Full wwPDB EM Validation Report

Sep 9, 2024 – 04:52 pm BST

PDB ID	:	8RO2
EMDB ID	:	EMD-19399
Title	:	Integrative Structure of the human intron lariat Spliceosome (ILS")
Authors	:	Rothe, P.; Vorlaender, M.K.; Plaschka, C.
Deposited on	:	2024-01-11
Resolution	:	3.50 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

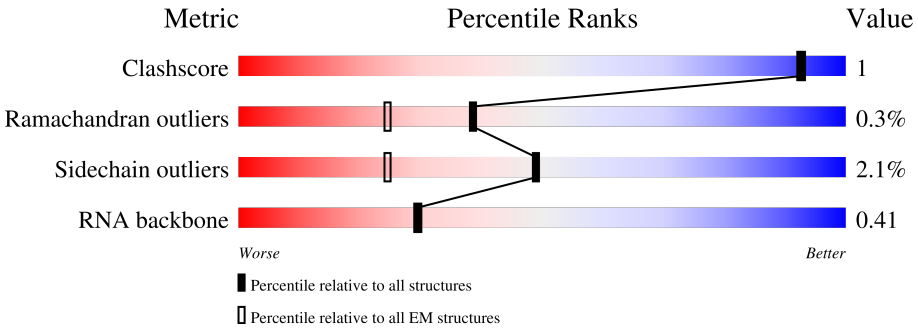
EMDB validation analysis	:	0.0.1.dev112
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.38.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.50 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
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	2	188	18% 7% 12% 79%
2	6	106	80% 33% 42% 14% 8%
3	C	972	5% 88% 5% 7%
4	D	285	12% 18% 82%
5	DX	795	56% 81% 18%
6	E	357	80% 16%
7	J	848	32% 66% 34%

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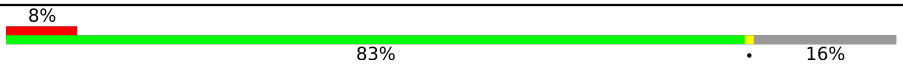
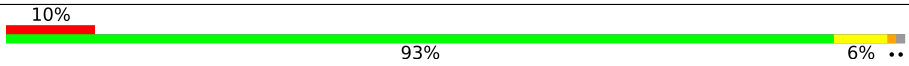
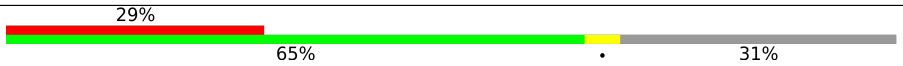
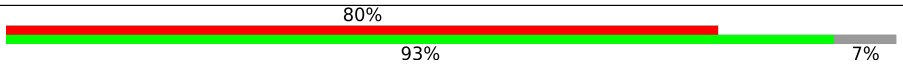
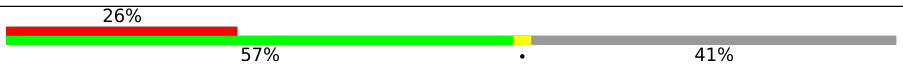
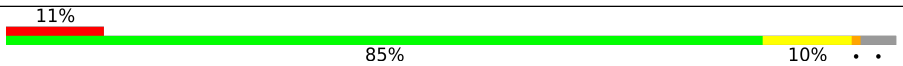
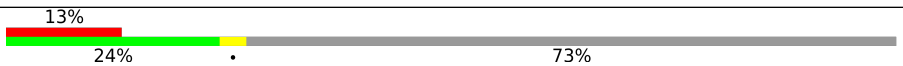
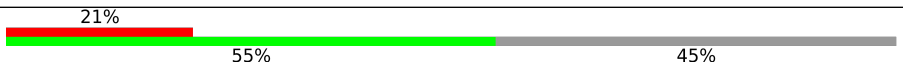
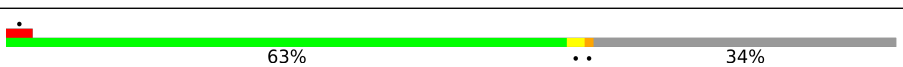
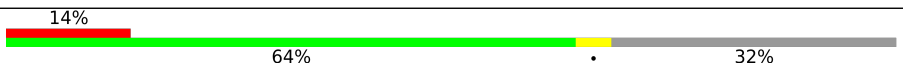
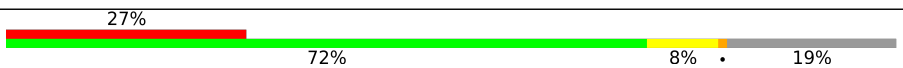
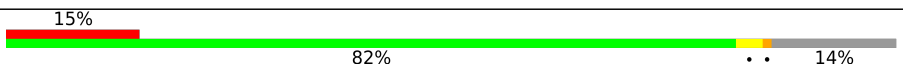
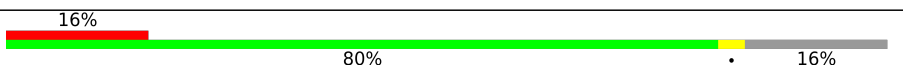
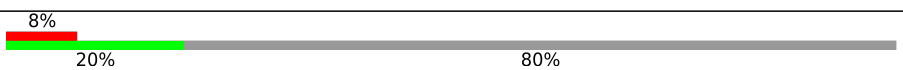
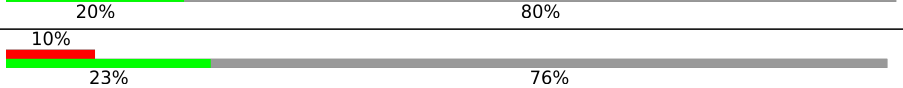
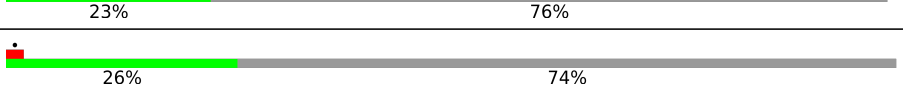
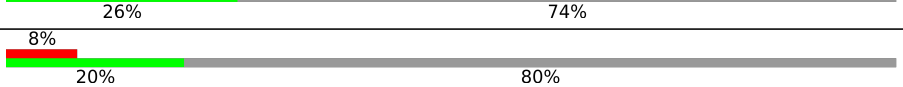
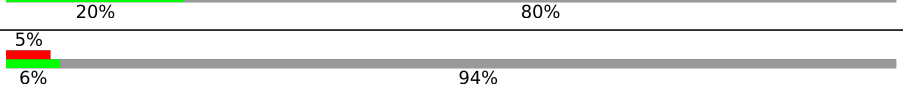
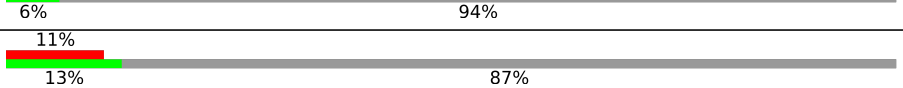
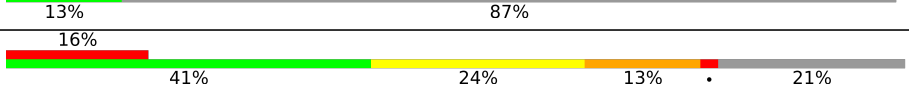
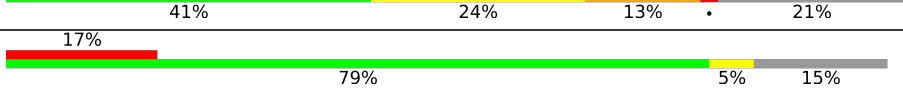
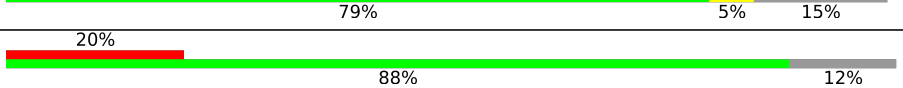
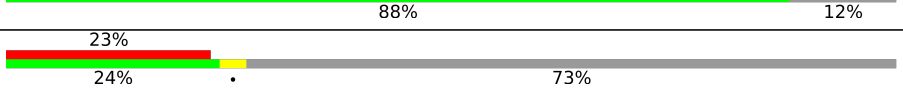
Mol	Chain	Length	Quality of chain
8	K	225	
9	L1	538	
10	N	144	
11	O	420	
12	Q	1485	
13	R	536	
14	S	166	
15	W	579	
16	Z	166	
17	a	126	
18	c	119	
19	d	118	
20	e	92	
21	f	86	
22	g	76	
23	q	504	
23	r	504	
23	s	504	
23	t	504	
24	z	451	
25	3	476	
26	5	116	
27	A	2335	
28	I	855	
29	IN	154	

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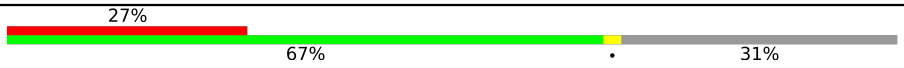
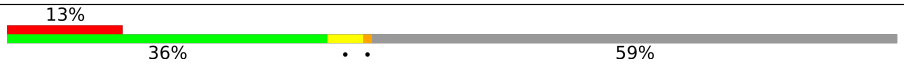
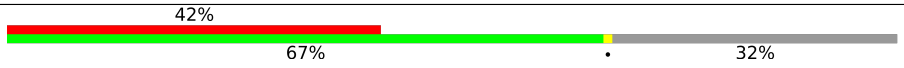
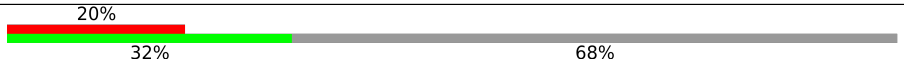
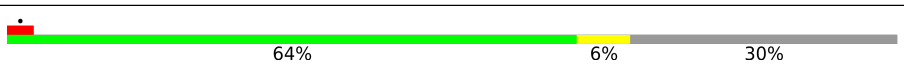
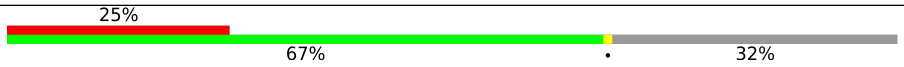
Mol	Chain	Length	Quality of chain
30	L	802	
31	L2	894	
32	M	243	
33	P	229	
34	PX	917	
35	T	514	
36	TF	837	
37	b	240	

2 Entry composition

There are 40 unique types of molecules in this entry. The entry contains 81753 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 RNA chain called U2 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	2	39	823	368	137	279	39	0	0

- Molecule 2 is a RNA chain called U6 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	6	97	2075	928	381	669	97	0	0

- Molecule 3 is a protein called 116 kDa U5 small nuclear ribonucleoprotein component.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	908	7184	4598	1194	1357	35	0	0

- Molecule 4 is a protein called Pre-mRNA-splicing factor ISY1 homolog.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	D	51	253	151	51	51	0	0

- Molecule 5 is a protein called ATP-dependent RNA helicase DHX15.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	DX	650	3220	1920	650	650	0	0

- Molecule 6 is a protein called U5 small nuclear ribonucleoprotein 40 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	E	299	2341	1470	411	447	13	0	0

- Molecule 7 is a protein called Crooked neck-like protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	J	561	Total	C	N	O	0	0
			2793	1671	561	561		

- Molecule 8 is a protein called Pre-mRNA-splicing factor SPF27.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	K	189	Total	C	N	O	0	0
			941	563	189	189		

- Molecule 9 is a protein called CWF19-like protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	L1	275	Total	C	N	O	0	0
			1353	803	275	275		

- Molecule 10 is a protein called Protein BUD31 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	N	143	Total	C	N	O	S	0	0
			1184	746	217	209	12		

- Molecule 11 is a protein called Pre-mRNA-splicing factor RBM22.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	O	288	Total	C	N	O	S	0	0
			2328	1463	412	433	20		

- Molecule 12 is a protein called Intron-binding protein aquarius.

Mol	Chain	Residues	Atoms				AltConf	Trace
12	Q	1384	Total	C	N	O	0	0
			6859	4091	1384	1384		

- Molecule 13 is a protein called SNW domain-containing protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
13	R	317	Total	C	N	O	0	0
			1571	937	317	317		

- Molecule 14 is a protein called Peptidyl-prolyl cis-trans isomerase-like 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	S	159	Total 1236	C 787	N 215	O 227	S 7	0	0

- Molecule 15 is a protein called Pre-mRNA-processing factor 17.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	W	158	Total 1276	C 803	N 217	O 252	S 4	0	0

- Molecule 16 is a protein called Coiled-coil domain-containing protein 12.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	Z	92	Total 459	C 275	N 92	O 92	0	0

- Molecule 17 is a protein called Small nuclear ribonucleoprotein Sm D3.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	a	83	Total 651	C 408	N 114	O 122	S 7	0	0

- Molecule 18 is a protein called Small nuclear ribonucleoprotein Sm D1.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	c	81	Total 641	C 409	N 112	O 116	S 4	0	0

- Molecule 19 is a protein called Small nuclear ribonucleoprotein Sm D2.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	d	96	Total 775	C 485	N 146	O 139	S 5	0	0

- Molecule 20 is a protein called Small nuclear ribonucleoprotein E.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	e	79	Total 653	C 412	N 116	O 120	S 5	0	0

- Molecule 21 is a protein called Small nuclear ribonucleoprotein F.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	f	72	Total	C	N	O	S	0	0
			564	364	93	102	5		

- Molecule 22 is a protein called Small nuclear ribonucleoprotein G.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	g	73	Total	C	N	O	S	0	0
			568	358	102	102	6		

- Molecule 23 is a protein called Pre-mRNA-processing factor 19.

Mol	Chain	Residues	Atoms				AltConf	Trace
23	s	132	Total	C	N	O	0	0
			659	395	132	132		
23	q	103	Total	C	N	O	0	0
			514	308	103	103		
23	r	119	Total	C	N	O	0	0
			594	356	119	119		
23	t	103	Total	C	N	O	0	0
			514	308	103	103		

- Molecule 24 is a protein called Splicing regulator SDE2.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	z	25	Total	C	N	O	S	0	0
			198	119	35	41	3		

- Molecule 25 is a protein called Splicing factor ESS-2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	3	60	Total	C	N	O	S	0	0
			499	311	85	102	1		

- Molecule 26 is a RNA chain called U5 snRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	5	92	Total	C	N	O	P	0	0
			1936	867	322	655	92		

- Molecule 27 is a protein called Pre-mRNA-processing-splicing factor 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	A	1981	Total	C	N	O	S	0	0
			16477	10621	2883	2902	71		

- Molecule 28 is a protein called Pre-mRNA-splicing factor SYF1.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	I	753	Total	C	N	O	0	0
			3739	2233	753	753		

- Molecule 29 is a RNA chain called INTRON.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	IN	41	Total	C	O	P	0	0
			492	205	246	41		

- Molecule 30 is a protein called Cell division cycle 5-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	L	555	Total	C	N	O	S	0	0
			3623	2216	695	705	7		

- Molecule 31 is a protein called CWF19-like protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	L2	369	Total	C	N	O	S	0	0
			3049	1930	527	569	23		

- Molecule 32 is a protein called Pre-mRNA-splicing factor SYF2.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	M	166	Total	C	N	O	0	0
			827	495	166	166		

- Molecule 33 is a protein called Spliceosome-associated protein CWC15 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	P	112	Total	C	N	O	S	0	0
			942	575	184	181	2		

- Molecule 34 is a protein called PAX3- and PAX7-binding protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	PX	295	Total	C	N	O	0	0
			1465	875	295	295		

- Molecule 35 is a protein called Pleiotropic regulator 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	T	360	Total	C	N	O	S	0	0
			2854	1800	521	523	10		

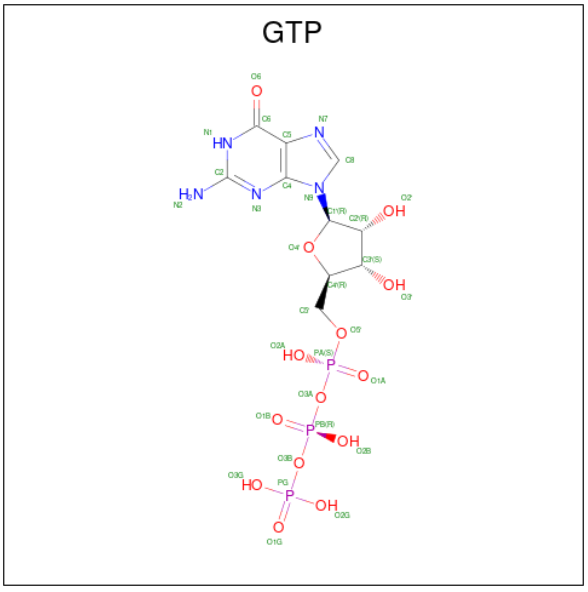
- Molecule 36 is a protein called Tuftelin-interacting protein 11.

Mol	Chain	Residues	Atoms				AltConf	Trace
36	TF	572	Total	C	N	O	0	0
			2835	1690	572	573		

- Molecule 37 is a protein called Small nuclear ribonucleoprotein-associated proteins B and B'.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	b	94	Total	C	N	O	S	0	0
			717	449	135	126	7		

- Molecule 38 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).

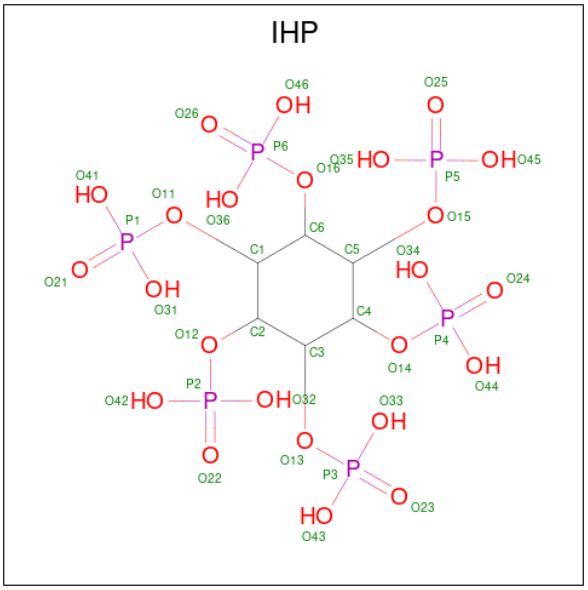


Mol	Chain	Residues	Atoms					AltConf
38	C	1	Total	C	N	O	P	0
			32	10	5	14	3	

- Molecule 39 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
39	N	3	Total	Zn	0
			3	3	

- Molecule 40 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: $C_6H_{18}O_{24}P_6$).



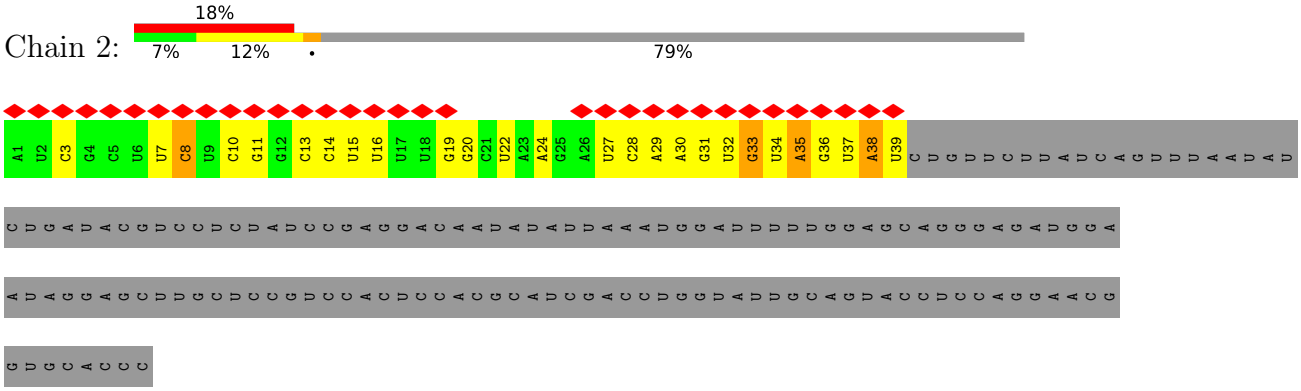
Mol	Chain	Residues	Atoms				AltConf
40	A	1	Total	C	O	P	0
			36	6	24	6	

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.

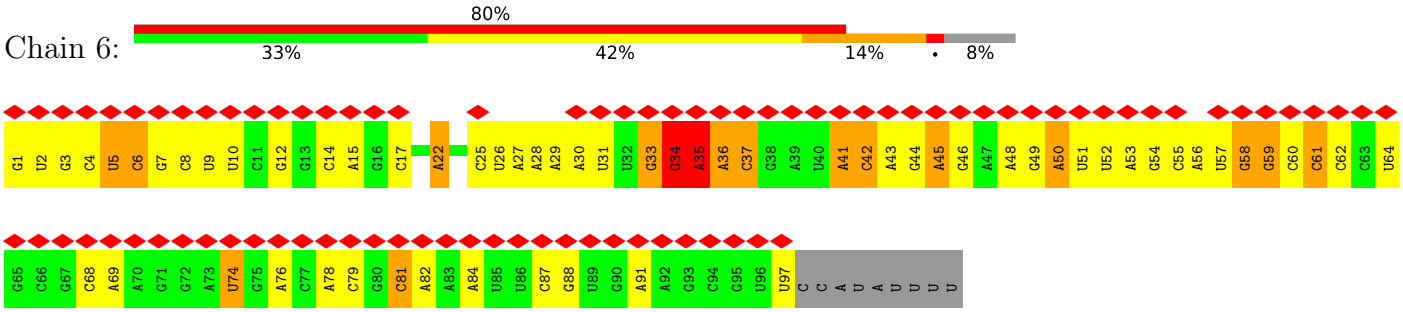
• Molecule 1: U2 snRNA

Chain 2:



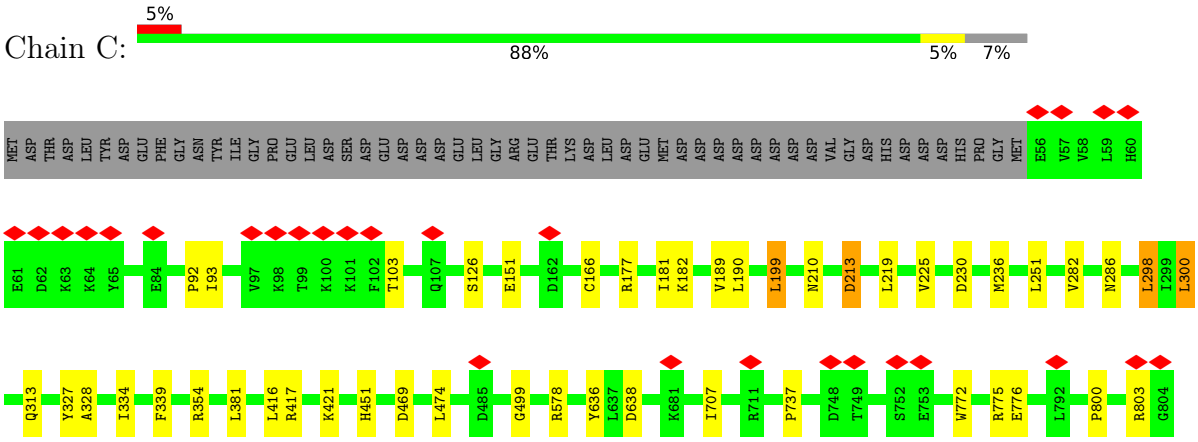
• Molecule 2: U6 snRNA

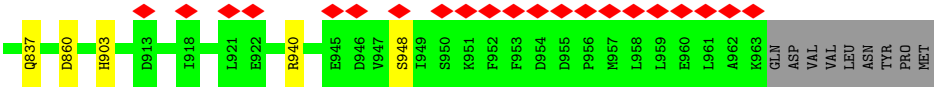
Chain 6:



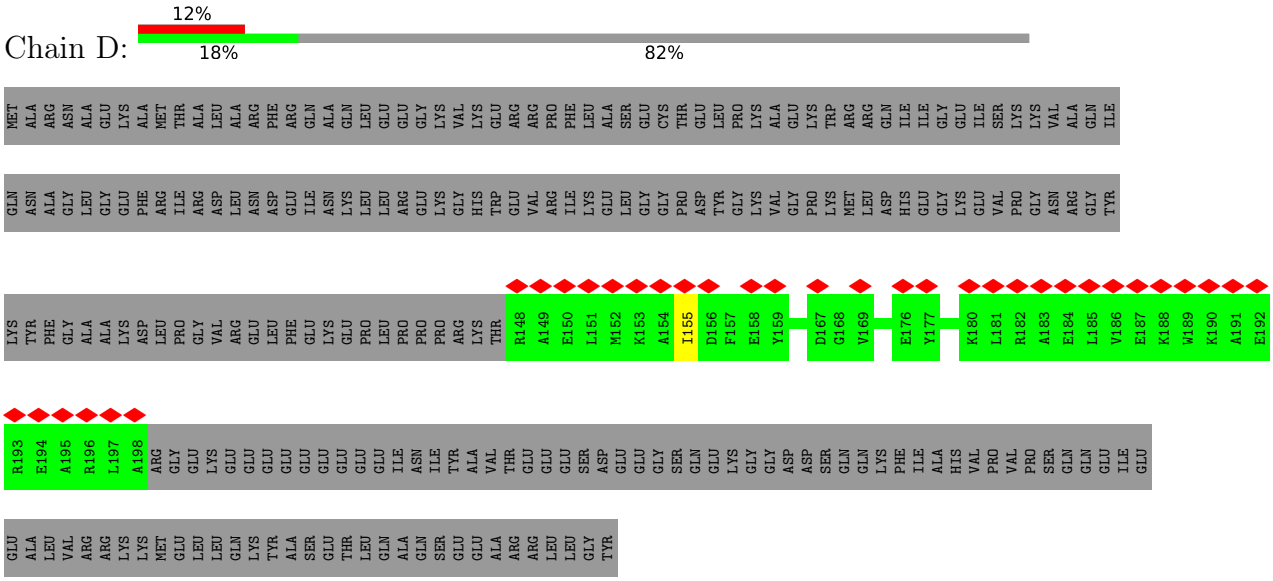
• Molecule 3: 116 kDa U5 small nuclear ribonucleoprotein component

Chain C:

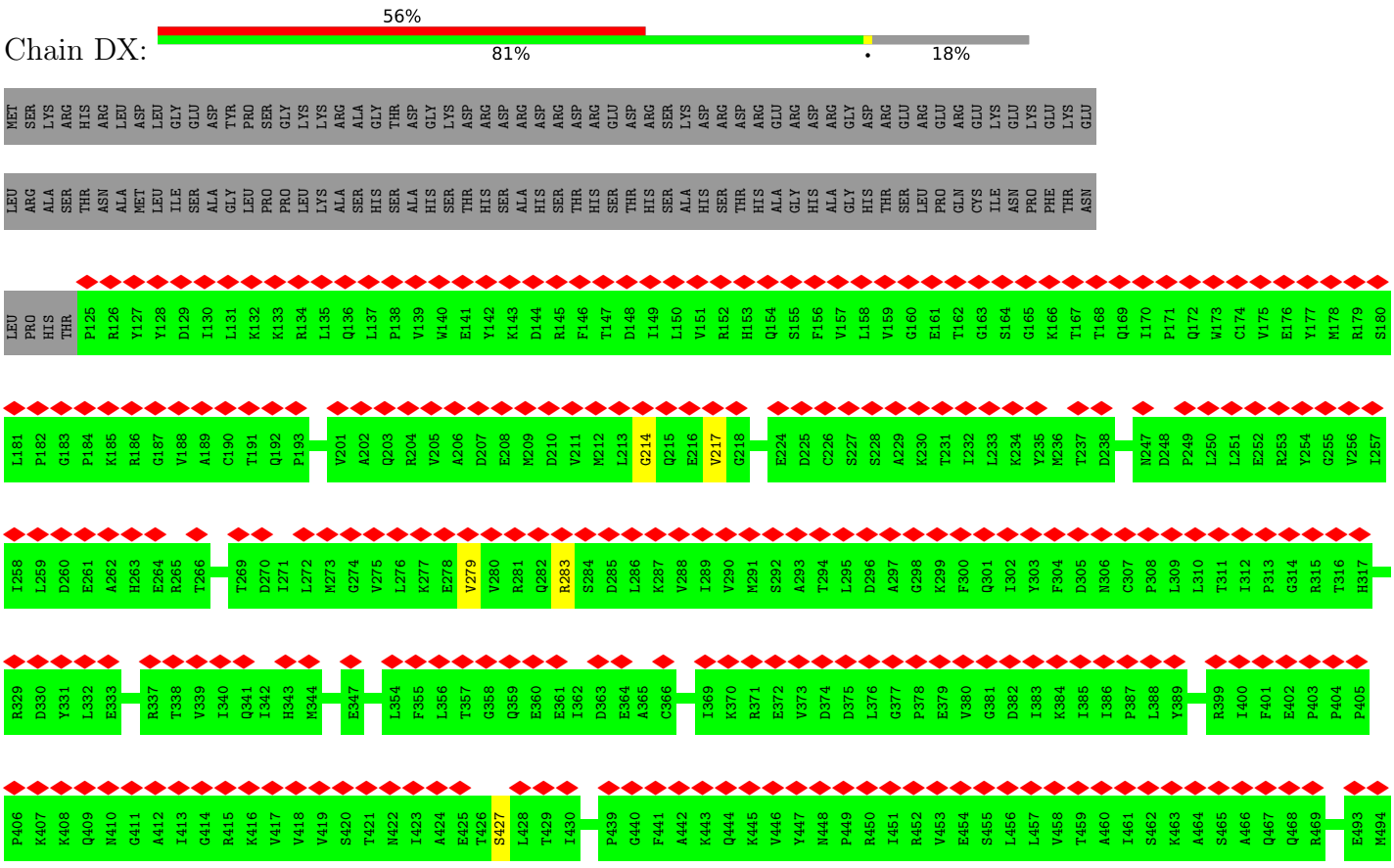


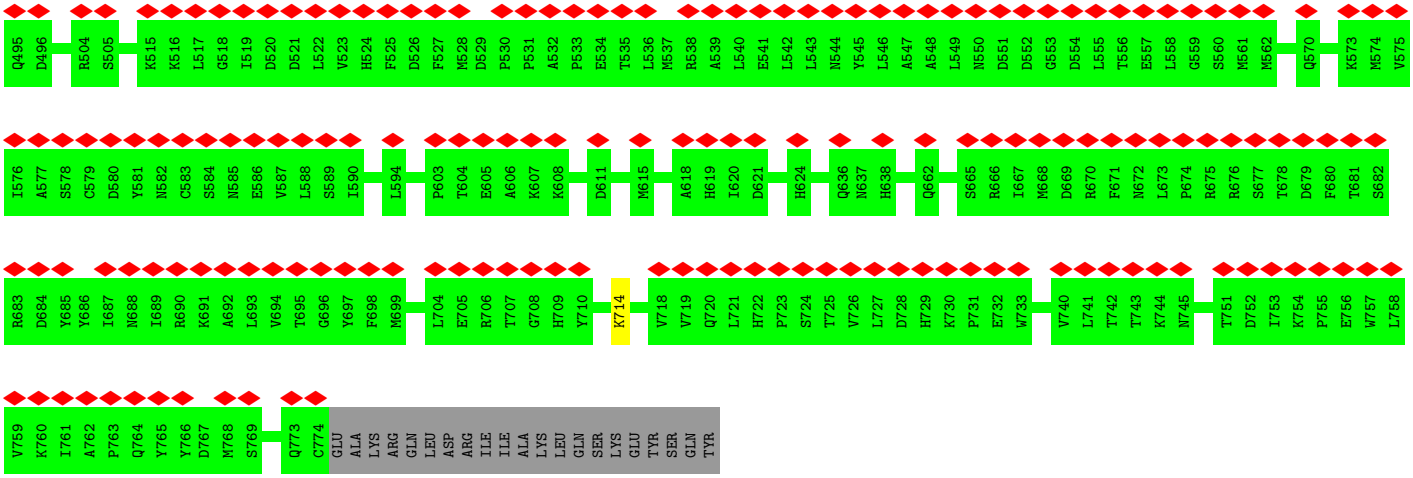


• Molecule 4: Pre-mRNA-splicing factor ISY1 homolog



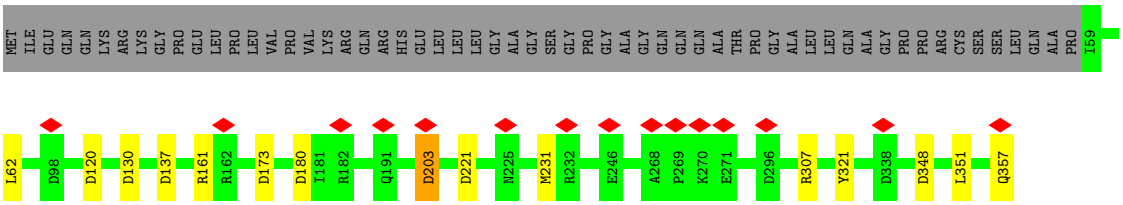
• Molecule 5: ATP-dependent RNA helicase DHX15





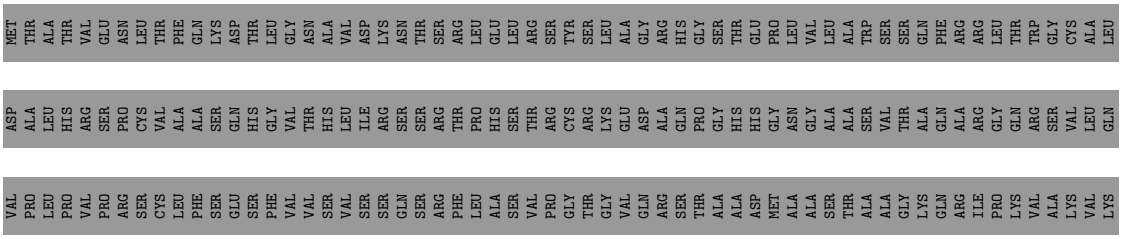
• Molecule 6: U5 small nuclear ribonucleoprotein 40 kDa protein

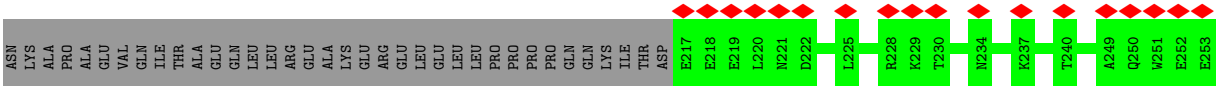
Chain E:

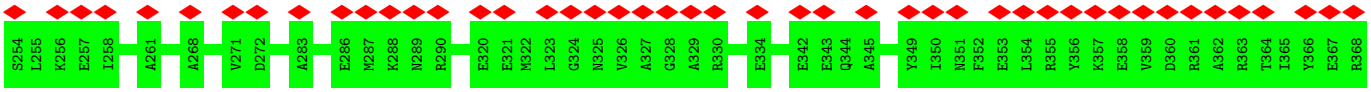


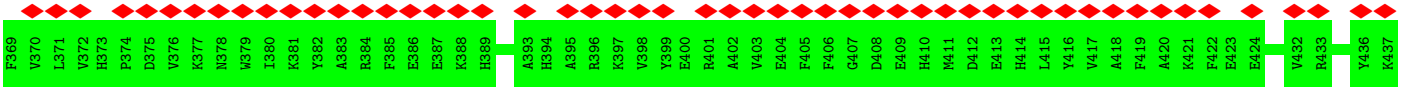
• Molecule 7: Crooked neck-like protein 1

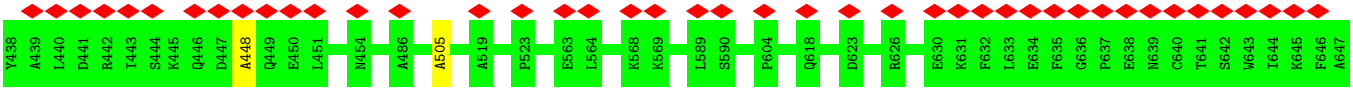
Chain J:

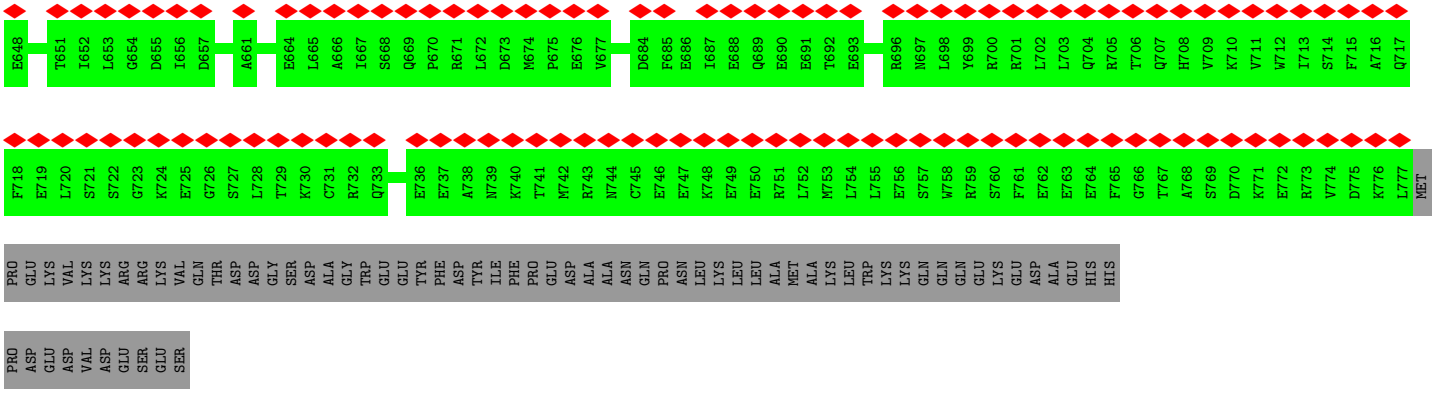




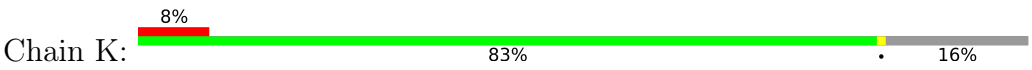


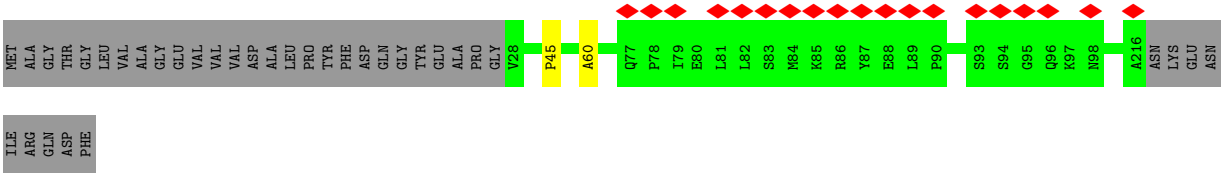




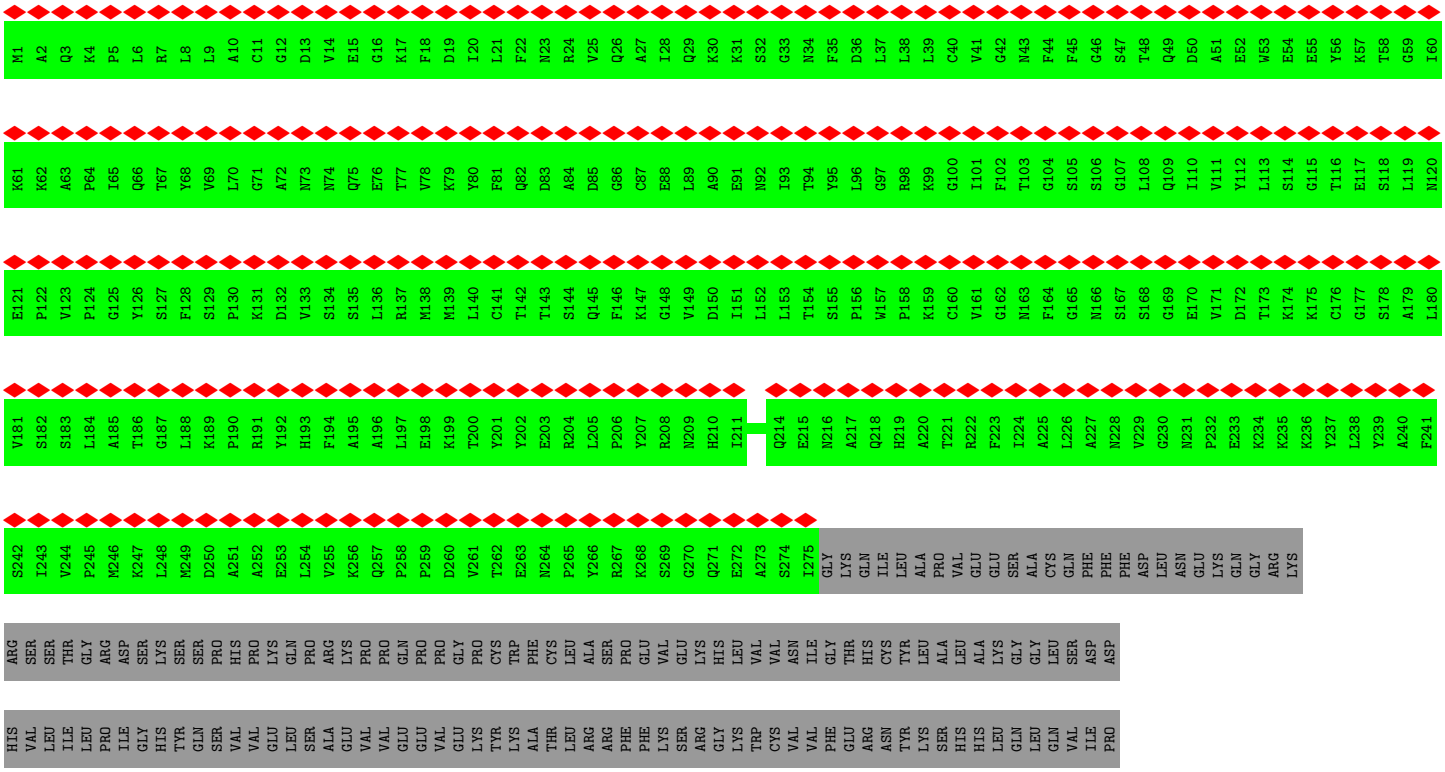


• Molecule 8: Pre-mRNA-splicing factor SPF27



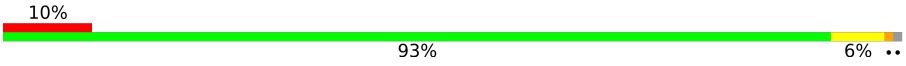


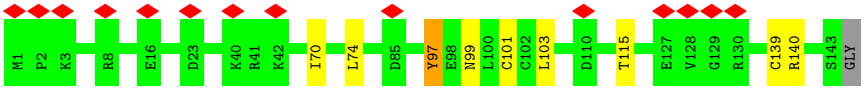
• Molecule 9: CWF19-like protein 1



• Molecule 10: Protein BUD31 homolog

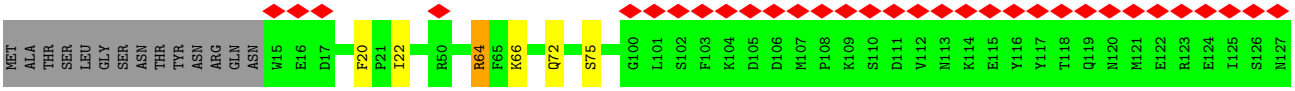
Chain N:

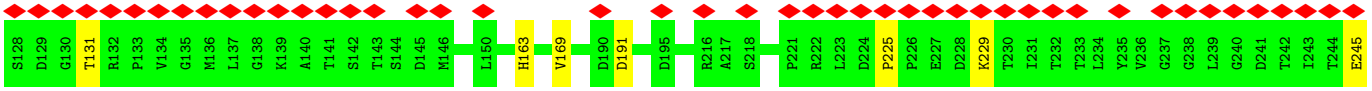


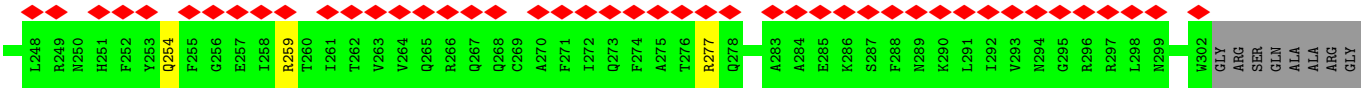


• Molecule 11: Pre-mRNA-splicing factor RBM22

Chain O:

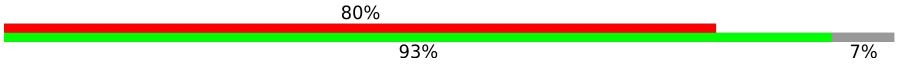


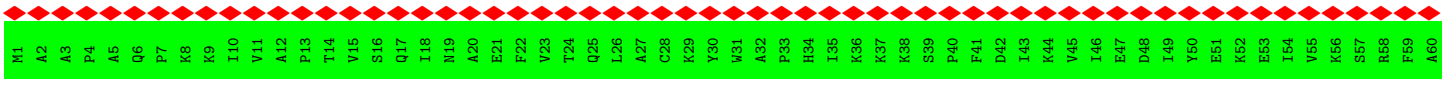


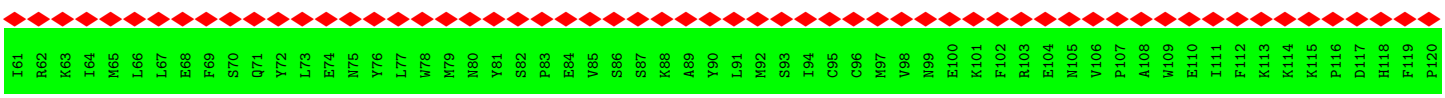


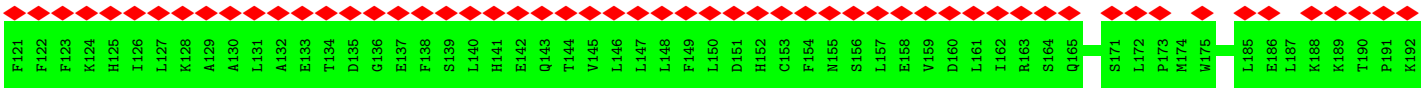
• Molecule 12: Intron-binding protein aquarius

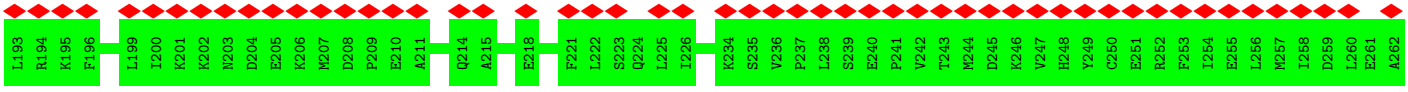
Chain Q:

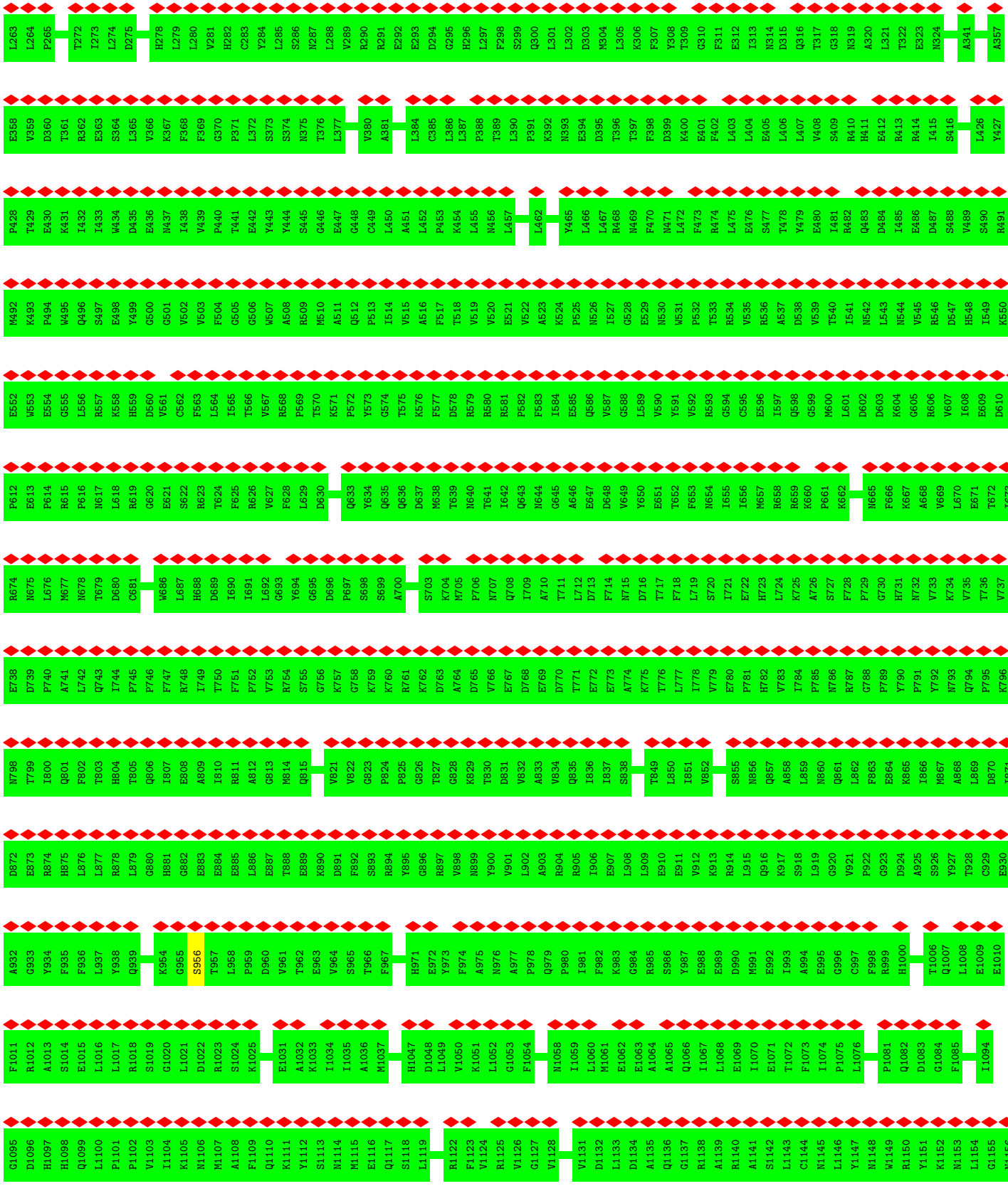








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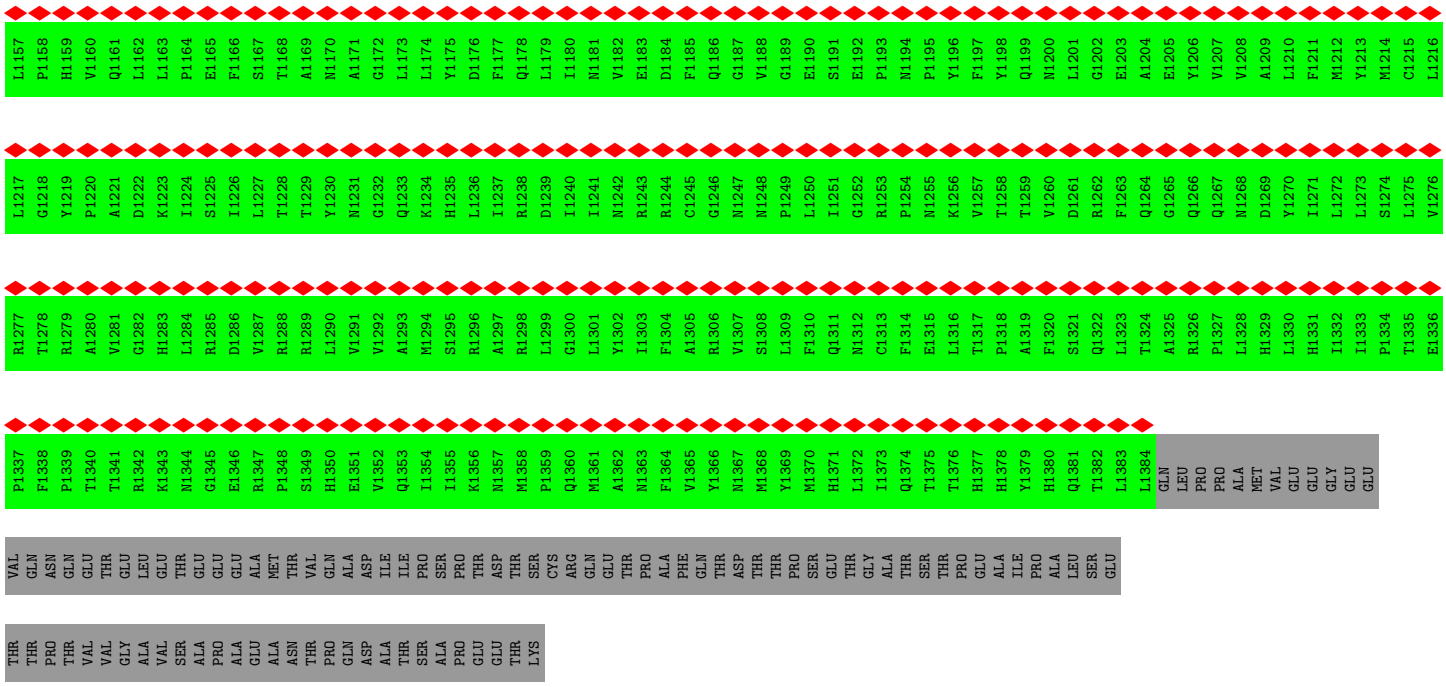
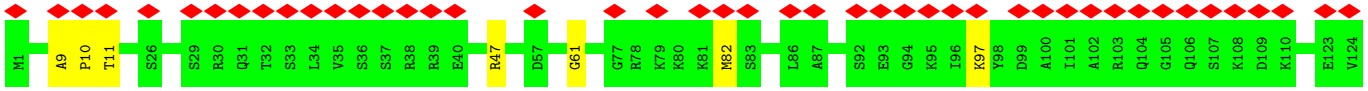
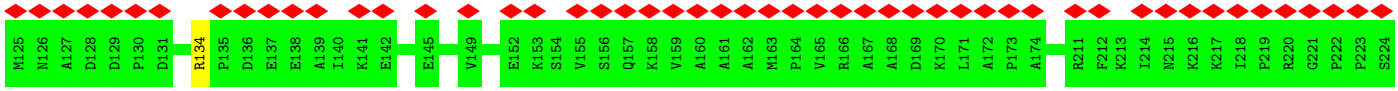
E358 V359 D360 T361 R362 E363 S364 L365 V366 K367 F368 F369 G370 P371 L372 S373 S374 N375 T376 L377 V380 A381 L384 C385 L386 L387 P388 T389 L390 P391 K392 N393 E394 D395 T396 T397 F398 D399 K400 E401 F402 L403 L404 E405 L406 L407 V408 S409 R410 H411 E412 R413 R414 I415 S416 L426 Y427
P428 T429 E430 K431 I432 I433 W434 D435 E436 N437 I438 V439 P440 T441 E442 Y443 Y444 S445 G446 E447 G448 C449 L450 A451 L452 P453 K454 L455 N456 L457 L462 Y465 L466 L467 R468 N469 F470 N471 L472 F473 R474 L475 E476 S477 T478 Y479 E480 I481 R482 Q483 D484 I485 E486 D487 S488 V489 S490 R491
M492 K493 P494 W495 Q496 S497 E498 Y499 G500 G501 V502 V503 F504 G505 G506 W507 A508 R509 M510 A511 Q512 P513 I514 V515 A516 F517 T518 V519 V520 E521 V522 A523 K524 P525 N526 I527 G528 E529 N530 W531 P532 T533 R534 V535 R536 A537 D538 V539 T540 I541 N542 L543 N544 V545 R546 D547 H548 I549 K550 D551
E552 W553 E554 G555 L556 R557 K558 H559 D560 V561 C562 F563 L564 I565 T566 V567 R568 P569 T570 K571 P572 Y573 G574 T575 K576 F577 D578 R579 R580 R581 P582 F583 I584 E585 Q586 V587 G588 L589 V590 Y591 V592 R593 G594 C595 E596 I597 Q598 G599 M600 L601 D602 D603 K604 G605 R606 V607 I608 E609 D610 G611
P612 E613 P614 R615 P616 N617 L618 R619 G620 E621 S622 R623 T624 F625 R626 V627 F628 L629 D630 Q633 Y634 Q635 Q636 D637 M638 T639 N640 T641 I642 Q643 N644 G645 A646 E647 D648 V649 Y650 E651 T652 F653 N654 I655 I656 M657 R658 R659 K660 P661 K662 N665 F666 K667 A668 V669 L670 E671 T672 I673
R674 N675 L676 M677 N678 T679 D680 C681 W686 L687 H688 D689 I690 I691 L692 G693 Y694 G695 D696 P697 S698 S699 A700 S703 K704 M705 P706 N707 Q708 I709 A710 T711 L712 D713 F714 N715 D716 T717 F718 L719 S720 I721 E722 H723 L724 K725 A726 S727 F728 P729 G730 H731 N732 V733 K734 V735 T736 V737
E738 D739 P740 A741 L742 Q743 I744 P745 P746 F747 R748 I749 T750 F751 P752 V753 R754 S755 G756 K757 G758 K759 K760 R761 K762 D763 A764 D765 V766 E767 D768 E769 D770 T771 E772 E773 A774 K775 T776 L777 I778 V779 E780 P781 H782 V783 I784 P785 N786 R787 G788 P789 Y790 P791 Y792 N793 Q794 P795 K796 R797
N798 T799 I800 Q801 F802 T803 H804 T805 Q806 I807 E808 A809 I810 R811 A812 G813 M814 Q815 V821 V822 G823 P824 P825 G826 T827 G828 K829 T830 D831 V832 A833 V834 Q835 I836 I837 S838 T849 L850 I851 V852 S855 N856 Q857 A858 L859 N860 Q861 L862 F863 E864 K865 I866 M867 A868 L869 D870 I871
D872 E873 R874 H875 L876 L877 R878 L879 G880 H881 G882 E883 E884 E885 L886 E887 T888 E889 K890 D891 F892 S893 R894 Y895 G896 R897 V898 N899 Y900 V901 L902 A903 R904 R905 I906 E907 L908 L909 E910 E911 V912 K913 R914 L915 Q916 K917 S918 L919 G920 V921 P922 G923 D924 A925 S926 Y927 T928 C929 E930 T931
A932 G933 Y934 F935 F936 L937 Y938 Q939 K954 G955 S956 T957 L958 P959 D960 V961 T962 E963 V964 S965 T966 F967 H971 E972 Y973 F974 A975 N976 A977 P978 Q979 P980 I981 F982 K983 G984 R985 S986 Y987 E988 E989 D990 M991 E992 I993 A994 E995 G996 C997 F998 R999 H1000 T1006 Q1007 L1008 E1009 E1010
F1011 R1012 A1013 S1014 E1015 L1016 L1017 R1018 S1019 G1020 L1021 D1022 R1023 S1024 K1025 E1031 A1032 K1033 I1034 I1035 A1036 M1037 H1047 D1048 L1049 V1050 K1051 L1052 G1053 F1054 N1058 I1059 L1060 M1061 E1062 E1063 A1064 A1065 Q1066 I1067 L1068 E1069 I1070 E1071 T1072 F1073 I1074 P1075 L1076 P1081 Q1082 D1083 G1084 F1085 I1094
G1095 D1096 H1097 H1098 Q1099 L1100 P1101 P1102 V1103 I1104 K1105 N1106 M1107 A1108 F1109 Q1110 K1111 Y1112 S1113 N1114 M1115 E1116 Q1117 S1118 L1119 R1122 F1123 V1124 R1125 V1126 G1127 V1128 V1131 D1132 L1133 D1134 A1135 Q1136 G1137 R1138 A1139 R1140 A1141 S1142 L1143 C1144 N1145 L1146 Y1147 N1148 W1149 R1150 Y1151 K1152 N1153 L1154 G1155 N1156

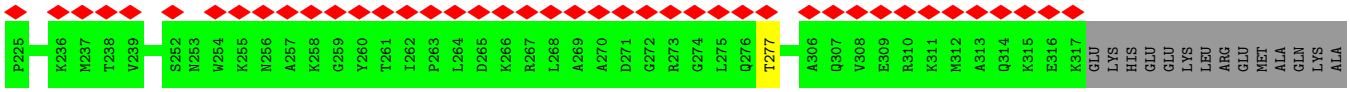


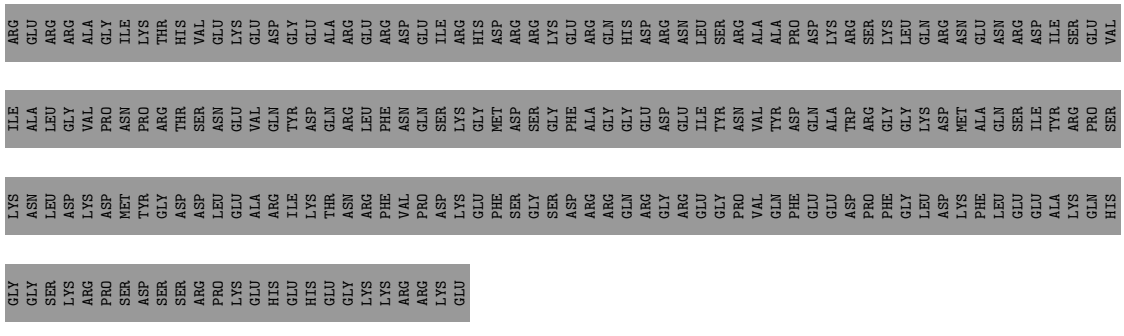
• Molecule 13: SNW domain-containing protein 1

Chain R:



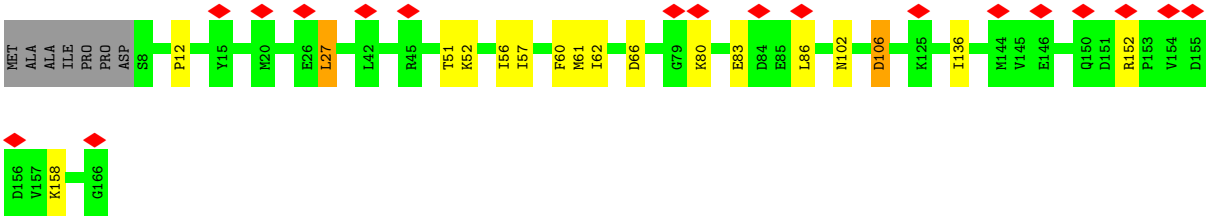






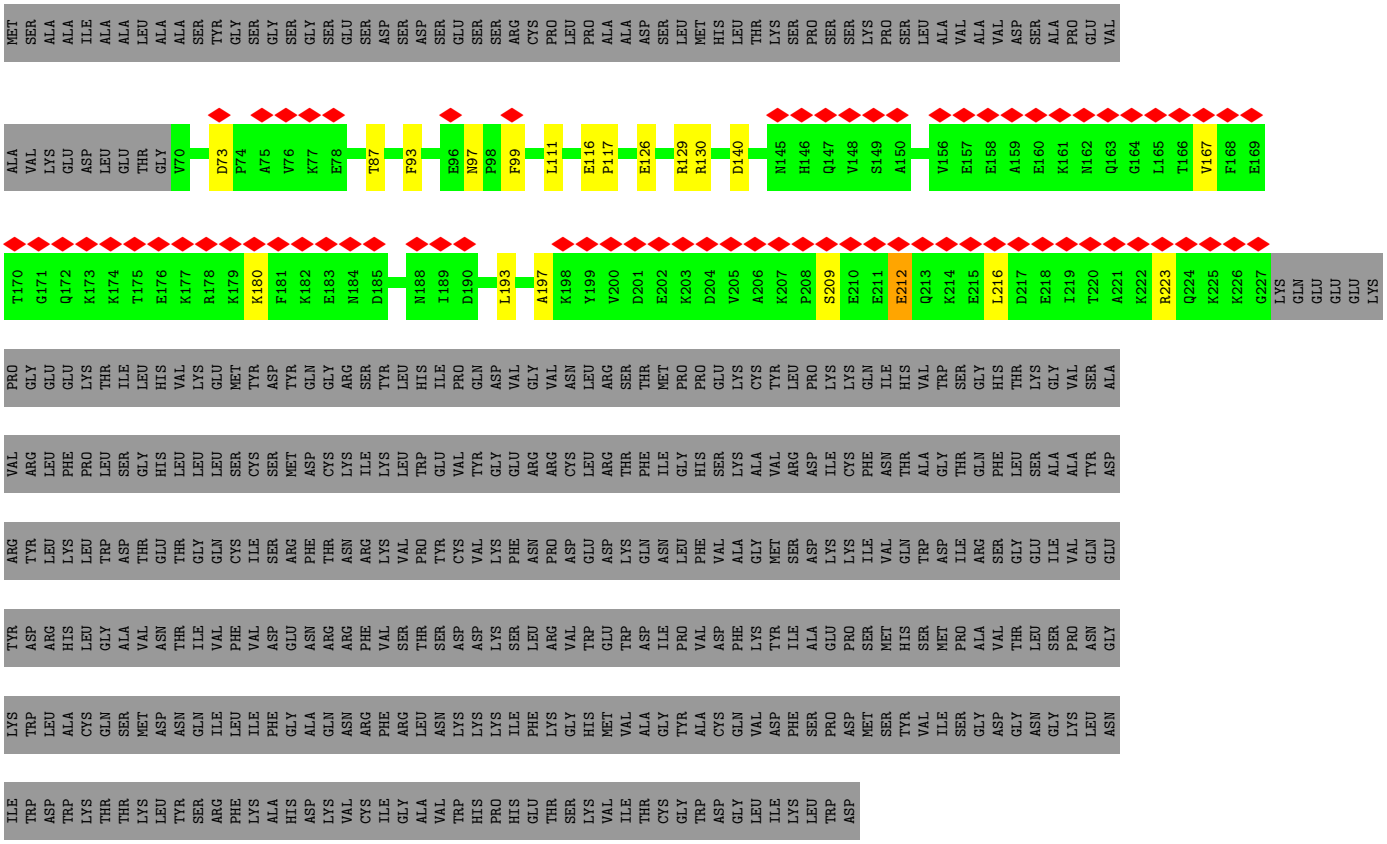
• Molecule 14: Peptidyl-prolyl cis-trans isomerase-like 1

Chain S:



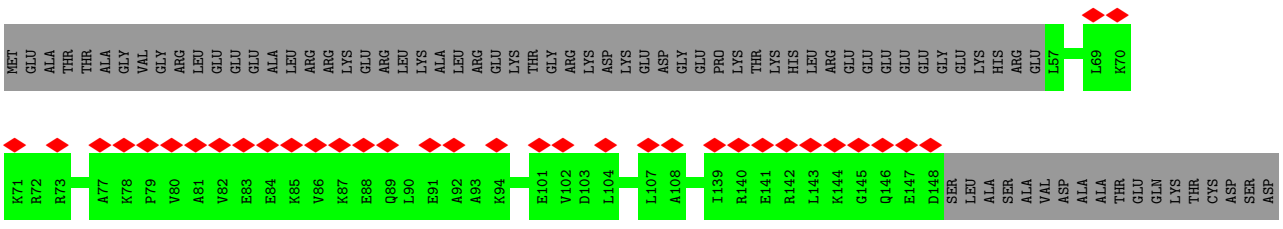
• Molecule 15: Pre-mRNA-processing factor 17

Chain W:



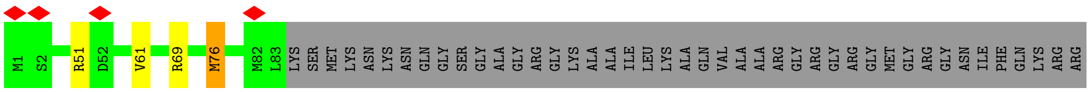
• Molecule 16: Coiled-coil domain-containing protein 12

Chain Z:



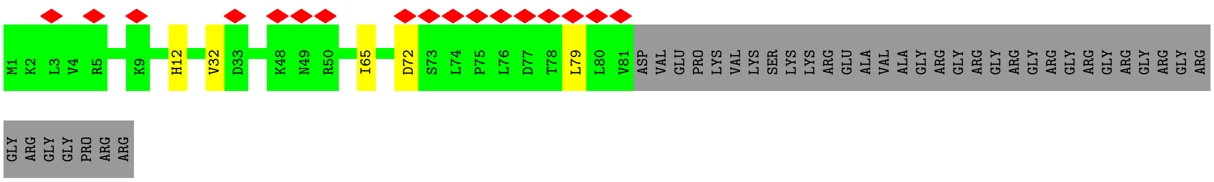
• Molecule 17: Small nuclear ribonucleoprotein Sm D3

Chain a:



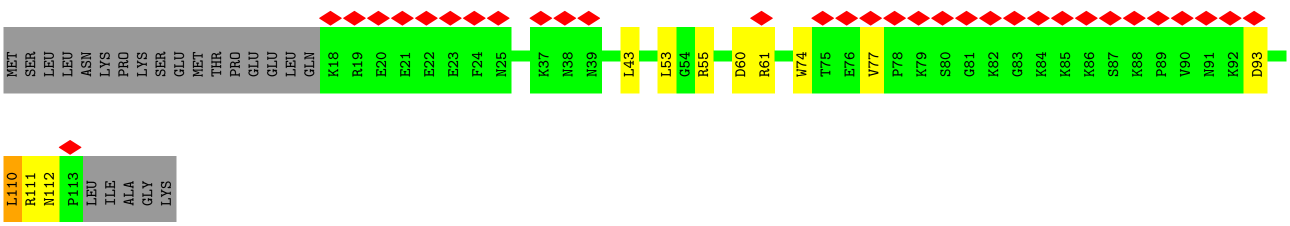
• Molecule 18: Small nuclear ribonucleoprotein Sm D1

Chain c:



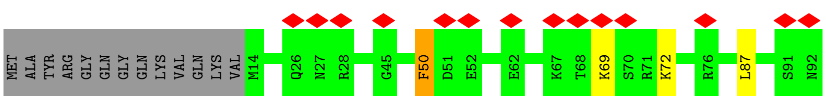
• Molecule 19: Small nuclear ribonucleoprotein Sm D2

Chain d:



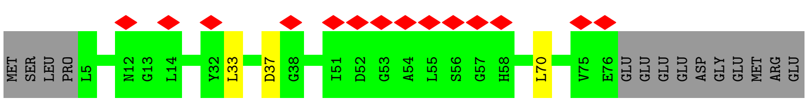
• Molecule 20: Small nuclear ribonucleoprotein E

Chain e:



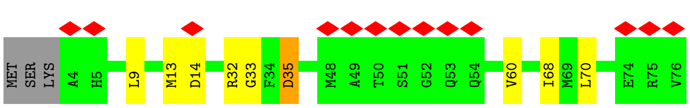
• Molecule 21: Small nuclear ribonucleoprotein F

Chain f:



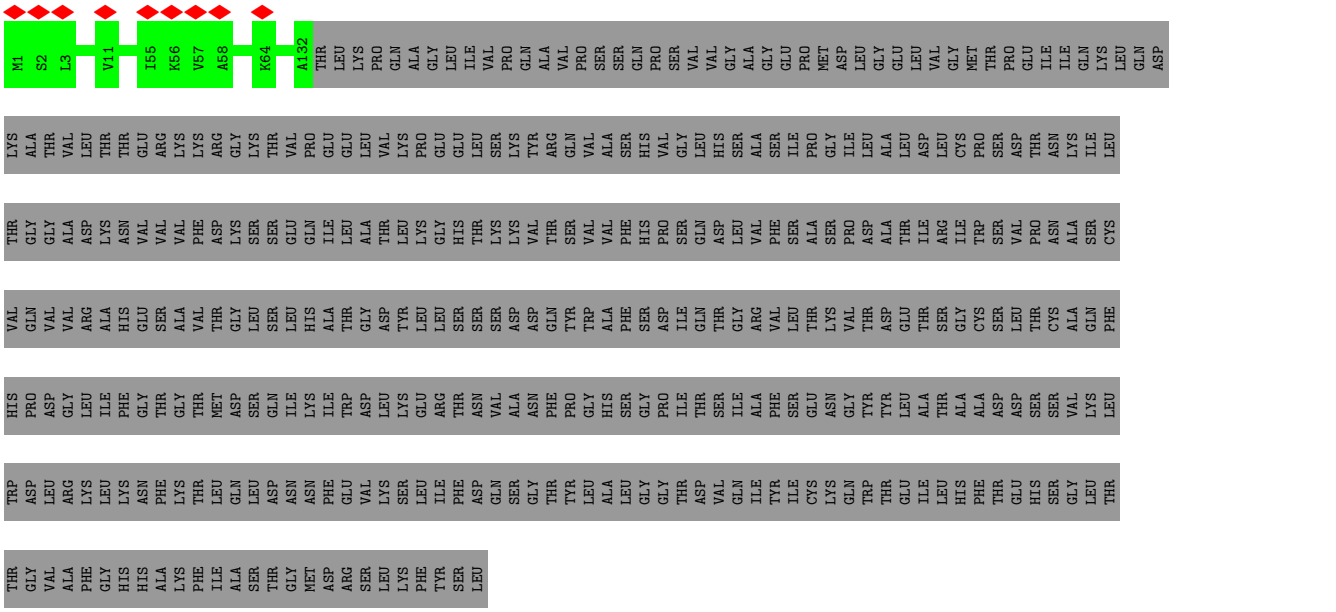
• Molecule 22: Small nuclear ribonucleoprotein G

Chain g:



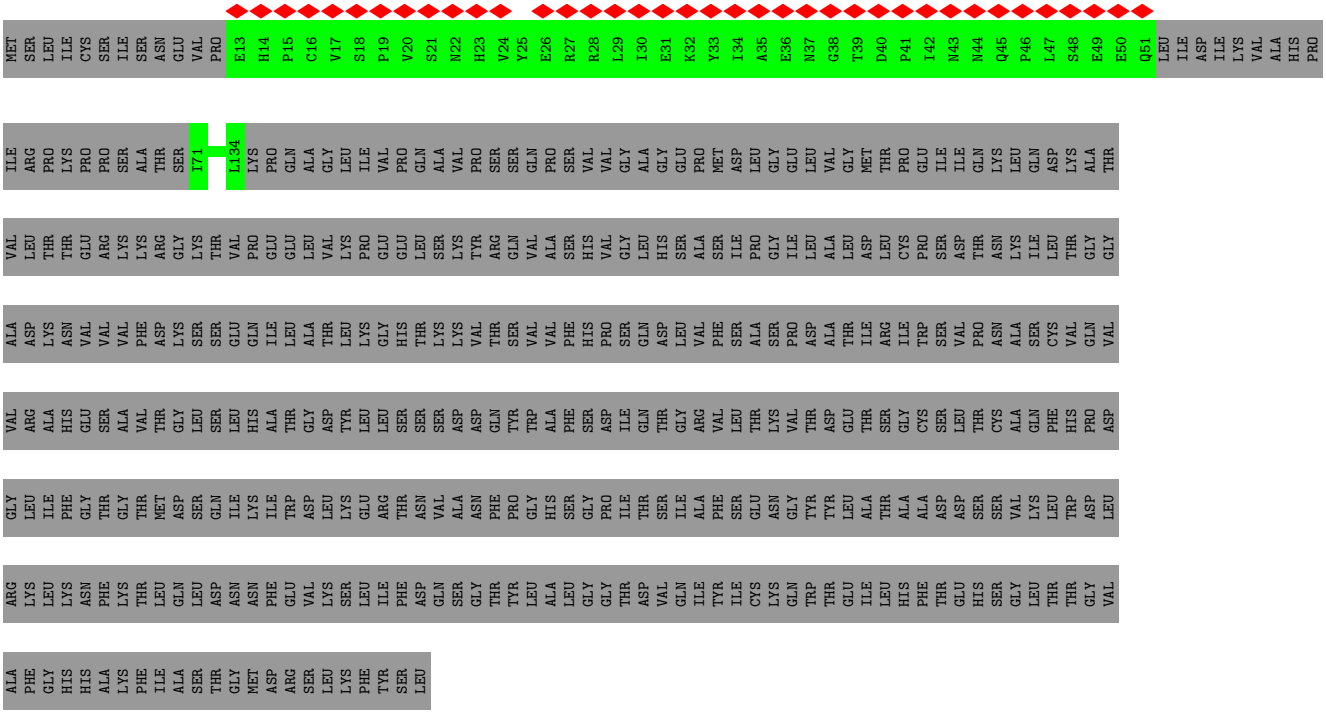
• Molecule 23: Pre-mRNA-processing factor 19

Chain s:



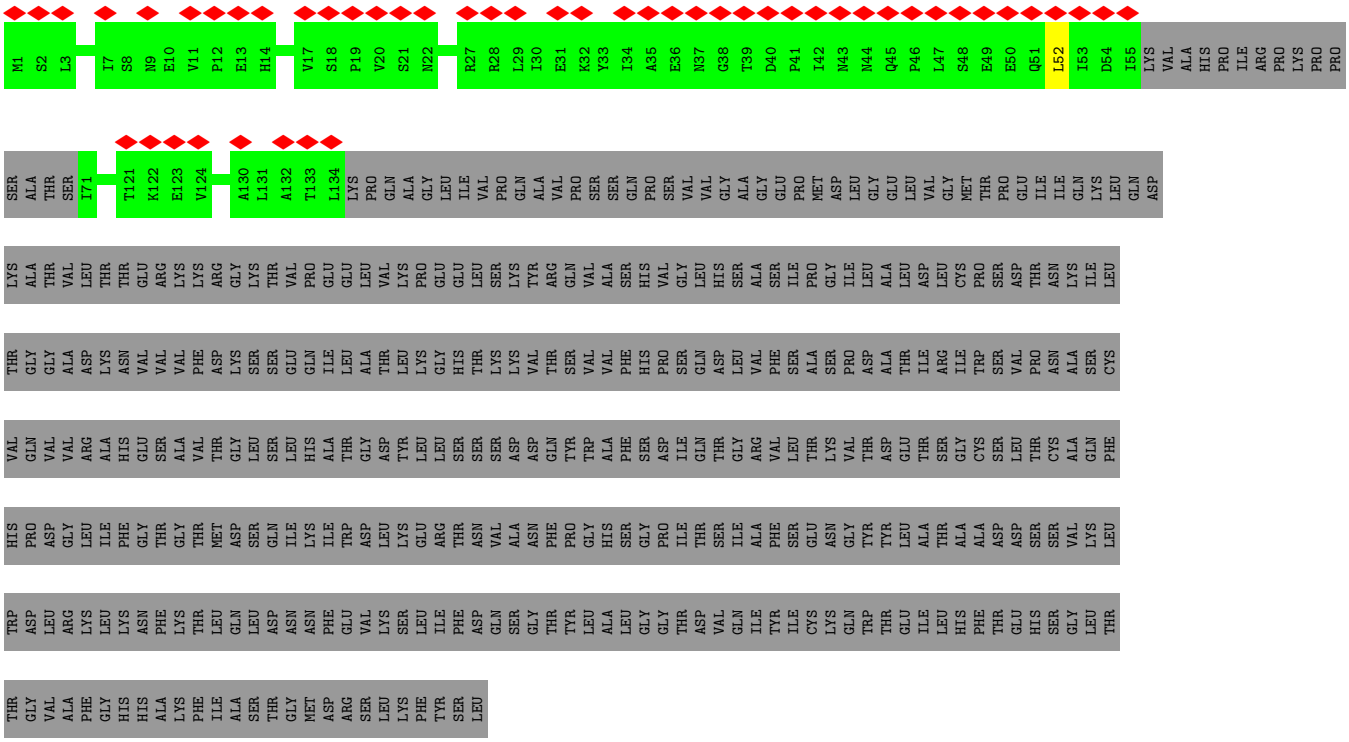
• Molecule 23: Pre-mRNA-processing factor 19

Chain q:



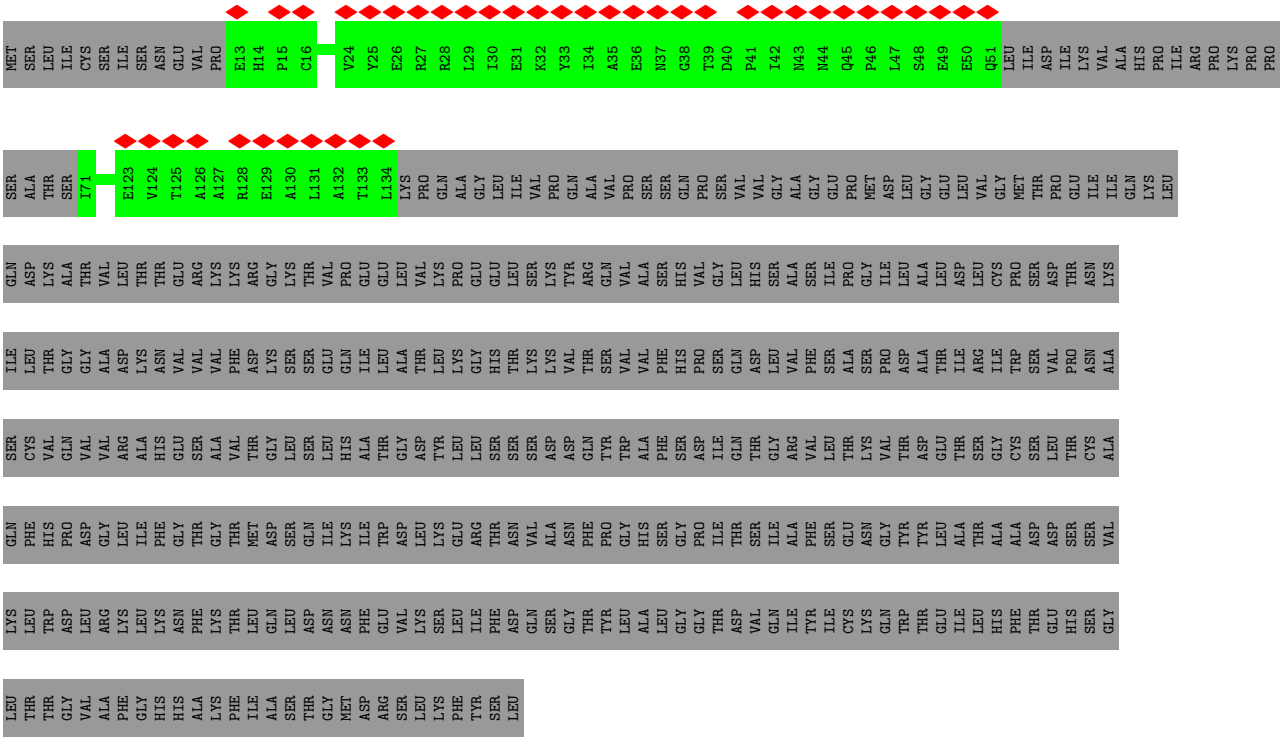
• Molecule 23: Pre-mRNA-processing factor 19

Chain r:



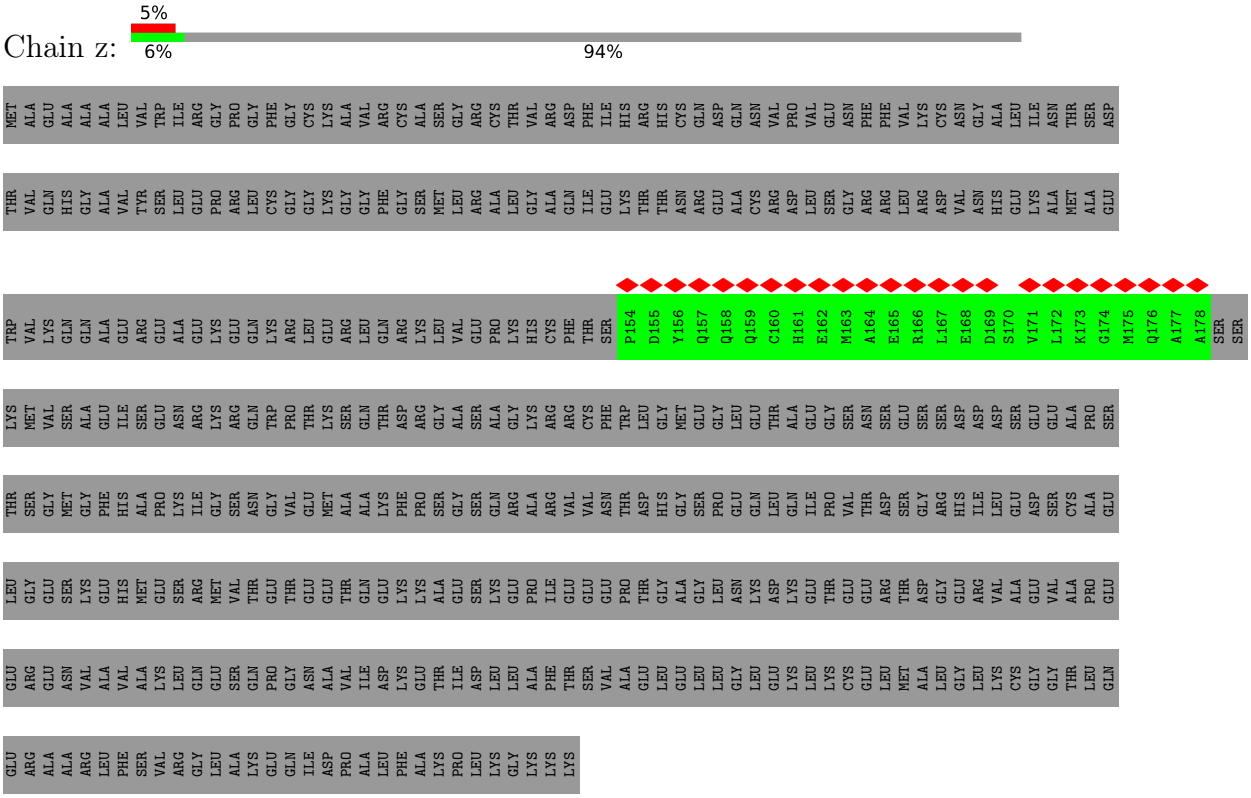
• Molecule 23: Pre-mRNA-processing factor 19

Chain t:



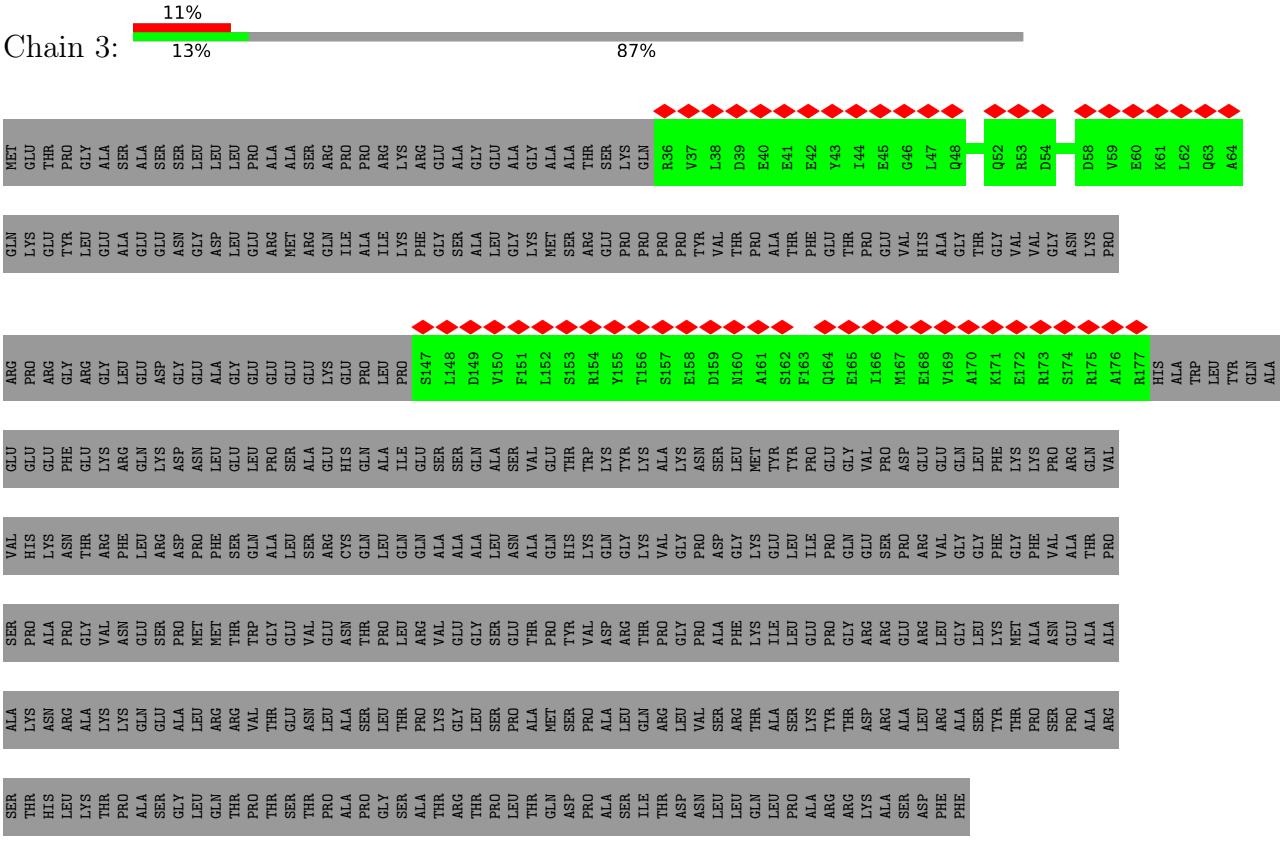
• Molecule 24: Splicing regulator SDE2

Chain z:



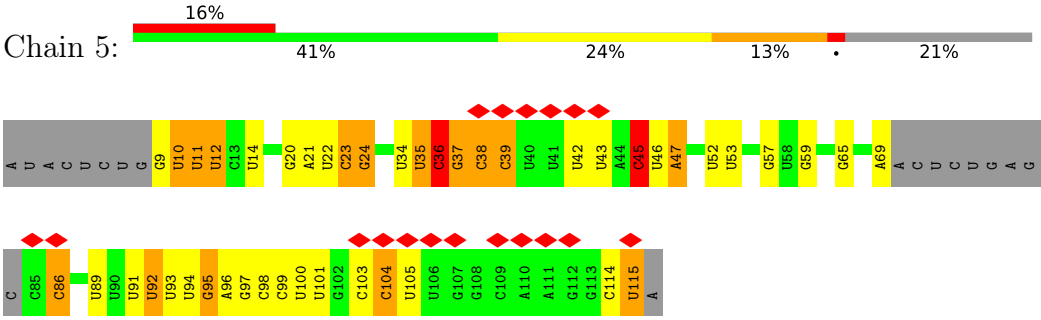
• Molecule 25: Splicing factor ESS-2 homolog

Chain 3:



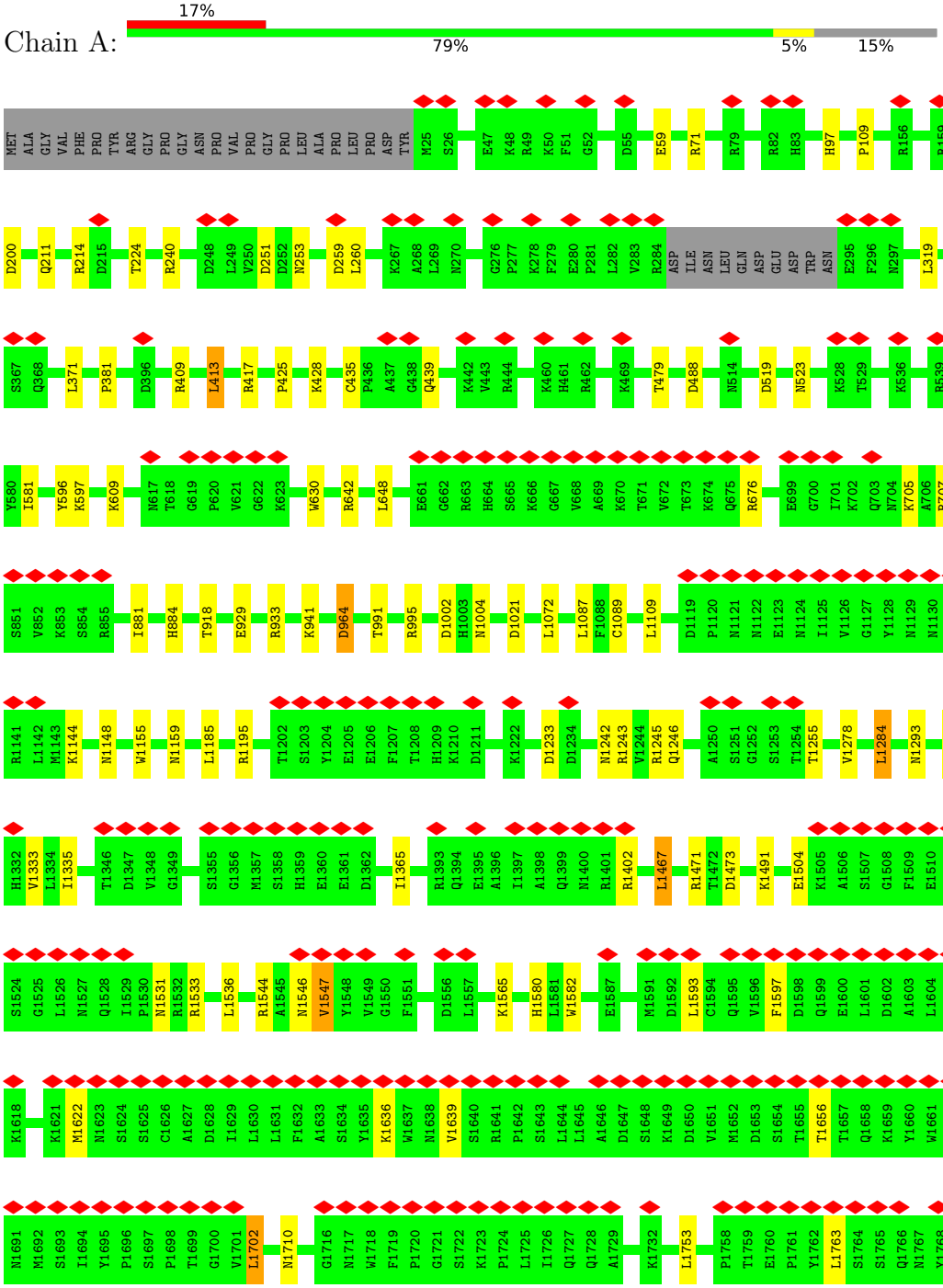
• Molecule 26: U5 snRNA

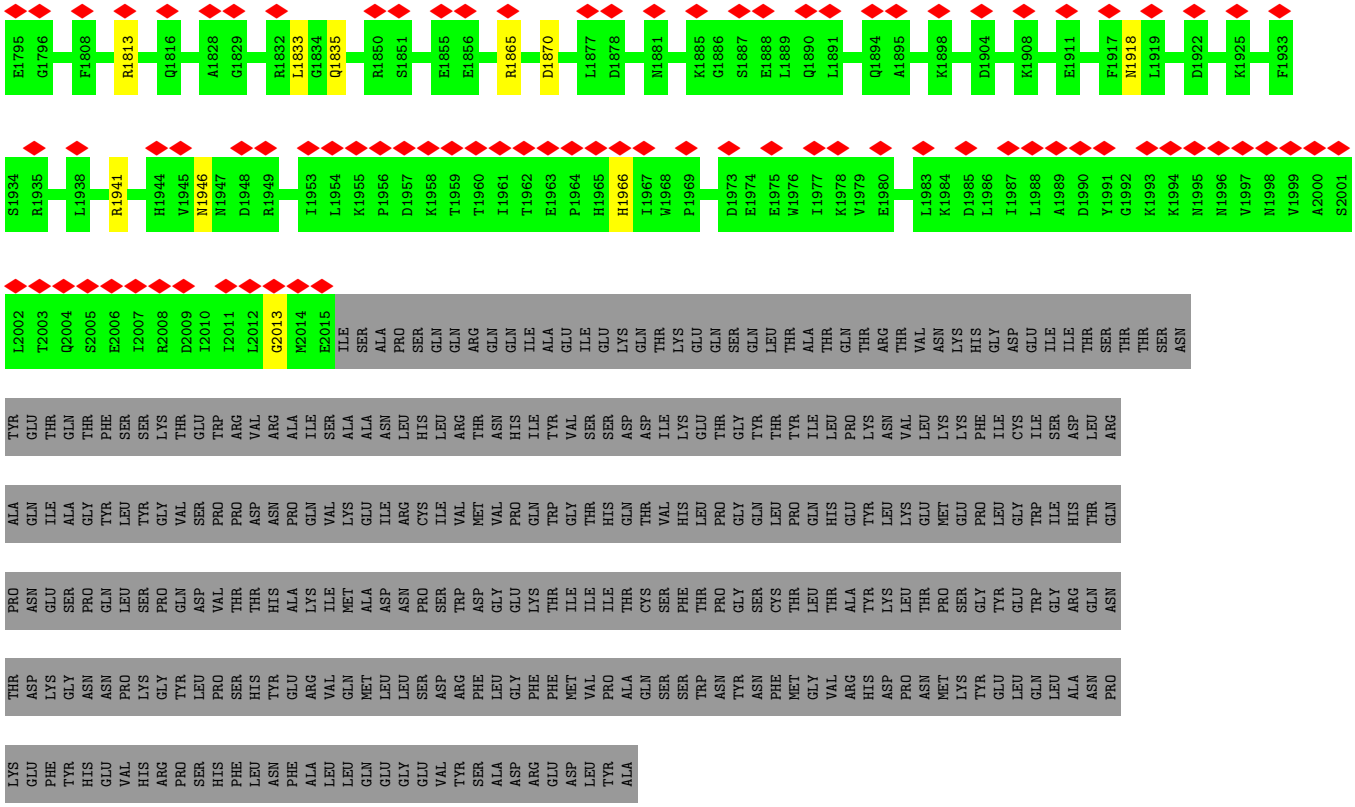
Chain 5:



• Molecule 27: Pre-mRNA-processing-splicing factor 8

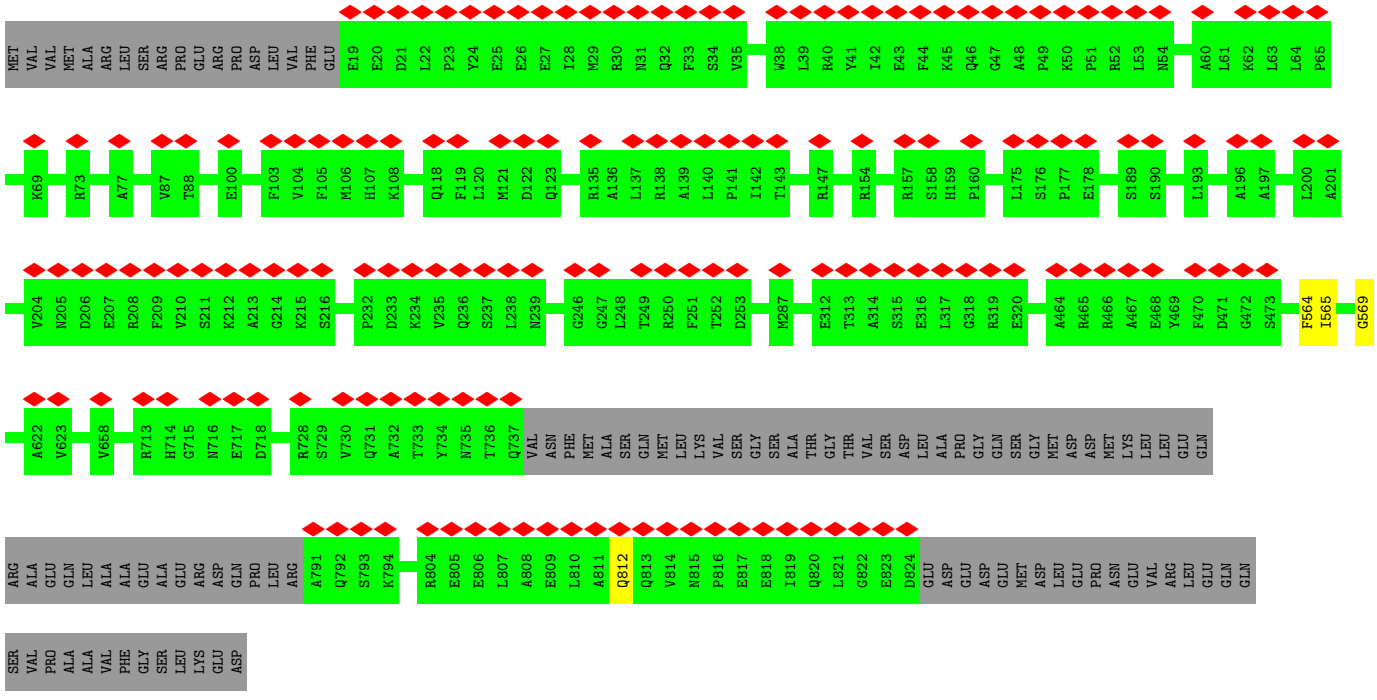
Chain A:





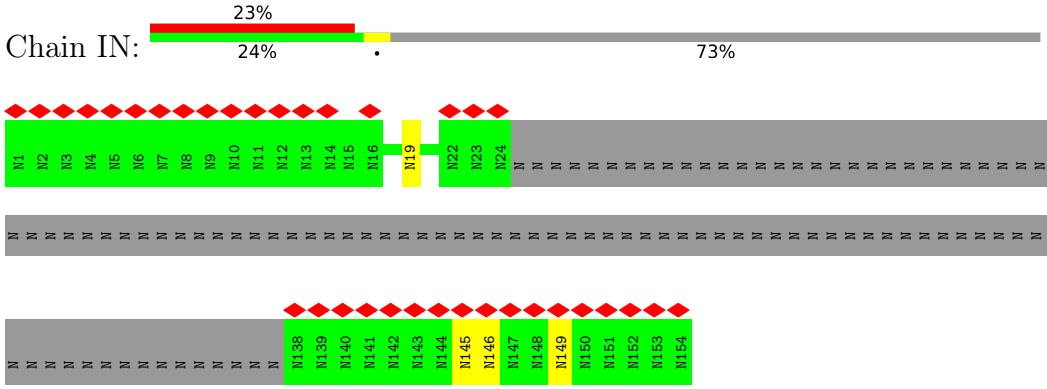
• Molecule 28: Pre-mRNA-splicing factor SYF1

Chain I:



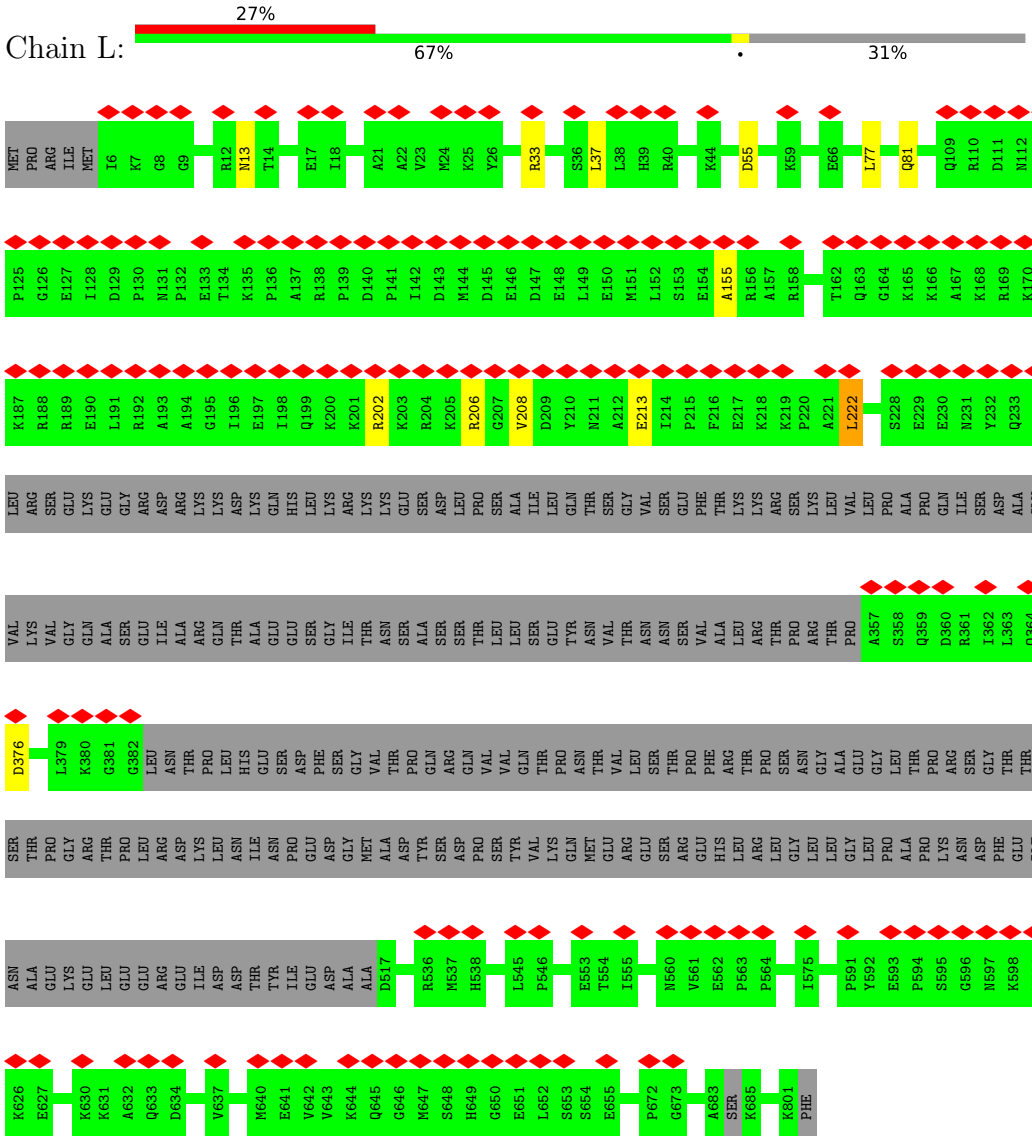
• Molecule 29: INTRON

Chain IN:



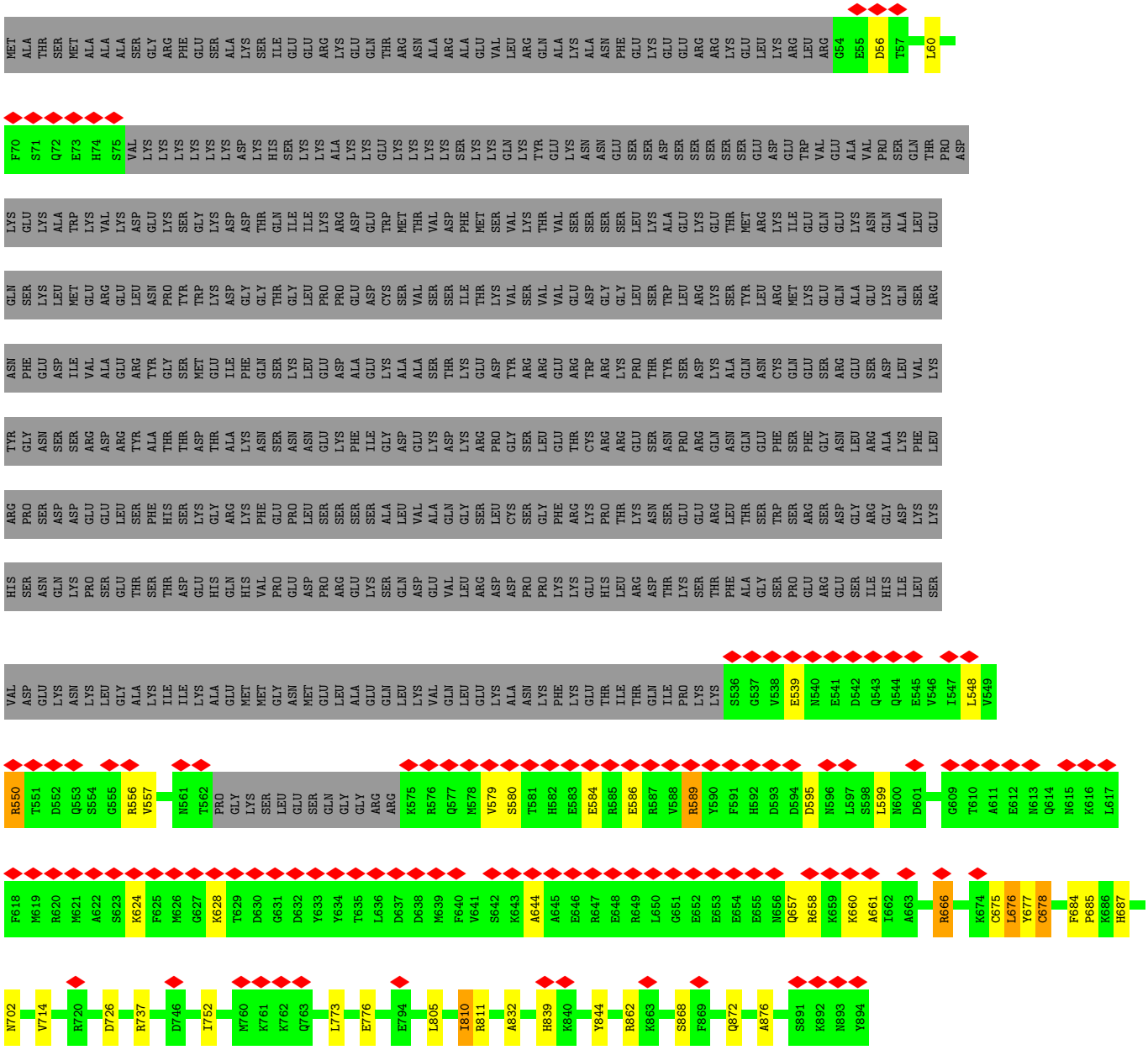
• Molecule 30: Cell division cycle 5-like protein

Chain L:



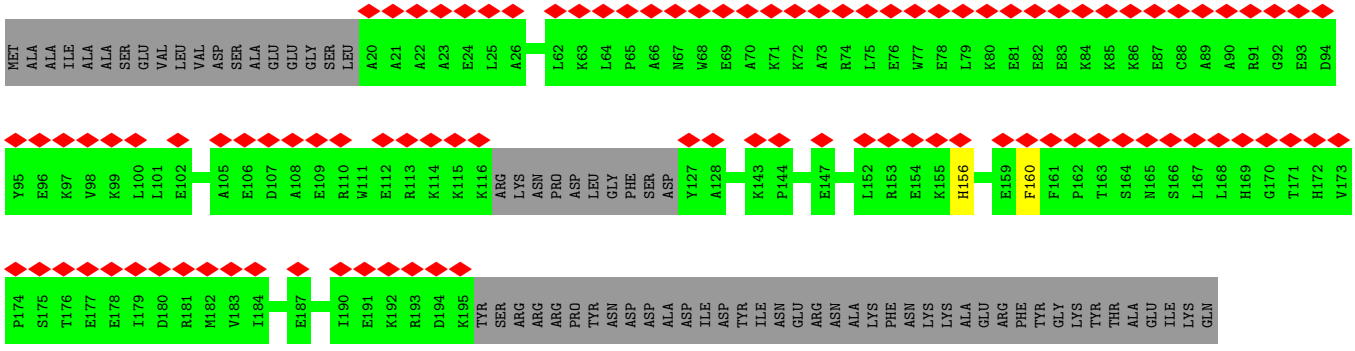
• Molecule 31: CWF19-like protein 2

Chain L2:



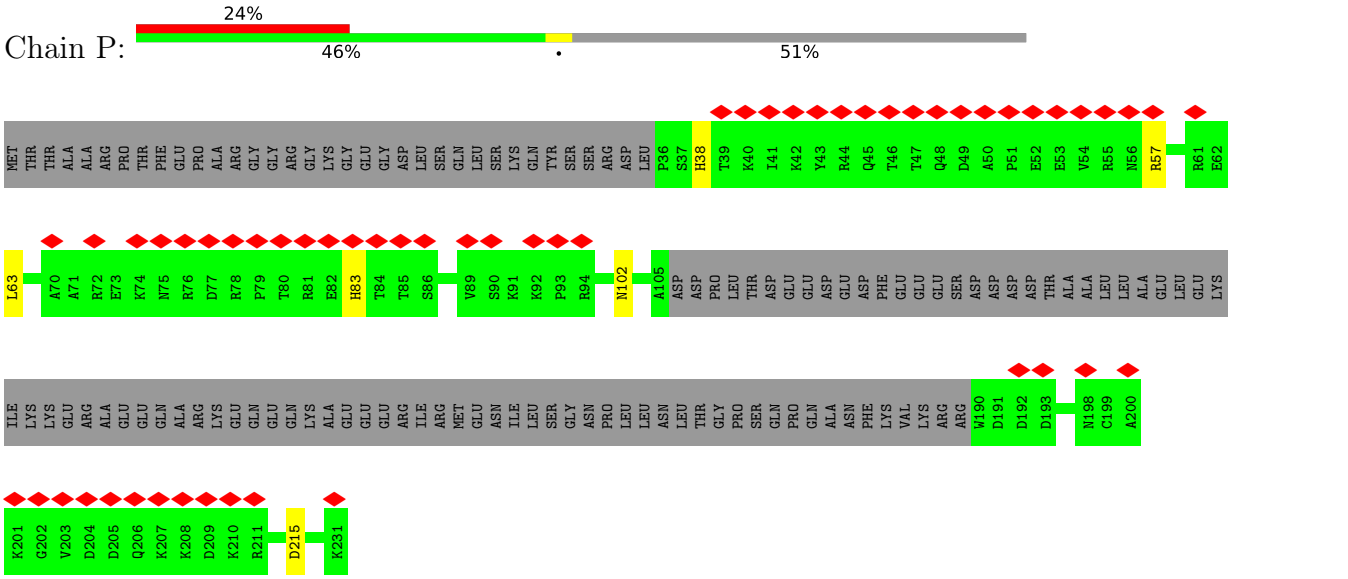
• Molecule 32: Pre-mRNA-splicing factor SYF2

Chain M:



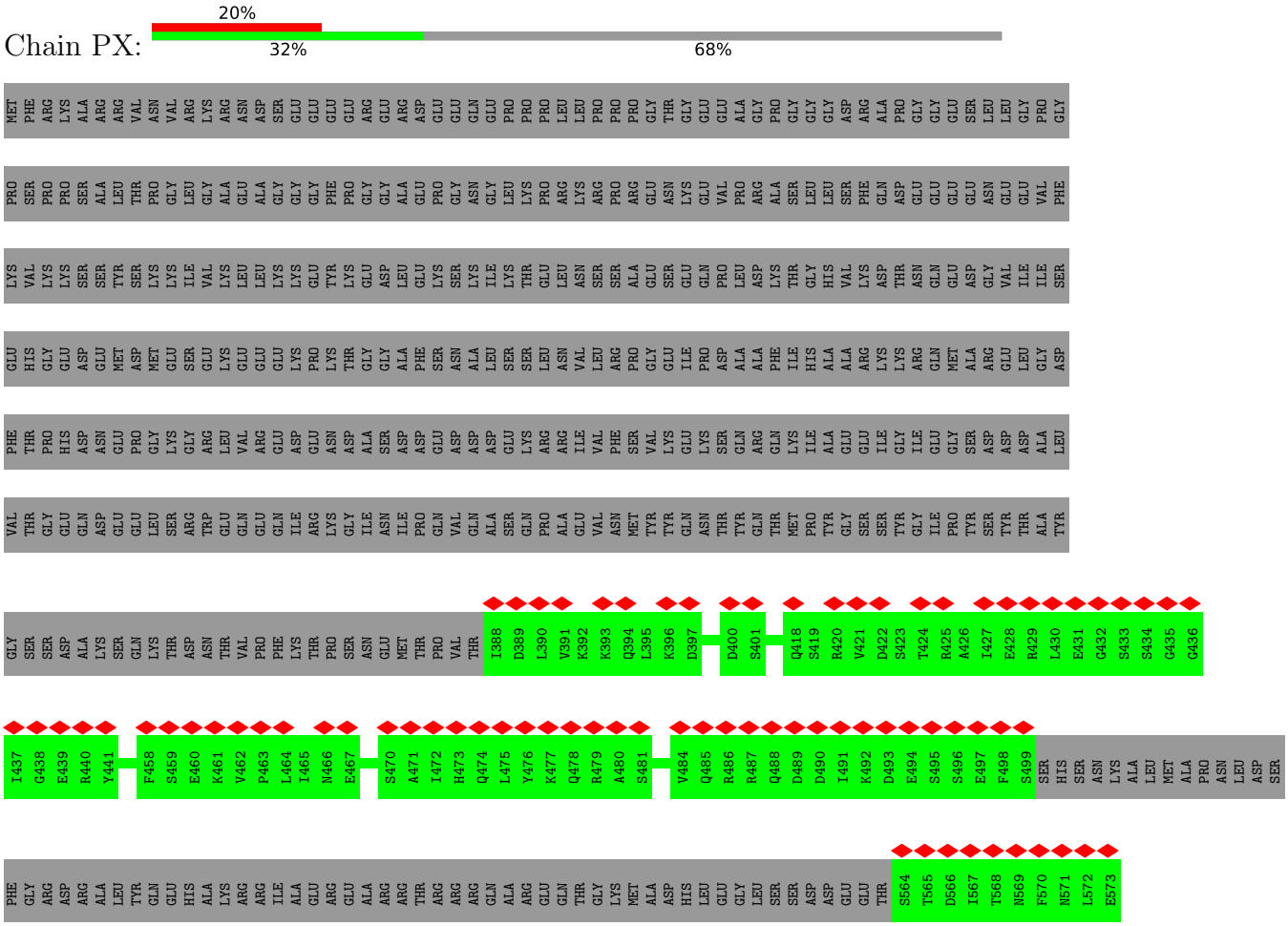
• Molecule 33: Spliceosome-associated protein CWC15 homolog

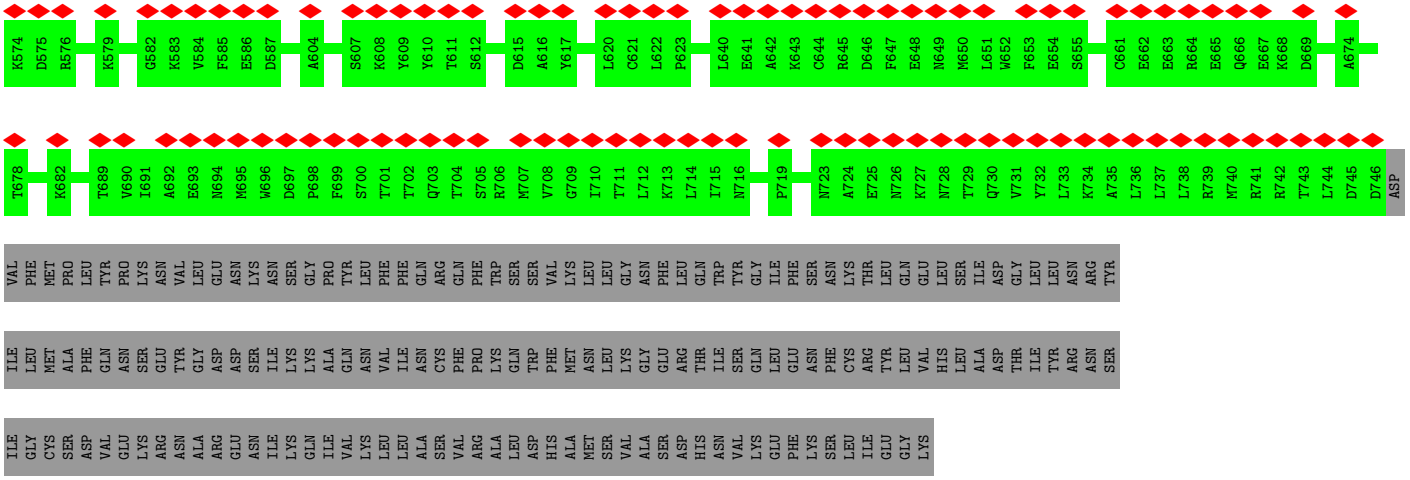
Chain P:



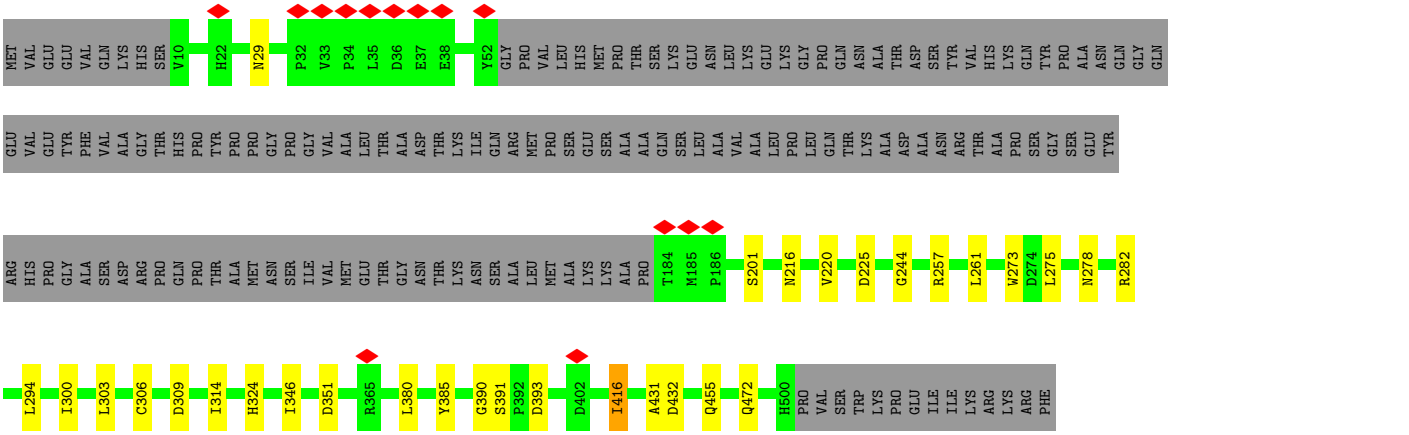
• Molecule 34: PAX3- and PAX7-binding protein 1

Chain PX:

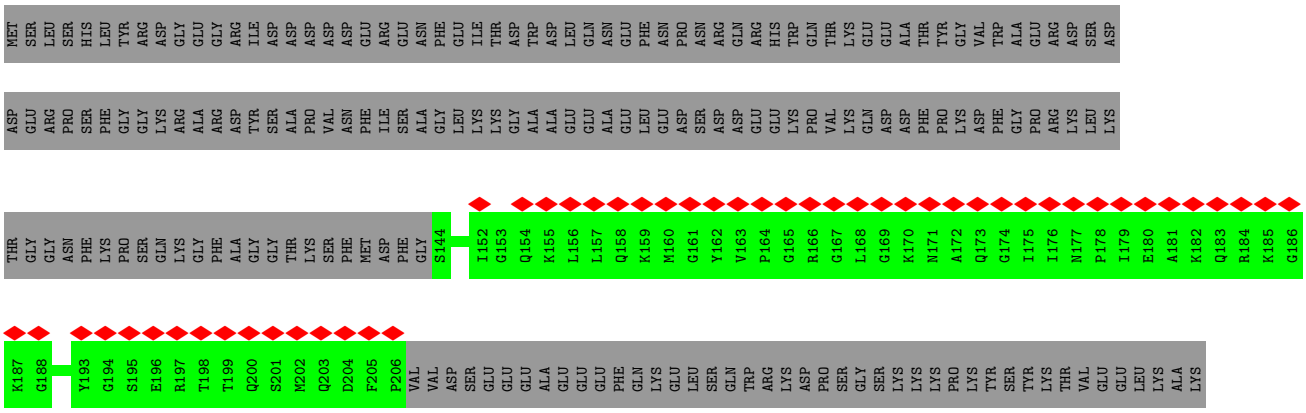


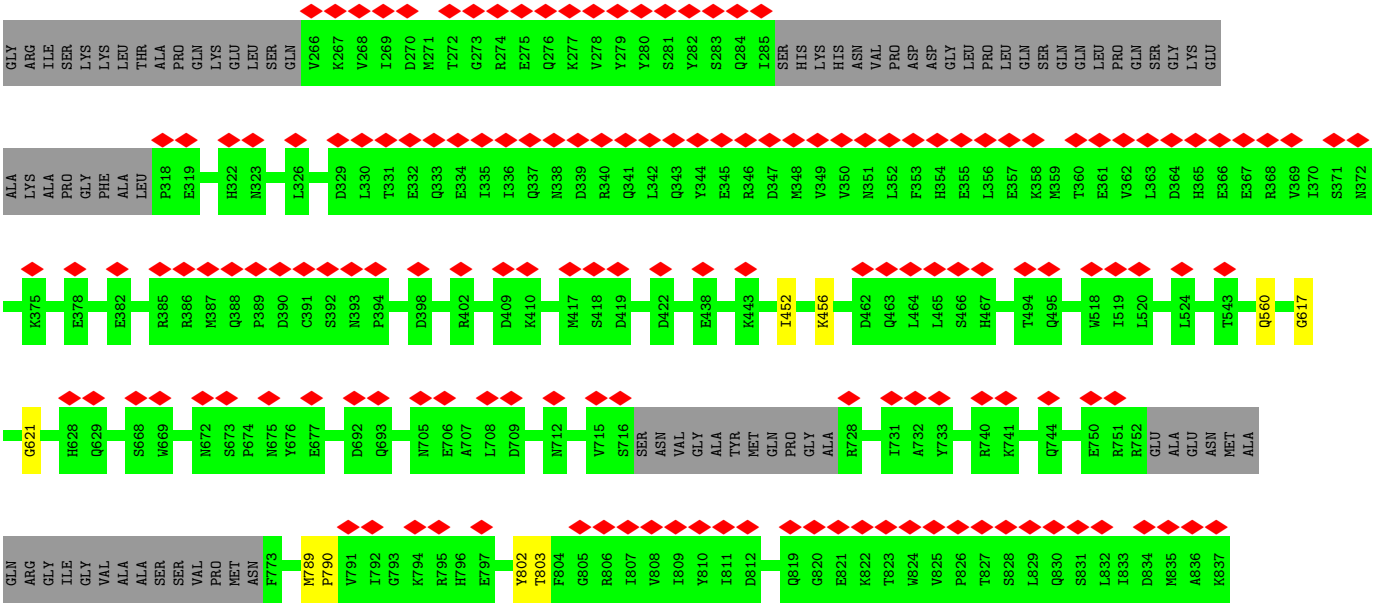


• Molecule 35: Pleiotropic regulator 1



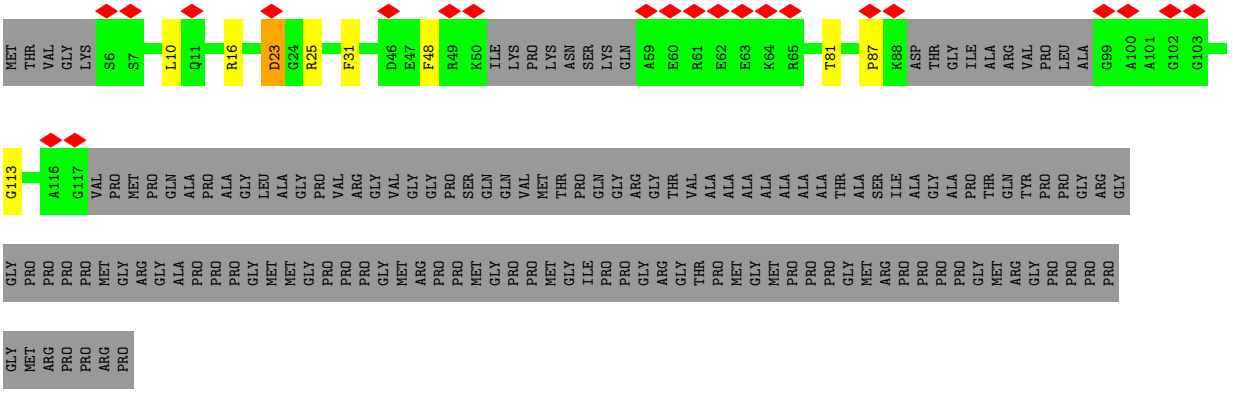
• Molecule 36: Tuftelin-interacting protein 11





• Molecule 37: Small nuclear ribonucleoprotein-associated proteins B and B'

Chain b:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	87951	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 ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	750	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	5.823	Depositor
Minimum map value	0.000	Depositor
Average map value	0.016	Depositor
Map value standard deviation	0.127	Depositor
Recommended contour level	0.975	Depositor
Map size (Å)	519.75, 519.75, 519.75	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.2375, 1.2375, 1.2375	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, IHP, GTP, SEP

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	0.62	1/917 (0.1%)	1.56	19/1425 (1.3%)
2	6	0.56	1/2323 (0.0%)	1.52	50/3619 (1.4%)
3	C	0.34	0/7346	0.70	6/9980 (0.1%)
4	D	0.35	0/252	0.57	0/350
5	DX	0.30	0/3219	0.59	0/4487
6	E	0.36	0/2394	0.79	7/3243 (0.2%)
7	J	0.29	0/2792	0.48	0/3900
8	K	0.33	0/940	0.49	0/1312
9	L1	0.29	0/1352	0.59	0/1878
10	N	0.38	0/1210	0.76	1/1622 (0.1%)
11	O	0.40	1/2378 (0.0%)	0.81	2/3211 (0.1%)
12	Q	0.30	0/6858	0.52	0/9563
13	R	0.34	0/1558	0.67	0/2168
14	S	0.33	0/1268	0.73	2/1714 (0.1%)
15	W	0.36	0/1306	0.75	3/1760 (0.2%)
16	Z	0.31	0/458	0.54	0/639
17	a	0.38	0/659	0.92	2/888 (0.2%)
18	c	0.37	0/649	1.00	3/877 (0.3%)
19	d	0.43	0/785	1.02	3/1049 (0.3%)
20	e	0.38	0/661	0.96	0/886
21	f	0.43	0/575	1.01	3/776 (0.4%)
22	g	0.45	0/575	1.01	4/768 (0.5%)
23	q	0.33	0/512	0.47	0/713
23	r	0.35	0/592	0.56	0/825
23	s	0.31	0/658	0.55	0/919
23	t	0.32	0/512	0.49	0/713
24	z	0.28	0/200	0.56	0/266
25	3	0.31	0/504	0.59	0/675
26	5	0.52	0/2157	1.59	58/3351 (1.7%)
27	A	0.35	1/16926 (0.0%)	0.73	21/22947 (0.1%)
28	I	0.30	0/3737	0.50	0/5213
30	L	0.31	0/3657	0.64	4/4979 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
31	L2	0.36	1/3117 (0.0%)	0.77	6/4183 (0.1%)
32	M	0.30	0/825	0.47	0/1150
33	P	0.34	0/957	0.75	2/1276 (0.2%)
34	PX	0.31	0/1463	0.49	0/2039
35	T	0.36	1/2927 (0.0%)	0.81	5/3980 (0.1%)
36	TF	0.31	0/2830	0.55	0/3937
37	b	0.36	0/726	0.90	2/966 (0.2%)
All	All	0.36	6/82775 (0.0%)	0.78	203/114247 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
3	C	0	1
17	a	0	2
19	d	0	3
20	e	0	1
22	g	0	1
27	A	0	3
All	All	0	11

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	O	225	PRO	C-N	6.48	1.46	1.34
2	6	35	A	N9-C4	5.92	1.41	1.37
31	L2	678	CYS	CB-SG	-5.63	1.72	1.81
1	2	35	A	N9-C8	-5.43	1.33	1.37
35	T	306	CYS	CB-SG	-5.37	1.73	1.81
27	A	1307	MET	C-N	5.19	1.44	1.34

All (203) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	6	36	A	C8-N9-C4	-14.35	100.06	105.80
26	5	86	C	N1-C2-O2	13.81	127.18	118.90
2	6	36	A	N7-C8-N9	13.30	120.45	113.80
26	5	86	C	C2-N1-C1'	12.61	132.67	118.80
26	5	24	G	O4'-C1'-N9	-11.78	98.78	108.20
26	5	99	C	C6-N1-C2	-11.62	115.65	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	6	37	C	N1-C2-O2	11.29	125.67	118.90
26	5	86	C	N3-C2-O2	-11.04	114.17	121.90
26	5	103	C	C6-N1-C2	-10.06	116.28	120.30
2	6	81	C	C6-N1-C2	-9.79	116.39	120.30
1	2	35	A	O4'-C1'-N9	-9.42	100.66	108.20
2	6	37	C	N3-C2-O2	-9.30	115.39	121.90
1	2	7	U	C6-N1-C2	-9.29	115.42	121.00
1	2	7	U	C5-C6-N1	9.14	127.27	122.70
26	5	99	C	C2-N1-C1'	9.06	128.77	118.80
2	6	36	A	C5-N7-C8	-8.98	99.41	103.90
1	2	7	U	N3-C2-O2	-8.97	115.92	122.20
2	6	35	A	C8-N9-C4	-8.78	102.29	105.80
26	5	23	C	C2-N1-C1'	8.76	128.43	118.80
2	6	37	C	C6-N1-C2	-8.71	116.82	120.30
26	5	86	C	C6-N1-C2	-8.70	116.82	120.30
30	L	77	LEU	CA-CB-CG	8.69	135.29	115.30
26	5	86	C	C6-N1-C1'	-8.59	110.49	120.80
2	6	37	C	C2-N1-C1'	8.50	128.15	118.80
27	A	259	ASP	CB-CG-OD1	8.37	125.83	118.30
2	6	97	U	C5-C6-N1	8.33	126.86	122.70
26	5	11	U	C2-N1-C1'	8.32	127.69	117.70
21	f	70	LEU	CA-CB-CG	8.30	134.38	115.30
2	6	34	G	P-O3'-C3'	8.10	129.42	119.70
18	c	32	VAL	CG1-CB-CG2	-8.06	98.01	110.90
1	2	8	C	O4'-C1'-N1	8.04	114.63	108.20
2	6	81	C	O4'-C1'-N1	7.98	114.58	108.20
26	5	103	C	C5-C6-N1	7.91	124.95	121.00
27	A	519	ASP	CB-CG-OD1	7.86	125.38	118.30
37	b	23	ASP	CB-CG-OD1	7.72	125.25	118.30
3	C	860	ASP	CB-CG-OD1	7.67	125.20	118.30
26	5	10	U	C2-N1-C1'	7.64	126.87	117.70
35	T	300	ILE	CG1-CB-CG2	-7.62	94.64	111.40
26	5	37	G	N9-C1'-C2'	7.61	123.90	114.00
2	6	42	C	P-O3'-C3'	7.58	128.80	119.70
22	g	35	ASP	CB-CG-OD1	7.55	125.10	118.30
1	2	7	U	N1-C2-O2	7.50	128.05	122.80
2	6	35	A	N7-C8-N9	7.50	117.55	113.80
1	2	8	C	C6-N1-C2	-7.41	117.34	120.30
19	d	60	ASP	CB-CG-OD1	7.39	124.95	118.30
2	6	81	C	C6-N1-C1'	7.36	129.63	120.80
26	5	11	U	C5-C6-N1	7.34	126.37	122.70
26	5	36	C	C2-N1-C1'	7.30	126.83	118.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
35	T	225	ASP	CB-CG-OD1	7.19	124.77	118.30
2	6	41	A	O5'-P-OP1	7.15	119.28	110.70
26	5	36	C	N1-C2-O2	7.08	123.15	118.90
2	6	35	A	C2-N3-C4	7.02	114.11	110.60
26	5	86	C	C5-C6-N1	7.01	124.50	121.00
30	L	222	LEU	CA-CB-CG	6.99	131.38	115.30
27	A	1467	LEU	CA-CB-CG	6.99	131.38	115.30
27	A	371	LEU	CA-CB-CG	6.93	131.23	115.30
2	6	37	C	C5-C6-N1	6.91	124.45	121.00
18	c	79	LEU	CA-CB-CG	6.88	131.13	115.30
27	A	1670	ASP	CB-CG-OD1	6.88	124.49	118.30
15	W	193	LEU	CA-CB-CG	6.82	130.99	115.30
1	2	7	U	O4'-C1'-N1	6.80	113.64	108.20
6	E	180	ASP	CB-CG-OD1	6.78	124.40	118.30
27	A	488	ASP	CB-CG-OD1	6.76	124.38	118.30
6	E	130	ASP	CB-CG-OD1	6.73	124.36	118.30
26	5	99	C	C5-C6-N1	6.69	124.34	121.00
26	5	92	U	P-O3'-C3'	6.64	127.67	119.70
26	5	10	U	C5-C6-N1	6.64	126.02	122.70
26	5	36	C	C6-N1-C2	-6.61	117.66	120.30
1	2	22	U	N3-C2-O2	-6.58	117.59	122.20
3	C	300	LEU	CA-CB-CG	6.58	130.43	115.30
2	6	36	A	C6-C5-N7	-6.58	127.70	132.30
26	5	95	G	P-O3'-C3'	6.57	127.59	119.70
27	A	1473	ASP	CB-CG-OD1	6.51	124.16	118.30
1	2	13	C	N1-C2-O2	6.49	122.79	118.90
22	g	68	ILE	CG1-CB-CG2	-6.47	97.17	111.40
22	g	70	LEU	CA-CB-CG	6.44	130.11	115.30
2	6	33	G	P-O3'-C3'	6.41	127.39	119.70
26	5	105	U	N3-C2-O2	-6.40	117.72	122.20
2	6	36	A	C4-C5-N7	6.37	113.89	110.70
26	5	37	G	O4'-C1'-N9	-6.36	103.11	108.20
1	2	8	C	C6-N1-C1'	6.36	128.43	120.80
26	5	103	C	C2-N1-C1'	6.30	125.73	118.80
6	E	120	ASP	CB-CG-OD1	6.28	123.95	118.30
21	f	37	ASP	CB-CG-OD1	6.28	123.95	118.30
26	5	23	C	N1-C2-O2	6.27	122.67	118.90
2	6	52	U	N3-C2-O2	-6.27	117.81	122.20
2	6	35	A	O4'-C1'-N9	6.25	113.20	108.20
3	C	230	ASP	CB-CG-OD1	6.20	123.88	118.30
2	6	45	A	C2-N3-C4	6.20	113.70	110.60
26	5	35	U	N3-C2-O2	-6.15	117.89	122.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	6	81	C	C5-C6-N1	6.15	124.08	121.00
33	P	63	LEU	CA-CB-CG	6.14	129.42	115.30
26	5	23	C	C6-N1-C1'	-6.13	113.44	120.80
27	A	260	LEU	CA-CB-CG	6.10	129.34	115.30
3	C	298	LEU	CA-CB-CG	6.10	129.32	115.30
26	5	45	C	C6-N1-C2	-6.09	117.86	120.30
2	6	52	U	N1-C2-O2	6.04	127.03	122.80
2	6	35	A	P-O3'-C3'	6.03	126.94	119.70
27	A	1233	ASP	CB-CG-OD1	6.02	123.72	118.30
3	C	469	ASP	CB-CG-OD1	6.00	123.70	118.30
35	T	351	ASP	CB-CG-OD1	6.00	123.70	118.30
2	6	62	C	C6-N1-C2	-6.00	117.90	120.30
11	O	64	ARG	CG-CD-NE	5.97	124.34	111.80
27	A	1109	LEU	CA-CB-CG	5.97	129.03	115.30
6	E	348	ASP	CB-CG-OD1	5.93	123.64	118.30
35	T	257	ARG	C-N-CA	5.91	136.47	121.70
19	d	77	VAL	CG1-CB-CG2	-5.87	101.51	110.90
26	5	105	U	N1-C2-O2	5.85	126.90	122.80
31	L2	599	LEU	CA-CB-CG	5.84	128.74	115.30
27	A	413	LEU	CA-CB-CG	5.84	128.73	115.30
1	2	27	U	N3-C2-O2	-5.82	118.12	122.20
27	A	1593	LEU	CA-CB-CG	5.81	128.66	115.30
2	6	41	A	C2-N3-C4	5.80	113.50	110.60
2	6	58	G	P-O3'-C3'	5.80	126.66	119.70
27	A	1185	LEU	CA-CB-CG	5.75	128.53	115.30
27	A	1639	VAL	CA-CB-CG1	5.75	119.53	110.90
2	6	45	A	O5'-P-OP1	5.75	117.60	110.70
2	6	61	C	C6-N1-C2	-5.71	118.02	120.30
2	6	97	U	C6-N1-C2	-5.71	117.57	121.00
26	5	36	C	N3-C2-O2	-5.70	117.91	121.90
6	E	137	ASP	CB-CG-OD1	5.69	123.42	118.30
14	S	106	ASP	CB-CG-OD1	5.67	123.40	118.30
11	O	191	ASP	CB-CG-OD1	5.66	123.39	118.30
21	f	33	LEU	CA-CB-CG	5.66	128.32	115.30
15	W	140	ASP	CB-CG-OD1	5.63	123.37	118.30
27	A	941	LYS	N-CA-C	5.62	126.17	111.00
15	W	193	LEU	CB-CG-CD1	5.60	120.53	111.00
1	2	13	C	C6-N1-C2	-5.58	118.07	120.30
17	a	61	VAL	CG1-CB-CG2	-5.57	101.99	110.90
26	5	39	C	N1-C2-O2	5.55	122.23	118.90
26	5	43	U	N1-C2-O2	5.55	126.68	122.80
26	5	23	C	N3-C2-O2	-5.54	118.02	121.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
33	P	215	ASP	CB-CG-OD1	5.54	123.29	118.30
2	6	62	C	C2-N1-C1'	5.54	124.89	118.80
26	5	105	U	C5-C6-N1	5.53	125.47	122.70
30	L	375	VAL	CG1-CB-CG2	-5.51	102.09	110.90
26	5	23	C	C6-N1-C2	-5.50	118.10	120.30
26	5	22	U	N1-C2-O2	5.48	126.64	122.80
2	6	17	C	C5-C6-N1	5.47	123.74	121.00
1	2	38	A	N7-C8-N9	5.46	116.53	113.80
1	2	27	U	O4'-C1'-N1	5.44	112.55	108.20
2	6	34	G	C8-N9-C4	-5.43	104.23	106.40
1	2	13	C	N3-C2-O2	-5.43	118.10	121.90
26	5	12	U	N1-C2-O2	5.42	126.59	122.80
27	A	1547	VAL	CA-CB-CG1	5.41	119.01	110.90
26	5	105	U	C6-N1-C2	-5.40	117.76	121.00
2	6	35	A	OP1-P-O3'	5.39	117.06	105.20
2	6	35	A	N3-C4-C5	-5.37	123.04	126.80
1	2	35	A	N7-C8-N9	5.36	116.48	113.80
2	6	50	A	P-O3'-C3'	5.35	126.12	119.70
31	L2	676	LEU	CA-CB-CG	5.35	127.61	115.30
6	E	221	ASP	CB-CG-OD1	5.35	123.12	118.30
14	S	27	LEU	CA-CB-CG	5.35	127.61	115.30
1	2	3	C	C6-N1-C2	-5.34	118.16	120.30
2	6	57	U	C2-N1-C1'	5.33	124.10	117.70
26	5	36	C	C5-C6-N1	5.32	123.66	121.00
26	5	99	C	N3-C2-O2	-5.32	118.17	121.90
2	6	45	A	C4-N9-C1'	5.31	135.86	126.30
26	5	98	C	C6-N1-C2	-5.30	118.18	120.30
31	L2	666	ARG	NE-CZ-NH1	5.30	122.95	120.30
27	A	1690	ASP	CB-CG-OD1	5.30	123.07	118.30
31	L2	811	ARG	NE-CZ-NH1	5.30	122.95	120.30
2	6	4	C	C6-N1-C2	-5.29	118.18	120.30
26	5	11	U	C6-N1-C1'	-5.29	113.80	121.20
2	6	8	C	C6-N1-C2	-5.28	118.19	120.30
26	5	12	U	N3-C2-O2	-5.28	118.50	122.20
2	6	36	A	N1-C6-N6	5.28	121.77	118.60
1	2	7	U	C2-N1-C1'	5.27	124.02	117.70
26	5	114	C	N1-C2-O2	5.27	122.06	118.90
26	5	47	A	O4'-C1'-N9	5.25	112.40	108.20
18	c	65	ILE	CG1-CB-CG2	-5.23	99.89	111.40
26	5	14	U	N3-C2-O2	-5.23	118.54	122.20
19	d	110	LEU	CA-CB-CG	5.23	127.32	115.30
26	5	22	U	C2-N1-C1'	5.23	123.97	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
26	5	38	C	C6-N1-C2	-5.23	118.21	120.30
31	L2	811	ARG	CD-NE-CZ	5.22	130.91	123.60
27	A	830	LEU	CA-CB-CG	5.22	127.31	115.30
6	E	173	ASP	CB-CG-OD1	5.18	122.96	118.30
26	5	11	U	C6-N1-C2	-5.18	117.89	121.00
35	T	309	ASP	CB-CG-OD1	5.18	122.96	118.30
30	L	55	ASP	CB-CG-OD1	5.17	122.96	118.30
10	N	97	TYR	CA-CB-CG	5.15	123.19	113.40
2	6	6	C	O5'-P-OP2	-5.15	101.06	105.70
22	g	60	VAL	CG1-CB-CG2	-5.14	102.67	110.90
3	C	190	LEU	CA-CB-CG	5.12	127.07	115.30
31	L2	811	ARG	CG-CD-NE	5.11	122.53	111.80
17	a	76	MET	CA-CB-CG	5.10	121.97	113.30
26	5	43	U	N3-C2-O2	-5.09	118.64	122.20
26	5	103	C	O4'-C1'-N1	5.09	112.27	108.20
27	A	1284	LEU	CA-CB-CG	5.08	126.98	115.30
27	A	1753	LEU	CA-CB-CG	5.08	126.98	115.30
26	5	10	U	C6-N1-C1'	-5.08	114.09	121.20
37	b	31	PHE	CB-CG-CD1	5.08	124.35	120.80
2	6	4	C	C5-C6-N1	5.07	123.53	121.00
2	6	5	U	C2-N1-C1'	5.06	123.78	117.70
26	5	99	C	C6-N1-C1'	-5.05	114.73	120.80
2	6	61	C	C5-C6-N1	5.05	123.52	121.00
2	6	64	U	N3-C2-O2	-5.05	118.67	122.20
26	5	9	G	C4-N9-C1'	5.04	133.06	126.50
26	5	104	C	C6-N1-C2	-5.04	118.28	120.30
26	5	10	U	C6-N1-C2	-5.03	117.98	121.00
27	A	1702	LEU	CA-CB-CG	5.03	126.86	115.30
2	6	31	U	N1-C2-O2	5.01	126.31	122.80

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
27	A	165	ARG	Peptide
27	A	707	ARG	Sidechain
27	A	995	ARG	Sidechain
3	C	940	ARG	Sidechain
17	a	51	ARG	Sidechain
17	a	69	ARG	Sidechain
19	d	110	LEU	Peptide
19	d	55	ARG	Sidechain

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Mol	Chain	Res	Type	Group
19	d	61	ARG	Sidechain
20	e	50	PHE	Peptide
22	g	33	GLY	Peptide

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	2	823	0	416	2	0
2	6	2075	0	1048	12	0
3	C	7184	0	7206	20	0
4	D	253	0	120	0	0
5	DX	3220	0	1416	2	0
6	E	2341	0	2275	4	0
7	J	2793	0	1241	0	0
8	K	941	0	424	0	0
9	L1	1353	0	620	0	0
10	N	1184	0	1189	5	0
11	O	2328	0	2317	8	0
12	Q	6859	0	2971	0	0
13	R	1571	0	725	3	0
14	S	1236	0	1210	7	0
15	W	1276	0	1221	11	0
16	Z	459	0	204	0	0
17	a	651	0	669	0	0
18	c	641	0	689	0	0
19	d	775	0	818	0	0
20	e	653	0	668	0	0
21	f	564	0	572	0	0
22	g	568	0	590	0	0
23	q	514	0	236	0	0
23	r	594	0	270	0	0
23	s	659	0	299	0	0
23	t	514	0	236	0	0
24	z	198	0	184	0	0
25	3	499	0	479	0	0
26	5	1936	0	982	10	0
27	A	16477	0	16462	46	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
28	I	3739	0	1699	2	0
29	IN	492	0	330	4	0
30	L	3623	0	2842	6	0
31	L2	3049	0	2973	21	0
32	M	827	0	380	1	0
33	P	942	0	929	2	0
34	PX	1465	0	620	0	0
35	T	2854	0	2812	15	0
36	TF	2835	0	1200	4	0
37	b	717	0	736	0	0
38	C	32	0	12	0	0
39	N	3	0	0	0	0
40	A	36	0	6	1	0
All	All	81753	0	62296	154	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 1.

All (154) 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)
2:6:59:G:H1	2:6:76:A:H61	1.01	0.96
2:6:59:G:H1	2:6:76:A:N6	1.75	0.84
14:S:56:ILE:HG12	14:S:62:ILE:HG23	1.78	0.65
14:S:57:ILE:HD13	15:W:97:ASN:HB3	1.80	0.63
2:6:1:G:O2'	10:N:99:ASN:ND2	2.33	0.62
26:5:12:U:H3	26:5:65:G:H1	1.48	0.61
27:A:435:CYS:SG	27:A:439:GLN:NE2	2.73	0.61
6:E:62:LEU:HB2	6:E:351:LEU:HB2	1.85	0.58
27:A:1304:ASN:ND2	27:A:1565:LYS:O	2.36	0.58
27:A:929:GLU:OE1	27:A:933:ARG:NH1	2.38	0.57
35:T:390:GLY:HA3	35:T:416:ILE:HD11	1.87	0.56
33:P:57:ARG:NH1	35:T:472:GLN:O	2.38	0.56
35:T:314:ILE:HD12	35:T:324:HIS:HB2	1.87	0.56
26:5:36:C:N4	26:5:37:G:O6	2.39	0.55
27:A:1335:ILE:HG23	27:A:1365:ILE:HD11	1.88	0.55
1:2:10:C:H2'	1:2:11:G:H8	1.72	0.55
27:A:1255:THR:HA	27:A:1531:ASN:HD21	1.72	0.55
26:5:59:G:OP1	27:A:417:ARG:NH2	2.40	0.54
27:A:549:GLU:OE1	27:A:552:ARG:NH1	2.40	0.54
3:C:451:HIS:O	3:C:578:ARG:NH1	2.41	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
27:A:71:ARG:NH1	27:A:177:ASP:OD2	2.41	0.54
31:L2:844:TYR:OH	31:L2:862:ARG:NH2	2.41	0.54
11:O:169:VAL:HG13	15:W:216:LEU:HD22	1.90	0.54
27:A:1333:VAL:HG13	27:A:1365:ILE:HD13	1.90	0.54
11:O:20:PHE:O	11:O:72:GLN:NE2	2.41	0.54
27:A:1310:ARG:NH1	27:A:1546:ASN:O	2.42	0.53
26:5:46:U:OP2	27:A:597:LYS:NZ	2.42	0.52
27:A:881:ILE:HG23	27:A:918:THR:HG23	1.90	0.52
31:L2:685:PRO:O	31:L2:687:HIS:ND1	2.43	0.52
3:C:93:ILE:HD12	35:T:275:LEU:HD22	1.91	0.51
3:C:213:ASP:N	3:C:213:ASP:OD1	2.44	0.51
2:6:49:G:OP1	30:L:33:ARG:NH2	2.44	0.51
36:TF:790:PRO:HA	36:TF:802:TYR:HA	1.92	0.51
27:A:1155:TRP:O	27:A:1159:ASN:ND2	2.43	0.51
27:A:1617:ARG:NH1	31:L2:586:GLU:OE2	2.44	0.51
3:C:313:GLN:O	3:C:417:ARG:NH1	2.44	0.50
10:N:139:CYS:SG	10:N:140:ARG:N	2.85	0.50
36:TF:617:GLY:O	36:TF:621:GLY:N	2.44	0.50
6:E:161:ARG:HD2	6:E:203:ASP:HA	1.93	0.49
11:O:66:LYS:NZ	29:IN:19:N:OP1	2.45	0.49
3:C:92:PRO:HA	35:T:278:ASN:HD21	1.77	0.49
3:C:236:MET:SD	3:C:837:GLN:NE2	2.83	0.49
30:L:376:ASP:OD1	30:L:376:ASP:N	2.46	0.49
35:T:346:ILE:HD13	35:T:380:LEU:HD11	1.94	0.49
3:C:772:TRP:NE1	3:C:776:GLU:OE2	2.44	0.49
27:A:211:GLN:OE1	27:A:214:ARG:NH1	2.44	0.49
36:TF:789:MET:O	36:TF:803:THR:N	2.40	0.49
27:A:1580:HIS:NE2	31:L2:595:ASP:OD1	2.45	0.49
11:O:229:LYS:O	11:O:277:ARG:NH1	2.45	0.49
32:M:156:HIS:O	32:M:160:PHE:N	2.43	0.49
27:A:425:PRO:HB2	27:A:428:LYS:HB2	1.95	0.48
3:C:381:LEU:HG	3:C:416:LEU:HD21	1.95	0.48
15:W:126:GLU:HG3	15:W:130:ARG:HE	1.78	0.48
27:A:109:PRO:HG3	27:A:630:TRP:HE1	1.77	0.48
27:A:991:THR:HG22	30:L:81:GLN:HE22	1.76	0.48
30:L:37:LEU:HD11	30:L:155:ALA:HA	1.96	0.48
2:6:14:C:H2'	2:6:15:A:H8	1.77	0.48
30:L:119:ASP:OD2	30:L:122:LYS:NZ	2.46	0.48
35:T:244:GLY:H	35:T:273:TRP:HH2	1.62	0.48
26:5:97:G:N2	26:5:115:U:O2	2.47	0.48
27:A:1870:ASP:OD2	31:L2:556:ARG:NH1	2.43	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:E:321:TYR:OH	6:E:357:GLN:O	2.31	0.47
31:L2:550:ARG:HB3	31:L2:660:LYS:HB3	1.95	0.47
27:A:523:ASN:OD1	27:A:552:ARG:NH2	2.47	0.47
27:A:1865:ARG:NH2	31:L2:726:ASP:OD2	2.43	0.47
35:T:391:SER:OG	35:T:393:ASP:OD1	2.32	0.47
27:A:1243:ARG:NH1	27:A:1246:GLN:OE1	2.46	0.47
27:A:1242:ASN:OD1	27:A:1245:ARG:NH1	2.47	0.47
14:S:51:THR:HB	14:S:66:ASP:H	1.80	0.47
26:5:12:U:H5'	27:A:224:THR:HG23	1.97	0.47
35:T:416:ILE:HA	35:T:431:ALA:HA	1.95	0.46
13:R:134:ARG:HA	35:T:385:TYR:HB2	1.97	0.46
36:TF:452:ILE:O	36:TF:456:LYS:N	2.47	0.46
10:N:101:CYS:SG	10:N:139:CYS:HB2	2.56	0.46
11:O:64:ARG:NH1	29:IN:19:N:OP2	2.49	0.46
27:A:1504:GLU:O	27:A:1533:ARG:NH1	2.48	0.46
31:L2:60:LEU:HD11	31:L2:876:ALA:HB1	1.97	0.46
31:L2:677:TYR:HB3	31:L2:714:VAL:HG11	1.97	0.46
27:A:251:ASP:OD2	27:A:253:ASN:ND2	2.49	0.45
35:T:201:SER:OG	35:T:455:GLN:NE2	2.49	0.45
3:C:800:PRO:HA	3:C:803:ARG:HE	1.82	0.45
26:5:45:C:H4'	27:A:596:TYR:HB3	1.98	0.45
31:L2:548:LEU:HD22	31:L2:661:ALA:HB1	1.98	0.45
2:6:2:U:H2'	2:6:3:G:H8	1.82	0.45
31:L2:675:CYS:SG	31:L2:678:CYS:N	2.86	0.45
33:P:38:HIS:HB2	35:T:282:ARG:HD3	1.99	0.44
15:W:180:LYS:HD3	15:W:197:ALA:HB3	1.99	0.44
27:A:609:LYS:NZ	40:A:3000:IHP:O12	2.50	0.44
27:A:1144:LYS:HE2	27:A:1148:ASN:HD21	1.82	0.44
31:L2:805:LEU:HD11	31:L2:832:ALA:HB2	1.99	0.44
2:6:34:G:H2'	2:6:35:A:H8	1.82	0.44
28:I:565:ILE:HA	28:I:569:GLY:HA3	1.99	0.44
3:C:354:ARG:NH1	27:A:381:PRO:O	2.50	0.44
35:T:393:ASP:OD1	35:T:393:ASP:N	2.51	0.44
27:A:1278:VAL:HG13	27:A:1284:LEU:HD12	2.00	0.44
10:N:103:LEU:HD13	27:A:59:GLU:HB2	2.00	0.44
14:S:52:LYS:HA	14:S:158:LYS:HA	2.00	0.44
13:R:9:ALA:O	13:R:11:THR:N	2.45	0.43
14:S:60:PHE:HB2	15:W:99:PHE:HE2	1.83	0.43
26:5:23:C:H5'	26:5:24:G:H5"	1.99	0.43
27:A:1491:LYS:O	27:A:1710:ASN:ND2	2.49	0.43
3:C:737:PRO:HB2	3:C:775:ARG:HE	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
27:A:578:LEU:HA	27:A:581:ILE:HD12	2.00	0.43
6:E:307:ARG:NH1	15:W:116:GLU:OE1	2.51	0.43
27:A:1544:ARG:HB2	27:A:1547:VAL:HG12	2.00	0.43
31:L2:810:ILE:H	31:L2:810:ILE:HG13	1.56	0.43
2:6:30:A:O2'	15:W:223:ARG:NH1	2.51	0.43
10:N:70:ILE:HG23	10:N:74:LEU:HB3	2.01	0.43
26:5:12:U:O2	26:5:65:G:N2	2.41	0.43
35:T:220:VAL:HG11	35:T:261:LEU:HD21	1.99	0.43
14:S:83:GLU:HA	14:S:106:ASP:HB2	1.99	0.43
31:L2:580:SER:O	31:L2:589:ARG:NH1	2.52	0.43
27:A:1321:GLU:OE1	27:A:1471:ARG:NH1	2.51	0.43
3:C:189:VAL:HG12	3:C:199:LEU:HA	2.00	0.43
31:L2:868:SER:HB2	31:L2:872:GLN:H	1.84	0.43
31:L2:56:ASP:OD1	31:L2:56:ASP:N	2.52	0.42
1:2:33:G:OP1	31:L2:666:ARG:NH2	2.49	0.42
27:A:1941:ARG:HH22	27:A:2013:GLY:HA2	1.84	0.42
3:C:181:ILE:HG13	3:C:182:LYS:HG2	2.02	0.42
3:C:282:VAL:O	3:C:286:ASN:ND2	2.44	0.42
27:A:1072:LEU:HD22	27:A:1087:LEU:HD22	2.02	0.42
3:C:151:GLU:OE1	3:C:421:LYS:NZ	2.52	0.42
3:C:225:VAL:HG23	3:C:251:LEU:HD12	2.02	0.42
27:A:546:LEU:HD13	27:A:648:LEU:HD21	2.02	0.42
29:IN:149:N:H3'	31:L2:839:HIS:HE1	1.85	0.42
2:6:22:A:H62	15:W:167:VAL:HG11	1.84	0.42
3:C:210:ASN:HB3	3:C:636:TYR:HB2	2.01	0.42
5:DX:279:VAL:O	5:DX:283:ARG:N	2.44	0.42
27:A:802:THR:HB	27:A:805:GLU:HG3	2.02	0.42
13:R:61:GLY:HA3	14:S:136:ILE:HG21	2.02	0.41
35:T:294:LEU:HD12	35:T:303:LEU:HD11	2.02	0.41
27:A:200:ASP:OD1	27:A:240:ARG:NH2	2.53	0.41
31:L2:805:LEU:HD13	31:L2:810:ILE:HG12	2.03	0.41
27:A:1002:ASP:OD1	27:A:1004:ASN:ND2	2.49	0.41
2:6:14:C:H2'	2:6:15:A:C8	2.55	0.41
27:A:1597:PHE:HB3	27:A:1609:VAL:HG11	2.03	0.41
2:6:2:U:H2'	2:6:3:G:C8	2.56	0.41
3:C:474:LEU:HA	3:C:499:GLY:HA3	2.03	0.41
28:I:564:PHE:O	28:I:569:GLY:N	2.53	0.41
3:C:177:ARG:NH2	3:C:638:ASP:OD2	2.49	0.41
5:DX:214:GLY:N	5:DX:217:VAL:O	2.53	0.41
26:5:100:U:H2'	26:5:101:U:H6	1.85	0.41
27:A:964:ASP:OD1	27:A:964:ASP:N	2.52	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
27:A:1835:GLN:HB3	31:L2:557:VAL:HG11	2.02	0.41
31:L2:752:ILE:HD12	31:L2:773:LEU:HD21	2.03	0.41
29:IN:145:N:H1'2	29:IN:146:N:H5'	2.02	0.41
11:O:72:GLN:HA	11:O:75:SER:HB3	2.02	0.41
15:W:116:GLU:HA	15:W:117:PRO:HD3	1.93	0.41
2:6:55:C:OP2	2:6:74:U:O2'	2.33	0.40
30:L:236:ASP:OD1	30:L:236:ASP:N	2.49	0.40
11:O:22:ILE:HG21	15:W:111:LEU:HD23	2.03	0.40
15:W:209:SER:HB2	15:W:212:GLU:HB2	2.03	0.40
3:C:328:ALA:HA	3:C:334:ILE:HD12	2.04	0.40
11:O:64:ARG:HH21	11:O:163:HIS:CE1	2.40	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
3	C	906/972 (93%)	868 (96%)	35 (4%)	3 (0%)	37 68
4	D	49/285 (17%)	48 (98%)	0	1 (2%)	6 33
5	DX	648/795 (82%)	631 (97%)	15 (2%)	2 (0%)	37 68
6	E	297/357 (83%)	285 (96%)	12 (4%)	0	100 100
7	J	559/848 (66%)	548 (98%)	9 (2%)	2 (0%)	30 64
8	K	187/225 (83%)	182 (97%)	3 (2%)	2 (1%)	12 45
9	L1	273/538 (51%)	264 (97%)	9 (3%)	0	100 100
10	N	141/144 (98%)	125 (89%)	16 (11%)	0	100 100
11	O	286/420 (68%)	265 (93%)	21 (7%)	0	100 100
12	Q	1382/1485 (93%)	1346 (97%)	35 (2%)	1 (0%)	48 79
13	R	313/536 (58%)	281 (90%)	27 (9%)	5 (2%)	8 38

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
14	S	157/166 (95%)	143 (91%)	11 (7%)	3 (2%)	6 34
15	W	156/579 (27%)	137 (88%)	19 (12%)	0	100 100
16	Z	90/166 (54%)	83 (92%)	7 (8%)	0	100 100
17	a	81/126 (64%)	71 (88%)	10 (12%)	0	100 100
18	c	79/119 (66%)	69 (87%)	10 (13%)	0	100 100
19	d	94/118 (80%)	82 (87%)	12 (13%)	0	100 100
20	e	77/92 (84%)	63 (82%)	13 (17%)	1 (1%)	10 41
21	f	70/86 (81%)	64 (91%)	6 (9%)	0	100 100
22	g	71/76 (93%)	65 (92%)	6 (8%)	0	100 100
23	q	99/504 (20%)	97 (98%)	2 (2%)	0	100 100
23	r	115/504 (23%)	112 (97%)	2 (2%)	1 (1%)	14 49
23	s	130/504 (26%)	126 (97%)	4 (3%)	0	100 100
23	t	99/504 (20%)	97 (98%)	2 (2%)	0	100 100
24	z	23/451 (5%)	23 (100%)	0	0	100 100
25	3	56/476 (12%)	56 (100%)	0	0	100 100
27	A	1977/2335 (85%)	1863 (94%)	112 (6%)	2 (0%)	48 79
28	I	749/855 (88%)	728 (97%)	20 (3%)	1 (0%)	48 79
30	L	547/802 (68%)	514 (94%)	32 (6%)	1 (0%)	44 75
31	L2	363/894 (41%)	321 (88%)	37 (10%)	5 (1%)	9 40
32	M	162/243 (67%)	159 (98%)	3 (2%)	0	100 100
33	P	108/229 (47%)	103 (95%)	5 (5%)	0	100 100
34	PX	291/917 (32%)	286 (98%)	5 (2%)	0	100 100
35	T	356/514 (69%)	337 (95%)	19 (5%)	0	100 100
36	TF	562/837 (67%)	549 (98%)	12 (2%)	1 (0%)	44 75
37	b	88/240 (37%)	78 (89%)	8 (9%)	2 (2%)	5 31
All	All	11641/18942 (62%)	11069 (95%)	539 (5%)	33 (0%)	38 68

All (33) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
31	L2	579	VAL
3	C	166	CYS
13	R	47	ARG

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Mol	Chain	Res	Type
13	R	277	THR
3	C	126	SER
3	C	948	SER
7	J	448	ALA
7	J	505	ALA
14	S	12	PRO
14	S	80	LYS
27	A	1656	THR
28	I	812	GLN
31	L2	644	ALA
31	L2	776	GLU
14	S	86	LEU
20	e	69	LYS
5	DX	427	SER
8	K	45	PRO
13	R	82	MET
13	R	97	LYS
31	L2	584	GLU
36	TF	560	GLN
23	r	52	LEU
5	DX	714	LYS
8	K	60	ALA
12	Q	956	SER
31	L2	684	PHE
37	b	87	PRO
13	R	10	PRO
27	A	1785	VAL
30	L	208	VAL
4	D	155	ILE
37	b	113	GLY

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
3	C	807/866 (93%)	797 (99%)	10 (1%)	67 82

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
6	E	256/300 (85%)	254 (99%)	2 (1%)	79 88
10	N	130/130 (100%)	128 (98%)	2 (2%)	60 77
11	O	258/361 (72%)	254 (98%)	4 (2%)	58 76
14	S	129/134 (96%)	125 (97%)	4 (3%)	35 63
15	W	135/502 (27%)	130 (96%)	5 (4%)	29 58
17	a	73/101 (72%)	72 (99%)	1 (1%)	62 79
18	c	76/101 (75%)	74 (97%)	2 (3%)	41 66
19	d	90/110 (82%)	84 (93%)	6 (7%)	13 40
20	e	74/84 (88%)	71 (96%)	3 (4%)	26 55
21	f	61/74 (82%)	61 (100%)	0	100 100
22	g	63/66 (96%)	58 (92%)	5 (8%)	10 34
24	z	21/371 (6%)	21 (100%)	0	100 100
25	3	55/395 (14%)	55 (100%)	0	100 100
27	A	1792/2108 (85%)	1761 (98%)	31 (2%)	56 75
30	L	231/709 (33%)	224 (97%)	7 (3%)	36 63
31	L2	334/806 (41%)	323 (97%)	11 (3%)	33 61
33	P	103/203 (51%)	101 (98%)	2 (2%)	52 73
35	T	313/441 (71%)	309 (99%)	4 (1%)	65 81
37	b	74/177 (42%)	68 (92%)	6 (8%)	9 33
All	All	5075/8039 (63%)	4970 (98%)	105 (2%)	49 71

All (105) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	C	103	THR
3	C	199	LEU
3	C	213	ASP
3	C	219	LEU
3	C	298	LEU
3	C	300	LEU
3	C	327	TYR
3	C	339	PHE
3	C	707	ILE
3	C	903	HIS
6	E	203	ASP

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Mol	Chain	Res	Type
6	E	231	MET
10	N	97	TYR
10	N	115	THR
11	O	131	THR
11	O	245	GLU
11	O	254	GLN
11	O	259	ARG
14	S	27	LEU
14	S	61	MET
14	S	102	ASN
14	S	152	ARG
15	W	73	ASP
15	W	87	THR
15	W	93	PHE
15	W	129	ARG
15	W	212	GLU
17	a	76	MET
18	c	12	HIS
18	c	72	ASP
19	d	43	LEU
19	d	53	LEU
19	d	74	TRP
19	d	93	ASP
19	d	111	ARG
19	d	112	ASN
20	e	50	PHE
20	e	72	LYS
20	e	87	LEU
22	g	9	LEU
22	g	13	MET
22	g	14	ASP
22	g	32	ARG
22	g	35	ASP
27	A	97	HIS
27	A	166	PHE
27	A	319	LEU
27	A	327	VAL
27	A	351	TYR
27	A	409	ARG
27	A	413	LEU
27	A	479	THR
27	A	579	GLN

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Mol	Chain	Res	Type
27	A	642	ARG
27	A	676	ARG
27	A	705	LYS
27	A	884	HIS
27	A	964	ASP
27	A	1021	ASP
27	A	1089	CYS
27	A	1195	ARG
27	A	1293	ASN
27	A	1402	ARG
27	A	1467	LEU
27	A	1536	LEU
27	A	1582	TRP
27	A	1622	MET
27	A	1636	LYS
27	A	1702	LEU
27	A	1763	LEU
27	A	1813	ARG
27	A	1833	LEU
27	A	1918	ASN
27	A	1946	ASN
27	A	1966	HIS
30	L	13	ASN
30	L	202	ARG
30	L	206	ARG
30	L	213	GLU
30	L	222	LEU
30	L	244	GLN
30	L	250	GLU
31	L2	539	GLU
31	L2	550	ARG
31	L2	589	ARG
31	L2	624	LYS
31	L2	628	LYS
31	L2	657	GLN
31	L2	658	ARG
31	L2	676	LEU
31	L2	702	ASN
31	L2	737	ARG
31	L2	810	ILE
33	P	83	HIS
33	P	102	ASN

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Mol	Chain	Res	Type
35	T	29	ASN
35	T	216	ASN
35	T	416	ILE
35	T	432	ASP
37	b	10	LEU
37	b	16	ARG
37	b	23	ASP
37	b	25	ARG
37	b	48	PHE
37	b	81	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
10	N	99	ASN
10	N	116	ASN
11	O	163	HIS
14	S	102	ASN
15	W	213	GLN
18	c	64	ASN
19	d	45	ASN
20	e	32	GLN
27	A	368	GLN
27	A	439	GLN
27	A	579	GLN
27	A	1096	HIS
27	A	1282	GLN
27	A	1293	ASN
27	A	1468	ASN
27	A	1487	HIS
27	A	1531	ASN
27	A	1830	GLN
27	A	1918	ASN
30	L	13	ASN
30	L	81	GLN
31	L2	702	ASN
31	L2	839	HIS
35	T	50	ASN
35	T	278	ASN
35	T	283	HIS
35	T	324	HIS
35	T	455	GLN

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Mol	Chain	Res	Type
37	b	11	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	38/188 (20%)	19 (50%)	1 (2%)
2	6	96/106 (90%)	42 (43%)	7 (7%)
26	5	90/116 (77%)	26 (28%)	2 (2%)
29	IN	0/154	-	-
All	All	224/564 (39%)	87 (38%)	10 (4%)

All (87) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	8	C
1	2	14	C
1	2	15	U
1	2	16	U
1	2	19	G
1	2	20	G
1	2	24	A
1	2	28	C
1	2	29	A
1	2	30	A
1	2	31	G
1	2	32	U
1	2	33	G
1	2	34	U
1	2	35	A
1	2	36	G
1	2	37	U
1	2	38	A
1	2	39	U
2	6	5	U
2	6	6	C
2	6	7	G
2	6	9	U
2	6	10	U
2	6	12	G
2	6	22	A
2	6	25	C

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Mol	Chain	Res	Type
2	6	26	U
2	6	27	A
2	6	28	A
2	6	29	A
2	6	33	G
2	6	34	G
2	6	35	A
2	6	36	A
2	6	37	C
2	6	41	A
2	6	42	C
2	6	43	A
2	6	44	G
2	6	45	A
2	6	46	G
2	6	48	A
2	6	51	U
2	6	53	A
2	6	54	G
2	6	56	A
2	6	59	G
2	6	60	C
2	6	61	C
2	6	68	C
2	6	69	A
2	6	74	U
2	6	78	A
2	6	79	C
2	6	81	C
2	6	82	A
2	6	84	A
2	6	87	C
2	6	88	G
2	6	91	A
26	5	10	U
26	5	11	U
26	5	20	G
26	5	21	A
26	5	34	U
26	5	35	U
26	5	36	C
26	5	38	C

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Mol	Chain	Res	Type
26	5	39	C
26	5	42	U
26	5	45	C
26	5	47	A
26	5	52	U
26	5	53	U
26	5	57	G
26	5	69	A
26	5	86	C
26	5	89	U
26	5	91	U
26	5	92	U
26	5	93	U
26	5	94	U
26	5	95	G
26	5	96	A
26	5	104	C
26	5	115	U

All (10) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	2	28	C
2	6	5	U
2	6	33	G
2	6	35	A
2	6	50	A
2	6	58	G
2	6	81	C
2	6	82	A
26	5	92	U
26	5	95	G

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

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	$\#\|Z\| > 2$
13	SEP	R	232	13	3,4,10	0.75	0	2,4,14	1.37	0
13	SEP	R	224	13	3,4,10	0.71	0	2,4,14	1.30	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
13	SEP	R	232	13	-	0/0/2/10	-
13	SEP	R	224	13	-	0/0/2/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 5 ligands modelled in this entry, 3 are monoatomic - leaving 2 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	$\#\|Z\|>2$
38	GTP	C	1500	-	26,34,34	1.22	2 (7%)	32,54,54	1.56	7 (21%)
40	IHP	A	3000	-	36,36,36	1.50	6 (16%)	54,60,60	0.78	3 (5%)

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
38	GTP	C	1500	-	-	3/18/38/38	0/3/3/3
40	IHP	A	3000	-	-	4/30/54/54	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
38	C	1500	GTP	C5-C6	-4.25	1.38	1.47
40	A	3000	IHP	P1-O11	3.22	1.65	1.59
40	A	3000	IHP	P3-O13	3.21	1.65	1.59
40	A	3000	IHP	P6-O16	3.18	1.65	1.59
40	A	3000	IHP	P2-O12	3.15	1.65	1.59
40	A	3000	IHP	P5-O15	3.11	1.65	1.59
40	A	3000	IHP	P4-O14	3.05	1.65	1.59
38	C	1500	GTP	C2-N3	2.17	1.38	1.33

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
38	C	1500	GTP	PA-O3A-PB	-3.90	119.43	132.83
38	C	1500	GTP	C5-C6-N1	2.96	119.18	113.95
40	A	3000	IHP	C5-C6-C1	2.86	116.68	110.41
38	C	1500	GTP	PB-O3B-PG	-2.85	123.05	132.83
38	C	1500	GTP	C2-N1-C6	-2.77	120.00	125.10
38	C	1500	GTP	C8-N7-C5	2.62	107.98	102.99
40	A	3000	IHP	C6-C1-C2	2.11	115.02	110.41
40	A	3000	IHP	O11-C1-C6	-2.10	103.72	108.69
38	C	1500	GTP	O6-C6-C5	-2.08	120.30	124.37
38	C	1500	GTP	O5'-C5'-C4'	2.03	115.96	108.99

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
38	C	1500	GTP	C5'-O5'-PA-O3A
38	C	1500	GTP	C5'-O5'-PA-O2A
38	C	1500	GTP	C5'-O5'-PA-O1A
40	A	3000	IHP	C1-O11-P1-O21
40	A	3000	IHP	C3-O13-P3-O23
40	A	3000	IHP	C4-O14-P4-O24
40	A	3000	IHP	C3-O13-P3-O43

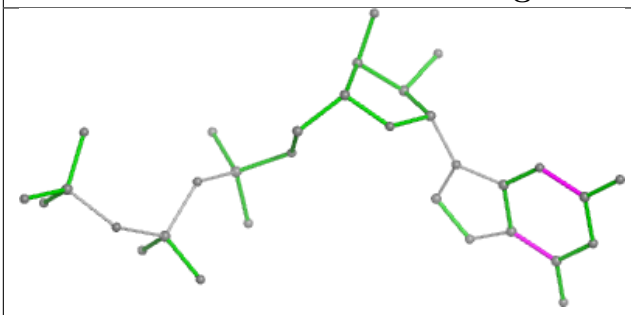
There are no ring outliers.

1 monomer is involved in 1 short contact:

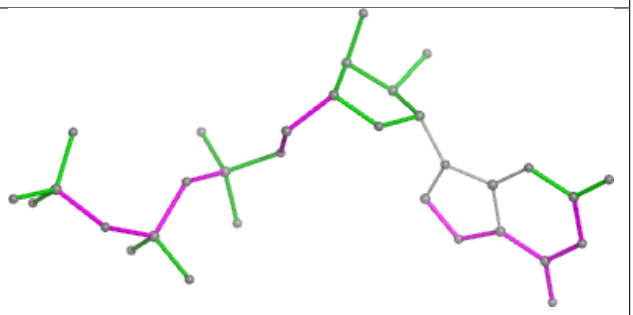
Mol	Chain	Res	Type	Clashes	Symm-Clashes
40	A	3000	IHP	1	0

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. 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.

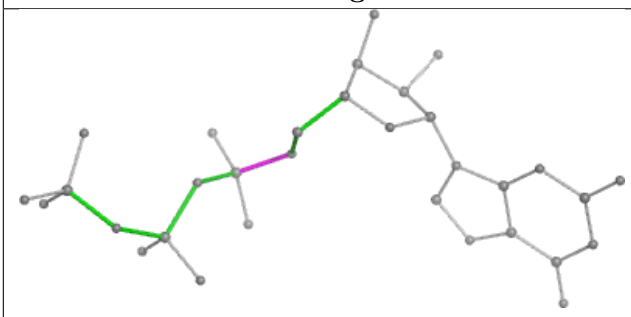
Ligand GTP C 1500



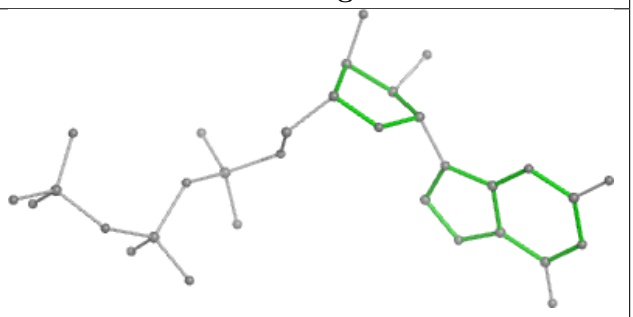
Bond lengths



Bond angles

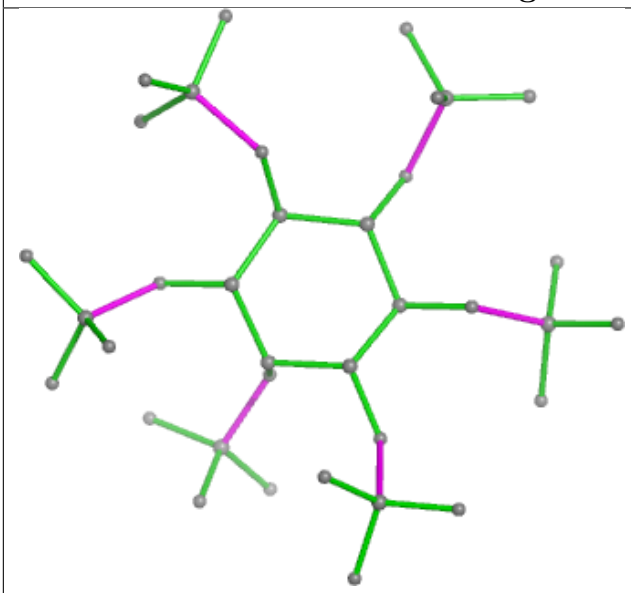


Torsions

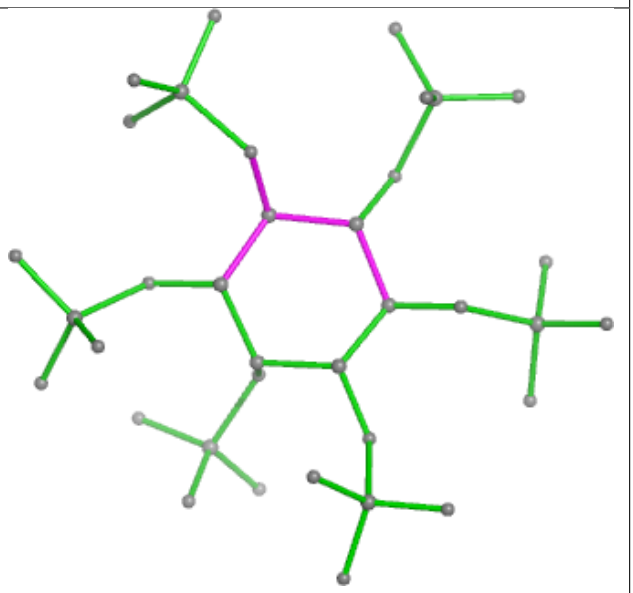


Rings

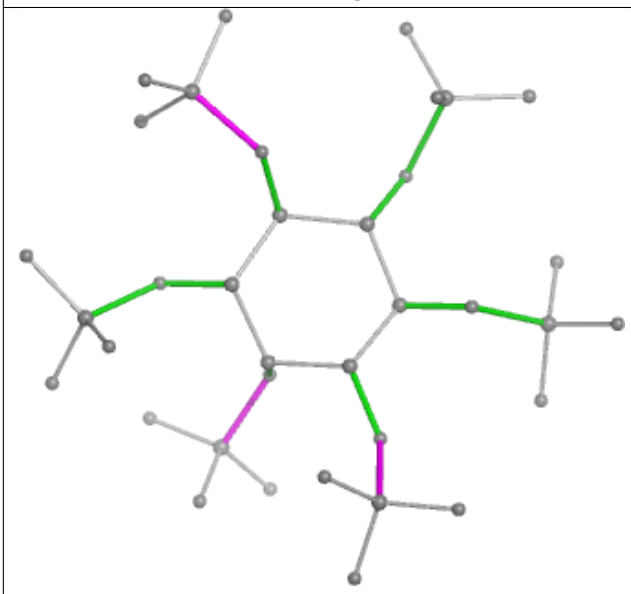
Ligand IHP A 3000



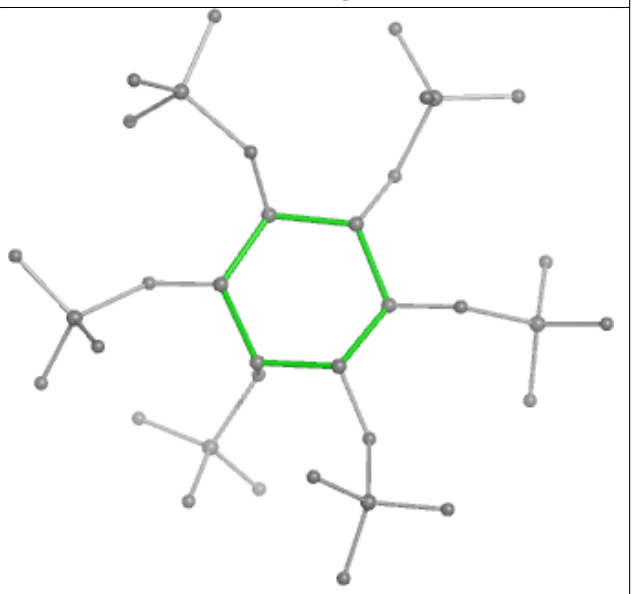
Bond lengths



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.

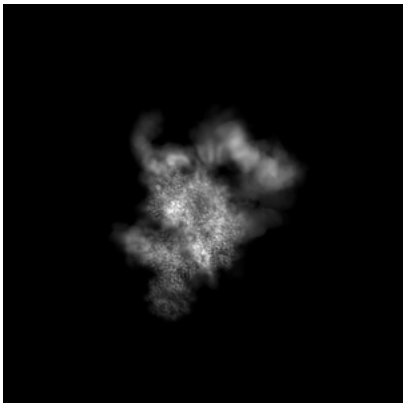
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-19399. These allow visual inspection of the internal detail of the map and identification of artifacts.

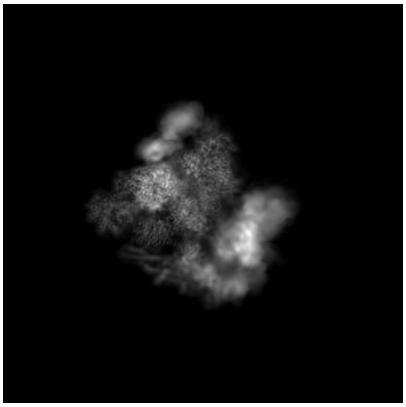
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

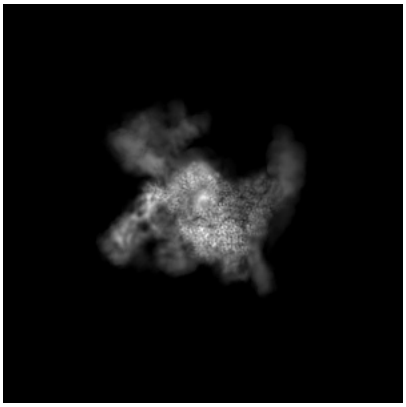
6.1.1 Primary map



X



Y

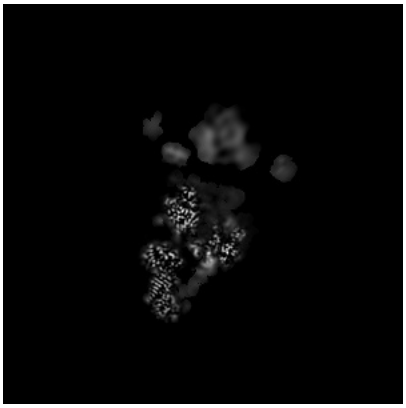


Z

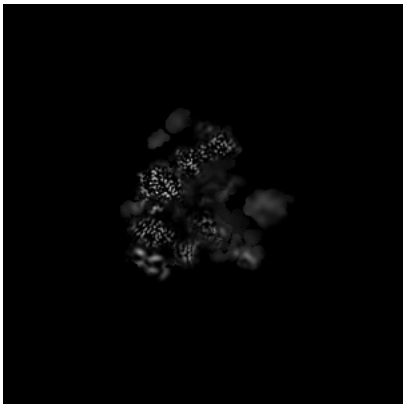
The images above show the map projected in three orthogonal directions.

6.2 Central slices

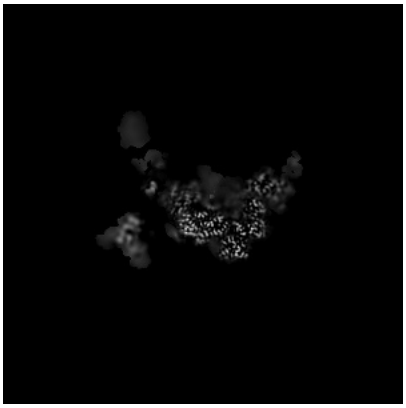
6.2.1 Primary map



X Index: 210



Y Index: 210

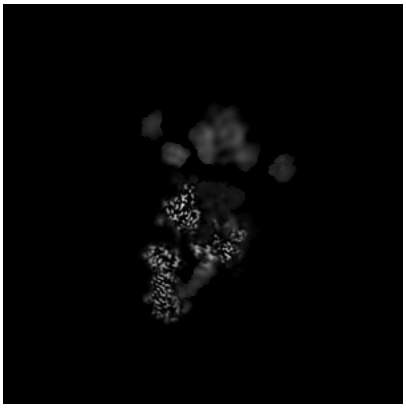


Z Index: 210

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

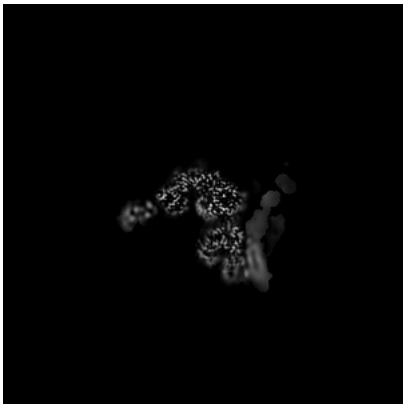
6.3 Largest variance slices (i)

6.3.1 Primary map



X Index: 208

Y Index: 181

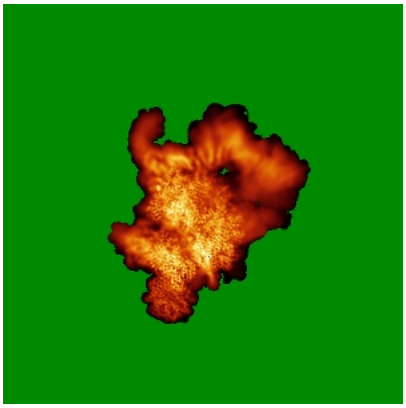


Z Index: 164

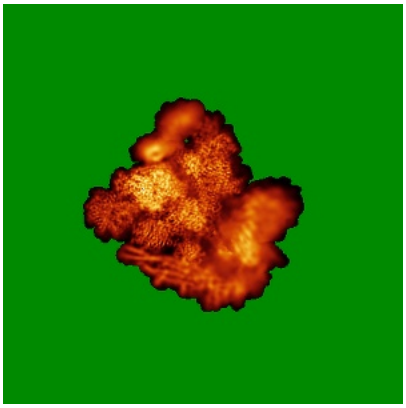
The images above show the largest variance slices of the map in three orthogonal directions.

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

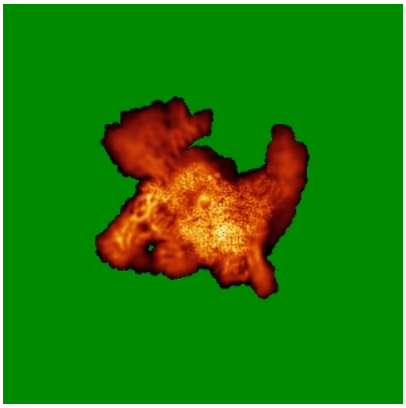
6.4.1 Primary map



X



Y

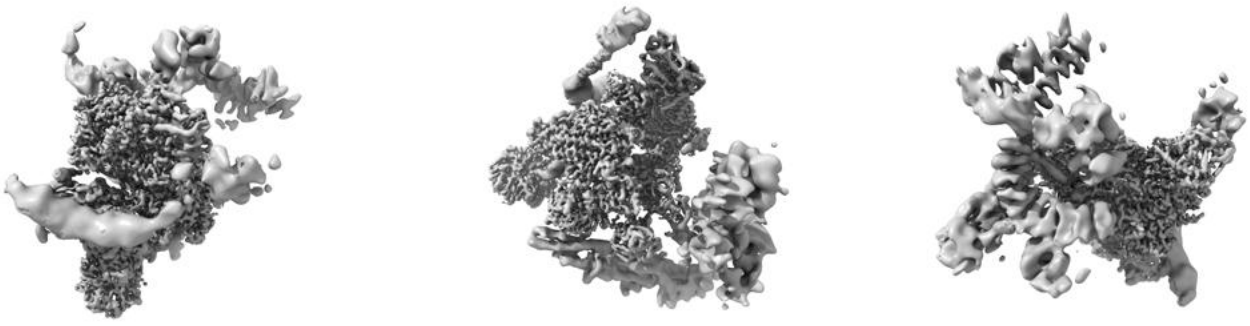


Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.975. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

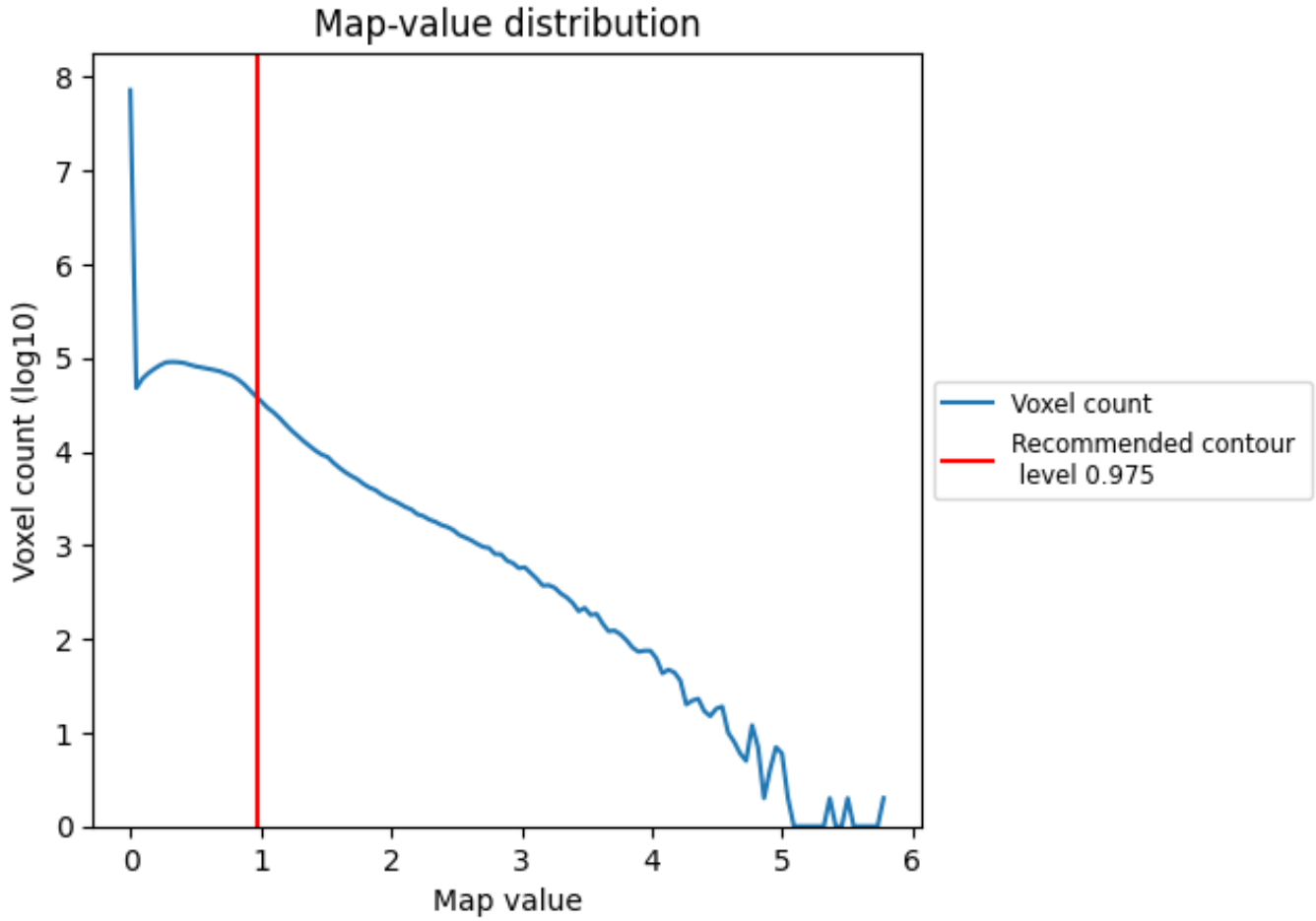
6.6 Mask visualisation (i)

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

7 Map analysis

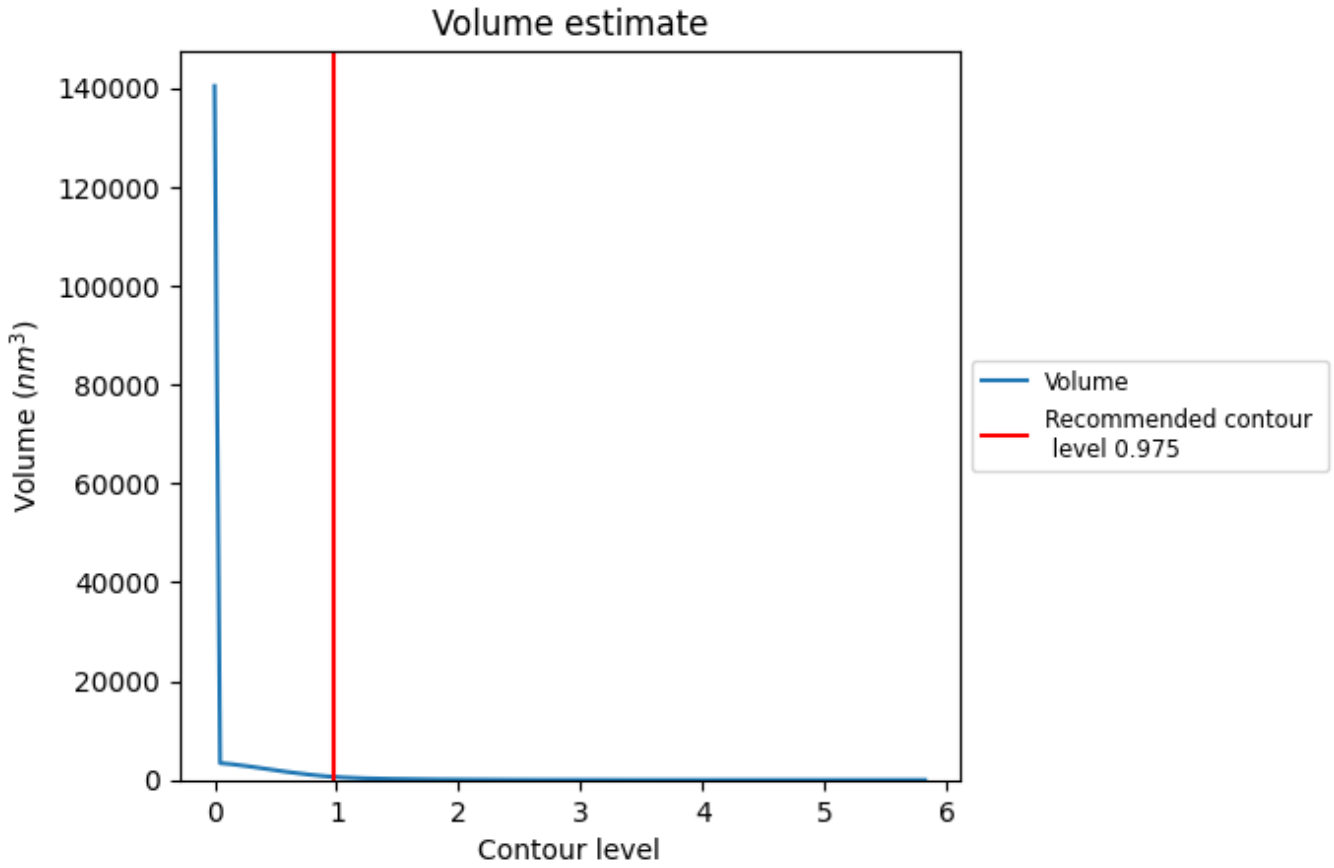
This section contains the results of statistical analysis of the map.

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.

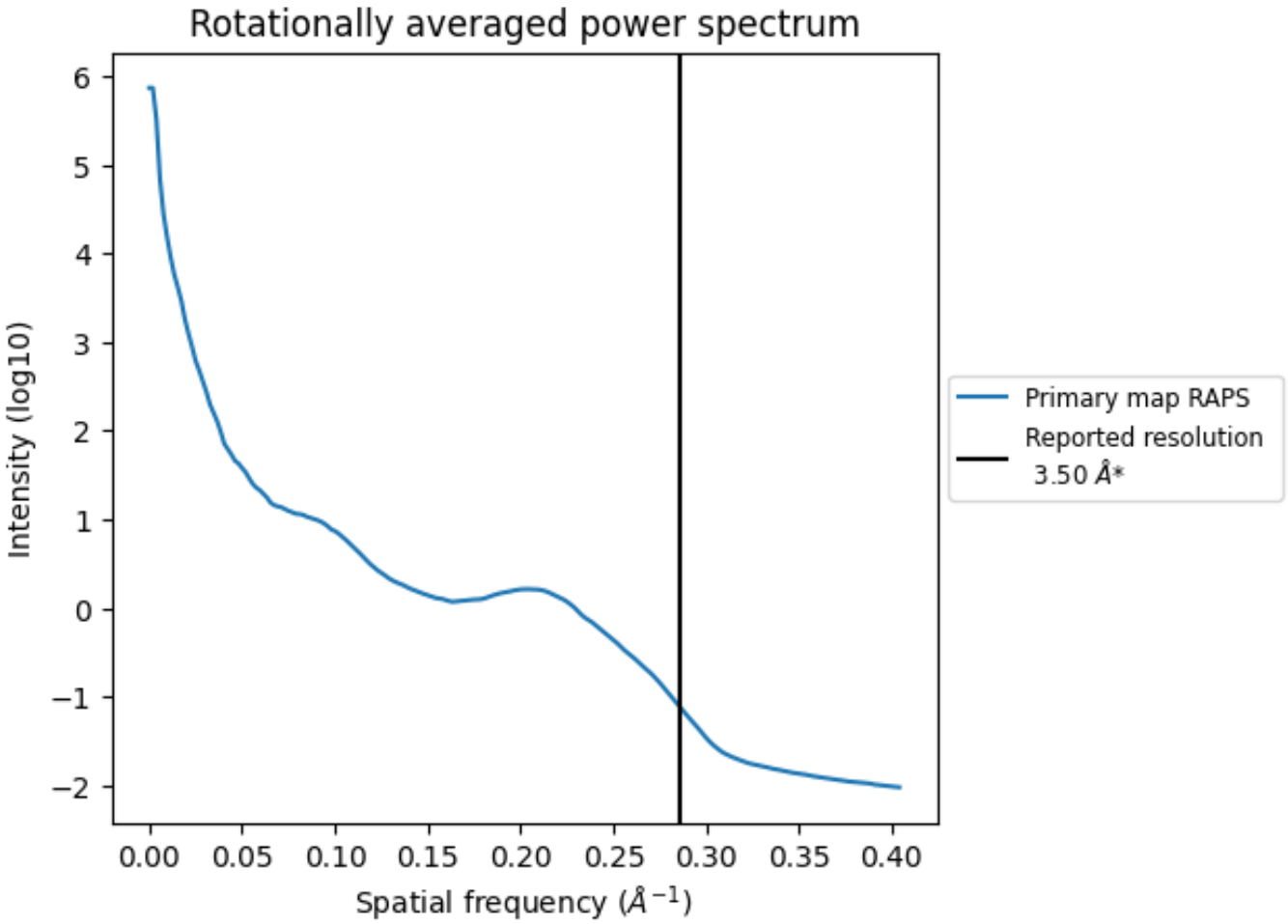
7.2 Volume estimate



The volume at the recommended contour level is 632 nm^3; this corresponds to an approximate mass of 571 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 0.286 Å^{-1}

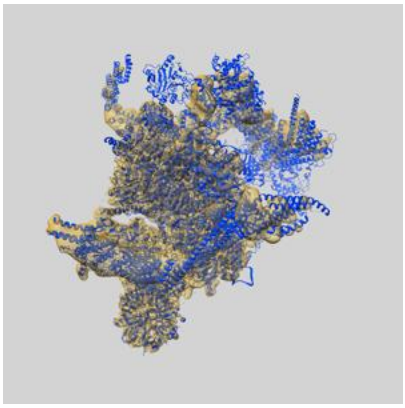
8 Fourier-Shell correlation (i)

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

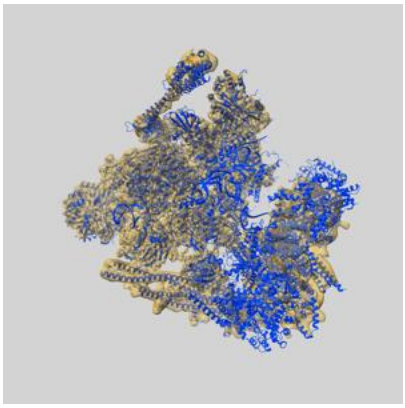
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-19399 and PDB model 8RO2. Per-residue inclusion information can be found in section 3 on page 12.

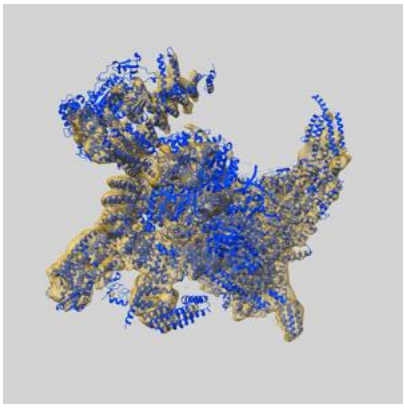
9.1 Map-model overlay



X



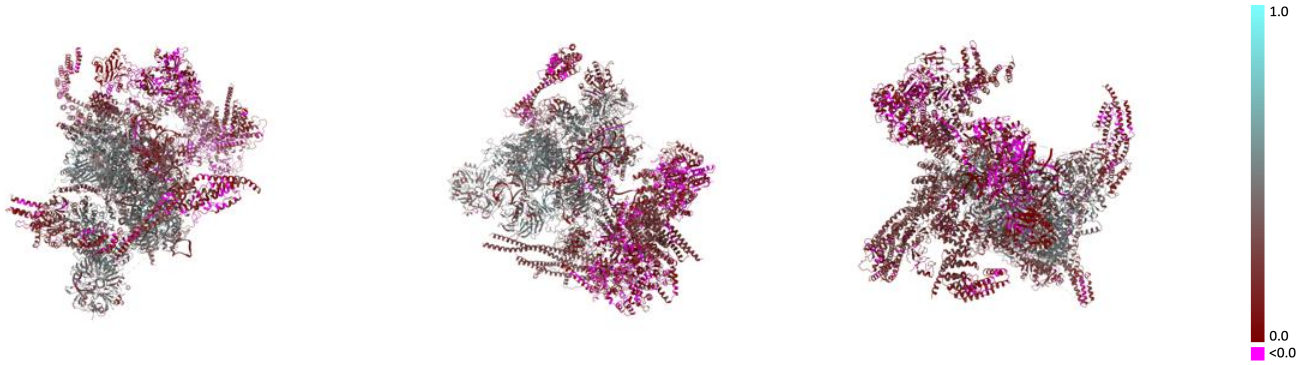
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.975 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.

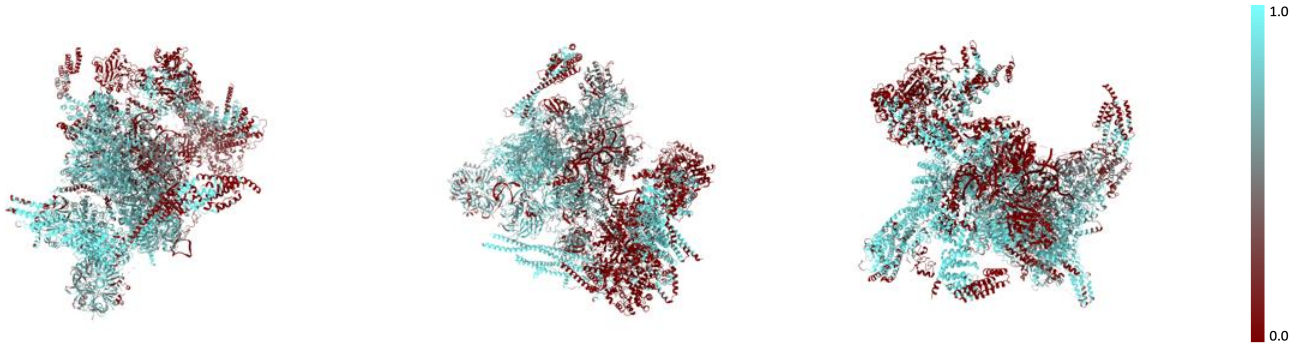
9.2 Q-score mapped to coordinate model (i)



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.

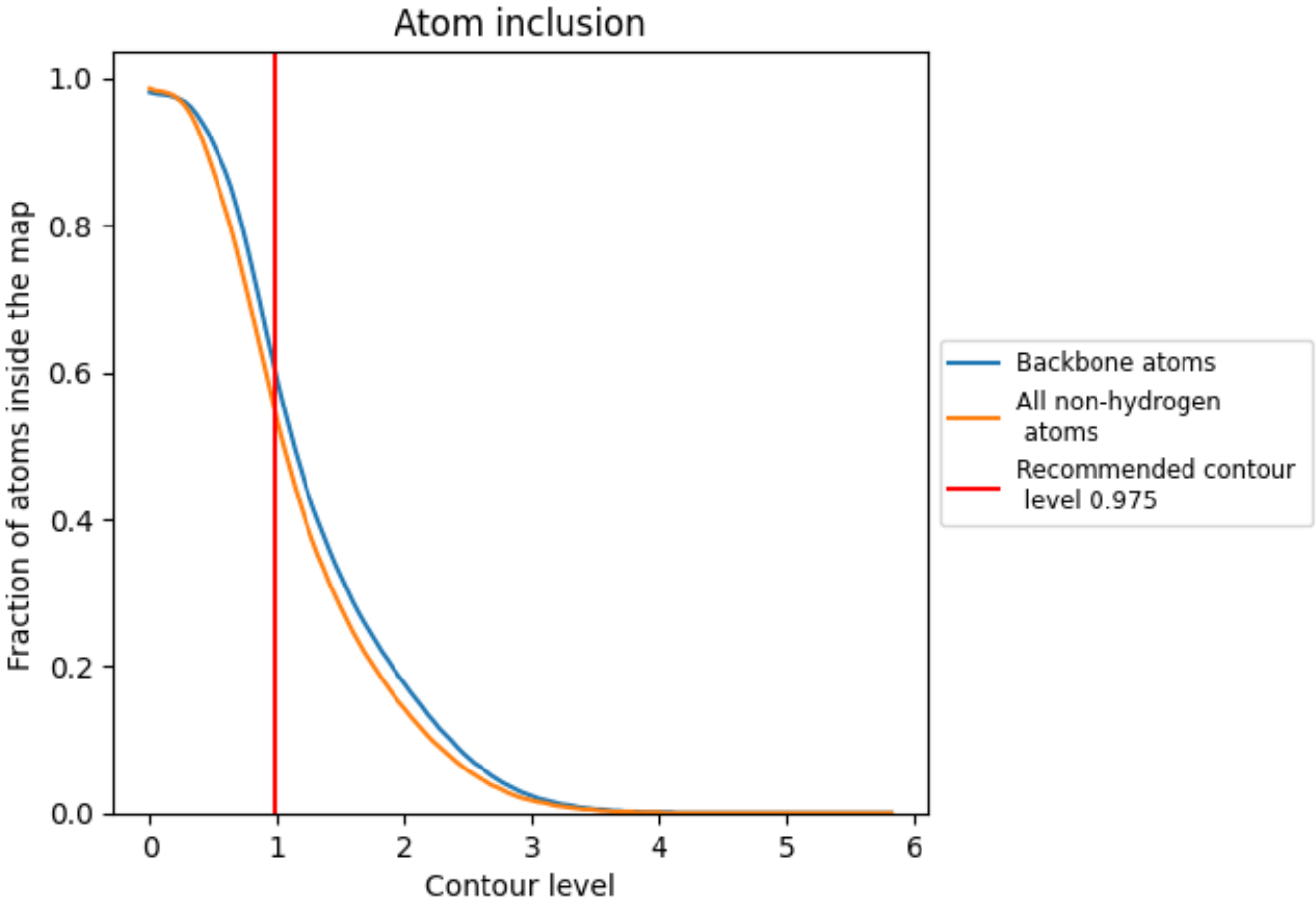
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.975).

9.4 Atom inclusion (i)



At the recommended contour level, 61% of all backbone atoms, 55% 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 (0.975) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5500	0.2970
2	0.1030	0.1420
3	0.1130	0.2610
5	0.7420	0.3420
6	0.1140	0.1380
A	0.6610	0.4410
C	0.7990	0.4230
D	0.3200	0.1480
DX	0.3170	0.0420
E	0.7530	0.4590
I	0.7640	0.2170
IN	0.1340	0.1400
J	0.4970	0.2040
K	0.8930	0.2380
L	0.5120	0.2490
L1	0.0050	-0.0160
L2	0.5040	0.3570
M	0.3880	0.2140
N	0.7100	0.4570
O	0.4830	0.3360
P	0.3950	0.3060
PX	0.3900	0.0850
Q	0.1440	0.0730
R	0.5260	0.3470
S	0.6770	0.3700
T	0.8480	0.4350
TF	0.6370	0.1070
W	0.4190	0.3350
Z	0.5930	0.1980
a	0.7150	0.4790
b	0.5820	0.4170
c	0.5730	0.4140
d	0.4780	0.3430
e	0.5900	0.4110
f	0.6080	0.4210

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Continued from previous page...

Chain	Atom inclusion	Q-score
g	0.5840	0.4440
q	0.6130	0.2030
r	0.5660	0.1850
s	0.9060	0.2290
t	0.5800	0.1830
z	0.0260	-0.0320