



## Full wwPDB EM Validation Report ⓘ

Oct 28, 2024 – 09:43 pm GMT

PDB ID : 5MQ0  
EMDB ID : EMD-3541  
Title : Structure of a spliceosome remodeled for exon ligation  
Authors : Fica, S.M.; Oubridge, C.; Galej, W.P.; Wilkinson, M.E.; Newman, A.J.; Bai, X.-C.; Nagai, K.  
Deposited on : 2016-12-19  
Resolution : 4.17 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](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev113  
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) : 2.39

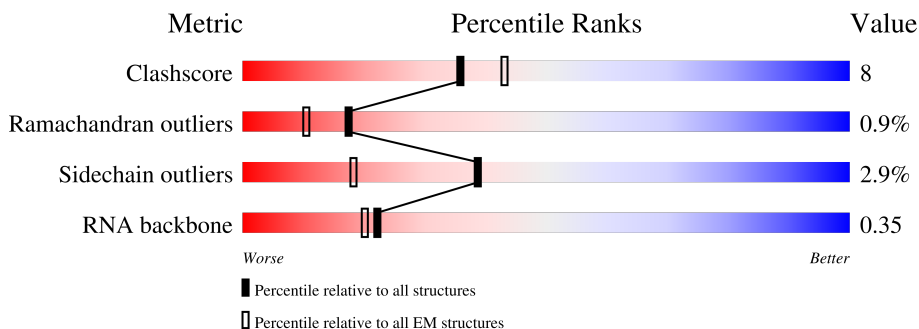
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.17 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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	I	95	
2	E	20	
3	2	1175	
4	6	112	
5	5	179	
6	A	2413	
7	C	1008	

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Mol	Chain	Length	Quality of chain
8	H	577	41% 52% 17% 31%
9	J	451	14% 51% 22% 24%
10	K	379	20% 42% 8% 51%
11	L	157	12% 82% 14%
12	M	339	19% 64% 10% 26%
13	N	364	22% 50% 12% 38%
14	O	590	10% 30% 6% 64%
15	P	175	16% 35% 61%
16	R	135	54% 72% 7% 20%
17	S	687	34% 60% 7% 32%
18	T	877	53% 64% 8% 28%
19	a	251	26% 55% 45%
20	c	382	11% 25% 73%
21	o	455	36% 65% 31%
22	X	68	50% 97%
23	y	215	10% 38% 61%
24	b	196	19% 41% 59%
24	k	196	41% 39% 59%
25	d	101	42% 81% 19%
25	n	101	81% 78% 19%
26	e	94	65% 78% 20%
26	p	94	80% 73% 6% 20%
27	f	86	53% 84% 16%
27	q	86	84% 81% 16%
28	g	77	69% 88% 10%

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Mol	Chain	Length	Quality of chain
28	r	77	
29	h	146	
29	l	146	
30	j	110	
30	m	110	
31	V	1145	
32	W	238	
33	Y	111	
34	3	3	
35	s	175	
36	t	503	
36	u	503	
36	v	503	
36	w	503	

## 2 Entry composition

There are 41 unique types of molecules in this entry. The entry contains 77441 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 Yeast UBC4 gene for ubiquitin-conjugating enzyme.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	I	34	714	321	118	241	34	0	0

- Molecule 2 is a RNA chain called 5'-EXON OF UBC4 PRE-MRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	E	16	346	155	66	109	16	0	0

- Molecule 3 is a RNA chain called S.cerevisiae chromosome II reading frame ORF YBR230c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	2	155	3271	1462	547	1107	155	0	0

- Molecule 4 is a RNA chain called Saccharomyces cerevisiae strain T.52\_2H chromosome XII sequence.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	6	99	2108	944	375	690	99	0	0

- Molecule 5 is a RNA chain called Saccharomyces cerevisiae strain WI\_C\_MBSP\_4 chromosome VII sequence.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	5	141	2999	1342	530	986	141	0	0

- Molecule 6 is a protein called Pre-mRNA-splicing factor 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	A	1914	15199	9832	2669	2645	53	0	0

- Molecule 7 is a protein called Pre-mRNA-splicing factor SNU114.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	C	874	6562	4265	1104	1168	25	0	0

- Molecule 8 is a protein called Pre-mRNA-splicing factor CWC22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	401	3261	2104	544	595	18	0	0

- Molecule 9 is a protein called Pre-mRNA-splicing factor PRP46.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	J	342	2690	1699	475	506	10	0	0

- Molecule 10 is a protein called Pre-mRNA-processing protein 45.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	K	187	1458	908	269	276	5	0	0

- Molecule 11 is a protein called Pre-mRNA-splicing factor BUD31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	L	155	1162	737	217	198	10	0	0

- Molecule 12 is a protein called Pre-mRNA-splicing factor CWC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	M	252	2016	1281	356	368	11	0	0

- Molecule 13 is a protein called Pre-mRNA-splicing factor SLT11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	N	227	1798	1139	309	335	15	0	0

- Molecule 14 is a protein called Pre-mRNA-splicing factor CEF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	O	211	1755	1102	320	327	6	0	0

- Molecule 15 is a protein called Pre-mRNA-splicing factor CWC15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	P	69	565	358	112	94	1	0	0

- Molecule 16 is a protein called Pre-mRNA-splicing factor CWC21.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
16	R	108	614	369	121	124	0	0

- Molecule 17 is a protein called Pre-mRNA-splicing factor CLF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	S	468	3229	2025	599	598	7	0	0

- Molecule 18 is a protein called Pre-mRNA-splicing factor SYF1,PRE-MRNASPLICING FACTOR SYF1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
18	T	633	3154	1888	633	633	0	0

- Molecule 19 is a protein called Pre-mRNA-splicing factor 18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	a	137	1119	726	194	196	3	0	0

- Molecule 20 is a protein called Pre-mRNA-splicing factor SLU7.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	c	103	Total	C	N	O	S	0	0
			786	498	142	144	2		

- Molecule 21 is a protein called Pre-mRNA-processing factor 17.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	o	313	Total	C	N	O	S	0	0
			2425	1537	429	451	8		

- Molecule 22 is a protein called UNKNOWN PROTEIN.

Mol	Chain	Residues	Atoms				AltConf	Trace
22	X	68	Total	C	N	O	0	0
			338	202	68	68		

- Molecule 23 is a protein called Pre-mRNA-splicing factor SYF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	y	83	Total	C	N	O	S	0	0
			679	420	125	133	1		

- Molecule 24 is a protein called Small nuclear ribonucleoprotein-associated protein B.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	b	80	Total	C	N	O	S	0	0
			631	403	114	111	3		
24	k	80	Total	C	N	O	S	0	0
			631	403	114	111	3		

- Molecule 25 is a protein called Small nuclear ribonucleoprotein Sm D3.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	d	82	Total	C	N	O	S	0	0
			625	399	109	115	2		
25	n	82	Total	C	N	O	S	0	0
			625	399	109	115	2		

- Molecule 26 is a protein called Small nuclear ribonucleoprotein E.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	e	75	Total	C	N	O	S	0	0
			575	379	92	101	3		

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	p	75	Total	C	N	O	S	0	0
			575	379	92	101	3		

- Molecule 27 is a protein called Small nuclear ribonucleoprotein F.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	f	72	Total	C	N	O	S	0	0
			573	368	101	103	1		
27	q	72	Total	C	N	O	S	0	0
			573	368	101	103	1		

- Molecule 28 is a protein called Small nuclear ribonucleoprotein G.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	g	69	Total	C	N	O	S	0	0
			529	337	93	97	2		
28	r	69	Total	C	N	O	S	0	0
			526	336	93	95	2		

- Molecule 29 is a protein called Small nuclear ribonucleoprotein Sm D1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	h	82	Total	C	N	O	S	0	0
			644	409	110	123	2		
29	l	79	Total	C	N	O	S	0	0
			618	393	107	116	2		

- Molecule 30 is a protein called Small nuclear ribonucleoprotein Sm D2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	j	94	Total	C	N	O	S	0	0
			741	477	141	119	4		
30	m	93	Total	C	N	O	S	0	0
			726	468	136	118	4		

- Molecule 31 is a protein called Pre-mRNA-splicing factor ATP-dependent RNA helicase PRP22.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
31	V	645	Total	C	N	O	0	0
			3189	1899	645	645		

- Molecule 32 is a protein called U2 small nuclear ribonucleoprotein A'.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
32	W	164	816	488	164	164	0	0

- Molecule 33 is a protein called U2 small nuclear ribonucleoprotein B'.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
33	Y	84	416	248	84	84	0	0

- Molecule 34 is a RNA chain called 3'-EXON OF UBC4 PRE-MRNA, BOUND BY PRP22 HELICASE.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
34	3	3	60	27	6	24	3	0	0

- Molecule 35 is a protein called Pre-mRNA-splicing factor SNT309.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
35	s	110	548	328	110	110	0	0

- Molecule 36 is a protein called Pre-mRNA-processing factor 19.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
36	t	438	2171	1295	438	438	0	0
36	u	116	578	346	116	116	0	0
36	v	118	588	352	118	118	0	0
36	w	435	2156	1286	435	435	0	0

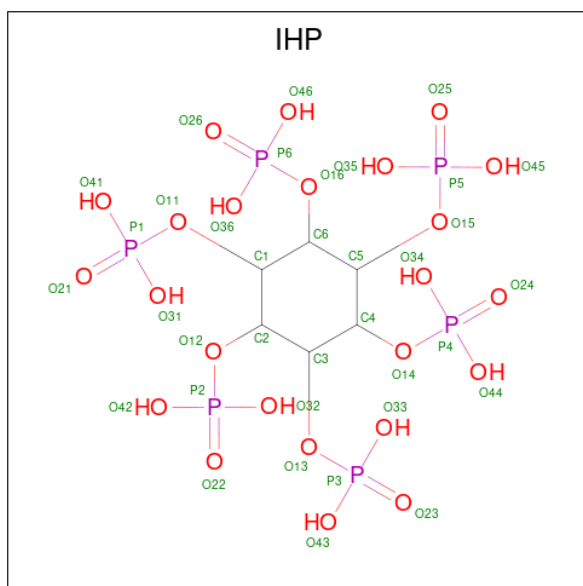
- Molecule 37 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
37	6	3	Total	Mg	0
			3	3	

- Molecule 38 is POTASSIUM ION (three-letter code: K) (formula: K).

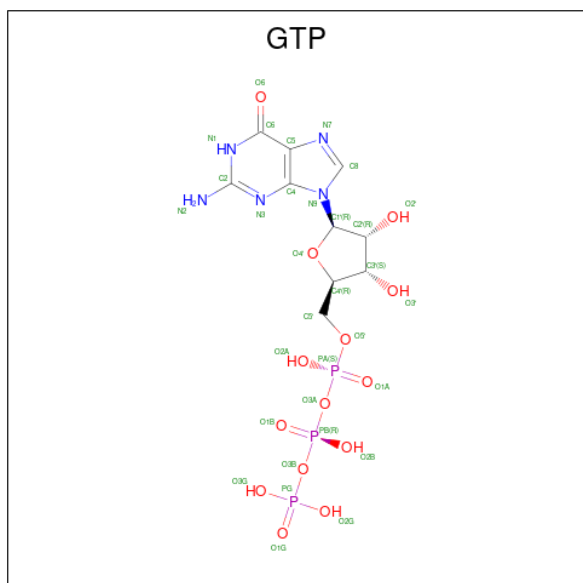
Mol	Chain	Residues	Atoms	AltConf
38	6	2	Total K 2 2	0

- Molecule 39 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula:  $C_6H_{18}O_{24}P_6$ ).



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

- Molecule 40 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula:  $C_{10}H_{16}N_5O_{14}P_3$ ).



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

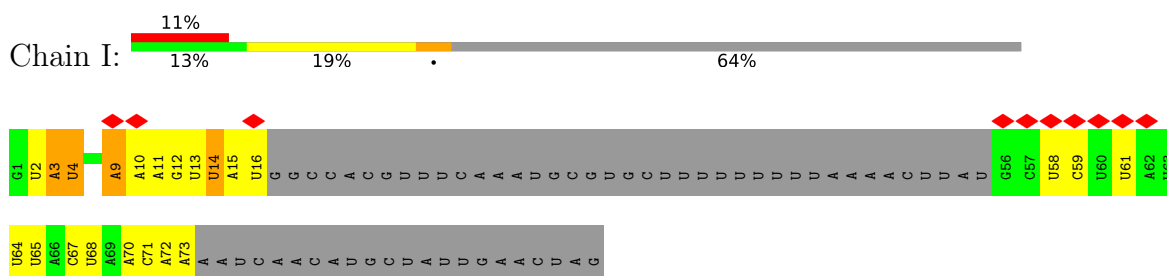
- Molecule 41 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
41	L	3	Total	Zn	0
			3	3	
41	M	1	Total	Zn	0
			1	1	
41	N	2	Total	Zn	0
			2	2	

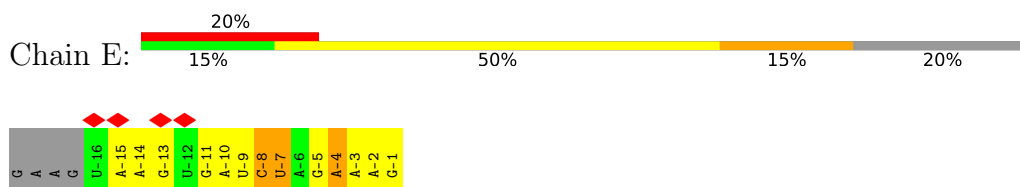
### 3 Residue-property plots [i](#)

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.

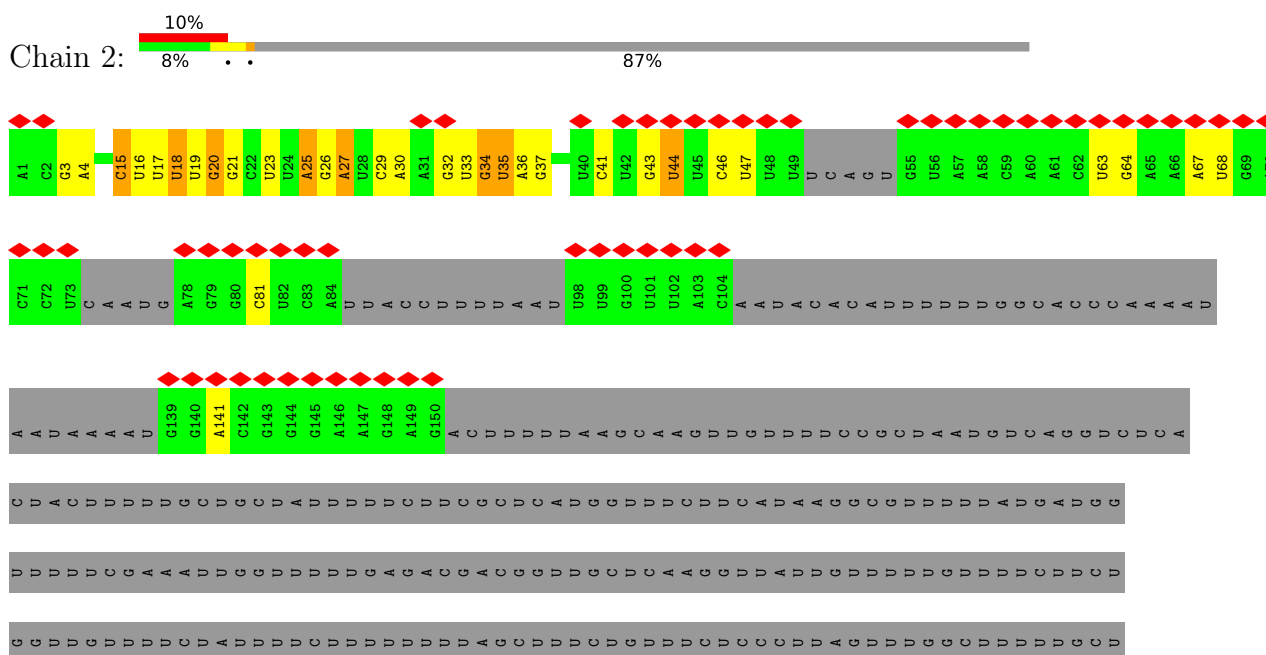
- Molecule 1: Yeast UBC4 gene for ubiquitin-conjugating enzyme



- Molecule 2: 5'-EXON OF UBC4 PRE-MRNA



- Molecule 3: *S.cerevisiae* chromosome II reading frame ORF YBR230c





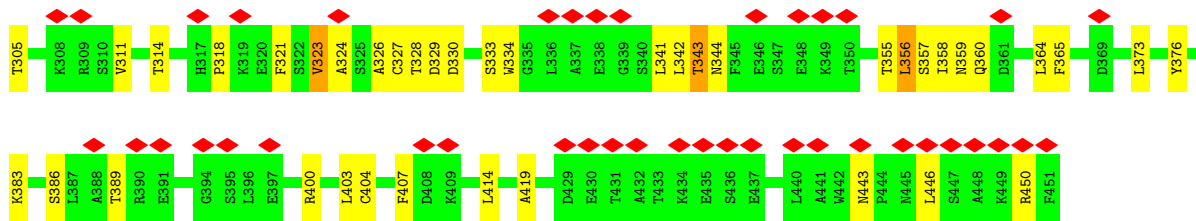


9907	D906	A1047	A1138	E1277	P1391	R1511	M1618	I1701	S1837	T1936	S2021	ALA	ASP
A915	A915	L1054	M1139	V1278	K1392	F1514	V1619	T1702	S1838	R1937	A2022	ALA	ASP
L916	A915	G1055	M1140	V1279	E1393	F1521	V1620	M1703	E1842	K1938	K2023	ALA	VAL
L919	L916	E1056	F1144	S1280	L1400	R1521	G1622	E1704	E1843	M1940	M2024	GLN	THR
R920	L919	M1057	F1147	M1281	S1401	D1523	F1623	H1707	M1845	L1941	L2025	THR	THR
D921	R920	A1058	K1148	D1282	A1402	M1537	L1624	E1708	N1846	D1942	L2026	VAL	VAL
S925	D921	F1063	I1158	V1286	I1405	W1537	D1628	H1718	I1848	F1951	S2028	ASN	ASN
R926	S925	L1066	I1158	D1287	L1406	R1543	L1629	E1719	I1848	R1957	D2029	THR	THR
R927	R926	M1067	Y1161	L1288	L1407	T1544	T1630	E1720	K1849	P1958	P2030	THR	THR
R928	R927	L1069	L1165	E1291	W1414	D1545	G1631	M1721	L1850	T1959	T2031	ASN	ASN
L929	R928	L1072	D1166	R1292	D1419	V1546	F1633	F1724	T1855	E1960	T2033	ALA	ALA
R934	L929	I1073	R1167	T1293	H1420	I1547	L1634	K1725	H1856	L1961	I2034	GLN	GLN
D945	R934	V1074	M1170	K1294	G1421	I1553	H1635	G1726	Y1858	R1962	K2035	GLY	GLY
L958	D945	D1075	L1171	Q1295	I1422	T1565	G1636	L1727	R1859	L1964	S2036	ILE	ILE
L959	L958	I1082	F1172	L1302	F1425	M1568	L1641	M1732	V1862	F1965	H2038	VAL	VAL
T960	L959	T1083	L1182	I1309	R1426	S1569	L1645	M1733	T1865	S1966	L2039	VAL	VAL
R961	T960	A1084	L1182	I1309	M1429	W1570	F1649	F1734	E1866	A1967	E2046	TRP	TRP
R962	R961	K1085	A1188	M1321	M1429	M1575	R1650	A1754	E1867	A1968	Q2047	ALA	ALA
R965	R962	N1086	P1193	S1323	D1433	L1575	A1651	I1757	G1866	M1969	R2065	TYR	TYR
P966	R965	V1088	M1194	G1324	E1434	W1654	Q1655	D1758	G1867	K1973	R2068	GLN	GLN
I969	P966	V1089	F1195	S1325	K1435	L1655	K1656	M1763	G1877	L1974	V2069	THR	THR
R977	I969	F1092	S1198	T1326	L1436	M1575	F1663	V1764	C1878	S1975	N2070	ALA	ALA
I978	R977	K1093	T1327	F1328	L1440	L1575	F1663	V1764	G1877	D1976	I2071	PHE	PHE
V984	I978	D1094	N1203	T1337	F1441	L1575	Q1667	M1766	C1878	V1977	S2072	LYS	LYS
D985	V984	N1100	R1204	T1337	I1444	L1575	D1670	V1766	L1879	V1978	A2073	ASN	ASN
A993	D985	L1104	M1207	T1344	F1451	L1575	G1671	M1766	F1880	A1981	L2074	GLU	GLU
Y994	A993	I1105	W1207	Y1345	F1451	L1575	H1671	V1766	F1880	T1982	T2075	TRP	TRP
L995	Y994	G1106	R1212	F1346	S1454	L1575	V1674	V1766	L1881	L1984	E2078	VAL	VAL
D996	L995	L1107	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	P1984	L2079	ALA	ALA
L999	D996	K1108	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	F1989	I2082	ALA	ALA
R1006	L999	A1110	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	M1990	L2083	ALA	ALA
S1016	R1006	I1113	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	I1991	L2084	THR	THR
D1017	S1016	Y1116	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	Y1992	L2089	LEU	LEU
S1018	D1017	I1121	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	D1993	K2089	LEU	LEU
E1019	S1018	L1125	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L1996	Q2096	THR	THR
I1020	E1019	G1126	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	D1997	Q2096	VAL	VAL
P1021	I1020	L1127	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	R1998	A2099	VAL	VAL
P1022	P1021	Q1128	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	I1999	E2100	ASN	ASN
M1033	P1022	D1133	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	S2000	LEU	LEU	LEU
N1034	M1033	P1137	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2010	GLU	GLU	GLU
E1037	N1034	L1270	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2011	ALA	ALA	ALA
	E1037	M1267	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2012	ALA	ALA	ALA
		L1268	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2013	ALA	ALA	ALA
		F1260	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2014	ALA	ALA	ALA
		V1267	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	R2013	ALA	ALA	ALA
		R1268	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	A2014	ALA	ALA	ALA
		L1270	R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2015	ALA	ALA	ALA
			R1212	R1347	Q1465	L1575	V1675	V1766	L1882	L2016	ALA	ALA	ALA
			R1212	R1347	Q1465	L1575	V1675	V1766	L1882	K2016	ALA	ALA	ALA
			R1212	R1347	Q1465	L1575	V1675	V1766	L1882	T2017	ALA	ALA	ALA
			R1212	R1347	Q1465	L1575	V1675	V1766	L1882	M2018	ALA	ALA	ALA
			R1212	R1347	Q1465	L1575	V1675	V1766	L1882	E2019	ALA	ALA	ALA
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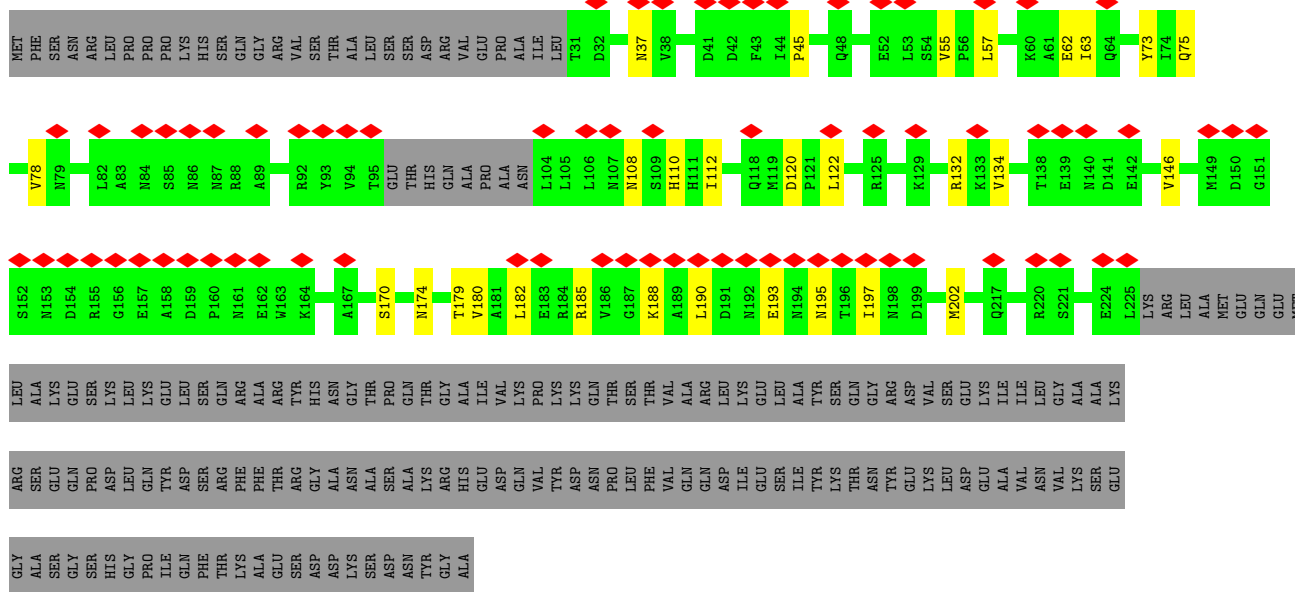
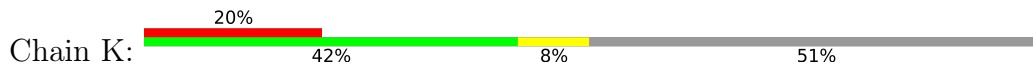




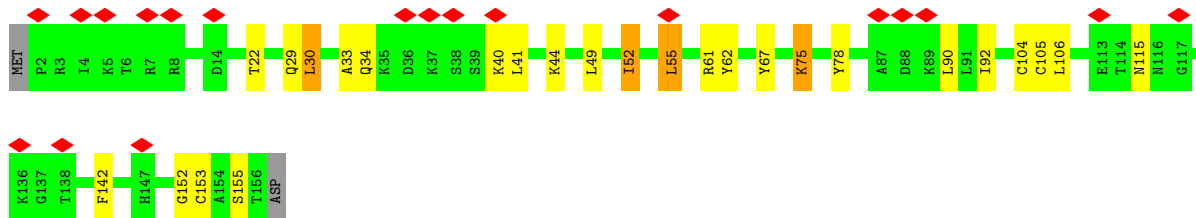
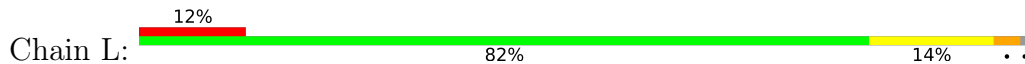




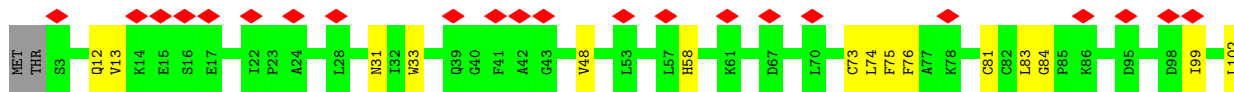
• Molecule 10: Pre-mRNA-processing protein 45



• Molecule 11: Pre-mRNA-splicing factor BUD31

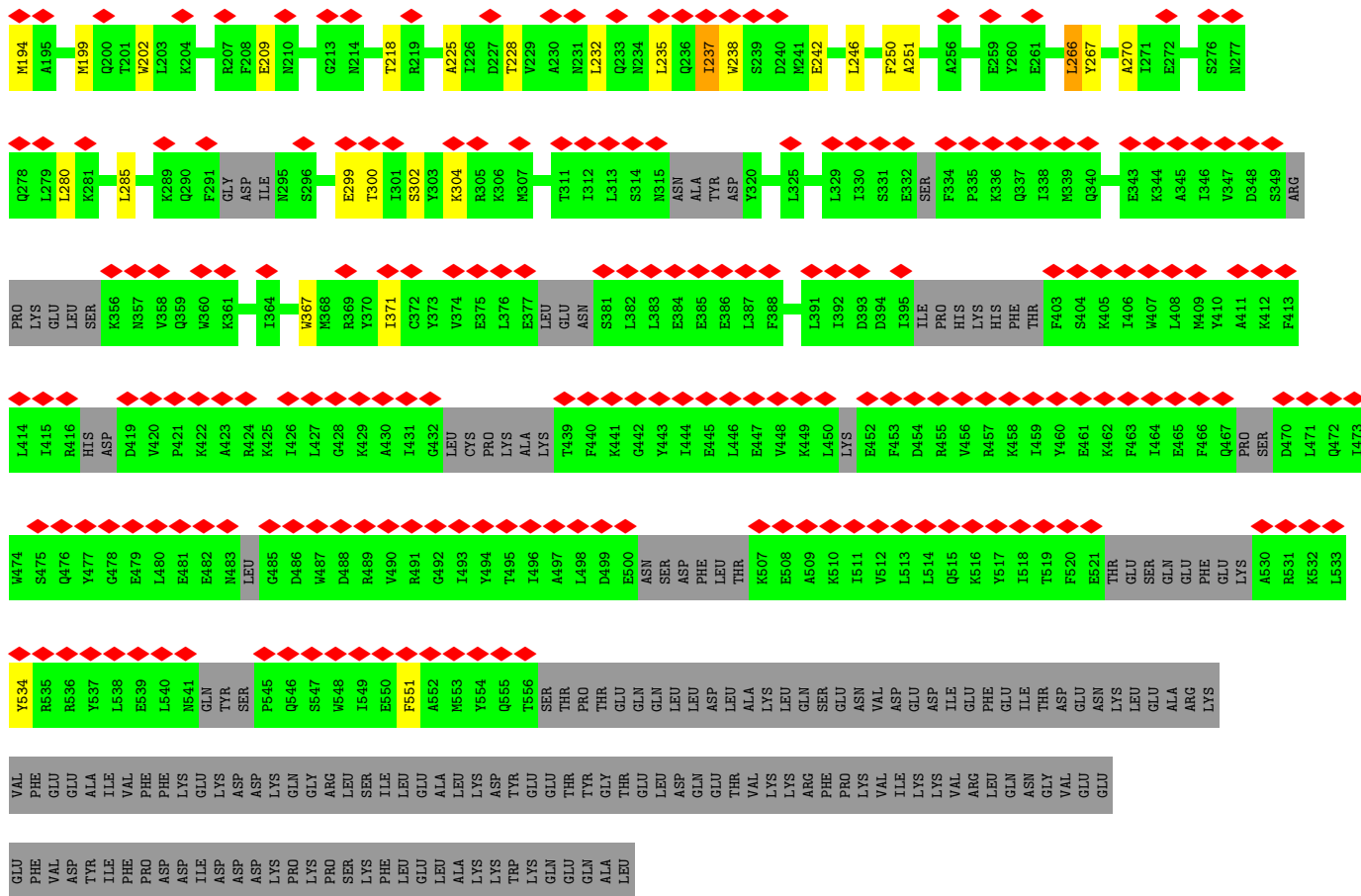


• Molecule 12: Pre-mRNA-splicing factor CWC2

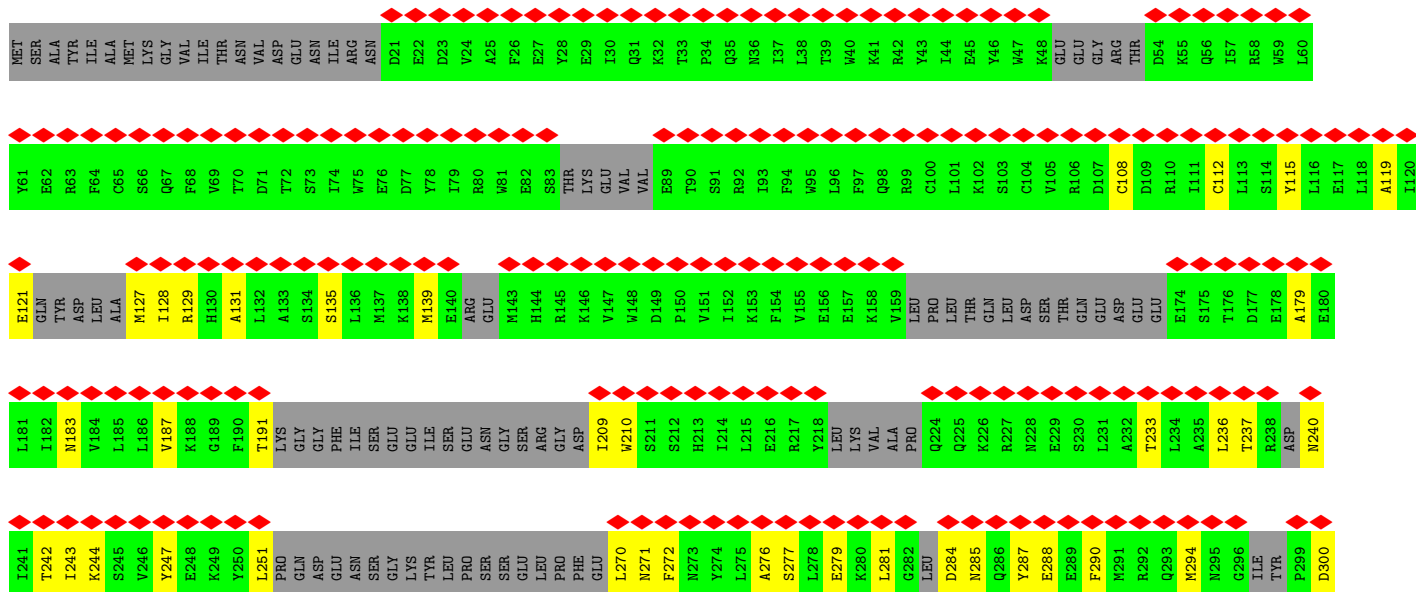


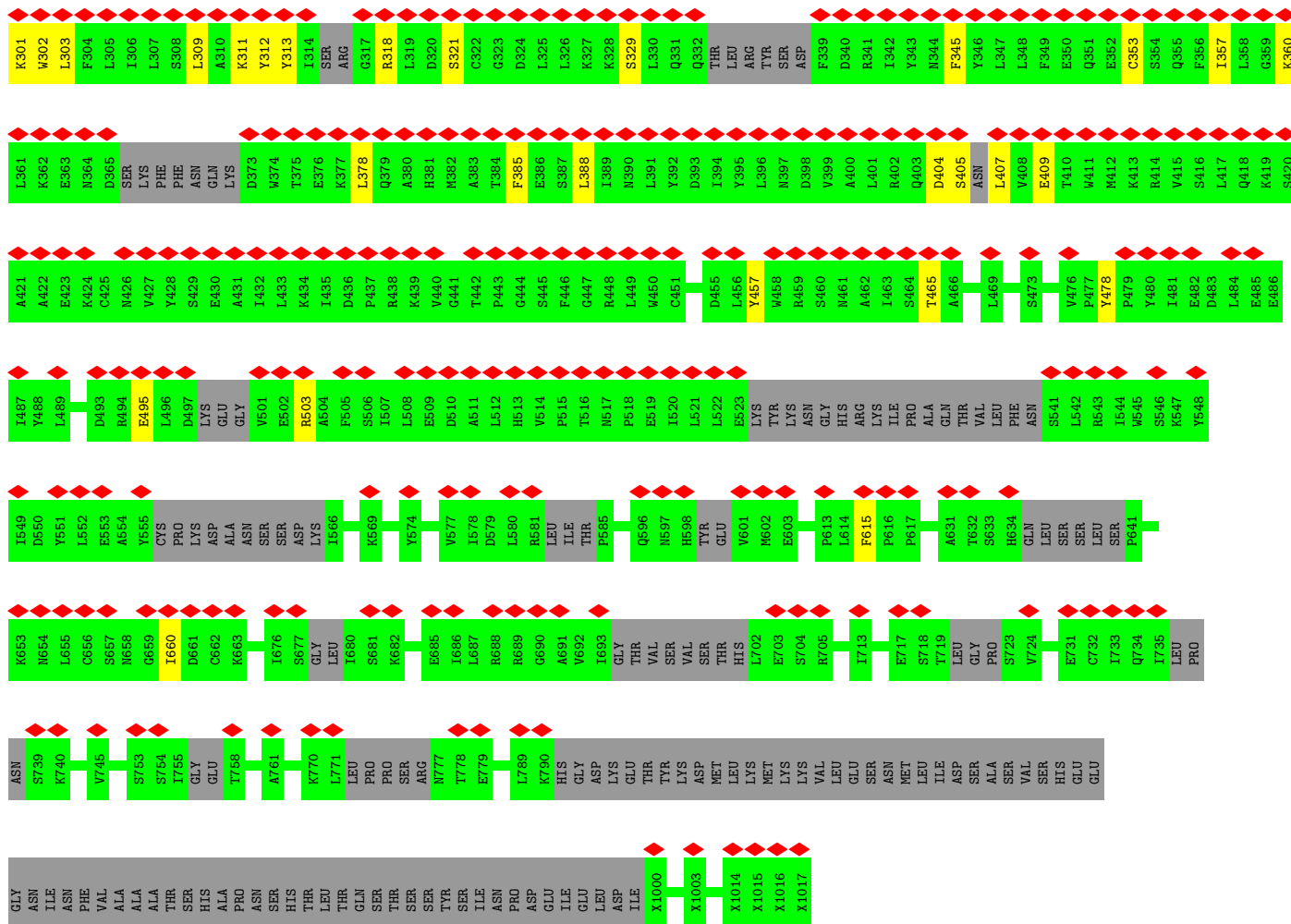




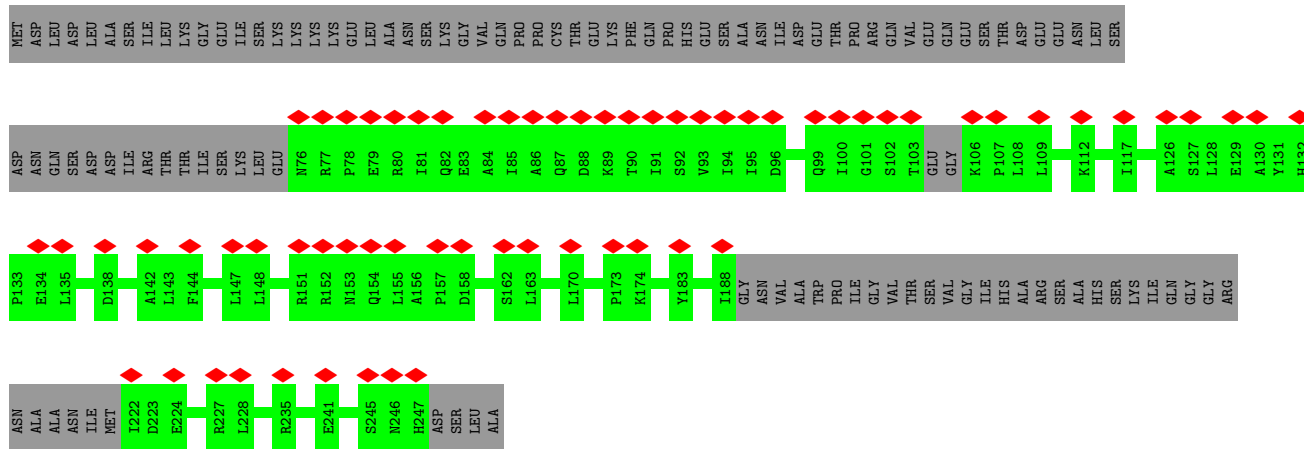


● Molecule 18: Pre-mRNA-splicing factor SYF1, PRE-MRNASPLICING FACTOR SYF1





• Molecule 19: Pre-mRNA-splicing factor 18



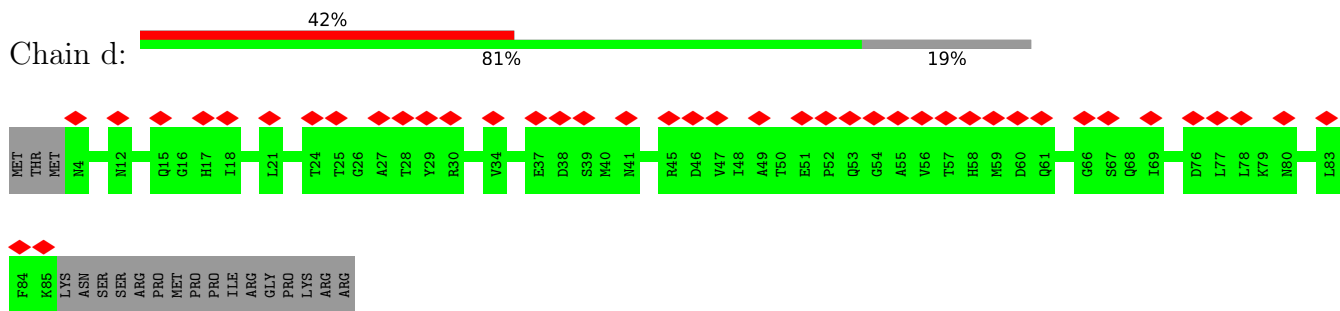
• Molecule 20: Pre-mRNA-splicing factor SLU7



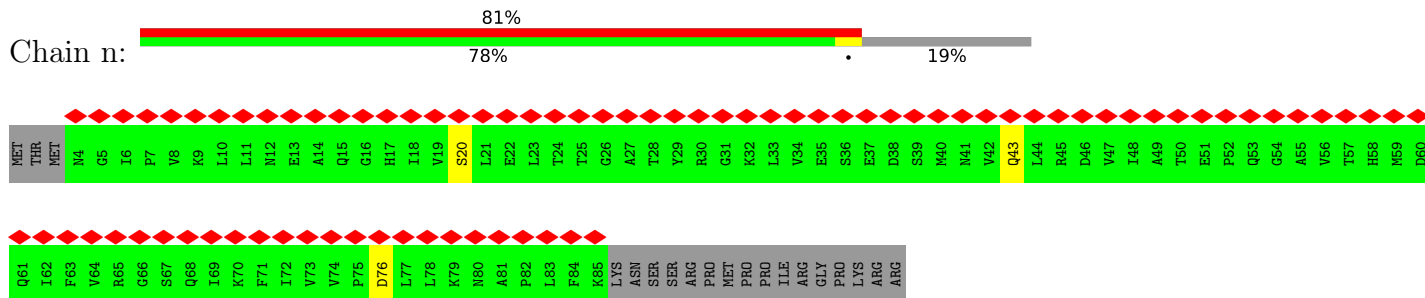




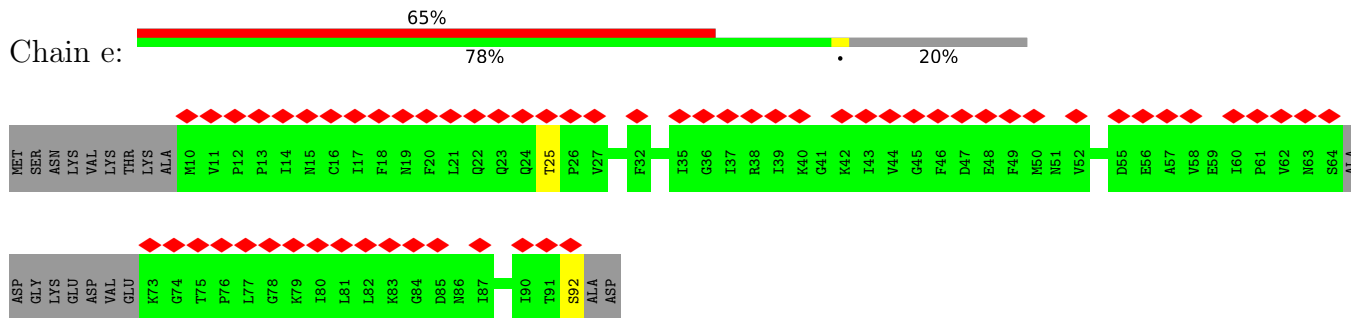




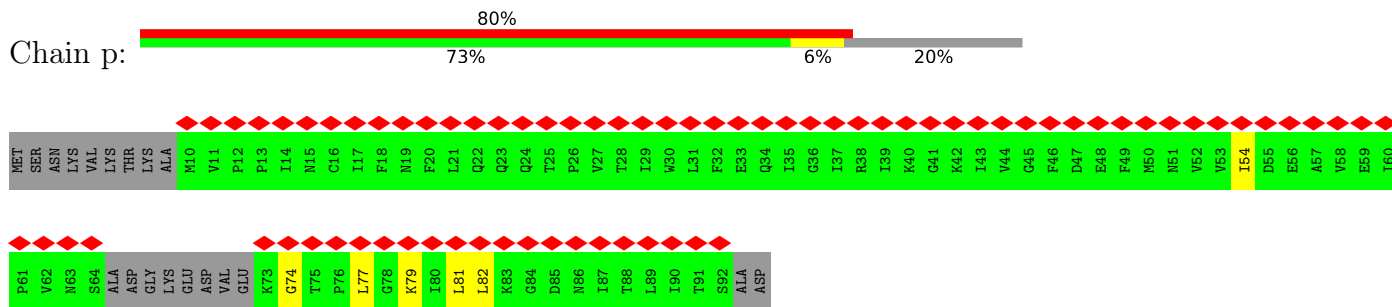
• Molecule 25: Small nuclear ribonucleoprotein Sm D3



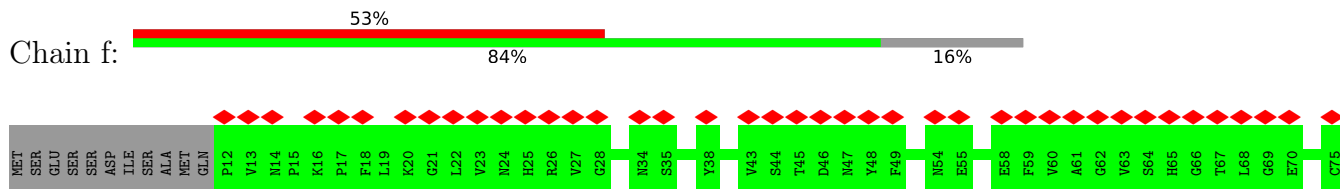
• Molecule 26: Small nuclear ribonucleoprotein E

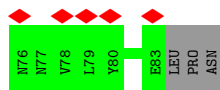


• Molecule 26: Small nuclear ribonucleoprotein E

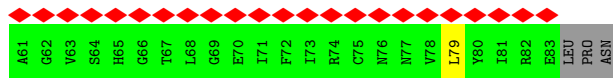
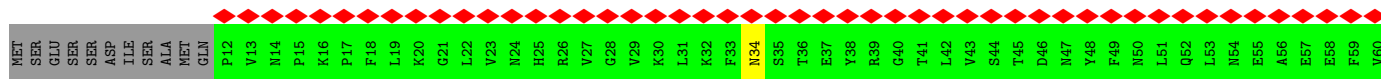
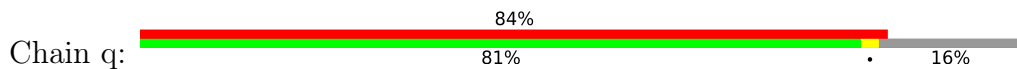


• Molecule 27: Small nuclear ribonucleoprotein F

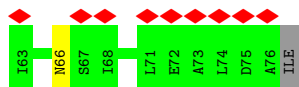
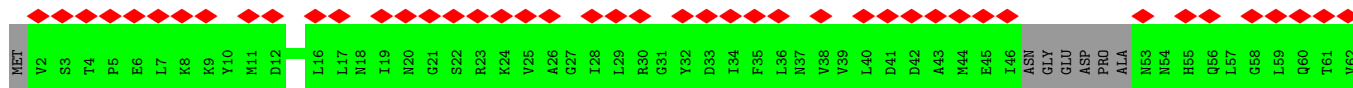
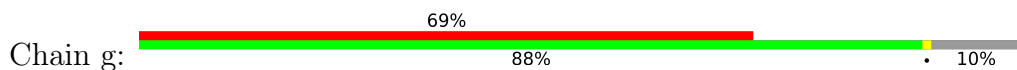




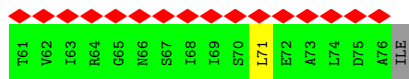
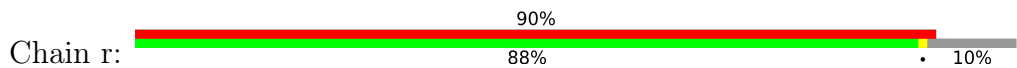
• Molecule 27: Small nuclear ribonucleoprotein F



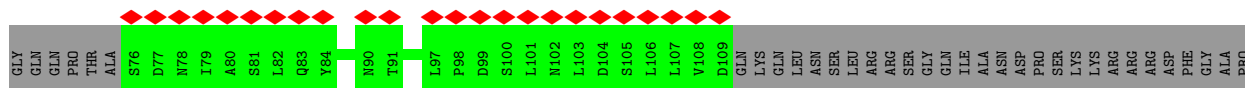
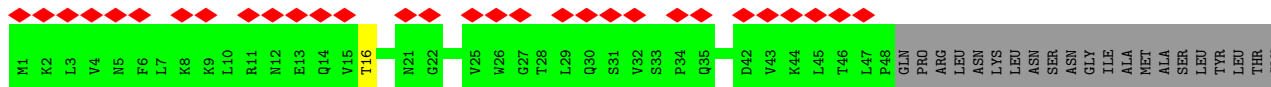
• Molecule 28: Small nuclear ribonucleoprotein G



• Molecule 28: Small nuclear ribonucleoprotein G



• Molecule 29: Small nuclear ribonucleoprotein Sm D1





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SER ASP  
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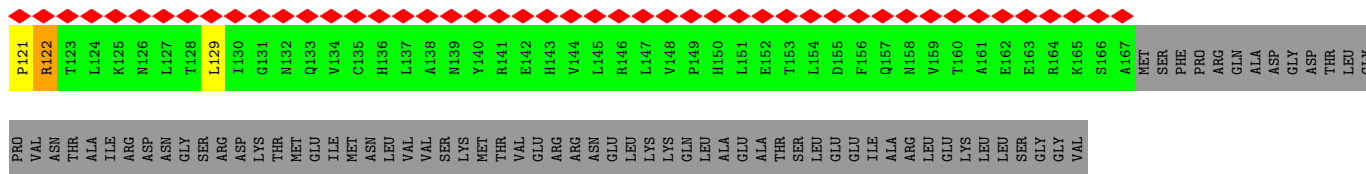
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• Molecule 32: U2 small nuclear ribonucleoprotein A'

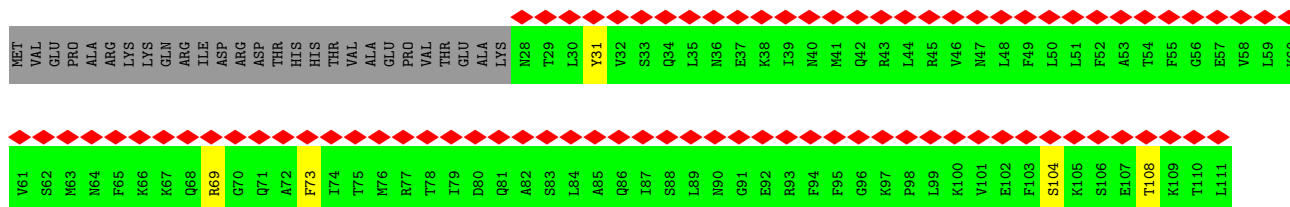
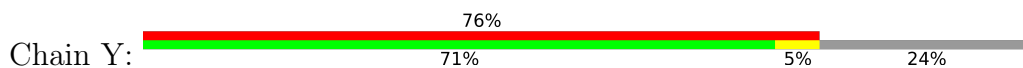


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M61 M62 D63 L64 I65 M66 I67 P68 D69 L70 S71 R72 R73 D74 D75 I76 H77 T78 L79 L80 L81 G82 R83 N84 M85 I86 V87 E88 V89 G91 G92 L93 L94 P95 M96 M97 V98 Q99 N100 L101 T102 L103 S104 N105 N106 S107 I108 R109 R110 F111 E112 D113 L114 Q115 R116 L117 R118 R119 A120



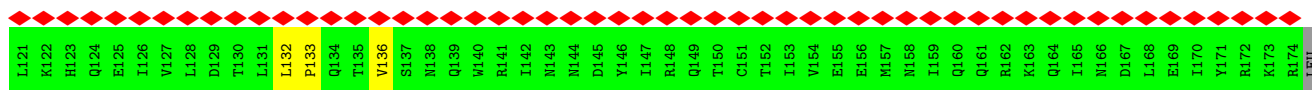
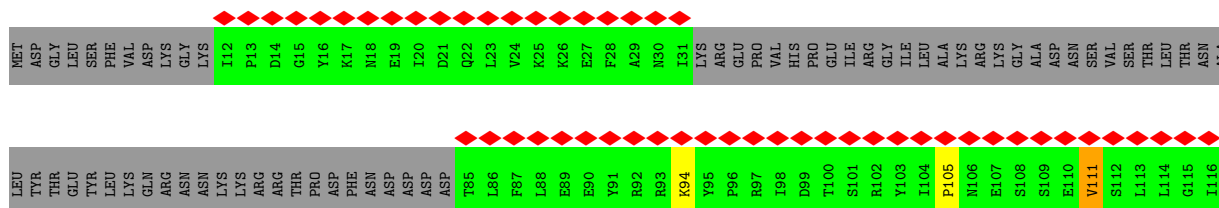
• Molecule 33: U2 small nuclear ribonucleoprotein B”



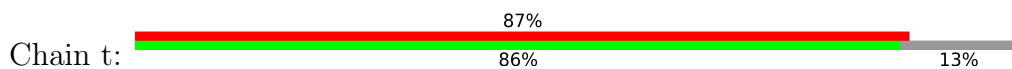
• Molecule 34: 3'-EXON OF UBC4 PRE-MRNA, BOUND BY PRP22 HELICASE



• Molecule 35: Pre-mRNA-splicing factor SNT309



• Molecule 36: Pre-mRNA-processing factor 19









C481	G482	D483	G484	G485	I486	A487	A488	I489	L490	K491	T492	M493	D494	S495	F496	M497	I498	V499	A500	L501	T502	P503																																					
THR	G422	T423	V424	T425	Y426	D427	I428	D429	D430	S431	G432	K433	M434	M435	I436	A437	Y438	S439	M440	E441	S442	M443	S444	L445	T446	I447	Y448	K449	F450	D451	K452	K453	T454	K455	M456	W457	T458	K459	D460	E461	E462	S463	A464	L465	C466	L467	GLN	SER	ASP	THR	A472	D473	F474	T475	D476	M477	D478	V479	V480
S361	P362	D363	Q364	A365	S366	S367	R368	F369	P370	V371	D372	E373	E374	A375	K376	I377	K378	E379	V380	K381	F382	A383	D384	N385	G386	Y387	W388	M389	V390	V391	E392	C393	D394	Q395	T396	V397	V398	C399	F400	D401	L402	R403	K404	D405	V406	G407	T408	L409	A410	Y411	P412	T413	Y414	T415	I416	PRO	GLU	PHE	LYS
Y301	F302	I303	W304	A305	D306	N307	R308	G309	T310	I311	G312	F313	Q314	S315	Y316	E317	D318	D319	S320	Q321	Y322	I323	V324	H325	S326	A327	K328	S329	D330	V331	E332	Y333	S334	S335	G336	V337	L338	H339	K340	D341	S342	L343	L344	L345	A346	L347	Y348	S349	P350	D351	G352	I353	L354	D355	V356	Y357	N358	L359	S360
S241	G242	G243	E244	H245	P246	A247	I248	I249	S250	R251	G252	P253	C254	N255	R256	L257	L258	L259	L260	Y261	P262	G263	N264	Q265	I266	T267	I268	L269	D270	S271	K272	T273	N274	K275	V276	L277	R278	E279	I280	E281	V282	D283	S284	A285	N286	E287	I288	I289	Y290	M291	Y292	G293	H294	N295	GLU	VAL	ASN	T299	E300
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## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	29527	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	2	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4500	Depositor
Magnification	81000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.094	Depositor
Minimum map value	-0.033	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.03	Depositor
Map size ( $\text{\AA}$ )	589.16, 589.16, 589.16	wwPDB
Map dimensions	412, 412, 412	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.43, 1.43, 1.43	Depositor

## 5 Model quality i

### 5.1 Standard geometry i

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

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	I	0.33	0/795	0.83	1/1231 (0.1%)
2	E	0.34	0/388	0.78	0/603
3	2	0.27	0/3639	0.72	0/5643
4	6	0.33	0/2357	0.72	1/3667 (0.0%)
5	5	0.32	0/3351	0.73	0/5213
6	A	0.46	0/15598	0.73	0/21212
7	C	0.42	0/6703	0.69	0/9138
8	H	0.48	0/3314	0.77	0/4463
9	J	0.47	0/2749	0.74	0/3735
10	K	0.44	0/1480	0.75	0/2000
11	L	0.46	0/1186	0.72	0/1606
12	M	0.41	0/2062	0.66	0/2772
13	N	0.41	0/1823	0.71	0/2456
14	O	0.46	0/1781	0.78	0/2385
15	P	0.39	0/580	0.66	0/776
16	R	0.41	0/617	0.68	0/848
17	S	0.47	0/3269	0.76	0/4446
18	T	0.42	0/3036	0.71	0/4197
19	a	0.38	0/1141	0.61	0/1546
20	c	0.45	1/798 (0.1%)	0.60	0/1074
21	o	0.41	0/2491	0.64	0/3384
23	y	0.34	0/681	0.54	0/902
24	b	0.36	0/636	0.63	0/856
24	k	0.35	0/636	0.58	0/856
25	d	0.35	0/634	0.56	0/859
25	n	0.37	0/634	0.53	0/859
26	e	0.41	0/585	0.61	0/795
26	p	0.40	0/585	0.56	0/795
27	f	0.40	0/585	0.57	0/791
27	q	0.40	0/585	0.61	0/791
28	g	0.50	0/532	0.61	0/715
28	r	0.35	0/529	0.50	0/711

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
29	h	0.38	0/649	0.54	0/880
29	l	0.40	0/623	0.64	0/844
30	j	0.36	0/753	0.57	0/1013
30	m	0.37	0/738	0.61	0/995
31	V	0.57	2/3186 (0.1%)	1.53	9/4434 (0.2%)
32	W	0.31	0/814	0.53	0/1134
33	Y	0.32	0/415	0.55	0/577
34	3	0.19	0/65	0.65	0/98
35	s	0.57	0/546	0.80	0/760
36	t	0.46	0/2165	0.71	3/3010 (0.1%)
36	u	0.57	0/576	0.78	0/802
36	v	0.59	0/586	0.89	3/816 (0.4%)
36	w	0.47	0/2150	0.68	2/2989 (0.1%)
All	All	0.43	3/79046 (0.0%)	0.76	19/109677 (0.0%)

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
7	C	0	1
9	J	0	1
15	P	0	1
21	o	0	1
24	k	0	1
31	V	0	3
35	s	0	2
36	t	0	2
36	v	0	1
36	w	0	1
All	All	0	14

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
31	V	1009	LEU	C-N	7.26	1.50	1.34
20	c	230	SER	C-O	6.14	1.35	1.23
31	V	834	THR	C-N	-5.27	1.22	1.34

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
31	V	834	THR	C-N-CA	-46.64	5.11	121.70
31	V	834	THR	CA-C-N	-38.77	31.91	117.20
31	V	1009	LEU	O-C-N	27.39	166.52	122.70
31	V	1009	LEU	CA-C-N	-22.51	67.67	117.20
31	V	1009	LEU	C-N-CA	-18.95	74.32	121.70
31	V	659	THR	O-C-N	-18.65	92.86	122.70
31	V	659	THR	C-N-CA	-15.15	83.82	121.70
31	V	834	THR	O-C-N	-13.32	101.39	122.70
31	V	659	THR	CA-C-N	-12.68	89.30	117.20
36	t	134	SER	CA-C-O	-7.90	103.51	120.10
4	6	45	A	C2'-C3'-O3'	7.15	125.23	109.50
36	t	134	SER	O-C-N	6.00	132.31	122.70
36	w	39	PRO	N-CA-CB	6.00	110.50	103.30
36	v	134	SER	CA-C-O	-5.68	108.18	120.10
36	v	76	SER	N-CA-CB	5.29	118.44	110.50
1	I	9	A	C4'-C3'-O3'	5.26	123.53	113.00
36	v	134	SER	O-C-N	5.19	131.01	122.70
36	t	306	ASP	CB-CA-C	-5.11	100.17	110.40
36	w	306	ASP	CB-CA-C	-5.10	100.19	110.40

There are no chirality outliers.

All (14) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	C	105	ILE	Peptide
9	J	194	HIS	Peptide
15	P	5	HIS	Peptide
31	V	659	THR	Mainchain
31	V	834	THR	Peptide,Mainchain
24	k	84	LEU	Peptide
21	o	239	LYS	Peptide
35	s	111	VAL	Peptide
35	s	132	LEU	Peptide
36	t	134	SER	Mainchain
36	t	3	CYS	Mainchain
36	v	109	LEU	Mainchain
36	w	134	SER	Mainchain

## 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	I	714	0	361	6	0
2	E	346	0	173	11	0
3	2	3271	0	1660	26	0
4	6	2108	0	1063	29	0
5	5	2999	0	1515	34	0
6	A	15199	0	14954	262	0
7	C	6562	0	6486	105	0
8	H	3261	0	3323	91	0
9	J	2690	0	2690	85	0
10	K	1458	0	1468	20	0
11	L	1162	0	1111	19	0
12	M	2016	0	1985	32	0
13	N	1798	0	1842	38	0
14	O	1755	0	1794	24	0
15	P	565	0	555	7	0
16	R	614	0	390	8	0
17	S	3229	0	2573	37	0
18	T	3154	0	1331	94	0
19	a	1119	0	1164	0	0
20	c	786	0	719	0	0
21	o	2425	0	2253	0	0
22	X	338	0	70	1	0
23	y	679	0	706	0	0
24	b	631	0	670	0	0
24	k	631	0	665	0	0
25	d	625	0	647	0	0
25	n	625	0	647	0	0
26	e	575	0	597	0	0
26	p	575	0	597	0	0
27	f	573	0	572	0	0
27	q	573	0	572	0	0
28	g	529	0	557	0	0
28	r	526	0	555	0	0
29	h	644	0	686	0	0
29	l	618	0	660	0	0
30	j	741	0	778	0	0
30	m	726	0	754	0	0
31	V	3189	0	1412	12	0
32	W	816	0	340	1	0
33	Y	416	0	182	14	0
34	3	60	0	31	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
35	s	548	0	219	0	0
36	t	2171	0	945	0	0
36	u	578	0	246	0	0
36	v	588	0	250	0	0
36	w	2156	0	938	0	0
37	6	3	0	0	0	0
38	6	2	0	0	0	0
39	A	36	0	6	0	0
40	C	32	0	12	0	0
41	L	3	0	0	0	0
41	M	1	0	0	0	0
41	N	2	0	0	0	0
All	All	77441	0	63724	846	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 8.

All (846) 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)
18:T:119:ALA:HB2	18:T:131:ALA:CB	1.25	1.63
18:T:119:ALA:CB	18:T:131:ALA:HB3	1.40	1.48
18:T:237:THR:N	18:T:240:ASN:N	1.73	1.34
18:T:300:ASP:CB	18:T:303:LEU:CB	2.06	1.33
18:T:119:ALA:HB1	18:T:128:ILE:CA	1.58	1.33
18:T:128:ILE:H	18:T:183:ASN:CB	1.45	1.29
18:T:119:ALA:CB	18:T:128:ILE:HA	1.61	1.29
18:T:271:ASN:HA	18:T:294:MET:O	1.27	1.28
34:3:2:U:C2'	34:3:3:U:H5'	1.63	1.28
8:H:312:LEU:HA	8:H:315:LEU:CD2	1.64	1.27
34:3:2:U:H2'	34:3:3:U:C5'	1.64	1.26
8:H:311:LYS:O	8:H:315:LEU:CD2	1.85	1.24
3:2:1107:C:C4	33:Y:31:TYR:CB	2.23	1.21
8:H:312:LEU:CA	8:H:315:LEU:HD23	1.72	1.19
18:T:285:ASN:HA	18:T:311:LYS:CB	1.73	1.19
12:M:108:VAL:CG1	13:N:59:LEU:HD22	1.72	1.19
18:T:128:ILE:N	18:T:183:ASN:CB	2.06	1.18
3:2:1107:C:N3	33:Y:31:TYR:CB	2.06	1.18
8:H:312:LEU:CA	8:H:315:LEU:CD2	2.21	1.18
8:H:312:LEU:O	8:H:315:LEU:HD23	1.44	1.18
12:M:108:VAL:CG1	13:N:59:LEU:CD2	2.21	1.18

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:312:LEU:C	8:H:315:LEU:HD23	1.61	1.17
18:T:191:THR:CB	18:T:209:ILE:CB	2.24	1.14
8:H:311:LYS:O	8:H:315:LEU:HD22	1.38	1.13
18:T:357:ILE:CB	18:T:385:PHE:CB	2.29	1.11
18:T:119:ALA:HB1	18:T:128:ILE:C	1.72	1.09
18:T:119:ALA:HB1	18:T:128:ILE:HA	1.11	1.08
18:T:115:TYR:O	18:T:131:ALA:HB1	1.53	1.06
8:H:312:LEU:HA	8:H:315:LEU:HD21	1.39	1.04
8:H:315:LEU:HD22	8:H:315:LEU:H	1.22	1.03
12:M:108:VAL:HG13	13:N:59:LEU:HD22	1.40	1.03
18:T:271:ASN:CA	18:T:294:MET:O	2.06	1.03
3:2:1106:G:C6	33:Y:69:ARG:O	2.11	1.02
8:H:317:ILE:HD11	8:H:322:LYS:HG2	1.42	1.01
18:T:313:TYR:HA	18:T:318:ARG:CB	1.91	1.00
18:T:300:ASP:C	18:T:303:LEU:H	1.64	1.00
18:T:288:GLU:CB	18:T:311:LYS:CB	2.42	0.98
18:T:300:ASP:C	18:T:301:LYS:N	2.16	0.98
18:T:128:ILE:CB	18:T:183:ASN:CB	2.42	0.97
12:M:108:VAL:HG13	13:N:59:LEU:CD2	1.91	0.96
3:2:1106:G:O6	33:Y:69:ARG:O	1.83	0.95
8:H:312:LEU:HA	8:H:315:LEU:HD23	1.31	0.95
18:T:404:ASP:CB	18:T:409:GLU:CB	2.45	0.94
8:H:312:LEU:C	8:H:315:LEU:CD2	2.35	0.94
18:T:237:THR:H	18:T:240:ASN:N	1.54	0.94
18:T:119:ALA:CA	18:T:128:ILE:HA	1.97	0.93
12:M:108:VAL:HG11	13:N:59:LEU:HD22	1.47	0.93
6:A:904:THR:O	31:V:1116:PRO:CB	2.17	0.93
8:H:311:LYS:O	8:H:315:LEU:HD21	1.66	0.92
18:T:119:ALA:HB1	18:T:128:ILE:O	1.70	0.91
12:M:108:VAL:CG1	13:N:59:LEU:HD21	1.97	0.91
18:T:119:ALA:C	18:T:128:ILE:HA	1.90	0.91
8:H:317:ILE:HD11	8:H:322:LYS:CG	1.99	0.90
18:T:119:ALA:CB	18:T:131:ALA:CB	2.19	0.90
18:T:119:ALA:HB2	18:T:131:ALA:HB2	1.50	0.89
31:V:732:SER:CB	34:3:2:U:OP2	2.22	0.87
8:H:312:LEU:CA	8:H:315:LEU:HD21	1.99	0.86
18:T:284:ASP:C	18:T:311:LYS:HA	1.95	0.85
18:T:128:ILE:CA	18:T:183:ASN:CB	2.54	0.85
3:2:1108:A:N6	33:Y:108:THR:CB	2.40	0.84
31:V:700:GLY:HA3	34:3:1:U:OP2	1.76	0.84
18:T:312:TYR:CB	18:T:321:SER:CB	2.55	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
18:T:119:ALA:CB	18:T:128:ILE:O	2.26	0.83
9:J:355:THR:HG21	9:J:404:CYS:HA	1.59	0.83
7:C:142:LEU:HD11	7:C:189:LEU:HD22	1.61	0.82
9:J:156:ILE:HD13	9:J:197:LEU:HD21	1.59	0.82
8:H:311:LYS:C	8:H:315:LEU:HD21	2.00	0.82
12:M:108:VAL:HG21	13:N:73:CYS:O	1.78	0.81
8:H:312:LEU:O	8:H:315:LEU:CD2	2.25	0.81
18:T:187:VAL:CB	18:T:210:TRP:CB	2.60	0.80
7:C:139:ILE:HD12	7:C:225:THR:HG23	1.62	0.79
31:V:903:MET:C	31:V:904:ASP:N	2.35	0.79
9:J:240:ALA:HB1	9:J:248:ILE:HD11	1.65	0.78
12:M:108:VAL:HG12	13:N:59:LEU:HD21	1.65	0.78
6:A:139:LEU:HD12	6:A:193:TYR:CG	2.18	0.78
18:T:285:ASN:CA	18:T:311:LYS:CB	2.59	0.78
18:T:237:THR:CA	18:T:240:ASN:N	2.47	0.78
14:O:16:VAL:HG22	14:O:152:LEU:HD21	1.66	0.77
11:L:41:LEU:HD23	11:L:44:LYS:HB2	1.65	0.77
8:H:136:LEU:HD22	8:H:169:THR:HG21	1.66	0.77
18:T:271:ASN:HA	18:T:294:MET:C	2.04	0.77
3:2:25:A:OP1	6:A:854:ARG:HD2	1.83	0.77
9:J:342:LEU:HD21	10:K:55:VAL:HG21	1.66	0.77
6:A:856:TRP:CD1	15:P:174:VAL:HG21	2.19	0.77
6:A:1350:ILE:HG23	6:A:1356:LEU:HD23	1.68	0.76
8:H:317:ILE:O	8:H:317:ILE:HD12	1.85	0.76
18:T:300:ASP:O	18:T:303:LEU:N	2.18	0.76
3:2:1108:A:C2	33:Y:73:PHE:CB	2.69	0.76
9:J:248:ILE:HG23	9:J:262:LEU:HB2	1.67	0.76
8:H:315:LEU:CD2	8:H:315:LEU:H	1.98	0.76
8:H:317:ILE:CD1	8:H:322:LYS:HG3	2.15	0.76
3:2:1106:G:N1	33:Y:69:ARG:O	2.19	0.75
18:T:233:THR:O	18:T:240:ASN:N	2.19	0.75
7:C:493:LEU:HD22	7:C:542:ILE:HD11	1.68	0.75
6:A:1020:ILE:HG22	6:A:1022:PRO:HD2	1.71	0.73
8:H:311:LYS:C	8:H:315:LEU:CD2	2.56	0.73
7:C:539:VAL:HG13	7:C:564:ILE:HG23	1.71	0.73
8:H:317:ILE:CD1	8:H:322:LYS:CG	2.66	0.73
8:H:315:LEU:HD22	8:H:315:LEU:N	2.02	0.72
18:T:244:LYS:CB	18:T:276:ALA:HA	2.20	0.72
8:H:316:LYS:HG3	8:H:316:LYS:O	1.90	0.71
6:A:1391:PRO:HG2	6:A:1547:ILE:HD11	1.70	0.71
18:T:300:ASP:C	18:T:303:LEU:N	2.41	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
17:S:140:LEU:HD21	17:S:155:LEU:HD22	1.71	0.71
6:A:1082:ILE:HD13	6:A:1113:ILE:HD11	1.72	0.71
18:T:251:LEU:CB	18:T:272:PHE:CB	2.69	0.71
31:V:699:THR:O	34:3:1:U:H4'	1.89	0.71
18:T:244:LYS:CB	18:T:279:GLU:CB	2.68	0.71
18:T:300:ASP:C	18:T:302:TRP:N	2.44	0.71
18:T:236:LEU:C	18:T:240:ASN:N	2.43	0.71
6:A:1634:LEU:HD21	6:A:1641:LEU:HD12	1.73	0.70
12:M:104:LEU:HD21	13:N:16:CYS:HA	1.73	0.70
17:S:209:GLU:HB3	17:S:218:THR:HG22	1.71	0.70
6:A:518:VAL:HG21	6:A:689:TYR:CD2	2.26	0.70
18:T:270:LEU:O	18:T:294:MET:HA	1.92	0.70
18:T:119:ALA:HA	18:T:127:MET:O	1.92	0.69
6:A:377:VAL:HG11	7:C:912:ALA:HB3	1.73	0.69
9:J:403:LEU:HD11	9:J:419:ALA:HB2	1.74	0.69
6:A:621:LEU:HD23	6:A:722:LEU:HD21	1.73	0.69
18:T:108:CYS:CB	18:T:139:MET:CB	2.72	0.68
18:T:236:LEU:CB	18:T:242:THR:CB	2.72	0.68
18:T:277:SER:CB	18:T:290:PHE:CB	2.71	0.68
12:M:108:VAL:HG11	13:N:59:LEU:CD2	2.09	0.68
7:C:633:ILE:HB	7:C:645:LEU:HD12	1.76	0.68
18:T:353:CYS:CB	18:T:388:LEU:CB	2.72	0.68
9:J:230:VAL:HG22	9:J:241:THR:HG22	1.75	0.68
4:6:79:A:OP1	4:6:81:G:O2'	2.12	0.68
5:5:101:C:OP1	6:A:672:LYS:N	2.26	0.67
6:A:1067:ASN:HB2	6:A:1083:THR:HG21	1.76	0.67
9:J:144:CYS:SG	9:J:188:VAL:N	2.68	0.67
34:3:2:U:C2'	34:3:3:U:C5'	2.45	0.66
6:A:857:ILE:HD11	6:A:969:ILE:HD11	1.76	0.66
8:H:317:ILE:HD12	8:H:317:ILE:C	2.15	0.66
3:2:1107:C:N4	33:Y:31:TYR:CB	2.57	0.66
18:T:233:THR:O	18:T:240:ASN:HA	1.95	0.66
14:O:37:ALA:HB2	14:O:45:ALA:HA	1.76	0.66
6:A:1092:PHE:CZ	6:A:1093:LYS:HG3	2.31	0.66
7:C:193:LEU:HD12	7:C:213:LEU:HB3	1.78	0.66
5:5:38:A:H2'	5:5:39:U:O4'	1.96	0.65
7:C:142:LEU:HD13	7:C:218:HIS:HB2	1.78	0.65
9:J:333:SER:HB2	9:J:343:THR:HG23	1.79	0.65
34:3:2:U:C5	34:3:3:U:C5	2.85	0.65
7:C:155:ILE:HD11	7:C:175:LEU:HD23	1.78	0.65
8:H:132:GLU:HB2	8:H:135:ILE:HD11	1.78	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:330:ILE:O	8:H:334:LEU:HD23	1.97	0.64
12:M:250:MET:SD	13:N:139:LEU:HD21	2.37	0.64
18:T:244:LYS:O	18:T:276:ALA:HB2	1.96	0.64
5:5:45:A:H61	5:5:74:U:H3	1.46	0.64
6:A:228:LYS:HG3	6:A:695:LEU:HD11	1.80	0.64
6:A:569:LEU:HD21	6:A:637:VAL:HG21	1.80	0.64
7:C:197:THR:HG21	7:C:544:LEU:HD22	1.79	0.64
18:T:281:LEU:CB	18:T:287:TYR:CB	2.76	0.64
18:T:119:ALA:C	18:T:128:ILE:CA	2.65	0.64
6:A:1961:LEU:HD13	6:A:2083:ILE:HG21	1.78	0.63
3:2:1107:C:C2	33:Y:31:TYR:CB	2.82	0.63
31:V:608:ARG:O	31:V:837:GLU:CB	2.46	0.63
31:V:920:SER:N	31:V:1012:ILE:O	2.31	0.63
8:H:49:ILE:HB	8:H:56:ILE:HD13	1.80	0.63
8:H:334:LEU:HD21	8:H:384:LEU:HD12	1.81	0.63
31:V:779:LYS:O	34:3:1:U:H1'	1.98	0.63
12:M:250:MET:HB2	13:N:139:LEU:HD11	1.81	0.62
2:E:-3:A:H2'	2:E:-2:A:O4'	2.00	0.62
18:T:233:THR:O	18:T:240:ASN:CA	2.48	0.62
3:2:1108:A:H62	33:Y:108:THR:CB	2.13	0.61
6:A:1375:LEU:HD12	6:A:1383:PHE:CZ	2.35	0.61
6:A:1422:ILE:HD12	6:A:1422:ILE:O	2.00	0.61
14:O:16:VAL:CG2	14:O:152:LEU:HD21	2.31	0.61
6:A:388:PRO:HB2	6:A:398:VAL:HG11	1.82	0.61
9:J:145:VAL:HG22	9:J:157:THR:HG22	1.81	0.61
7:C:839:ILE:HB	7:C:840:PRO:HD3	1.81	0.61
14:O:24:ALA:HB2	14:O:39:LEU:HD23	1.83	0.61
7:C:483:TRP:CH2	7:C:550:VAL:HG11	2.36	0.60
18:T:129:ARG:H	18:T:183:ASN:CB	2.14	0.60
6:A:664:THR:O	6:A:666:ILE:N	2.34	0.60
5:5:45:A:N6	5:5:74:U:H3	1.99	0.59
6:A:585:ARG:HD3	12:M:33:TRP:CE2	2.38	0.59
7:C:691:VAL:HG12	7:C:841:LEU:HD22	1.83	0.59
9:J:277:VAL:HG22	9:J:278:ASP:H	1.67	0.59
6:A:677:ILE:HG21	6:A:1621:VAL:HG12	1.85	0.59
6:A:1092:PHE:O	6:A:1093:LYS:C	2.39	0.59
6:A:1126:LEU:HD11	6:A:1161:TYR:CD2	2.36	0.59
7:C:241:VAL:HG11	7:C:273:LEU:CD2	2.33	0.59
8:H:312:LEU:N	8:H:315:LEU:HD21	2.17	0.59
8:H:421:LYS:HB2	8:H:468:ILE:HD11	1.84	0.59
4:6:2:U:H2'	4:6:3:U:O4'	2.03	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:966:PRO:HB3	6:A:1089:VAL:HB	1.84	0.59
14:O:214:ASN:ND2	17:S:44:ARG:O	2.35	0.58
6:A:374:ILE:HG22	6:A:376:ARG:HG2	1.84	0.58
6:A:1023:LEU:HD13	6:A:1451:PHE:CE1	2.38	0.58
18:T:271:ASN:N	18:T:294:MET:O	2.35	0.58
18:T:329:SER:CB	18:T:345:PHE:CB	2.81	0.58
9:J:373:LEU:HD13	9:J:389:THR:CG2	2.33	0.58
6:A:1632:ILE:HD11	6:A:1649:PHE:CE2	2.39	0.58
6:A:779:ALA:HA	6:A:782:ILE:HD12	1.85	0.58
6:A:1422:ILE:HD13	6:A:1425:PHE:CZ	2.38	0.58
8:H:61:VAL:HG23	8:H:101:MET:SD	2.44	0.58
6:A:660:ILE:HG21	6:A:711:TRP:CH2	2.39	0.57
18:T:247:TYR:O	18:T:272:PHE:CB	2.51	0.57
18:T:236:LEU:CB	18:T:242:THR:H	2.17	0.57
18:T:284:ASP:O	18:T:311:LYS:HA	2.04	0.57
6:A:671:TYR:CZ	6:A:674:MET:HG3	2.39	0.57
6:A:585:ARG:HD3	12:M:33:TRP:CD2	2.40	0.57
9:J:200:VAL:HG11	9:J:230:VAL:HG23	1.87	0.57
9:J:265:HIS:CE1	9:J:291:ARG:HG2	2.40	0.57
6:A:1350:ILE:HD12	6:A:1356:LEU:CD2	2.34	0.57
17:S:270:ALA:HB1	17:S:280:LEU:HD11	1.85	0.57
18:T:309:LEU:HA	18:T:321:SER:CB	2.35	0.57
4:6:63:G:H2'	4:6:64:U:C6	2.39	0.57
6:A:1814:VAL:O	6:A:1818:ARG:HG2	2.04	0.57
7:C:562:VAL:HG23	7:C:564:ILE:HD11	1.87	0.57
8:H:334:LEU:HD12	8:H:380:GLN:HB3	1.87	0.57
6:A:1286:TRP:CE2	6:A:1302:LEU:HD11	2.40	0.57
6:A:1968:ALA:HA	6:A:2012:LEU:HD22	1.87	0.57
7:C:191:ILE:HG23	7:C:221:PHE:CE1	2.40	0.57
6:A:1426:ARG:HD2	16:R:8:LEU:HD12	1.87	0.56
8:H:200:ILE:O	8:H:204:ASP:N	2.35	0.56
2:E:-4:A:OP1	6:A:668:ARG:NE	2.38	0.56
3:2:1106:G:H1	33:Y:69:ARG:CB	2.18	0.56
18:T:112:CYS:HA	18:T:135:SER:CB	2.35	0.56
8:H:351:ILE:HG21	8:H:395:GLU:HB3	1.85	0.56
7:C:323:THR:CG2	7:C:438:ALA:HB2	2.36	0.56
6:A:176:LEU:HD22	6:A:632:ILE:HD11	1.86	0.56
6:A:1023:LEU:HA	6:A:1451:PHE:CZ	2.40	0.56
12:M:108:VAL:HG22	13:N:75:MET:HG2	1.86	0.56
14:O:20:ILE:HD11	14:O:152:LEU:HD22	1.86	0.56
18:T:119:ALA:CB	18:T:127:MET:O	2.53	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:3:A:C2	1:I:4:U:C2	2.94	0.56
6:A:1309:ILE:HG12	6:A:1356:LEU:HD13	1.88	0.56
1:I:67:C:H2'	1:I:68:U:O4'	2.06	0.56
5:5:110:U:H2'	5:5:111:C:O4'	2.06	0.56
7:C:687:ALA:HB3	7:C:852:THR:HG21	1.88	0.56
6:A:1882:LEU:HD11	6:A:1991:ILE:HG21	1.88	0.55
9:J:164:MET:HE1	9:J:185:VAL:HG11	1.88	0.55
9:J:324:ALA:HB3	9:J:356:LEU:HD21	1.89	0.55
14:O:17:GLU:HA	14:O:20:ILE:HD12	1.88	0.55
17:S:149:VAL:HA	17:S:152:VAL:HG12	1.89	0.55
17:S:250:PHE:CE2	17:S:266:LEU:HD13	2.42	0.55
5:5:23:C:O2	5:5:23:C:O4'	2.25	0.55
6:A:1543:ARG:O	6:A:1547:ILE:HD12	2.06	0.55
8:H:25:VAL:HG23	8:H:44:LEU:HD13	1.89	0.55
3:2:34:G:O2'	3:2:35:U:H6	1.90	0.55
6:A:255:ILE:HD11	6:A:637:VAL:HG13	1.89	0.55
17:S:193:VAL:HG11	17:S:202:TRP:CZ2	2.42	0.55
18:T:129:ARG:CB	18:T:187:VAL:CB	2.85	0.55
6:A:343:ASN:HD21	6:A:354:PRO:HA	1.72	0.55
6:A:742:VAL:HG21	9:J:224:LEU:HA	1.89	0.55
6:A:1973:LYS:HB3	6:A:2039:LEU:HD12	1.89	0.55
7:C:900:LEU:O	7:C:902:VAL:N	2.39	0.55
4:6:70:U:OP2	6:A:737:ARG:NH2	2.40	0.55
4:6:61:C:H2'	4:6:62:A:O4'	2.07	0.54
11:L:29:GLN:HB3	11:L:55:LEU:HD11	1.88	0.54
4:6:35:A:H2'	12:M:75:PHE:CE1	2.42	0.54
6:A:615:LEU:HD13	6:A:619:PHE:CD2	2.41	0.54
6:A:624:GLU:HB3	6:A:666:ILE:HG12	1.89	0.54
17:S:251:ALA:HB1	17:S:267:TYR:OH	2.07	0.54
13:N:240:LEU:HD13	13:N:251:LEU:HD13	1.89	0.54
6:A:1158:ILE:HG12	6:A:1172:PHE:CE1	2.43	0.54
7:C:823:ILE:CG2	7:C:825:VAL:HG23	2.37	0.54
8:H:309:ALA:O	8:H:313:LEU:HD13	2.07	0.54
6:A:898:ILE:HB	6:A:1074:VAL:HG12	1.89	0.54
8:H:21:ILE:HG22	8:H:47:VAL:HG23	1.88	0.54
5:5:65:U:H2'	5:5:66:A:C8	2.43	0.54
18:T:281:LEU:CB	18:T:287:TYR:HA	2.37	0.54
18:T:405:SER:O	18:T:407:LEU:N	2.41	0.54
13:N:16:CYS:HB2	13:N:74:CYS:SG	2.47	0.54
8:H:60:VAL:HG13	8:H:76:LEU:HD21	1.89	0.54
9:J:321:PHE:HB2	10:K:57:LEU:HD12	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:L:30:LEU:HD13	11:L:55:LEU:HD22	1.89	0.54
6:A:1624:LEU:HD21	6:A:1635:HIS:CE1	2.43	0.54
17:S:99:ILE:N	17:S:100:PRO:CD	2.71	0.54
32:W:121:PRO:O	32:W:122:ARG:CB	2.56	0.54
4:6:62:A:H61	15:P:5:HIS:HB2	1.73	0.53
6:A:857:ILE:HD11	6:A:969:ILE:CD1	2.38	0.53
7:C:116:THR:HG21	7:C:118:TYR:CZ	2.42	0.53
3:2:34:G:HO2'	3:2:35:U:H6	1.55	0.53
6:A:673:VAL:HG22	6:A:714:PHE:CE1	2.44	0.53
6:A:1632:ILE:HG21	6:A:1645:LEU:HD13	1.90	0.53
3:2:1107:C:N3	33:Y:104:SER:HA	2.23	0.53
5:5:39:U:H2'	5:5:40:C:C6	2.43	0.53
5:5:43:G:N2	5:5:46:C:OP1	2.41	0.53
13:N:13:CYS:SG	13:N:16:CYS:HB2	2.48	0.53
6:A:1699:ALA:HB2	6:A:1767:TYR:CD1	2.43	0.53
9:J:277:VAL:HG11	9:J:321:PHE:HZ	1.74	0.53
18:T:119:ALA:HB2	18:T:131:ALA:HB3	0.56	0.53
5:5:123:U:H2'	5:5:124:C:C6	2.43	0.53
6:A:1283:GLU:N	8:H:345:ILE:HD11	2.24	0.53
7:C:324:ILE:HD12	7:C:325:LYS:N	2.24	0.53
8:H:351:ILE:HD11	8:H:361:TYR:CB	2.39	0.53
9:J:257:ILE:CD1	10:K:78:VAL:HG23	2.39	0.53
9:J:359:ASN:OD1	9:J:360:GLN:N	2.41	0.53
6:A:615:LEU:HD13	6:A:619:PHE:CE2	2.44	0.53
17:S:65:MET:SD	17:S:65:MET:N	2.81	0.53
4:6:52:G:O2'	4:6:53:A:O5'	2.23	0.53
8:H:73:ILE:HG13	8:H:74:PRO:HD3	1.91	0.53
14:O:30:THR:O	14:O:33:TRP:NE1	2.42	0.53
4:6:41:A:H2'	4:6:42:A:O4'	2.09	0.52
6:A:165:LEU:HD21	6:A:578:MET:HB3	1.91	0.52
8:H:51:ILE:HG22	8:H:245:CYS:SG	2.49	0.52
9:J:200:VAL:HG21	9:J:227:VAL:CG1	2.39	0.52
3:2:1108:A:N1	33:Y:73:PHE:CB	2.72	0.52
4:6:35:A:N1	12:M:81:CYS:HA	2.24	0.52
6:A:1375:LEU:HD12	6:A:1383:PHE:HZ	1.72	0.52
6:A:889:TRP:O	6:A:893:ARG:HG2	2.09	0.52
7:C:323:THR:HG21	7:C:438:ALA:HB2	1.91	0.52
17:S:225:ALA:O	17:S:228:THR:HG22	2.09	0.52
6:A:1257:ASN:OD1	6:A:1270:LEU:HD13	2.09	0.52
6:A:1372:LYS:HB3	6:A:1378:LYS:HA	1.91	0.52
7:C:539:VAL:HG13	7:C:564:ILE:CG2	2.39	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:6:75:A:H8	5:5:98:U:HO2'	1.58	0.52
6:A:915:ALA:HB1	6:A:993:ALA:HB1	1.90	0.52
8:H:58:LYS:HA	8:H:61:VAL:HG12	1.92	0.52
11:L:90:LEU:HB2	11:L:106:LEU:HD11	1.91	0.52
1:I:58:U:H2'	1:I:59:C:O4'	2.10	0.52
6:A:868:GLN:O	10:K:197:ILE:HA	2.10	0.52
7:C:242:VAL:HG21	7:C:272:ARG:HE	1.74	0.52
11:L:104:CYS:SG	11:L:105:CYS:N	2.83	0.52
5:5:30:A:H2'	5:5:31:G:O4'	2.09	0.52
5:5:62:G:H2'	5:5:63:C:O4'	2.10	0.52
6:A:1422:ILE:HD11	8:H:306:ASP:CG	2.30	0.52
9:J:200:VAL:CG2	9:J:227:VAL:HB	2.40	0.51
7:C:318:LEU:HD22	7:C:421:LEU:CD2	2.40	0.51
7:C:823:ILE:HG22	7:C:825:VAL:HG23	1.92	0.51
9:J:144:CYS:SG	9:J:187:ASP:HA	2.51	0.51
9:J:290:VAL:HG11	9:J:334:TRP:CZ3	2.45	0.51
6:A:1067:ASN:CB	6:A:1083:THR:HG21	2.40	0.51
18:T:233:THR:HA	18:T:243:ILE:N	2.22	0.51
7:C:139:ILE:CG2	7:C:252:LEU:HD22	2.40	0.51
8:H:83:LEU:HD21	8:H:90:ILE:HB	1.93	0.51
9:J:145:VAL:N	9:J:404:CYS:SG	2.84	0.51
6:A:168:LEU:N	6:A:169:PRO:HD2	2.26	0.51
6:A:627:LYS:HG2	6:A:664:THR:HB	1.92	0.51
6:A:1624:LEU:HD22	6:A:1633:PHE:HB3	1.93	0.51
6:A:1823:LEU:O	6:A:1825:ILE:HG23	2.10	0.51
9:J:284:SER:OG	9:J:311:VAL:O	2.28	0.51
6:A:849:LEU:HD23	6:A:978:ILE:HG21	1.92	0.51
7:C:241:VAL:HG11	7:C:273:LEU:HD23	1.93	0.51
6:A:355:LEU:HD23	6:A:356:TYR:CE2	2.46	0.51
6:A:687:ILE:HD11	6:A:706:PRO:HG3	1.93	0.51
7:C:116:THR:HG21	7:C:118:TYR:CE1	2.46	0.51
14:O:20:ILE:HD11	14:O:152:LEU:CD2	2.41	0.51
6:A:1407:ILE:HG21	6:A:1426:ARG:NH2	2.26	0.51
7:C:147:THR:HG1	7:C:190:SER:HG	1.58	0.51
6:A:1400:ILE:HG21	6:A:1440:ILE:HD12	1.93	0.51
7:C:324:ILE:HG22	7:C:377:ILE:HD13	1.92	0.51
7:C:385:PHE:CE1	7:C:425:LEU:HD11	2.46	0.51
8:H:312:LEU:N	8:H:315:LEU:CD2	2.74	0.51
18:T:115:TYR:O	18:T:131:ALA:CB	2.43	0.51
2:E:-9:U:H2'	2:E:-9:U:O2	2.11	0.50
6:A:1454:SER:HA	6:A:1487:GLY:HA2	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:74:PRO:HA	8:H:123:ILE:HD12	1.92	0.50
7:C:418:GLN:HB3	7:C:419:PRO:HD3	1.92	0.50
7:C:655:LEU:C	7:C:655:LEU:HD23	2.32	0.50
8:H:181:LEU:HD13	8:H:194:LEU:HD22	1.92	0.50
6:A:806:ALA:N	6:A:807:PRO:HD2	2.26	0.50
11:L:33:ALA:HB1	11:L:52:ILE:HG22	1.93	0.50
18:T:119:ALA:CA	18:T:127:MET:O	2.58	0.50
1:I:14:U:C6	12:M:229:ASP:HB3	2.47	0.50
6:A:138:HIS:HB2	11:L:52:ILE:HD11	1.93	0.50
6:A:522:TYR:CZ	6:A:686:ILE:HD12	2.47	0.50
6:A:687:ILE:HD11	6:A:706:PRO:CG	2.41	0.50
6:A:1387:VAL:HG12	6:A:1610:TRP:CD2	2.47	0.50
9:J:324:ALA:CB	9:J:364:LEU:HD11	2.42	0.50
13:N:34:CYS:SG	13:N:37:CYS:N	2.83	0.50
3:2:1108:A:H62	33:Y:108:THR:CA	2.25	0.50
6:A:338:ASN:O	6:A:342:LEU:HG	2.11	0.50
8:H:94:LEU:HA	8:H:97:GLU:HG2	1.94	0.50
9:J:269:ILE:HA	9:J:285:SER:HA	1.93	0.50
6:A:1212:ARG:HA	6:A:1259:LEU:HD11	1.93	0.50
6:A:1925:PRO:O	6:A:1929:GLN:N	2.45	0.50
7:C:241:VAL:HG22	7:C:267:ILE:CG2	2.42	0.50
6:A:139:LEU:HD13	6:A:562:ILE:HD11	1.94	0.49
6:A:194:HIS:CD2	10:K:122:LEU:HD23	2.46	0.49
7:C:314:ALA:CB	7:C:321:THR:HG22	2.42	0.49
9:J:277:VAL:HG11	9:J:321:PHE:CZ	2.47	0.49
5:5:76:U:O3'	6:A:334:LYS:NZ	2.42	0.49
5:5:103:A:OP2	6:A:675:HIS:NE2	2.44	0.49
9:J:357:SER:O	9:J:365:PHE:HB3	2.11	0.49
17:S:285:LEU:HD21	17:S:302:SER:CB	2.41	0.49
18:T:404:ASP:CB	18:T:409:GLU:CA	2.90	0.49
6:A:1426:ARG:CD	16:R:8:LEU:HD12	2.43	0.49
9:J:242:ALA:HB2	9:J:248:ILE:HA	1.92	0.49
9:J:334:TRP:HD1	9:J:341:LEU:HA	1.78	0.49
6:A:468:LEU:HD21	7:C:382:TYR:HB3	1.95	0.49
6:A:1391:PRO:CG	6:A:1547:ILE:HD11	2.42	0.49
6:A:1407:ILE:HG21	6:A:1426:ARG:HH21	1.77	0.49
9:J:242:ALA:HB1	9:J:269:ILE:CG2	2.43	0.49
11:L:29:GLN:CB	11:L:55:LEU:HD11	2.43	0.49
6:A:173:LEU:HD13	6:A:715:LEU:HB2	1.94	0.49
6:A:660:ILE:HG21	6:A:711:TRP:CZ2	2.48	0.49
6:A:165:LEU:HD12	6:A:622:MET:HG2	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:461:LEU:HD11	7:C:331:TYR:HB3	1.95	0.49
6:A:834:ILE:HD13	6:A:845:VAL:HG23	1.93	0.49
12:M:74:LEU:HA	12:M:112:PHE:CE1	2.47	0.49
3:2:3:G:H2'	3:2:4:A:O4'	2.13	0.49
6:A:1855:THR:HG21	6:A:1966:SER:HB3	1.93	0.49
9:J:327:CYS:SG	9:J:328:THR:N	2.86	0.49
7:C:493:LEU:CD2	7:C:542:ILE:HD11	2.40	0.49
7:C:800:TYR:O	7:C:803:VAL:HG12	2.13	0.49
10:K:174:ASN:HD21	10:K:185:ARG:HH22	1.61	0.49
18:T:233:THR:HA	18:T:243:ILE:H	1.78	0.49
6:A:1754:ALA:O	6:A:1758:ASP:HB2	2.12	0.49
9:J:403:LEU:CD1	9:J:419:ALA:HB2	2.42	0.49
9:J:200:VAL:CG1	9:J:230:VAL:HG23	2.43	0.49
10:K:182:LEU:HD11	14:O:22:LYS:CG	2.43	0.49
14:O:14:THR:HG23	14:O:17:GLU:HB2	1.95	0.48
17:S:185:VAL:O	17:S:188:ILE:HG13	2.13	0.48
18:T:119:ALA:O	18:T:128:ILE:N	2.46	0.48
34:3:2:U:H2'	34:3:3:U:H5'	0.71	0.48
6:A:166:LYS:HE3	6:A:730:ILE:HD11	1.95	0.48
7:C:315:SER:HB3	7:C:320:PHE:CE1	2.48	0.48
8:H:47:VAL:HG13	8:H:49:ILE:HG23	1.94	0.48
8:H:58:LYS:O	8:H:61:VAL:HG12	2.13	0.48
18:T:237:THR:CB	18:T:240:ASN:CB	2.91	0.48
6:A:336:PHE:HB3	6:A:530:VAL:HG21	1.93	0.48
6:A:1862:VAL:HG13	6:A:1870:VAL:HG13	1.95	0.48
9:J:238:LEU:HD21	9:J:250:LEU:HD22	1.94	0.48
14:O:30:THR:HG23	14:O:31:HIS:CE1	2.48	0.48
6:A:343:ASN:HD21	6:A:354:PRO:CA	2.25	0.48
6:A:480:TYR:OH	7:C:317:LYS:NZ	2.46	0.48
6:A:1267:VAL:HG22	6:A:1302:LEU:CD2	2.44	0.48
7:C:318:LEU:HD13	7:C:421:LEU:HD21	1.95	0.48
9:J:289:THR:HG22	9:J:305:THR:HG22	1.94	0.48
12:M:250:MET:CG	13:N:139:LEU:HD11	2.43	0.48
18:T:236:LEU:CB	18:T:240:ASN:N	2.77	0.48
6:A:632:ILE:HG22	6:A:656:ILE:HG21	1.95	0.48
13:N:25:MET:CB	13:N:46:PHE:HB3	2.44	0.48
1:I:3:A:N6	4:6:51:A:O4'	2.47	0.48
6:A:1967:ALA:HB1	6:A:2015:LEU:HB3	1.96	0.48
7:C:801:TRP:HB3	7:C:843:LYS:HD3	1.96	0.48
7:C:862:TYR:CE2	7:C:908:VAL:HG13	2.48	0.48
8:H:143:LEU:HD11	8:H:151:VAL:HG11	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
17:S:140:LEU:CD2	17:S:155:LEU:HD22	2.41	0.48
22:X:88:UNK:O	22:X:91:UNK:N	2.46	0.48
6:A:238:ARG:NH2	6:A:1694:MET:O	2.46	0.48
6:A:355:LEU:HD23	6:A:356:TYR:CZ	2.49	0.48
6:A:766:ILE:HG21	6:A:782:ILE:HD13	1.95	0.48
9:J:344:ASN:HD22	10:K:45:PRO:HG3	1.78	0.48
8:H:44:LEU:O	8:H:47:VAL:HG12	2.13	0.48
10:K:185:ARG:NH1	14:O:26:GLN:O	2.43	0.48
12:M:99:ILE:HD13	12:M:188:TYR:CD2	2.49	0.48
17:S:107:ASP:O	17:S:111:LYS:HG2	2.14	0.48
6:A:379:ILE:HD11	6:A:391:TYR:CD1	2.49	0.48
9:J:376:TYR:HD1	9:J:383:LYS:HA	1.78	0.48
3:2:46:C:H2'	3:2:47:U:C6	2.49	0.48
4:6:70:U:H2'	4:6:71:G:O4'	2.14	0.48
6:A:1033:ASN:HB2	6:A:1288:LEU:HD23	1.94	0.48
8:H:135:ILE:HD12	8:H:162:LEU:HD21	1.95	0.48
6:A:182:PRO:HB2	6:A:264:ILE:HD11	1.95	0.47
6:A:209:ILE:HG21	6:A:303:PHE:HE2	1.79	0.47
12:M:250:MET:CB	13:N:139:LEU:HD11	2.44	0.47
8:H:80:ILE:HD12	8:H:94:LEU:HD13	1.96	0.47
9:J:276:PRO:HB2	10:K:63:ILE:HD12	1.95	0.47
17:S:140:LEU:HD22	17:S:152:VAL:HG23	1.95	0.47
7:C:222:MET:HE1	7:C:225:THR:HG21	1.95	0.47
8:H:351:ILE:HD11	8:H:361:TYR:HB2	1.95	0.47
18:T:281:LEU:CB	18:T:287:TYR:CA	2.92	0.47
6:A:1565:THR:HG21	6:A:1825:ILE:HD11	1.95	0.47
7:C:150:MET:HG3	7:C:214:ASP:CB	2.44	0.47
16:R:8:LEU:HD23	16:R:9:LYS:N	2.29	0.47
7:C:150:MET:HB3	7:C:178:LEU:HD22	1.95	0.47
3:2:34:G:O2'	3:2:35:U:C6	2.66	0.47
6:A:636:HIS:CE1	6:A:653:ILE:HD11	2.49	0.47
6:A:1344:THR:HG21	6:A:1537:TRP:CD2	2.49	0.47
6:A:1991:ILE:HG23	6:A:1992:TYR:CD2	2.50	0.47
6:A:1347:ARG:HD3	6:A:1444:ILE:HG22	1.96	0.47
7:C:222:MET:CE	7:C:252:LEU:HD21	2.45	0.47
14:O:88:ALA:HB2	14:O:95:ALA:HA	1.96	0.47
5:5:110:U:C2	5:5:111:C:C6	3.03	0.47
6:A:2015:LEU:HD22	6:A:2022:ALA:HB1	1.96	0.47
9:J:147:ILE:HD11	9:J:169:LEU:HD11	1.97	0.47
13:N:116:LYS:HB3	13:N:118:VAL:HG22	1.96	0.47
18:T:404:ASP:CB	18:T:409:GLU:HA	2.45	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:625:LEU:HD22	6:A:715:LEU:HD21	1.96	0.47
13:N:8:PRO:HB2	13:N:62:VAL:HG11	1.97	0.47
18:T:119:ALA:HA	18:T:127:MET:C	2.36	0.47
5:5:93:G:C2	5:5:102:C:C2	3.03	0.47
7:C:319:GLY:O	7:C:426:GLN:NE2	2.48	0.47
9:J:290:VAL:HG12	9:J:304:LEU:HB2	1.96	0.47
5:5:25:G:H2'	5:5:25:G:N3	2.30	0.46
5:5:106:A:O2'	9:J:213:LYS:NZ	2.30	0.46
6:A:161:PHE:CE1	6:A:198:ALA:HA	2.50	0.46
6:A:611:LYS:O	6:A:614:ARG:HG2	2.16	0.46
9:J:156:ILE:HG22	9:J:166:VAL:HG13	1.97	0.46
11:L:41:LEU:HD21	12:M:83:LEU:HD21	1.96	0.46
14:O:217:ILE:HD11	17:S:82:ARG:CZ	2.45	0.46
6:A:165:LEU:HD13	6:A:578:MET:HE2	1.97	0.46
6:A:1107:LEU:HB2	6:A:1110:ALA:HB2	1.98	0.46
7:C:222:MET:HE1	7:C:252:LEU:HD21	1.97	0.46
10:K:180:VAL:HG12	10:K:185:ARG:NH1	2.30	0.46
14:O:76:LEU:O	14:O:80:LEU:N	2.43	0.46
5:5:88:U:O2'	9:J:216:ILE:HD11	2.15	0.46
6:A:228:LYS:CG	6:A:695:LEU:HD11	2.42	0.46
16:R:67:HIS:O	16:R:71:ARG:CB	2.64	0.46
31:V:919:CYS:HA	31:V:1013:SER:HA	1.97	0.46
6:A:522:TYR:CE1	6:A:686:ILE:HD12	2.50	0.46
6:A:637:VAL:O	6:A:641:LEU:N	2.46	0.46
7:C:241:VAL:HG11	7:C:273:LEU:HD22	1.97	0.46
8:H:60:VAL:HG13	8:H:76:LEU:HD11	1.98	0.46
11:L:22:THR:HG21	11:L:62:TYR:CE1	2.50	0.46
17:S:128:THR:HB	17:S:129:LEU:HD12	1.96	0.46
1:I:64:U:H2'	1:I:65:U:O4'	2.16	0.46
6:A:1354:GLU:N	6:A:1355:PRO:CD	2.79	0.46
8:H:45:PHE:CZ	8:H:258:LEU:HB3	2.50	0.46
9:J:277:VAL:HG22	9:J:278:ASP:N	2.29	0.46
9:J:365:PHE:CE1	9:J:373:LEU:HG	2.50	0.46
11:L:78:TYR:OH	11:L:92:ILE:HG21	2.16	0.46
14:O:214:ASN:HD22	17:S:44:ARG:HG3	1.80	0.46
6:A:209:ILE:HB	6:A:212:VAL:HB	1.97	0.46
6:A:1204:ARG:NH2	6:A:1260:PHE:HA	2.31	0.46
9:J:407:PHE:CZ	9:J:414:LEU:HD13	2.51	0.46
6:A:1961:LEU:HD12	6:A:1963:LEU:HG	1.98	0.46
8:H:402:LEU:HD22	8:H:420:ILE:HD11	1.98	0.46
11:L:67:TYR:HE1	11:L:75:LYS:HA	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
18:T:284:ASP:O	18:T:311:LYS:CB	2.63	0.46
12:M:121:ARG:O	12:M:123:ASP:N	2.48	0.46
6:A:191:VAL:O	6:A:559:GLN:HA	2.16	0.46
6:A:719:ILE:N	6:A:720:PRO:CD	2.79	0.46
6:A:789:ALA:HB2	6:A:799:TRP:CE2	2.51	0.46
6:A:831:ARG:HG3	6:A:852:LEU:CD1	2.46	0.46
17:S:72:ALA:HB1	17:S:88:PHE:CZ	2.50	0.46
18:T:119:ALA:CA	18:T:131:ALA:CB	2.92	0.46
6:A:1082:ILE:HG23	6:A:1109:PHE:HE1	1.81	0.46
7:C:152:LEU:HD21	7:C:319:GLY:HA2	1.97	0.46
8:H:148:LEU:HA	8:H:151:VAL:HG12	1.97	0.46
11:L:61:ARG:O	11:L:61:ARG:HD3	2.16	0.46
14:O:189:ARG:NE	17:S:38:LEU:HD12	2.31	0.46
6:A:1165:LEU:HD21	6:A:1514:PHE:CE1	2.51	0.45
6:A:1701:ILE:HB	6:A:1734:PHE:HB2	1.99	0.45
9:J:198:PHE:CD1	9:J:239:ILE:HD13	2.50	0.45
9:J:227:VAL:HA	9:J:243:GLY:HA3	1.98	0.45
12:M:146:LEU:HD13	12:M:151:LEU:HD12	1.96	0.45
4:6:39:G:C6	12:M:117:PHE:HD2	2.33	0.45
6:A:1165:LEU:HD21	6:A:1514:PHE:HE1	1.81	0.45
6:A:1651:ALA:HB2	6:A:1911:TRP:CH2	2.51	0.45
17:S:285:LEU:HD22	17:S:299:GLU:HA	1.99	0.45
17:S:300:THR:O	17:S:304:LYS:CB	2.64	0.45
6:A:995:LEU:O	6:A:999:LEU:HG	2.16	0.45
6:A:1875:ILE:HG22	6:A:1876:ASN:N	2.31	0.45
18:T:300:ASP:C	18:T:301:LYS:C	2.75	0.45
6:A:831:ARG:HG3	6:A:852:LEU:HD13	1.99	0.45
6:A:1850:LEU:HD11	6:A:1881:THR:HG22	1.97	0.45
10:K:134:VAL:HG11	13:N:115:LEU:HD11	1.97	0.45
17:S:199:MET:HB2	17:S:242:GLU:HB3	1.98	0.45
18:T:285:ASN:HA	18:T:311:LYS:CA	2.42	0.45
5:5:35:A:H2'	5:5:36:A:C8	2.52	0.45
6:A:518:VAL:HG21	6:A:689:TYR:CE2	2.51	0.45
6:A:674:MET:HA	6:A:677:ILE:HD12	1.98	0.45
7:C:235:VAL:HG23	7:C:261:VAL:HG11	1.99	0.45
7:C:879:LEU:HD11	7:C:921:SER:OG	2.16	0.45
9:J:291:ARG:HD3	9:J:303:VAL:HG23	1.99	0.45
9:J:341:LEU:HD23	9:J:342:LEU:N	2.31	0.45
31:V:791:GLN:HA	31:V:1074:LEU:CB	2.47	0.45
6:A:1865:THR:CG2	6:A:1871:ALA:HB2	2.46	0.45
18:T:284:ASP:C	18:T:311:LYS:CA	2.78	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:2:27:A:OP1	6:A:1093:LYS:NZ	2.40	0.45
5:5:80:G:C4	5:5:82:A:C2	3.05	0.45
6:A:721:LEU:HD11	6:A:725:TYR:CZ	2.52	0.45
7:C:152:LEU:HD11	7:C:319:GLY:HA2	1.97	0.45
7:C:200:CYS:HB3	7:C:436:VAL:HG21	1.99	0.45
7:C:493:LEU:HD21	7:C:539:VAL:HG21	1.98	0.45
13:N:67:GLN:HG2	13:N:120:LEU:HD23	1.99	0.45
6:A:376:ARG:NH1	7:C:957:ALA:O	2.49	0.45
7:C:126:MET:SD	7:C:132:ARG:NH2	2.90	0.45
9:J:209:TRP:HA	9:J:216:ILE:HA	1.99	0.45
12:M:12:GLN:HE22	12:M:58:HIS:HB3	1.81	0.45
12:M:121:ARG:O	12:M:124:MET:N	2.49	0.45
13:N:94:VAL:HG23	13:N:142:ILE:HD12	1.99	0.45
9:J:198:PHE:CE1	9:J:239:ILE:HD13	2.51	0.44
9:J:242:ALA:HB1	9:J:269:ILE:HG21	1.99	0.44
6:A:138:HIS:CE1	11:L:49:LEU:HD11	2.52	0.44
6:A:330:LEU:HD21	6:A:386:ALA:HB2	1.98	0.44
6:A:1047:ALA:HB3	6:A:1251:TYR:HB3	1.98	0.44
7:C:691:VAL:CG1	7:C:841:LEU:HD22	2.46	0.44
14:O:22:LYS:HB2	14:O:56:LEU:HD11	1.99	0.44
9:J:296:VAL:HG23	10:K:73:TYR:CG	2.52	0.44
4:6:69:C:C2	4:6:78:G:C2	3.05	0.44
8:H:317:ILE:CD1	8:H:317:ILE:C	2.86	0.44
18:T:457:TYR:CB	18:T:465:THR:HA	2.48	0.44
5:5:15:A:N7	5:5:133:C:N4	2.65	0.44
6:A:203:ASN:HA	6:A:548:LEU:HD23	1.99	0.44
6:A:1689:ARG:NH1	6:A:1692:TYR:OH	2.51	0.44
13:N:43:LEU:HD21	13:N:57:LYS:HB2	1.99	0.44
4:6:62:A:C4	4:6:63:G:C8	3.06	0.44
6:A:461:LEU:HD11	7:C:331:TYR:CB	2.46	0.44
6:A:1182:LEU:HD11	15:P:127:TRP:HZ2	1.81	0.44
7:C:318:LEU:HD22	7:C:421:LEU:HD22	1.98	0.44
6:A:1624:LEU:HD21	6:A:1635:HIS:ND1	2.32	0.44
7:C:155:ILE:CD1	7:C:175:LEU:HD23	2.47	0.44
7:C:416:ASP:HB3	7:C:417:PRO:HD2	1.99	0.44
8:H:73:ILE:CG1	8:H:74:PRO:HD3	2.48	0.44
12:M:48:VAL:HG22	12:M:220:GLY:N	2.33	0.44
16:R:102:LEU:O	16:R:106:LEU:CB	2.66	0.44
18:T:119:ALA:O	18:T:128:ILE:CA	2.65	0.44
2:E:-15:A:N3	2:E:-15:A:H2'	2.32	0.44
5:5:103:A:C4	5:5:104:G:C8	3.06	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1328:PHE:CD2	6:A:1603:ASN:HB2	2.53	0.44
7:C:150:MET:SD	7:C:212:PHE:HB3	2.58	0.44
13:N:60:ILE:HG13	13:N:72:GLN:HG3	1.98	0.44
13:N:68:ARG:HB3	13:N:84:ILE:HD12	2.00	0.44
18:T:119:ALA:HB3	18:T:131:ALA:HB3	1.72	0.44
3:2:20:G:C2	15:P:6:ARG:HD3	2.52	0.44
6:A:137:GLU:HG3	11:L:30:LEU:HD23	2.00	0.44
6:A:181:HIS:HB3	6:A:182:PRO:HD2	2.00	0.44
6:A:660:ILE:HD12	6:A:660:ILE:HA	1.94	0.44
6:A:1508:HIS:O	6:A:1511:ARG:HG2	2.17	0.44
7:C:231:ALA:O	7:C:487:ARG:NH1	2.51	0.44
8:H:355:ARG:O	8:H:359:THR:HG23	2.18	0.44
9:J:324:ALA:CB	9:J:356:LEU:HD21	2.48	0.44
6:A:1082:ILE:HG23	6:A:1109:PHE:CE1	2.53	0.43
7:C:187:ARG:NH2	7:C:653:ASP:OD2	2.51	0.43
7:C:760:LEU:HD23	7:C:764:ASN:HD21	1.82	0.43
8:H:298:VAL:HG13	8:H:311:LYS:HB3	2.00	0.43
9:J:181:HIS:CE1	9:J:201:SER:HG	2.36	0.43
9:J:181:HIS:CG	9:J:201:SER:HG	2.34	0.43
9:J:229:THR:HG21	9:J:271:GLN:HA	1.99	0.43
6:A:1054:LEU:HD13	6:A:1121:ILE:HD13	1.99	0.43
2:E:-14:A:O2'	2:E:-13:G:O4'	2.25	0.43
6:A:996:ASP:OD2	6:A:1511:ARG:NH1	2.49	0.43
6:A:1974:LEU:O	6:A:1977:VAL:HG12	2.18	0.43
7:C:105:ILE:HG22	7:C:182:LYS:HB3	2.00	0.43
7:C:423:HIS:CE1	7:C:427:LEU:HD11	2.53	0.43
7:C:501:ILE:HD13	7:C:567:ILE:HG23	2.00	0.43
8:H:98:LEU:O	8:H:101:MET:HG2	2.18	0.43
8:H:189:THR:O	8:H:192:GLU:HG2	2.18	0.43
13:N:71:CYS:SG	13:N:72:GLN:N	2.92	0.43
4:6:1:G:H2'	4:6:2:U:C6	2.53	0.43
3:2:43:G:H2'	3:2:44:U:H5'	2.01	0.43
18:T:121:GLU:C	18:T:179:ALA:HB1	2.39	0.43
5:5:111:C:H2'	5:5:112:C:C6	2.54	0.43
6:A:1353:THR:HG23	6:A:1356:LEU:HB3	1.99	0.43
7:C:866:ILE:HG22	7:C:868:VAL:HG13	1.99	0.43
9:J:250:LEU:HD11	9:J:262:LEU:HD11	2.00	0.43
9:J:341:LEU:HD22	10:K:45:PRO:HA	2.01	0.43
13:N:214:ILE:O	13:N:244:HIS:NE2	2.43	0.43
5:5:112:C:H1'	6:A:716:ARG:HG3	1.99	0.43
6:A:342:LEU:HD22	6:A:392:ASN:ND2	2.34	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1170:MET:HE3	6:A:1230:ILE:HG13	1.99	0.43
6:A:1999:ILE:HG22	6:A:2000:SER:N	2.34	0.43
7:C:151:ASP:CB	7:C:175:LEU:O	2.67	0.43
17:S:126:ILE:HD12	17:S:136:TRP:CD2	2.53	0.43
17:S:534:TYR:HA	17:S:551:PHE:CB	2.49	0.43
4:6:78:G:O2'	6:A:611:LYS:HD3	2.19	0.43
6:A:239:PHE:HA	6:A:240:PRO:C	2.39	0.43
6:A:521:SER:HB2	6:A:682:ASP:HA	2.00	0.43
13:N:71:CYS:SG	13:N:73:CYS:N	2.80	0.43
5:5:74:U:O2	5:5:78:A:C4	2.72	0.43
6:A:137:GLU:OE1	11:L:34:GLN:NE2	2.52	0.43
6:A:905:TYR:HB2	6:A:908:ASP:HB2	2.01	0.43
7:C:567:ILE:HG22	7:C:571:TYR:CE1	2.53	0.43
7:C:622:LEU:HD21	7:C:644:ILE:HD11	2.01	0.43
8:H:17:ASN:O	8:H:20:MET:HG2	2.19	0.43
9:J:217:ILE:HG23	15:P:34:HIS:CG	2.54	0.43
31:V:779:LYS:O	34:3:1:U:C1'	2.67	0.43
6:A:1069:LEU:HB3	6:A:1116:TYR:CE2	2.54	0.43
6:A:1069:LEU:HB3	6:A:1116:TYR:HE2	1.84	0.43
6:A:1886:THR:O	6:A:1996:LEU:HD11	2.18	0.43
7:C:444:GLN:N	7:C:445:PRO:CD	2.82	0.43
8:H:423:LEU:HD23	8:H:427:LEU:HD13	2.01	0.43
3:2:36:A:H2'	3:2:37:G:C8	2.54	0.42
4:6:35:A:O2'	11:L:40:LYS:HE2	2.19	0.42
5:5:102:C:OP1	6:A:675:HIS:NE2	2.52	0.42
6:A:1087:ASN:HD21	6:A:1098:VAL:CG1	2.32	0.42
7:C:107:THR:HG21	7:C:479:GLY:HA2	2.01	0.42
7:C:137:GLY:HA2	7:C:213:LEU:HB2	2.01	0.42
8:H:351:ILE:HD13	8:H:358:GLN:HA	2.00	0.42
9:J:271:GLN:HB3	9:J:314:THR:HG22	2.01	0.42
4:6:72:C:OP2	6:A:732:ARG:NH2	2.52	0.42
5:5:74:U:O2	5:5:78:A:C2	2.72	0.42
6:A:226:ARG:O	6:A:229:ARG:HB2	2.19	0.42
6:A:1207:TRP:CZ2	6:A:1268:ARG:HB2	2.55	0.42
8:H:44:LEU:HD23	8:H:79:LEU:HD21	2.01	0.42
8:H:143:LEU:CD1	8:H:151:VAL:HG21	2.49	0.42
10:K:75:GLN:O	10:K:78:VAL:HG12	2.19	0.42
18:T:112:CYS:CA	18:T:135:SER:CB	2.96	0.42
6:A:637:VAL:O	6:A:641:LEU:HB2	2.19	0.42
6:A:1033:ASN:HD22	6:A:1288:LEU:HB3	1.85	0.42
6:A:1278:VAL:HG23	6:A:1278:VAL:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1351:VAL:HA	8:H:303:LEU:HD21	2.01	0.42
7:C:314:ALA:HB2	7:C:321:THR:HG22	2.01	0.42
7:C:825:VAL:HG22	7:C:834:MET:SD	2.59	0.42
7:C:928:CYS:SG	7:C:929:GLN:N	2.92	0.42
9:J:282:VAL:HG11	9:J:323:VAL:HG21	2.01	0.42
6:A:1082:ILE:HG21	6:A:1113:ILE:CD1	2.50	0.42
6:A:1400:ILE:CG2	6:A:1440:ILE:HB	2.49	0.42
7:C:195:GLY:C	7:C:545:LEU:HD13	2.39	0.42
7:C:602:VAL:HG11	7:C:860:PRO:HG3	2.01	0.42
8:H:28:ILE:HG12	8:H:43:ASP:HB3	2.02	0.42
9:J:142:VAL:CG1	9:J:157:THR:HB	2.50	0.42
9:J:334:TRP:CD1	9:J:341:LEU:HA	2.54	0.42
13:N:39:LEU:HD13	13:N:40:PRO:HD2	2.01	0.42
18:T:271:ASN:O	18:T:294:MET:CB	2.67	0.42
6:A:834:ILE:CD1	6:A:845:VAL:HG23	2.50	0.42
7:C:617:LYS:HB3	7:C:666:ILE:HD11	2.01	0.42
13:N:101:THR:HG22	13:N:120:LEU:HB3	2.02	0.42
2:E:-8:C:H2'	2:E:-7:U:O4'	2.20	0.42
4:6:30:G:OP1	11:L:115:ASN:N	2.44	0.42
6:A:229:ARG:HG2	6:A:695:LEU:HD23	2.01	0.42
6:A:460:PRO:HB3	7:C:376:PHE:HA	2.02	0.42
6:A:688:TYR:O	6:A:692:ASN:N	2.53	0.42
6:A:1608:LEU:HG	6:A:1823:LEU:HD21	2.01	0.42
9:J:216:ILE:HD12	9:J:216:ILE:C	2.39	0.42
2:E:-13:G:C2	8:H:316:LYS:HD2	2.55	0.42
6:A:139:LEU:HD12	6:A:193:TYR:CD2	2.55	0.42
6:A:165:LEU:CD2	6:A:578:MET:HB3	2.49	0.42
6:A:654:HIS:CE1	6:A:658:ASN:OD1	2.72	0.42
6:A:1369:ASN:O	6:A:1373:LEU:CB	2.67	0.42
6:A:1553:ILE:HG21	6:A:1570:TRP:CE3	2.54	0.42
12:M:173:ILE:HG12	12:M:184:VAL:HG13	2.02	0.42
6:A:200:THR:OG1	6:A:574:GLN:NE2	2.53	0.42
6:A:719:ILE:N	6:A:720:PRO:HD2	2.34	0.42
7:C:229:LEU:HD22	7:C:235:VAL:HG21	2.02	0.42
9:J:250:LEU:CD1	9:J:295:VAL:HG23	2.50	0.42
9:J:326:ALA:HB2	9:J:356:LEU:HD13	2.01	0.42
4:6:71:G:N2	4:6:74:U:OP2	2.47	0.42
6:A:556:TYR:CG	10:K:120:ASP:HB3	2.54	0.42
6:A:754:TYR:HA	9:J:183:MET:CE	2.49	0.42
6:A:780:ARG:HA	6:A:780:ARG:NE	2.35	0.42
6:A:1125:LEU:HD22	6:A:1170:MET:HE1	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1634:LEU:HD21	6:A:1641:LEU:CD1	2.46	0.42
6:A:2078:GLU:O	6:A:2082:ILE:HD12	2.19	0.42
7:C:178:LEU:HD12	7:C:178:LEU:N	2.35	0.42
9:J:187:ASP:O	9:J:200:VAL:HG12	2.20	0.42
17:S:140:LEU:HD13	17:S:156:TYR:CZ	2.54	0.42
3:2:20:G:O4'	6:A:780:ARG:HD3	2.19	0.42
4:6:52:G:H2'	4:6:53:A:C8	2.55	0.42
4:6:91:A:C2	17:S:99:ILE:HG21	2.55	0.42
6:A:330:LEU:HD12	7:C:920:LEU:HD21	2.01	0.42
6:A:1887:GLY:O	6:A:1991:ILE:HG22	2.20	0.42
8:H:334:LEU:CD1	8:H:380:GLN:HB3	2.48	0.42
8:H:462:ILE:HG23	8:H:473:LEU:HD13	2.02	0.42
9:J:111:ILE:HG22	17:S:194:MET:O	2.19	0.42
9:J:223:HIS:CG	9:J:227:VAL:CG2	3.03	0.42
9:J:327:CYS:SG	9:J:330:ASP:N	2.93	0.42
12:M:156:ILE:HG21	12:M:175:TYR:CE1	2.54	0.42
6:A:165:LEU:HD11	6:A:579:LEU:HD23	2.02	0.41
6:A:168:LEU:HD21	6:A:626:LEU:HD11	2.00	0.41
6:A:207:ARG:HD2	6:A:298:TYR:O	2.19	0.41
6:A:209:ILE:HG23	6:A:301:TRP:CE2	2.55	0.41
6:A:1282:ASP:C	8:H:345:ILE:HD11	2.40	0.41
6:A:1805:ILE:HG23	6:A:1809:ASN:HB2	2.02	0.41
8:H:463:ASN:O	8:H:466:THR:OG1	2.29	0.41
31:V:779:LYS:HA	31:V:793:ILE:O	2.20	0.41
6:A:841:GLU:HB2	6:A:844:MET:CB	2.50	0.41
7:C:152:LEU:HD21	7:C:319:GLY:CA	2.50	0.41
7:C:200:CYS:SG	7:C:210:ILE:HD12	2.60	0.41
7:C:870:ALA:N	7:C:871:PRO:HD2	2.35	0.41
6:A:708:TRP:CZ2	6:A:712:LEU:HD11	2.54	0.41
6:A:1442:ARG:HG3	8:H:300:LYS:O	2.20	0.41
6:A:1468:ALA:O	6:A:1472:ASN:N	2.53	0.41
6:A:1974:LEU:O	6:A:1978:VAL:HG23	2.20	0.41
8:H:373:ILE:HD11	8:H:419:PHE:CD2	2.55	0.41
9:J:244:ARG:HA	9:J:268:PRO:HB3	2.01	0.41
18:T:119:ALA:CB	18:T:131:ALA:HB2	2.28	0.41
2:E:-9:U:O4'	16:R:19:HIS:HB2	2.20	0.41
6:A:714:PHE:CE1	6:A:718:THR:HG21	2.56	0.41
6:A:2075:THR:O	6:A:2079:ILE:HG12	2.20	0.41
7:C:95:THR:HG21	15:P:40:ARG:NH2	2.35	0.41
8:H:42:ARG:O	8:H:45:PHE:HB3	2.20	0.41
10:K:110:HIS:NE2	13:N:20:GLU:O	2.52	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:O:39:LEU:HD11	14:O:155:ALA:CB	2.50	0.41
2:E:-5:G:OP2	6:A:1377:SER:O	2.38	0.41
4:6:57:U:H2'	4:6:58:C:O4'	2.20	0.41
6:A:766:ILE:CG2	6:A:782:ILE:HD13	2.50	0.41
6:A:818:SER:HB3	9:J:141:TRP:CZ2	2.55	0.41
6:A:1107:LEU:HD23	6:A:1109:PHE:CZ	2.56	0.41
6:A:1609:TRP:HE3	6:A:1823:LEU:HD13	1.85	0.41
7:C:347:ARG:O	7:C:348:LEU:C	2.58	0.41
9:J:311:VAL:HA	9:J:326:ALA:O	2.20	0.41
9:J:358:ILE:HG22	9:J:359:ASN:O	2.20	0.41
14:O:219:TYR:O	14:O:221:GLN:N	2.54	0.41
17:S:47:GLN:HG2	17:S:51:ARG:HE	1.86	0.41
17:S:185:VAL:HG22	17:S:189:TYR:CE2	2.55	0.41
18:T:119:ALA:CB	18:T:128:ILE:CA	2.39	0.41
3:2:15:C:HO2'	3:2:18:U:H3	1.68	0.41
6:A:583:ILE:HD11	6:A:619:PHE:CZ	2.55	0.41
7:C:212:PHE:O	7:C:213:LEU:HD23	2.20	0.41
8:H:50:LEU:HB2	8:H:251:LEU:HD22	2.02	0.41
10:K:112:ILE:HD11	13:N:23:ILE:HB	2.02	0.41
13:N:139:LEU:HD13	13:N:139:LEU:C	2.40	0.41
16:R:16:THR:OG1	16:R:17:SER:N	2.53	0.41
17:S:140:LEU:CD2	17:S:152:VAL:HG23	2.51	0.41
17:S:367:TRP:O	17:S:371:ILE:N	2.44	0.41
6:A:1879:ILE:HD11	6:A:1894:ILE:HD11	2.02	0.41
8:H:49:ILE:CG2	8:H:56:ILE:HG21	2.51	0.41
13:N:84:ILE:O	13:N:87:ARG:HG3	2.20	0.41
14:O:163:GLN:HB3	14:O:167:ALA:HB3	2.02	0.41
4:6:31:G:N1	13:N:53:ASN:O	2.54	0.41
6:A:305:LEU:HD21	6:A:476:ALA:HB2	2.02	0.41
6:A:593:LEU:HD23	6:A:593:LEU:HA	1.94	0.41
5:5:45:A:N6	5:5:74:U:N3	2.56	0.41
5:5:130:A:H2'	5:5:131:A:C8	2.56	0.41
6:A:506:PHE:CD2	6:A:525:LEU:HD13	2.56	0.41
6:A:1857:VAL:HG22	6:A:1878:CYS:O	2.21	0.41
6:A:1935:VAL:O	6:A:1959:THR:HG22	2.21	0.41
7:C:133:ILE:HD13	7:C:560:GLN:HB3	2.01	0.41
7:C:502:LEU:HD21	7:C:510:ARG:HH21	1.85	0.41
8:H:391:LEU:HD23	8:H:391:LEU:HA	1.95	0.41
9:J:146:ALA:HB3	9:J:188:VAL:HG23	2.03	0.41
11:L:52:ILE:C	11:L:52:ILE:HD12	2.42	0.41
17:S:199:MET:SD	17:S:246:LEU:HD22	2.60	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:-5:G:O3'	6:A:667:TYR:HE1	2.04	0.41
4:6:42:A:H2'	4:6:43:C:O4'	2.21	0.41
5:5:93:G:H4'	16:R:13:GLY:HA2	2.03	0.41
6:A:218:SER:CB	6:A:315:SER:HA	2.51	0.41
6:A:695:LEU:HD13	6:A:696:GLY:N	2.35	0.41
6:A:762:VAL:HG22	6:A:815:TYR:CG	2.56	0.41
6:A:1654:TRP:CZ3	6:A:1779:LEU:HD12	2.55	0.41
7:C:117:ARG:NH1	7:C:156:ASP:O	2.54	0.41
7:C:126:MET:SD	7:C:132:ARG:HG2	2.60	0.41
7:C:677:PHE:CD1	7:C:857:LEU:HD11	2.56	0.41
7:C:813:ILE:HD13	7:C:818:TYR:OH	2.21	0.41
17:S:185:VAL:HG22	17:S:189:TYR:CZ	2.56	0.41
4:6:69:C:C2	4:6:78:G:N2	2.89	0.40
6:A:1066:LEU:HD21	6:A:1113:ILE:HG21	2.03	0.40
6:A:1632:ILE:HD11	6:A:1649:PHE:CD2	2.56	0.40
6:A:1632:ILE:HG21	6:A:1645:LEU:CD1	2.50	0.40
8:H:65:LEU:HD12	8:H:117:ILE:HD11	2.03	0.40
8:H:333:SER:HA	8:H:343:TYR:CE2	2.56	0.40
8:H:474:THR:HA	8:H:477:MET:HG2	2.04	0.40
18:T:495:GLU:CB	18:T:503:ARG:CB	2.98	0.40
6:A:1995:TRP:CD1	6:A:1995:TRP:N	2.89	0.40
7:C:139:ILE:CD1	7:C:225:THR:HG23	2.40	0.40
8:H:151:VAL:O	8:H:154:VAL:HG12	2.21	0.40
9:J:200:VAL:HG21	9:J:227:VAL:HG12	2.03	0.40
10:K:146:VAL:N	17:S:128:THR:O	2.52	0.40
12:M:73:CYS:O	12:M:76:PHE:HB3	2.21	0.40
2:E:-5:G:C4	6:A:671:TYR:CE1	3.09	0.40
5:5:103:A:O2'	5:5:104:G:H5''	2.20	0.40
6:A:507:LEU:HD21	6:A:529:TYR:CD2	2.55	0.40
6:A:919:LEU:HD23	6:A:919:LEU:HA	1.95	0.40
7:C:320:PHE:HB2	7:C:429:PHE:HD2	1.86	0.40
8:H:124:LEU:O	8:H:129:VAL:HG23	2.21	0.40
9:J:213:LYS:HZ2	9:J:215:GLN:HG3	1.86	0.40
10:K:170:SER:O	10:K:185:ARG:NH2	2.48	0.40
5:5:104:G:OP2	6:A:531:LEU:HD11	2.22	0.40
6:A:781:THR:O	6:A:785:HIS:HB2	2.22	0.40
6:A:1553:ILE:HG21	6:A:1570:TRP:CZ3	2.57	0.40
6:A:1879:ILE:HD12	6:A:1892:LYS:HB3	2.02	0.40
7:C:127:ALA:HA	7:C:133:ILE:HD11	2.02	0.40
4:6:85:C:O2	14:O:167:ALA:HA	2.22	0.40
6:A:239:PHE:HE1	6:A:635:THR:HG22	1.87	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1967:ALA:HB2	6:A:2016:LYS:HA	2.04	0.40
9:J:150:VAL:HG11	15:P:40:ARG:NH2	2.37	0.40
14:O:33:TRP:CD1	14:O:49:GLU:HG3	2.57	0.40
17:S:155:LEU:HD23	17:S:155:LEU:C	2.42	0.40
18:T:360:LYS:CB	18:T:378:LEU:O	2.70	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	
6	A	1906/2413 (79%)	1733 (91%)	161 (8%)	12 (1%)	22	59
7	C	864/1008 (86%)	771 (89%)	87 (10%)	6 (1%)	19	56
8	H	393/577 (68%)	353 (90%)	36 (9%)	4 (1%)	13	48
9	J	340/451 (75%)	295 (87%)	39 (12%)	6 (2%)	7	36
10	K	183/379 (48%)	163 (89%)	17 (9%)	3 (2%)	8	39
11	L	153/157 (98%)	136 (89%)	16 (10%)	1 (1%)	19	56
12	M	250/339 (74%)	236 (94%)	12 (5%)	2 (1%)	16	54
13	N	217/364 (60%)	191 (88%)	22 (10%)	4 (2%)	7	36
14	O	207/590 (35%)	193 (93%)	11 (5%)	3 (1%)	9	41
15	P	63/175 (36%)	56 (89%)	7 (11%)	0	100	100
16	R	104/135 (77%)	91 (88%)	12 (12%)	1 (1%)	13	48
17	S	438/687 (64%)	415 (95%)	20 (5%)	3 (1%)	19	56
18	T	557/877 (64%)	532 (96%)	22 (4%)	3 (0%)	25	63
19	a	131/251 (52%)	123 (94%)	8 (6%)	0	100	100
20	c	97/382 (25%)	87 (90%)	8 (8%)	2 (2%)	5	33
21	o	305/455 (67%)	251 (82%)	46 (15%)	8 (3%)	4	29

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
23	y	77/215 (36%)	76 (99%)	1 (1%)	0	100	100
24	b	76/196 (39%)	74 (97%)	2 (3%)	0	100	100
24	k	76/196 (39%)	68 (90%)	7 (9%)	1 (1%)	10	43
25	d	80/101 (79%)	73 (91%)	7 (9%)	0	100	100
25	n	80/101 (79%)	74 (92%)	6 (8%)	0	100	100
26	e	71/94 (76%)	62 (87%)	9 (13%)	0	100	100
26	p	71/94 (76%)	66 (93%)	4 (6%)	1 (1%)	9	41
27	f	70/86 (81%)	61 (87%)	9 (13%)	0	100	100
27	q	70/86 (81%)	65 (93%)	5 (7%)	0	100	100
28	g	65/77 (84%)	63 (97%)	2 (3%)	0	100	100
28	r	65/77 (84%)	57 (88%)	8 (12%)	0	100	100
29	h	78/146 (53%)	71 (91%)	7 (9%)	0	100	100
29	l	75/146 (51%)	65 (87%)	8 (11%)	2 (3%)	4	28
30	j	92/110 (84%)	83 (90%)	9 (10%)	0	100	100
30	m	91/110 (83%)	84 (92%)	7 (8%)	0	100	100
31	V	639/1145 (56%)	602 (94%)	34 (5%)	3 (0%)	25	63
32	W	160/238 (67%)	117 (73%)	35 (22%)	8 (5%)	1	19
33	Y	82/111 (74%)	76 (93%)	6 (7%)	0	100	100
35	s	106/175 (61%)	92 (87%)	8 (8%)	6 (6%)	1	17
36	t	426/503 (85%)	417 (98%)	9 (2%)	0	100	100
36	u	112/503 (22%)	104 (93%)	8 (7%)	0	100	100
36	v	114/503 (23%)	108 (95%)	3 (3%)	3 (3%)	4	29
36	w	423/503 (84%)	414 (98%)	7 (2%)	2 (0%)	25	63
All	All	9407/14756 (64%)	8598 (91%)	725 (8%)	84 (1%)	17	50

All (84) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	A	487	ASN
6	A	742	VAL
6	A	1620	TYR
7	C	568	SER
7	C	901	GLU
8	H	414	PRO

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	K	108	ASN
10	K	188	LYS
17	S	238	TRP
18	T	478	TYR
20	c	226	ASP
21	o	173	LYS
21	o	418	LEU
31	V	527	ASN
31	V	659	THR
32	W	76	ILE
35	s	94	LYS
35	s	111	VAL
35	s	133	PRO
6	A	2069	VAL
7	C	927	MET
9	J	226	GLY
9	J	287	ASP
9	J	400	ARG
10	K	193	GLU
12	M	84	GLY
12	M	122	GLU
14	O	204	LYS
14	O	220	GLU
20	c	172	ASP
21	o	164	GLY
21	o	181	GLY
21	o	381	SER
31	V	758	ASN
32	W	122	ARG
35	s	105	PRO
35	s	136	VAL
36	v	109	LEU
6	A	511	ASP
6	A	1622	GLY
8	H	109	LYS
9	J	162	THR
13	N	16	CYS
13	N	249	GLY
16	R	14	SER
24	k	81	VAL
32	W	95	PRO
36	v	20	ARG

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Mol	Chain	Res	Type
6	A	418	ASP
7	C	159	LYS
8	H	67	LYS
9	J	277	VAL
13	N	38	THR
14	O	92	ALA
18	T	615	PHE
21	o	306	SER
29	l	31	SER
32	W	68	PRO
32	W	94	LEU
32	W	129	LEU
35	s	119	SER
36	w	20	ARG
6	A	322	VAL
6	A	1093	LYS
6	A	1405	ILE
9	J	318	PRO
17	S	235	LEU
29	l	98	PRO
36	w	17	PRO
8	H	353	PHE
18	T	660	ILE
21	o	297	LEU
21	o	448	ALA
6	A	1984	PRO
6	A	665	GLY
11	L	152	GLY
13	N	121	GLY
17	S	237	ILE
26	p	74	GLY
7	C	301	GLY
7	C	987	PRO
32	W	56	ILE
32	W	98	VAL
36	v	36	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	
6	A	1577/2182 (72%)	1549 (98%)	28 (2%)	54	71
7	C	681/910 (75%)	662 (97%)	19 (3%)	38	59
8	H	366/538 (68%)	357 (98%)	9 (2%)	42	62
9	J	299/397 (75%)	280 (94%)	19 (6%)	14	38
10	K	159/328 (48%)	152 (96%)	7 (4%)	24	47
11	L	112/141 (79%)	105 (94%)	7 (6%)	15	38
12	M	214/296 (72%)	210 (98%)	4 (2%)	52	69
13	N	211/332 (64%)	205 (97%)	6 (3%)	38	59
14	O	187/525 (36%)	181 (97%)	6 (3%)	34	55
15	P	56/151 (37%)	54 (96%)	2 (4%)	30	52
16	R	25/121 (21%)	24 (96%)	1 (4%)	27	49
17	S	230/633 (36%)	221 (96%)	9 (4%)	27	50
18	T	1/786 (0%)	1 (100%)	0	100	100
19	a	125/225 (56%)	125 (100%)	0	100	100
20	c	71/346 (20%)	68 (96%)	3 (4%)	25	48
21	o	256/413 (62%)	247 (96%)	9 (4%)	31	53
23	y	76/193 (39%)	74 (97%)	2 (3%)	41	61
24	b	70/176 (40%)	70 (100%)	0	100	100
24	k	70/176 (40%)	69 (99%)	1 (1%)	62	75
25	d	69/89 (78%)	69 (100%)	0	100	100
25	n	69/89 (78%)	66 (96%)	3 (4%)	25	48
26	e	65/83 (78%)	63 (97%)	2 (3%)	35	56
26	p	65/83 (78%)	60 (92%)	5 (8%)	10	32
27	f	63/77 (82%)	63 (100%)	0	100	100
27	q	63/77 (82%)	61 (97%)	2 (3%)	34	55
28	g	58/66 (88%)	57 (98%)	1 (2%)	56	72
28	r	57/66 (86%)	56 (98%)	1 (2%)	54	71
29	h	77/129 (60%)	76 (99%)	1 (1%)	65	76
29	l	73/129 (57%)	63 (86%)	10 (14%)	3	16
30	j	79/103 (77%)	79 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
30	m	77/103 (75%)	74 (96%)	3 (4%)	27	50
All	All	5601/9963 (56%)	5441 (97%)	160 (3%)	39	58

All (160) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	A	155	ASN
6	A	175	LEU
6	A	196	SER
6	A	233	HIS
6	A	326	ASN
6	A	527	LYS
6	A	537	THR
6	A	588	LEU
6	A	632	ILE
6	A	716	ARG
6	A	753	TYR
6	A	756	LEU
6	A	760	ASN
6	A	1094	ASP
6	A	1140	ASN
6	A	1165	LEU
6	A	1212	ARG
6	A	1337	THR
6	A	1346	PHE
6	A	1511	ARG
6	A	1650	ARG
6	A	1663	PHE
6	A	1757	LEU
6	A	1803	ARG
6	A	1940	MET
6	A	1951	PHE
6	A	1995	TRP
6	A	1997	ASP
7	C	153	LEU
7	C	223	ASP
7	C	300	LYS
7	C	360	ARG
7	C	400	LEU
7	C	430	ARG
7	C	461	LYS
7	C	537	CYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	C	586	MET
7	C	590	LYS
7	C	602	VAL
7	C	630	PRO
7	C	658	ASP
7	C	774	LEU
7	C	784	SER
7	C	803	VAL
7	C	830	ASN
7	C	928	CYS
7	C	933	TRP
8	H	84	ASN
8	H	130	ILE
8	H	193	SER
8	H	315	LEU
8	H	320	ASN
8	H	357	TRP
8	H	399	MET
8	H	419	PHE
8	H	421	LYS
9	J	110	LEU
9	J	152	ASN
9	J	156	ILE
9	J	162	THR
9	J	218	ARG
9	J	238	LEU
9	J	261	THR
9	J	274	CYS
9	J	286	THR
9	J	290	VAL
9	J	303	VAL
9	J	323	VAL
9	J	329	ASP
9	J	343	THR
9	J	356	LEU
9	J	386	SER
9	J	443	ASN
9	J	446	LEU
9	J	450	ARG
10	K	37	ASN
10	K	62	GLU
10	K	132	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	K	179	THR
10	K	190	LEU
10	K	195	ASN
10	K	202	MET
11	L	30	LEU
11	L	52	ILE
11	L	55	LEU
11	L	75	LYS
11	L	142	PHE
11	L	153	CYS
11	L	155	SER
12	M	13	VAL
12	M	31	ASN
12	M	102	LEU
12	M	174	ARG
13	N	22	ASN
13	N	39	LEU
13	N	87	ARG
13	N	106	ASN
13	N	109	MET
13	N	288	ILE
14	O	44	THR
14	O	50	LEU
14	O	53	ASN
14	O	56	LEU
14	O	98	CYS
14	O	160	LEU
15	P	9	LEU
15	P	175	ARG
16	R	17	SER
17	S	65	MET
17	S	124	ARG
17	S	128	THR
17	S	143	GLU
17	S	147	ASN
17	S	156	TYR
17	S	232	LEU
17	S	237	ILE
17	S	266	LEU
20	c	173	ARG
20	c	191	ARG
20	c	225	LYS

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Mol	Chain	Res	Type
21	o	156	ARG
21	o	166	THR
21	o	216	GLU
21	o	278	ARG
21	o	299	LEU
21	o	330	GLN
21	o	356	MET
21	o	406	ARG
21	o	451	ILE
23	y	162	ASN
23	y	185	ASN
26	e	25	THR
26	e	92	SER
28	g	66	ASN
29	h	16	THR
24	k	19	LYS
29	l	11	ARG
29	l	15	VAL
29	l	16	THR
29	l	25	VAL
29	l	43	VAL
29	l	44	LYS
29	l	95	ILE
29	l	96	ILE
29	l	97	LEU
29	l	101	LEU
30	m	41	ARG
30	m	82	LYS
30	m	94	LEU
25	n	20	SER
25	n	43	GLN
25	n	76	ASP
28	r	71	LEU
26	p	54	ILE
26	p	77	LEU
26	p	79	LYS
26	p	81	LEU
26	p	82	LEU
27	q	34	ASN
27	q	79	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (59) such sidechains are listed below:

Mol	Chain	Res	Type
6	A	155	ASN
6	A	326	ASN
6	A	344	ASN
6	A	542	HIS
6	A	617	ASN
6	A	636	HIS
6	A	713	ASN
6	A	828	HIS
6	A	848	ASN
6	A	1030	GLN
6	A	1115	GLN
6	A	1140	ASN
6	A	1369	ASN
6	A	1856	ASN
6	A	2018	ASN
7	C	143	HIS
7	C	194	ASN
7	C	211	ASN
7	C	218	HIS
7	C	289	ASN
7	C	358	ASN
7	C	423	HIS
7	C	431	GLN
7	C	683	ASN
7	C	764	ASN
7	C	776	ASN
7	C	830	ASN
8	H	320	ASN
9	J	271	GLN
9	J	443	ASN
10	K	86	ASN
10	K	171	ASN
10	K	192	ASN
10	K	195	ASN
11	L	116	ASN
12	M	12	GLN
12	M	31	ASN
12	M	39	GLN
14	O	83	GLN
15	P	34	HIS
17	S	79	HIS
17	S	147	ASN
17	S	236	GLN

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Mol	Chain	Res	Type
17	S	248	ASN
17	S	252	HIS
19	a	246	ASN
20	c	332	ASN
21	o	183	ASN
21	o	259	ASN
21	o	330	GLN
23	y	99	GLN
23	y	144	GLN
23	y	185	ASN
29	h	94	GLN
29	l	14	GLN
29	l	21	ASN
29	l	86	ASN
29	l	94	GLN
28	r	53	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	I	32/95 (33%)	14 (43%)	4 (12%)
2	E	15/20 (75%)	5 (33%)	1 (6%)
3	2	146/1175 (12%)	49 (33%)	5 (3%)
34	3	2/3 (66%)	2 (100%)	0
4	6	98/112 (87%)	37 (37%)	3 (3%)
5	5	138/179 (77%)	61 (44%)	3 (2%)
All	All	431/1584 (27%)	168 (38%)	16 (3%)

All (168) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	I	2	U
1	I	3	A
1	I	4	U
1	I	10	A
1	I	11	A
1	I	13	U
1	I	14	U
1	I	15	A
1	I	16	U
1	I	61	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	70	A
1	I	71	C
1	I	72	A
1	I	73	A
2	E	-11	G
2	E	-10	A
2	E	-8	C
2	E	-4	A
2	E	-1	G
3	2	15	C
3	2	16	U
3	2	17	U
3	2	18	U
3	2	19	U
3	2	20	G
3	2	21	G
3	2	23	U
3	2	25	A
3	2	26	G
3	2	27	A
3	2	29	C
3	2	30	A
3	2	32	G
3	2	33	U
3	2	34	G
3	2	35	U
3	2	41	C
3	2	44	U
3	2	63	U
3	2	64	G
3	2	67	A
3	2	68	U
3	2	81	C
3	2	141	A
3	2	1094	G
3	2	1096	C
3	2	1098	C
3	2	1099	G
3	2	1100	A
3	2	1101	C
3	2	1102	C
3	2	1103	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	2	1104	U
3	2	1106	G
3	2	1107	C
3	2	1108	A
3	2	1120	G
3	2	1123	C
3	2	1124	U
3	2	1125	U
3	2	1126	G
3	2	1139	G
3	2	1144	U
3	2	1145	U
3	2	1146	G
3	2	1149	G
3	2	1152	U
3	2	1166	G
4	6	8	A
4	6	10	G
4	6	17	U
4	6	19	C
4	6	20	G
4	6	21	U
4	6	27	U
4	6	28	U
4	6	29	U
4	6	34	A
4	6	35	A
4	6	36	U
4	6	37	U
4	6	40	A
4	6	41	A
4	6	43	C
4	6	46	U
4	6	49	A
4	6	50	G
4	6	51	A
4	6	52	G
4	6	54	U
4	6	55	G
4	6	59	A
4	6	68	C
4	6	72	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	6	73	A
4	6	74	U
4	6	75	A
4	6	80	U
4	6	84	C
4	6	85	C
4	6	88	U
4	6	90	U
4	6	91	A
4	6	92	C
4	6	93	A
5	5	10	U
5	5	14	G
5	5	15	A
5	5	16	U
5	5	17	C
5	5	20	U
5	5	24	G
5	5	25	G
5	5	26	A
5	5	27	G
5	5	28	G
5	5	31	G
5	5	33	U
5	5	34	C
5	5	40	C
5	5	41	A
5	5	42	A
5	5	43	G
5	5	44	A
5	5	45	A
5	5	46	C
5	5	52	G
5	5	63	C
5	5	64	C
5	5	67	U
5	5	68	A
5	5	69	G
5	5	70	A
5	5	71	A
5	5	75	A
5	5	76	U

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Mol	Chain	Res	Type
5	5	77	A
5	5	78	A
5	5	80	G
5	5	81	A
5	5	82	A
5	5	89	U
5	5	92	U
5	5	95	C
5	5	97	U
5	5	101	C
5	5	108	C
5	5	109	A
5	5	113	G
5	5	116	U
5	5	121	U
5	5	126	A
5	5	129	G
5	5	130	A
5	5	131	A
5	5	133	C
5	5	134	A
5	5	135	G
5	5	136	G
5	5	140	A
5	5	142	C
5	5	145	U
5	5	169	U
5	5	170	U
5	5	171	U
5	5	172	U
34	3	2	U
34	3	3	U

All (16) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	I	9	A
1	I	12	G
1	I	13	U
1	I	70	A
2	E	-7	U
3	2	15	C

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Mol	Chain	Res	Type
3	2	17	U
3	2	1123	C
3	2	1124	U
3	2	1145	U
4	6	16	C
4	6	45	A
4	6	92	C
5	5	27	G
5	5	39	U
5	5	45	A

## 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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 11 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
39	IHP	A	3001	-	36,36,36	0.71	0	54,60,60	1.08	4 (7%)
40	GTP	C	1101	-	26,34,34	0.83	1 (3%)	32,54,54	1.83	7 (21%)

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
39	IHP	A	3001	-	-	0/30/54/54	0/1/1/1
40	GTP	C	1101	-	-	6/18/38/38	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
40	C	1101	GTP	C6-N1	-2.01	1.34	1.37

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
40	C	1101	GTP	PB-O3B-PG	-5.83	112.82	132.83
40	C	1101	GTP	PA-O3A-PB	-4.08	118.81	132.83
39	A	3001	IHP	C3-C2-C1	2.87	116.69	110.41
40	C	1101	GTP	C5-C6-N1	2.83	118.96	113.95
40	C	1101	GTP	C3'-C2'-C1'	2.49	104.73	100.98
40	C	1101	GTP	O6-C6-C5	-2.47	119.54	124.37
40	C	1101	GTP	C8-N7-C5	2.29	107.35	102.99
40	C	1101	GTP	O2B-PB-O1B	2.26	123.40	112.24
39	A	3001	IHP	C6-C1-C2	2.10	115.02	110.41
39	A	3001	IHP	O46-P6-O36	2.05	115.46	107.64
39	A	3001	IHP	O42-P2-O32	2.02	115.34	107.64

There are no chirality outliers.

All (6) torsion outliers are listed below:

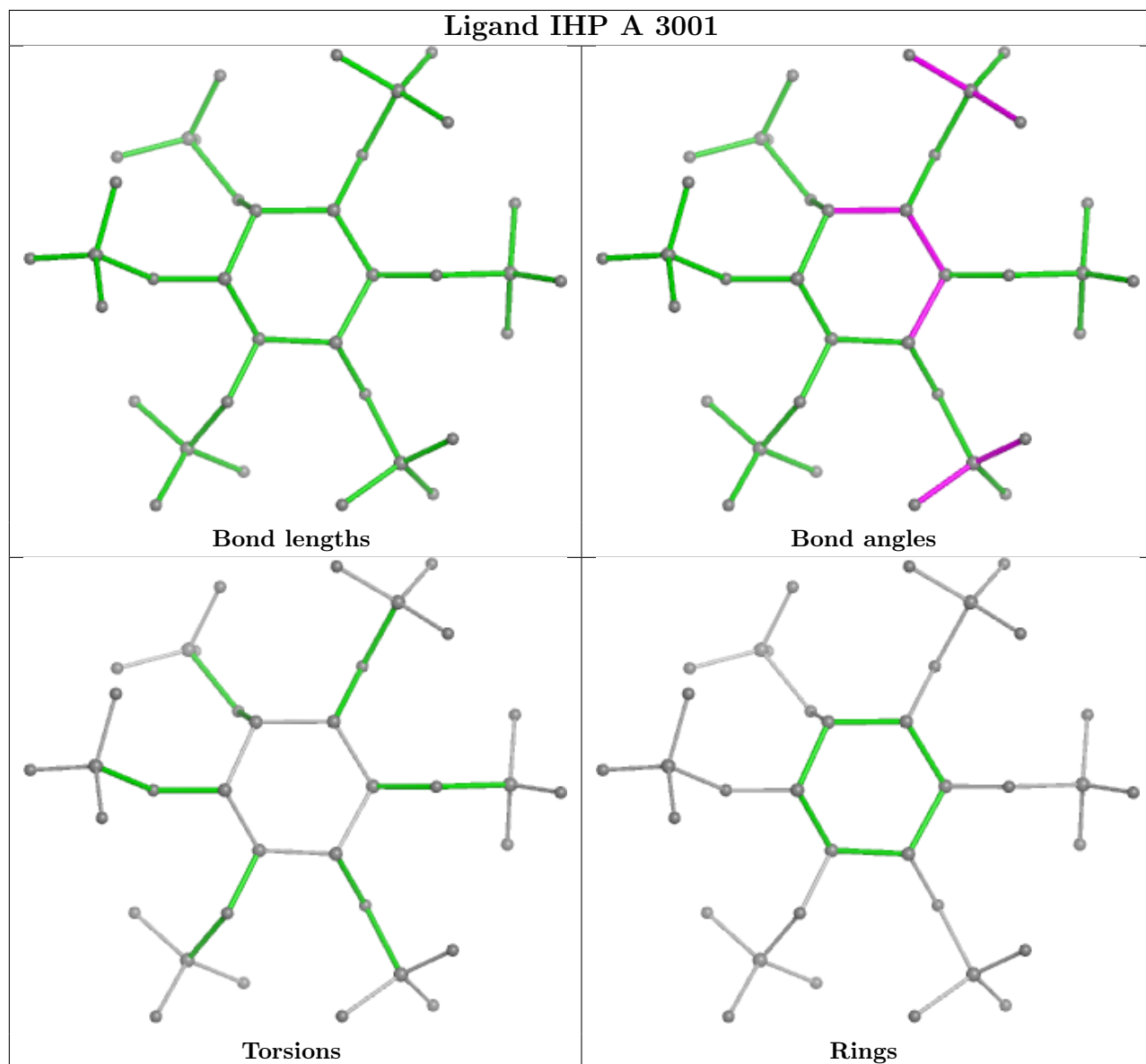
Mol	Chain	Res	Type	Atoms
40	C	1101	GTP	C5'-O5'-PA-O1A
40	C	1101	GTP	O4'-C4'-C5'-O5'
40	C	1101	GTP	C3'-C4'-C5'-O5'
40	C	1101	GTP	C4'-C5'-O5'-PA
40	C	1101	GTP	C5'-O5'-PA-O3A
40	C	1101	GTP	PB-O3A-PA-O2A

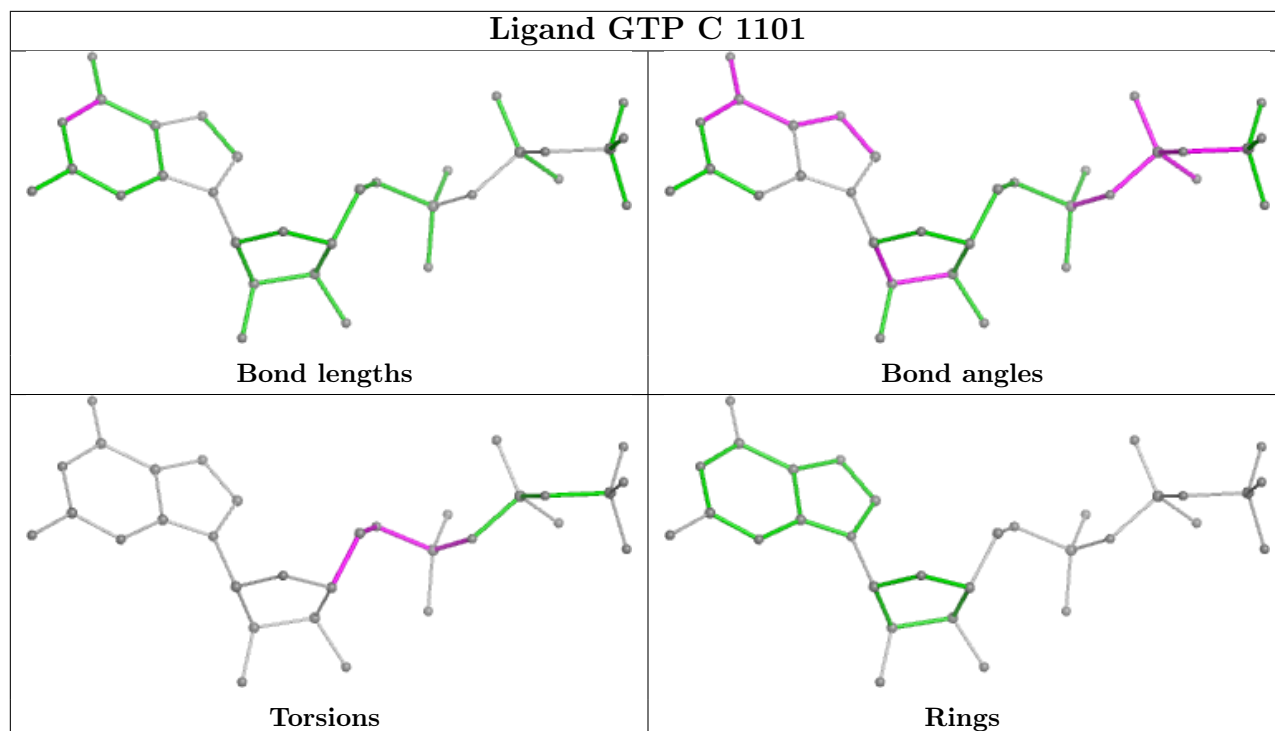
There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
22	X	1
31	V	1
18	T	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	X	27:UNK	C	86:UNK	N	8.48
1	V	903:MET	C	904:ASP	N	2.35
1	T	300:ASP	C	301:LYS	N	2.16

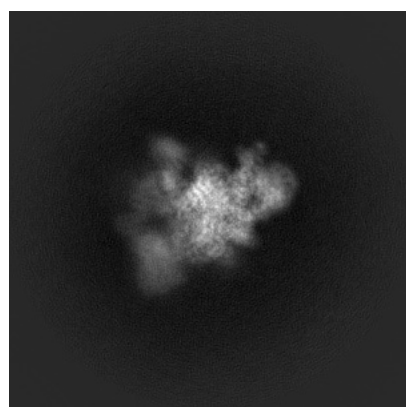
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-3541. These allow visual inspection of the internal detail of the map and identification of artifacts.

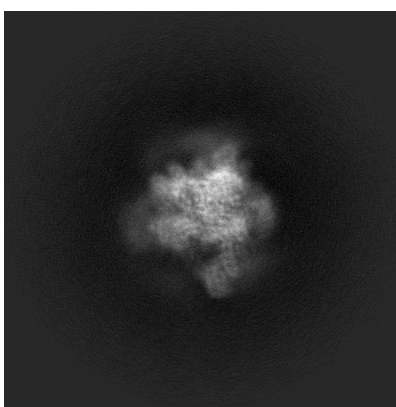
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

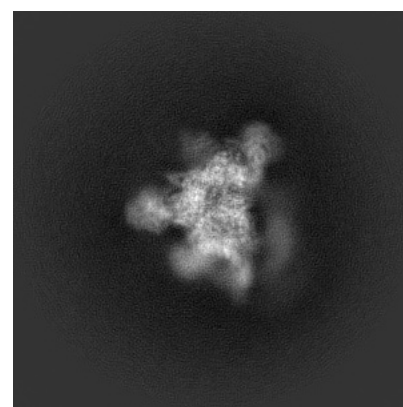
#### 6.1.1 Primary map



X



Y

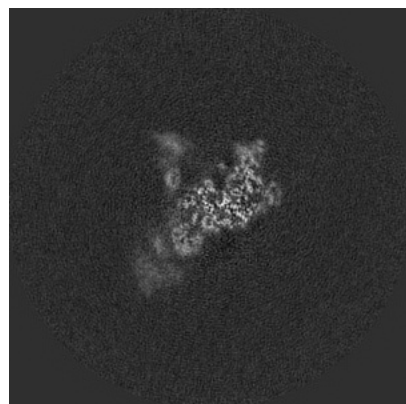


Z

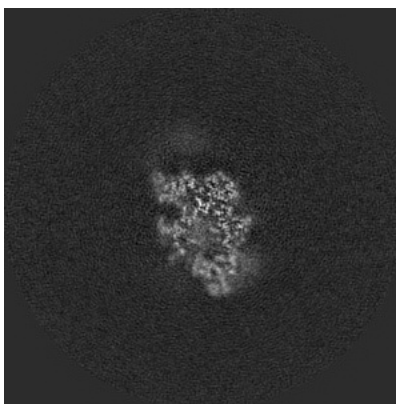
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

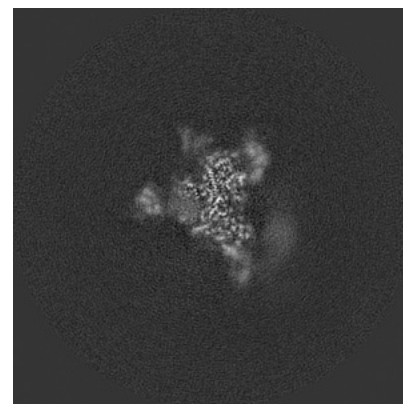
#### 6.2.1 Primary map



X Index: 206



Y Index: 206

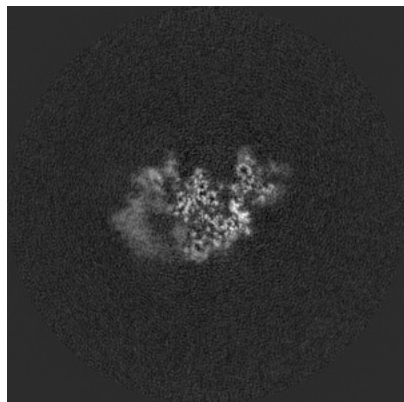


Z Index: 206

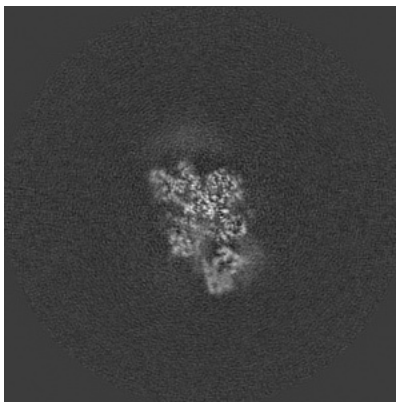
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

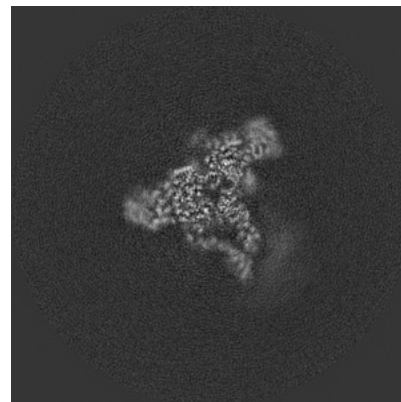
### 6.3.1 Primary map



X Index: 234



Y Index: 201

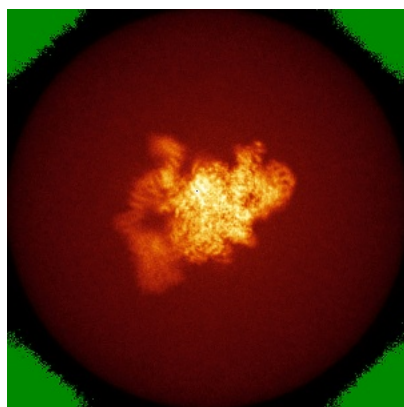


Z Index: 227

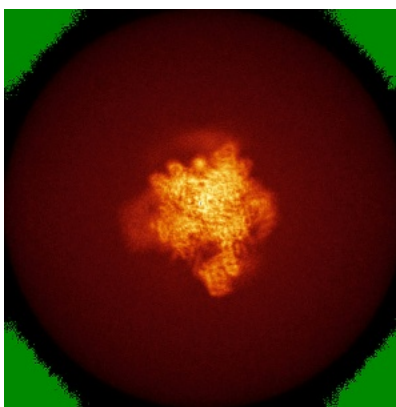
The images above show the largest variance slices of the map in three orthogonal directions.

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

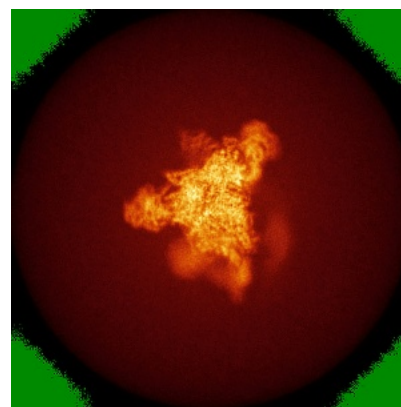
### 6.4.1 Primary map



X



Y



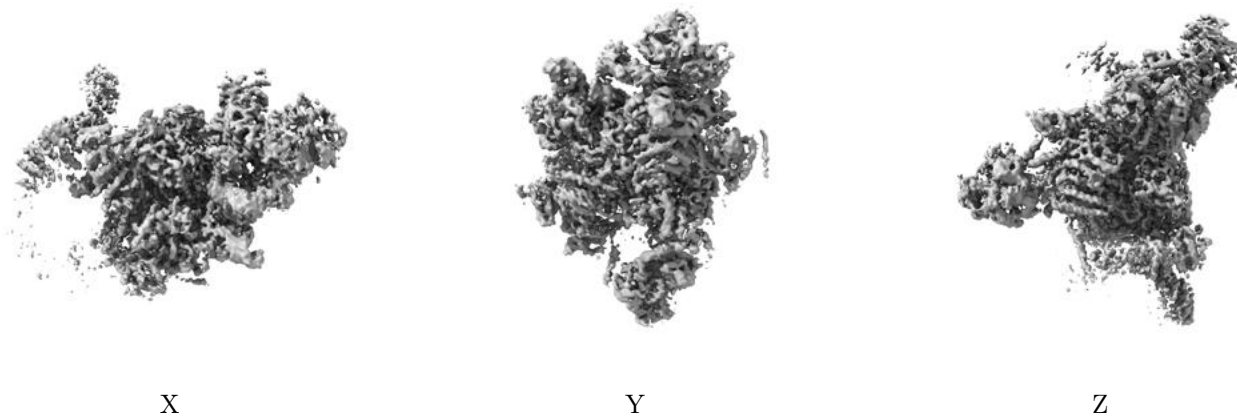
Z

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



The images above show the 3D surface view of the map at the recommended contour level 0.03. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

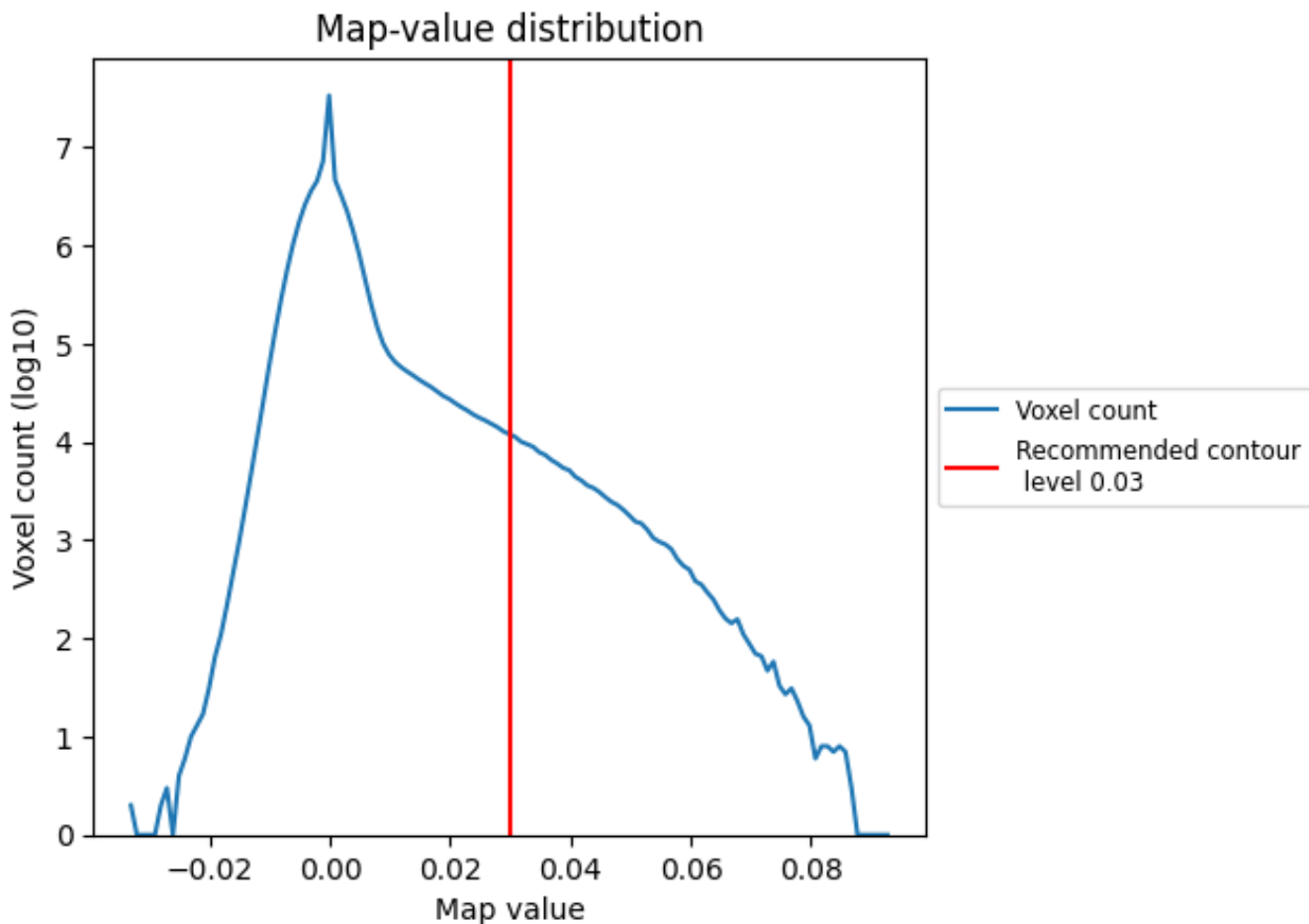
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

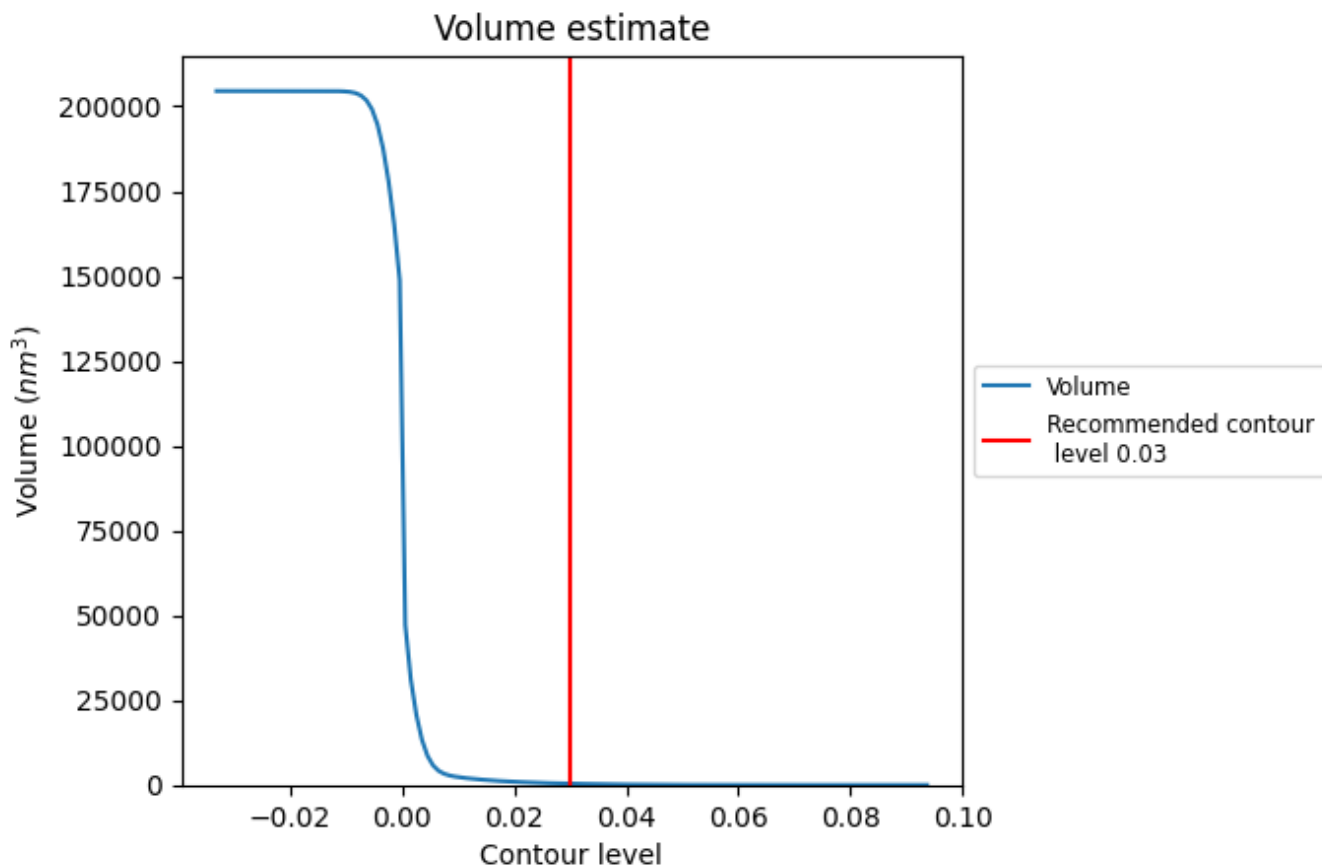
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

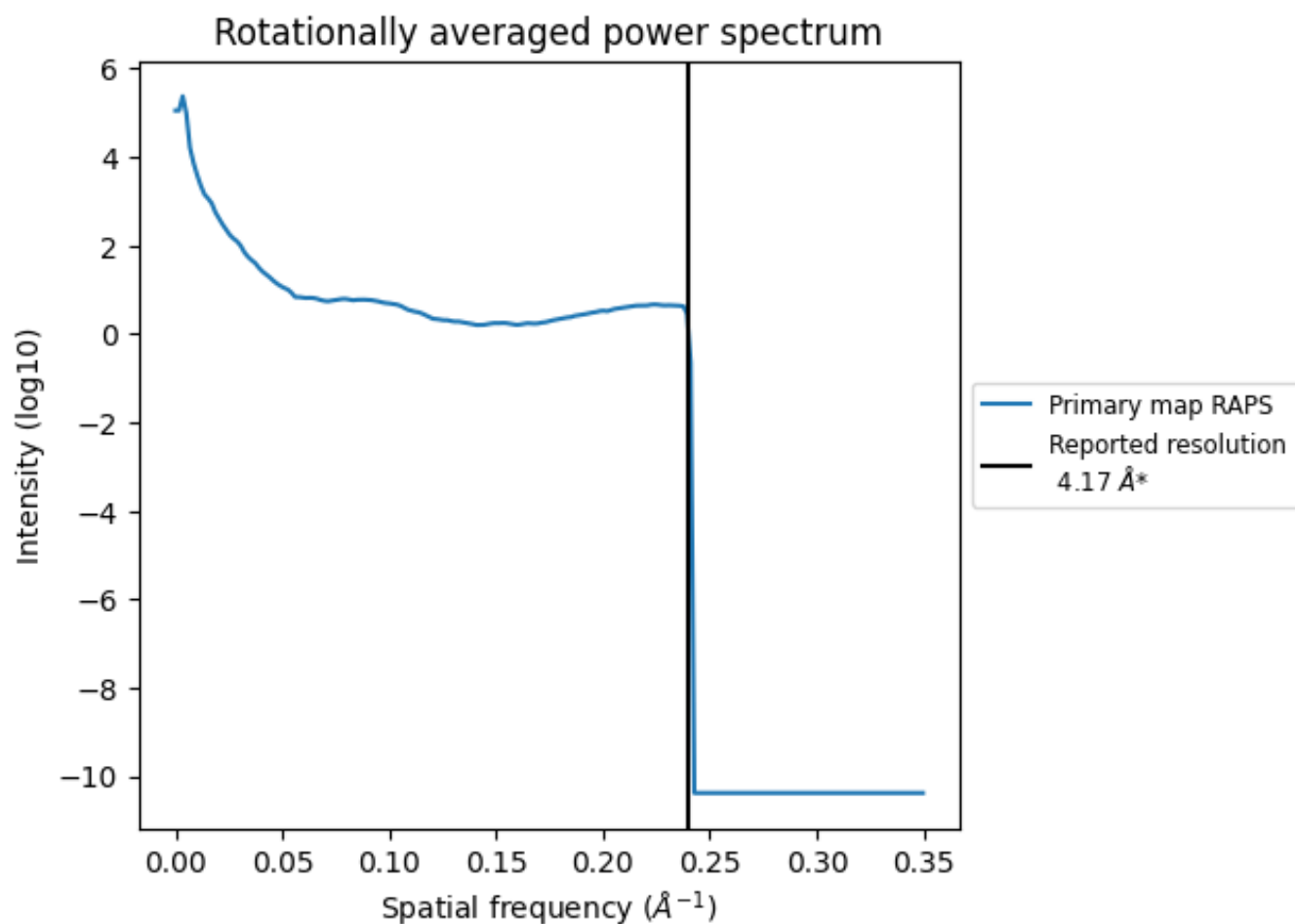
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 380  $\text{nm}^3$ ; this corresponds to an approximate mass of 344 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 0.240 Å<sup>-1</sup>

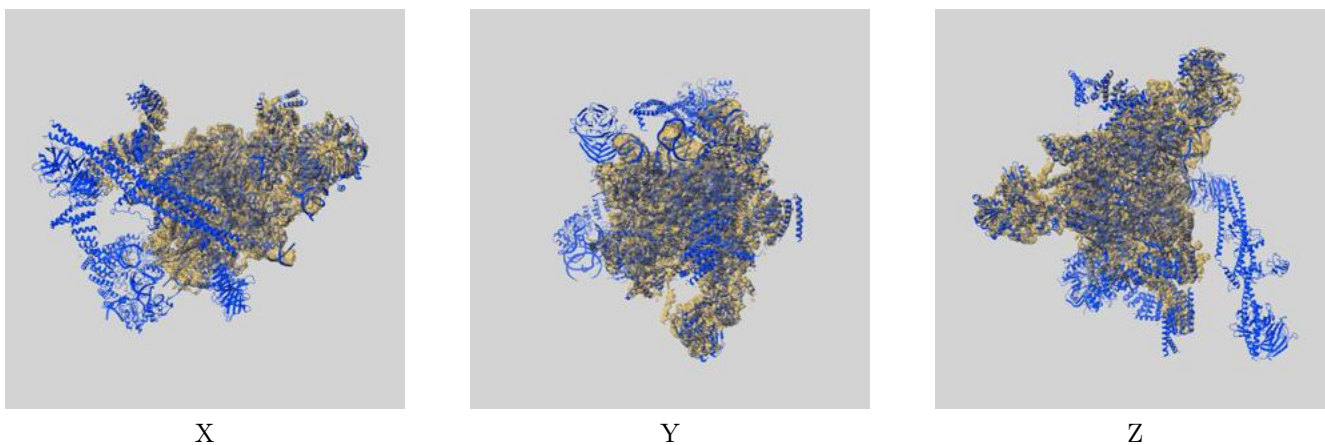
## 8 Fourier-Shell correlation

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

## 9 Map-model fit [i](#)

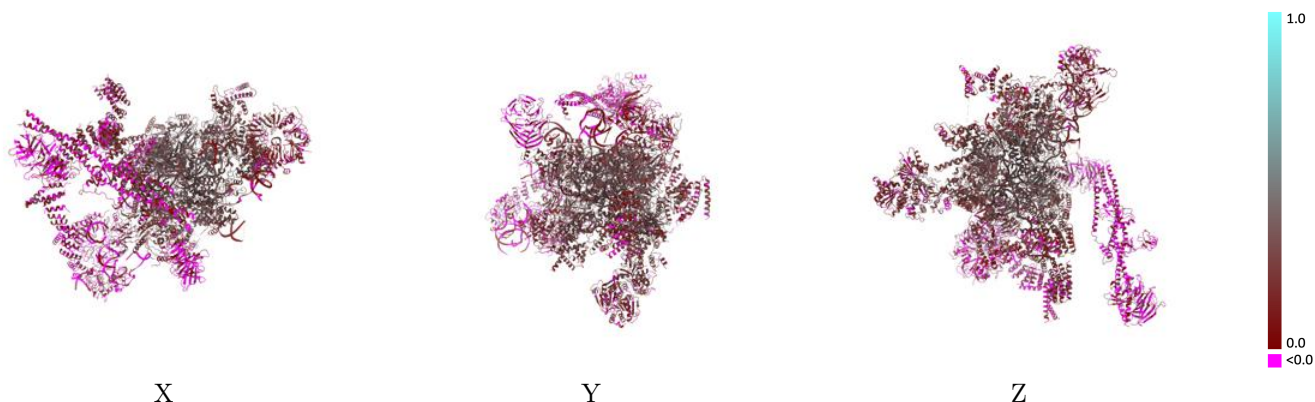
This section contains information regarding the fit between EMDB map EMD-3541 and PDB model 5MQ0. Per-residue inclusion information can be found in section 3 on page 13.

### 9.1 Map-model overlay [i](#)



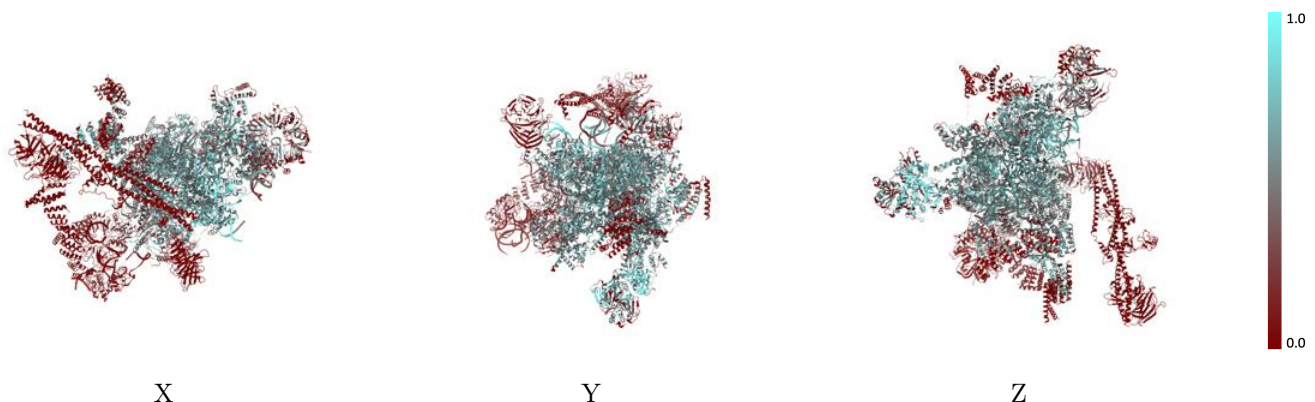
The images above show the 3D surface view of the map at the recommended contour level 0.03 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



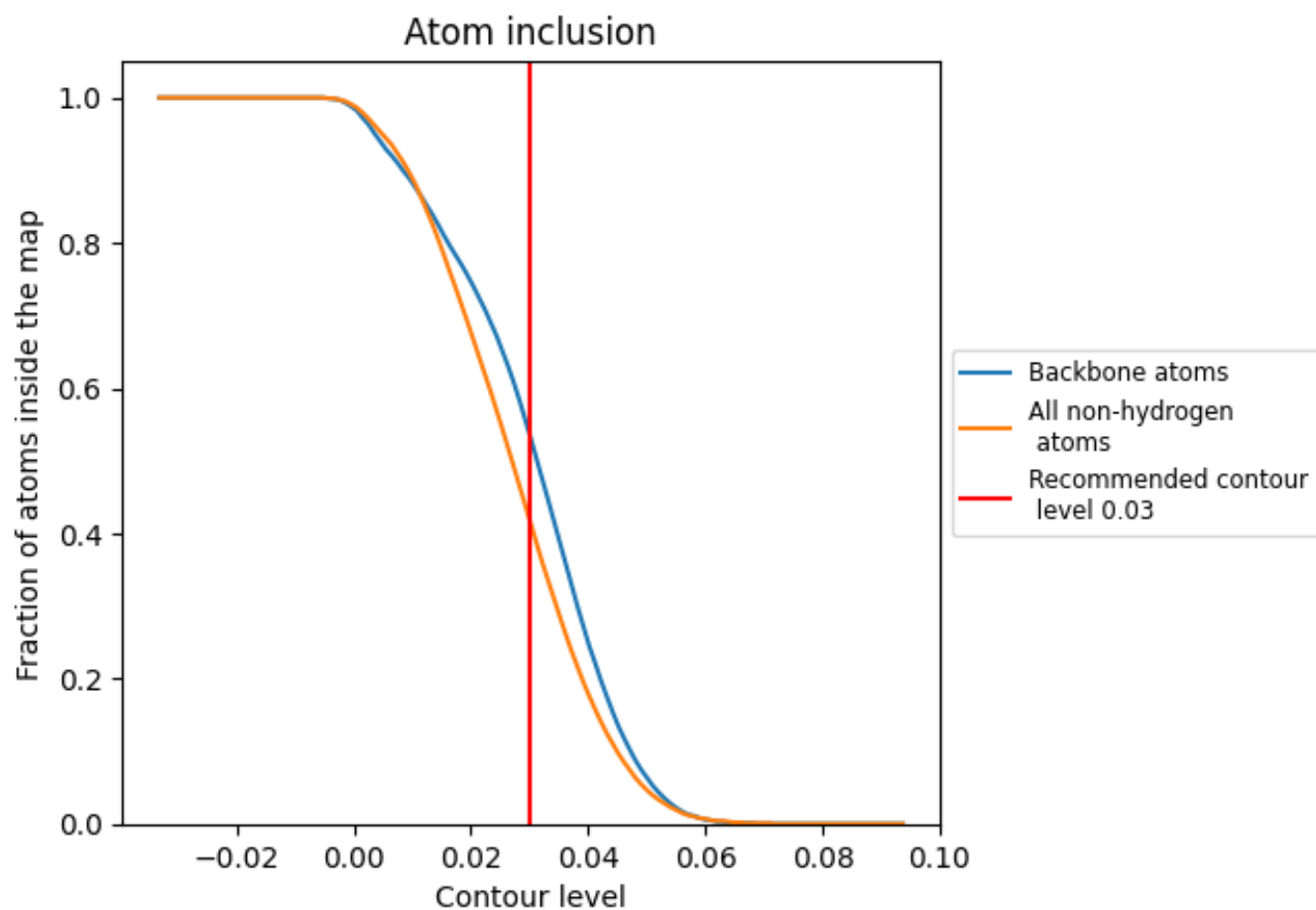
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.03).

## 9.4 Atom inclusion [i](#)









































































At the recommended contour level, 54% of all backbone atoms, 42% 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 (0.03) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.4180	 0.2230
2	 0.1850	 0.0890
3	 0.7670	 0.3180
5	 0.6970	 0.2510
6	 0.7630	 0.3180
A	 0.5870	 0.3250
C	 0.5690	 0.3100
E	 0.5950	 0.2930
H	 0.3110	 0.2080
I	 0.5480	 0.2360
J	 0.5830	 0.3480
K	 0.4440	 0.2970
L	 0.6600	 0.3130
M	 0.5570	 0.2870
N	 0.4920	 0.2600
O	 0.5110	 0.2880
P	 0.5000	 0.3400
R	 0.2910	 0.2440
S	 0.4310	 0.2260
T	 0.2500	 0.1360
V	 0.5410	 0.1740
W	 0.0000	 0.0460
X	 0.4820	 0.2650
Y	 0.0000	 0.0360
a	 0.4140	 0.2210
b	 0.3810	 0.2090
c	 0.4480	 0.2410
d	 0.3900	 0.2450
e	 0.2100	 0.1450
f	 0.2990	 0.1120
g	 0.2690	 0.2060
h	 0.2970	 0.1290
j	 0.2220	 0.1380
k	 0.0020	 0.0410
l	 0.0020	 0.0350



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Chain	Atom inclusion	Q-score
m	 0.0010	 0.0390
n	 0.0030	 0.0710
o	 0.3890	 0.2400
p	 0.0000	 0.0120
q	 0.0020	 0.0290
r	 0.0000	 0.0590
s	 0.0000	 0.0560
t	 0.0000	 -0.0010
u	 0.0000	 0.0210
v	 0.0000	 -0.0160
w	 0.0000	 -0.0030
y	 0.4940	 0.2550