2
A	13	ARG	-	expression tag	UNP P0DTC2
A	14	PRO	-	expression tag	UNP P0DTC2
A	15	LEU	-	expression tag	UNP P0DTC2
A	16	LEU	-	expression tag	UNP P0DTC2
A	17	PRO	-	expression tag	UNP P0DTC2
A	18	LEU	-	expression tag	UNP P0DTC2
A	19	GLN	-	expression tag	UNP P0DTC2
A	20	PRO	-	expression tag	UNP P0DTC2
A	21	ARG	-	expression tag	UNP P0DTC2
A	22	GLY	-	expression tag	UNP P0DTC2
A	23	CYS	-	expression tag	UNP P0DTC2
A	24	PRO	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	25	ARG	-	expression tag	UNP P0DTC2
A	26	GLY	-	expression tag	UNP P0DTC2
A	27	ASP	-	expression tag	UNP P0DTC2
A	28	GLY	-	expression tag	UNP P0DTC2
A	29	CYS	-	expression tag	UNP P0DTC2
A	30	LEU	-	expression tag	UNP P0DTC2
A	31	ARG	-	expression tag	UNP P0DTC2
A	32	GLY	-	expression tag	UNP P0DTC2
A	33	GLY	-	expression tag	UNP P0DTC2
A	34	ARG	-	expression tag	UNP P0DTC2
A	35	GLY	-	expression tag	UNP P0DTC2
A	36	ARG	-	expression tag	UNP P0DTC2
A	37	ALA	-	expression tag	UNP P0DTC2
A	38	GLY	-	expression tag	UNP P0DTC2
A	39	PHE	-	expression tag	UNP P0DTC2
A	40	GLY	-	expression tag	UNP P0DTC2
A	41	PHE	-	expression tag	UNP P0DTC2
A	42	TRP	-	expression tag	UNP P0DTC2
A	43	ARG	-	expression tag	UNP P0DTC2
A	44	VAL	-	expression tag	UNP P0DTC2
A	45	THR	-	expression tag	UNP P0DTC2
A	46	GLY	-	expression tag	UNP P0DTC2
A	47	GLY	-	expression tag	UNP P0DTC2
A	48	SER	-	expression tag	UNP P0DTC2
A	49	SER	-	expression tag	UNP P0DTC2
A	50	ALA	-	expression tag	UNP P0DTC2
A	51	SER	-	expression tag	UNP P0DTC2
A	52	ALA	-	expression tag	UNP P0DTC2
A	53	ASN	-	expression tag	UNP P0DTC2
A	54	HIS	-	expression tag	UNP P0DTC2
A	55	VAL	-	expression tag	UNP P0DTC2
A	56	HIS	-	expression tag	UNP P0DTC2
A	57	ALA	-	expression tag	UNP P0DTC2
A	58	PHE	-	expression tag	UNP P0DTC2
A	59	PHE	-	expression tag	UNP P0DTC2
A	60	PHE	-	expression tag	UNP P0DTC2
A	61	PHE	-	expression tag	UNP P0DTC2
A	62	LEU	-	expression tag	UNP P0DTC2
A	63	GLN	-	expression tag	UNP P0DTC2
A	64	LEU	-	expression tag	UNP P0DTC2
A	65	LEU	-	expression tag	UNP P0DTC2
A	66	GLY	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	67	ASN	-	expression tag	UNP P0DTC2
A	68	VAL	-	expression tag	UNP P0DTC2
A	69	LEU	-	expression tag	UNP P0DTC2
A	70	VAL	-	expression tag	UNP P0DTC2
A	71	VAL	-	expression tag	UNP P0DTC2
A	72	VAL	-	expression tag	UNP P0DTC2
A	73	LEU	-	expression tag	UNP P0DTC2
A	74	SER	-	expression tag	UNP P0DTC2
A	75	HIS	-	expression tag	UNP P0DTC2
A	76	HIS	-	expression tag	UNP P0DTC2
A	77	PHE	-	expression tag	UNP P0DTC2
A	78	GLY	-	expression tag	UNP P0DTC2
A	79	LYS	-	expression tag	UNP P0DTC2
A	80	GLU	-	expression tag	UNP P0DTC2
A	81	LEU	-	expression tag	UNP P0DTC2
A	82	ARG	-	expression tag	UNP P0DTC2
A	83	PRO	-	expression tag	UNP P0DTC2
A	84	SER	-	expression tag	UNP P0DTC2
A	85	GLN	-	expression tag	UNP P0DTC2
A	86	ALA	-	expression tag	UNP P0DTC2
A	87	GLU	-	expression tag	UNP P0DTC2
A	88	PHE	-	expression tag	UNP P0DTC2
A	89	GLY	-	expression tag	UNP P0DTC2
A	90	THR	-	expression tag	UNP P0DTC2
A	91	ALA	-	expression tag	UNP P0DTC2
A	92	THR	-	expression tag	UNP P0DTC2
A	774	GLY	ARG	engineered mutation	UNP P0DTC2
A	775	SER	ARG	engineered mutation	UNP P0DTC2
A	777	SER	ARG	engineered mutation	UNP P0DTC2
A	909	PRO	PHE	engineered mutation	UNP P0DTC2
A	984	PRO	ALA	engineered mutation	UNP P0DTC2
A	991	PRO	ALA	engineered mutation	UNP P0DTC2
A	1034	PRO	ALA	engineered mutation	UNP P0DTC2
A	1078	PRO	LYS	engineered mutation	UNP P0DTC2
A	1079	PRO	VAL	engineered mutation	UNP P0DTC2
A	1301	GLY	-	expression tag	UNP P0DTC2
A	1302	SER	-	expression tag	UNP P0DTC2
A	1303	GLY	-	expression tag	UNP P0DTC2
A	1304	TYR	-	expression tag	UNP P0DTC2
A	1305	ILE	-	expression tag	UNP P0DTC2
A	1306	PRO	-	expression tag	UNP P0DTC2
A	1307	GLU	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1308	ALA	-	expression tag	UNP P0DTC2
A	1309	PRO	-	expression tag	UNP P0DTC2
A	1310	ARG	-	expression tag	UNP P0DTC2
A	1311	ASP	-	expression tag	UNP P0DTC2
A	1312	GLY	-	expression tag	UNP P0DTC2
A	1313	GLN	-	expression tag	UNP P0DTC2
A	1314	ALA	-	expression tag	UNP P0DTC2
A	1315	TYR	-	expression tag	UNP P0DTC2
A	1316	VAL	-	expression tag	UNP P0DTC2
A	1317	ARG	-	expression tag	UNP P0DTC2
A	1318	LYS	-	expression tag	UNP P0DTC2
A	1319	ASP	-	expression tag	UNP P0DTC2
A	1320	GLY	-	expression tag	UNP P0DTC2
A	1321	GLU	-	expression tag	UNP P0DTC2
A	1322	TRP	-	expression tag	UNP P0DTC2
A	1323	VAL	-	expression tag	UNP P0DTC2
A	1324	LEU	-	expression tag	UNP P0DTC2
A	1325	LEU	-	expression tag	UNP P0DTC2
A	1326	SER	-	expression tag	UNP P0DTC2
A	1327	THR	-	expression tag	UNP P0DTC2
A	1328	PHE	-	expression tag	UNP P0DTC2
A	1329	LEU	-	expression tag	UNP P0DTC2
A	1330	GLY	-	expression tag	UNP P0DTC2
A	1331	ARG	-	expression tag	UNP P0DTC2
A	1332	SER	-	expression tag	UNP P0DTC2
A	1333	LEU	-	expression tag	UNP P0DTC2
A	1334	GLU	-	expression tag	UNP P0DTC2
A	1335	VAL	-	expression tag	UNP P0DTC2
A	1336	LEU	-	expression tag	UNP P0DTC2
A	1337	PHE	-	expression tag	UNP P0DTC2
A	1338	GLN	-	expression tag	UNP P0DTC2
A	1339	GLY	-	expression tag	UNP P0DTC2
A	1340	PRO	-	expression tag	UNP P0DTC2
A	1341	GLY	-	expression tag	UNP P0DTC2
A	1342	HIS	-	expression tag	UNP P0DTC2
A	1343	HIS	-	expression tag	UNP P0DTC2
A	1344	HIS	-	expression tag	UNP P0DTC2
A	1345	HIS	-	expression tag	UNP P0DTC2
A	1346	HIS	-	expression tag	UNP P0DTC2
A	1347	HIS	-	expression tag	UNP P0DTC2
A	1348	HIS	-	expression tag	UNP P0DTC2
A	1349	HIS	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1350	SER	-	expression tag	UNP P0DTC2
A	1351	ALA	-	expression tag	UNP P0DTC2
A	1352	TRP	-	expression tag	UNP P0DTC2
A	1353	SER	-	expression tag	UNP P0DTC2
A	1354	HIS	-	expression tag	UNP P0DTC2
A	1355	PRO	-	expression tag	UNP P0DTC2
A	1356	GLN	-	expression tag	UNP P0DTC2
A	1357	PHE	-	expression tag	UNP P0DTC2
A	1358	GLU	-	expression tag	UNP P0DTC2
A	1359	LYS	-	expression tag	UNP P0DTC2
A	1360	GLY	-	expression tag	UNP P0DTC2
A	1361	GLY	-	expression tag	UNP P0DTC2
A	1362	GLY	-	expression tag	UNP P0DTC2
A	1363	SER	-	expression tag	UNP P0DTC2
A	1364	GLY	-	expression tag	UNP P0DTC2
A	1365	GLY	-	expression tag	UNP P0DTC2
A	1366	GLY	-	expression tag	UNP P0DTC2
A	1367	GLY	-	expression tag	UNP P0DTC2
A	1368	SER	-	expression tag	UNP P0DTC2
A	1369	GLY	-	expression tag	UNP P0DTC2
A	1370	GLY	-	expression tag	UNP P0DTC2
A	1371	SER	-	expression tag	UNP P0DTC2
A	1372	ALA	-	expression tag	UNP P0DTC2
A	1373	TRP	-	expression tag	UNP P0DTC2
A	1374	SER	-	expression tag	UNP P0DTC2
A	1375	HIS	-	expression tag	UNP P0DTC2
A	1376	PRO	-	expression tag	UNP P0DTC2
A	1377	GLN	-	expression tag	UNP P0DTC2
A	1378	PHE	-	expression tag	UNP P0DTC2
A	1379	GLU	-	expression tag	UNP P0DTC2
A	1380	LYS	-	expression tag	UNP P0DTC2
B	1	MET	-	initiating methionine	UNP P0DTC2
B	2	GLY	-	expression tag	UNP P0DTC2
B	3	GLY	-	expression tag	UNP P0DTC2
B	4	GLU	-	expression tag	UNP P0DTC2
B	5	GLY	-	expression tag	UNP P0DTC2
B	6	LEU	-	expression tag	UNP P0DTC2
B	7	ARG	-	expression tag	UNP P0DTC2
B	8	ALA	-	expression tag	UNP P0DTC2
B	9	SER	-	expression tag	UNP P0DTC2
B	10	PRO	-	expression tag	UNP P0DTC2
B	11	ARG	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	12	ARG	-	expression tag	UNP P0DTC2
B	13	ARG	-	expression tag	UNP P0DTC2
B	14	PRO	-	expression tag	UNP P0DTC2
B	15	LEU	-	expression tag	UNP P0DTC2
B	16	LEU	-	expression tag	UNP P0DTC2
B	17	PRO	-	expression tag	UNP P0DTC2
B	18	LEU	-	expression tag	UNP P0DTC2
B	19	GLN	-	expression tag	UNP P0DTC2
B	20	PRO	-	expression tag	UNP P0DTC2
B	21	ARG	-	expression tag	UNP P0DTC2
B	22	GLY	-	expression tag	UNP P0DTC2
B	23	CYS	-	expression tag	UNP P0DTC2
B	24	PRO	-	expression tag	UNP P0DTC2
B	25	ARG	-	expression tag	UNP P0DTC2
B	26	GLY	-	expression tag	UNP P0DTC2
B	27	ASP	-	expression tag	UNP P0DTC2
B	28	GLY	-	expression tag	UNP P0DTC2
B	29	CYS	-	expression tag	UNP P0DTC2
B	30	LEU	-	expression tag	UNP P0DTC2
B	31	ARG	-	expression tag	UNP P0DTC2
B	32	GLY	-	expression tag	UNP P0DTC2
B	33	GLY	-	expression tag	UNP P0DTC2
B	34	ARG	-	expression tag	UNP P0DTC2
B	35	GLY	-	expression tag	UNP P0DTC2
B	36	ARG	-	expression tag	UNP P0DTC2
B	37	ALA	-	expression tag	UNP P0DTC2
B	38	GLY	-	expression tag	UNP P0DTC2
B	39	PHE	-	expression tag	UNP P0DTC2
B	40	GLY	-	expression tag	UNP P0DTC2
B	41	PHE	-	expression tag	UNP P0DTC2
B	42	TRP	-	expression tag	UNP P0DTC2
B	43	ARG	-	expression tag	UNP P0DTC2
B	44	VAL	-	expression tag	UNP P0DTC2
B	45	THR	-	expression tag	UNP P0DTC2
B	46	GLY	-	expression tag	UNP P0DTC2
B	47	GLY	-	expression tag	UNP P0DTC2
B	48	SER	-	expression tag	UNP P0DTC2
B	49	SER	-	expression tag	UNP P0DTC2
B	50	ALA	-	expression tag	UNP P0DTC2
B	51	SER	-	expression tag	UNP P0DTC2
B	52	ALA	-	expression tag	UNP P0DTC2
B	53	ASN	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	54	HIS	-	expression tag	UNP P0DTC2
B	55	VAL	-	expression tag	UNP P0DTC2
B	56	HIS	-	expression tag	UNP P0DTC2
B	57	ALA	-	expression tag	UNP P0DTC2
B	58	PHE	-	expression tag	UNP P0DTC2
B	59	PHE	-	expression tag	UNP P0DTC2
B	60	PHE	-	expression tag	UNP P0DTC2
B	61	PHE	-	expression tag	UNP P0DTC2
B	62	LEU	-	expression tag	UNP P0DTC2
B	63	GLN	-	expression tag	UNP P0DTC2
B	64	LEU	-	expression tag	UNP P0DTC2
B	65	LEU	-	expression tag	UNP P0DTC2
B	66	GLY	-	expression tag	UNP P0DTC2
B	67	ASN	-	expression tag	UNP P0DTC2
B	68	VAL	-	expression tag	UNP P0DTC2
B	69	LEU	-	expression tag	UNP P0DTC2
B	70	VAL	-	expression tag	UNP P0DTC2
B	71	VAL	-	expression tag	UNP P0DTC2
B	72	VAL	-	expression tag	UNP P0DTC2
B	73	LEU	-	expression tag	UNP P0DTC2
B	74	SER	-	expression tag	UNP P0DTC2
B	75	HIS	-	expression tag	UNP P0DTC2
B	76	HIS	-	expression tag	UNP P0DTC2
B	77	PHE	-	expression tag	UNP P0DTC2
B	78	GLY	-	expression tag	UNP P0DTC2
B	79	LYS	-	expression tag	UNP P0DTC2
B	80	GLU	-	expression tag	UNP P0DTC2
B	81	LEU	-	expression tag	UNP P0DTC2
B	82	ARG	-	expression tag	UNP P0DTC2
B	83	PRO	-	expression tag	UNP P0DTC2
B	84	SER	-	expression tag	UNP P0DTC2
B	85	GLN	-	expression tag	UNP P0DTC2
B	86	ALA	-	expression tag	UNP P0DTC2
B	87	GLU	-	expression tag	UNP P0DTC2
B	88	PHE	-	expression tag	UNP P0DTC2
B	89	GLY	-	expression tag	UNP P0DTC2
B	90	THR	-	expression tag	UNP P0DTC2
B	91	ALA	-	expression tag	UNP P0DTC2
B	92	THR	-	expression tag	UNP P0DTC2
B	774	GLY	ARG	engineered mutation	UNP P0DTC2
B	775	SER	ARG	engineered mutation	UNP P0DTC2
B	777	SER	ARG	engineered mutation	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	909	PRO	PHE	engineered mutation	UNP P0DTC2
B	984	PRO	ALA	engineered mutation	UNP P0DTC2
B	991	PRO	ALA	engineered mutation	UNP P0DTC2
B	1034	PRO	ALA	engineered mutation	UNP P0DTC2
B	1078	PRO	LYS	engineered mutation	UNP P0DTC2
B	1079	PRO	VAL	engineered mutation	UNP P0DTC2
B	1301	GLY	-	expression tag	UNP P0DTC2
B	1302	SER	-	expression tag	UNP P0DTC2
B	1303	GLY	-	expression tag	UNP P0DTC2
B	1304	TYR	-	expression tag	UNP P0DTC2
B	1305	ILE	-	expression tag	UNP P0DTC2
B	1306	PRO	-	expression tag	UNP P0DTC2
B	1307	GLU	-	expression tag	UNP P0DTC2
B	1308	ALA	-	expression tag	UNP P0DTC2
B	1309	PRO	-	expression tag	UNP P0DTC2
B	1310	ARG	-	expression tag	UNP P0DTC2
B	1311	ASP	-	expression tag	UNP P0DTC2
B	1312	GLY	-	expression tag	UNP P0DTC2
B	1313	GLN	-	expression tag	UNP P0DTC2
B	1314	ALA	-	expression tag	UNP P0DTC2
B	1315	TYR	-	expression tag	UNP P0DTC2
B	1316	VAL	-	expression tag	UNP P0DTC2
B	1317	ARG	-	expression tag	UNP P0DTC2
B	1318	LYS	-	expression tag	UNP P0DTC2
B	1319	ASP	-	expression tag	UNP P0DTC2
B	1320	GLY	-	expression tag	UNP P0DTC2
B	1321	GLU	-	expression tag	UNP P0DTC2
B	1322	TRP	-	expression tag	UNP P0DTC2
B	1323	VAL	-	expression tag	UNP P0DTC2
B	1324	LEU	-	expression tag	UNP P0DTC2
B	1325	LEU	-	expression tag	UNP P0DTC2
B	1326	SER	-	expression tag	UNP P0DTC2
B	1327	THR	-	expression tag	UNP P0DTC2
B	1328	PHE	-	expression tag	UNP P0DTC2
B	1329	LEU	-	expression tag	UNP P0DTC2
B	1330	GLY	-	expression tag	UNP P0DTC2
B	1331	ARG	-	expression tag	UNP P0DTC2
B	1332	SER	-	expression tag	UNP P0DTC2
B	1333	LEU	-	expression tag	UNP P0DTC2
B	1334	GLU	-	expression tag	UNP P0DTC2
B	1335	VAL	-	expression tag	UNP P0DTC2
B	1336	LEU	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	1337	PHE	-	expression tag	UNP P0DTC2
B	1338	GLN	-	expression tag	UNP P0DTC2
B	1339	GLY	-	expression tag	UNP P0DTC2
B	1340	PRO	-	expression tag	UNP P0DTC2
B	1341	GLY	-	expression tag	UNP P0DTC2
B	1342	HIS	-	expression tag	UNP P0DTC2
B	1343	HIS	-	expression tag	UNP P0DTC2
B	1344	HIS	-	expression tag	UNP P0DTC2
B	1345	HIS	-	expression tag	UNP P0DTC2
B	1346	HIS	-	expression tag	UNP P0DTC2
B	1347	HIS	-	expression tag	UNP P0DTC2
B	1348	HIS	-	expression tag	UNP P0DTC2
B	1349	HIS	-	expression tag	UNP P0DTC2
B	1350	SER	-	expression tag	UNP P0DTC2
B	1351	ALA	-	expression tag	UNP P0DTC2
B	1352	TRP	-	expression tag	UNP P0DTC2
B	1353	SER	-	expression tag	UNP P0DTC2
B	1354	HIS	-	expression tag	UNP P0DTC2
B	1355	PRO	-	expression tag	UNP P0DTC2
B	1356	GLN	-	expression tag	UNP P0DTC2
B	1357	PHE	-	expression tag	UNP P0DTC2
B	1358	GLU	-	expression tag	UNP P0DTC2
B	1359	LYS	-	expression tag	UNP P0DTC2
B	1360	GLY	-	expression tag	UNP P0DTC2
B	1361	GLY	-	expression tag	UNP P0DTC2
B	1362	GLY	-	expression tag	UNP P0DTC2
B	1363	SER	-	expression tag	UNP P0DTC2
B	1364	GLY	-	expression tag	UNP P0DTC2
B	1365	GLY	-	expression tag	UNP P0DTC2
B	1366	GLY	-	expression tag	UNP P0DTC2
B	1367	GLY	-	expression tag	UNP P0DTC2
B	1368	SER	-	expression tag	UNP P0DTC2
B	1369	GLY	-	expression tag	UNP P0DTC2
B	1370	GLY	-	expression tag	UNP P0DTC2
B	1371	SER	-	expression tag	UNP P0DTC2
B	1372	ALA	-	expression tag	UNP P0DTC2
B	1373	TRP	-	expression tag	UNP P0DTC2
B	1374	SER	-	expression tag	UNP P0DTC2
B	1375	HIS	-	expression tag	UNP P0DTC2
B	1376	PRO	-	expression tag	UNP P0DTC2
B	1377	GLN	-	expression tag	UNP P0DTC2
B	1378	PHE	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	1379	GLU	-	expression tag	UNP P0DTC2
B	1380	LYS	-	expression tag	UNP P0DTC2
C	1	MET	-	initiating methionine	UNP P0DTC2
C	2	GLY	-	expression tag	UNP P0DTC2
C	3	GLY	-	expression tag	UNP P0DTC2
C	4	GLU	-	expression tag	UNP P0DTC2
C	5	GLY	-	expression tag	UNP P0DTC2
C	6	LEU	-	expression tag	UNP P0DTC2
C	7	ARG	-	expression tag	UNP P0DTC2
C	8	ALA	-	expression tag	UNP P0DTC2
C	9	SER	-	expression tag	UNP P0DTC2
C	10	PRO	-	expression tag	UNP P0DTC2
C	11	ARG	-	expression tag	UNP P0DTC2
C	12	ARG	-	expression tag	UNP P0DTC2
C	13	ARG	-	expression tag	UNP P0DTC2
C	14	PRO	-	expression tag	UNP P0DTC2
C	15	LEU	-	expression tag	UNP P0DTC2
C	16	LEU	-	expression tag	UNP P0DTC2
C	17	PRO	-	expression tag	UNP P0DTC2
C	18	LEU	-	expression tag	UNP P0DTC2
C	19	GLN	-	expression tag	UNP P0DTC2
C	20	PRO	-	expression tag	UNP P0DTC2
C	21	ARG	-	expression tag	UNP P0DTC2
C	22	GLY	-	expression tag	UNP P0DTC2
C	23	CYS	-	expression tag	UNP P0DTC2
C	24	PRO	-	expression tag	UNP P0DTC2
C	25	ARG	-	expression tag	UNP P0DTC2
C	26	GLY	-	expression tag	UNP P0DTC2
C	27	ASP	-	expression tag	UNP P0DTC2
C	28	GLY	-	expression tag	UNP P0DTC2
C	29	CYS	-	expression tag	UNP P0DTC2
C	30	LEU	-	expression tag	UNP P0DTC2
C	31	ARG	-	expression tag	UNP P0DTC2
C	32	GLY	-	expression tag	UNP P0DTC2
C	33	GLY	-	expression tag	UNP P0DTC2
C	34	ARG	-	expression tag	UNP P0DTC2
C	35	GLY	-	expression tag	UNP P0DTC2
C	36	ARG	-	expression tag	UNP P0DTC2
C	37	ALA	-	expression tag	UNP P0DTC2
C	38	GLY	-	expression tag	UNP P0DTC2
C	39	PHE	-	expression tag	UNP P0DTC2
C	40	GLY	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	41	PHE	-	expression tag	UNP P0DTC2
C	42	TRP	-	expression tag	UNP P0DTC2
C	43	ARG	-	expression tag	UNP P0DTC2
C	44	VAL	-	expression tag	UNP P0DTC2
C	45	THR	-	expression tag	UNP P0DTC2
C	46	GLY	-	expression tag	UNP P0DTC2
C	47	GLY	-	expression tag	UNP P0DTC2
C	48	SER	-	expression tag	UNP P0DTC2
C	49	SER	-	expression tag	UNP P0DTC2
C	50	ALA	-	expression tag	UNP P0DTC2
C	51	SER	-	expression tag	UNP P0DTC2
C	52	ALA	-	expression tag	UNP P0DTC2
C	53	ASN	-	expression tag	UNP P0DTC2
C	54	HIS	-	expression tag	UNP P0DTC2
C	55	VAL	-	expression tag	UNP P0DTC2
C	56	HIS	-	expression tag	UNP P0DTC2
C	57	ALA	-	expression tag	UNP P0DTC2
C	58	PHE	-	expression tag	UNP P0DTC2
C	59	PHE	-	expression tag	UNP P0DTC2
C	60	PHE	-	expression tag	UNP P0DTC2
C	61	PHE	-	expression tag	UNP P0DTC2
C	62	LEU	-	expression tag	UNP P0DTC2
C	63	GLN	-	expression tag	UNP P0DTC2
C	64	LEU	-	expression tag	UNP P0DTC2
C	65	LEU	-	expression tag	UNP P0DTC2
C	66	GLY	-	expression tag	UNP P0DTC2
C	67	ASN	-	expression tag	UNP P0DTC2
C	68	VAL	-	expression tag	UNP P0DTC2
C	69	LEU	-	expression tag	UNP P0DTC2
C	70	VAL	-	expression tag	UNP P0DTC2
C	71	VAL	-	expression tag	UNP P0DTC2
C	72	VAL	-	expression tag	UNP P0DTC2
C	73	LEU	-	expression tag	UNP P0DTC2
C	74	SER	-	expression tag	UNP P0DTC2
C	75	HIS	-	expression tag	UNP P0DTC2
C	76	HIS	-	expression tag	UNP P0DTC2
C	77	PHE	-	expression tag	UNP P0DTC2
C	78	GLY	-	expression tag	UNP P0DTC2
C	79	LYS	-	expression tag	UNP P0DTC2
C	80	GLU	-	expression tag	UNP P0DTC2
C	81	LEU	-	expression tag	UNP P0DTC2
C	82	ARG	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	83	PRO	-	expression tag	UNP P0DTC2
C	84	SER	-	expression tag	UNP P0DTC2
C	85	GLN	-	expression tag	UNP P0DTC2
C	86	ALA	-	expression tag	UNP P0DTC2
C	87	GLU	-	expression tag	UNP P0DTC2
C	88	PHE	-	expression tag	UNP P0DTC2
C	89	GLY	-	expression tag	UNP P0DTC2
C	90	THR	-	expression tag	UNP P0DTC2
C	91	ALA	-	expression tag	UNP P0DTC2
C	92	THR	-	expression tag	UNP P0DTC2
C	774	GLY	ARG	engineered mutation	UNP P0DTC2
C	775	SER	ARG	engineered mutation	UNP P0DTC2
C	777	SER	ARG	engineered mutation	UNP P0DTC2
C	909	PRO	PHE	engineered mutation	UNP P0DTC2
C	984	PRO	ALA	engineered mutation	UNP P0DTC2
C	991	PRO	ALA	engineered mutation	UNP P0DTC2
C	1034	PRO	ALA	engineered mutation	UNP P0DTC2
C	1078	PRO	LYS	engineered mutation	UNP P0DTC2
C	1079	PRO	VAL	engineered mutation	UNP P0DTC2
C	1301	GLY	-	expression tag	UNP P0DTC2
C	1302	SER	-	expression tag	UNP P0DTC2
C	1303	GLY	-	expression tag	UNP P0DTC2
C	1304	TYR	-	expression tag	UNP P0DTC2
C	1305	ILE	-	expression tag	UNP P0DTC2
C	1306	PRO	-	expression tag	UNP P0DTC2
C	1307	GLU	-	expression tag	UNP P0DTC2
C	1308	ALA	-	expression tag	UNP P0DTC2
C	1309	PRO	-	expression tag	UNP P0DTC2
C	1310	ARG	-	expression tag	UNP P0DTC2
C	1311	ASP	-	expression tag	UNP P0DTC2
C	1312	GLY	-	expression tag	UNP P0DTC2
C	1313	GLN	-	expression tag	UNP P0DTC2
C	1314	ALA	-	expression tag	UNP P0DTC2
C	1315	TYR	-	expression tag	UNP P0DTC2
C	1316	VAL	-	expression tag	UNP P0DTC2
C	1317	ARG	-	expression tag	UNP P0DTC2
C	1318	LYS	-	expression tag	UNP P0DTC2
C	1319	ASP	-	expression tag	UNP P0DTC2
C	1320	GLY	-	expression tag	UNP P0DTC2
C	1321	GLU	-	expression tag	UNP P0DTC2
C	1322	TRP	-	expression tag	UNP P0DTC2
C	1323	VAL	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1324	LEU	-	expression tag	UNP P0DTC2
C	1325	LEU	-	expression tag	UNP P0DTC2
C	1326	SER	-	expression tag	UNP P0DTC2
C	1327	THR	-	expression tag	UNP P0DTC2
C	1328	PHE	-	expression tag	UNP P0DTC2
C	1329	LEU	-	expression tag	UNP P0DTC2
C	1330	GLY	-	expression tag	UNP P0DTC2
C	1331	ARG	-	expression tag	UNP P0DTC2
C	1332	SER	-	expression tag	UNP P0DTC2
C	1333	LEU	-	expression tag	UNP P0DTC2
C	1334	GLU	-	expression tag	UNP P0DTC2
C	1335	VAL	-	expression tag	UNP P0DTC2
C	1336	LEU	-	expression tag	UNP P0DTC2
C	1337	PHE	-	expression tag	UNP P0DTC2
C	1338	GLN	-	expression tag	UNP P0DTC2
C	1339	GLY	-	expression tag	UNP P0DTC2
C	1340	PRO	-	expression tag	UNP P0DTC2
C	1341	GLY	-	expression tag	UNP P0DTC2
C	1342	HIS	-	expression tag	UNP P0DTC2
C	1343	HIS	-	expression tag	UNP P0DTC2
C	1344	HIS	-	expression tag	UNP P0DTC2
C	1345	HIS	-	expression tag	UNP P0DTC2
C	1346	HIS	-	expression tag	UNP P0DTC2
C	1347	HIS	-	expression tag	UNP P0DTC2
C	1348	HIS	-	expression tag	UNP P0DTC2
C	1349	HIS	-	expression tag	UNP P0DTC2
C	1350	SER	-	expression tag	UNP P0DTC2
C	1351	ALA	-	expression tag	UNP P0DTC2
C	1352	TRP	-	expression tag	UNP P0DTC2
C	1353	SER	-	expression tag	UNP P0DTC2
C	1354	HIS	-	expression tag	UNP P0DTC2
C	1355	PRO	-	expression tag	UNP P0DTC2
C	1356	GLN	-	expression tag	UNP P0DTC2
C	1357	PHE	-	expression tag	UNP P0DTC2
C	1358	GLU	-	expression tag	UNP P0DTC2
C	1359	LYS	-	expression tag	UNP P0DTC2
C	1360	GLY	-	expression tag	UNP P0DTC2
C	1361	GLY	-	expression tag	UNP P0DTC2
C	1362	GLY	-	expression tag	UNP P0DTC2
C	1363	SER	-	expression tag	UNP P0DTC2
C	1364	GLY	-	expression tag	UNP P0DTC2
C	1365	GLY	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1366	GLY	-	expression tag	UNP P0DTC2
C	1367	GLY	-	expression tag	UNP P0DTC2
C	1368	SER	-	expression tag	UNP P0DTC2
C	1369	GLY	-	expression tag	UNP P0DTC2
C	1370	GLY	-	expression tag	UNP P0DTC2
C	1371	SER	-	expression tag	UNP P0DTC2
C	1372	ALA	-	expression tag	UNP P0DTC2
C	1373	TRP	-	expression tag	UNP P0DTC2
C	1374	SER	-	expression tag	UNP P0DTC2
C	1375	HIS	-	expression tag	UNP P0DTC2
C	1376	PRO	-	expression tag	UNP P0DTC2
C	1377	GLN	-	expression tag	UNP P0DTC2
C	1378	PHE	-	expression tag	UNP P0DTC2
C	1379	GLU	-	expression tag	UNP P0DTC2
C	1380	LYS	-	expression tag	UNP P0DTC2

- Molecule 2 is a protein called NB21 Nanobody.

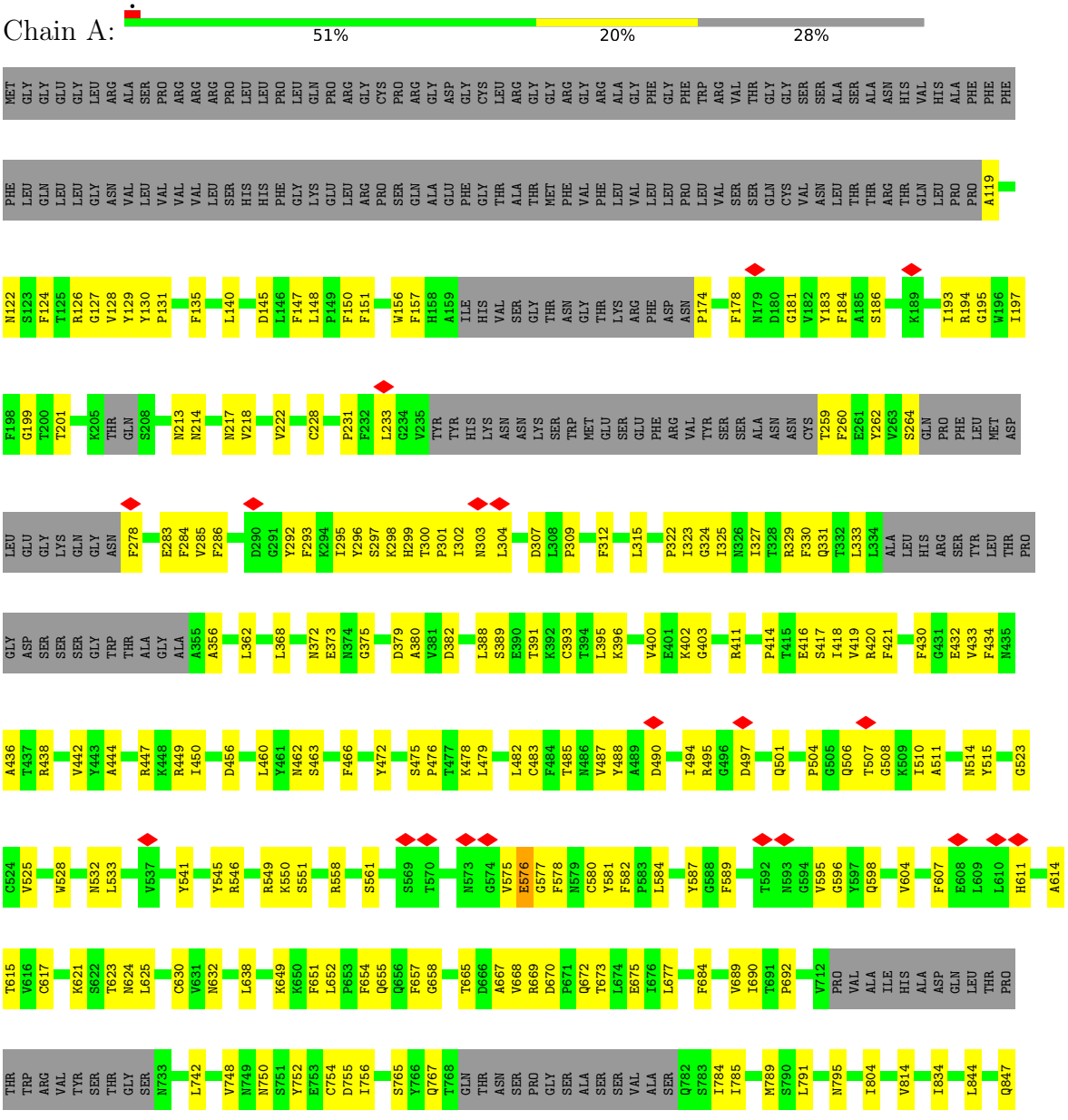
Mol	Chain	Residues	Atoms					AltConf	Trace
2	D	117	Total	C	N	O	S	0	0
			885	549	162	171	3		
2	F	117	Total	C	N	O	S	0	0
			881	547	162	169	3		

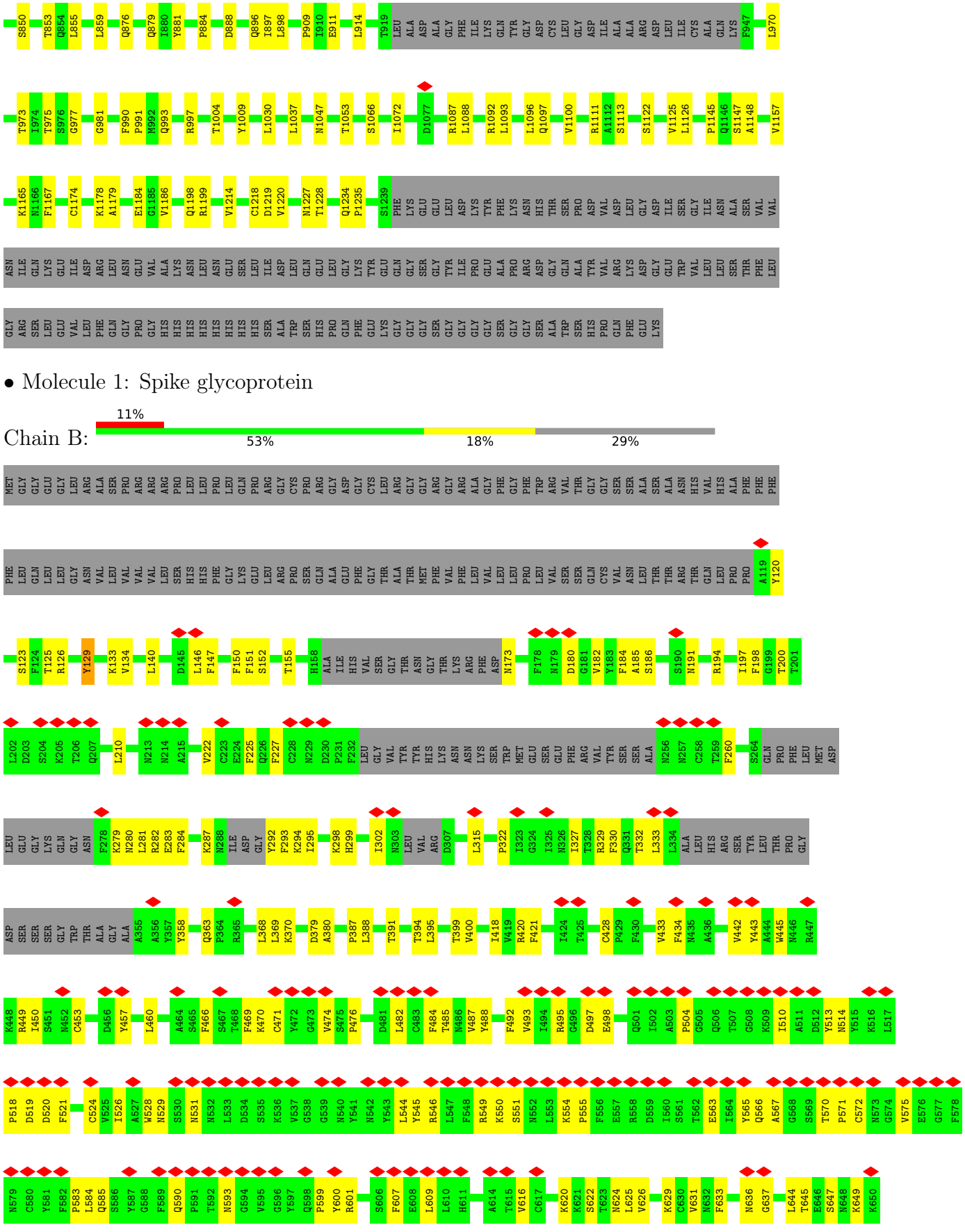
3 Residue-property plots (i)

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.

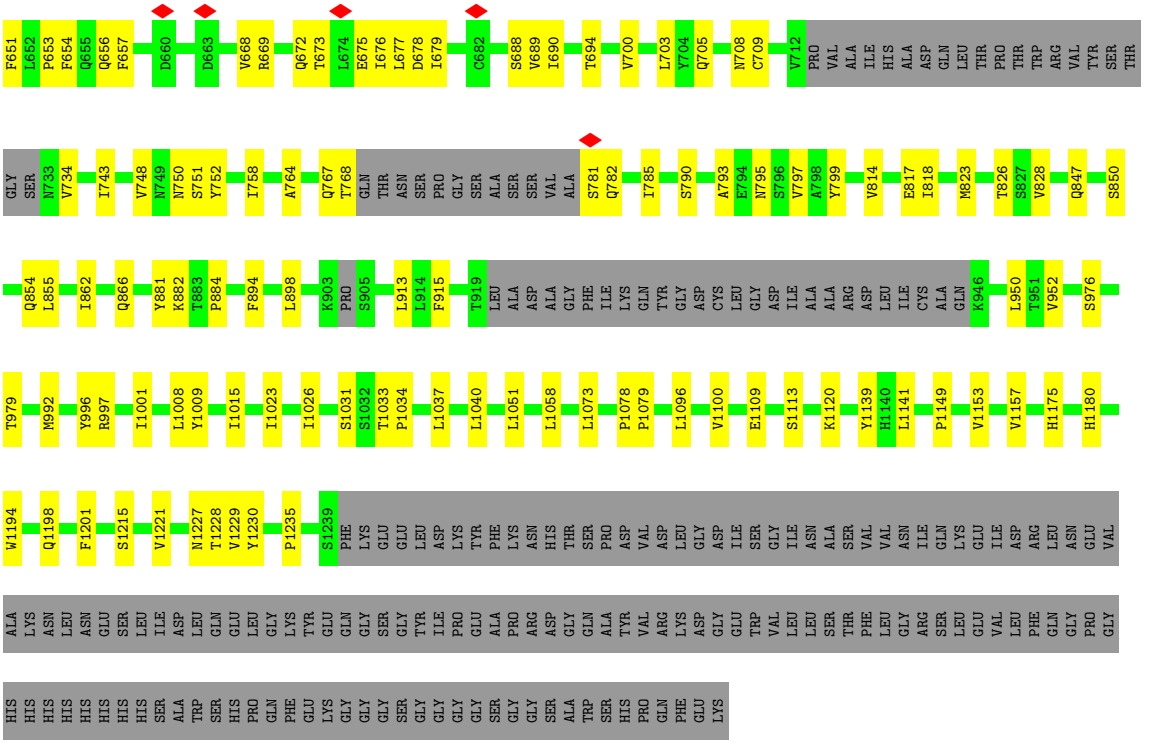
- Molecule 1: Spike glycoprotein

Chain A:



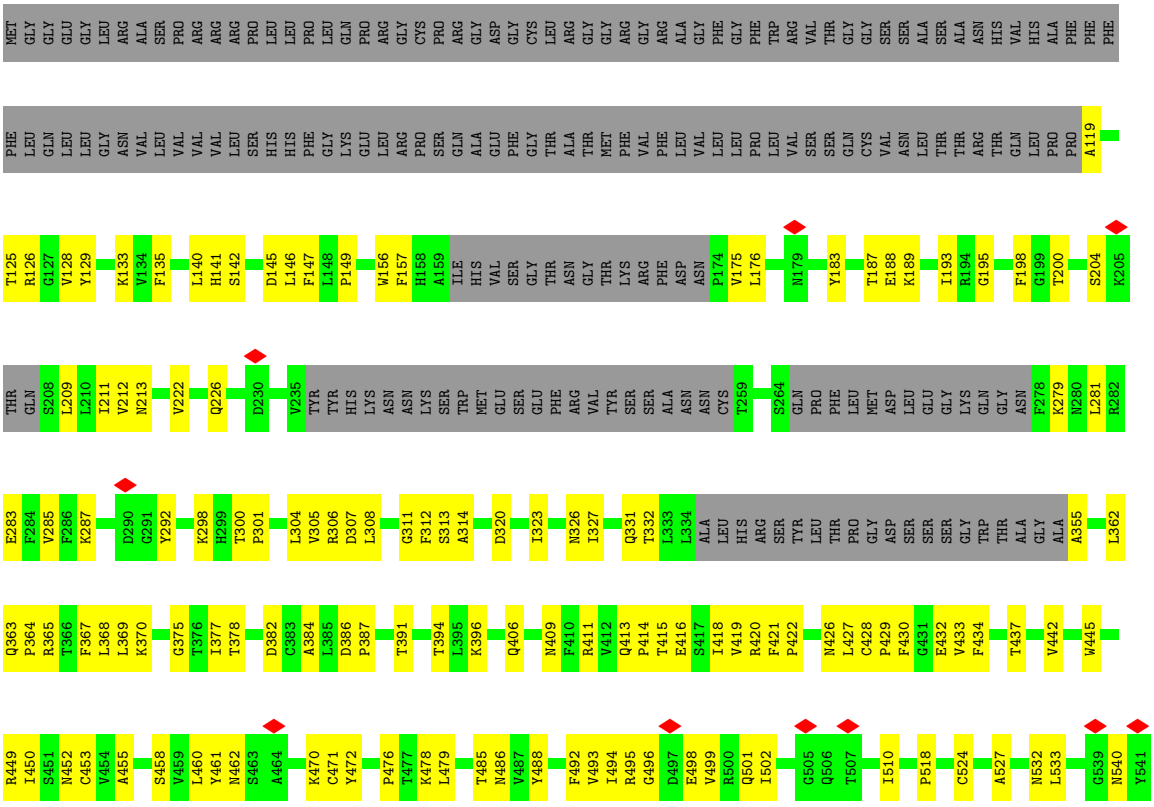


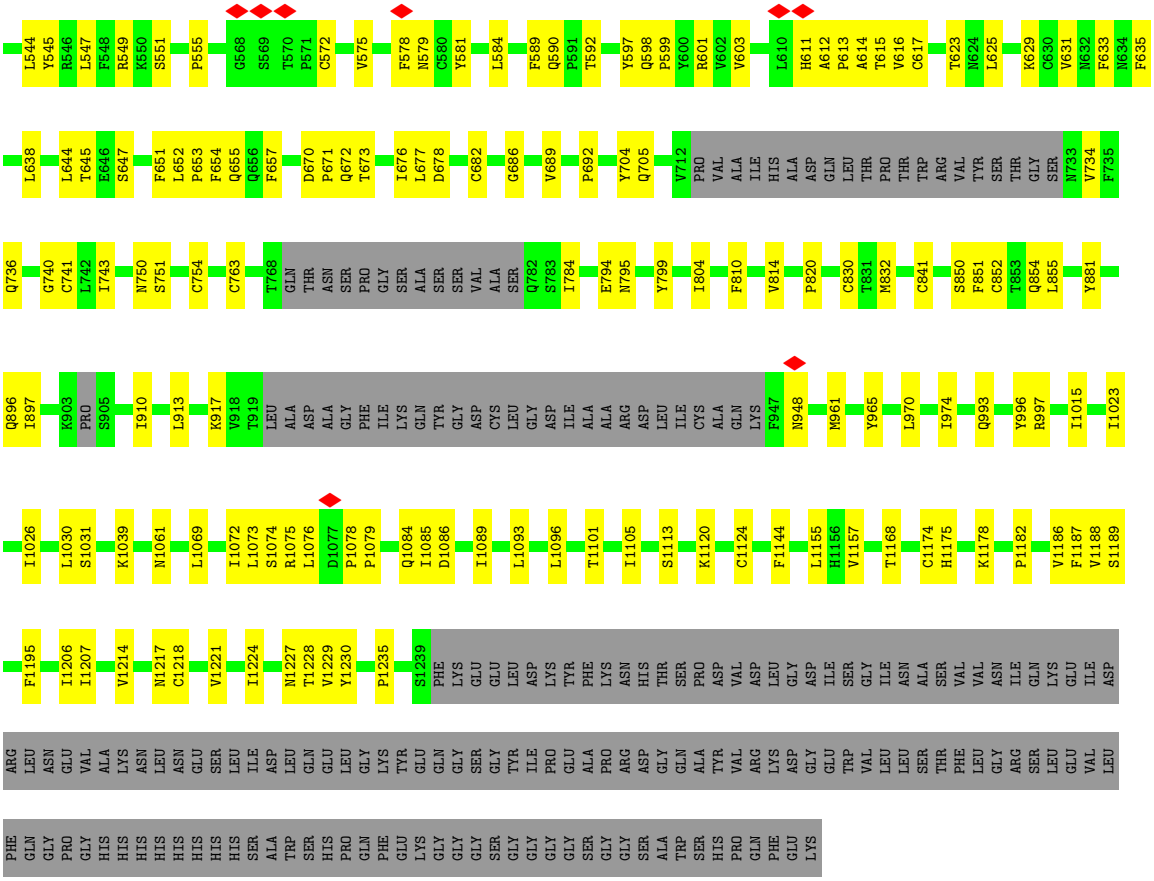
• Molecule 1: Spike glycoprotein



• Molecule 1: Spike glycoprotein

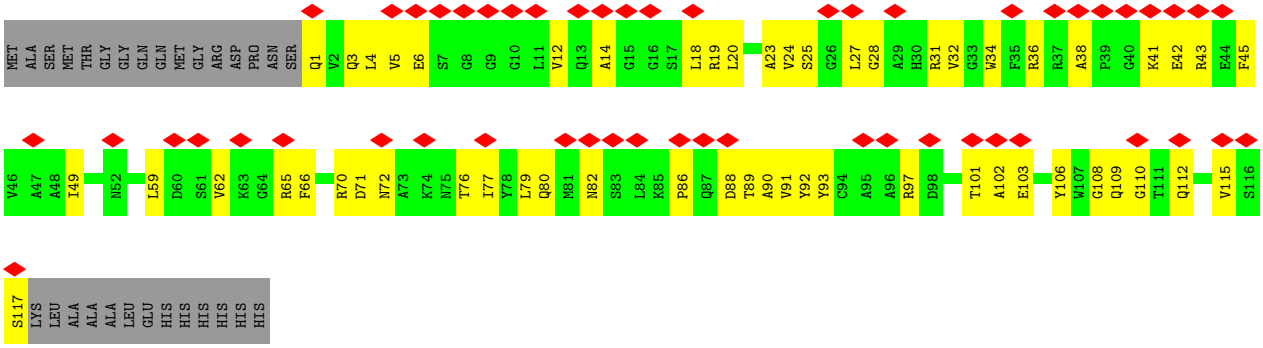
Chain C:





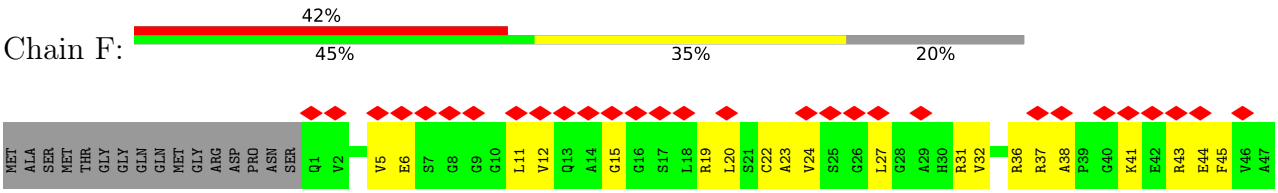
• Molecule 2: NB21 Nanobody

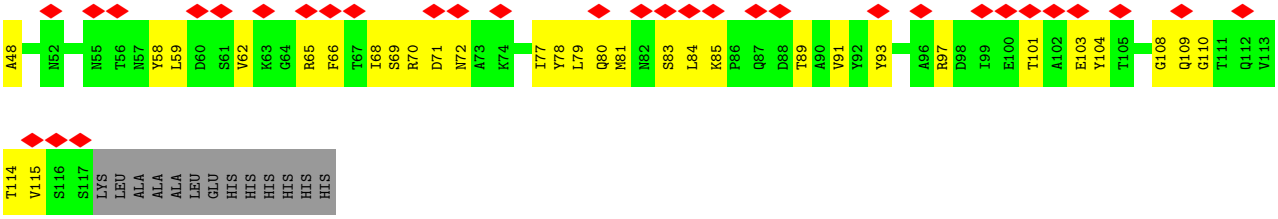
Chain D:



• Molecule 2: NB21 Nanobody

Chain F:




A48
N52
N55
T56
N57
Y58
L59
D60
S61
V62
K63
G64
R65
F66
T67
I68
S69
R70
D71
N72
A73
K74
I77
Y78
L79
Q80
M81
N82
S83
L84
K85
P86
Q87
D88
T89
A90
V91
Y92
Y93
A96
R97
D98
I99
E100
T101
A102
E103
Y104
T105
G108
Q109
G110
T111
Q112
V113
T114
V115
S116
S117
LYS
LEU
ALA
ALA
ALA
LEU
GLU
HIS
HIS
HIS
HIS
HIS
HIS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	91000	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 ($e^-/Å^2$)	60	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.137	Depositor
Minimum map value	-0.072	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.015	Depositor
Map size (Å)	424.96, 424.96, 424.96	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.83, 0.83, 0.83	Depositor

5 Model quality

5.1 Standard geometry

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	0.68	3/7806 (0.0%)	0.69	0/10636
1	B	0.67	1/7731 (0.0%)	0.66	0/10538
1	C	0.67	1/7790 (0.0%)	0.70	2/10613 (0.0%)
2	D	0.62	0/900	0.69	0/1217
2	F	0.64	0/896	0.80	0/1212
All	All	0.67	5/25123 (0.0%)	0.69	2/34216 (0.0%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	576	GLU	CD-OE2	-10.42	1.14	1.25
1	A	576	GLU	CD-OE1	-6.58	1.18	1.25
1	B	1113	SER	CA-CB	-5.16	1.45	1.52
1	C	1113	SER	CA-CB	-5.14	1.45	1.52
1	A	1113	SER	CA-CB	-5.05	1.45	1.52

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	581	TYR	OH-CZ-CE2	-9.12	95.48	120.10
1	C	581	TYR	CE1-CZ-OH	7.33	139.88	120.10

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	7631	0	7414	241	0
1	B	7560	0	7278	200	0
1	C	7618	0	7391	206	0
2	D	885	0	863	60	0
2	F	881	0	859	47	0
All	All	24575	0	23805	681	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 14.

The worst 5 of 681 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:578:PHE:HA	2:F:103:GLU:HA	1.30	1.10
1:A:483:CYS:HA	1:A:617:CYS:HB3	1.35	1.03
1:A:578:PHE:CD1	2:D:103:GLU:HG3	1.95	1.02
1:A:578:PHE:CE1	2:D:102:ALA:HB1	2.03	0.92
1:A:476:PRO:HA	1:A:479:LEU:HD23	1.51	0.92

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	971/1380 (70%)	946 (97%)	25 (3%)	0	100	100
1	B	964/1380 (70%)	928 (96%)	36 (4%)	0	100	100
1	C	968/1380 (70%)	943 (97%)	25 (3%)	0	100	100
2	D	115/146 (79%)	109 (95%)	6 (5%)	0	100	100
2	F	115/146 (79%)	111 (96%)	4 (4%)	0	100	100
All	All	3133/4432 (71%)	3037 (97%)	96 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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	842/1185 (71%)	840 (100%)	2 (0%)	93 97
1	B	825/1185 (70%)	824 (100%)	1 (0%)	93 97
1	C	839/1185 (71%)	839 (100%)	0	100 100
2	D	90/112 (80%)	90 (100%)	0	100 100
2	F	89/112 (80%)	89 (100%)	0	100 100
All	All	2685/3779 (71%)	2682 (100%)	3 (0%)	93 97

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

Mol	Chain	Res	Type
1	A	1047	ASN
1	A	1097	GLN
1	B	129	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	514	ASN
1	B	566	GLN
1	C	705	GLN
1	C	141	HIS
1	A	1198	GLN

5.3.3 RNA

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 (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.

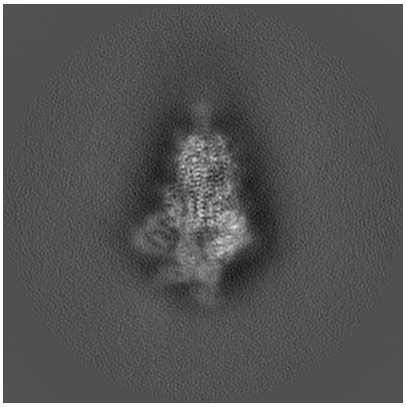
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-24255. These allow visual inspection of the internal detail of the map and identification of artifacts.

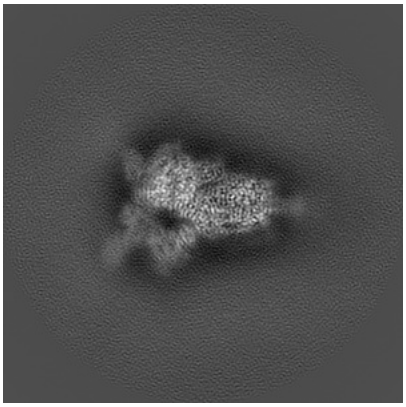
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

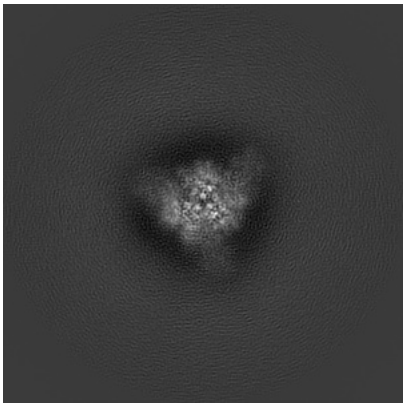
6.1.1 Primary map



X



Y

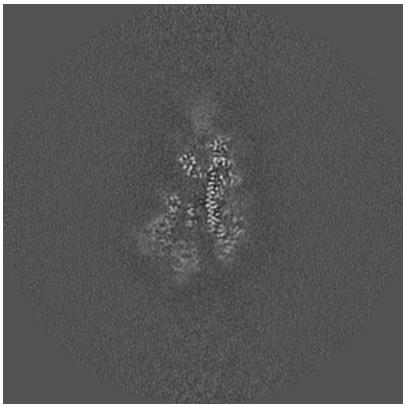


Z

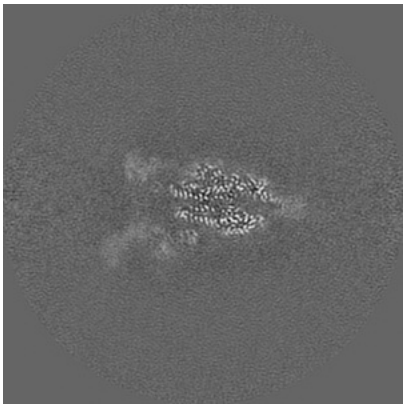
The images above show the map projected in three orthogonal directions.

6.2 Central slices

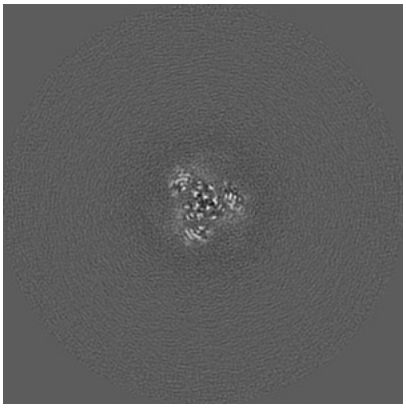
6.2.1 Primary map



X Index: 256



Y Index: 256

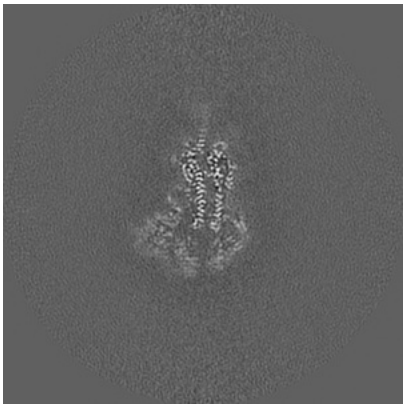


Z Index: 256

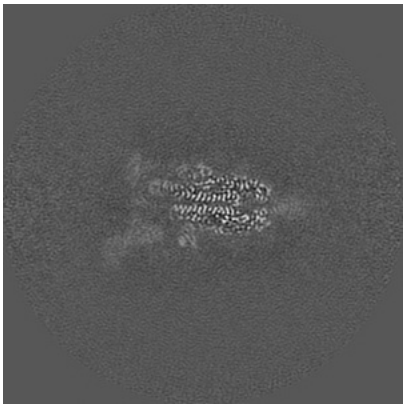
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

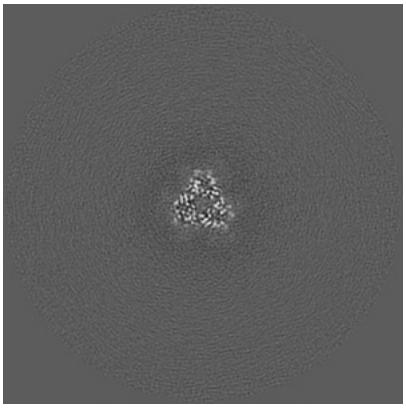
6.3.1 Primary map



X Index: 264



Y Index: 250



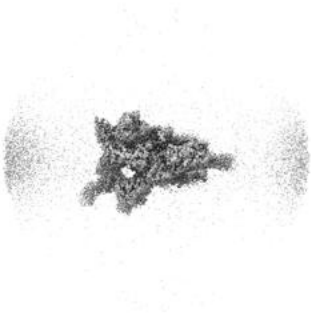
Z Index: 304

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

X



Y

Z

The images above show the 3D surface view of the map at the recommended contour level 0.015. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

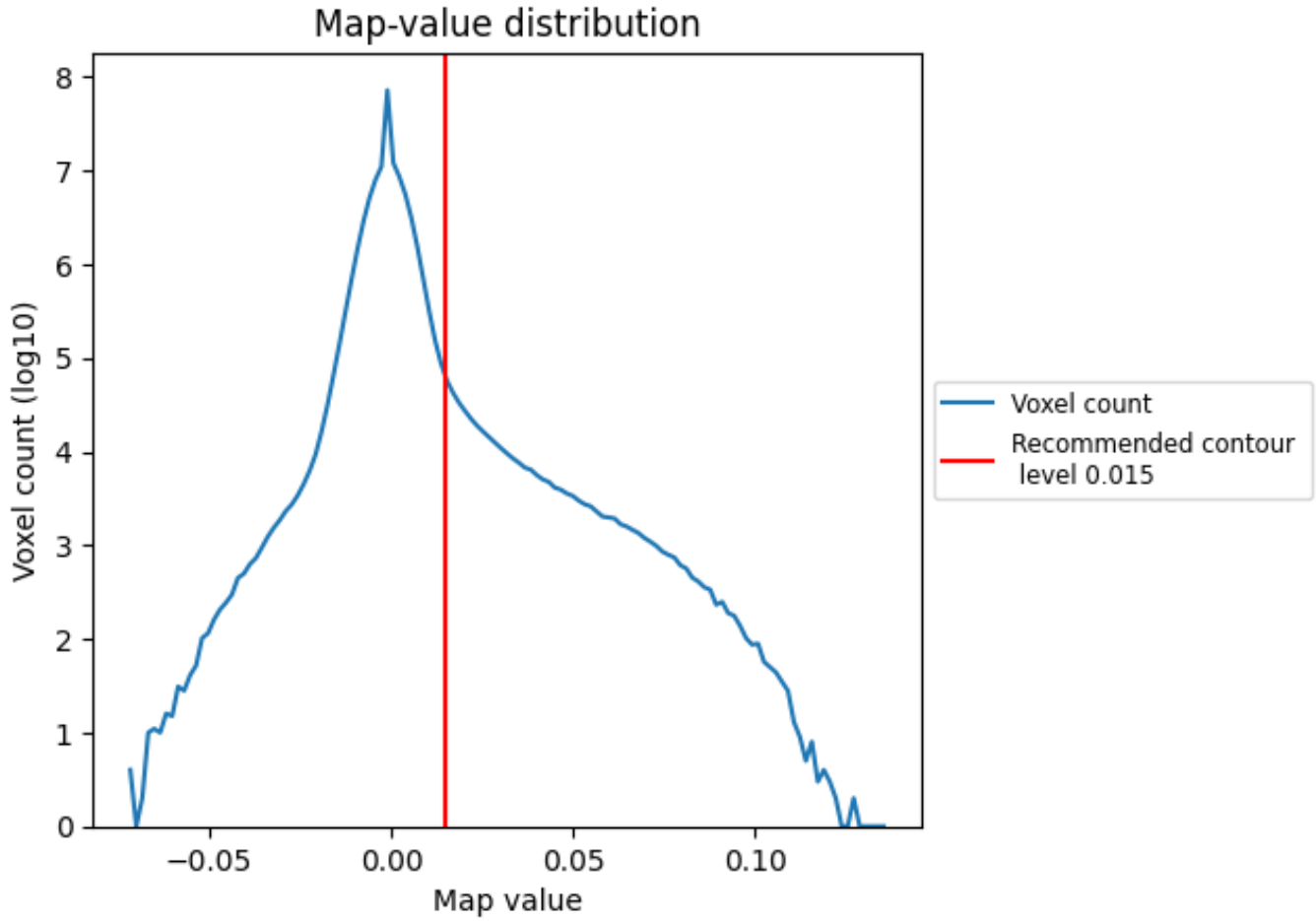
6.5 Mask visualisation (i)

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

7 Map analysis

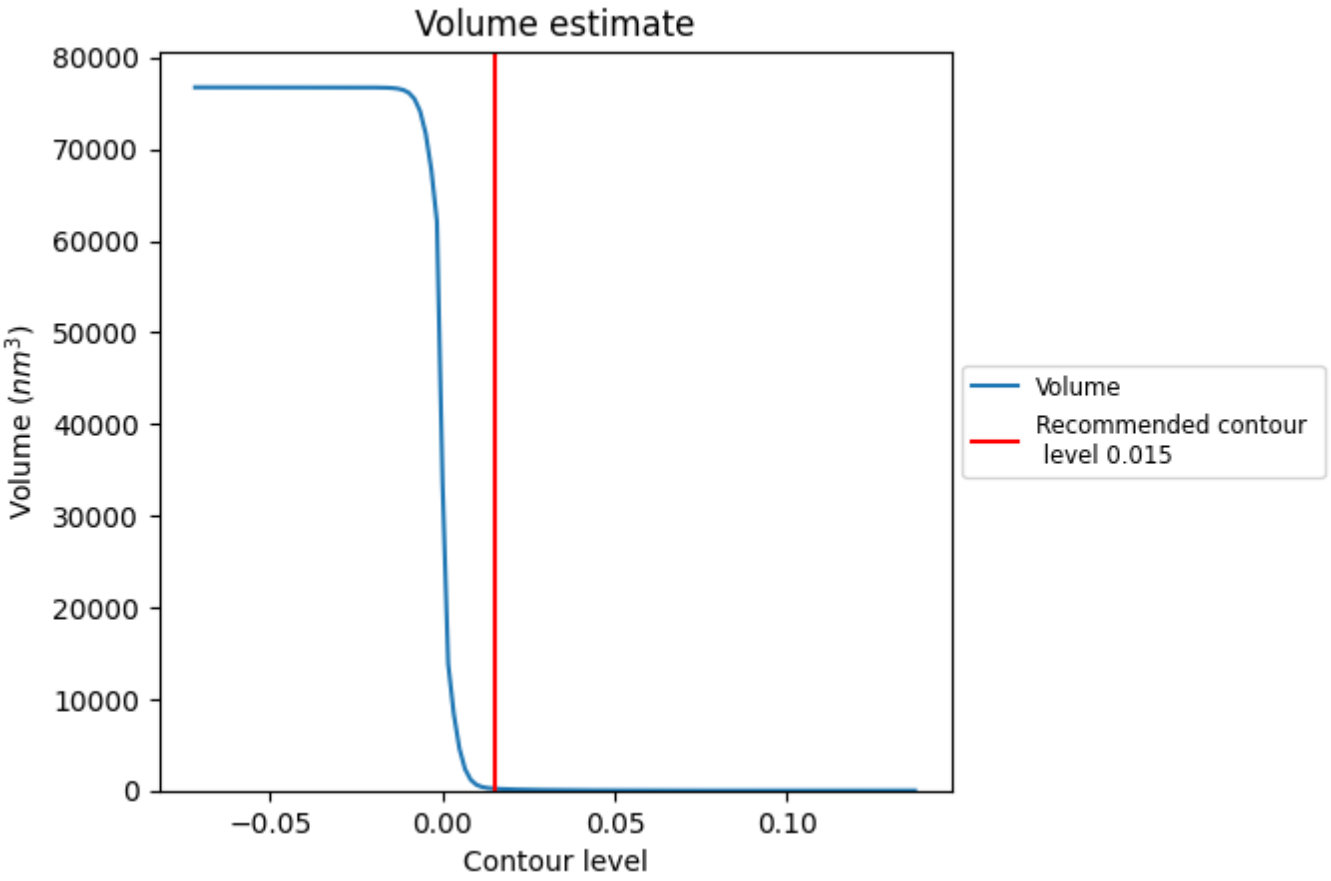
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

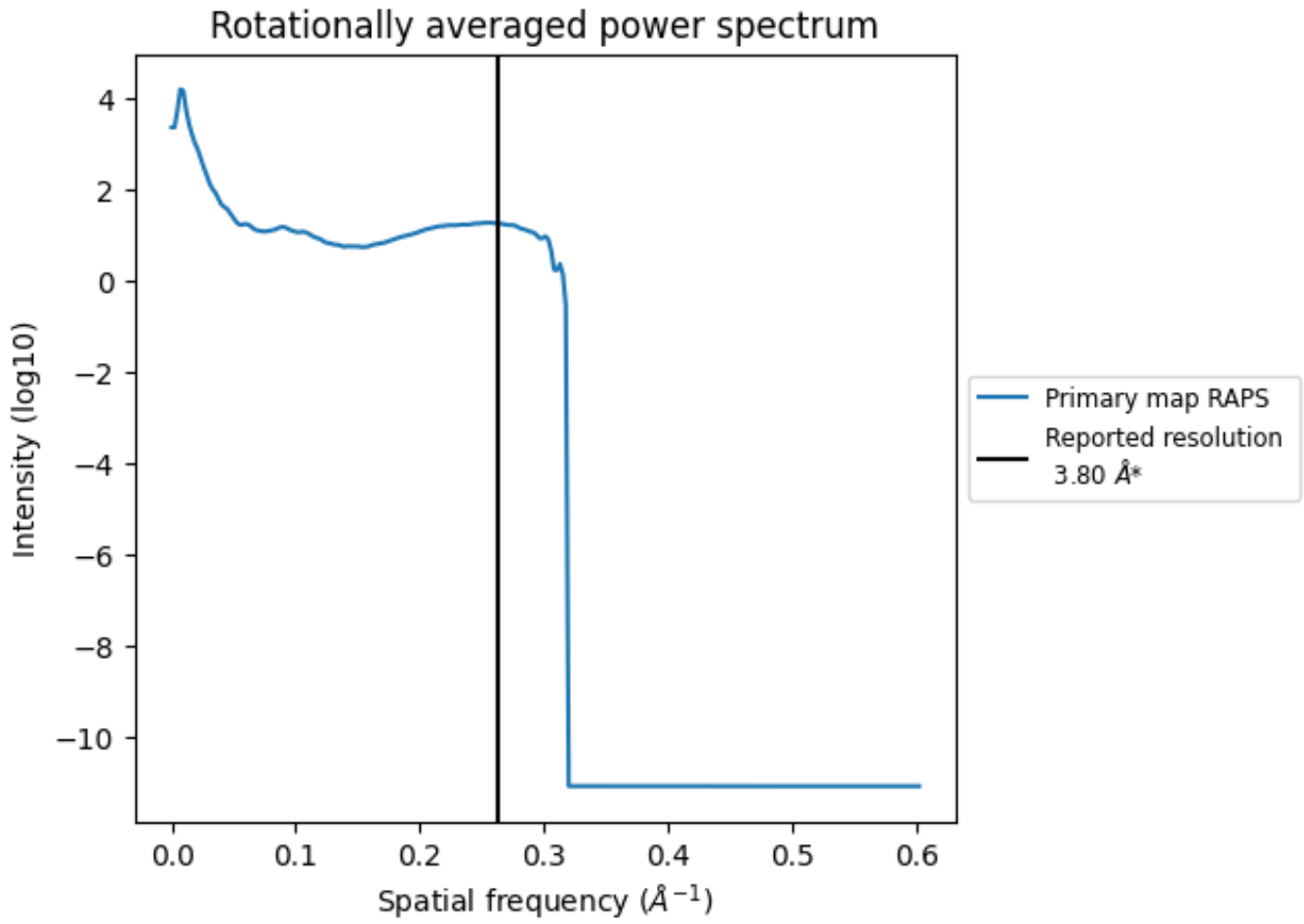
7.2 Volume estimate (i)



The volume at the recommended contour level is 216 nm^3; this corresponds to an approximate mass of 195 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 0.263 Å^{-1}

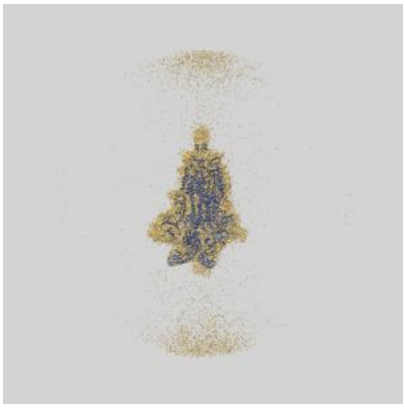
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

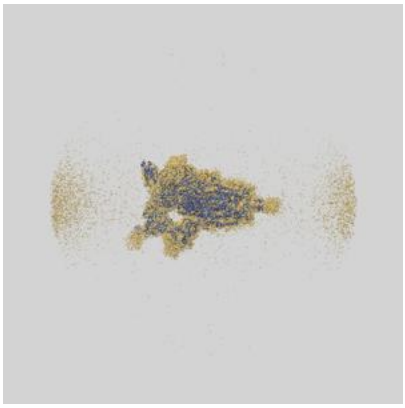
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-24255 and PDB model 7N9B. Per-residue inclusion information can be found in section 3 on page 17.

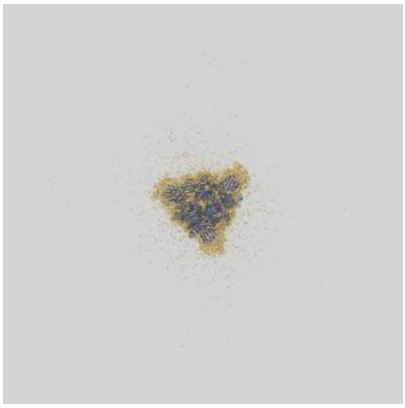
9.1 Map-model overlay



X



Y



Z

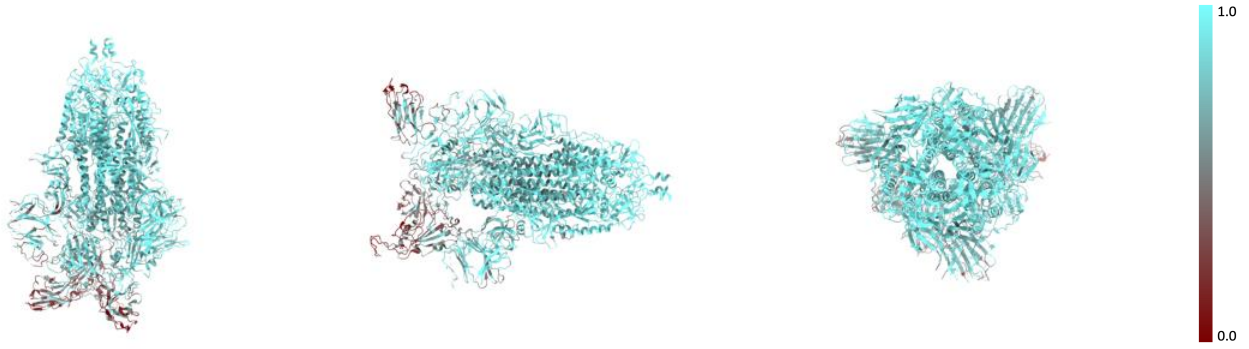
The images above show the 3D surface view of the map at the recommended contour level 0.015 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model

X Y Z

The images above show the model with each residue coloured according 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.

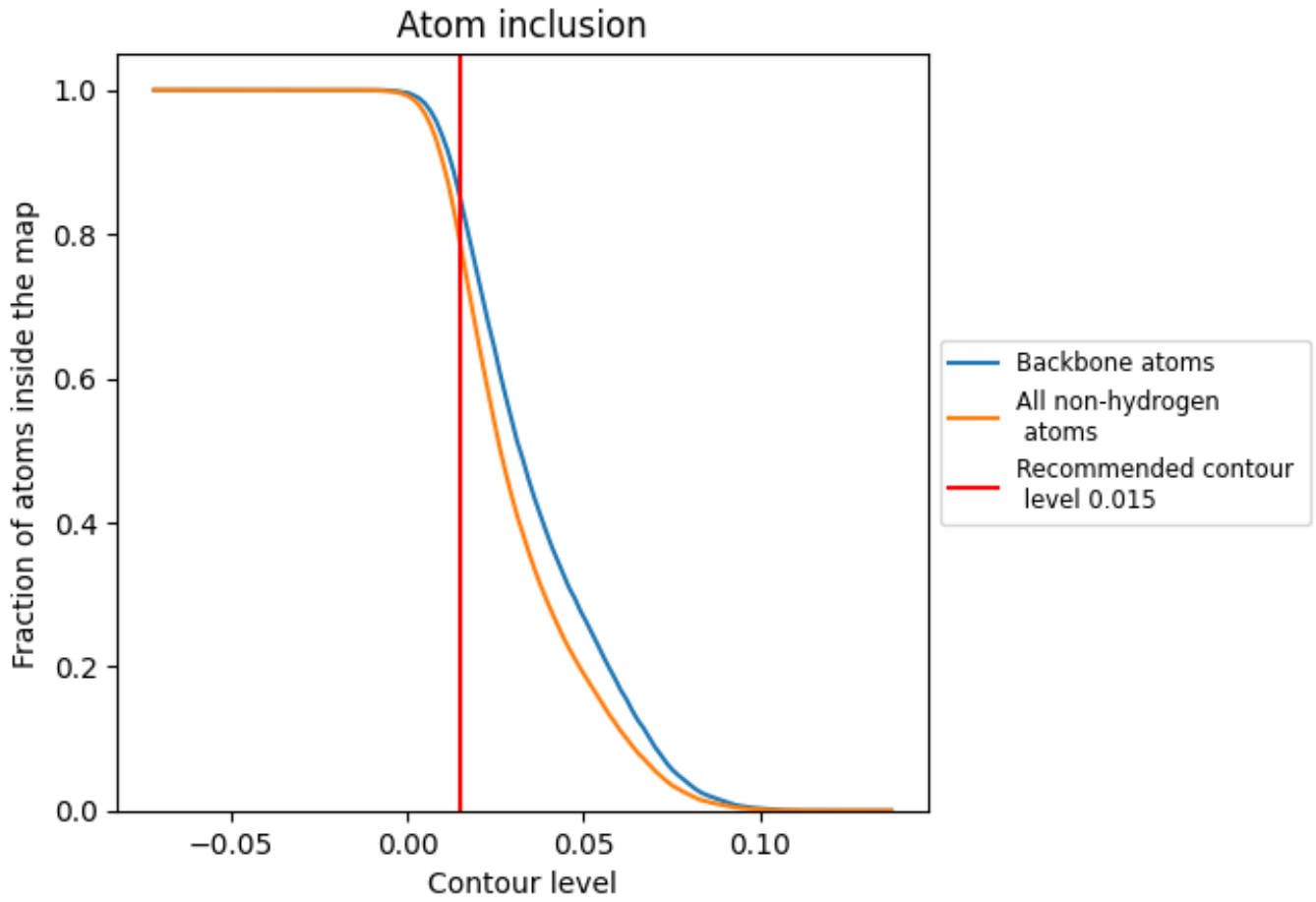
9.3 Atom inclusion mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.015).

9.4 Atom inclusion (i)



At the recommended contour level, 85% of all backbone atoms, 79% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.015) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7867	0.4540
A	0.8499	0.4890
B	0.7388	0.4410
C	0.8536	0.4910
D	0.4681	0.2200
F	0.3816	0.1780