



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 3, 2024 – 02:55 PM JST

PDB ID : 8KAK
Title : Crystal structure of SpyCas9 in complex with sgRNA and 18nt target DNA
Authors : Chen, Y.; Chen, J.; Liu, L.
Deposited on : 2023-08-03
Resolution : 3.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36.2
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

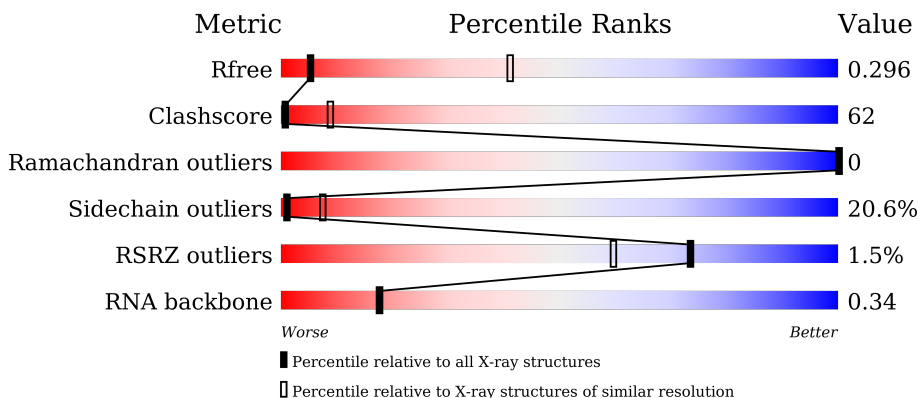
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.60 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.



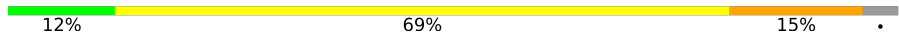
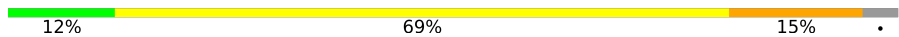


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1257 (3.70-3.50)
Clashscore	141614	1353 (3.70-3.50)
Ramachandran outliers	138981	1307 (3.70-3.50)
Sidechain outliers	138945	1307 (3.70-3.50)
RSRZ outliers	127900	1161 (3.70-3.50)
RNA backbone	3102	1017 (4.20-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	98	 12% 47% 32% 5% •
1	E	98	 2% 12% 45% 34% 5% •
2	B	1368	 29% 53% 14% ••
2	F	1368	 2% 30% 52% 14% ••

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Mol	Chain	Length	Quality of chain
3	C	26	
3	G	26	
4	D	11	
4	H	11	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	SO4	B	1401	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 27148 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 RNA (98-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	A	94	2009	899	362	654	94	0	0	0
1	E	94	2009	899	362	654	94	0	0	0

- Molecule 2 is a protein called CRISPR-associated endonuclease Cas9/Csn1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	1326	10827	6897	1879	2029	22	0	0	0
2	F	1326	10827	6897	1879	2029	22	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	10	ALA	ASP	engineered mutation	UNP Q99ZW2
B	840	ALA	HIS	engineered mutation	UNP Q99ZW2
F	10	ALA	ASP	engineered mutation	UNP Q99ZW2
F	840	ALA	HIS	engineered mutation	UNP Q99ZW2

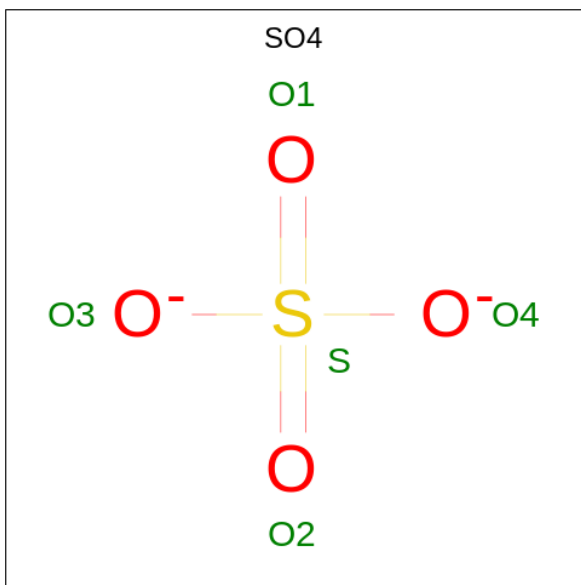
- Molecule 3 is a DNA chain called DNA (26-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	C	25	505	243	93	145	24	0	0	0
3	G	25	505	243	93	145	24	0	0	0

- Molecule 4 is a DNA chain called DNA (5'-D(*TP*TP*TP*AP*GP*GP*TP*AP*TP*TP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	11	Total	C	N	O	P	0	0	0
			225	110	37	68	10			
4	H	11	Total	C	N	O	P	0	0	0
			225	110	37	68	10			

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	O	S	0	0
			5	4	1		
5	F	1	Total	O	S	0	0
			5	4	1		

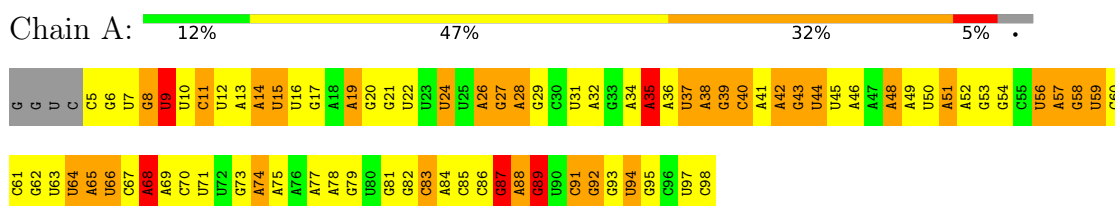
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	O	0	0
			1	1		
6	B	1	Total	O	0	0
			1	1		
6	F	4	Total	O	0	0
			4	4		

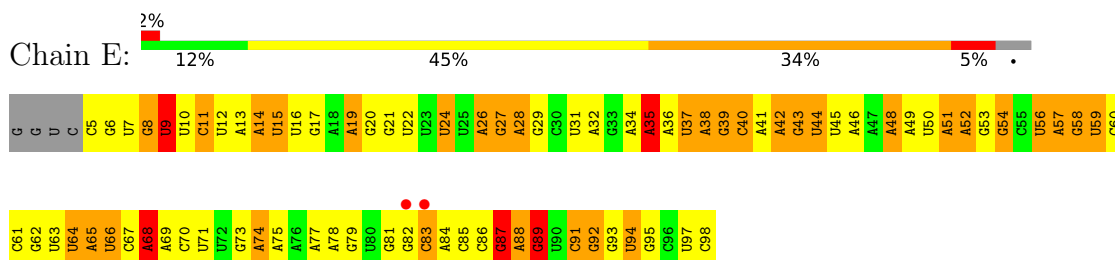
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the model, but not in the model, are shown in grey.

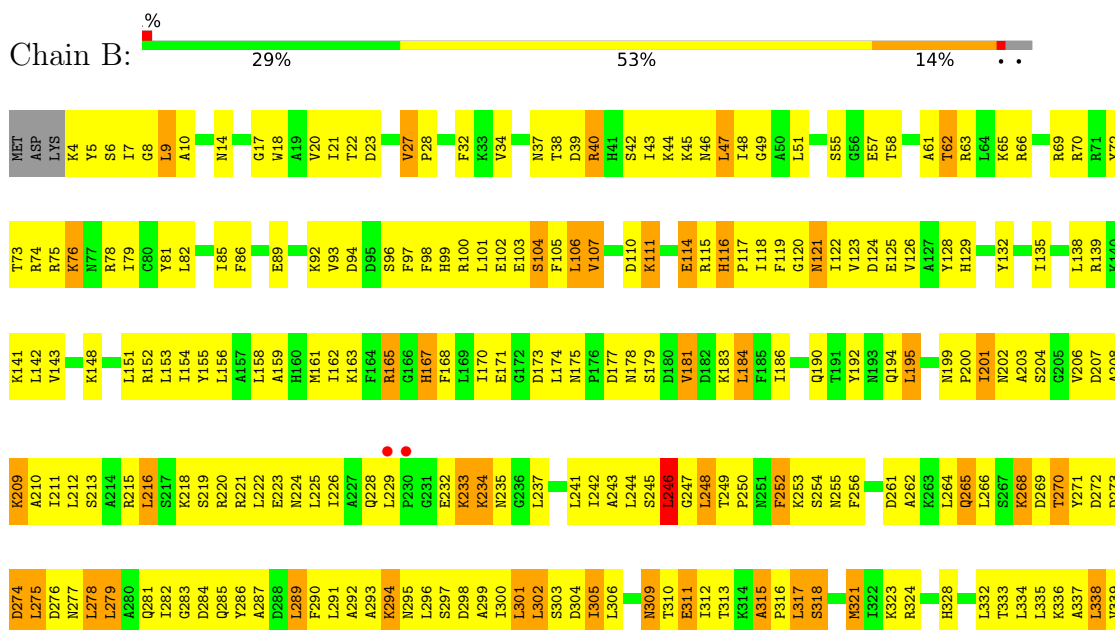
- Molecule 1: RNA (98-MER)



- Molecule 1: RNA (98-MER)



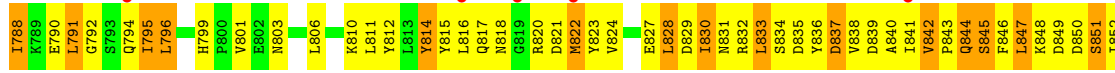
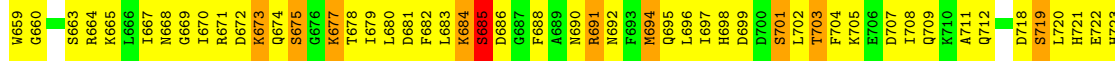
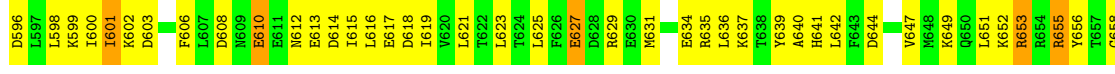
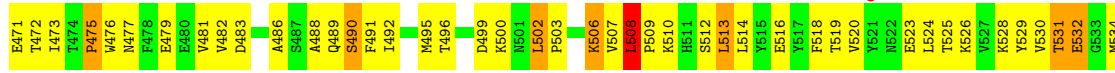
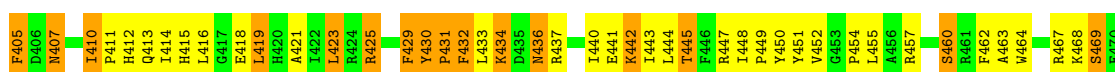
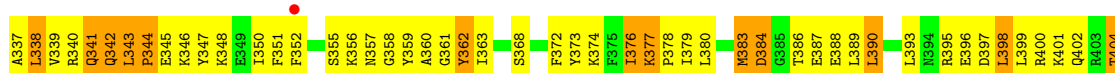
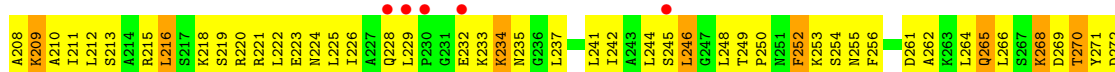
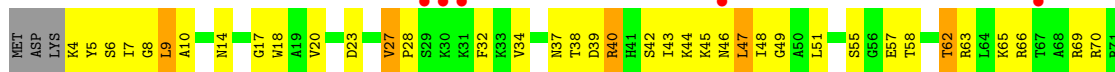
- Molecule 2: CRISPR-associated endonuclease Cas9/Csn1

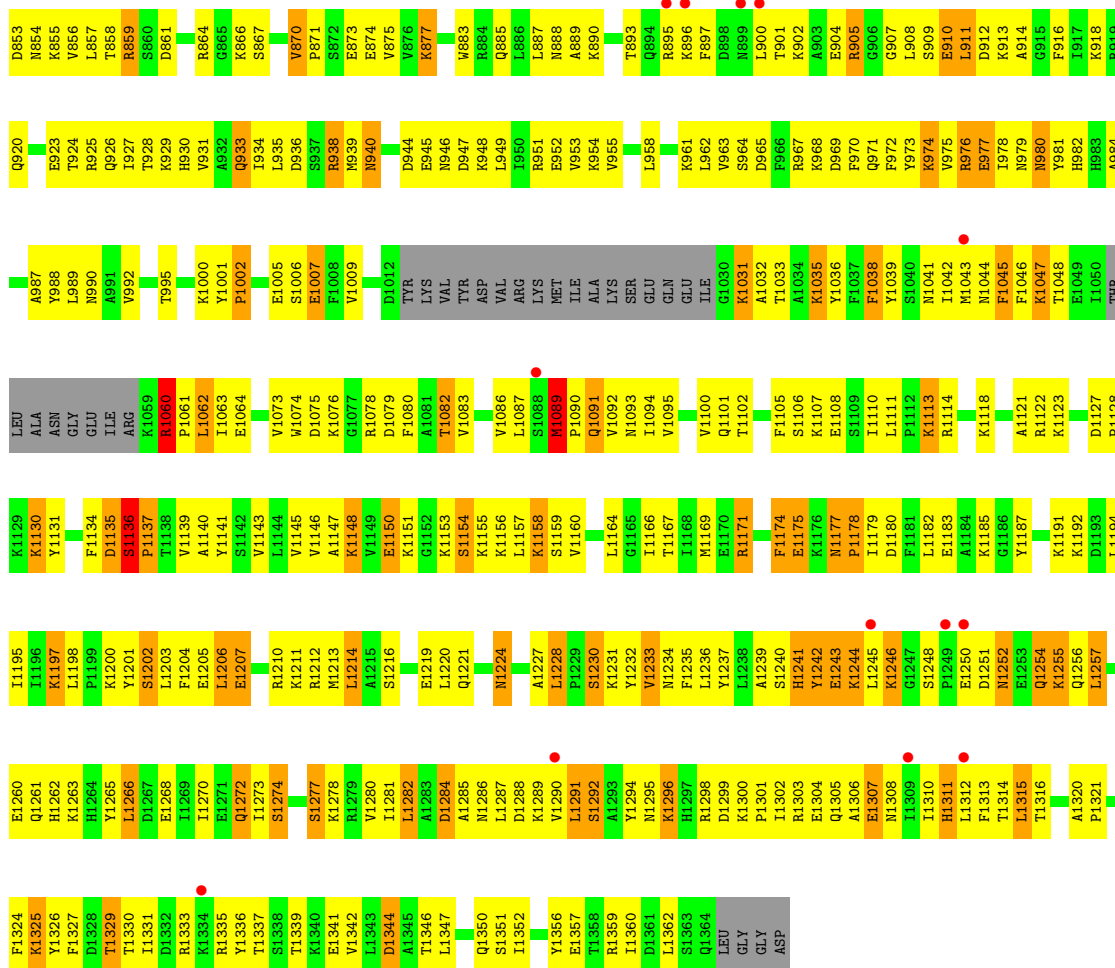


L1257	L1194	P1128	THR	A984	R919	S881	E766	E722	T857	H595	M534	E470	T404	R340	
E1260	I1195	K1129	LEU	A987	Q920	I882	G767	H723	G658	D896	R535	E471	F405	Q341	
Q1261	I1196	K1130	ALA	A988	E923	N854	K789	I724	L597	L597	P537	T472	D406	L343	
H1262	K1197	Y988	ASN	Y988	T924	K855	K788	I724	G660	K599	A538	L473	M407	P344	
K1263	P1198	L989	GLY	L989	R925	V856	L791	L727	S663	I600	F539	T474	I410	E345	
H1264	K1200	D1185	ILE	A991	Q926	L857	G792	S730	R664	I601	L540	U476	P411	K346	
Y1265	S1187	S1186	ARG	Y992	I927	T888	S793	F731	K665	S541	S541	K477	H412	K347	
L1266	S1202	R1059	R1059	T995	T928	R889	G794	A732	L666	D603	G542	F478	Q413	K348	
D1267	L1203	R1060	R1060	T995	K929	S860	I795	I733	L667	E543	E479	E479	Q414	E349	
E1268	F1204	P1061	R1061	R930	H930	D861	L796	K734	N668	D605	Q544	E480	H415	I350	
L1269	E1205	A1140	V951	K1000	V951	R864	K735	K735	G669	V481	V481	V481	L416	F351	
I1270	L1206	I1063	R864	Y1001	A932	G665	G736	G736	I670	K545	K545	V482	L416	F352	
E1271	E1207	E1064	G665	P4002	Q833	G665	I737	I737	R671	A947	A947	D483	E418	F352	
Q1272	R1210	G1070	K866	E1005	I934	R866	D872	D872	N609	L419	L419	A486	E418	S385	
I1273	L1144	L1144	E902	E1005	L935	S867	K673	K673	G610	H420	H420	A486	H420	K356	
S1274	K1211	S1006	N803	S1006	D936	S867	Q674	T740	E611	V549	V549	S487	H420	K356	
S1277	V1146	E1007	N803	E1007	D936	V870	S675	T740	N612	D550	D550	S487	H420	K356	
K1278	A1147	F1008	R871	F1008	R938	P871	G676	V744	E613	A488	A488	S487	I422	N357	
R1279	K1148	V1009	S872	V1009	M939	S872	K677	V744	D614	L552	L552	O489	L423	G358	
I1280	V1149	D1012	R883	D1012	N940	R883	L830	V743	D614	F553	F553	S490	R424	A360	
I1281	E1150	T1012	E873	T1012	D944	E873	K810	V743	L615	T555	T555	F491	R425	G361	
L1282	K1151	R1078	E874	R1078	D944	E874	L811	V744	L616	N556	N556	T496	F429	Y362	
K1283	G1152	D1079	V875	D1079	E945	V875	L812	L747	L680	E617	E617	T496	Y430	Y362	
L1220	G1153	F1080	R876	F1080	N946	R876	L813	V748	D681	D618	D618	T496	P431	I363	
Q1221	S1154	A1081	K877	A1081	D947	K877	Y814	K749	F682	I619	I619	T496	F432	D364	
A1285	K1155	V1082	W883	ASP	K948	W883	Y815	V750	L833	Y820	Y820	D499	F432	S388	
L1286	K1156	V1083	R884	VAL	K949	R884	L816	V751	K684	L621	L621	D499	L433	Q369	
L1287	L1157	V1083	R884	VAL	L949	R884	Q817	G752	S685	T622	T622	K500	L433	Q369	
L1226	K1158	V1086	Q885	ARG	N950	Q885	N818	R753	D686	L623	L623	K500	K434	F372	
A1227	S1159	E1087	R887	MET	R951	R887	G819	H754	G687	K562	K562	L502	M436	Y373	
V1290	V1160	S1088	R888	ILE	E952	R888	R820	K755	F688	L625	L625	P503	R437	K374	
L1291	L1161	R1089	R889	ALA	K954	R889	D821	P756	A689	F628	F628	K506	I440	F375	
A1292	L1162	Q1091	K890	LYS	K954	K890	M822	E757	E627	E627	E627	K506	I440	F375	
Y1294	I1166	V1092	K890	GLU	K954	K890	Y823	I758	R691	D628	D628	V507	E441	K377	
N1295	T1167	M1093	K891	GLN	N955	K891	V824	R760	N692	R629	R629	F509	K442	P378	
K1296	I1168	I1094	R895	GLU	L958	R895	E827	I761	G694	E630	E630	K510	L443	I379	
H1297	M1169	V1095	F897	ILE	K861	F897	L828	E762	Q695	M631	M631	H511	L444	L380	
L1298	E1170	V1100	K896	G1030	K861	K896	D829	R765	L696	E634	E634	H511	T445	E381	
D1299	R1171	Q1101	K896	K1031	L962	K896	I830	R765	L696	R635	R635	S512	F446	K382	
P1301	F1174	Q1101	K896	A1032	V963	F897	N831	GLU	I697	L636	L636	S512	R447	M383	
I1302	E1175	T1102	K902	T1033	D965	F902	R833	ASN	H698	F575	F575	L513	L448	D384	
R1303	K1176	F1105	K903	A1034	R966	T901	L833	GLN	D700	D576	D576	L514	P449	G385	
E1304	N1177	S1106	A903	K1035	K968	A903	S834	THR	S701	S577	S577	E516	Y450	T386	
Q1305	P1178	K1107	E904	Y1036	D969	E904	D835	THR	G702	E579	E579	F518	Y451	E387	
A1306	I1179	E1108	E904	F1037	D969	E904	Y836	GLN	L702	I880	I880	F518	V452	E388	
E1307	D1180	S1109	R905	F1038	R971	R905	D837	LYS	F704	S581	S581	V520	G453	L389	
N1308	F1181	I1110	L908	S1040	F972	G907	V839	GLY	K705	G582	G582	V520	L455	V391	
G1247	L1182	L1110	L908	S1040	Y973	L908	A840	GLN	E706	D644	D644	N522	A456	K392	
S1248	L1182	L1111	S909	M1041	K974	S909	I841	LYS	D707	E584	E584	E523	R457	L393	
P1249	E1183	P1112	E910	I1042	V975	E910	V842	LYS	I706	D886	D886	L524	S460	K394	
E1250	K1184	K1113	L911	M1043	R976	L911	P843	THR	Q709	R886	R886	T525	S460	R395	
D1251	K1185	R1114	D912	M1044	R977	D912	Q844	E779	K710	F587	F587	K526	R461	E396	
M1252	G1186	F1115	D912	F1045	I978	D912	Q844	E779	A711	N588	N588	V527	F462	D397	
L1314	Y1187	A1121	A914	F1046	R979	A914	S845	R780	Q712	A589	A589	K528	A463	L398	
E1253	K1047	R1122	G915	K1047	M860	G915	L847	K781	D718	S590	S590	Y529	W464	L399	
Q1254	T1048	R1122	F916	K1047	N860	F916	L847	K782	S719	L591	L591	V530	R467	R400	
K1255	T1048	R1123	I917	T1048	Y951	I917	K848	I784	S719	G592	G592	T531	R467	Q401	
Q1256	D1127	D1127	K918	I1050	H953	K918	D850	E785	L720	R655	R655	E532	K468	Q402	
														S469	R403

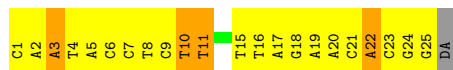
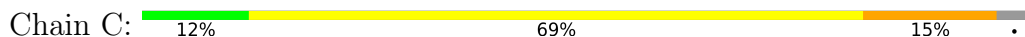


● Molecule 2: CRISPR-associated endonuclease Cas9/Csn1

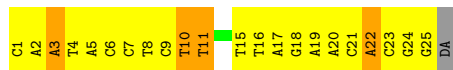




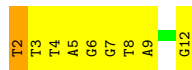
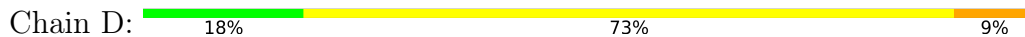
• Molecule 3: DNA (26-MER)



• Molecule 3: DNA (26-MER)

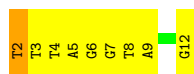


• Molecule 4: DNA (5'-D(*TP*TP*TP*AP*GP*GP*TP*AP*TP*TP*G)-3')



- Molecule 4: DNA (5'-D(*TP*TP*TP*AP*GP*GP*TP*AP*TP*TP*G)-3')

Chain H:  18% 73% 9%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	70.74Å 104.97Å 184.31Å 75.82° 78.67° 72.63°	Depositor
Resolution (Å)	24.97 – 3.60 49.55 – 3.60	Depositor EDS
% Data completeness (in resolution range)	73.7 (24.97-3.60) 73.8 (49.55-3.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.46 (at 3.57Å)	Xtrriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.265 , 0.297 0.265 , 0.296	Depositor DCC
R_{free} test set	2067 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å ²)	30.0	Xtrriage
Anisotropy	0.942	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , -19.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	0.107 for h,h-k,h-l	Xtrriage
F_o, F_c correlation	0.74	EDS
Total number of atoms	27148	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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: SO4

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.87	1/2249 (0.0%)	1.58	39/3503 (1.1%)
1	E	0.87	1/2249 (0.0%)	1.58	41/3503 (1.2%)
2	B	0.61	11/11019 (0.1%)	0.74	31/14807 (0.2%)
2	F	0.61	10/11019 (0.1%)	0.74	32/14807 (0.2%)
3	C	1.25	2/566 (0.4%)	1.24	6/870 (0.7%)
3	G	1.25	2/566 (0.4%)	1.24	6/870 (0.7%)
4	D	1.40	2/251 (0.8%)	1.28	0/387
4	H	1.40	2/251 (0.8%)	1.27	0/387
All	All	0.72	31/28170 (0.1%)	0.98	155/39134 (0.4%)

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	3	DT	N1-C2	5.79	1.42	1.38
4	H	3	DT	N1-C2	5.78	1.42	1.38
2	F	27	VAL	CA-C	5.60	1.67	1.52
2	B	27	VAL	CA-C	5.57	1.67	1.52
3	G	8	DT	C3'-O3'	5.53	1.51	1.44

The worst 5 of 155 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	685	SER	N-CA-C	12.54	144.85	111.00
2	F	684	LYS	N-CA-C	-9.21	86.15	111.00
2	B	684	LYS	N-CA-C	-9.20	86.15	111.00
1	E	15	U	N3-C4-C5	8.90	119.94	114.60
1	A	15	U	N3-C4-C5	8.88	119.93	114.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2009	0	1009	109	0
1	E	2009	0	1009	111	0
2	B	10827	0	10973	1508	0
2	F	10827	0	10972	1554	0
3	C	505	0	283	31	0
3	G	505	0	283	31	0
4	D	225	0	129	18	0
4	H	225	0	129	19	0
5	B	5	0	0	3	0
5	F	5	0	0	1	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	F	4	0	0	0	0
All	All	27148	0	24787	3189	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 62.

The worst 5 of 3189 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:181:VAL:HG11	2:F:300:ILE:CD1	1.14	1.57
2:B:181:VAL:HG11	2:B:300:ILE:CD1	1.14	1.57
2:F:342:GLN:HG3	2:F:383:MET:CE	1.09	1.54
2:F:1270:ILE:HD12	2:F:1294:TYR:CE2	1.37	1.54
2:B:181:VAL:CG1	2:B:300:ILE:CD1	1.83	1.53

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 X-ray entries followed by that with respect to entries

of similar resolution.

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	
2	B	1318/1368 (96%)	1279 (97%)	39 (3%)	0	100	100
2	F	1318/1368 (96%)	1281 (97%)	37 (3%)	0	100	100
All	All	2636/2736 (96%)	2560 (97%)	76 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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	
2	B	1186/1225 (97%)	942 (79%)	244 (21%)	1	7
2	F	1186/1225 (97%)	942 (79%)	244 (21%)	1	7
All	All	2372/2450 (97%)	1884 (79%)	488 (21%)	1	7

5 of 488 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	1284	ASP
2	F	1150	GLU
2	F	302	LEU
2	F	1113	LYS
2	F	1277	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 47 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	295	ASN
2	F	650	GLN
2	F	341	GLN
2	F	412	HIS

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Mol	Chain	Res	Type
2	F	776	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	93/98 (94%)	31 (33%)	4 (4%)
1	E	93/98 (94%)	31 (33%)	4 (4%)
All	All	186/196 (94%)	62 (33%)	8 (4%)

5 of 62 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	9	U
1	A	11	C
1	A	20	G
1	A	24	U
1	A	27	G

5 of 8 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	E	68	A
1	E	42	A
1	E	8	G
1	A	68	A
1	E	27	G

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	SO4	F	1401	-	4,4,4	0.98	0	6,6,6	1.66	1 (16%)
5	SO4	B	1401	-	4,4,4	0.98	0	6,6,6	1.66	1 (16%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	1401	SO4	O4-S-O3	3.83	125.39	109.06
5	F	1401	SO4	O4-S-O3	3.83	125.39	109.06

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	F	1401	SO4	1	0
5	B	1401	SO4	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled '#RSRZ > 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q < 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	94/98 (95%)	-0.17	0 100 100	7, 25, 69, 93	0
1	E	94/98 (95%)	-0.07	2 (2%) 63 48	11, 39, 87, 112	0
2	B	1326/1368 (96%)	-0.39	10 (0%) 86 75	5, 26, 65, 117	0
2	F	1326/1368 (96%)	-0.25	31 (2%) 60 44	11, 40, 74, 131	0
3	C	25/26 (96%)	-0.48	0 100 100	9, 17, 64, 79	0
3	G	25/26 (96%)	-0.24	0 100 100	19, 29, 78, 84	0
4	D	11/11 (100%)	-0.12	0 100 100	18, 32, 95, 99	0
4	H	11/11 (100%)	-0.22	0 100 100	27, 56, 102, 112	0
All	All	2912/3006 (96%)	-0.31	43 (1%) 73 60	5, 33, 74, 131	0

The worst 5 of 43 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	543	GLU	6.0
2	F	46	ASN	5.0
2	F	29	SER	4.4
2	F	1249	PRO	4.0
2	F	1043	MET	3.8

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	SO4	B	1401	5/5	0.93	0.15	30,30,30,30	0
5	SO4	F	1401	5/5	0.94	0.20	30,30,30,30	0

6.5 Other polymers [i](#)

There are no such residues in this entry.