



Full wwPDB EM Validation Report ⓘ

Sep 2, 2026 – 03:40 PM EDT

PDB ID : 9ZVX / pdb_00009zvx
EMDB ID : EMD-74894
Title : Structural insights into the exosite-mediated activation of Factor IX by Factor XIa using cryoEM
Authors : Mohammed, B.M.
Deposited on : 2025-12-31
Resolution : 3.40 Å (reported)
Based on initial models : 1NL0, .., 6I58, 9ZqY

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.dev133
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

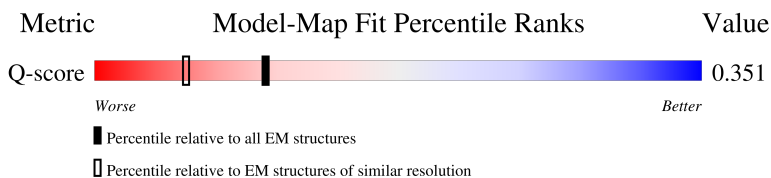
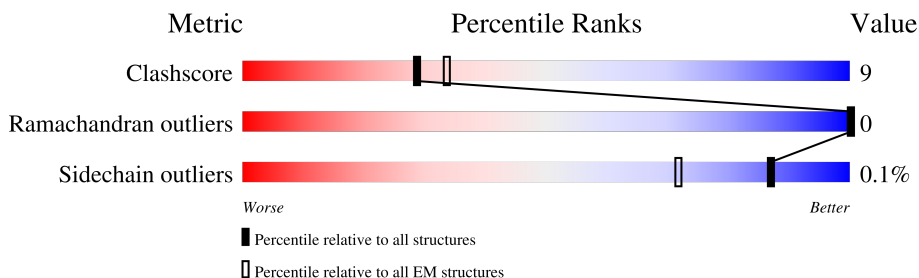
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.40 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14717 (2.90 - 3.90)

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	369	 78% 22%
2	B	236	 83% 17%
3	C	145	 7% 68% 32%
4	D	235	 10% 74% 26%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7841 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 Coagulation factor XIa heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	369	Total	C	N	O	S	0	0
			2879	1805	500	544	30		

- Molecule 2 is a protein called Coagulation factor XIa light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	236	Total	C	N	O	S	0	0
			1874	1184	332	347	11		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	557	ALA	SER	engineered mutation	UNP P03951

- Molecule 3 is a protein called Coagulation factor IXa light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	145	Total	C	N	O	S	0	0
			1180	707	196	261	16		

- Molecule 4 is a protein called Coagulation factor IXa heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	235	Total	C	N	O	S	0	0
			1844	1175	319	341	9		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	B	1	Total	C	N	O	0
			14	8	1	5	
5	B	1	Total	C	N	O	0
			14	8	1	5	

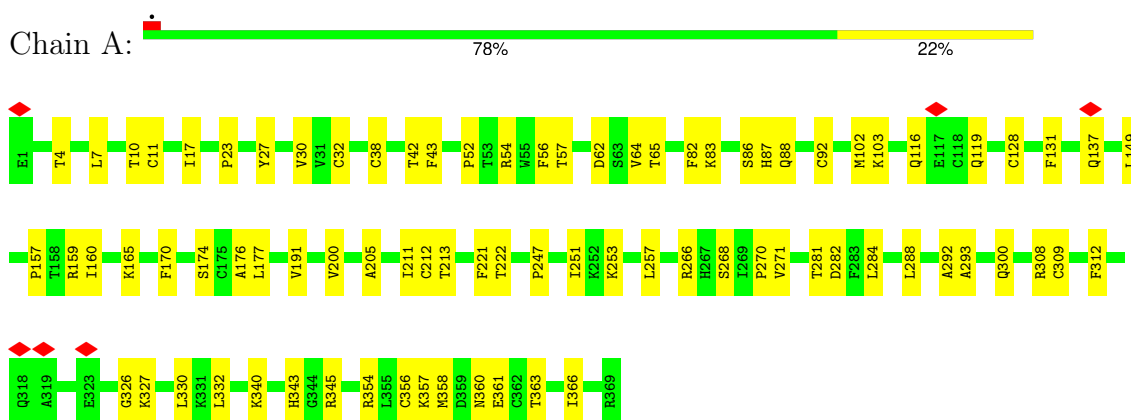
- Molecule 6 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
6	C	8	Total	Ca	0
			8	8	

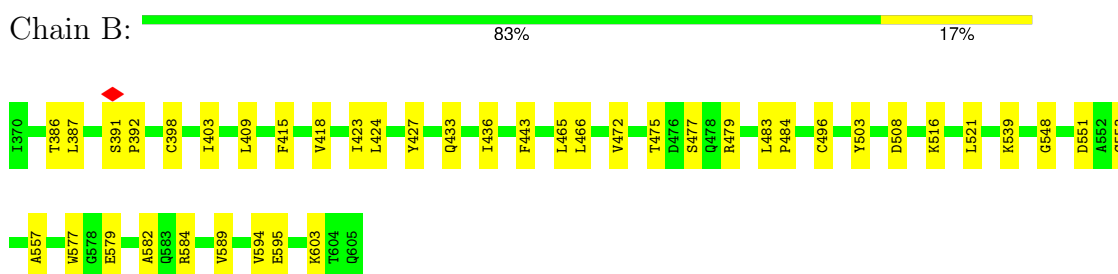
3 Residue-property plots

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.

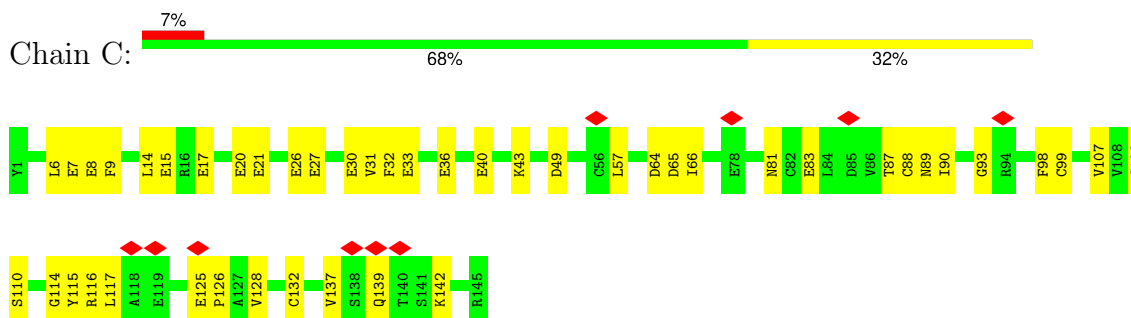
- Molecule 1: Coagulation factor XIa heavy chain



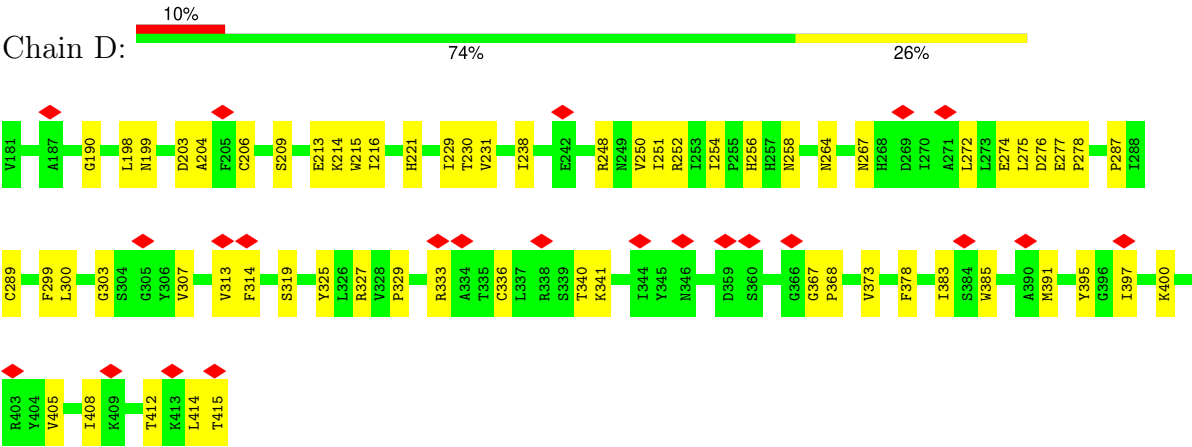
- Molecule 2: Coagulation factor XIa light chain



- Molecule 3: Coagulation factor IXa light chain



- Molecule 4: Coagulation factor IXa heavy chain



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, POINT, POINT, POINT	Depositor
Number of particles used	224103, 224103, 224103, 224103	Depositor
Resolution determination method	FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF, FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION, PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60, 57.2, 52.5, 52.5, 50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	150000	Depositor
Image detector	FEI FALCON IV (4k x 4k), FEI FALCON IV (4k x 4k), FEI FALCON IV (4k x 4k), FEI FALCON IV (4k x 4k), FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	2.491	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.0534	Depositor
Map size ($\text{\AA}$)	386.04797, 386.04797, 386.04797	wwPDB
Map dimensions	416, 416, 416	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.9279999, 0.9279999, 0.9279999	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.20	0/2944	0.48	0/3982
2	B	0.22	0/1919	0.42	0/2601
3	C	0.18	0/1047	0.46	0/1394
4	D	0.15	0/1888	0.39	0/2558
All	All	0.19	0/7798	0.44	0/10535

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	266	ARG	Sidechain

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2879	0	2803	56	0
2	B	1874	0	1833	26	0
3	C	1180	0	1017	24	0
4	D	1844	0	1807	44	0
5	A	28	0	26	0	0
5	B	28	0	26	0	0
6	C	8	0	0	0	0
All	All	7841	0	7512	144	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 9.

All (144) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:137:GLN:HB2	1:A:165:LYS:HZ3	1.40	0.87
1:A:43:PHE:HE1	1:A:56:PHE:HA	1.46	0.81
1:A:102:MET:HE2	1:A:157:PRO:HG2	1.72	0.71
3:C:132:CYS:HA	4:D:287:PRO:HG2	1.72	0.70
2:B:475:THR:HG23	2:B:477:SER:H	1.58	0.69
4:D:340:THR:HG22	4:D:395:TYR:HE1	1.59	0.68
1:A:292:ALA:HA	1:A:327:LYS:H	1.59	0.67
4:D:252:ARG:HB2	4:D:274:GLU:HB3	1.76	0.65
1:A:356:CYS:HA	1:A:360:ASN:HB2	1.78	0.65
4:D:367:GLY:HA3	4:D:383:ILE:HD12	1.83	0.61
2:B:387:LEU:HD11	2:B:466:LEU:HD11	1.83	0.60
3:C:43:LYS:HD3	3:C:65:ASP:HA	1.82	0.60
4:D:214:LYS:HG2	4:D:414:LEU:HD22	1.83	0.59
1:A:205:ALA:HB2	1:A:257:LEU:HD21	1.85	0.59
4:D:300:LEU:HD11	4:D:400:LYS:HG3	1.85	0.58
4:D:198:LEU:HD21	4:D:229:ILE:HD12	1.86	0.58
1:A:284:LEU:HD12	1:A:340:LYS:HB2	1.86	0.58
2:B:418:VAL:HG11	2:B:424:LEU:HD11	1.86	0.57
3:C:139:GLN:HG3	3:C:142:LYS:HD3	1.87	0.57
1:A:92:CYS:HB3	1:A:174:SER:OG	2.05	0.57
4:D:221:HIS:HD1	4:D:385:TRP:CG	2.23	0.56
4:D:395:TYR:HE2	4:D:397:ILE:HG13	1.71	0.56
1:A:43:PHE:CE1	1:A:56:PHE:HA	2.36	0.56
1:A:86:SER:HB2	1:A:358:MET:HG3	1.87	0.55
3:C:14:LEU:HG	3:C:31:VAL:HG11	1.88	0.55
2:B:403:ILE:HD13	2:B:409:LEU:HG	1.88	0.55
4:D:199:ASN:HB2	4:D:203:ASP:HA	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:198:LEU:HB3	4:D:206:CYS:SG	2.47	0.55
4:D:204:ALA:HB2	4:D:238:ILE:HD13	1.89	0.54
2:B:387:LEU:HB2	2:B:398:CYS:O	2.07	0.54
3:C:110:SER:HA	3:C:117:LEU:HD21	1.89	0.54
1:A:251:ILE:HG22	1:A:253:LYS:HG2	1.90	0.53
2:B:539:LYS:HA	2:B:595:GLU:HG3	1.90	0.53
4:D:216:ILE:HG13	4:D:231:VAL:HG11	1.90	0.53
4:D:198:LEU:HD11	4:D:229:ILE:HD12	1.91	0.53
4:D:215:TRP:CZ3	4:D:274:GLU:HB2	2.45	0.52
1:A:137:GLN:HB2	1:A:165:LYS:NZ	2.18	0.52
4:D:248:ARG:HD2	4:D:277:GLU:HB3	1.91	0.51
1:A:128:CYS:SG	1:A:149:LEU:HG	2.51	0.51
1:A:300:GLN:HG3	1:A:312:PHE:CE1	2.46	0.50
4:D:333:ARG:HA	4:D:336:CYS:HB3	1.92	0.50
1:A:282:ASP:OD2	1:A:345:ARG:HB2	2.11	0.50
2:B:503:TYR:HB2	2:B:553:CYS:O	2.12	0.50
3:C:81:ASN:HB2	3:C:83:GLU:OE2	2.12	0.50
4:D:250:VAL:HA	4:D:275:LEU:HD23	1.93	0.50
1:A:366:ILE:HD11	2:B:483:LEU:HD22	1.93	0.49
1:A:65:THR:HG22	1:A:65:THR:O	2.12	0.49
1:A:268:SER:OG	1:A:363:THR:HG21	2.12	0.49
4:D:214:LYS:HD3	4:D:278:PRO:HB3	1.94	0.49
3:C:98:PHE:O	3:C:109:CYS:HA	2.12	0.49
2:B:548:GLY:H	2:B:584:ARG:HA	1.77	0.49
1:A:27:TYR:CZ	1:A:170:PHE:HE2	2.31	0.49
1:A:87:HIS:CG	1:A:88:GLN:H	2.30	0.49
4:D:299:PHE:CE1	4:D:373:VAL:HG21	2.48	0.48
1:A:27:TYR:HA	1:A:30:VAL:HG22	1.94	0.48
1:A:32:CYS:O	1:A:38:CYS:HB3	2.14	0.48
4:D:313:VAL:HB	4:D:319:SER:HB3	1.95	0.48
3:C:137:VAL:HG21	4:D:190:GLY:HA3	1.94	0.48
4:D:215:TRP:CD1	4:D:412:THR:HA	2.49	0.48
1:A:54:ARG:NH1	1:A:57:THR:HG21	2.28	0.48
1:A:309:CYS:SG	1:A:330:LEU:HD22	2.54	0.48
4:D:405:VAL:HA	4:D:408:ILE:HG22	1.96	0.48
2:B:577:TRP:O	2:B:589:VAL:HG12	2.14	0.48
2:B:551:ASP:HB3	2:B:582:ALA:HB2	1.96	0.47
4:D:254:ILE:HG13	4:D:272:LEU:HB3	1.97	0.47
3:C:14:LEU:HD11	3:C:32:PHE:CZ	2.49	0.47
4:D:341:LYS:NZ	4:D:391:MET:HE2	2.30	0.47
1:A:119:GLN:OE1	1:A:131:PHE:HE1	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:87:THR:HG22	3:C:89:ASN:H	1.80	0.47
2:B:423:ILE:HG13	2:B:424:LEU:HD12	1.96	0.47
1:A:281:THR:HG22	1:A:343:HIS:ND1	2.29	0.47
3:C:125:GLU:CD	3:C:126:PRO:HD2	2.40	0.46
1:A:247:PRO:HG2	3:C:9:PHE:CE2	2.51	0.46
4:D:264:ASN:HD22	4:D:267:ASN:HD22	1.64	0.46
4:D:303:GLY:O	4:D:329:PRO:HA	2.16	0.46
2:B:391:SER:OG	2:B:392:PRO:HD3	2.15	0.46
1:A:52:PRO:C	1:A:54:ARG:H	2.22	0.46
2:B:386:THR:OG1	2:B:427:TYR:HB2	2.16	0.46
1:A:64:VAL:HA	1:A:308:ARG:NH1	2.29	0.46
1:A:87:HIS:O	1:A:88:GLN:HG2	2.16	0.46
1:A:213:THR:HG21	1:A:270:PRO:CG	2.46	0.46
2:B:398:CYS:HB2	2:B:557:ALA:HB3	1.97	0.46
3:C:88:CYS:HA	3:C:93:GLY:HA3	1.98	0.45
1:A:116:GLN:O	1:A:119:GLN:HB3	2.17	0.45
2:B:548:GLY:N	2:B:584:ARG:HA	2.32	0.45
2:B:577:TRP:HE3	2:B:579:GLU:H	1.64	0.45
4:D:209:SER:OG	4:D:368:PRO:HB3	2.16	0.45
4:D:307:VAL:O	4:D:325:TYR:HA	2.16	0.45
4:D:256:HIS:CD2	4:D:258:ASN:H	2.35	0.45
1:A:358:MET:HE2	2:B:479:ARG:HG3	1.99	0.45
1:A:247:PRO:HG2	3:C:9:PHE:HE2	1.82	0.44
3:C:90:ILE:O	3:C:90:ILE:HG13	2.18	0.44
2:B:443:PHE:CE2	2:B:472:VAL:HG12	2.52	0.44
2:B:503:TYR:HD1	2:B:508:ASP:HB3	1.83	0.44
1:A:83:LYS:HD3	1:A:354:ARG:NH1	2.33	0.44
1:A:212:CYS:SG	1:A:221:PHE:HB3	2.58	0.44
4:D:289:CYS:HB2	4:D:378:PHE:CD1	2.53	0.44
4:D:313:VAL:HG13	4:D:314:PHE:CD1	2.52	0.44
1:A:357:LYS:HG2	1:A:358:MET:HG3	2.00	0.43
4:D:313:VAL:HG13	4:D:314:PHE:HD1	1.83	0.43
1:A:11:CYS:SG	1:A:42:THR:HG21	2.58	0.43
4:D:327:ARG:HG3	4:D:327:ARG:O	2.18	0.43
1:A:293:ALA:H	1:A:326:GLY:HA3	1.84	0.43
2:B:415:PHE:CE2	2:B:466:LEU:HD21	2.54	0.43
4:D:215:TRP:HH2	4:D:252:ARG:HH12	1.66	0.43
2:B:496:CYS:SG	2:B:521:LEU:HD11	2.59	0.43
1:A:23:PRO:HD2	1:A:27:TYR:CD2	2.53	0.43
1:A:32:CYS:HB2	1:A:38:CYS:HB2	1.90	0.43
1:A:357:LYS:HG2	1:A:358:MET:CG	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:17:ILE:HD11	1:A:62:ASP:HB3	2.00	0.43
3:C:6:LEU:HD12	3:C:6:LEU:O	2.19	0.43
4:D:414:LEU:HG	4:D:415:THR:HG23	2.01	0.43
1:A:7:LEU:HG	1:A:10:THR:HB	2.00	0.43
1:A:102:MET:HG2	1:A:160:ILE:HG12	2.01	0.43
1:A:200:VAL:HG11	1:A:211:ILE:HD13	2.01	0.43
1:A:288:LEU:HG	1:A:332:LEU:HD22	2.00	0.43
3:C:65:ASP:OD1	3:C:66:ILE:N	2.52	0.42
4:D:254:ILE:HG13	4:D:254:ILE:O	2.19	0.42
3:C:14:LEU:HD11	3:C:32:PHE:CE1	2.54	0.42
1:A:103:LYS:HZ3	1:A:159:ARG:HH22	1.66	0.42
1:A:271:VAL:HG11	1:A:361:GLU:HA	2.01	0.42
1:A:191:VAL:HG13	1:A:222:THR:HG21	2.01	0.42
4:D:264:ASN:ND2	4:D:267:ASN:HD22	2.17	0.42
3:C:114:GLY:HA2	3:C:128:VAL:HG22	2.02	0.42
1:A:87:HIS:CG	1:A:88:GLN:N	2.87	0.41
4:D:340:THR:HG22	4:D:395:TYR:CE1	2.47	0.41
3:C:116:ARG:HD2	3:C:117:LEU:O	2.20	0.41
2:B:603:LYS:HD3	2:B:603:LYS:HA	1.82	0.41
1:A:4:THR:HG22	1:A:82:PHE:CE1	2.56	0.41
2:B:433:GLN:O	2:B:436:ILE:HG12	2.20	0.41
2:B:409:LEU:HD23	2:B:465:LEU:HD23	2.03	0.41
3:C:99:CYS:SG	3:C:107:VAL:HG13	2.61	0.41
1:A:23:PRO:HD2	1:A:27:TYR:HD2	1.84	0.41
1:A:213:THR:HG21	1:A:270:PRO:HG2	2.01	0.41
4:D:198:LEU:HD12	4:D:230:THR:O	2.21	0.41
4:D:213:GLU:CD	4:D:213:GLU:H	2.28	0.41
3:C:57:LEU:HD11	3:C:83:GLU:HA	2.01	0.41
3:C:115:TYR:HD1	3:C:126:PRO:HA	1.86	0.41
1:A:176:ALA:O	1:A:177:LEU:HD23	2.21	0.41
3:C:49:ASP:HA	3:C:64:ASP:OD1	2.21	0.40
4:D:214:LYS:HA	4:D:214:LYS:HD2	1.75	0.40
1:A:358:MET:HE2	1:A:358:MET:HB3	1.96	0.40
2:B:484:PRO:HB2	2:B:594:VAL:HG22	2.03	0.40
4:D:251:ILE:HG23	4:D:276:ASP:HB3	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	367/369 (100%)	349 (95%)	18 (5%)	0	100	100
2	B	234/236 (99%)	218 (93%)	16 (7%)	0	100	100
3	C	131/145 (90%)	118 (90%)	13 (10%)	0	100	100
4	D	233/235 (99%)	217 (93%)	16 (7%)	0	100	100
All	All	965/985 (98%)	902 (94%)	63 (6%)	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	331/331 (100%)	331 (100%)	0	100	100
2	B	202/202 (100%)	201 (100%)	1 (0%)	81	81
3	C	119/119 (100%)	119 (100%)	0	100	100
4	D	198/198 (100%)	198 (100%)	0	100	100
All	All	850/850 (100%)	849 (100%)	1 (0%)	87	89

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	516	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	233	GLN
2	B	388	HIS
2	B	396	HIS
2	B	478	GLN
3	C	2	ASN
4	D	256	HIS
4	D	264	ASN
4	D	324	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

12 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	CGU	C	8	6,3	9,11,12	1.48	2 (22%)	10,14,16	0.80	0
3	CGU	C	27	6,3	9,11,12	1.50	2 (22%)	10,14,16	0.76	0
3	CGU	C	30	6,3	9,11,12	1.53	2 (22%)	10,14,16	1.04	1 (10%)
3	CGU	C	7	6,3	9,11,12	1.55	2 (22%)	10,14,16	0.72	0
3	CGU	C	20	6,3	9,11,12	1.44	1 (11%)	10,14,16	0.79	0
3	CGU	C	21	6,3	9,11,12	1.55	2 (22%)	10,14,16	0.77	0
3	CGU	C	33	3	9,11,12	1.47	1 (11%)	10,14,16	1.41	1 (10%)
3	CGU	C	15	6,3	9,11,12	1.45	1 (11%)	10,14,16	0.79	0
3	CGU	C	26	6,3	9,11,12	1.50	1 (11%)	10,14,16	0.81	0
3	CGU	C	40	6,3	9,11,12	1.50	1 (11%)	10,14,16	0.83	0
3	CGU	C	36	6,3	9,11,12	1.57	2 (22%)	10,14,16	0.80	0
3	CGU	C	17	6,3	9,11,12	1.46	1 (11%)	10,14,16	0.99	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CGU	C	8	6,3	-	2/13/14/16	-
3	CGU	C	27	6,3	-	1/13/14/16	-
3	CGU	C	30	6,3	-	1/13/14/16	-
3	CGU	C	7	6,3	-	8/13/14/16	-
3	CGU	C	20	6,3	-	1/13/14/16	-
3	CGU	C	21	6,3	-	0/13/14/16	-
3	CGU	C	33	3	-	3/13/14/16	-
3	CGU	C	15	6,3	-	3/13/14/16	-
3	CGU	C	26	6,3	-	0/13/14/16	-
3	CGU	C	40	6,3	-	0/13/14/16	-
3	CGU	C	36	6,3	-	4/13/14/16	-
3	CGU	C	17	6,3	-	1/13/14/16	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	33	CGU	CG-CD1	2.59	1.55	1.52
3	C	36	CGU	CG-CD1	2.53	1.55	1.52
3	C	7	CGU	CG-CD1	2.48	1.55	1.52
3	C	40	CGU	CG-CD1	2.47	1.55	1.52
3	C	21	CGU	CG-CD1	2.42	1.55	1.52
3	C	26	CGU	CG-CD1	2.42	1.55	1.52
3	C	21	CGU	CG-CD2	2.35	1.55	1.52
3	C	36	CGU	CG-CD2	2.33	1.55	1.52
3	C	17	CGU	CG-CD1	2.27	1.55	1.52
3	C	27	CGU	CG-CD1	2.26	1.55	1.52
3	C	30	CGU	CG-CD1	2.23	1.55	1.52
3	C	8	CGU	CG-CD1	2.20	1.54	1.52
3	C	7	CGU	CG-CD2	2.19	1.54	1.52
3	C	8	CGU	CG-CD2	2.17	1.54	1.52
3	C	20	CGU	CG-CD1	2.15	1.54	1.52
3	C	15	CGU	CG-CD1	2.07	1.54	1.52
3	C	27	CGU	CG-CD2	2.04	1.54	1.52
3	C	30	CGU	CG-CD2	2.01	1.54	1.52

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	C	33	CGU	OE11-CD1-CG	-2.48	111.92	120.19
3	C	30	CGU	OE11-CD1-CG	-2.12	113.11	120.19

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	7	CGU	C-CA-CB-CG
3	C	7	CGU	CA-CB-CG-CD1
3	C	7	CGU	CA-CB-CG-CD2
3	C	30	CGU	O-C-CA-CB
3	C	33	CGU	N-CA-CB-CG
3	C	33	CGU	C-CA-CB-CG
3	C	33	CGU	CA-CB-CG-CD1
3	C	36	CGU	C-CA-CB-CG
3	C	36	CGU	OE22-CD2-CG-CD1
3	C	7	CGU	OE21-CD2-CG-CB
3	C	7	CGU	OE22-CD2-CG-CB
3	C	36	CGU	OE21-CD2-CG-CD1
3	C	17	CGU	CA-CB-CG-CD1
3	C	7	CGU	N-CA-CB-CG
3	C	36	CGU	N-CA-CB-CG
3	C	15	CGU	OE11-CD1-CG-CB
3	C	15	CGU	OE12-CD1-CG-CB
3	C	20	CGU	OE11-CD1-CG-CB
3	C	7	CGU	OE21-CD2-CG-CD1
3	C	7	CGU	OE22-CD2-CG-CD1
3	C	8	CGU	OE21-CD2-CG-CD1
3	C	8	CGU	OE22-CD2-CG-CD1
3	C	15	CGU	OE11-CD1-CG-CD2
3	C	27	CGU	OE22-CD2-CG-CD1

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	A	401	1	14,14,15	0.74	0	17,19,21	1.06	1 (5%)
5	NAG	B	701	2	14,14,15	0.74	0	17,19,21	2.44	5 (29%)
5	NAG	B	702	2	14,14,15	0.80	0	17,19,21	1.00	1 (5%)
5	NAG	A	402	1	14,14,15	0.78	0	17,19,21	1.27	2 (11%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	401	1	-	1/6/23/26	0/1/1/1
5	NAG	B	701	2	-	0/6/23/26	0/1/1/1
5	NAG	B	702	2	-	2/6/23/26	0/1/1/1
5	NAG	A	402	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	701	NAG	C1-O5-C5	7.72	122.54	112.19
5	B	701	NAG	O5-C1-C2	4.05	117.55	111.29
5	A	402	NAG	C1-O5-C5	-3.12	108.01	112.19
5	B	701	NAG	C4-C3-C2	-2.79	106.94	111.02
5	B	701	NAG	C3-C4-C5	-2.68	105.37	110.23
5	A	402	NAG	C1-C2-N2	2.61	114.55	110.43
5	A	401	NAG	C1-O5-C5	2.44	115.46	112.19
5	B	701	NAG	C1-C2-N2	2.20	113.91	110.43
5	B	702	NAG	O5-C1-C2	-2.20	107.88	111.29

There are no chirality outliers.

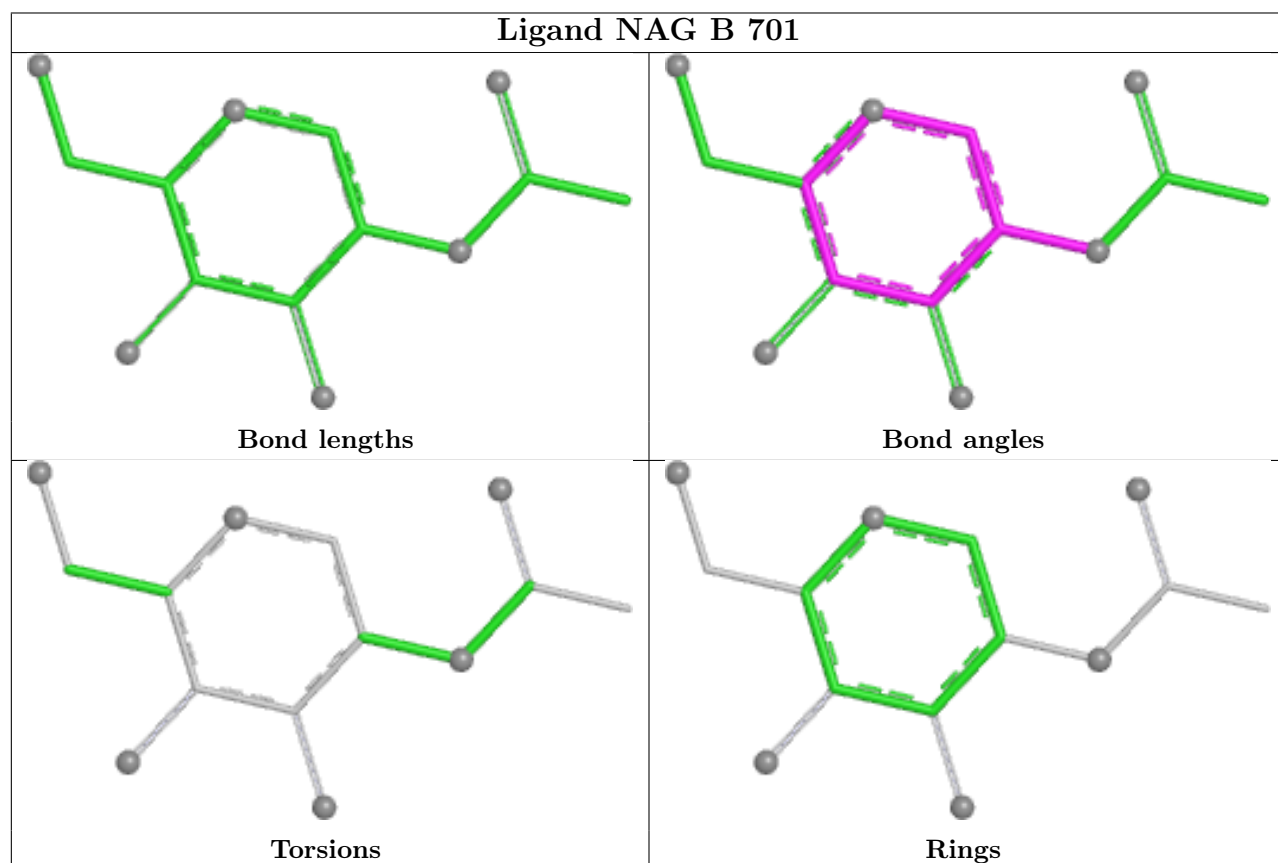
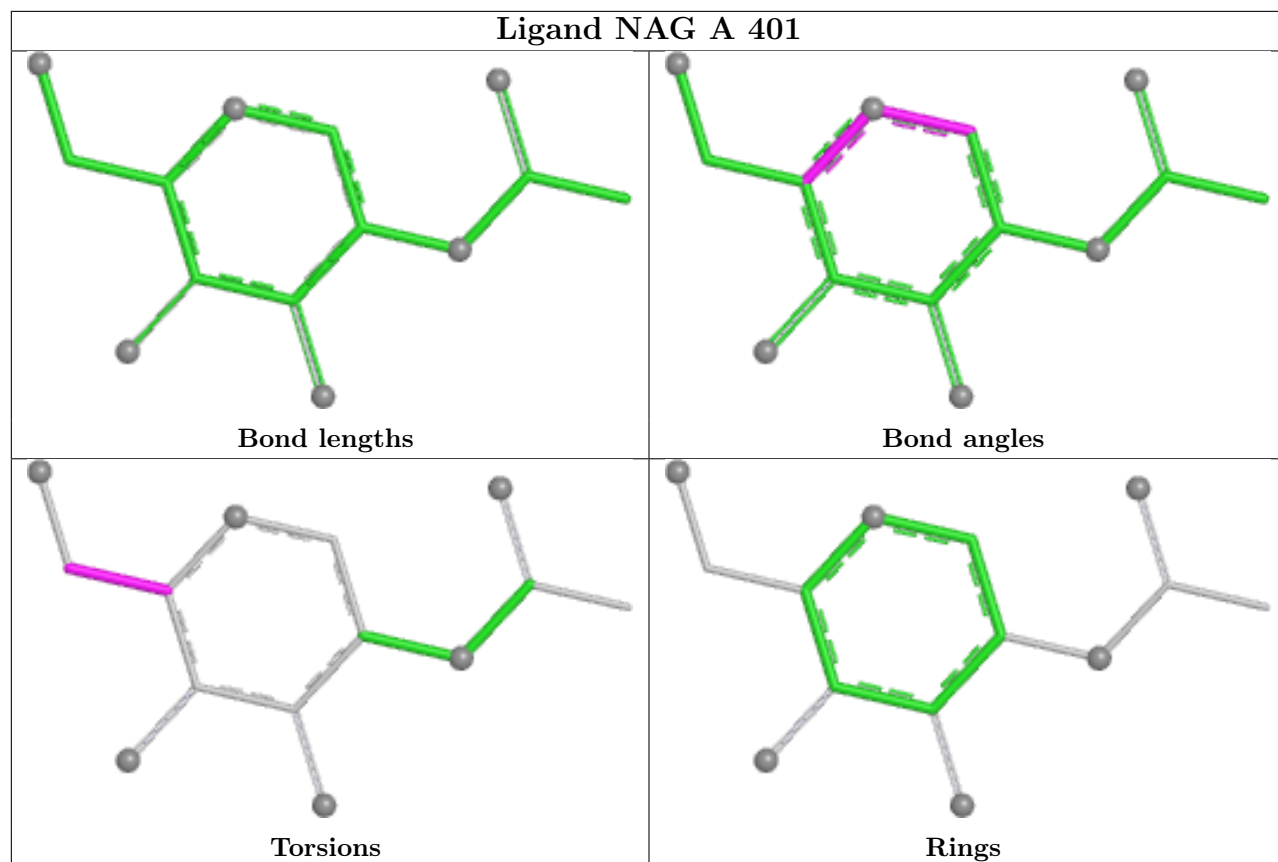
All (4) torsion outliers are listed below:

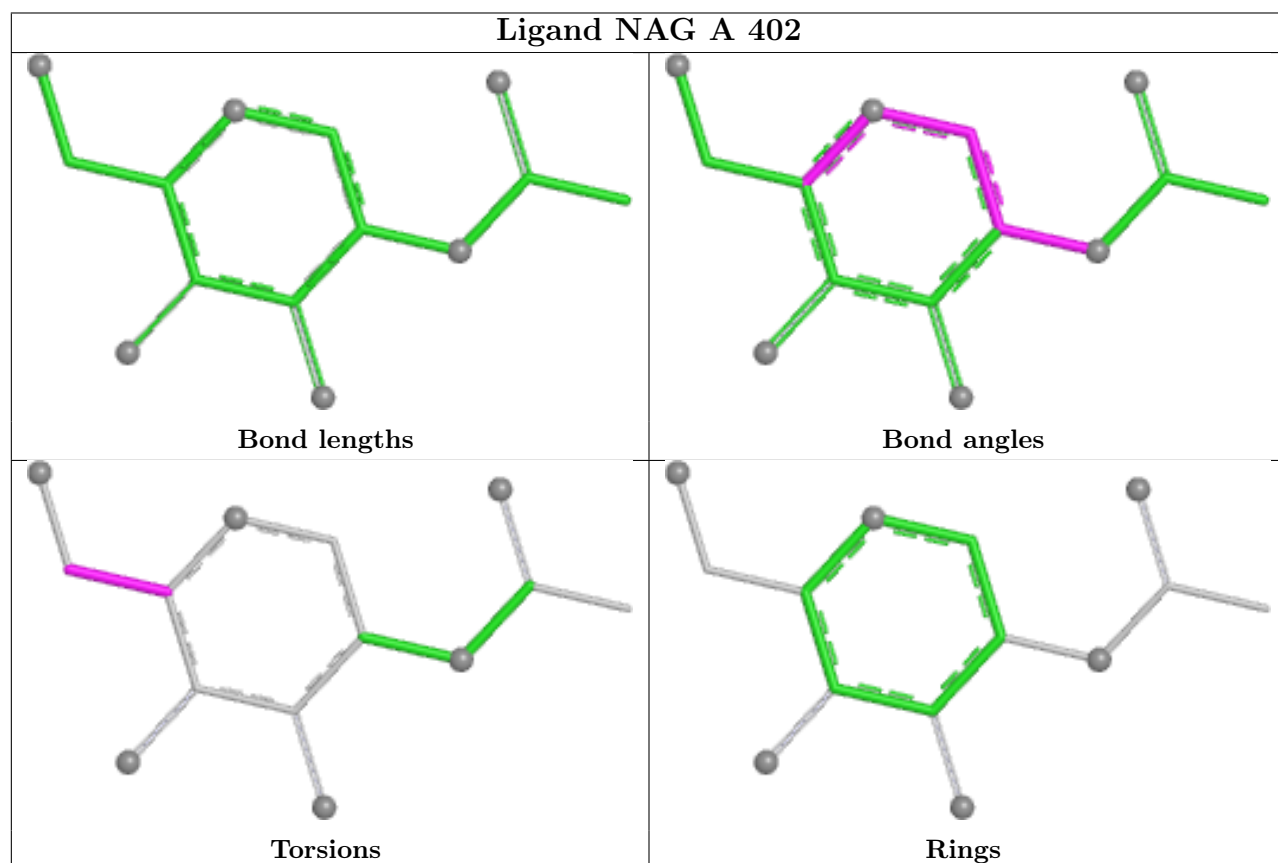
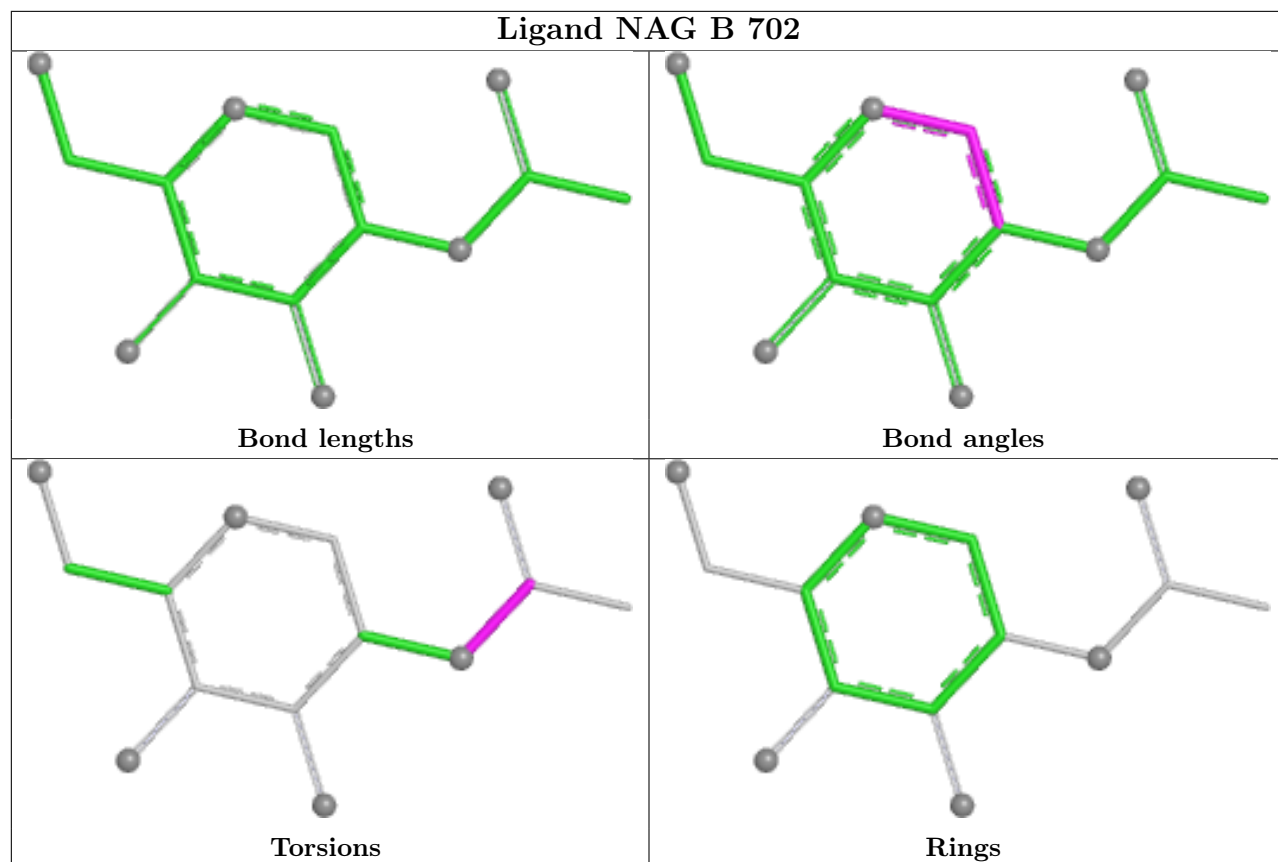
Mol	Chain	Res	Type	Atoms
5	B	702	NAG	C8-C7-N2-C2
5	B	702	NAG	O7-C7-N2-C2
5	A	401	NAG	O5-C5-C6-O6
5	A	402	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

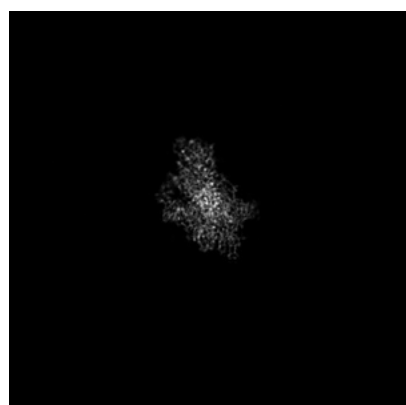
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-74894. These allow visual inspection of the internal detail of the map and identification of artifacts.

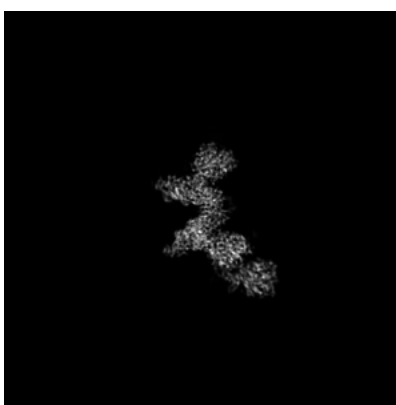
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

6.1.1 Primary 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: 208



Y Index: 208



Z Index: 208

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: 168



Y Index: 210

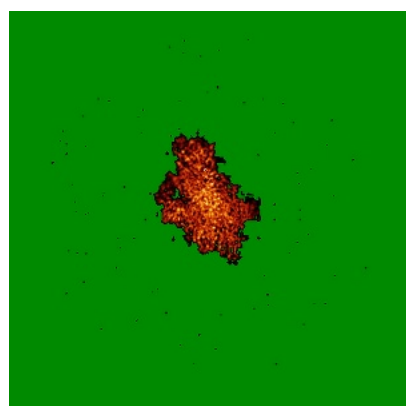


Z Index: 210

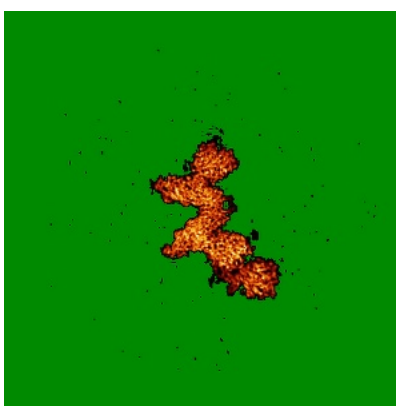
The images above show the largest variance slices of the map in three orthogonal directions.

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

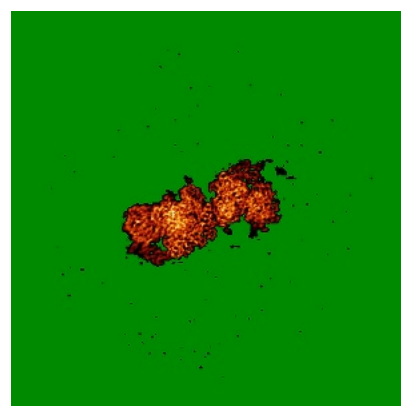
6.4.1 Primary map



X



Y



Z

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



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0534. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

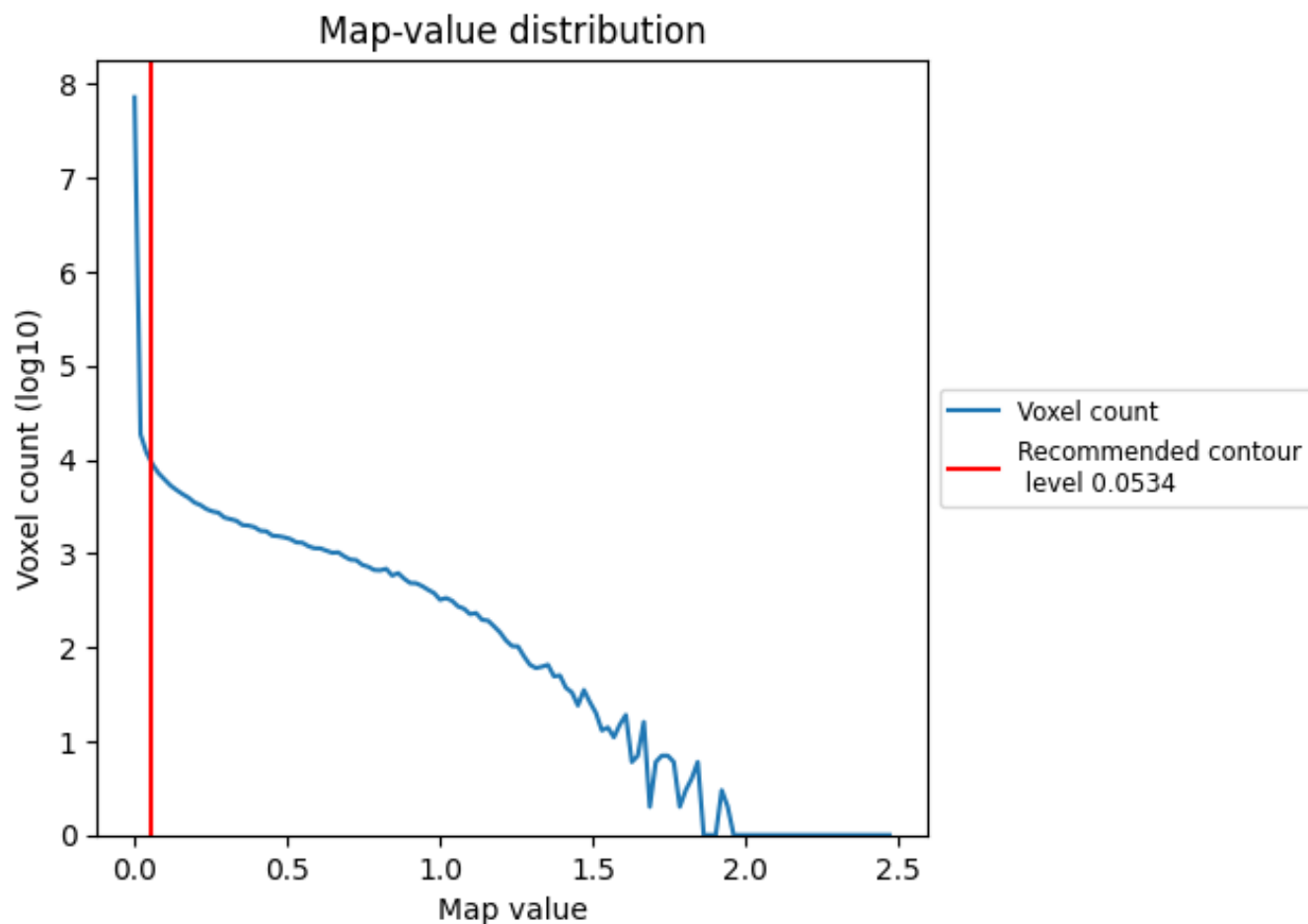
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

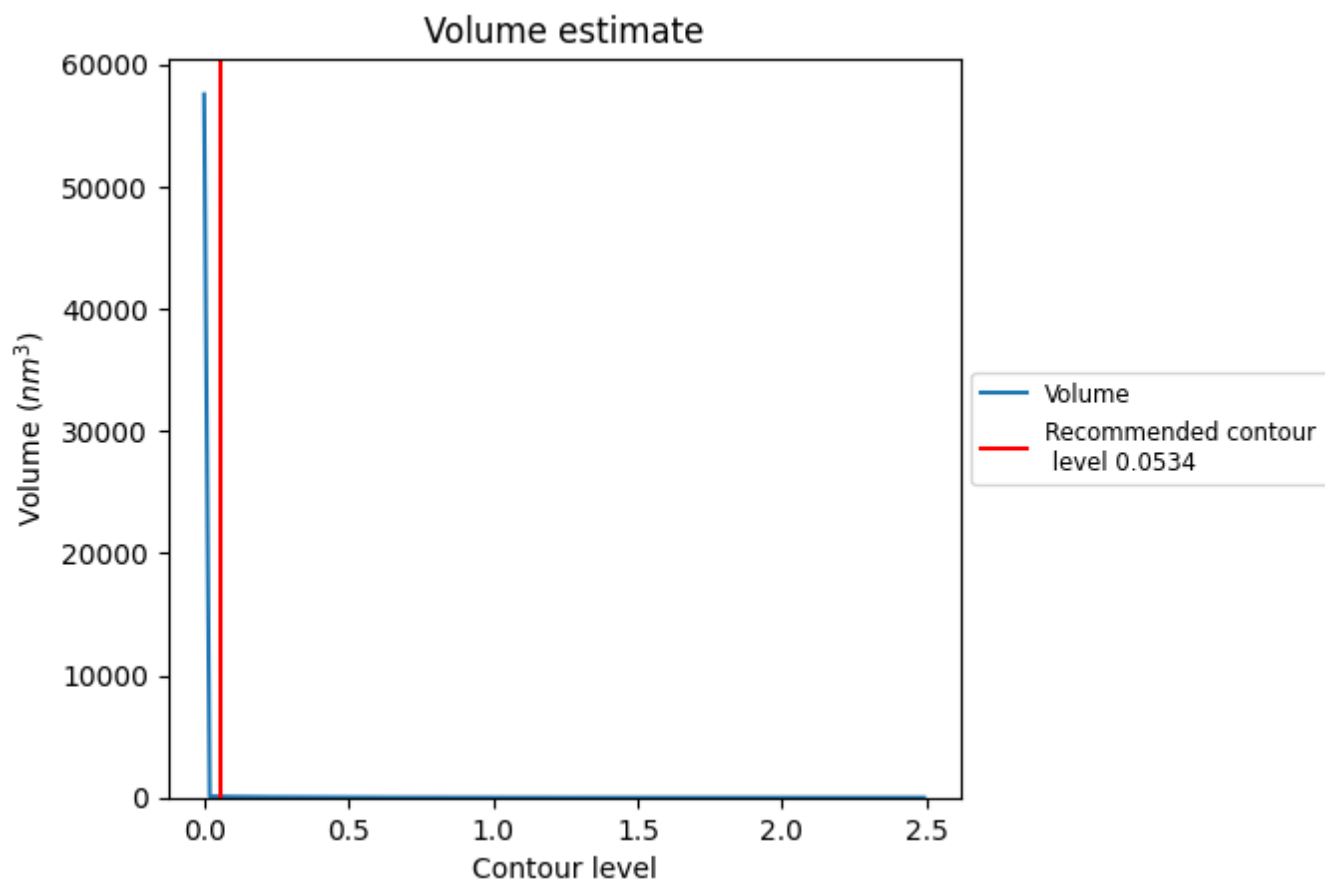
This section contains the results of statistical analysis of the map.

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.

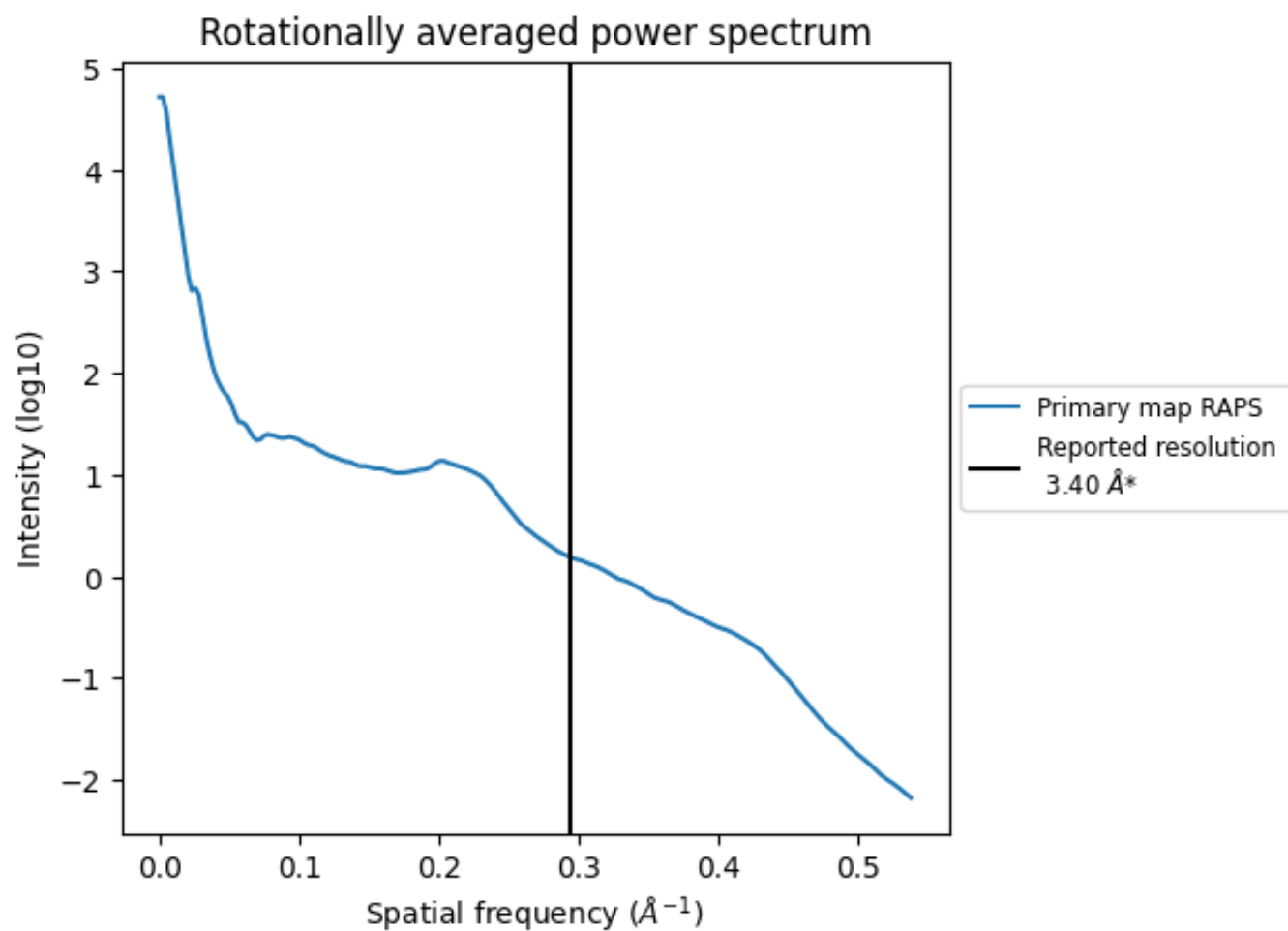
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 82 nm^3 ; this corresponds to an approximate mass of 74 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.294 Å⁻¹

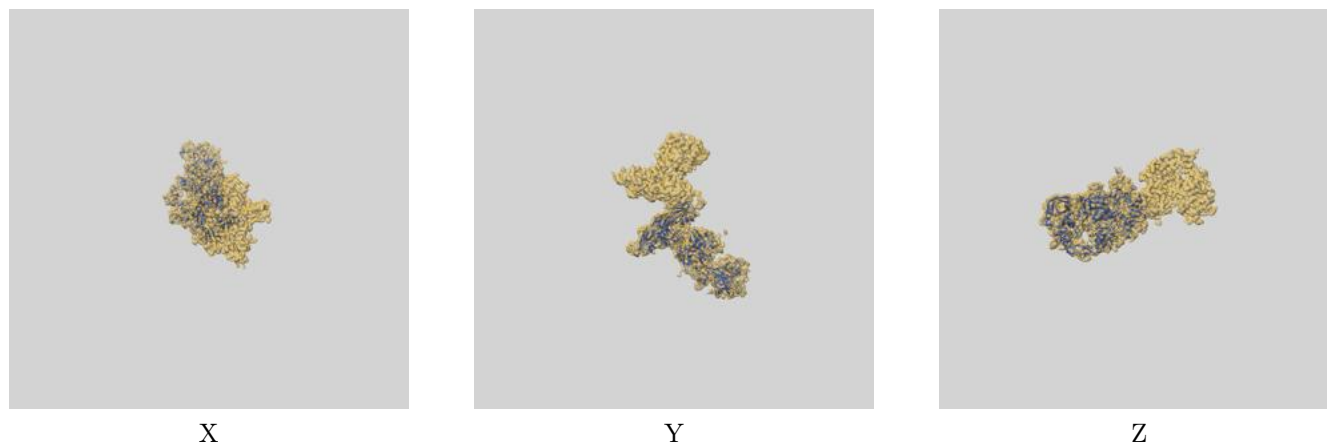
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

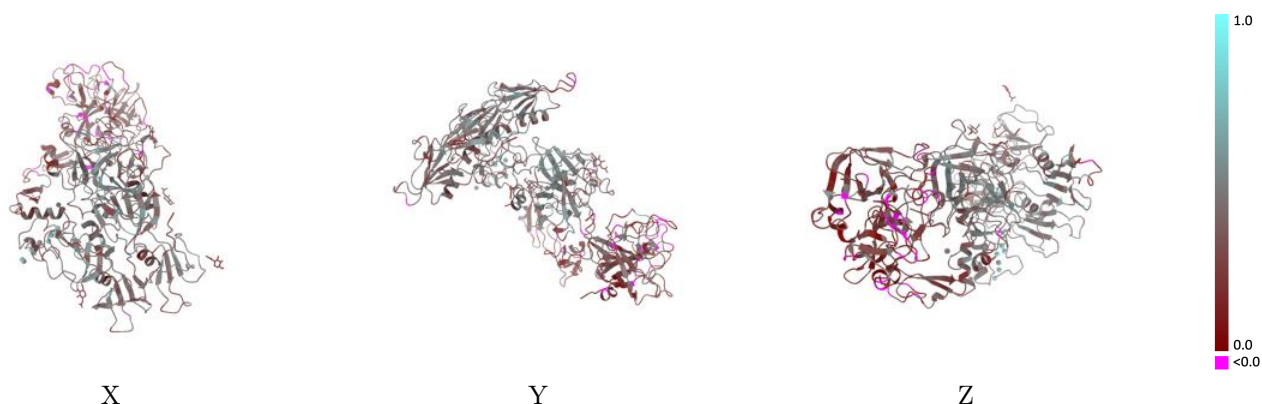
This section contains information regarding the fit between EMDB map EMD-74894 and PDB model 9ZVX. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

9.1 Map-model overlay [i](#)



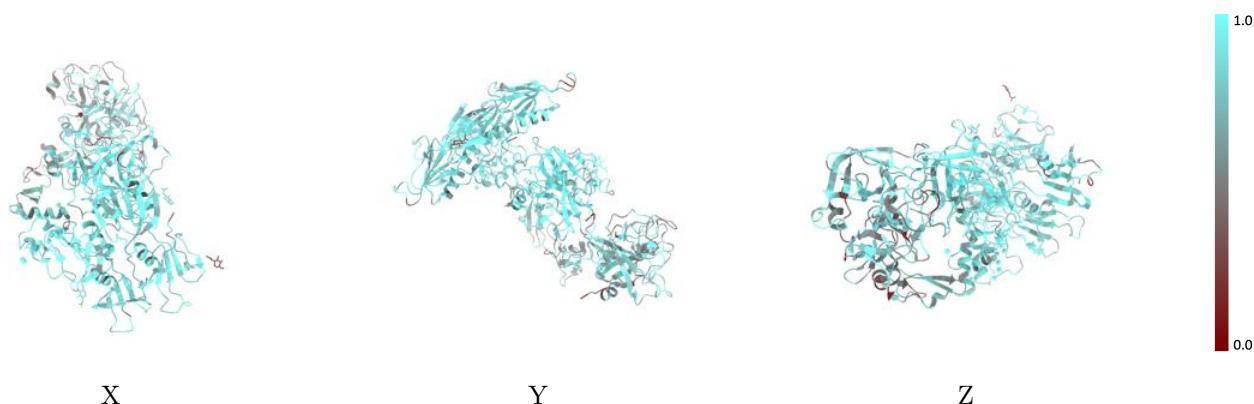
The images above show the 3D surface view of the map at the recommended contour level 0.0534 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



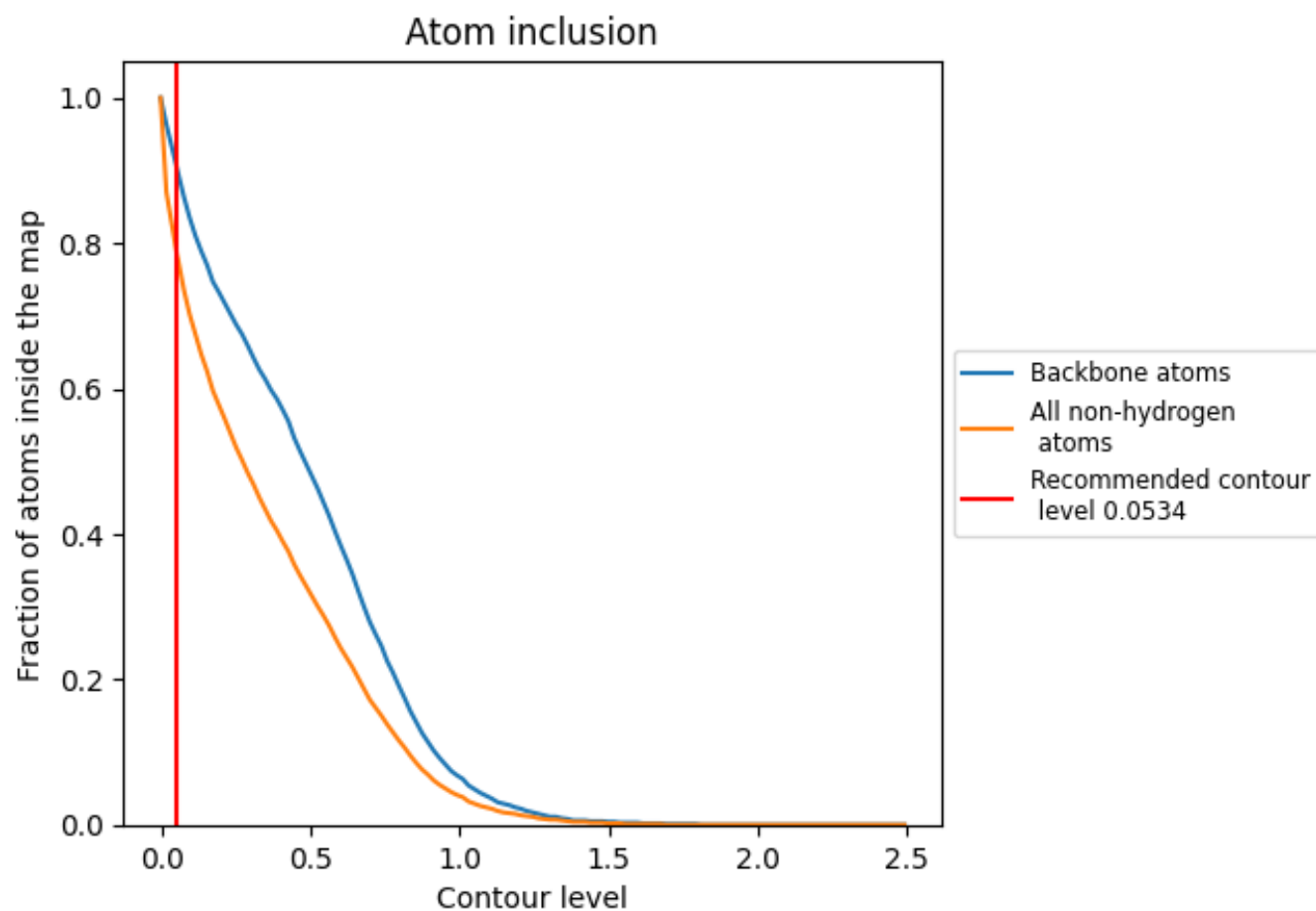
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0534).

9.4 Atom inclusion ⓘ



At the recommended contour level, 90% of all backbone atoms, 78% 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 (0.0534) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7830	0.3510
A	0.8240	0.4050
B	0.8640	0.4270
C	0.7060	0.2830
D	0.6880	0.2300

