WORLDWIDE PDB

PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Jul 9, 2025 – 10:44 pm BST

PDB ID	:	9G0A / pdb_00009g0a
EMDB ID	:	EMD-50927
Title	:	Influenza A/H7N9 polymerase post-cleavage cap-snatching complex
Authors	:	Rotsch, A.H.; Li, D.; Dienemann, C.; Cusack, S.; Cramer, P.
Deposited on	:	2024-07-07
Resolution	:	3.10 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 (i) 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 (i)) were used in the production of this report:

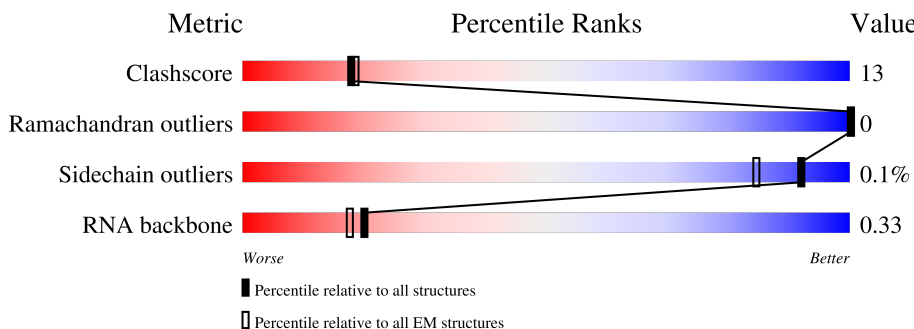|		
EMDB validation analysis	:	0.0.1.dev118
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.10 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.

Metric	Percentile Ranks	Value
Clashscore		13
Ramachandran outliers		0
Sidechain outliers		0.1%
RNA backbone		0.33

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	Z	1087	19% — 31% / 12% / 57%
2	Y	117	85% — 80% / 19% / •
3	A	1641	• — 72% / 16% / 12%
4	P	35	17% / 29% / 20% / 34%
5	a	717	14% — 54% / 46%
6	b	757	11% — 70% / 27% / •
7	c	759	15% — 69% / 27% / •

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Mol	Chain	Length	Quality of chain
8	r	13	15% / 23% / 31% / 8% / 38%
9	v	14	14% / 79% / 7%
10	X	14	79% / 57% / 43%
11	B	1174	82% / 14%
12	C	275	86% / 9% / 5%
13	E	210	88% / 11%
14	F	127	45% / 20% / 35%
15	H	150	78% / 21%
16	I	125	70% / 23% / 6%
17	J	67	76% / 19%
18	K	117	84% / 15%
19	L	58	50% / 29% / 21%
20	N	43	47% / 14% / 40%
21	T	43	47% / 35% / 19%
22	D	184	48% / 20% / 32%
23	G	172	63% / 37%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	SEP	A	3004	-	-	X	-

2 Entry composition (i)

There are 27 unique types of molecules in this entry. The entry contains 55859 atoms, of which 29 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 Transcription elongation factor SPT5.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	Z	472	Total 3787	C 2405	N 669	O 696	S 17	0	0

- Molecule 2 is a protein called Transcription elongation factor SPT4.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	Y	116	Total 911	C 570	N 159	O 173	S 9	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	A	1440	Total 11410	C 7170	N 2036	O 2132	P 2	S 70	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	527	THR	-	insertion	UNP I3LJR4
A	1300	GLY	-	insertion	UNP I3LJR4

- Molecule 4 is a RNA chain called 5' cap(1) RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	P	23	Total 499	C 223	N 101	O 152	P 23	0	0

- Molecule 5 is a protein called Polymerase acidic protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	a	717	Total 5807	C 3672	N 987	O 1107	S 41	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	0	GLY	-	expression tag	UNP M9TI86
a	119	ASP	GLU	engineered mutation	UNP M9TI86

- Molecule 6 is a protein called RNA-directed RNA polymerase catalytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	b	736	5865	3688	1026	1105	46	0	0

- Molecule 7 is a protein called Polymerase basic protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	c	734	5816	3655	1046	1075	40	0	0

- Molecule 8 is a RNA chain called 3' vRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
8	r	8	163	73	22	60	8	0	0

- Molecule 9 is a RNA chain called 5' vRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
9	v	14	306	137	62	93	14	0	0

- Molecule 10 is a protein called likely linker between KOWx4 and KOW5 domains of SPT5.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
10	X	14	77	48	14	15	0	0

- Molecule 11 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	B	1131	9053	5727	1592	1670	64	0	0

- Molecule 12 is a protein called DNA-directed RNA polymerase II subunit RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	C	261	Total 2096	C 1314	N 360	O 416	S 6	0	0

- Molecule 13 is a protein called DNA-directed RNA polymerase II subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	E	209	Total 1721	C 1089	N 300	O 324	S 8	0	0

- Molecule 14 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	F	82	Total 658	C 418	N 113	O 122	S 5	0	0

- Molecule 15 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	H	148	Total 1186	C 750	N 194	O 237	S 5	0	0

- Molecule 16 is a protein called DNA-directed RNA polymerase II subunit RPB9.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	I	117	Total 950	C 587	N 169	O 183	S 11	0	0

- Molecule 17 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	J	64	Total 507	C 328	N 86	O 87	S 6	0	0

- Molecule 18 is a protein called DNA-directed RNA polymerase II subunit RPB11-a.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	K	115	Total 920	C 593	N 152	O 173	S 2	0	0

- Molecule 19 is a protein called RNA polymerase II, I and III subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	L	46	Total	C	N	O	S	0	0
			389	241	75	67	6		

- Molecule 20 is a DNA chain called nontemplate DNA (43-mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
20	N	26	Total	C	N	O	P	0	0
			537	257	97	157	26		

- Molecule 21 is a DNA chain called template DNA (43-mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
21	T	35	Total	C	N	O	P	0	0
			713	343	128	208	34		

- Molecule 22 is a protein called RNA polymerase II subunit D.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	D	126	Total	C	N	O	S	0	0
			1030	642	175	209	4		

- Molecule 23 is a protein called DNA-directed RNA polymerase subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	G	171	Total	C	N	O	S	0	0
			1351	875	219	249	8		
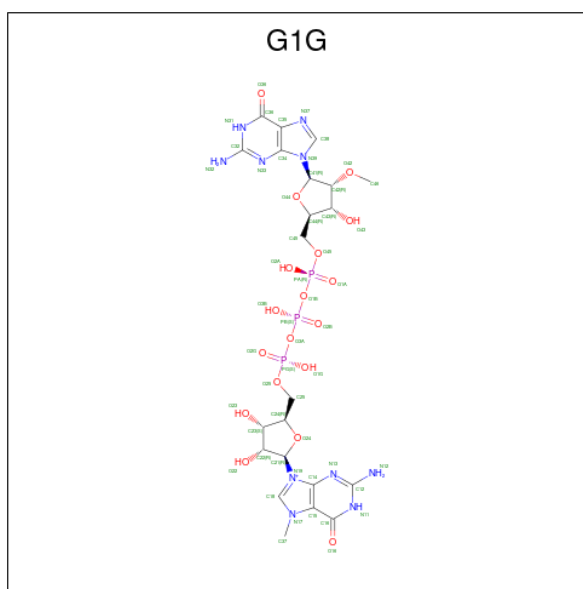
- Molecule 24 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
24	A	2	Total	Zn	0
			2	2	
24	B	1	Total	Zn	0
			1	1	
24	C	1	Total	Zn	0
			1	1	
24	I	2	Total	Zn	0
			2	2	
24	J	1	Total	Zn	0
			1	1	
24	L	1	Total	Zn	0
			1	1	

- Molecule 25 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	AltConf
25	A	1	Total Mg 1 1	0
25	a	1	Total Mg 1 1	0

- Molecule 26 is 7-METHYL-GUANOSINE-5'-TRIPHOSPHATE-5'-(2'-O-METHYL)-GUANOSINE (CCD ID: G1G) (formula: $C_{22}H_{32}N_{10}O_{18}P_3$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms						AltConf
			Total	C	H	N	O	P	
26	P	1	82	22	29	10	18	3	0

- Molecule 27 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).

PO4

O3

O$^-$

O2 O$^-$ — P === O O1

P

O$^-$

O4
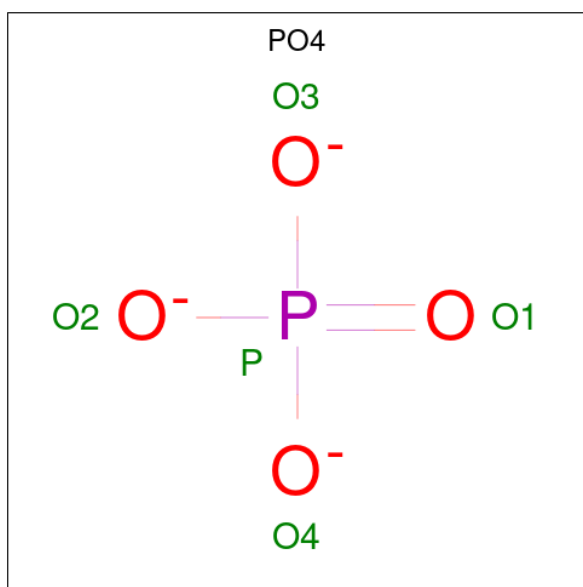
Mol	Chain	Residues	Atoms			AltConf
27	a	1	Total	O	P	0
			5	4	1	
27	a	1	Total	O	P	0
			5	4	1	
27	c	1	Total	O	P	0
			5	4	1	

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: Transcription elongation factor SPT5

• Molecule 2: Transcription elongation factor SPT4

Chain Y:

85%

80% 19%

• Molecule 3: DNA-directed RNA polymerase subunit

Chain A:

72% 16% 12%

E845 Q861 R862 S870 V871 M872 E893 L896 Q904 R928 E957 R958 M959 R960 E961 P980 C981 R985 M986 K992 E1011 E1015 K1018 K1019 L1020 Q1034 R1052 A1055 E1056 R1059 K1075 G1084 L1095 G1096 M1102 N1105 THR

PHE HIS TYR ALA VAL SER A1114 L1119 I1130 P1134 P1137 D1150 R1153 V1169 T1170 A1171 N1172 T1173 Y1177 D1178 P1179 N1180 P1181 Q1182 W1210 L1211 L1212 R1213 V1214 E1215 L1216 D1217 R1218 K1219 H1220 M1221 R1224 K1225 L1226 T1227 M1228 E1229 Q1230 F1247 A1252 L1255

R1260 I1261 M1262 N1263 SER ASP GLU ASN LYS MET GLN GLU GLU GLU VAL VAL ASP LYS M1279 D1280 D1281 F1284 L1285 I1288 E1289 S1290 N1291 T1294 D1295 K1306 L1311 Q1332 V1341 M1344 R1345 T1358 S1359 N1360 D1361 I1371 V1374 R1375 K1376 R1380 L1401

C1402 D1403 T1404 M1405 R1421 Q1422 D1423 T1424 L1427 M1428 E1433 M1440 M1451 I1458 M1459 L1475 K1479 Y1482 GLY MET GLU ILE PRO THR ASN ILE PRO GLY LEU GLY ALA ALA GLY PRO THR GLY MET PHE PHE GLY SER ALA PRO SER PRO MET GLY GLY ILE SER PRO

ALA MET THR PRO TRP ASN GLN GLY ALA THR PRO ALA TYR GLY ALA TRP PRO SER PRO SER VAL GLY SER GLY MET THR PRO GLY ALA TYR GLU PRO ARG SER PRO GLY GLY TYR THR PRO GLN SER PRO SER TYR SER PRO THR SER PRO SER

GLY PRO SER SER PRO TYR ILE PRO SER PRO GLY GLY ALA MET SER PRO SER TYR SER PRO THR SER PRO ALA TYR GLU PRO ARG SER PRO GLY GLY TYR THR PRO GLN SER PRO SER TYR SER PRO Y3000 S3001 P3002 T3003 S3004 P3005 S3006 TYR SER PRO THR SER PRO ASN

TYR SER PRO THR SER PRO S3013 Y3014 S3015 P3016 T3017 S3018 P3019 S3020 Y3021 S3022

• Molecule 4: 5' cap(1) RNA

Chain P: 17%   29%   20%   34%

G A2 A3 G4 C5 G6 A7 G A12 A13 C14 A C A G A C A G22 C23 A24 G25 C26 A27 G28 G34 C35

• Molecule 5: Polymerase acidic protein

Chain a: 14% 54% 46%

G0 M1 E2 D3 F4 V5 R6 Q7 N10 P11 M12 I13 V14 E15 L16 A17 E18 K19 A20 M21 K22 E23 Y24 G25 E26 K29 I30 N33 A36 S37 I38 C39 T40 H41 V44 C45 F46 M47 Y48 S49 F53 E56 R57 G58 E59 S60 T61 I62 I63 E64 S65 G66 D67

P68 N69 V70 L71 L72 K73 H74 R75 F76 E77 I78 R82 D83 R84 T85 M86 A87 W88 T89 V90 V91 I94 T98 E101 K102 P103 K104 F105 L106 P107 D108 L109 Y112 K113 E114 N115 R116 F117 I118 D119 I120 G121 V122 T123 R124 R125 E126 V127 H128 I129 Y130 Y131 L132 N136

K137 I138 K139 S140 E141 K142 H146 I147 F148 S149 E153 E165 E166 S167 R168 A169 R170 I171 K172 T173 R174 L175 I178 R179 Q180 E181 M182 G186 L187 W188 D189 S190 F191 E195 R196 G197 E198 E199 T200 I201 E202 E203 R204 F205 E206 I207 T208 G209 T210 M211 R212 R213 L214 A215

D216 Q217 S218 L219 N222 L226 E227 V233 D234 G235 F236 E237 P238 N239 G240 C241 I242 E243 G244 K245 L246 S247 Q248 M249 V253 N254 A255 R256 I257 E258 P259 F260 L261 R262 T263 T264 P265 R266 P267 L268 R269 L270 P271 D272 P275 R279 F282 M285 D286 A287 L288 K289

• Molecule 6: RNA-directed RNA polymerase catalytic subunit

Chain b:

M688 S702 R706 R707 I711 M714 V715 M718 I724 D725 A726 R727 E731 K736 K737 E738 E739 I743 M744 R755 Q756 K757

● Molecule 7: Polymerase basic protein 2

Chain c:

15%

69% 27%

M1 I4 K5 E6 L7 R8 M11 R15 I19 K22 T23 M28 A29 T35 S36 G37 R38 Q39 E40 L45 R46 M50 D60 K61 R62 I63 M64 E65 M66 I67 E72 N82 D83 A84 G85 S86 V89 P104 S107 H110 Y111 V114

Y118 V122 E123 R124 P132 V133 H134 F135 R136 N137 Q138 V139 K140 V145 D146 H151 A152 D153 L154 E158 V162 I163 M164 P169 V172 E180 S181 T184 I185 E188 Q194 D195 C196 K197 I198 E208 R213 K214 T215 R216 F217 L218 P219 V220 A221

E230 V231 E241 Q242 M243 G248 E249 V250 I260 I266 R269 A274 L277 L280 L281 E282 M283 T287 Q288 I289 G290 Q291 V292 R293 M294 V295 D296 I297 L298 R299 Q300 N301 P302 T303 E304 E305 Q306 K312 A313 A314 M315 R318 S322 F323 G327 F328

K339 R340 E343 V344 L345 T346 G347 N348 L352 K353 I354 R355 V356 H357 E358 G359 Y360 E361 E362 M365 V366 G367 R368 R369 A370 T378 G388 K389 S393 I394 A395 E396 A397 I398 I399 V400 Q406 M410 I411 D417 F420 V421 N422 R423 Q426 R427 L435

Q439 A442 K443 F446 Q447 I451 E452 P453 I454 M458 I461 G462 P465 D466 M467 T468 P469 M473 S474 V480 M483 D486 GLU TYR SER S490 T491 E492 R493 V496 S497 I498 L502 R503 V504 R508 G509 N510 V511 L512 E517 E520 Y531 S532

S533 S534 M535 M536 W537 E538 I539 L546 W552 I553 I554 R555 E558 I562 Q566 T569 M570 L571 E576 F580 K586 A587 A588 R589 G590 Q591 Y592 S593 R597 D605 V606 L607 G608 D611 T612 I615 I616 A624 P625 P626 E627 Q628 S629 R630 M631 Q632

F633 S634 N639 V640 R641 G642 S643 G644 M645 R646 I647 V648 V649 R650 V655 F656 N657 Y658 L665 L668 G669 K670 D671 M676 E677 D678 P679 D680 E681 G682 T683 A684 G685 V686 E687 V690 L691 R692 G693 F694 L695 I696 L697 G698 K699 E700 N701 K702 R703 Y704 G705 P706 A707 L708

S709 I710 N711 E712 L713 S714 N715 L716 A717 K718 G719 E720 K721 A722 N723 V724 L725 D730 V731 V732 L733 V734 M735 K736 R737 LYS ARG ASP SER ILE LEU THR ASP SER GLN THR ALA THR LYS ARG ILE ARG MET ALA ILE ASN

● Molecule 8: 3' vRNA

Chain r:

15%

23% 31% 8% 38%

C U C U G C6 U7 U8 C9 U10 G11 C12 U13

● Molecule 9: 5' vRNA

Chain v:

14% 79% 7%

A1 G2 U3 A4 G5 U6 A7 A8 C9 A10 A11 G12 A13 G14

• Molecule 10: likely linker between KOWx4 and KOW5 domains of SPT5

Chain X:

• Molecule 11: DNA-directed RNA polymerase subunit beta

Chain B:
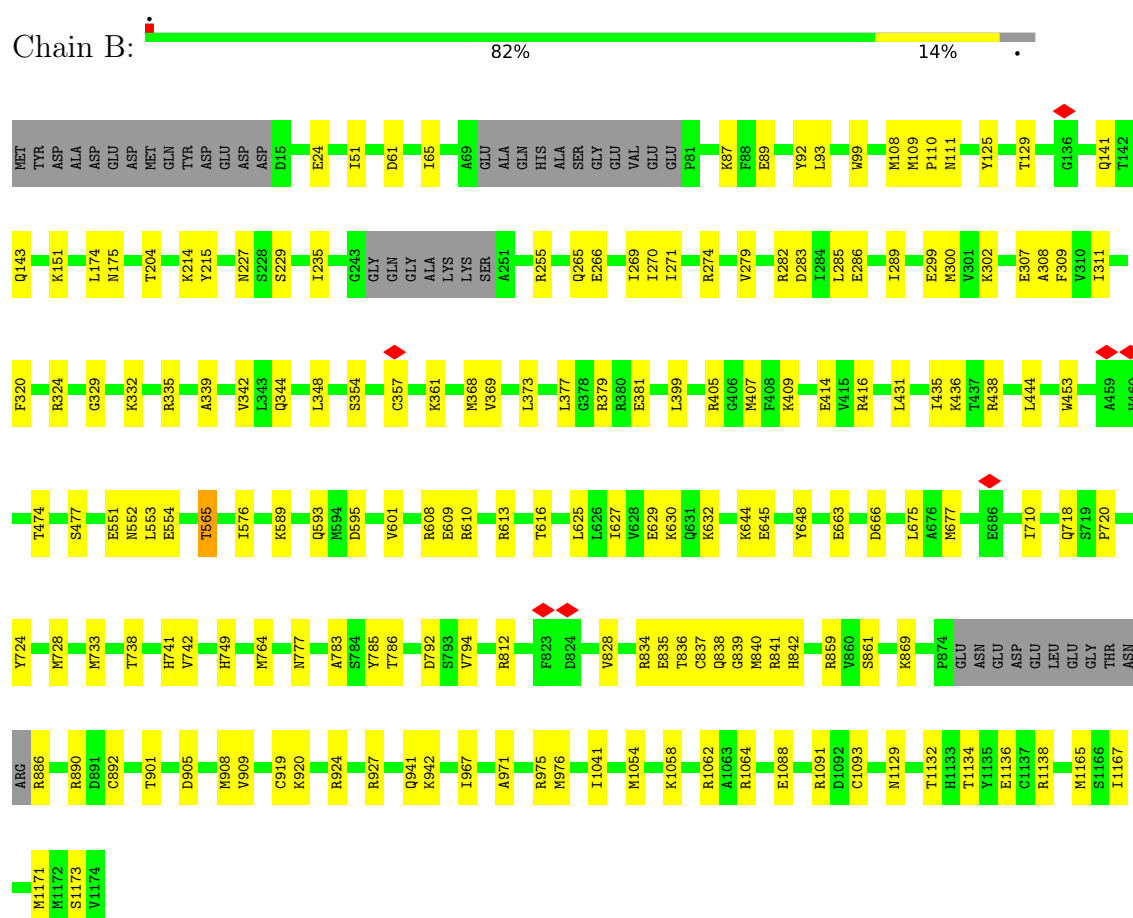
• Molecule 12: DNA-directed RNA polymerase II subunit RPB3

Chain C:

• Molecule 13: DNA-directed RNA polymerase II subunit E

Chain E:

MET D2 T7 D23 T36 L37 E38 E39 F40 K41 D46 R55 L58 Q71 E97 N98 I99 T100 R101 I104 I126 L127 Q133 E134 E141 K153 T157 R181 Y182 S197 Q210

- Molecule 14: DNA-directed RNA polymerases I, II, and III subunit RPABC2

Chain F: 45%   20%   35%

MET SER ASP ASN GLU ASP ASN PHE ASP GLY ASP ASP PHE ASP ASP VAL GLU GLU GLU ASP GLY GLY LEU ASP ASP LEU GLU ASN ALA GLU GLU GLU GLY GLN GLU ASN VAL GLU ILE LEU PRO SER GLY GLU ARG PRO Q46 R51 I52 T53 E61 R62 L66 P78 V79 M80

L83 E84 G85 E86 T87 I92 A93 M94 K95 E96 L97 R100 K101 I102 R108 E116 V120 D121 E122 D127
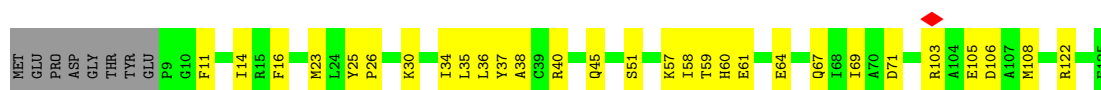
- Molecule 15: DNA-directed RNA polymerases I, II, and III subunit RPABC3

Chain H: 78%   21%   •

MET A2 E7 D8 I9 F10 D11 D14 K20 K21 F22 S26 E33 M37 I45 Y48 P49 L52 K55 V59 E66 R81 P82 E89 Y90 V91 M92 E103 T104 S105 T106 E107 N130 N131 L132 H133 L143 L144 M145 A149 PHE
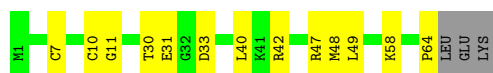
- Molecule 16: DNA-directed RNA polymerase II subunit RPB9

Chain I: 70%   23%   6%

MET GLU PRO ASP GLY THR TYR GLU P9 G10 F11 I14 R15 F16 M23 L24 Y25 P26 K30 I34 L35 L36 Y37 A38 C39 R40 Q45 S51 K57 I58 T59 H60 E61 E64 Q67 I68 I69 A70 D71 R103 A104 E105 D106 A107 M108 R122 E125
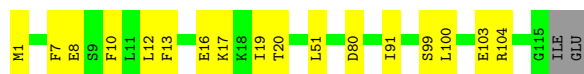
- Molecule 17: DNA-directed RNA polymerases I, II, and III subunit RPABC5

Chain J: 76%   19%   •

M1 C7 C10 G11 T30 E31 G32 D33 L40 K41 R42 R47 M48 L49 K58 P64 LEU GLU LYS

- Molecule 18: DNA-directed RNA polymerase II subunit RPB11-a

Chain K: 84%   15%   •

M1 F7 E8 S9 F10 L11 L12 F13 E16 K17 K18 I19 T20 L51 D80 I91 S99 L100 E103 R104 G115 ILE GLU
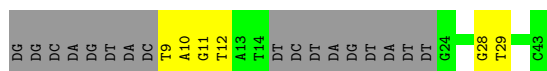
- Molecule 19: RNA polymerase II, I and III subunit K

Chain L: 50%   29%   21%

MET ASP THR GLN LYS ASP VAL GLN PRO PRO LYS GLN Q13 P14 M15 I16 Y17 I18 C19 G20 E21 C22 H23 T24 E25 R31 R35 C36 G40 M44 L52 V53 V54 F55 D56 A57 R58
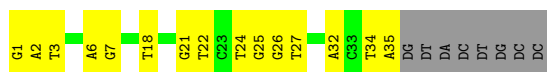
- Molecule 20: nontemplate DNA (43-mer)

Chain N:

47%   14%   40%

DG DG DC DA DG DT DA DC T9 A10 G11 T12 A13 T14 DT DC DT DA DG DT DA DT DT G24 G28 T29 C43
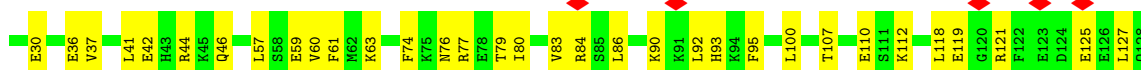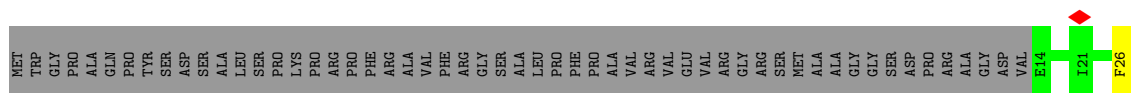
• Molecule 21: template DNA (43-mer)

Chain T:

47%   35%   19%

G1 A2 T3 A6 G7 T18 G21 T22 C23 T24 G25 G26 T27 A32 C33 T34 A35 DG DT DA DC DT DG DC DC
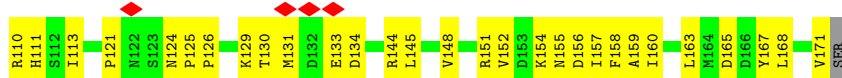
• Molecule 22: RNA polymerase II subunit D

Chain D:

48%   20%   32%

MET TRP GLY PRO ALA GLN PRO TYR SER ASP SER ALA LEU SER PRO LYS PRO ARG PHE ARG ALA VAL PHE ARG GLY SER ALA LEU PRO PHE PRO ALA VAL ARG VAL GLU VAL ARG GLY ARG SER MET ALA ALA GLY GLY SER ASP PRO ARG ALA GLY VAL E14 I21 F26

E30 E36 V37 L41 E42 H43 R44 K45 Q46 L57 S58 E59 V60 F61 M62 K63 F74 K75 N76 R77 E78 T79 I80 V83 R84 S85 L86 K90 K91 L92 H93 K94 F95 L100 T107 E110 S111 K112 L118 E119 G120 R121 F122 E123 D124 E125 E126 L127 Q128

Q129 I130 L131 I134 S139 PHE GLN TYR

• Molecule 23: DNA-directed RNA polymerase subunit

Chain G:

63%   37%   •

M1 F2 Y3 H4 I5 E10 Y17 F18 G19 T25 V26 K27 E35 C38 T39 G40 K41 Y42 G43 F44 V45 I46 I51 V58 I59 Q60 P61 G62 F65 V66 L67 Y68 I75 R78 E83 V84 V85 V92 N93 K94 I101 G102 P103 M104 I108 S109

R110 H111 S112 I113 P121 N122 S123 N124 P125 P126 K129 T130 M131 D132 E133 D134 R144 L145 V148 R151 V152 D153 K154 N155 D156 I157 F158 A159 I160 L163 M164 D165 D166 Y167 L168 V171 SER

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	63230	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	40.0	Depositor
Minimum defocus (nm)	200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	2.018	Depositor
Minimum map value	-0.756	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.046	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	470.39996, 470.39996, 470.39996	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: G1G, PO4, MG, SEP, ZN

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	Z	0.40	0/3853	0.73	0/5187
2	Y	0.13	0/927	0.34	0/1250
3	A	0.36	0/11599	0.70	0/15658
4	P	0.56	0/558	0.87	0/864
5	a	0.43	0/5931	0.70	0/7998
6	b	0.31	0/5980	0.58	0/8063
7	c	0.29	0/5912	0.56	0/7972
8	r	0.30	0/179	0.63	0/275
9	v	0.40	0/344	0.81	1/535 (0.2%)
10	X	1.00	0/77	1.14	0/104
11	B	0.35	0/9234	0.69	0/12463
12	C	0.32	0/2139	0.65	0/2906
13	E	0.36	0/1752	0.72	0/2366
14	F	0.32	0/668	0.69	0/901
15	H	0.35	0/1207	0.69	0/1628
16	I	0.44	0/973	0.97	1/1316 (0.1%)
17	J	0.36	0/516	0.72	0/696
18	K	0.33	0/939	0.64	0/1271
19	L	0.51	0/395	0.91	0/524
20	N	0.37	0/601	0.67	0/924
21	T	0.39	0/799	0.68	0/1231
22	D	0.52	0/1043	0.95	0/1400
23	G	0.52	0/1382	1.02	0/1874
All	All	0.37	0/57008	0.69	2/77406 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	v	2	G	O3'-P-O5'	-5.71	95.43	104.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	I	58	ILE	CA-CB-CG1	5.19	119.22	110.40

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts   (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	Z	3787	0	3830	140	0
2	Y	911	0	908	16	0
3	A	11410	0	11503	222	0
4	P	499	0	255	34	0
5	a	5807	0	5726	400	0
6	b	5865	0	5853	209	0
7	c	5816	0	5946	201	0
8	r	163	0	85	9	0
9	v	306	0	153	8	0
10	X	77	0	73	16	0
11	B	9053	0	9087	133	0
12	C	2096	0	2040	20	0
13	E	1721	0	1737	16	0
14	F	658	0	684	22	0
15	H	1186	0	1147	18	0
16	I	950	0	879	31	0
17	J	507	0	523	10	0
18	K	920	0	942	14	0
19	L	389	0	394	24	0
20	N	537	0	297	6	0
21	T	713	0	398	20	0
22	D	1030	0	1016	35	0
23	G	1351	0	1358	77	0
24	A	2	0	0	0	0
24	B	1	0	0	0	0
24	C	1	0	0	0	0
24	I	2	0	0	0	0
24	J	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
24	L	1	0	0	0	0
25	A	1	0	0	0	0
25	a	1	0	0	0	0
26	P	53	29	28	2	0
27	a	10	0	0	1	0
27	c	5	0	0	0	0
All	All	55830	29	54862	1447	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 13.

The worst 5 of 1447 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)
5:a:189:ASP:HB3	11:B:835:GLU:HB2	1.37	1.05
5:a:122:VAL:HA	5:a:148:PHE:O	1.71	0.90
1:Z:737:HIS:CE1	19:L:53:VAL:HG23	2.09	0.87
23:G:163:LEU:HA	23:G:168:LEU:HD23	1.55	0.86
1:Z:588:ASP:HB3	1:Z:594:ILE:HD11	1.57	0.86

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	Z	460/1087 (42%)	446 (97%)	14 (3%)	0	100	100
2	Y	114/117 (97%)	111 (97%)	3 (3%)	0	100	100
3	A	1426/1641 (87%)	1369 (96%)	57 (4%)	0	100	100
5	a	715/717 (100%)	662 (93%)	53 (7%)	0	100	100
6	b	732/757 (97%)	716 (98%)	16 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	c	730/759 (96%)	714 (98%)	16 (2%)	0	100	100
10	X	12/14 (86%)	8 (67%)	4 (33%)	0	100	100
11	B	1123/1174 (96%)	1088 (97%)	35 (3%)	0	100	100
12	C	257/275 (94%)	252 (98%)	5 (2%)	0	100	100
13	E	207/210 (99%)	205 (99%)	2 (1%)	0	100	100
14	F	80/127 (63%)	76 (95%)	4 (5%)	0	100	100
15	H	146/150 (97%)	142 (97%)	4 (3%)	0	100	100
16	I	115/125 (92%)	110 (96%)	5 (4%)	0	100	100
17	J	62/67 (92%)	61 (98%)	1 (2%)	0	100	100
18	K	113/117 (97%)	113 (100%)	0	0	100	100
19	L	44/58 (76%)	37 (84%)	7 (16%)	0	100	100
22	D	124/184 (67%)	118 (95%)	6 (5%)	0	100	100
23	G	169/172 (98%)	160 (95%)	9 (5%)	0	100	100
All	All	6629/7751 (86%)	6388 (96%)	241 (4%)	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	Z	417/940 (44%)	415 (100%)	2 (0%)	86	92
2	Y	102/103 (99%)	102 (100%)	0	100	100
3	A	1268/1425 (89%)	1268 (100%)	0	100	100
5	a	644/645 (100%)	643 (100%)	1 (0%)	92	96
6	b	647/668 (97%)	646 (100%)	1 (0%)	92	96
7	c	643/666 (96%)	643 (100%)	0	100	100
10	X	1/1 (100%)	1 (100%)	0	100	100
11	B	992/1027 (97%)	991 (100%)	1 (0%)	92	97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	C	238/252 (94%)	238 (100%)	0	100	100
13	E	191/192 (100%)	191 (100%)	0	100	100
14	F	71/111 (64%)	71 (100%)	0	100	100
15	H	129/131 (98%)	129 (100%)	0	100	100
16	I	105/112 (94%)	105 (100%)	0	100	100
17	J	53/56 (95%)	53 (100%)	0	100	100
18	K	104/106 (98%)	104 (100%)	0	100	100
19	L	43/55 (78%)	43 (100%)	0	100	100
22	D	116/160 (72%)	116 (100%)	0	100	100
23	G	152/153 (99%)	152 (100%)	0	100	100
All	All	5916/6803 (87%)	5911 (100%)	5 (0%)	92	97

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	Z	184	CYS
1	Z	285	ILE
5	a	354	ILE
6	b	744	MET
11	B	565	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 55 such sidechains are listed below:

Mol	Chain	Res	Type
6	b	367	GLN
7	c	447	GLN
23	G	60	GLN
13	E	95	GLN
6	b	425	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
4	P	20/35 (57%)	8 (40%)	0
8	r	7/13 (53%)	1 (14%)	0
9	v	13/14 (92%)	6 (46%)	0

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
All	All	40/62 (64%)	15 (37%)	0

5 of 15 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
4	P	5	C
4	P	6	G
4	P	7	A
4	P	13	A
4	P	14	C

There are no RNA pucker outliers to report.

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

2 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	SEP	A	3018	3	8,9,10	0.64	0	8,12,14	0.65	0
3	SEP	A	3004	3	8,9,10	0.65	0	8,12,14	0.62	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	SEP	A	3018	3	-	1/5/8/10	-
3	SEP	A	3004	3	-	1/5/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	3004	SEP	N-CA-CB-OG
3	A	3018	SEP	N-CA-CB-OG

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	3004	SEP	5	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 14 ligands modelled in this entry, 10 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	$\#|Z| > 2$
27	PO4	a	1002	-	4,4,4	0.93	0	6,6,6	0.42	0
26	G1G	P	101	4	46,58,58	2.07	7 (15%)	47,91,91	2.07	11 (23%)
27	PO4	a	1003	-	4,4,4	0.92	0	6,6,6	0.43	0
27	PO4	c	801	-	4,4,4	0.93	0	6,6,6	0.41	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
26	G1G	P	101	4	-	6/26/66/66	0/6/6/6

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
26	P	101	G1G	C35-C36	-8.19	1.30	1.47
26	P	101	G1G	C15-C16	-5.48	1.31	1.45
26	P	101	G1G	C35-C34	-4.50	1.31	1.43
26	P	101	G1G	C15-C14	-3.49	1.31	1.39
26	P	101	G1G	C22-C21	-2.96	1.49	1.53

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
26	P	101	G1G	O24-C21-C22	-7.26	96.31	106.93
26	P	101	G1G	PB-O1B-PA	-4.18	118.47	132.83
26	P	101	G1G	C43-C42-C41	-4.00	95.37	102.89
26	P	101	G1G	O44-C41-C42	-3.84	99.92	106.59
26	P	101	G1G	C12-N11-C16	-3.63	118.42	125.10

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
26	P	101	G1G	C45-O45-PA-O1A
26	P	101	G1G	C45-O45-PA-O1B
26	P	101	G1G	PG-O3A-PB-O2B
26	P	101	G1G	C45-O45-PA-O2A
26	P	101	G1G	O44-C44-C45-O45

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
26	P	101	G1G	2	0
27	a	1003	PO4	1	0

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 then 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.

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wwPDB
PROTEIN DATA BANK

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.

Ligand G1G P 101

Bond lengths

Bond angles

Torsions

Rings
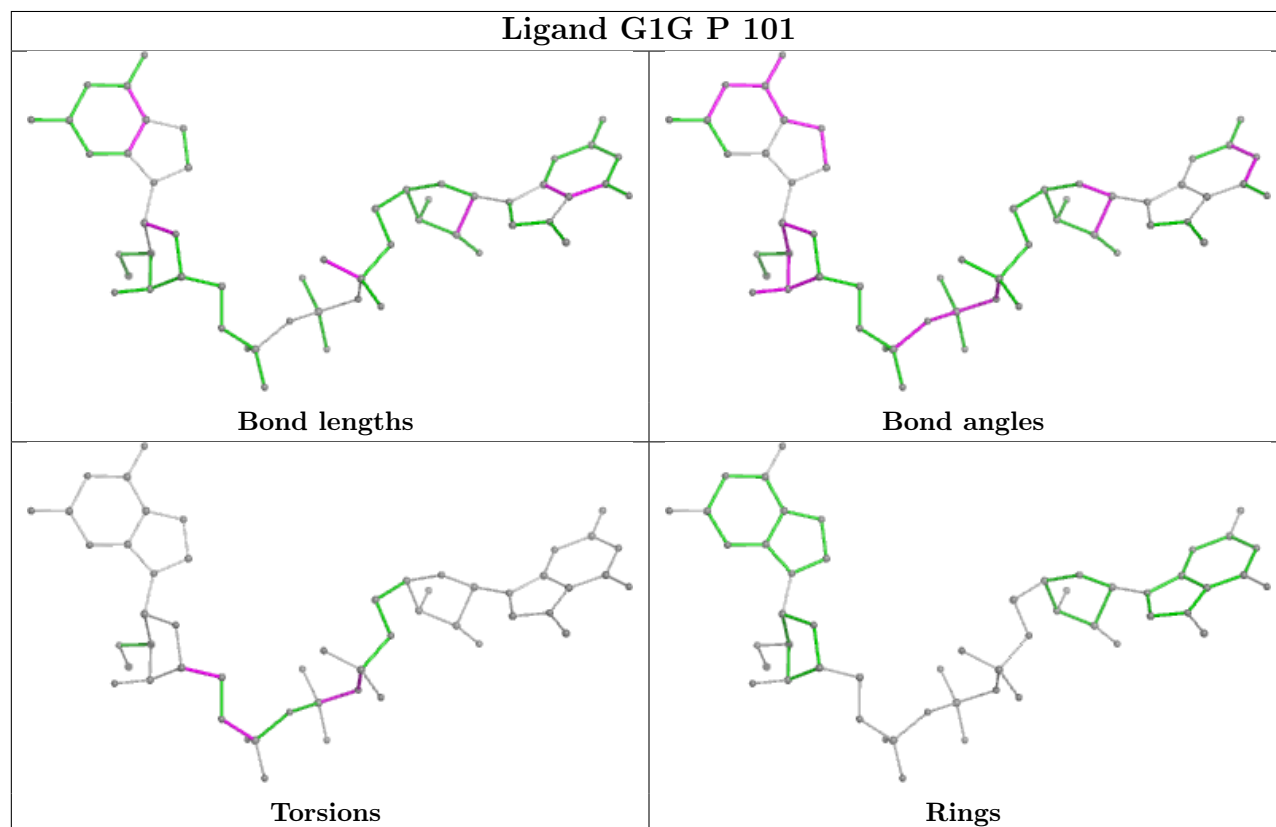
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-50927. 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 ⓘ
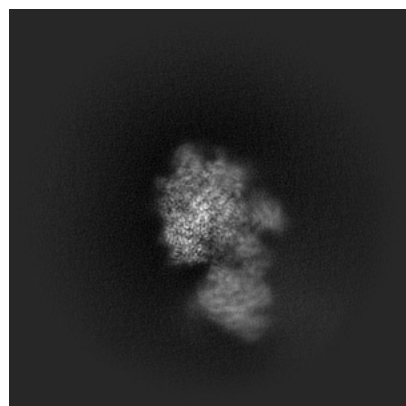
6.1.1 Primary map

X
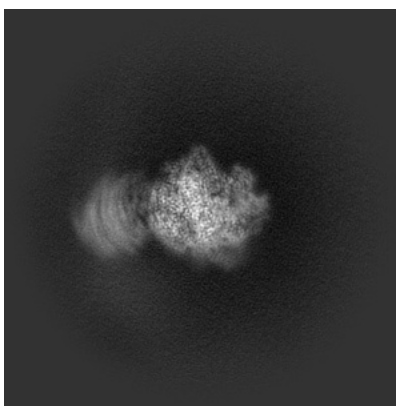
Y
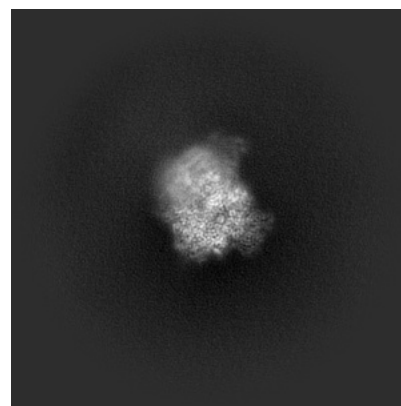
Z

6.1.2 Raw map

X

Y

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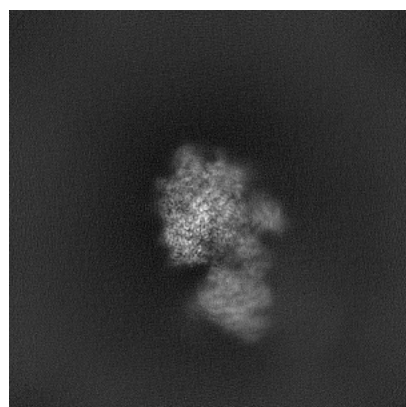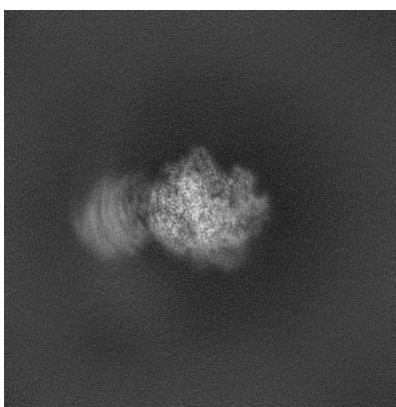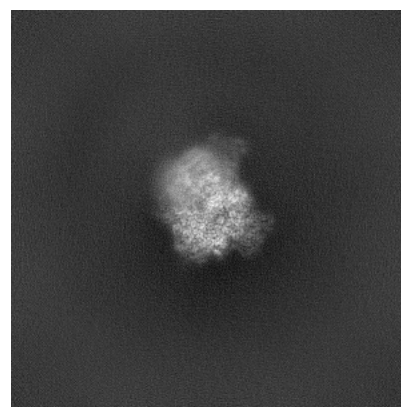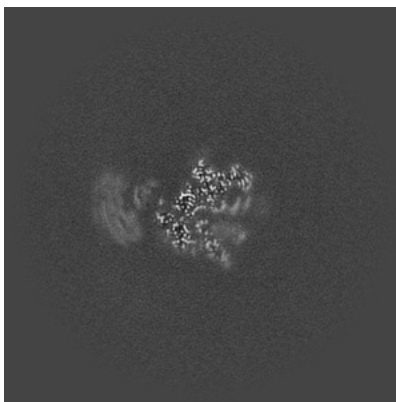
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
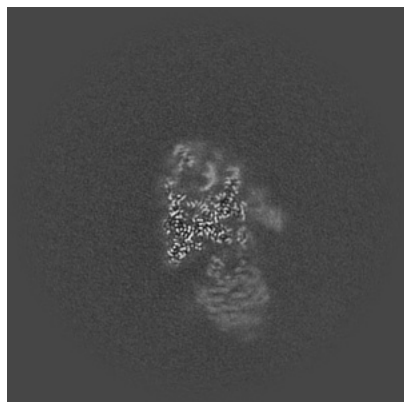
6.2.1 Primary map
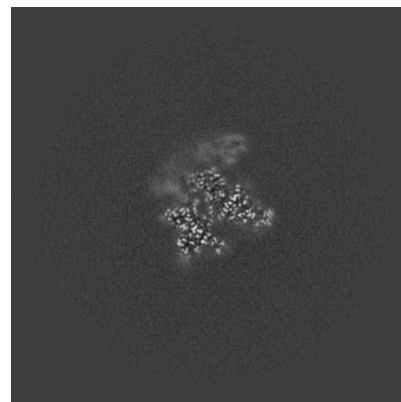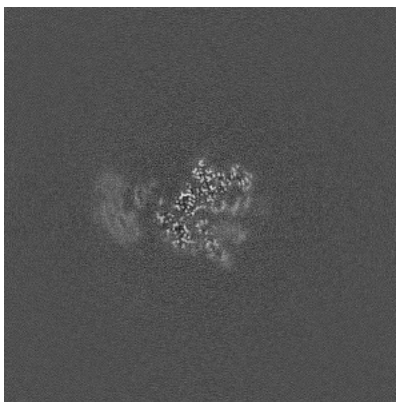
| X Index: 224 | Y Index: 224 | Z Index: 224 |

6.2.2 Raw map

| X Index: 224 | Y Index: 224 | Z Index: 224 |
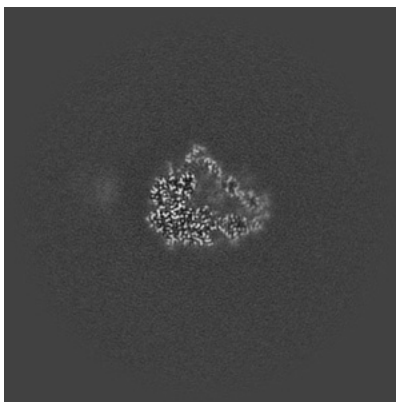
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices ⓘ
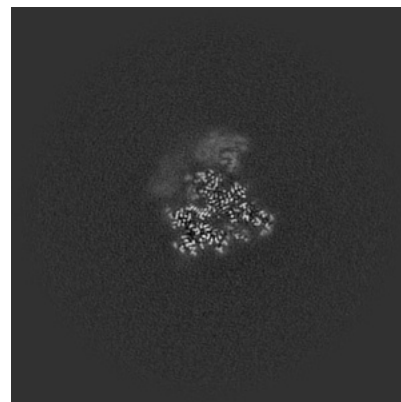
6.3.1 Primary map
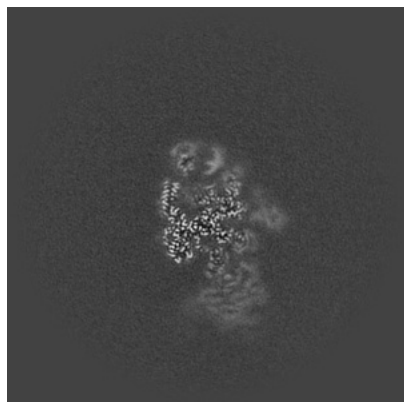
X Index: 230	Y Index: 203	Z Index: 216
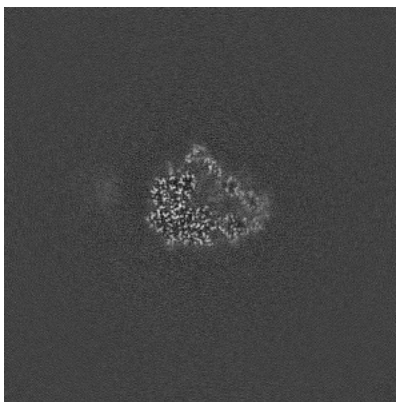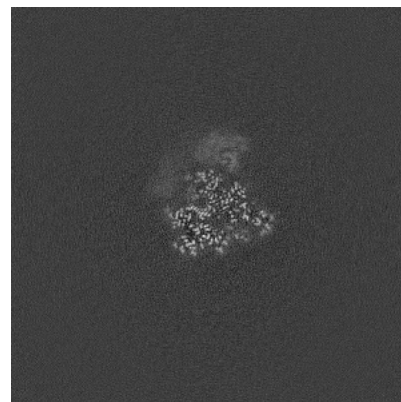
6.3.2 Raw map

X Index: 231	Y Index: 203	Z Index: 216

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

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

6.4.1 Primary map
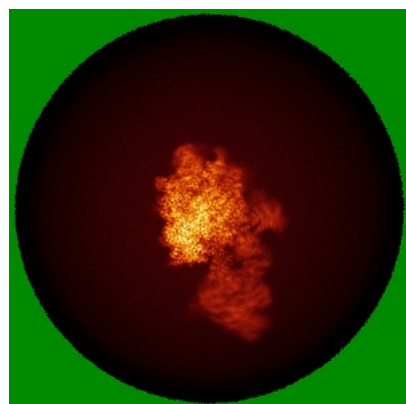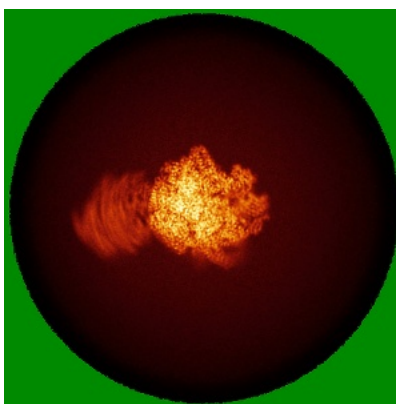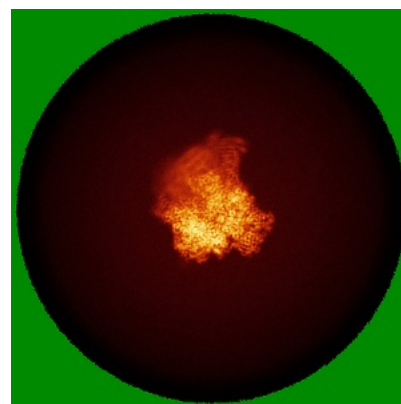
X   Y   Z

6.4.2 Raw map

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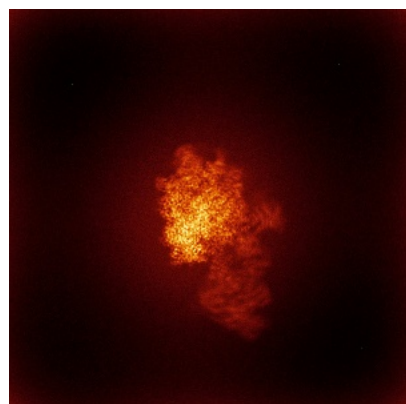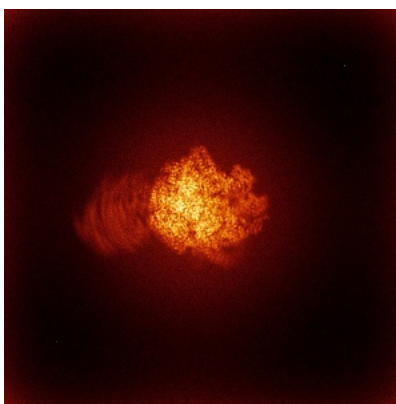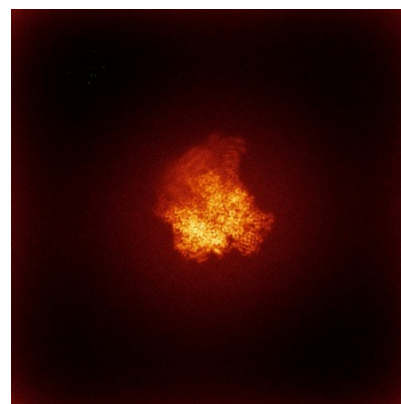
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5　Orthogonal surface views　ⓘ
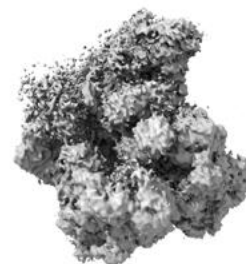
6.5.1　Primary map

| X | Y | Z |
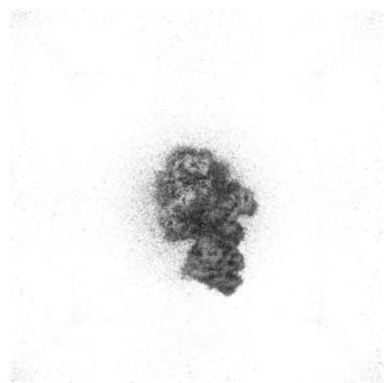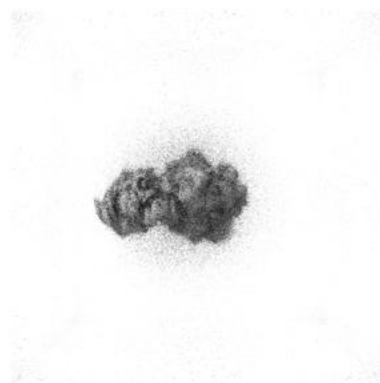
The images above show the 3D surface view of the map at the recommended contour level 0.2. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.
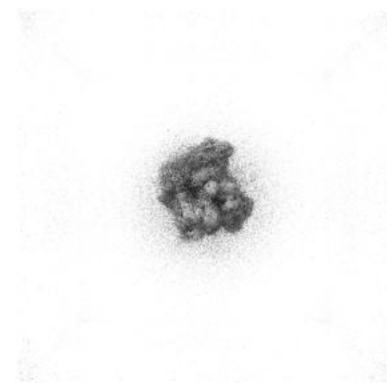
6.5.2　Raw map

| X | Y | Z |

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.
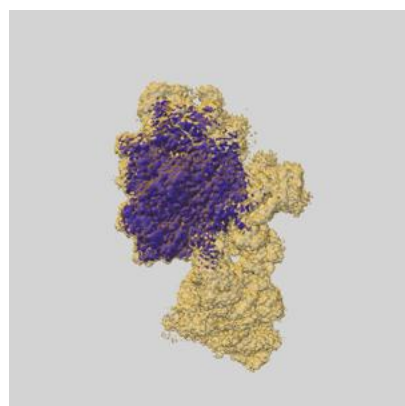
6.6   Mask visualisation ⓘ

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

A mask typically either:

- Encompasses the whole structure

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

6.6.1   emd_50927_msk_1.map ⓘ

X   Y   Z
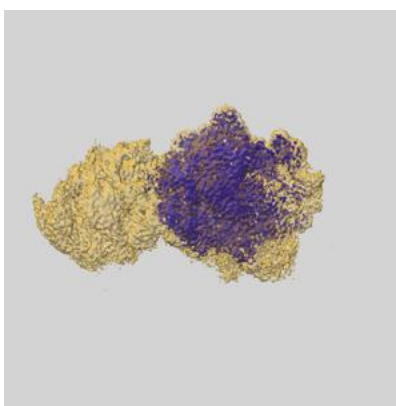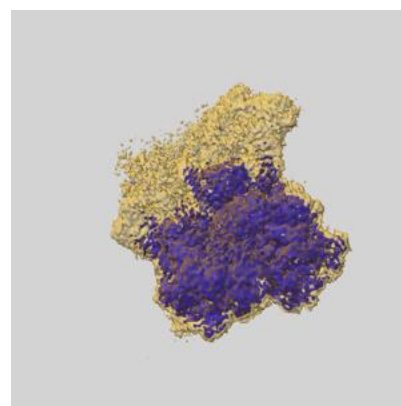
7 Map analysis ⓘ

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.
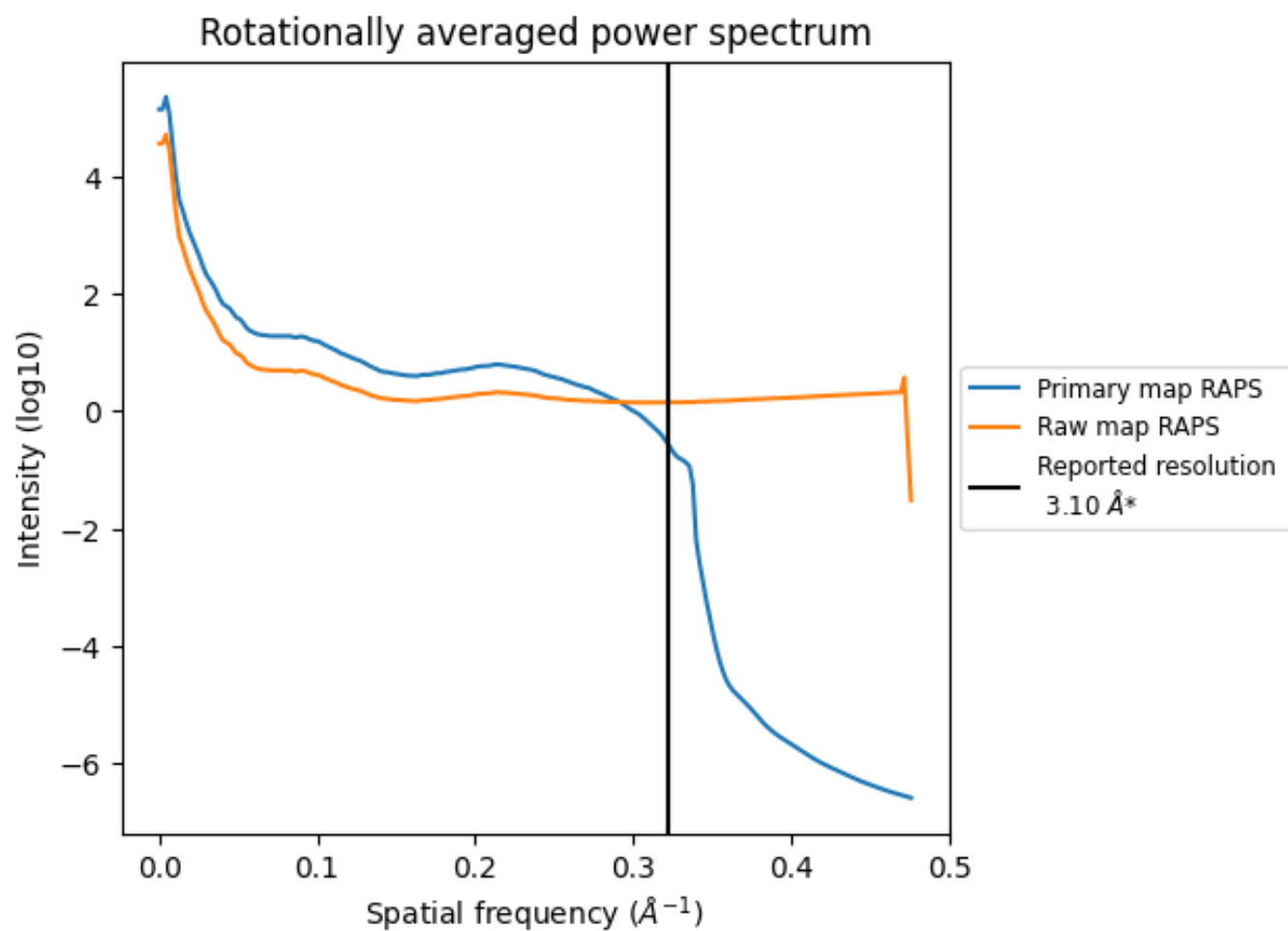
7.2   Volume estimate ⓘ
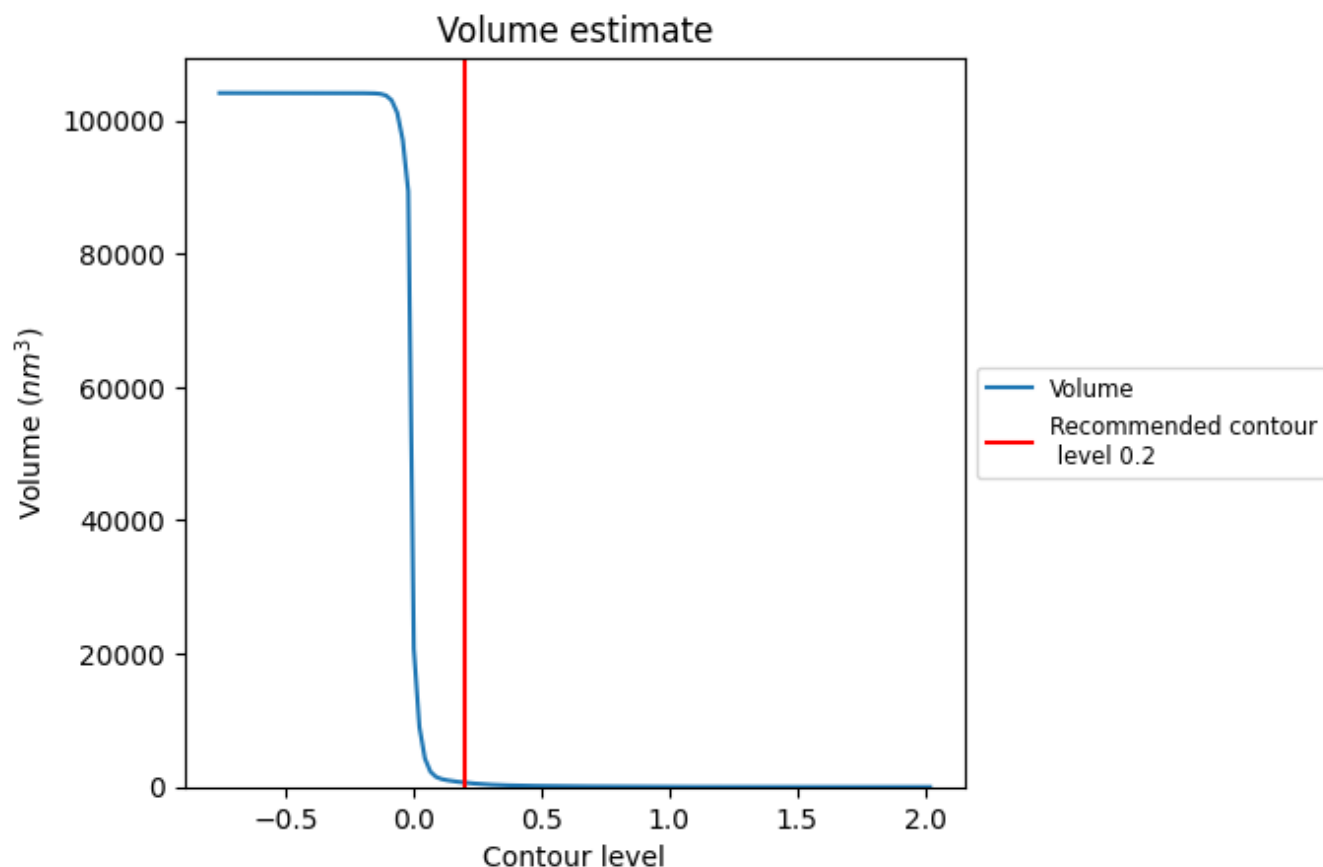
The volume at the recommended contour level is 656 nm³; this corresponds to an approximate mass of 592 kDa.

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 0.323 Å^{-1}

8   Fourier-Shell correlation ⓘ

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 ⓘ
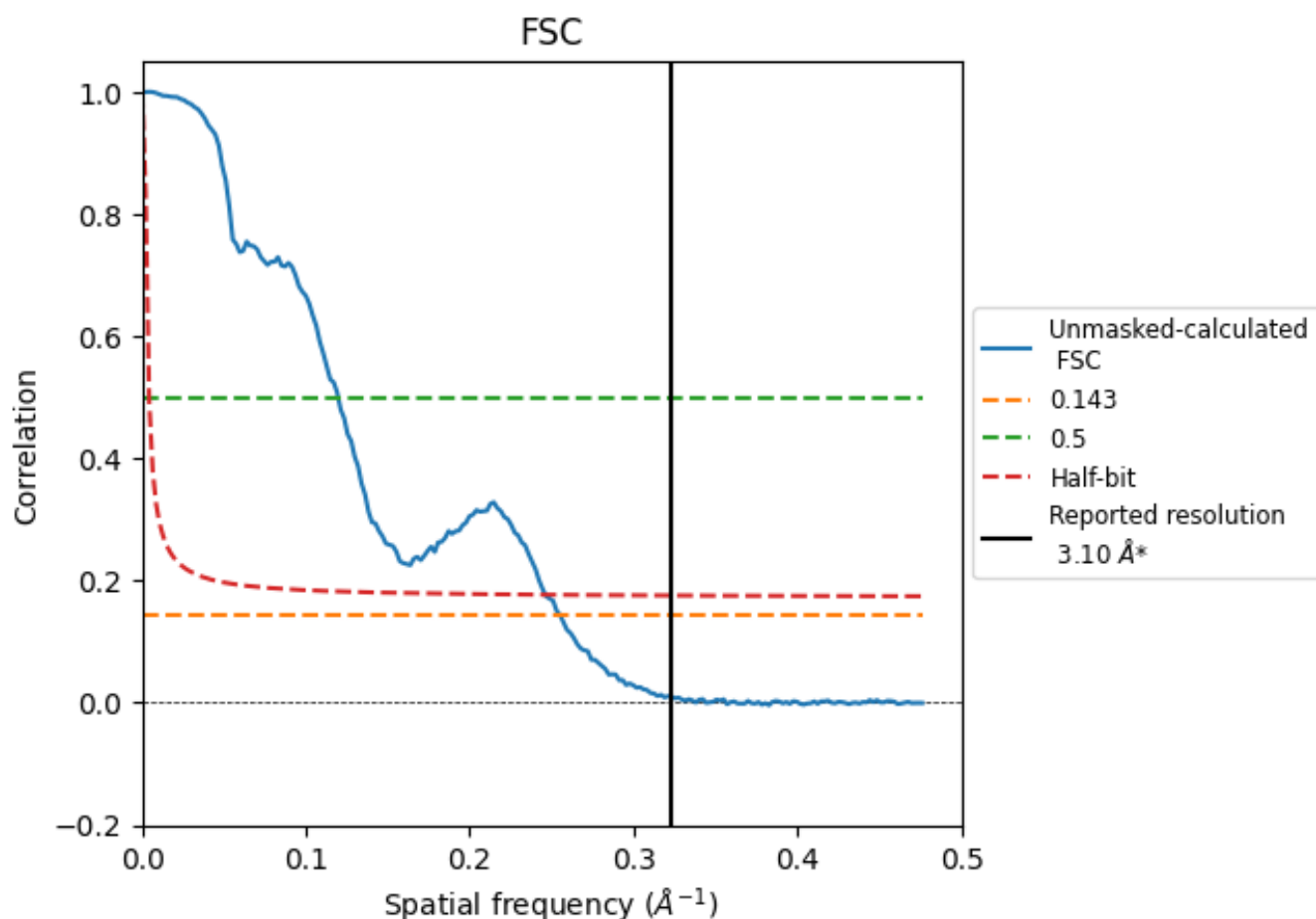
*Reported resolution corresponds to spatial frequency of 0.323 Å^{-1}

8.2   Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.92	8.36	4.06

*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 3.92 differs from the reported value 3.1 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-50927 and PDB model 9G0A. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay ⓘ

X	Y	Z
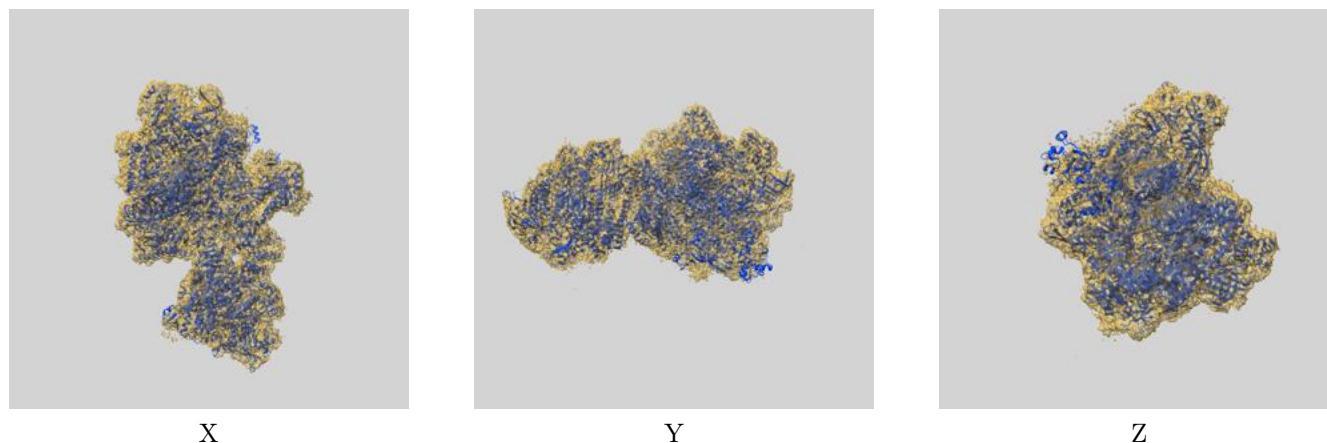
The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model ⓘ
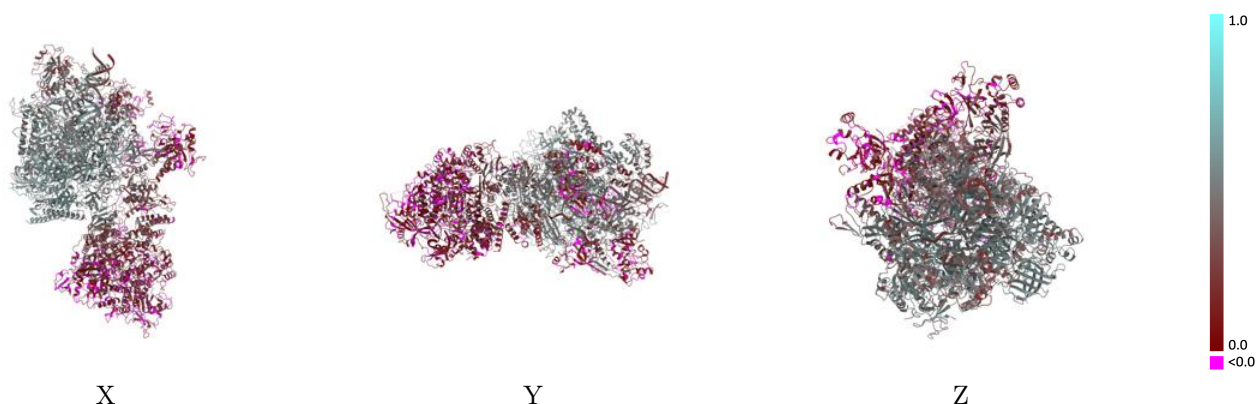
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 ⓘ
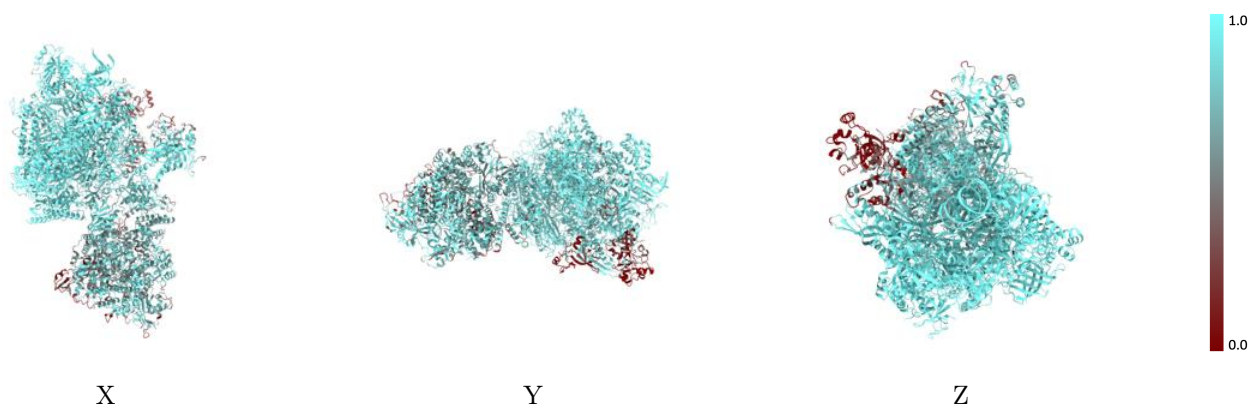
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.2).

WORLDWIDE
wwPDB
PROTEIN DATA BANK
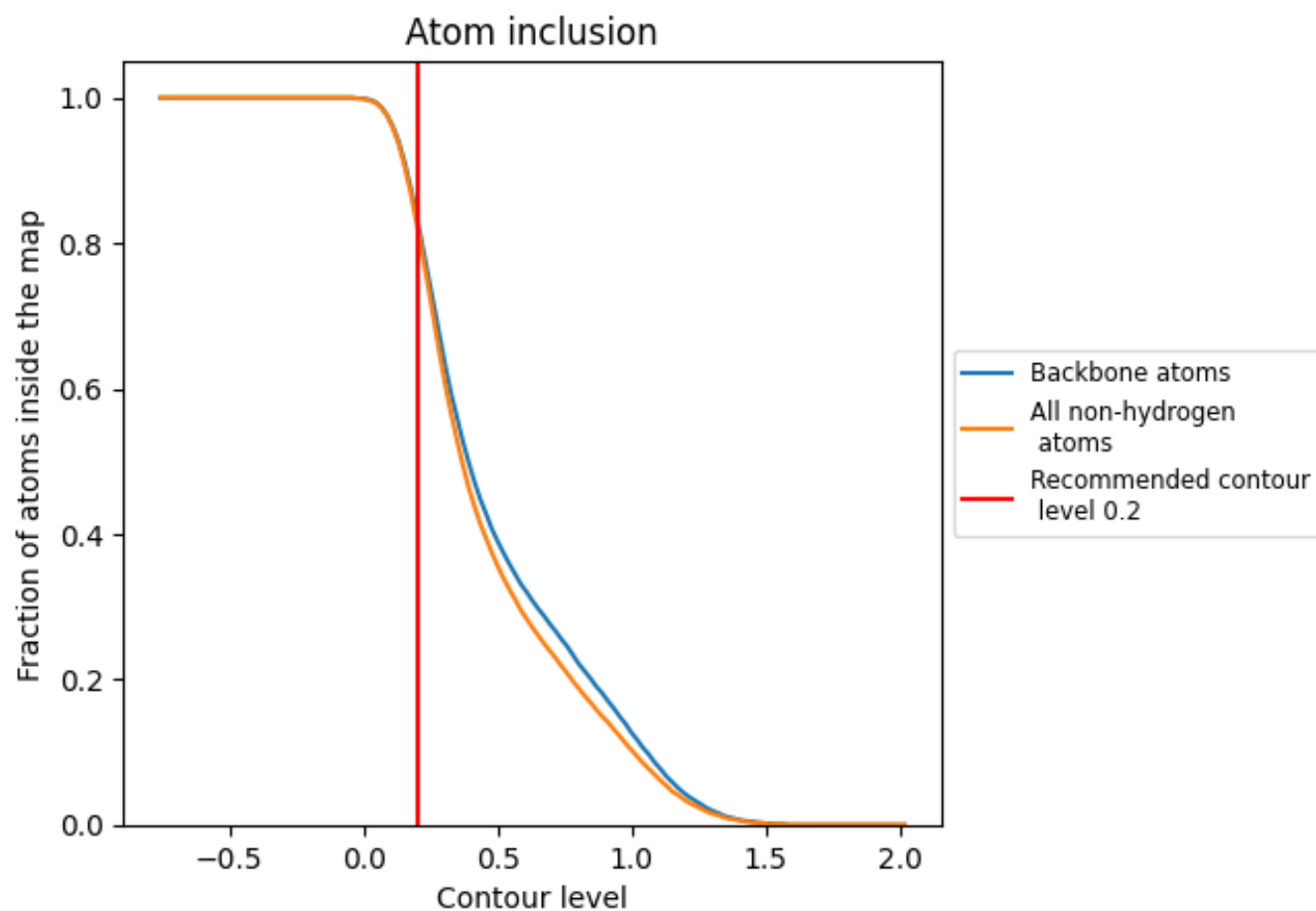
9.4 Atom inclusion ⓘ

At the recommended contour level, 84% of all backbone atoms, 82% 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 (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8250	0.3350
A	0.9440	0.4780
B	0.9550	0.4950
C	0.9620	0.5290
D	0.7920	0.1650
E	0.9600	0.4730
F	0.9330	0.4970
G	0.9080	0.2710
H	0.9550	0.5180
I	0.9510	0.4190
J	0.9780	0.5440
K	0.9620	0.5380
L	0.9440	0.4490
N	0.9720	0.2780
P	0.9440	0.3640
T	0.9660	0.3680
X	0.2210	0.0560
Y	0.1370	0.0860
Z	0.4990	0.1660
a	0.7370	0.1270
b	0.7230	0.1320
c	0.6850	0.1980
r	0.6500	0.1020
v	0.9740	0.0940

1.0

0.0
<0.0