wwPDB EM Validation Summary Report

Nov 27, 2023 – 09:15 PM JST

PDB ID	:	8KG8
EMDB ID	:	EMD-37213
Title	:	Yeast replisome in state II
Authors	:	Dang, S.; Zhai, Y.; Feng, J.; Yu, D.; Xu, Z.
Deposited on	:	2023-08-17
Resolution	:	4.23 Å(reported)
Based on initial model	:	6SKL

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:

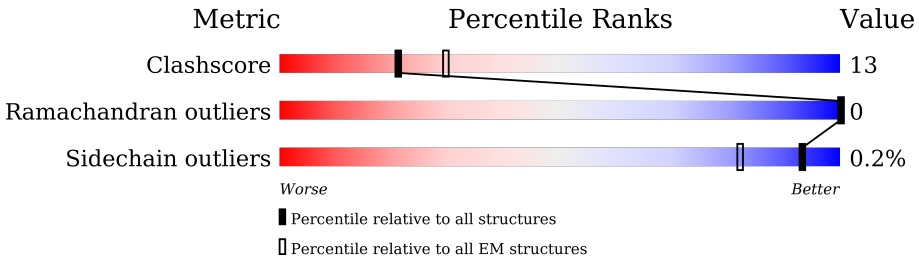
EMDB validation analysis	:	0.0.1.dev70
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 4.23 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	2	868	6% 57% 19% 24%
2	3	971	51% 15% 34%
3	4	933	18% 50% 24% 25%
4	5	775	6% 66% 21% 13%
5	6	1017	7% 40% 21% 39%
6	7	845	9% 49% 28% 23%
7	A	208	71% 25%
8	B	213	69% 22% 8%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
9	C	194	64% 25% 11%
10	D	294	60% 23% 17%
11	E	650	5% 61% 27% 13%
12	F	927	5% 31% 15% 53%
12	G	927	13% 29% 17% 55%
12	H	927	11% 27% 18% 55%
13	I	71	11% 13% 15% 72%
14	J	61	8% 5% 92%
15	M	2222	6% 25% 12% 63%
16	N	689	7% 49% 29% 22%

2 Entry composition (i)

There are 20 unique types of molecules in this entry. The entry contains 63829 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 DNA replication licensing factor MCM2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	2	662	5245	3292	942	992	19	0	0

- Molecule 2 is a protein called DNA replication licensing factor MCM3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	3	645	5005	3148	888	956	13	0	0

- Molecule 3 is a protein called DNA replication licensing factor MCM4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	4	697	5503	3452	950	1070	31	0	0

- Molecule 4 is a protein called Minichromosome maintenance protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	5	677	5334	3345	928	1037	24	0	0

- Molecule 5 is a protein called DNA replication licensing factor MCM6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	6	619	4880	3085	854	916	25	0	0

- Molecule 6 is a protein called DNA replication licensing factor MCM7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	7	647	5023	3169	877	950	27	0	0

- Molecule 7 is a protein called DNA replication complex GINS protein PSF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	A	200	Total	C	N	O	S	0	0
			1625	1021	280	316	8		

- Molecule 8 is a protein called DNA replication complex GINS protein PSF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	B	195	Total	C	N	O	S	0	0
			1630	1046	289	290	5		

- Molecule 9 is a protein called DNA replication complex GINS protein PSF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	C	173	Total	C	N	O	S	0	0
			1394	907	224	256	7		

- Molecule 10 is a protein called DNA replication complex GINS protein SLD5.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	D	243	Total	C	N	O	S	0	0
			2004	1276	327	389	12		

- Molecule 11 is a protein called Cell division control protein 45.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	568	Total	C	N	O	S	0	0
			4591	2930	774	873	14		

- Molecule 12 is a protein called DNA polymerase alpha-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	F	433	Total	C	N	O	S	0	0
			3467	2223	577	651	16		
12	G	421	Total	C	N	O	S	0	0
			3362	2162	555	629	16		
12	H	421	Total	C	N	O	S	0	0
			3358	2159	553	631	15		

- Molecule 13 is a DNA chain called DNA (71-mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
13	I	20	Total	C	N	O	P	0	0
			406	200	49	137	20		

- Molecule 14 is a DNA chain called DNA (61-mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
14	J	5	Total	C	N	O	P	0	0
			99	47	19	28	5		

- Molecule 15 is a protein called DNA polymerase epsilon catalytic subunit A.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	M	813	Total	C	N	O	S	0	0
			6490	4202	1060	1193	35		

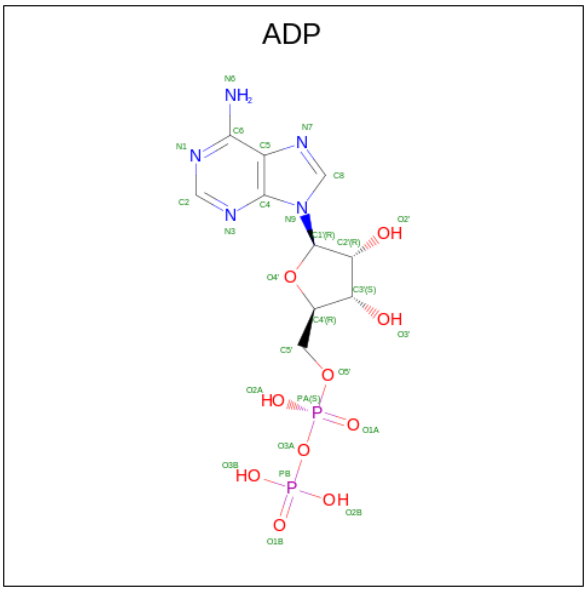
- Molecule 16 is a protein called DNA polymerase epsilon subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	N	536	Total	C	N	O	S	0	0
			4254	2726	725	786	17		

- Molecule 17 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
17	2	1	Total	Zn	0
			1	1	
17	4	1	Total	Zn	0
			1	1	
17	5	1	Total	Zn	0
			1	1	
17	6	1	Total	Zn	0
			1	1	
17	7	1	Total	Zn	0
			1	1	
17	M	2	Total	Zn	0
			2	2	

- Molecule 18 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).

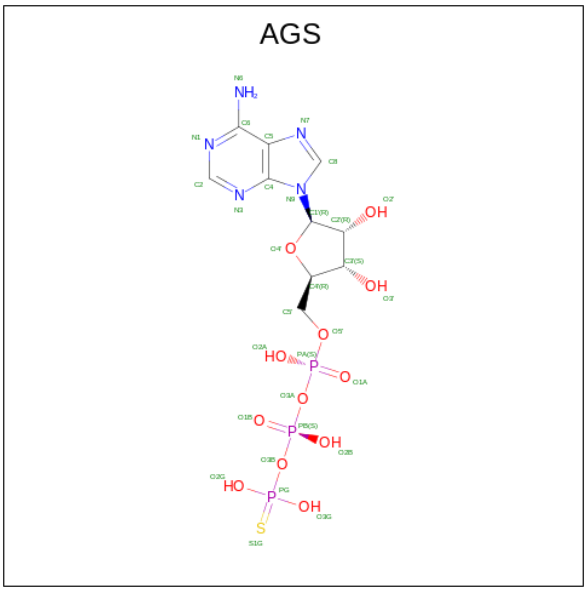


Mol	Chain	Residues	Atoms					AltConf
18	2	1	Total	C	N	O	P	0
			27	10	5	10	2	
18	3	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 19 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
19	2	1	Total	Mg	0
			1	1	
19	3	1	Total	Mg	0
			1	1	
19	5	1	Total	Mg	0
			1	1	
19	6	1	Total	Mg	0
			1	1	
19	7	1	Total	Mg	0
			1	1	

- Molecule 20 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (three-letter code: AGS) (formula: $C_{10}H_{16}N_5O_{12}P_3S$) (labeled as "Ligand of Interest" by depositor).

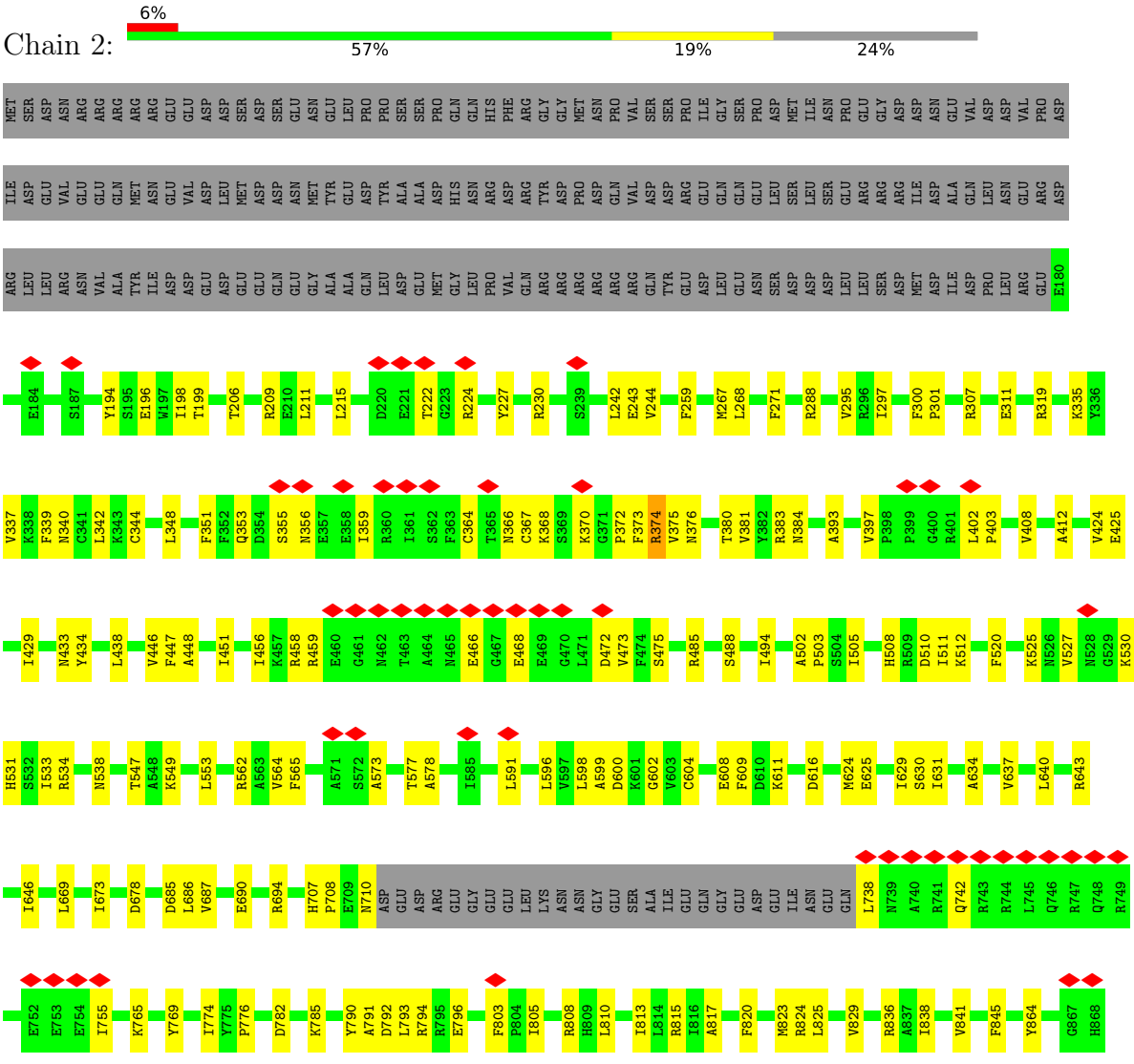


Mol	Chain	Residues	Atoms						AltConf
20	5	1	Total	C	N	O	P	S	0
			31	10	5	12	3	1	
20	6	1	Total	C	N	O	P	S	0
			31	10	5	12	3	1	
20	7	1	Total	C	N	O	P	S	0
			31	10	5	12	3	1	

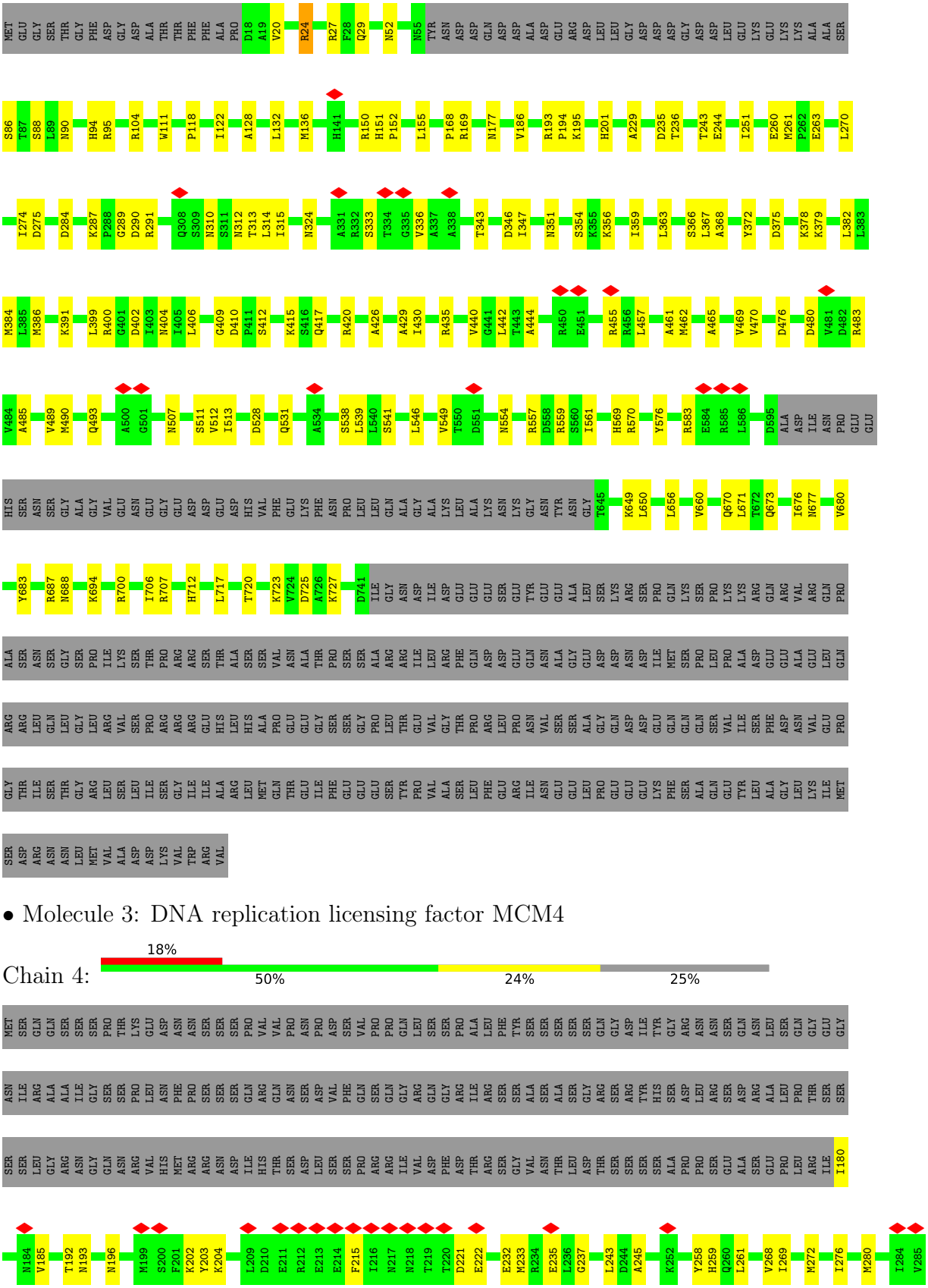
3 Residue-property plots (i)

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: DNA replication licensing factor MCM2

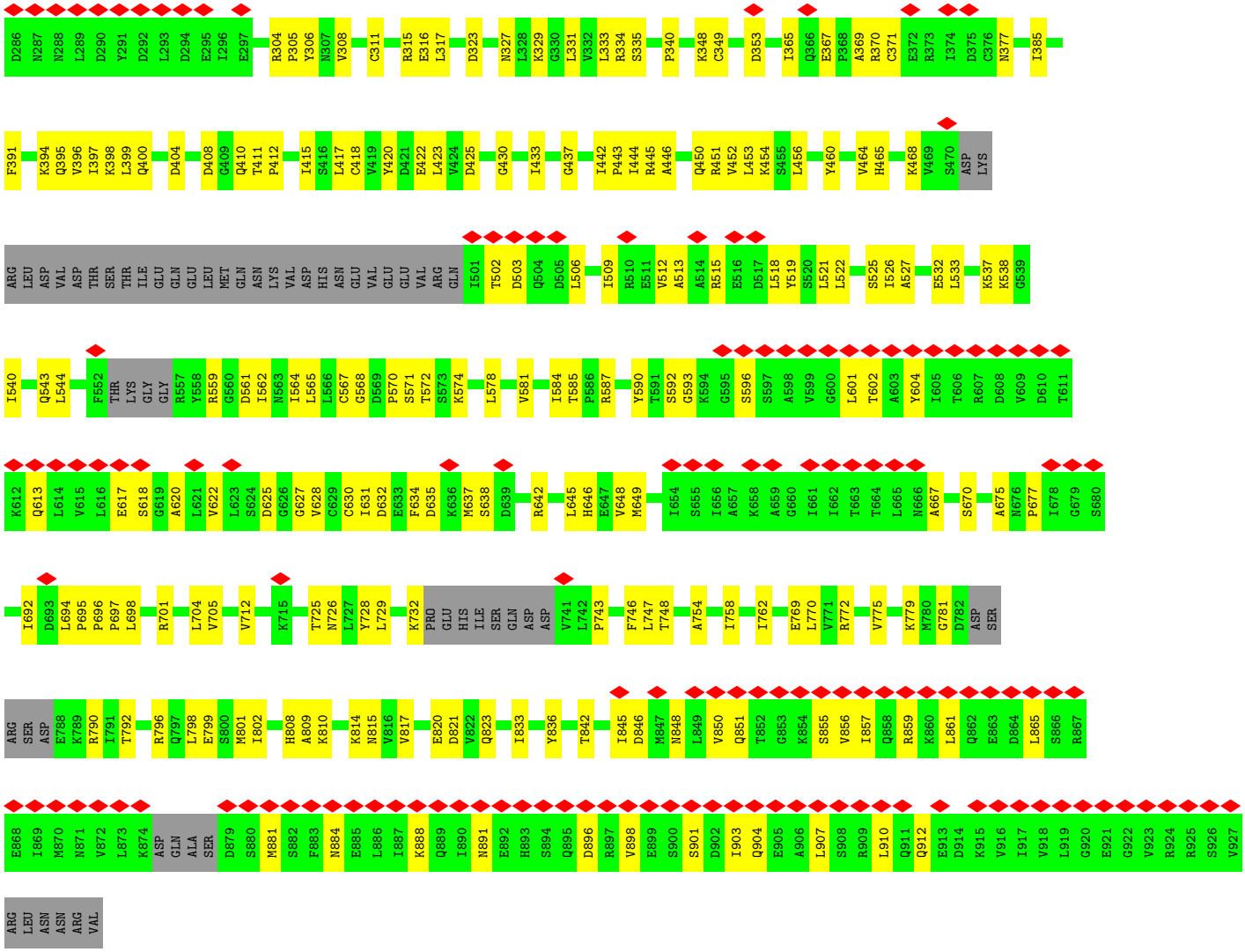


• Molecule 2: DNA replication licensing factor MCM3



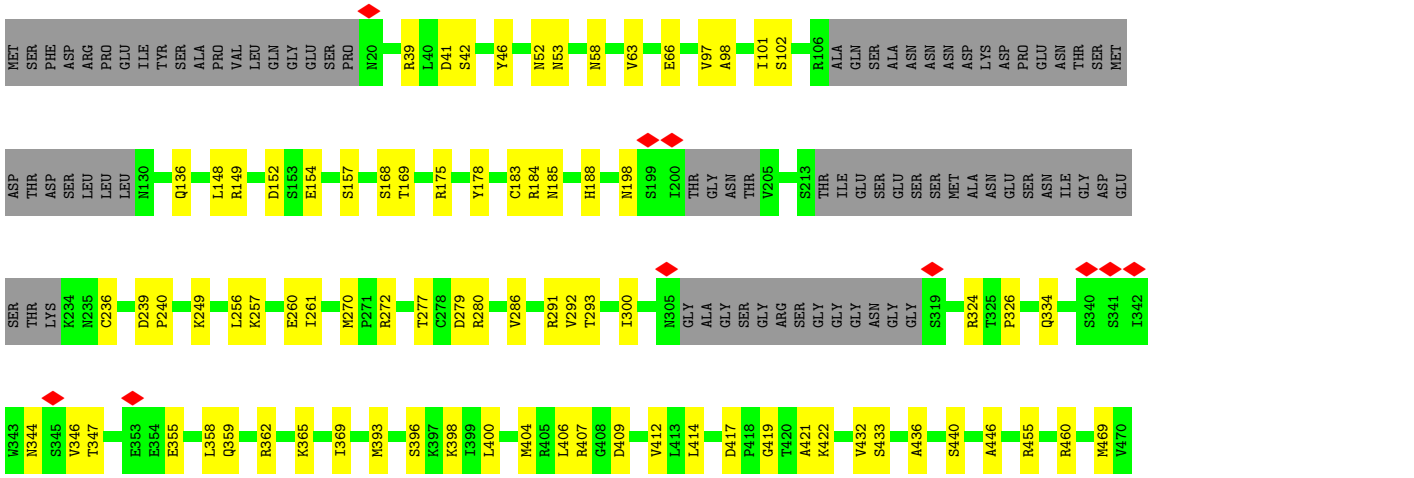
• Molecule 3: DNA replication licensing factor MCM4

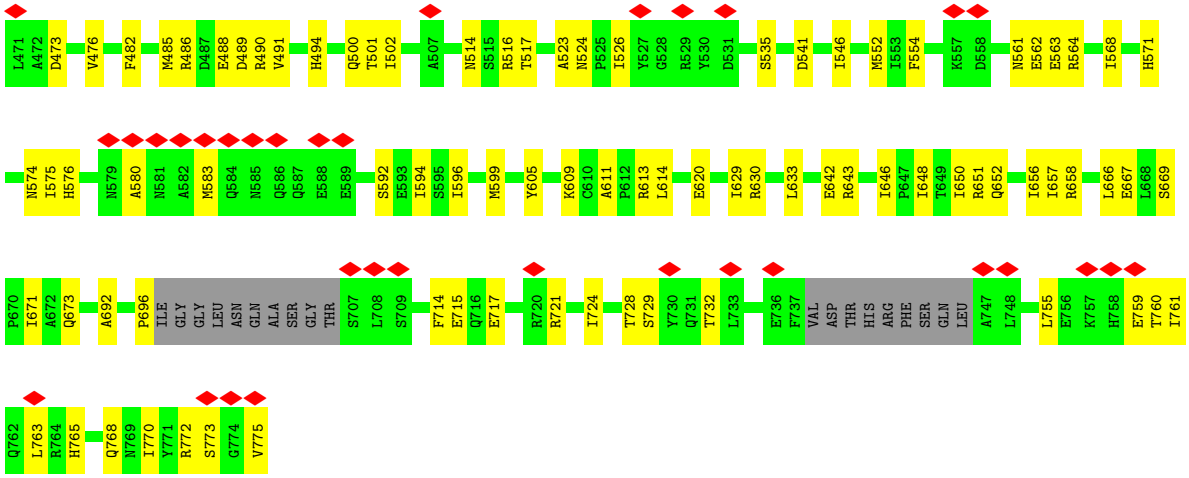
Chain 4:



• Molecule 4: Minichromosome maintenance protein 5

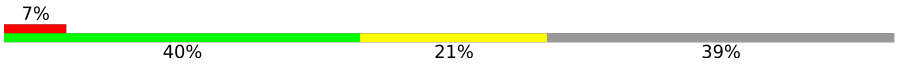
Chain 5:

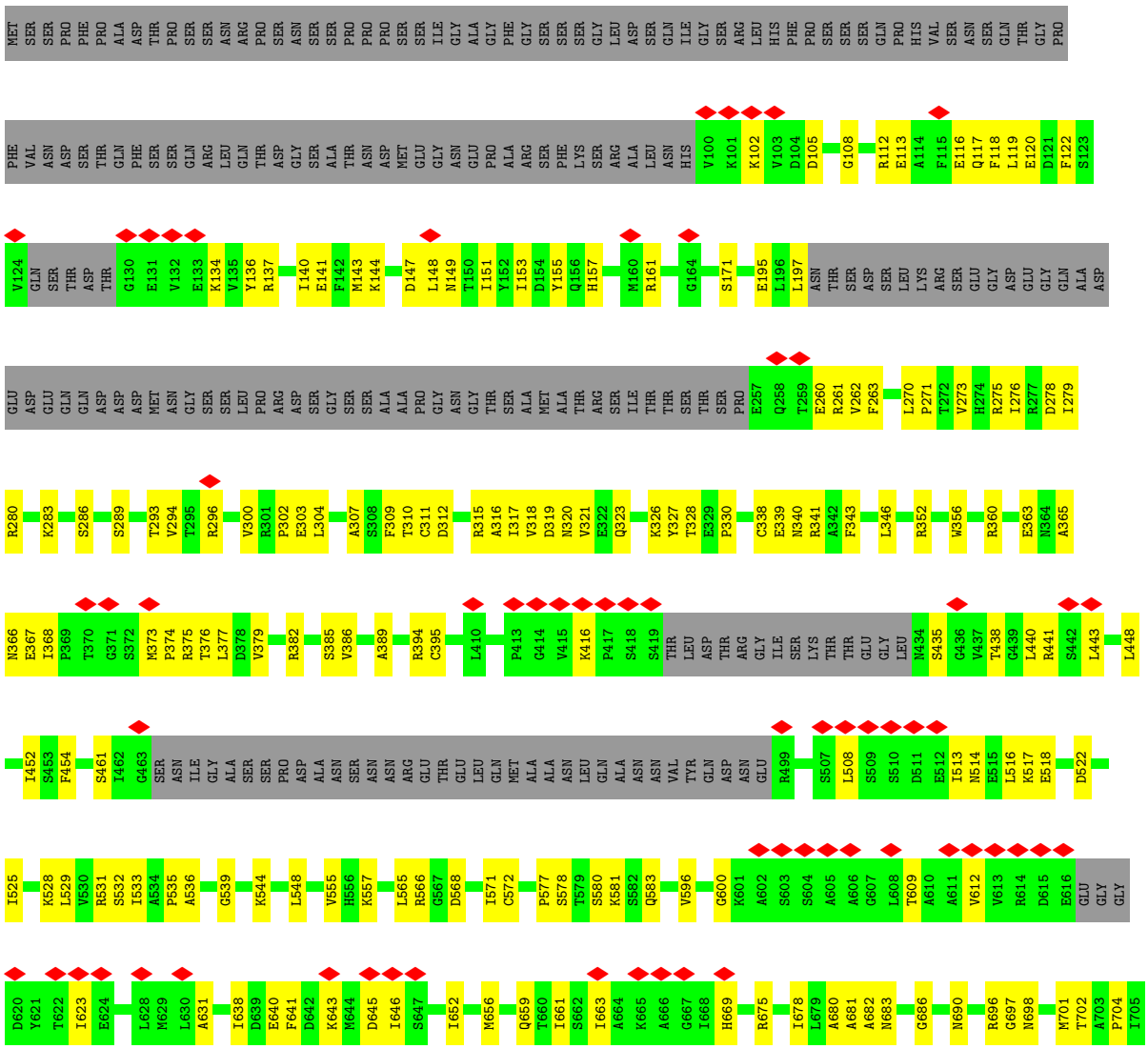


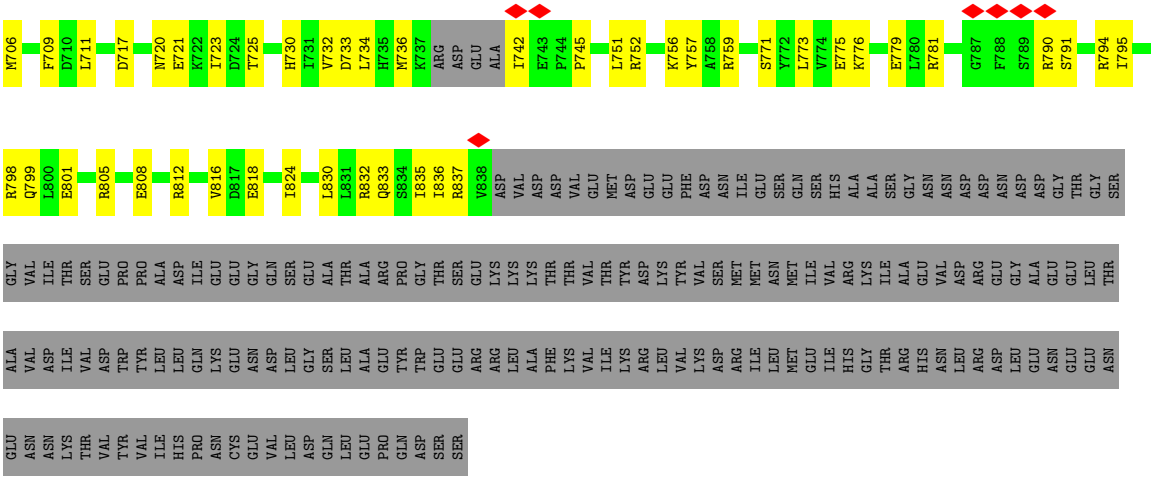


• Molecule 5: DNA replication licensing factor MCM6

Chain 6:

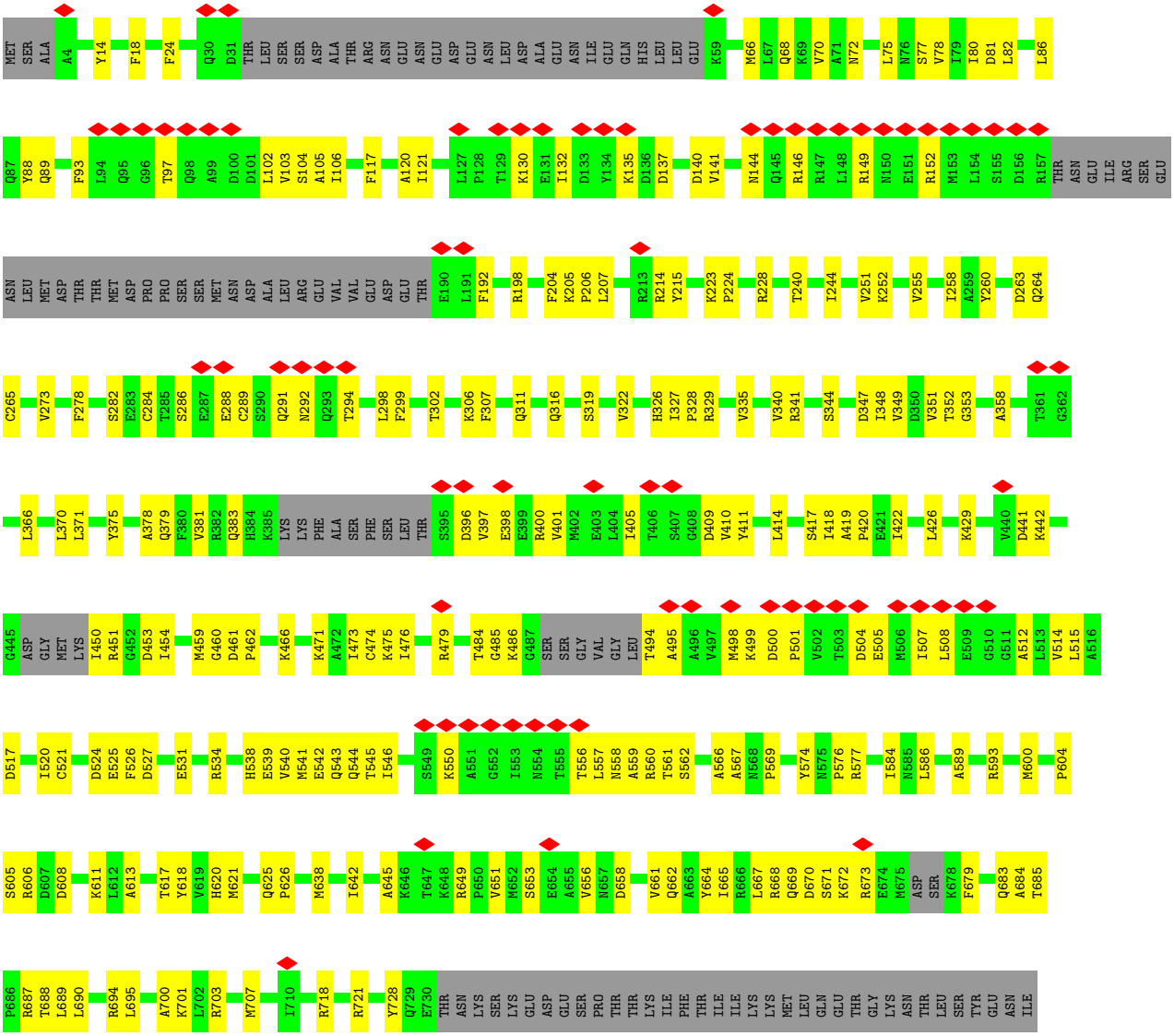






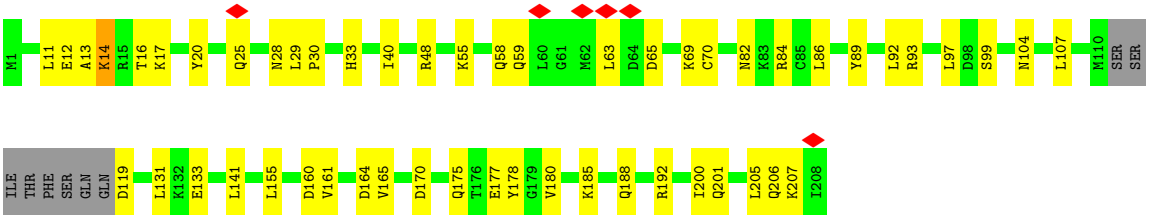
• Molecule 6: DNA replication licensing factor MCM7

Chain 7:



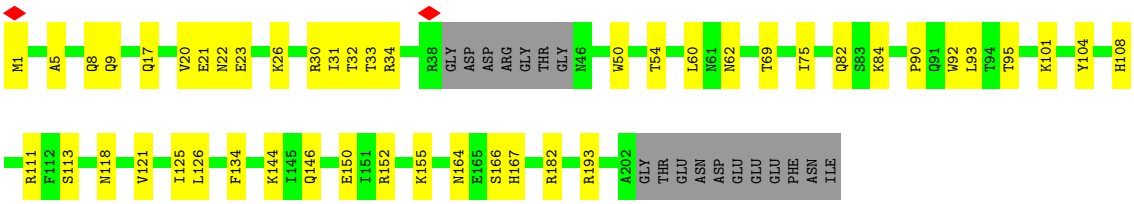
• Molecule 7: DNA replication complex GINS protein PSF1

Chain A:



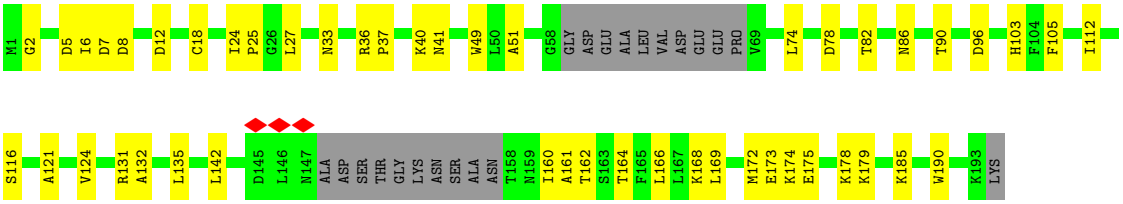
• Molecule 8: DNA replication complex GINS protein PSF2

Chain B:



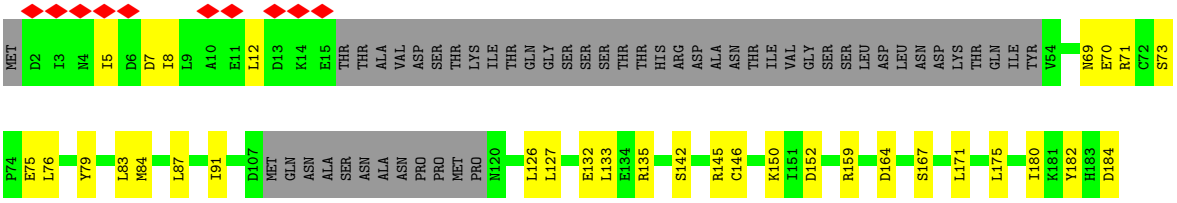
• Molecule 9: DNA replication complex GINS protein PSF3

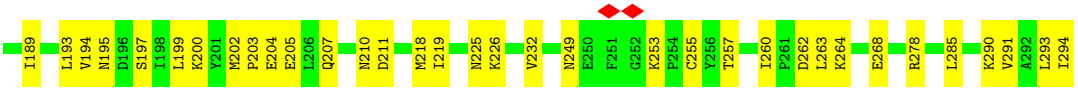
Chain C:



• Molecule 10: DNA replication complex GINS protein SLD5

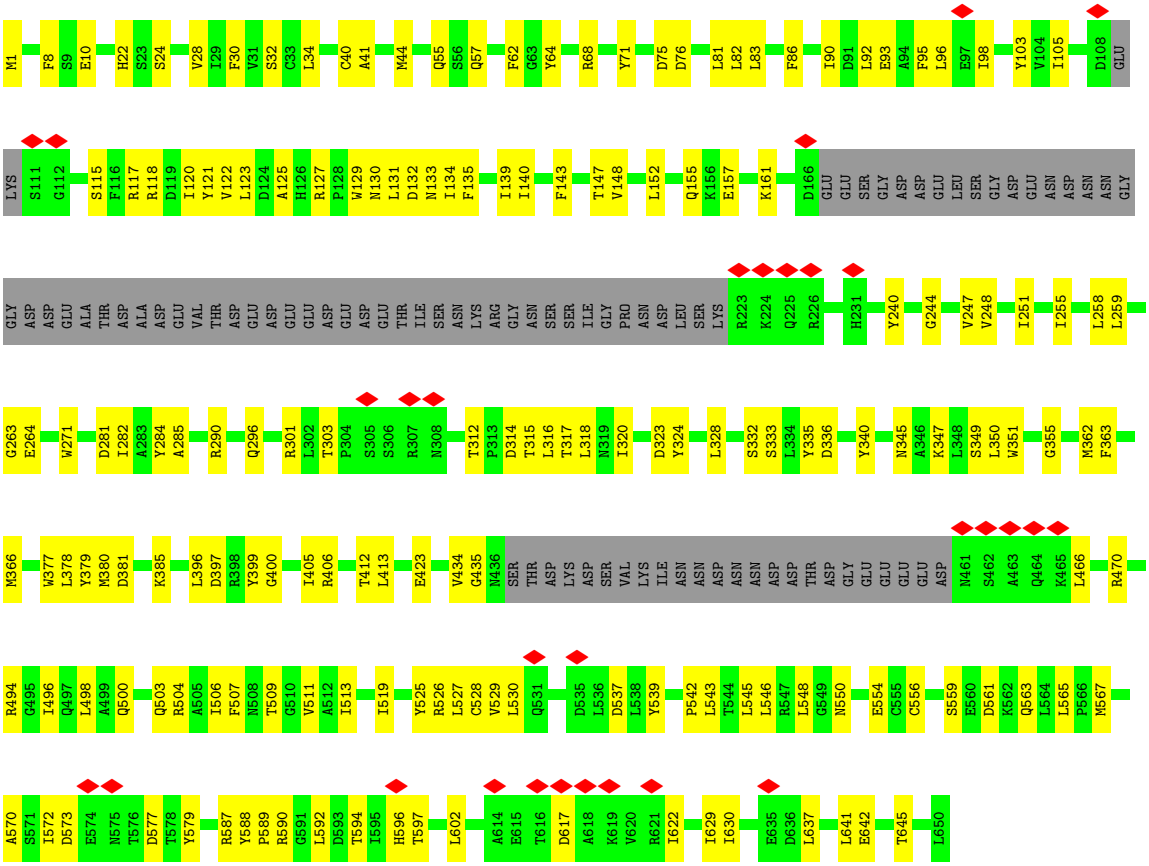
Chain D:





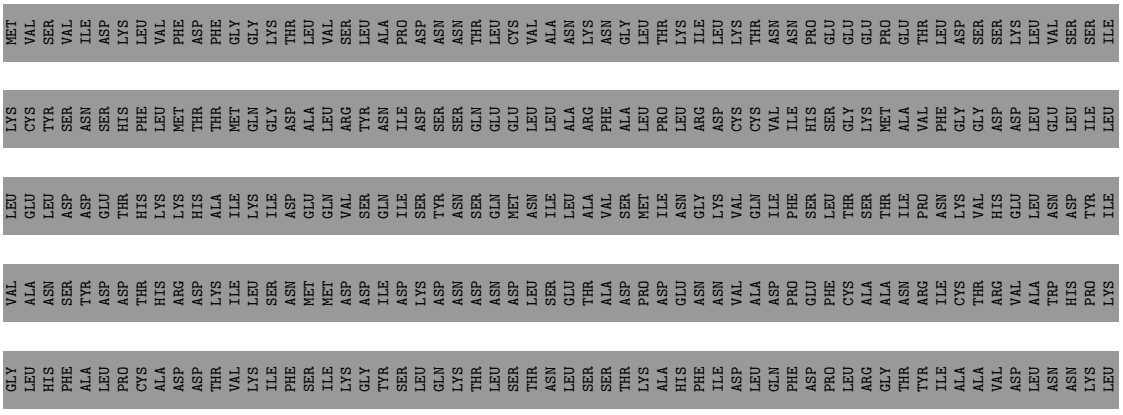
• Molecule 11: Cell division control protein 45

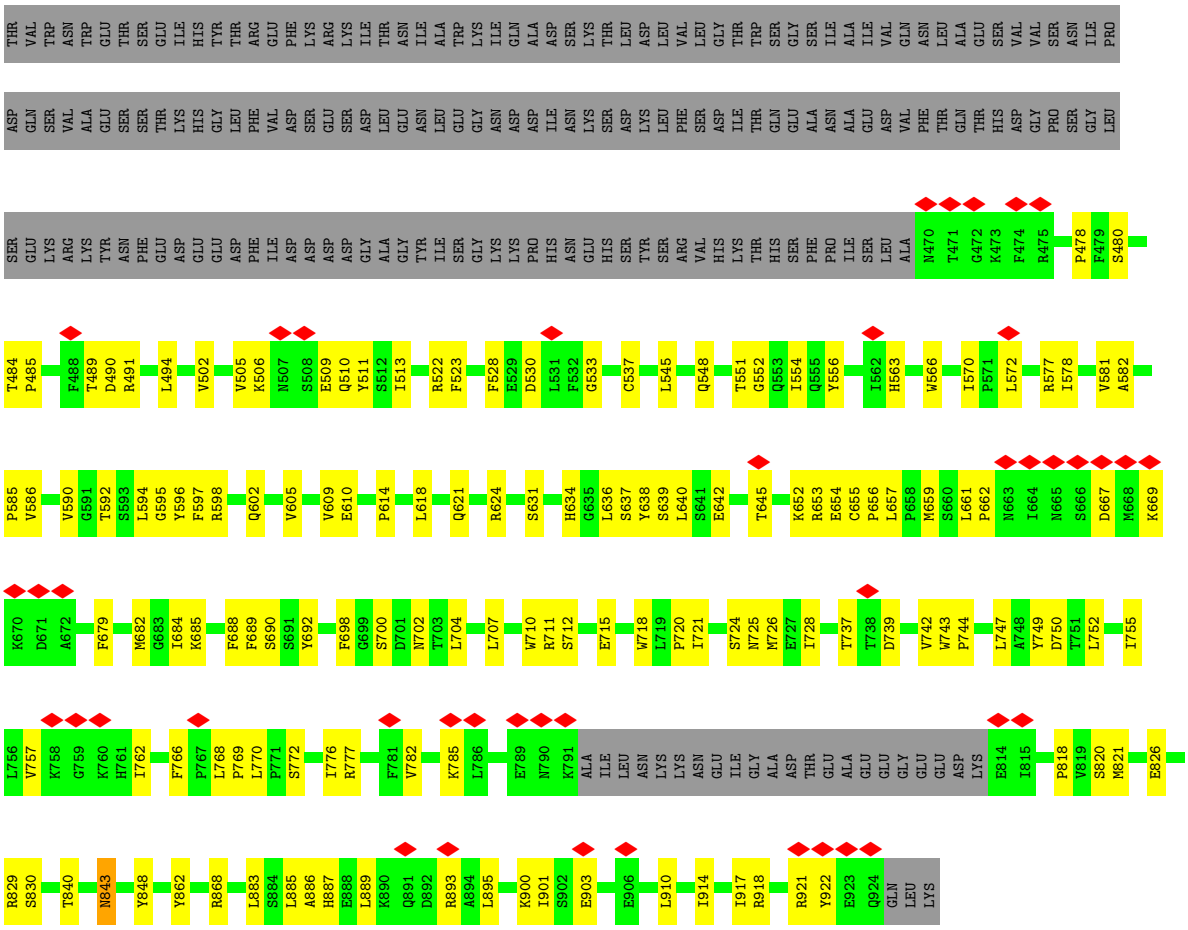
Chain E:



• Molecule 12: DNA polymerase alpha-binding protein

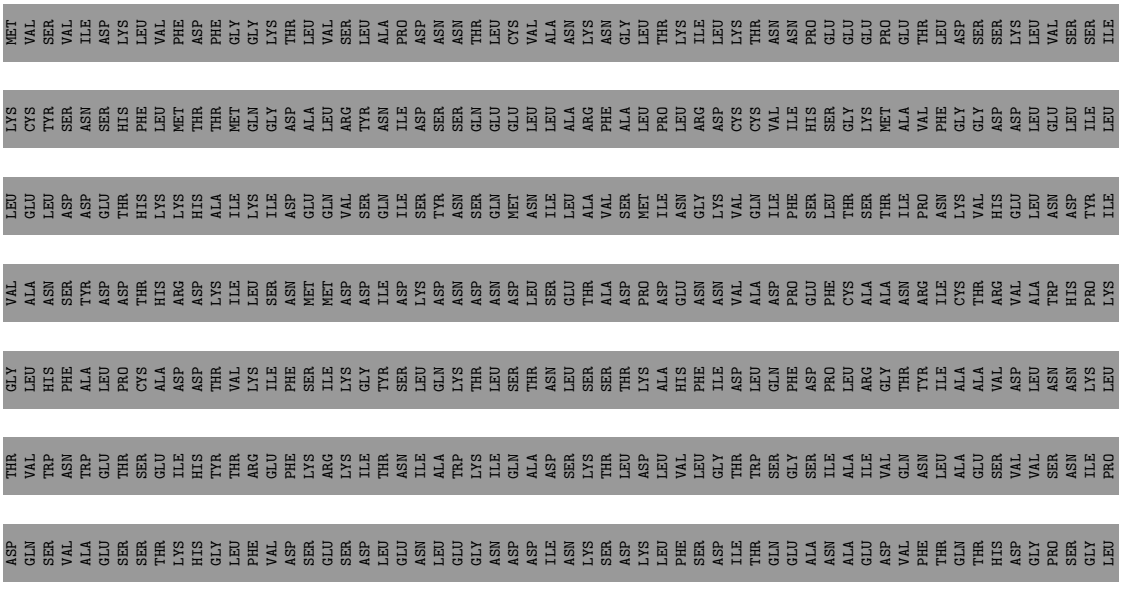
Chain F:

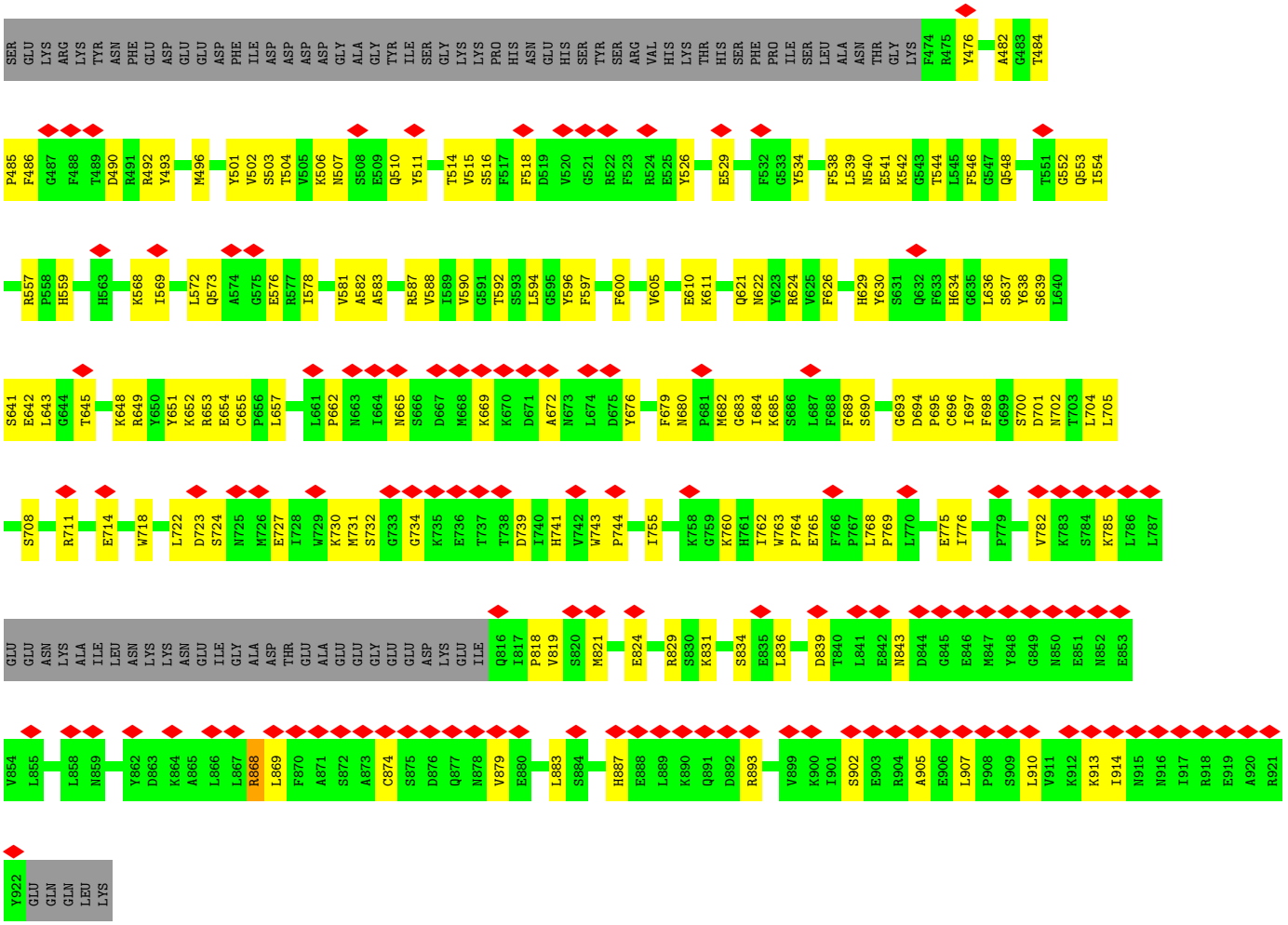




• Molecule 12: DNA polymerase alpha-binding protein

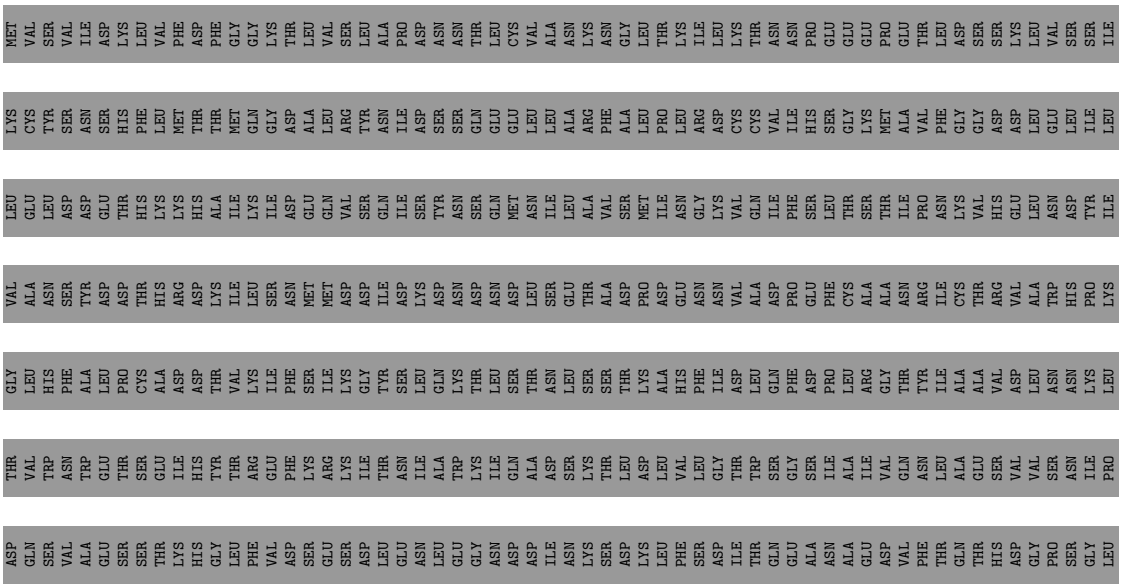
Chain G:

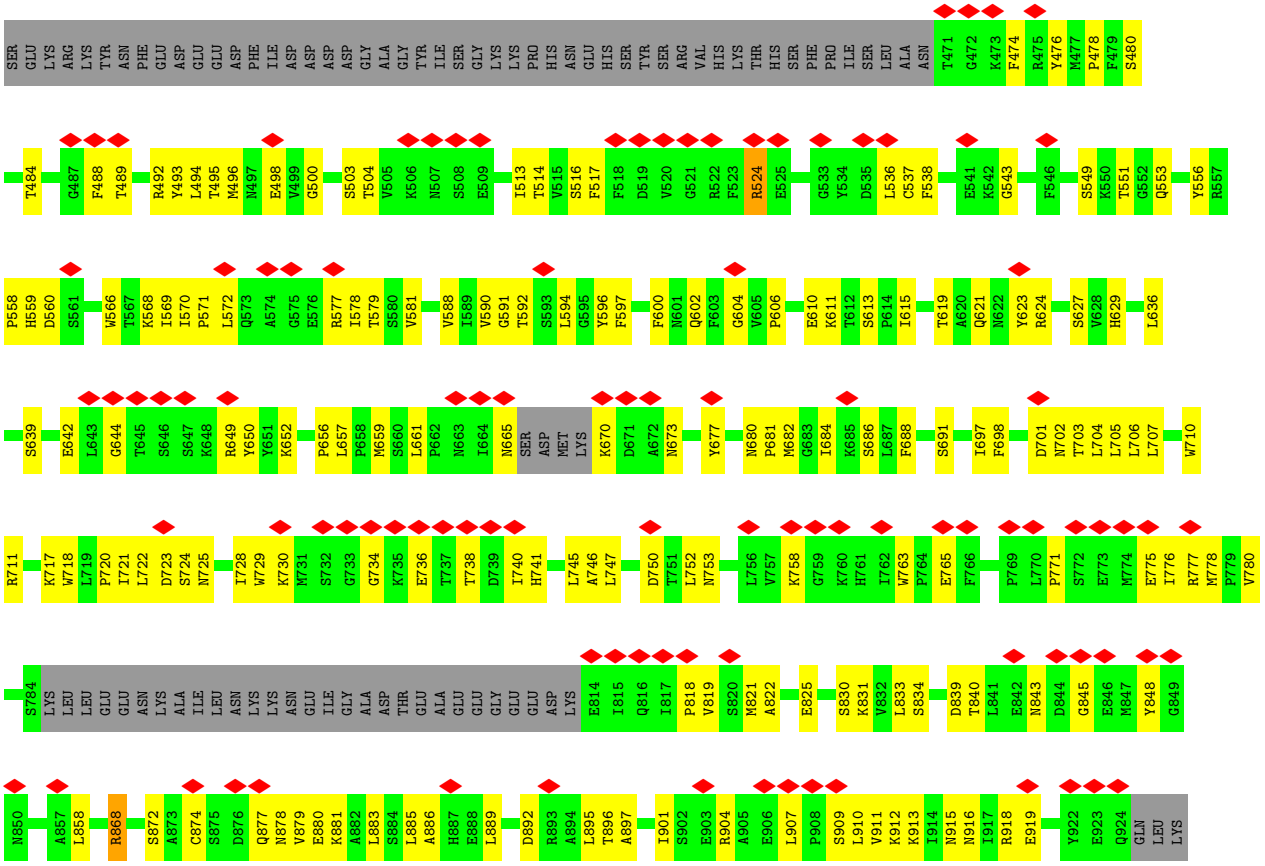




• Molecule 12: DNA polymerase alpha-binding protein

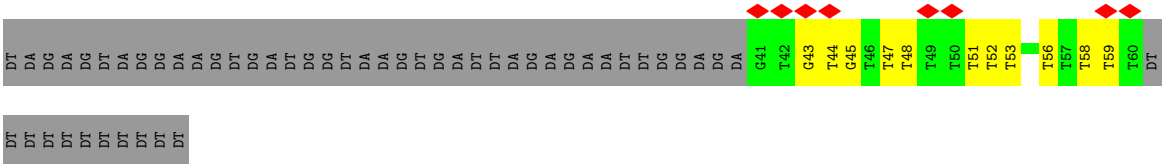
Chain H:





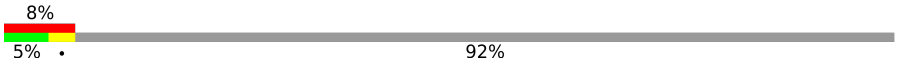
• Molecule 13: DNA (71-mer)

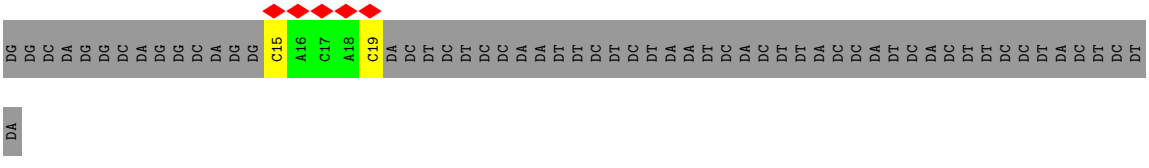
Chain I:



• Molecule 14: DNA (61-mer)

Chain J:





• Molecule 15: DNA polymerase epsilon catalytic subunit A

Chain M:

ASN GLY ARG PHE ASP ALA LYS ASP ILE ASP GLN ILE PRO GLY ARG VAL GLY TRP LEU THR ASN MET HIS ALA THR LEU VAL SER GLN GLU THR LEU SER SER GLY SER ASN GLY GLY GLY ASN SER ASN ASP GLY GLU ARG VAL THR THR ASN GLN GLY ILE SER GLY VAL ASP PHE TYR

PHE LEU ASP GLU GLU GLY GLY SER PHE LYS SER THR VAL VAL TYR ASP PRO TYR PHE PHE ILE ALA CYS ASN ASP GLU SER ARG VAL ASN ASP VAL GLU GLU LEU VAL LYS LYS TYR LEU GLU SER CYS LEU LYS SER LEU GLN ILE ILE ARG LYS GLU ASP LEU THR MET ASP ASN HIS

LEU LEU GLY LEU GLN LYS THR LEU ILE LYS LEU SER PHE VAL ASN SER ASN GLN LEU PHE GLU ALA ARG LYS LEU LEU ARG PRO ILE LEU GLN ASP ASN ALA ASN ASN ASN VAL GLN ARG ASN ILE TYR ASN VAL ALA ALA ASN GLY SER GLU LYS VAL ASP ALA LYS HIS LEU ILE GLU

ASP ILE ARG GLU TYR ASP VAL PRO TYR HIS VAL ARG VAL SER ILE ASP LYS ASP ILE ARG VAL GLY LYS TRP TYR LYS VAL THR GLN GLN GLY PHE ILE GLU ASP THR ARG LYS ILE ALA PHE ALA ASP PRO VAL VAL MET ALA PHE ASP ILE GLU THR THR LYS PRO PRO LEU LYS PHE

PRO ASP SER ALA VAL ASP GLN ILE MET MET ILE SER TYR MET ILE ASP GLY GLU GLY PHE LEU ILE THR ASN ARG GLU ILE ILE SER GLU ASP ILE GLU ASP PHE GLU TYR THR PRO LYS PRO GLU TYR PRO GLY PHE PHE THR ILE PHE ASN GLU ASN ASP GLU VAL ALA LEU LEU GLN

ARG PHE PHE GLU HIS ILE ARG ASP VAL ARG PRO THR VAL ILE SER THR PHE ASN GLY ASP PHE PHE ASP TRP PRO PHE ILE HIS ASN ARG SER LYS ILE HIS GLY LEU ASP MET PHE ASP GLU ILE GLY PHE ALA PRO ASP ALA GLU GLY GLU TYR LYS SER SER TYR CYS SER HIS MET

ASP CYS PHE ARG TRP VAL LYS ARG ASP SER TYR LEU PRO GLN GLY SER GLN GLY LEU LYS ALA VAL THR GLN SER LYS LEU GLY TYR ASN PRO ILE GLU LEU ASP PRO GLU LEU MET THR PRO TYR ALA PHE GLU LYS PRO GLN HIS LEU SER GLU TYR SER VAL SER ASP ALA VAL ALA

THR TYR TYR LEU TYR MET LYS TYR VAL HIS PRO PHE ILE PHE SER LEU CYS THR ILE ILE PRO LEU ASN PRO ASP GLU THR LEU ARG LYS GLY THR GLY THR LEU CYS GLU MET LEU LEU MET VAL GLN ALA TYR GLN HIS ASN ILE LEU LEU PRO ASN LYS HIS THR ASP PRO ILE GLU

ARG PHE TYR ASP GLY HIS LEU LEU GLU SER GLU THR TYR VAL GLY GLY HIS VAL GLU SER LEU GLU ALA GLY VAL PHE ARG SER ASP LEU LYS ASN GLU PHE LYS ILE ASP PRO SER ALA ILE ASP GLU LEU LEU GLN GLU LEU PRO GLU ALA LEU LYS PHE SER VAL GLU VAL GLU ASN

LYS SER SER VAL ASP LYS VAL THR ASN PHE GLU GLU ILE LYS ASN GLN ILE THR GLN LYS LEU LEU GLU LEU LYS GLU ASN ASN ILE ARG ASN GLU LEU PRO LEU ILE TYR HIS VAL ASP VAL ALA SER MET TYR PRO ASN ILE MET THR THR ASN ARG LEU GLN PRO ASP SER ILE LYS

ALA GLU ARG ASP CYS ALA SER CYS ASP PHE ASN ARG PRO GLY LYS THR CYS ALA ARG LYS LEU LYS TRP ALA TRP ARG GLY GLU PHE PHE PRO SER LYS MET ASP GLU TYR ASN MET ILE LYS ARG ALA LEU GLN ASN GLU THR PHE PRO ASN LYS ASN LYS PHE SER LYS LYS LYS VAL

LEU THR PHE ASP GLU LEU SER TYR ALA ASP GLN VAL ILE HIS ILE LYS LYS ARG LEU THR GLU TYR SER ARG LYS VAL TYR HIS ARG VAL LYS VAL SER GLU ILE VAL GLU ARG GLU ALA ILE VAL CYS GLN ARG GLU ASN PRO PHE TYR VAL ASP THR VAL LYS SER PHE ARG ASP ARG

ARG TYR GLU PHE LYS GLY LEU ALA LYS THR TRP LYS GLY ASN LEU SER LYS ILE ASP PRO SER ASP LYS HIS ALA ARG ASP GLU ALA LYS LYS MET ILE VAL LEU TYR ASP SER LEU GLN LEU ALA HIS LYS VAL ILE LEU ASN SER PHE TYR GLY TYR VAL MET ARG LYS GLY SER ARG

TRP TYR SER MET GLU MET ALA GLY ILE THR CYS LEU THR GLY ALA THR ILE ILE GLN MET ALA ARG ALA LEU VAL GLU ARG VAL GLY ARG PRO LEU GLU LEU ASP THR ASP GLY ILE TRP CYS ILE LEU PRO LYS SER PHE PRO GLU THR TYR PHE PHE THR LEU GLU ASN GLY LYS LYS

LEU TYR LEU SER TYR PRO CYS SER MET LEU ASN TYR ARG VAL HIS GLN LYS PHE THR ASN HIS GLN TYR GLN GLU LEU LYS ASP PRO LEU ASN TYR ILE TYR GLU THR HIS SER GLU ASN THR ILE PHE PHE GLU VAL ASP GLY PRO TYR LYS ALA MET ILE LEU PRO SER SER LYS GLU

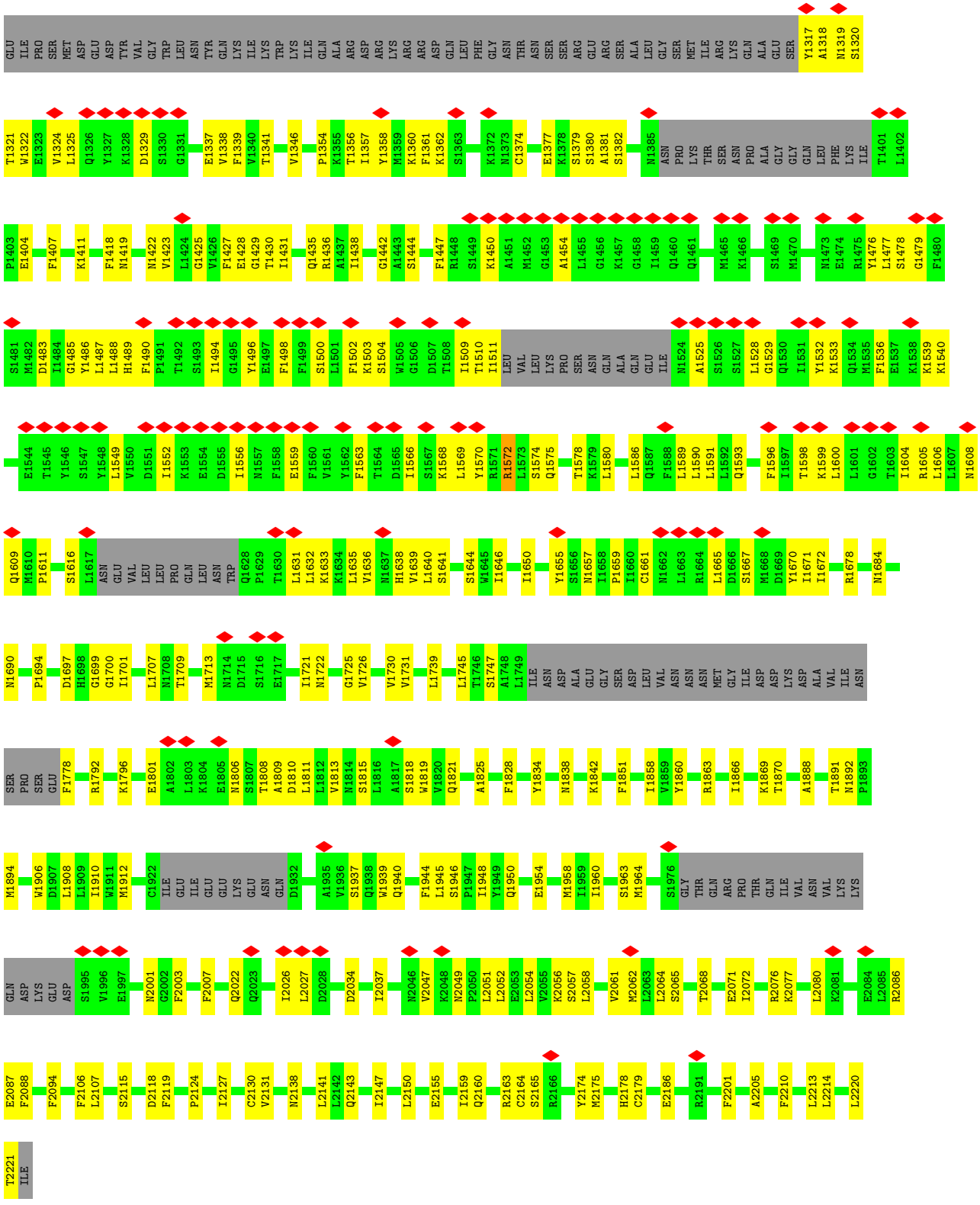
GLU GLY LYS GLY ILE LYS LYS ARG TYR ALA VAL PHE ASN GLU ASP GLY SER LEU ALA GLU LEU LYS GLY PHE GLU LEU LYS ARG ARG GLY GLU LEU GLN LEU ILE LYS ASN PHE GLN SER ASP ILE PHE LYS VAL PHE LEU GLU GLY ASP THR LEU GLU GLY CYS TYR SER ALA VAL ALA

SER VAL CYS ASN ARG TRP LEU ASP VAL LEU ASP SER HIS GLY LEU MET LEU GLU ASP GLU ASP LEU VAL SER LEU ILE CYS GLU ASN ARG SER MET SER LYS THR LEU LYS GLU TYR GLU GLY GLN LYS SER THR SER ILE THR THR ALA ARG ARG LEU GLY ASP PHE LEU GLY GLU ASP

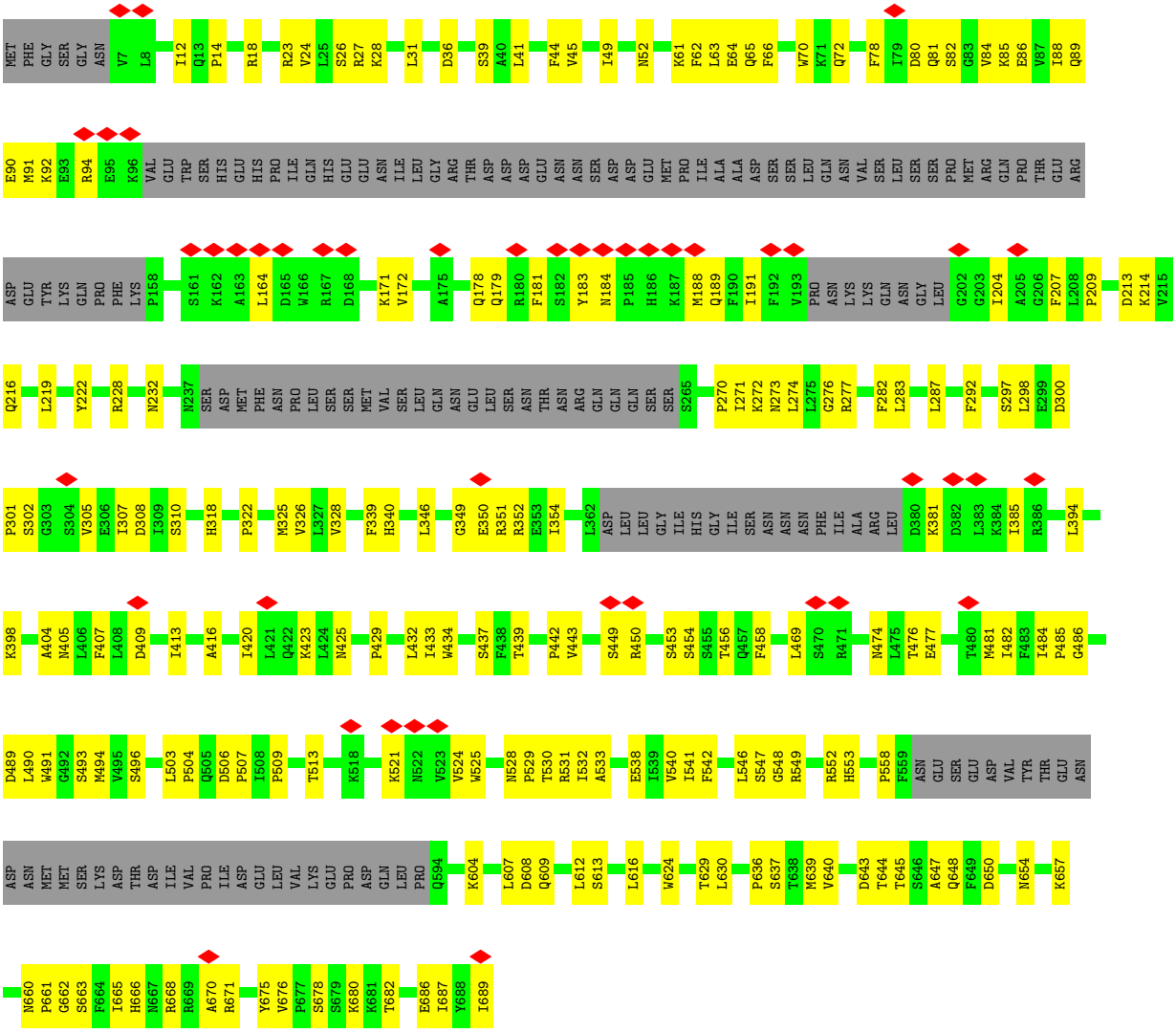
MET VAL LYS ASP LYS GLY LEU GLN CYS LYS TYR ILE ILE SER SER LYS PRO PHE ASN ALA PRO VAL THR GLU ARG ALA ILE PRO VAL ALA ILE PHE SER ALA ASP ILE PRO ILE LYS ARG SER PHE LEU ARG ARG TRP THR LEU ASP PRO SER LEU GLU ASP LEU ASP ILE ARG THR ILE

ILE ASP TRP GLY TYR TYR ARG GLU ARG LEU GLY SER ALA ILE GLN LYS ILE ILE THR ILE PRO ALA ALA LEU GLN GLY VAL SER ASN PRO VAL PRO ARG VAL GLU HIS PRO ASP TRP LEU LYS ARG LYS ILE ALA THR LYS GLU ASP LYS PHE LYS GLN THR SER LEU THR LYS PHE PHE

SER LYS THR LYS ASN VAL PRO THR MET GLY LYS ILE LYS ASP ILE GLU ASP LEU PHE GLU PRO THR VAL GLU GLU ASP ASN ALA LYS ILE LYS ILE ALA ARG THR THR LYS LYS LYS ALA VAL SER LYS ARG LYS ARG ASN GLN LEU THR ASN GLU GLU ASP PRO LEU VAL LEU PRO SER



• Molecule 16: DNA polymerase epsilon subunit B


MET PHE GLY SER GLY ASN V7 L8 I12 Q13 P14 R18 R23 V24 L25 S26 R27 K28 L31 D36 S39 A40 L41 F44 V45 I49 N52 K61 F62 L63 E64 Q65 F66 W70 K71 Q72 F78 I79 D80 Q81 S82 G83 V84 K85 E86 V87 I88 Q89
E90 M91 K92 E93 R94 E95 K96 VAL GLU TRP SER HIS GLU HIS PRO ILE GLN HIS GLU GLU ASN ILE LEU GLY ARG THR ASP ASP ASP GLU ASN ASN SER ASP ASP GLU MET PRO ILE ALA ALA ASP SER SER LEU GLN ASN VAL SER LEU SER SER PRO MET ARG GLN PRO THR GLU ARG
ASP GLU TYR LYS GLN PRO PHE LYS P158 S161 K162 A163 L164 D165 W166 R167 D168 K171 V172 A175 Q178 Q179 R180 F181 S182 Y183 N184 P185 H186 K187 M188 Q189 F190 I191 F192 V193 PRO ASN LYS LYS GLN ASN GLY LEU G202 G203 I204 A205 G206 F207 L208 P209 D213 K214 V215
Q216 L219 Y222 R228 N232 N237 SER ASP MET PHE ASN PRO LEU SER SER MET VAL SER LEU GLN ASN GLU LEU SER ASN THR ASN ARG GLN GLN GLN SER SER S265 P270 I271 K272 N273 L274 L275 G276 R277 F282 L283 L287 F292 S297 L298 E299 D300
P301 S302 G303 S304 V305 E306 I307 D308 I309 S310 H318 P322 M325 V326 L327 V328 F339 H340 L346 G349 E350 R351 R352 E353 I354 L362 ASP LEU LEU GLY ILE HIS GLY ILE SER ASN ASN ASN PHE ILE ALA ARG LEU D380 K381 D382 L383 K384 I385 R386 L394
K398 A404 N405 L406 F407 L408 D409 I413 A416 I420 L421 Q422 K423 L424 N425 P429 L432 I433 W434 S437 F438 T439 P442 V443 S449 R450 S453 S454 S455 T456 Q457 F458 L469 S470 R471 N474 L475 T476 E477 T480 M481 I482 F483 I484 P485 G486
D489 L490 W491 G492 S493 M494 V495 S496 L503 P504 Q505 D506 P507 I508 P509 T513 K518 K521 N522 V523 V524 W525 N528 P529 T530 R531 I532 A533 E538 I539 V540 I541 F542 L546 S547 G548 R549 R552 H553 P558 F559 ASN GLU SER GLU ASP VAL TYR THR GLU ASN
ASP ASN MET MET SER LYS ASP THR ASP ILE VAL PRO ILE ASP GLU LEU VAL LYS GLU PRO ASP GLN LEU PRO Q594 K604 L607 D608 Q609 L612 S613 L616 W624 T629 L630 P636 S637 T638 M639 V640 D643 T644 T645 S646 A647 Q648 F649 D650 N654 K657
N660 P661 G662 S663 F664 I665 H666 N667 R668 R669 A670 R671 Y675 V676 P677 S678 S679 K680 K681 T682 E686 I687 Y688 I689

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	147795	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 ($e^-/Å^2$)	53	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.082	Depositor
Minimum map value	-0.182	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.040	Depositor
Recommended contour level	0.35	Depositor
Map size (Å)	572.39996, 572.39996, 572.39996	wwPDB
Map dimensions	540, 540, 540	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, MG, AGS, 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	2	0.24	0/5334	0.50	0/7203
2	3	0.24	0/5091	0.51	0/6914
3	4	0.24	0/5575	0.50	0/7531
4	5	0.24	0/5407	0.48	0/7302
5	6	0.25	0/4957	0.51	0/6684
6	7	0.25	0/5097	0.51	0/6896
7	A	0.24	0/1645	0.47	0/2215
8	B	0.24	0/1663	0.50	0/2249
9	C	0.24	0/1426	0.42	0/1929
10	D	0.24	0/2040	0.48	0/2755
11	E	0.24	0/4677	0.47	0/6335
12	F	0.25	0/3553	0.50	0/4811
12	G	0.24	0/3448	0.48	0/4675
12	H	0.24	0/3443	0.48	0/4668
13	I	0.48	0/448	1.18	0/691
14	J	0.48	0/110	0.73	0/166
15	M	0.24	0/6632	0.45	0/8976
16	N	0.25	0/4345	0.49	0/5884
All	All	0.25	0/64891	0.50	0/87884

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	2	5245	0	5290	119	0
2	3	5005	0	5043	98	0
3	4	5503	0	5537	167	0
4	5	5334	0	5383	117	0
5	6	4880	0	4914	168	0
6	7	5023	0	5042	172	0
7	A	1625	0	1621	43	0
8	B	1630	0	1685	35	0
9	C	1394	0	1405	39	0
10	D	2004	0	2001	50	0
11	E	4591	0	4567	117	0
12	F	3467	0	3410	108	0
12	G	3362	0	3299	122	0
12	H	3358	0	3283	119	0
13	I	406	0	238	8	0
14	J	99	0	56	3	0
15	M	6490	0	6446	183	0
16	N	4254	0	4256	147	0
17	2	1	0	0	0	0
17	4	1	0	0	0	0
17	5	1	0	0	0	0
17	6	1	0	0	0	0
17	7	1	0	0	0	0
17	M	2	0	0	0	0
18	2	27	0	12	4	0
18	3	27	0	12	3	0
19	2	1	0	0	0	0
19	3	1	0	0	0	0
19	5	1	0	0	0	0
19	6	1	0	0	0	0
19	7	1	0	0	0	0
20	5	31	0	12	5	0
20	6	31	0	12	6	0
20	7	31	0	12	1	0
All	All	63829	0	63536	1680	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 1680 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)
5:6:734:LEU:HD21	5:6:742:ILE:CD1	1.66	1.25
5:6:734:LEU:CD2	5:6:742:ILE:CD1	2.21	1.18
5:6:734:LEU:HD21	5:6:742:ILE:HD11	1.27	1.11
5:6:734:LEU:HD21	5:6:742:ILE:CG1	1.83	1.07
5:6:734:LEU:CD2	5:6:742:ILE:HG13	1.86	1.06

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	2	658/868 (76%)	642 (98%)	16 (2%)	0	100	100
2	3	639/971 (66%)	617 (97%)	22 (3%)	0	100	100
3	4	685/933 (73%)	657 (96%)	28 (4%)	0	100	100
4	5	663/775 (86%)	644 (97%)	19 (3%)	0	100	100
5	6	605/1017 (60%)	586 (97%)	19 (3%)	0	100	100
6	7	633/845 (75%)	599 (95%)	34 (5%)	0	100	100
7	A	196/208 (94%)	189 (96%)	7 (4%)	0	100	100
8	B	191/213 (90%)	188 (98%)	3 (2%)	0	100	100
9	C	167/194 (86%)	165 (99%)	2 (1%)	0	100	100
10	D	237/294 (81%)	234 (99%)	3 (1%)	0	100	100
11	E	560/650 (86%)	546 (98%)	14 (2%)	0	100	100
12	F	429/927 (46%)	402 (94%)	27 (6%)	0	100	100
12	G	417/927 (45%)	390 (94%)	27 (6%)	0	100	100
12	H	415/927 (45%)	382 (92%)	33 (8%)	0	100	100
15	M	799/2222 (36%)	760 (95%)	39 (5%)	0	100	100
16	N	524/689 (76%)	493 (94%)	31 (6%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	7818/12660 (62%)	7494 (96%)	324 (4%)	0	100 100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	2	579/770 (75%)	578 (100%)	1 (0%)	93 96
2	3	551/835 (66%)	548 (100%)	3 (0%)	88 93
3	4	622/848 (73%)	622 (100%)	0	100 100
4	5	605/688 (88%)	605 (100%)	0	100 100
5	6	535/886 (60%)	533 (100%)	2 (0%)	91 94
6	7	550/753 (73%)	550 (100%)	0	100 100
7	A	182/193 (94%)	180 (99%)	2 (1%)	73 85
8	B	184/198 (93%)	184 (100%)	0	100 100
9	C	156/173 (90%)	156 (100%)	0	100 100
10	D	234/279 (84%)	234 (100%)	0	100 100
11	E	509/586 (87%)	509 (100%)	0	100 100
12	F	382/825 (46%)	381 (100%)	1 (0%)	92 95
12	G	370/825 (45%)	368 (100%)	2 (0%)	88 93
12	H	368/825 (45%)	365 (99%)	3 (1%)	81 89
15	M	720/2014 (36%)	719 (100%)	1 (0%)	93 97
16	N	474/629 (75%)	474 (100%)	0	100 100
All	All	7021/11327 (62%)	7006 (100%)	15 (0%)	93 96

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
7	A	206	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
12	H	868	ARG
12	F	843	ASN
15	M	1572	ARG
12	H	524	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
15	M	1608	ASN
12	G	680	ASN
11	E	130	ASN
12	G	510	GLN
6	7	683	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 17 ligands modelled in this entry, 12 are monoatomic - leaving 5 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	$\#\|Z\|>2$
20	AGS	6	1103	19	26,33,33	0.71	1 (3%)	26,52,52	1.03	2 (7%)
20	AGS	7	903	19	26,33,33	0.70	1 (3%)	26,52,52	1.08	2 (7%)
20	AGS	5	802	19	26,33,33	0.71	1 (3%)	26,52,52	1.03	2 (7%)
18	ADP	3	1001	19	24,29,29	0.96	1 (4%)	29,45,45	1.42	4 (13%)
18	ADP	2	902	19	24,29,29	0.96	1 (4%)	29,45,45	1.43	4 (13%)

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
20	AGS	6	1103	19	-	4/17/38/38	0/3/3/3
20	AGS	7	903	19	-	1/17/38/38	0/3/3/3
20	AGS	5	802	19	-	2/17/38/38	0/3/3/3
18	ADP	3	1001	19	-	3/12/32/32	0/3/3/3
18	ADP	2	902	19	-	2/12/32/32	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	2	902	ADP	C5-C4	2.49	1.47	1.40
18	3	1001	ADP	C5-C4	2.47	1.47	1.40
20	5	802	AGS	PG-S1G	2.18	1.95	1.90
20	6	1103	AGS	PG-S1G	2.12	1.95	1.90
20	7	903	AGS	PG-S1G	2.10	1.95	1.90

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
20	7	903	AGS	PA-O3A-PB	-3.83	119.69	132.83
20	5	802	AGS	PA-O3A-PB	-3.74	119.98	132.83
18	2	902	ADP	PA-O3A-PB	-3.35	121.33	132.83
20	6	1103	AGS	PA-O3A-PB	-3.29	121.55	132.83
18	3	1001	ADP	PA-O3A-PB	-3.19	121.89	132.83

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
18	2	902	ADP	C5'-O5'-PA-O3A
18	3	1001	ADP	C5'-O5'-PA-O1A
18	3	1001	ADP	C5'-O5'-PA-O2A
20	6	1103	AGS	C5'-O5'-PA-O1A
18	2	902	ADP	C5'-O5'-PA-O1A

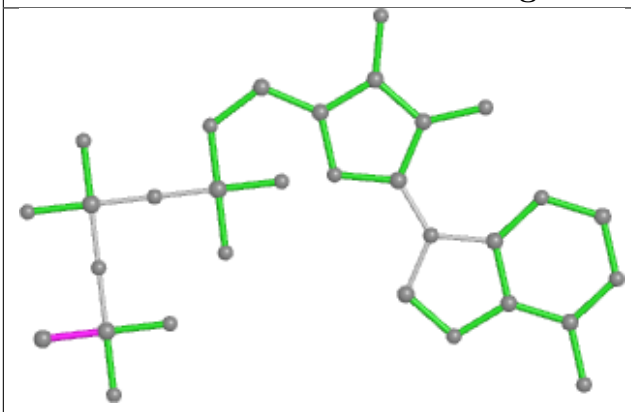
There are no ring outliers.

5 monomers are involved in 19 short contacts:

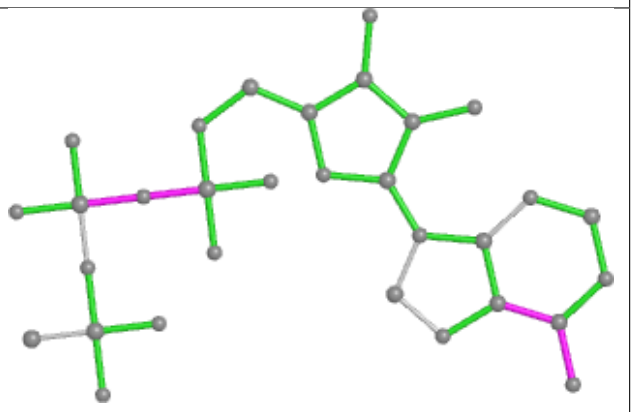
Mol	Chain	Res	Type	Clashes	Symm-Clashes
20	6	1103	AGS	6	0
20	7	903	AGS	1	0
20	5	802	AGS	5	0
18	3	1001	ADP	3	0
18	2	902	ADP	4	0

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. 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.

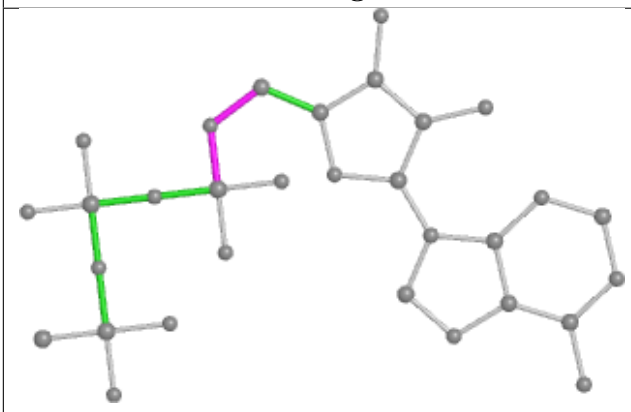
Ligand AGS 6 1103



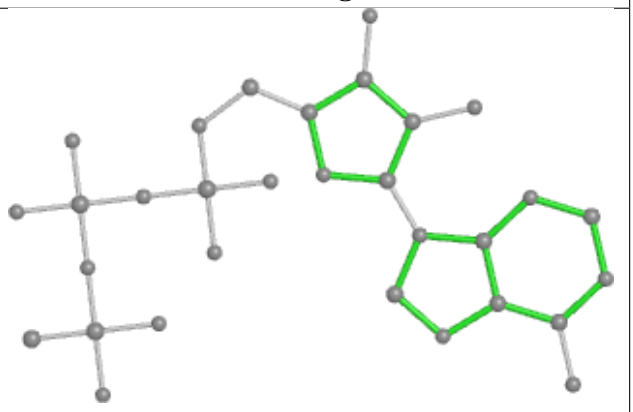
Bond lengths



Bond angles

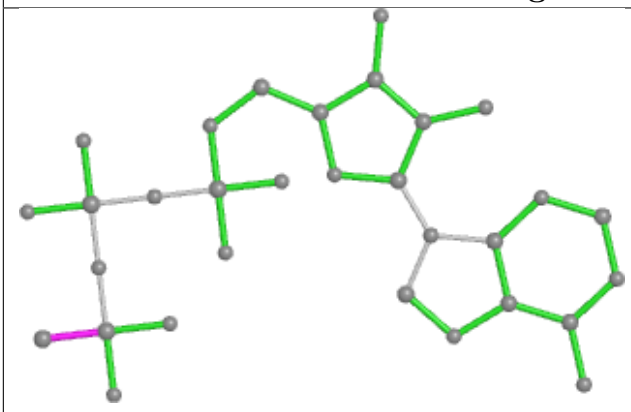


Torsions

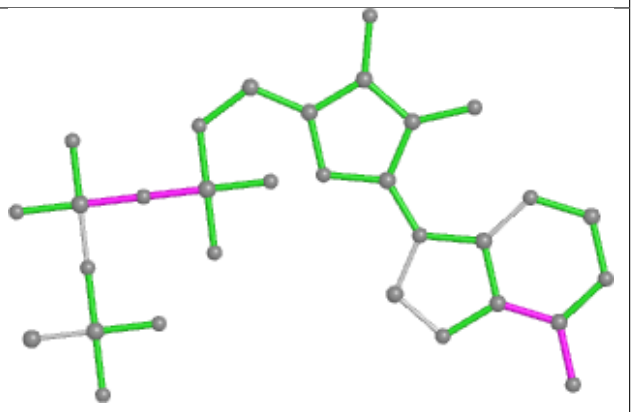


Rings

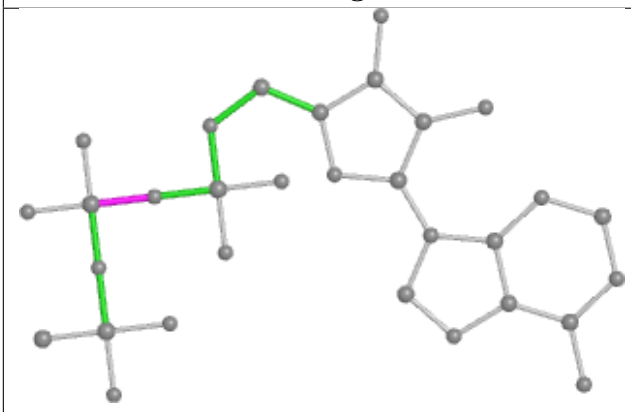
Ligand AGS 7 903



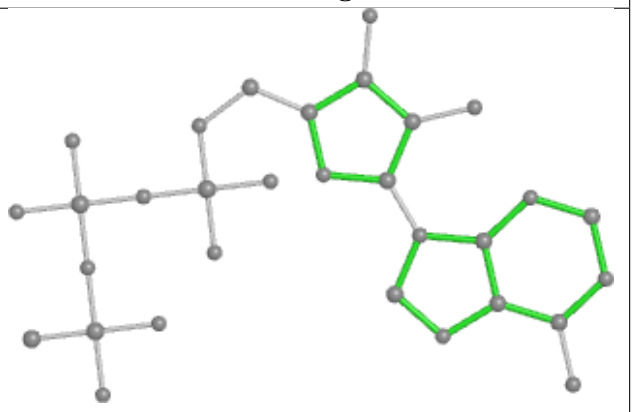
Bond lengths



Bond angles

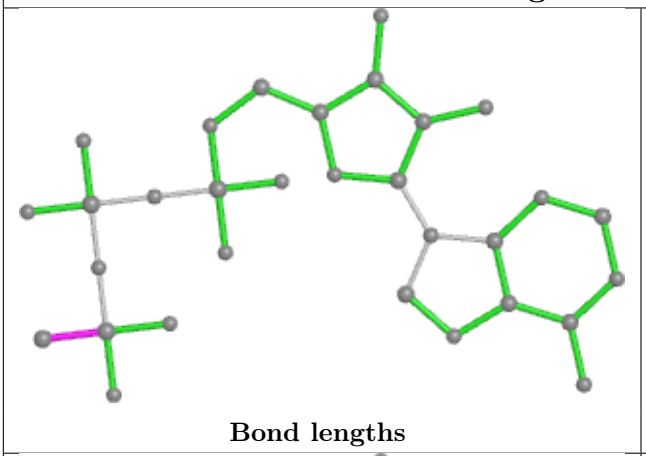


Torsions

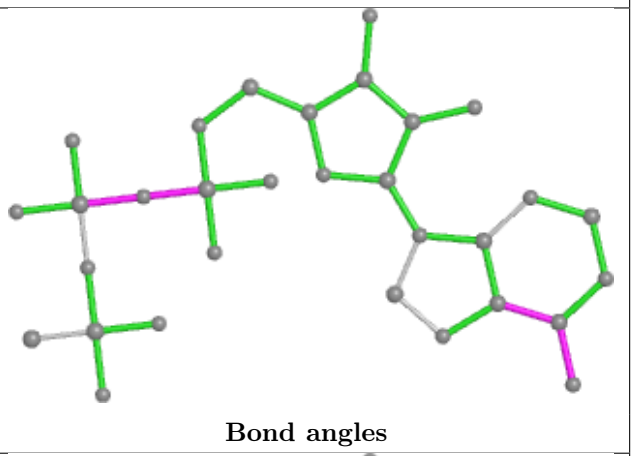


Rings

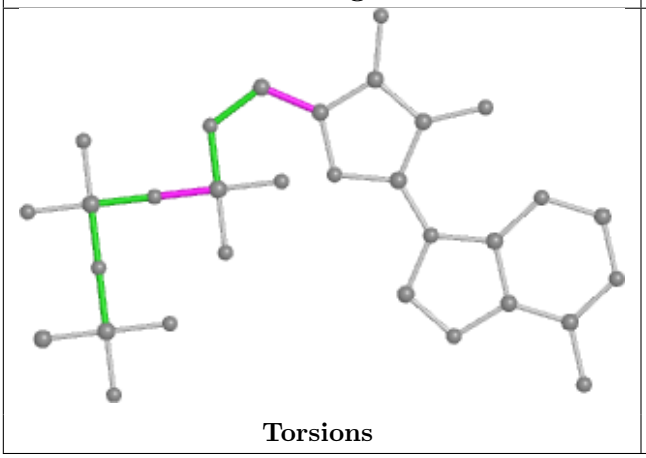
Ligand AGS 5 802



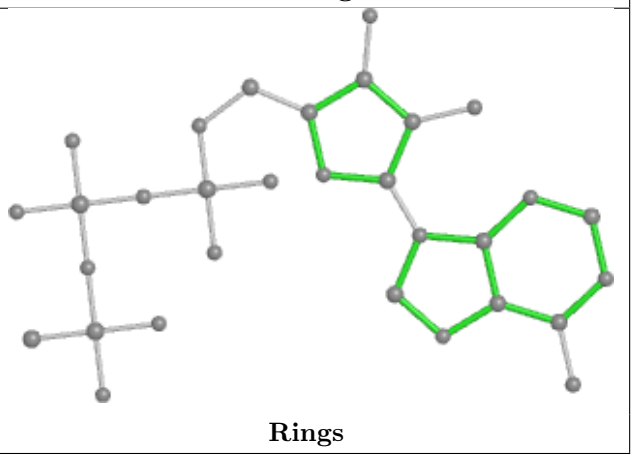
Bond lengths



Bond angles

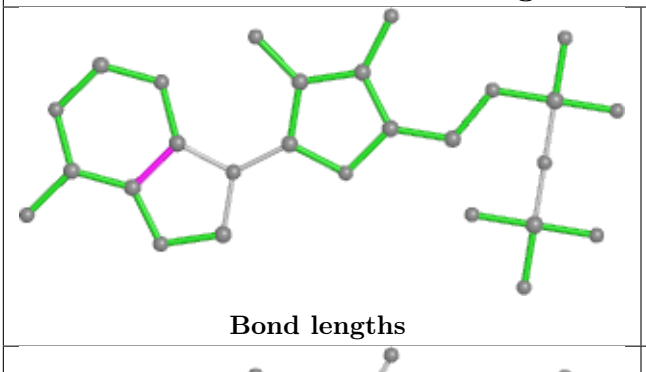


Torsions

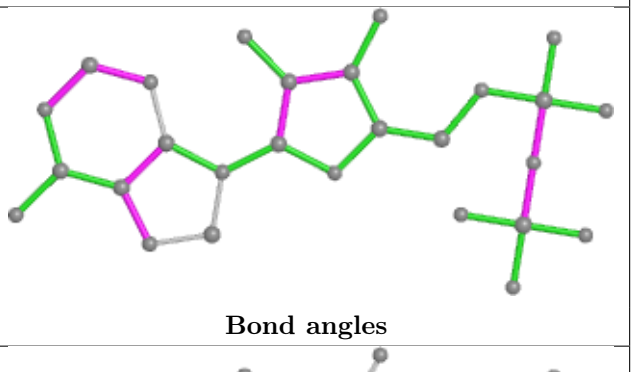


Rings

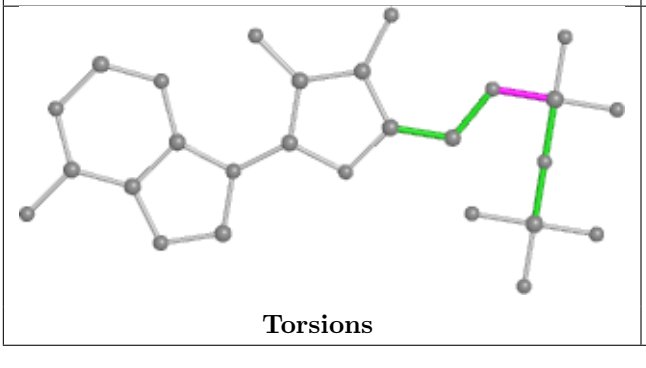
Ligand ADP 3 1001



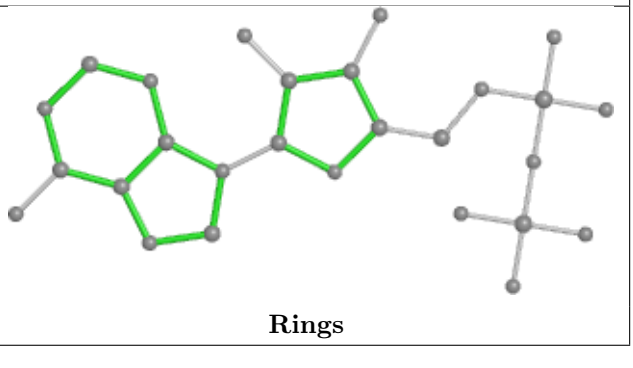
Bond lengths



Bond angles

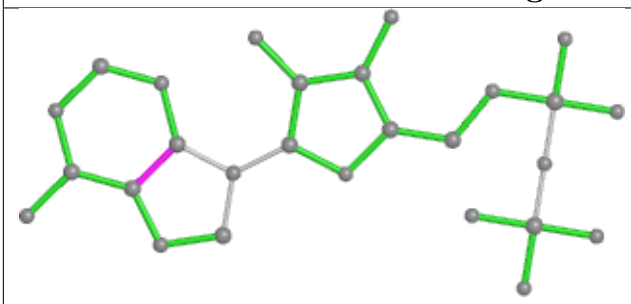


Torsions

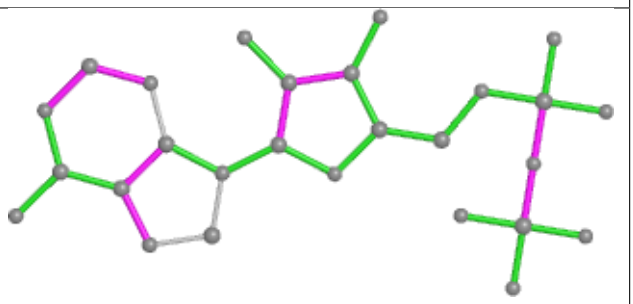


Rings

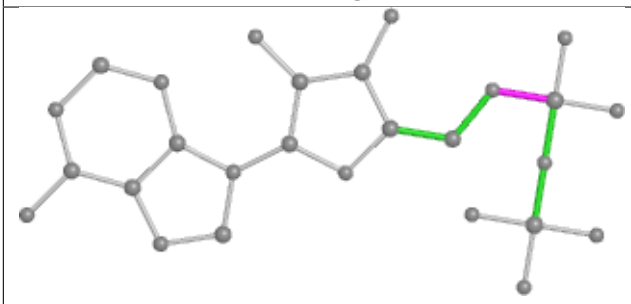
Ligand ADP 2 902



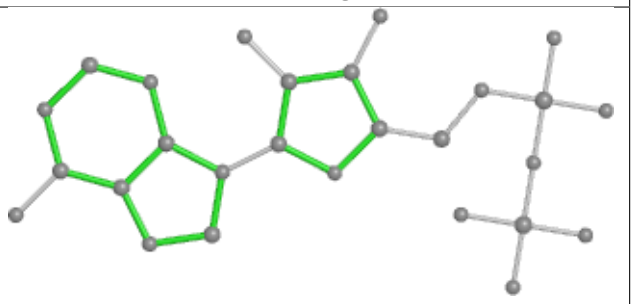
Bond lengths



Bond angles



Torsions



Rings

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.

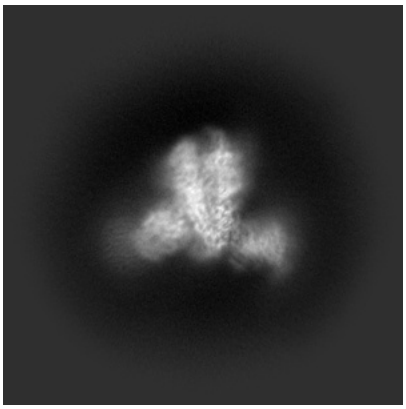
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-37213. These allow visual inspection of the internal detail of the map and identification of artifacts.

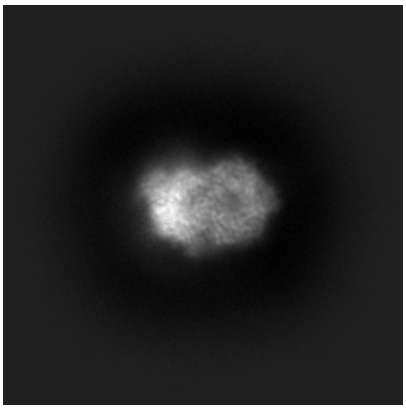
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

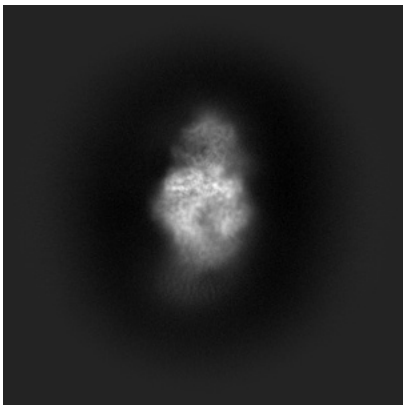
6.1.1 Primary map



X

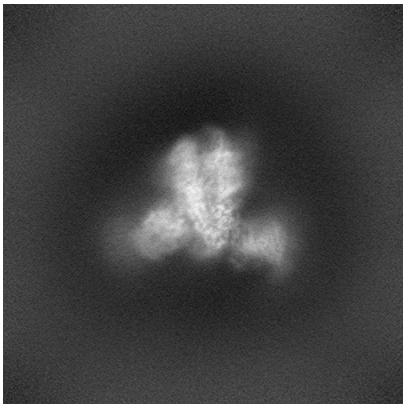


Y

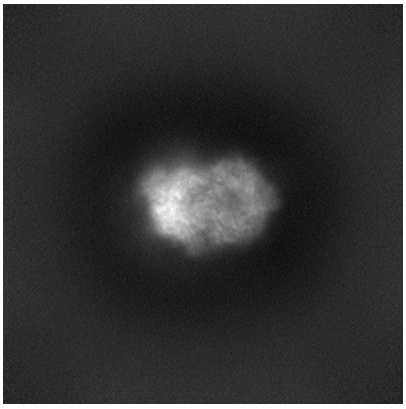


Z

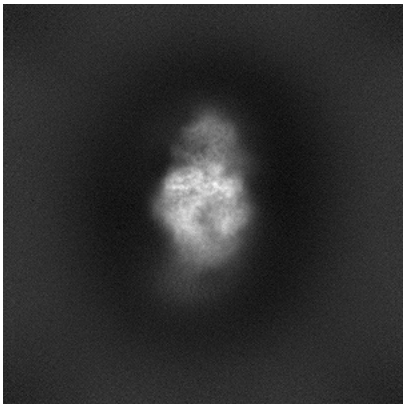
6.1.2 Raw map



X



Y

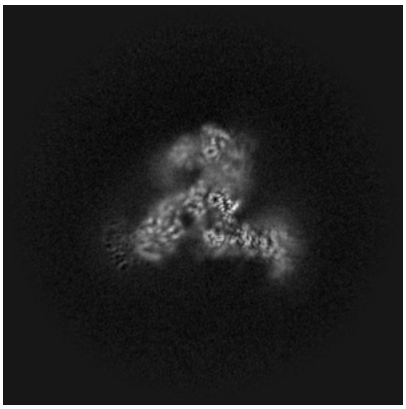


Z

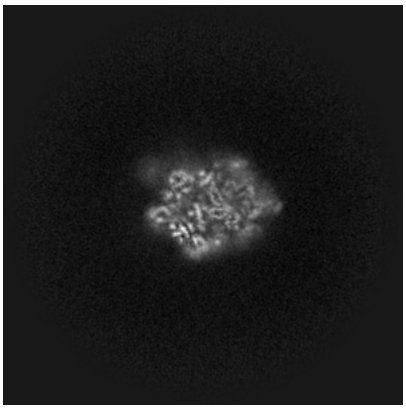
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

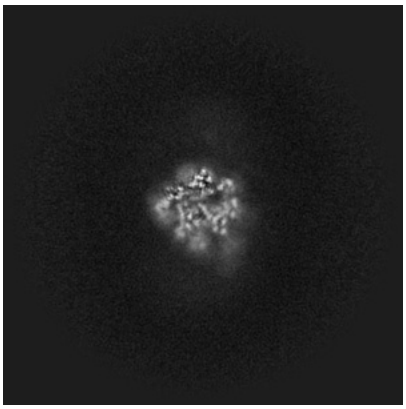
6.2.1 Primary map



X Index: 270

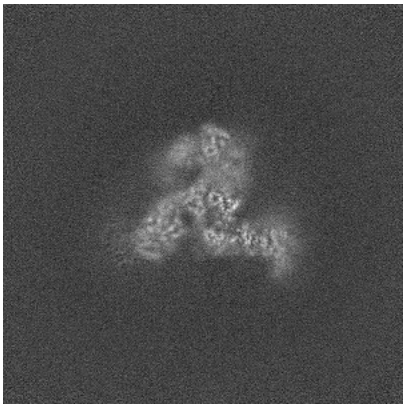


Y Index: 270

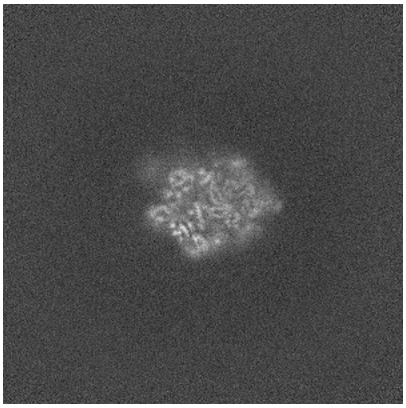


Z Index: 270

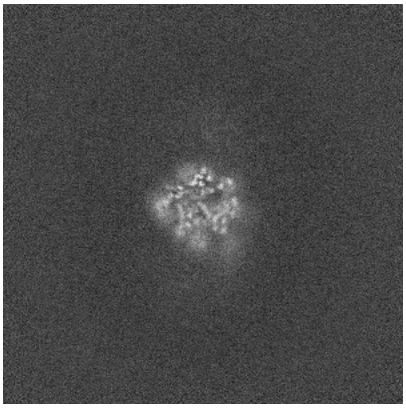
6.2.2 Raw map



X Index: 270



Y Index: 270

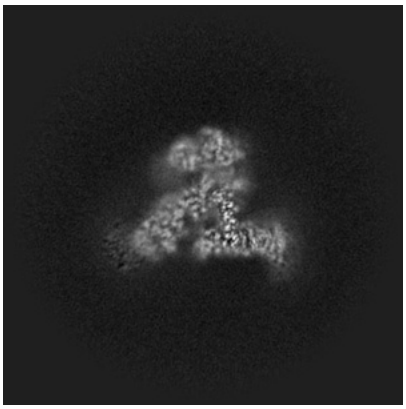


Z Index: 270

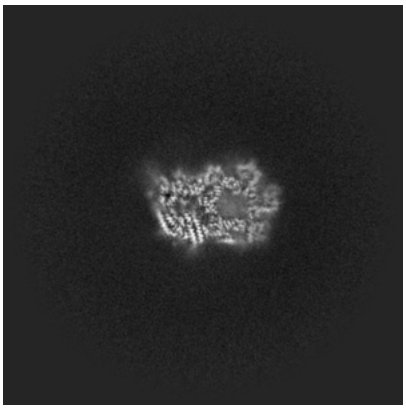
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

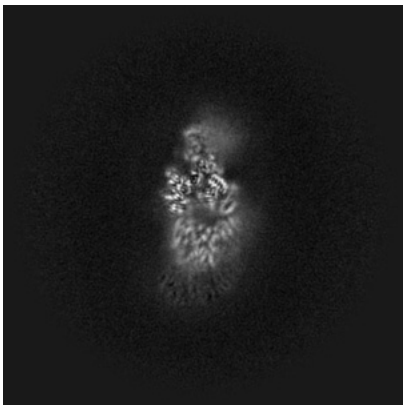
6.3.1 Primary map



X Index: 263

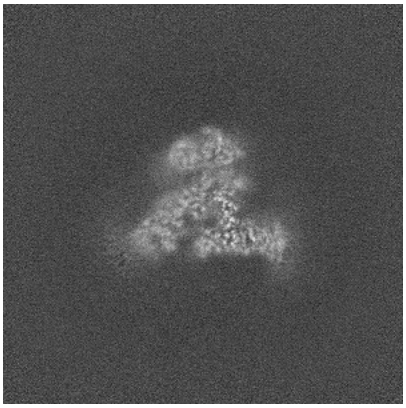


Y Index: 292

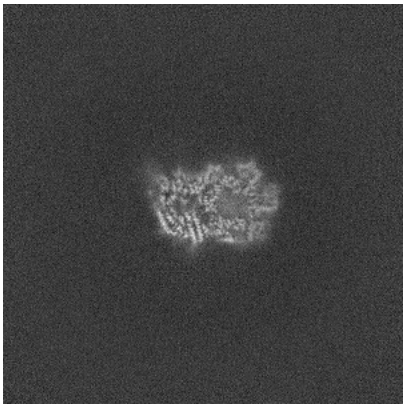


Z Index: 236

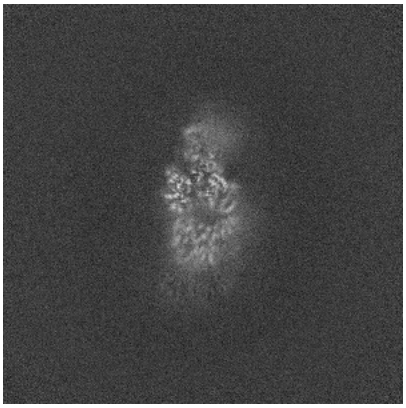
6.3.2 Raw map



X Index: 262



Y Index: 292

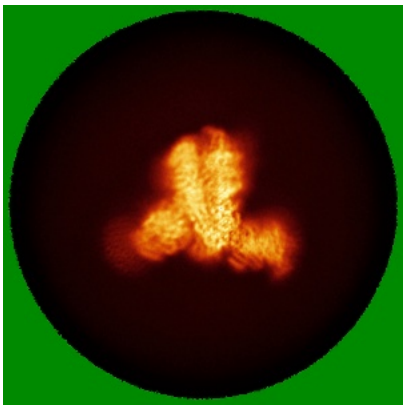


Z Index: 236

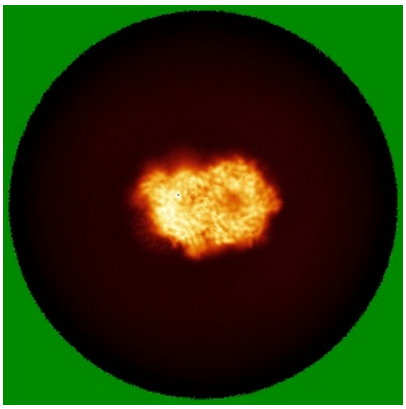
The images above show the largest variance slices of the map in three orthogonal directions.

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

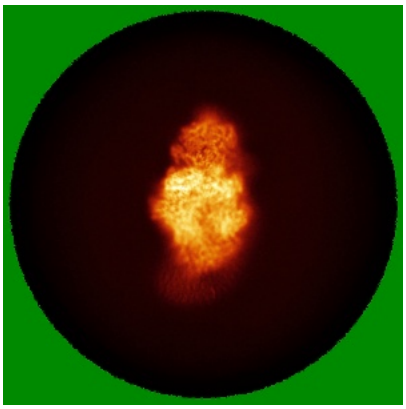
6.4.1 Primary map



X

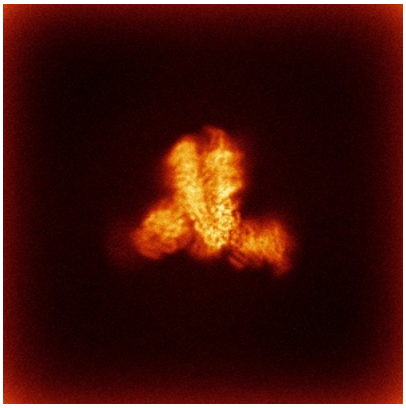


Y

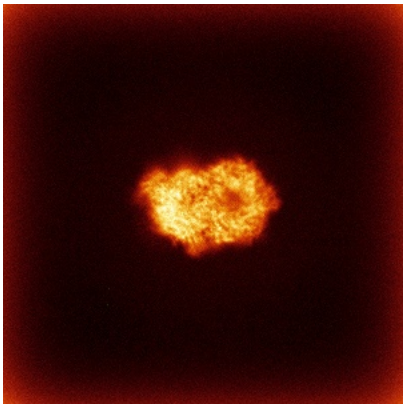


Z

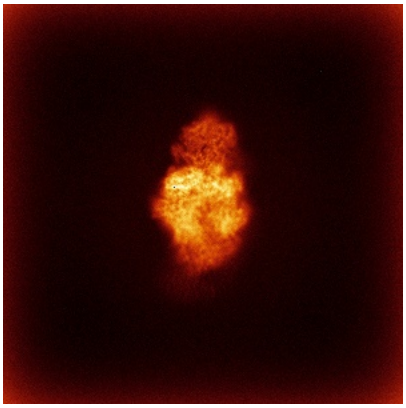
6.4.2 Raw map



X



Y



Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.35. 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.

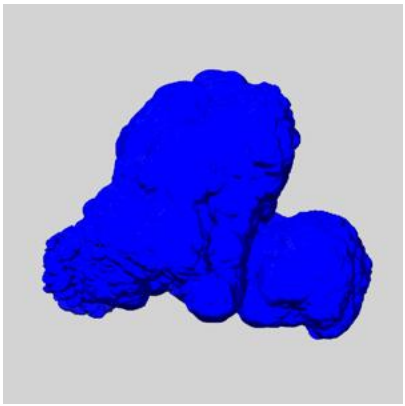
6.6 Mask visualisation

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

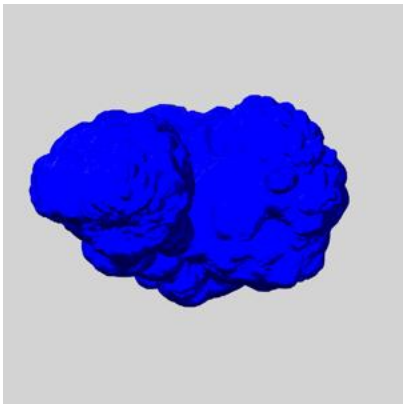
A mask typically either:

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

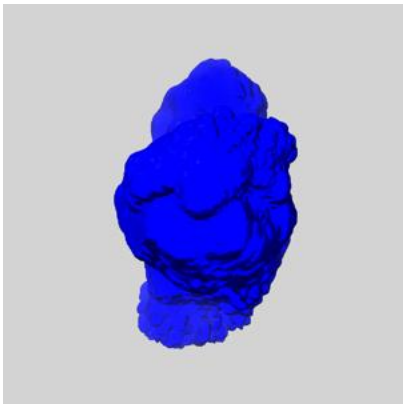
6.6.1 emd_37213_msk_1.map



X



Y

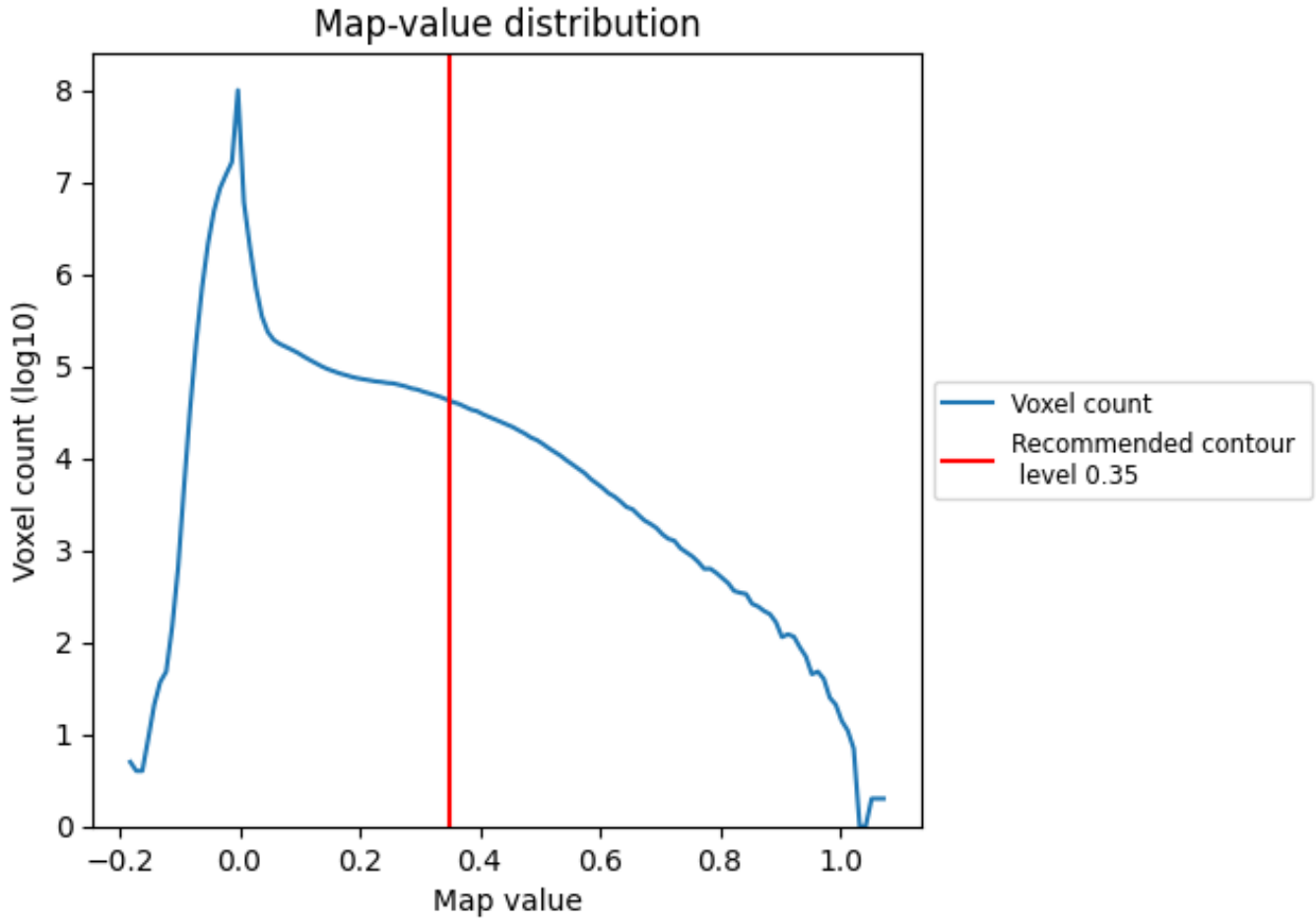


Z

7 Map analysis

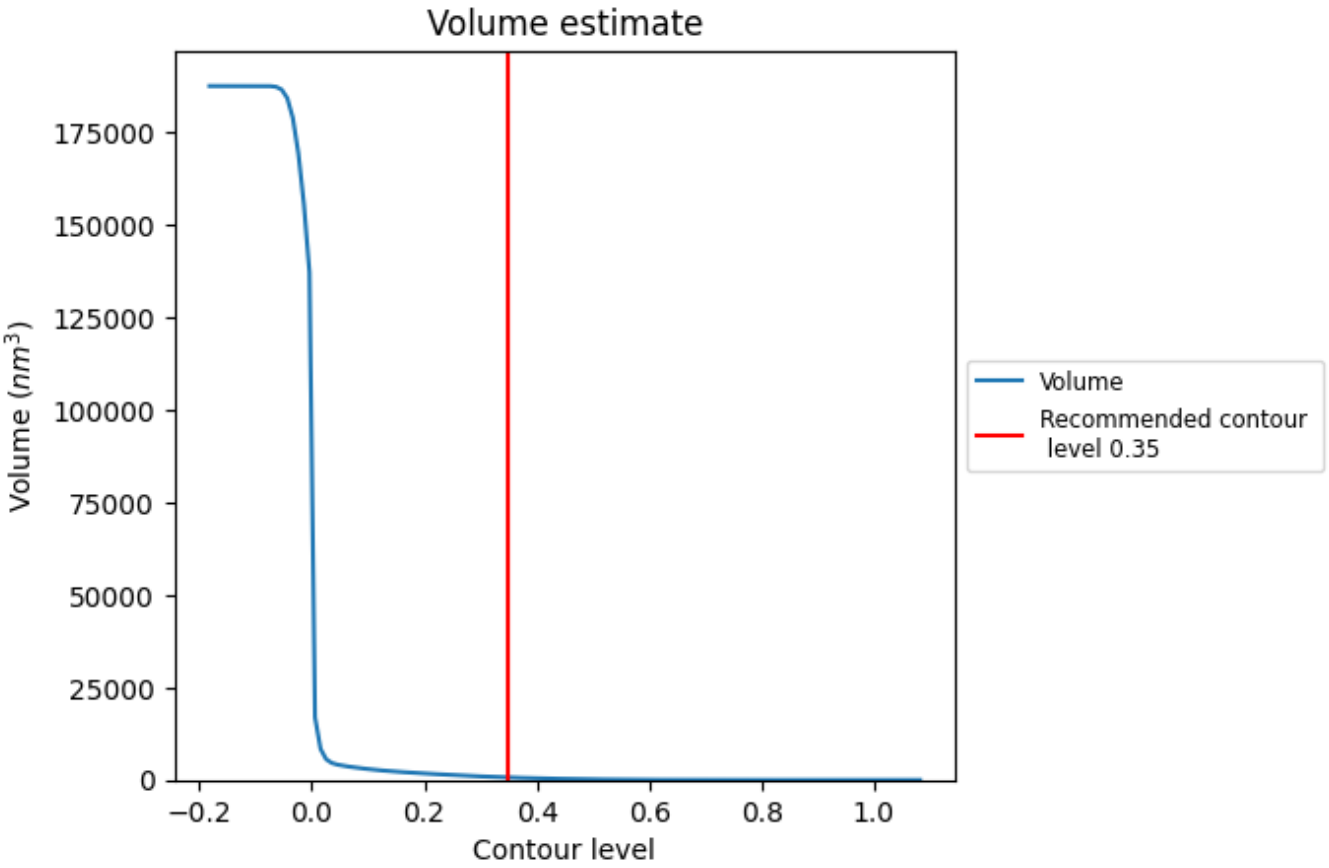
This section contains the results of statistical analysis of the map.

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.

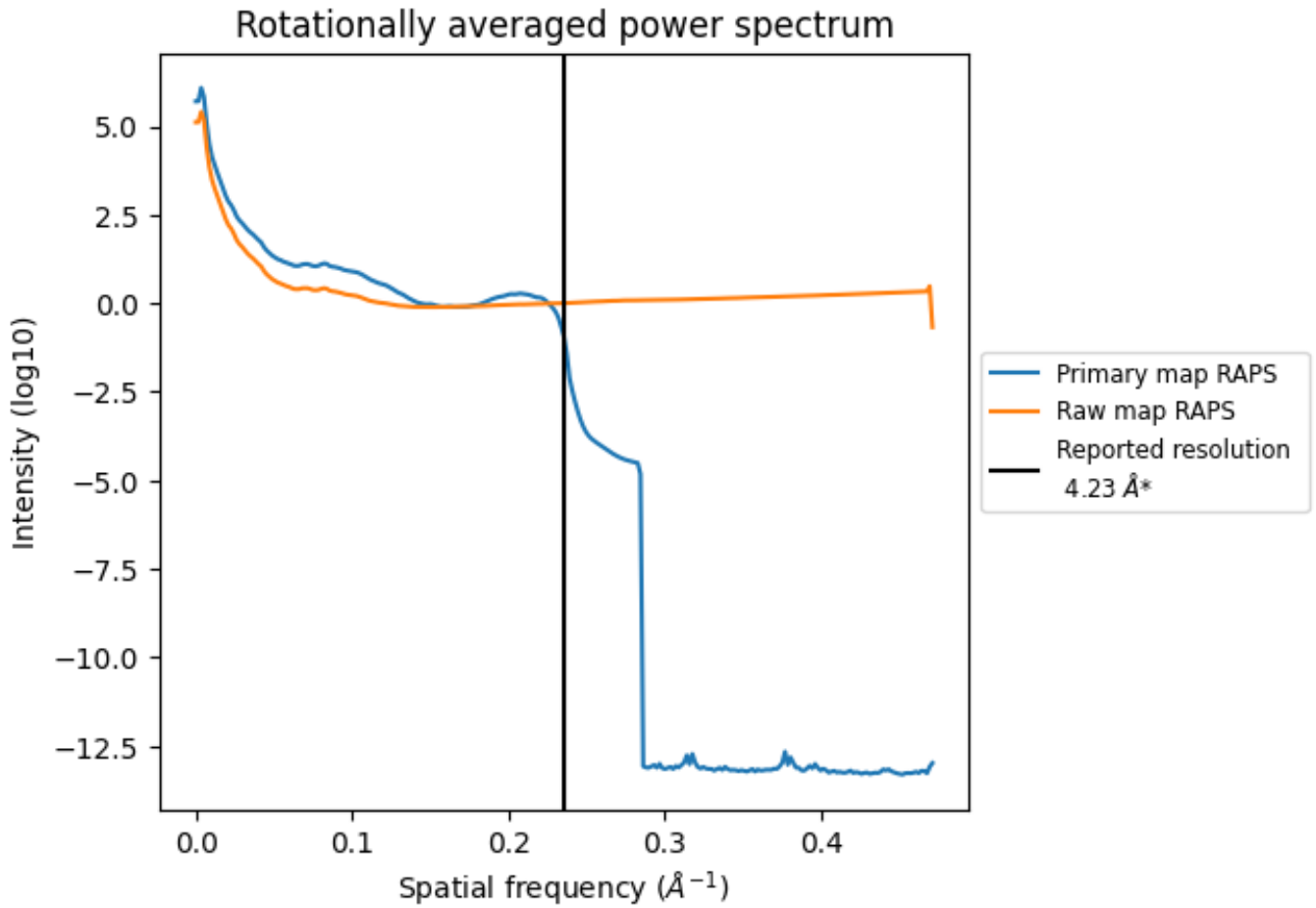
7.2 Volume estimate



The volume at the recommended contour level is 676 nm^3; this corresponds to an approximate mass of 611 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)

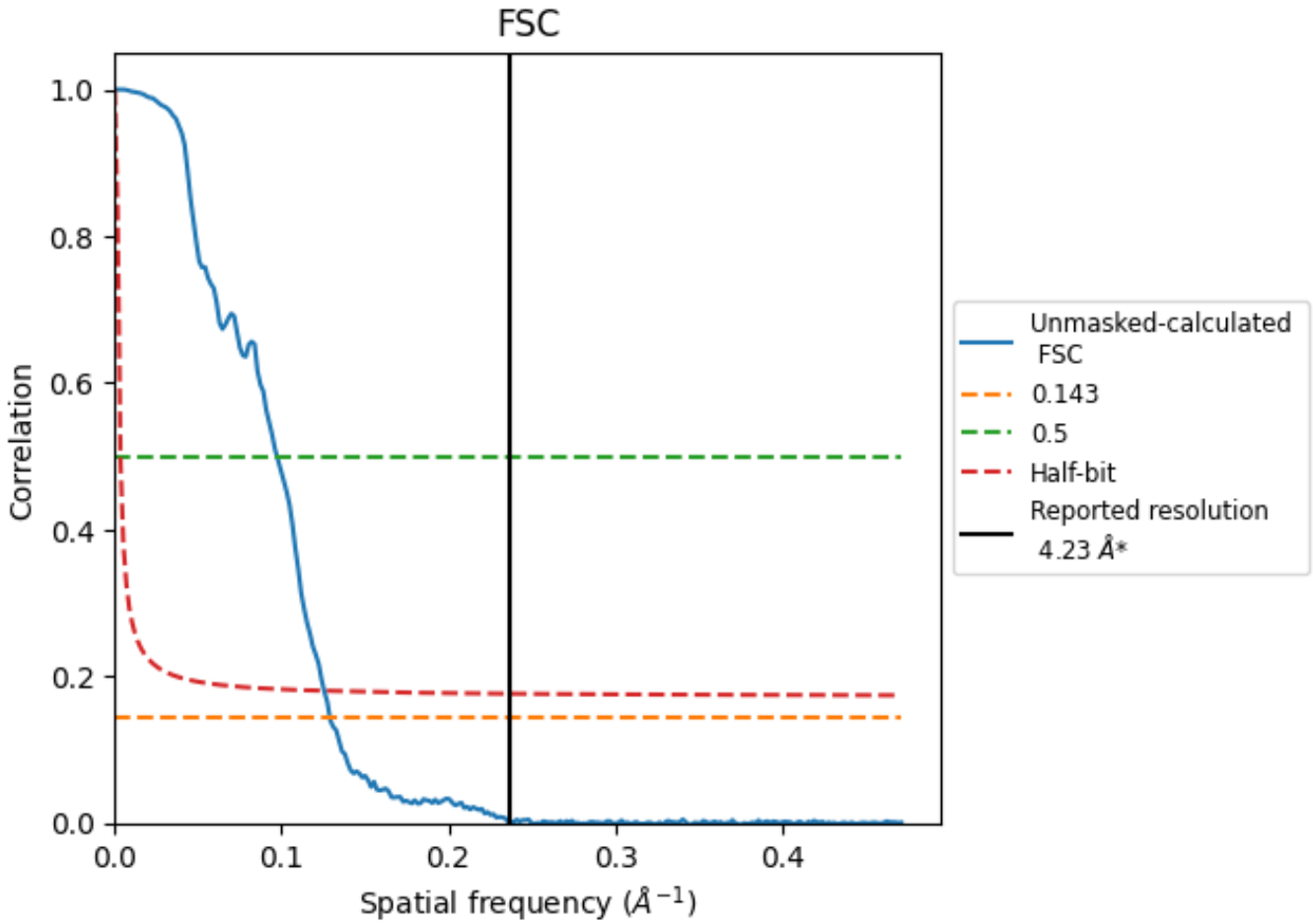


*Reported resolution corresponds to spatial frequency of 0.236 Å^{-1}

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 0.236 Å^{-1}

8.2 Resolution estimates (i)

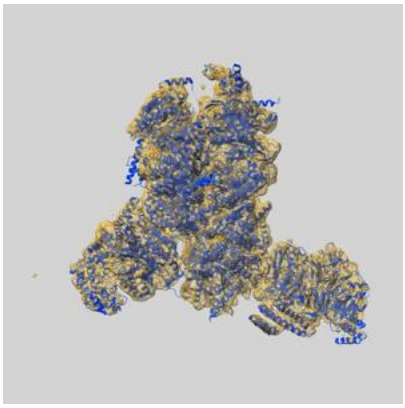
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.23	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.75	10.28	7.96

*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 7.75 differs from the reported value 4.23 by more than 10 %

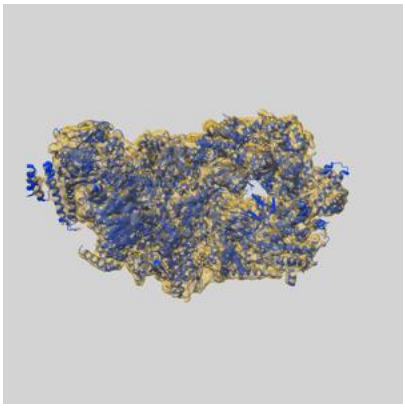
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-37213 and PDB model 8KG8. Per-residue inclusion information can be found in section 3 on page 9.

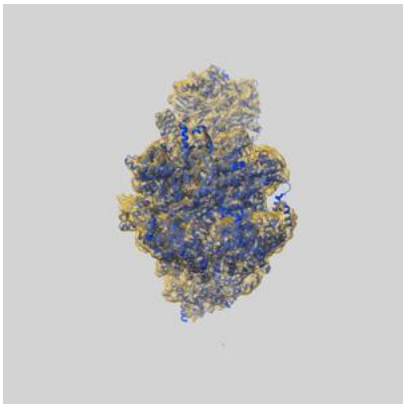
9.1 Map-model overlay



X



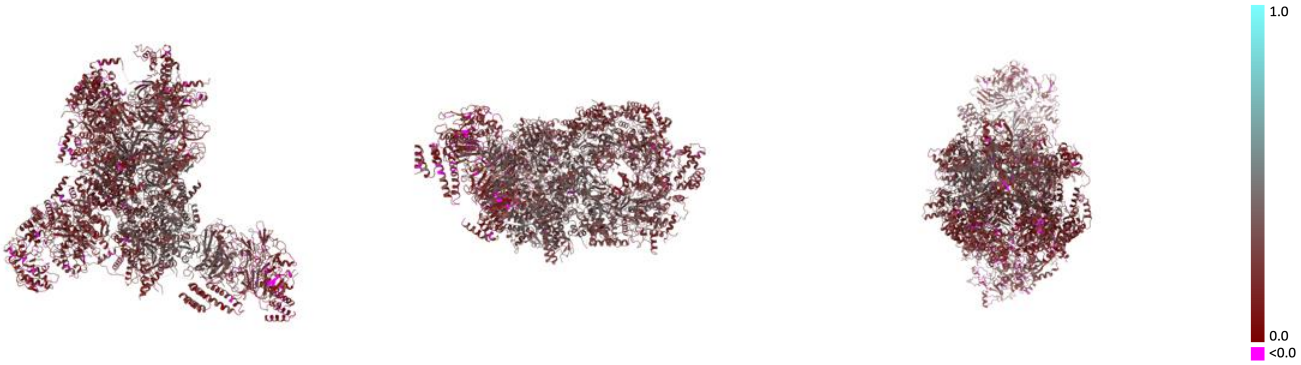
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.35 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.

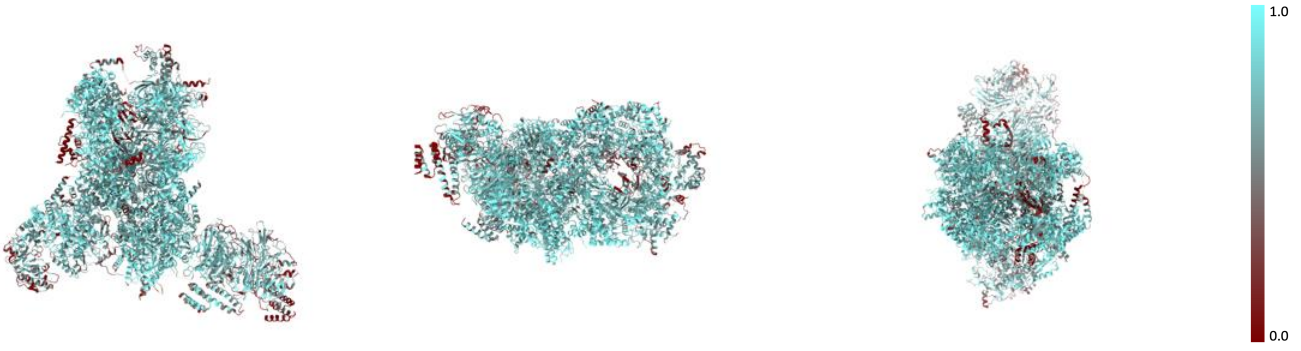
9.2 Q-score mapped to coordinate model (i)



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.

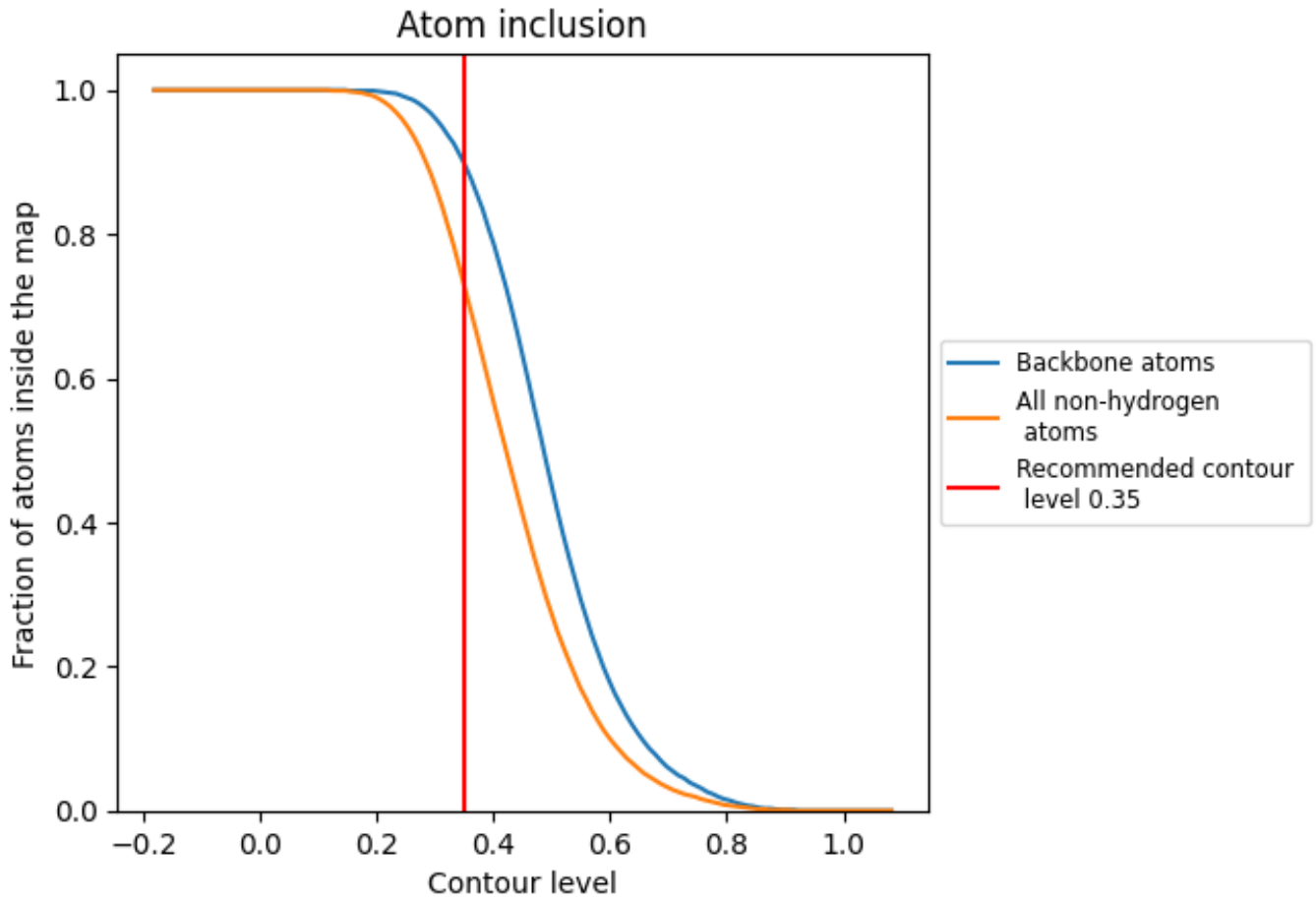
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.35).

9.4 Atom inclusion (i)



At the recommended contour level, 90% of all backbone atoms, 73% 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 (0.35) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7280	0.2460
2	0.7570	0.2480
3	0.8300	0.2940
4	0.6210	0.1970
5	0.7680	0.2840
6	0.7480	0.2230
7	0.7220	0.2290
A	0.8010	0.2770
B	0.8490	0.3650
C	0.8530	0.3160
D	0.8280	0.3410
E	0.7900	0.2920
F	0.7130	0.2950
G	0.5620	0.1870
H	0.5890	0.1930
I	0.5300	0.2420
J	0.1920	0.1970
M	0.6830	0.1930
N	0.7750	0.2090