



Full wwPDB EM Validation Report ⓘ

Jul 15, 2025 – 10:29 AM JST

PDB ID : 8IK0 / pdb_00008ik0
EMDB ID : EMD-35503
Title : Cryo-EM structure of Stimulator of interferon genes
Authors : Lu, D.F.; Shang, G.J.
Deposited on : 2023-02-28
Resolution : 3.30 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

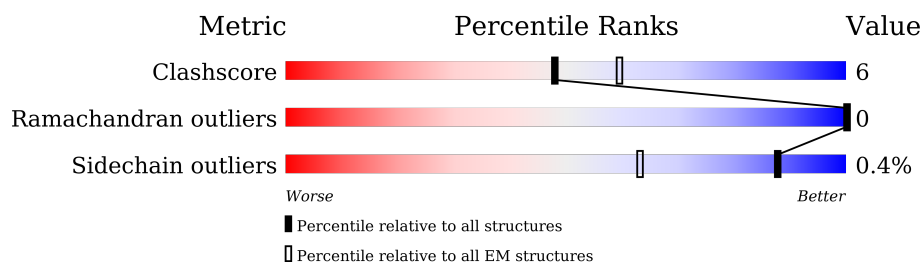
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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

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

Mol	Chain	Length	Quality of chain
1	A	490	58% 8% 35%
1	B	490	57% 9% 35%
1	C	490	56% 9% 35%
1	D	490	56% 9% 35%
1	E	490	56% 9% 35%
1	F	490	55% 10% 35%
1	G	490	57% 9% 35%
1	H	490	56% 10% 35%

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 19536 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Stimulator of interferon genes protein, Immune protein Tsi3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	319	Total	C	N	O	S	0	0
			2435	1563	428	425	19		
1	B	320	Total	C	N	O	S	0	0
			2449	1571	431	429	18		
1	C	319	Total	C	N	O	S	0	0
			2435	1563	428	425	19		
1	F	320	Total	C	N	O	S	0	0
			2449	1571	431	429	18		
1	D	319	Total	C	N	O	S	0	0
			2435	1563	428	425	19		
1	G	320	Total	C	N	O	S	0	0
			2449	1571	431	429	18		
1	E	319	Total	C	N	O	S	0	0
			2435	1563	428	425	19		
1	H	320	Total	C	N	O	S	0	0
			2449	1571	431	429	18		

There are 224 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	50	THR	ILE	conflict	UNP E1C7U0
A	52	ARG	SER	conflict	UNP E1C7U0
A	100	HIS	TYR	conflict	UNP E1C7U0
A	187	ILE	LEU	conflict	UNP E1C7U0
A	343	ARG	-	linker	UNP E1C7U0
A	344	GLU	-	linker	UNP E1C7U0
A	345	GLU	-	linker	UNP E1C7U0
A	346	TYR	-	linker	UNP E1C7U0
A	347	MET	-	linker	UNP E1C7U0
A	348	VAL	-	linker	UNP E1C7U0
A	349	LEU	-	linker	UNP E1C7U0
A	350	GLU	-	linker	UNP E1C7U0
A	351	VAL	-	linker	UNP E1C7U0
A	352	LEU	-	linker	UNP E1C7U0

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Chain	Residue	Modelled	Actual	Comment	Reference
A	353	PHE	-	linker	UNP E1C7U0
A	354	GLN	-	linker	UNP E1C7U0
A	355	GLY	-	linker	UNP E1C7U0
A	356	PRO	-	linker	UNP E1C7U0
A	481	SER	-	expression tag	UNP Q9HYC4
A	482	SER	-	expression tag	UNP Q9HYC4
A	483	HIS	-	expression tag	UNP Q9HYC4
A	484	HIS	-	expression tag	UNP Q9HYC4
A	485	HIS	-	expression tag	UNP Q9HYC4
A	486	HIS	-	expression tag	UNP Q9HYC4
A	487	HIS	-	expression tag	UNP Q9HYC4
A	488	HIS	-	expression tag	UNP Q9HYC4
A	489	HIS	-	expression tag	UNP Q9HYC4
A	490	HIS	-	expression tag	UNP Q9HYC4
B	50	THR	ILE	conflict	UNP E1C7U0
B	52	ARG	SER	conflict	UNP E1C7U0
B	100	HIS	TYR	conflict	UNP E1C7U0
B	187	ILE	LEU	conflict	UNP E1C7U0
B	343	ARG	-	linker	UNP E1C7U0
B	344	GLU	-	linker	UNP E1C7U0
B	345	GLU	-	linker	UNP E1C7U0
B	346	TYR	-	linker	UNP E1C7U0
B	347	MET	-	linker	UNP E1C7U0
B	348	VAL	-	linker	UNP E1C7U0
B	349	LEU	-	linker	UNP E1C7U0
B	350	GLU	-	linker	UNP E1C7U0
B	351	VAL	-	linker	UNP E1C7U0
B	352	LEU	-	linker	UNP E1C7U0
B	353	PHE	-	linker	UNP E1C7U0
B	354	GLN	-	linker	UNP E1C7U0
B	355	GLY	-	linker	UNP E1C7U0
B	356	PRO	-	linker	UNP E1C7U0
B	481	SER	-	expression tag	UNP Q9HYC4
B	482	SER	-	expression tag	UNP Q9HYC4
B	483	HIS	-	expression tag	UNP Q9HYC4
B	484	HIS	-	expression tag	UNP Q9HYC4
B	485	HIS	-	expression tag	UNP Q9HYC4
B	486	HIS	-	expression tag	UNP Q9HYC4
B	487	HIS	-	expression tag	UNP Q9HYC4
B	488	HIS	-	expression tag	UNP Q9HYC4
B	489	HIS	-	expression tag	UNP Q9HYC4
B	490	HIS	-	expression tag	UNP Q9HYC4

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Chain	Residue	Modelled	Actual	Comment	Reference
C	50	THR	ILE	conflict	UNP E1C7U0
C	52	ARG	SER	conflict	UNP E1C7U0
C	100	HIS	TYR	conflict	UNP E1C7U0
C	187	ILE	LEU	conflict	UNP E1C7U0
C	343	ARG	-	linker	UNP E1C7U0
C	344	GLU	-	linker	UNP E1C7U0
C	345	GLU	-	linker	UNP E1C7U0
C	346	TYR	-	linker	UNP E1C7U0
C	347	MET	-	linker	UNP E1C7U0
C	348	VAL	-	linker	UNP E1C7U0
C	349	LEU	-	linker	UNP E1C7U0
C	350	GLU	-	linker	UNP E1C7U0
C	351	VAL	-	linker	UNP E1C7U0
C	352	LEU	-	linker	UNP E1C7U0
C	353	PHE	-	linker	UNP E1C7U0
C	354	GLN	-	linker	UNP E1C7U0
C	355	GLY	-	linker	UNP E1C7U0
C	356	PRO	-	linker	UNP E1C7U0
C	481	SER	-	expression tag	UNP Q9HYC4
C	482	SER	-	expression tag	UNP Q9HYC4
C	483	HIS	-	expression tag	UNP Q9HYC4
C	484	HIS	-	expression tag	UNP Q9HYC4
C	485	HIS	-	expression tag	UNP Q9HYC4
C	486	HIS	-	expression tag	UNP Q9HYC4
C	487	HIS	-	expression tag	UNP Q9HYC4
C	488	HIS	-	expression tag	UNP Q9HYC4
C	489	HIS	-	expression tag	UNP Q9HYC4
C	490	HIS	-	expression tag	UNP Q9HYC4
F	50	THR	ILE	conflict	UNP E1C7U0
F	52	ARG	SER	conflict	UNP E1C7U0
F	100	HIS	TYR	conflict	UNP E1C7U0
F	187	ILE	LEU	conflict	UNP E1C7U0
F	343	ARG	-	linker	UNP E1C7U0
F	344	GLU	-	linker	UNP E1C7U0
F	345	GLU	-	linker	UNP E1C7U0
F	346	TYR	-	linker	UNP E1C7U0
F	347	MET	-	linker	UNP E1C7U0
F	348	VAL	-	linker	UNP E1C7U0
F	349	LEU	-	linker	UNP E1C7U0
F	350	GLU	-	linker	UNP E1C7U0
F	351	VAL	-	linker	UNP E1C7U0
F	352	LEU	-	linker	UNP E1C7U0

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Chain	Residue	Modelled	Actual	Comment	Reference
F	353	PHE	-	linker	UNP E1C7U0
F	354	GLN	-	linker	UNP E1C7U0
F	355	GLY	-	linker	UNP E1C7U0
F	356	PRO	-	linker	UNP E1C7U0
F	481	SER	-	expression tag	UNP Q9HYC4
F	482	SER	-	expression tag	UNP Q9HYC4
F	483	HIS	-	expression tag	UNP Q9HYC4
F	484	HIS	-	expression tag	UNP Q9HYC4
F	485	HIS	-	expression tag	UNP Q9HYC4
F	486	HIS	-	expression tag	UNP Q9HYC4
F	487	HIS	-	expression tag	UNP Q9HYC4
F	488	HIS	-	expression tag	UNP Q9HYC4
F	489	HIS	-	expression tag	UNP Q9HYC4
F	490	HIS	-	expression tag	UNP Q9HYC4
D	50	THR	ILE	conflict	UNP E1C7U0
D	52	ARG	SER	conflict	UNP E1C7U0
D	100	HIS	TYR	conflict	UNP E1C7U0
D	187	ILE	LEU	conflict	UNP E1C7U0
D	343	ARG	-	linker	UNP E1C7U0
D	344	GLU	-	linker	UNP E1C7U0
D	345	GLU	-	linker	UNP E1C7U0
D	346	TYR	-	linker	UNP E1C7U0
D	347	MET	-	linker	UNP E1C7U0
D	348	VAL	-	linker	UNP E1C7U0
D	349	LEU	-	linker	UNP E1C7U0
D	350	GLU	-	linker	UNP E1C7U0
D	351	VAL	-	linker	UNP E1C7U0
D	352	LEU	-	linker	UNP E1C7U0
D	353	PHE	-	linker	UNP E1C7U0
D	354	GLN	-	linker	UNP E1C7U0
D	355	GLY	-	linker	UNP E1C7U0
D	356	PRO	-	linker	UNP E1C7U0
D	481	SER	-	expression tag	UNP Q9HYC4
D	482	SER	-	expression tag	UNP Q9HYC4
D	483	HIS	-	expression tag	UNP Q9HYC4
D	484	HIS	-	expression tag	UNP Q9HYC4
D	485	HIS	-	expression tag	UNP Q9HYC4
D	486	HIS	-	expression tag	UNP Q9HYC4
D	487	HIS	-	expression tag	UNP Q9HYC4
D	488	HIS	-	expression tag	UNP Q9HYC4
D	489	HIS	-	expression tag	UNP Q9HYC4
D	490	HIS	-	expression tag	UNP Q9HYC4

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Chain	Residue	Modelled	Actual	Comment	Reference
G	50	THR	ILE	conflict	UNP E1C7U0
G	52	ARG	SER	conflict	UNP E1C7U0
G	100	HIS	TYR	conflict	UNP E1C7U0
G	187	ILE	LEU	conflict	UNP E1C7U0
G	343	ARG	-	linker	UNP E1C7U0
G	344	GLU	-	linker	UNP E1C7U0
G	345	GLU	-	linker	UNP E1C7U0
G	346	TYR	-	linker	UNP E1C7U0
G	347	MET	-	linker	UNP E1C7U0
G	348	VAL	-	linker	UNP E1C7U0
G	349	LEU	-	linker	UNP E1C7U0
G	350	GLU	-	linker	UNP E1C7U0
G	351	VAL	-	linker	UNP E1C7U0
G	352	LEU	-	linker	UNP E1C7U0
G	353	PHE	-	linker	UNP E1C7U0
G	354	GLN	-	linker	UNP E1C7U0
G	355	GLY	-	linker	UNP E1C7U0
G	356	PRO	-	linker	UNP E1C7U0
G	481	SER	-	expression tag	UNP Q9HYC4
G	482	SER	-	expression tag	UNP Q9HYC4
G	483	HIS	-	expression tag	UNP Q9HYC4
G	484	HIS	-	expression tag	UNP Q9HYC4
G	485	HIS	-	expression tag	UNP Q9HYC4
G	486	HIS	-	expression tag	UNP Q9HYC4
G	487	HIS	-	expression tag	UNP Q9HYC4
G	488	HIS	-	expression tag	UNP Q9HYC4
G	489	HIS	-	expression tag	UNP Q9HYC4
G	490	HIS	-	expression tag	UNP Q9HYC4
E	50	THR	ILE	conflict	UNP E1C7U0
E	52	ARG	SER	conflict	UNP E1C7U0
E	100	HIS	TYR	conflict	UNP E1C7U0
E	187	ILE	LEU	conflict	UNP E1C7U0
E	343	ARG	-	linker	UNP E1C7U0
E	344	GLU	-	linker	UNP E1C7U0
E	345	GLU	-	linker	UNP E1C7U0
E	346	TYR	-	linker	UNP E1C7U0
E	347	MET	-	linker	UNP E1C7U0
E	348	VAL	-	linker	UNP E1C7U0
E	349	LEU	-	linker	UNP E1C7U0
E	350	GLU	-	linker	UNP E1C7U0
E	351	VAL	-	linker	UNP E1C7U0
E	352	LEU	-	linker	UNP E1C7U0

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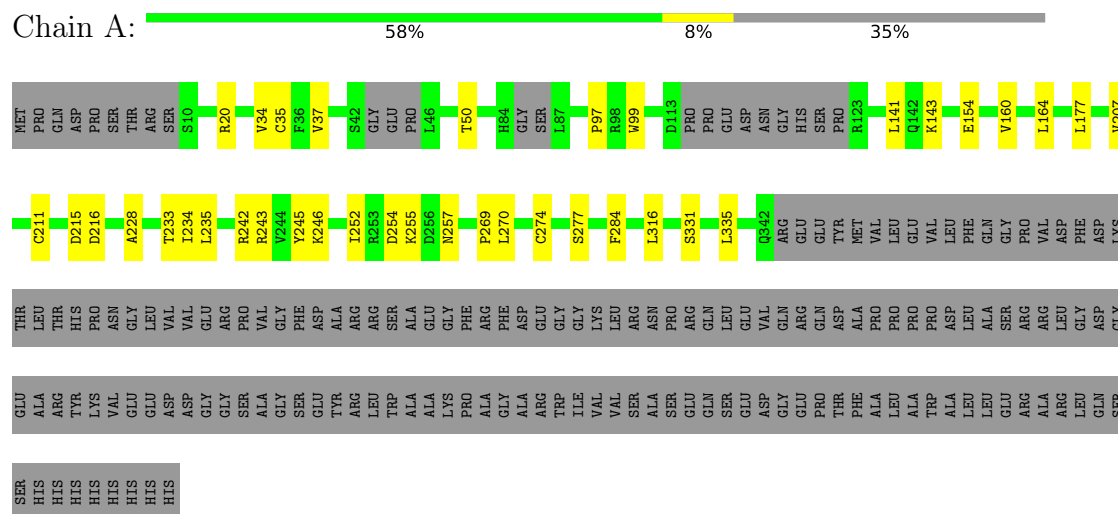
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Chain	Residue	Modelled	Actual	Comment	Reference
E	353	PHE	-	linker	UNP E1C7U0
E	354	GLN	-	linker	UNP E1C7U0
E	355	GLY	-	linker	UNP E1C7U0
E	356	PRO	-	linker	UNP E1C7U0
E	481	SER	-	expression tag	UNP Q9HYC4
E	482	SER	-	expression tag	UNP Q9HYC4
E	483	HIS	-	expression tag	UNP Q9HYC4
E	484	HIS	-	expression tag	UNP Q9HYC4
E	485	HIS	-	expression tag	UNP Q9HYC4
E	486	HIS	-	expression tag	UNP Q9HYC4
E	487	HIS	-	expression tag	UNP Q9HYC4
E	488	HIS	-	expression tag	UNP Q9HYC4
E	489	HIS	-	expression tag	UNP Q9HYC4
E	490	HIS	-	expression tag	UNP Q9HYC4
H	50	THR	ILE	conflict	UNP E1C7U0
H	52	ARG	SER	conflict	UNP E1C7U0
H	100	HIS	TYR	conflict	UNP E1C7U0
H	187	ILE	LEU	conflict	UNP E1C7U0
H	343	ARG	-	linker	UNP E1C7U0
H	344	GLU	-	linker	UNP E1C7U0
H	345	GLU	-	linker	UNP E1C7U0
H	346	TYR	-	linker	UNP E1C7U0
H	347	MET	-	linker	UNP E1C7U0
H	348	VAL	-	linker	UNP E1C7U0
H	349	LEU	-	linker	UNP E1C7U0
H	350	GLU	-	linker	UNP E1C7U0
H	351	VAL	-	linker	UNP E1C7U0
H	352	LEU	-	linker	UNP E1C7U0
H	353	PHE	-	linker	UNP E1C7U0
H	354	GLN	-	linker	UNP E1C7U0
H	355	GLY	-	linker	UNP E1C7U0
H	356	PRO	-	linker	UNP E1C7U0
H	481	SER	-	expression tag	UNP Q9HYC4
H	482	SER	-	expression tag	UNP Q9HYC4
H	483	HIS	-	expression tag	UNP Q9HYC4
H	484	HIS	-	expression tag	UNP Q9HYC4
H	485	HIS	-	expression tag	UNP Q9HYC4
H	486	HIS	-	expression tag	UNP Q9HYC4
H	487	HIS	-	expression tag	UNP Q9HYC4
H	488	HIS	-	expression tag	UNP Q9HYC4
H	489	HIS	-	expression tag	UNP Q9HYC4
H	490	HIS	-	expression tag	UNP Q9HYC4

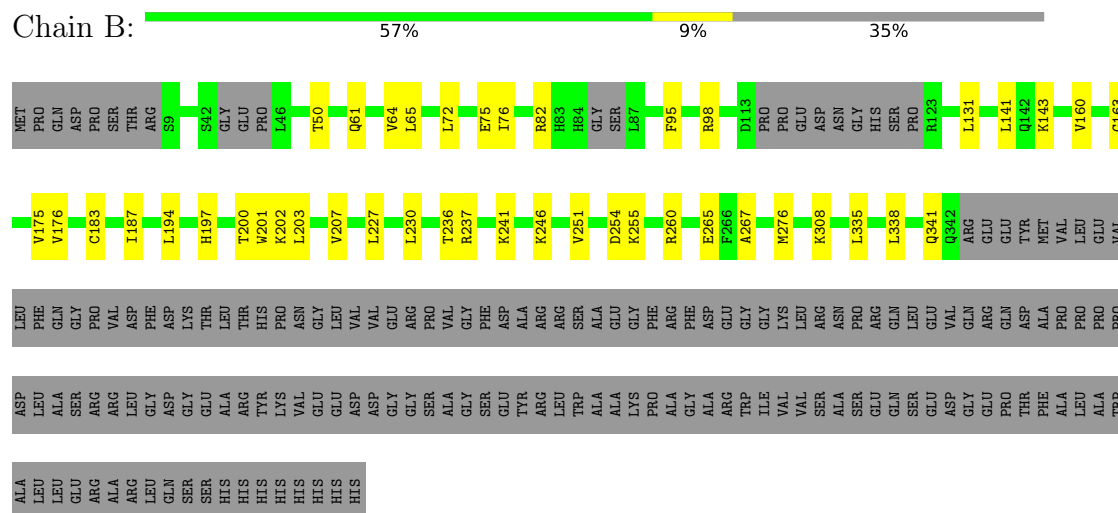
3 Residue-property plots

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. 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. 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: Stimulator of interferon genes protein, Immune protein Tsi3



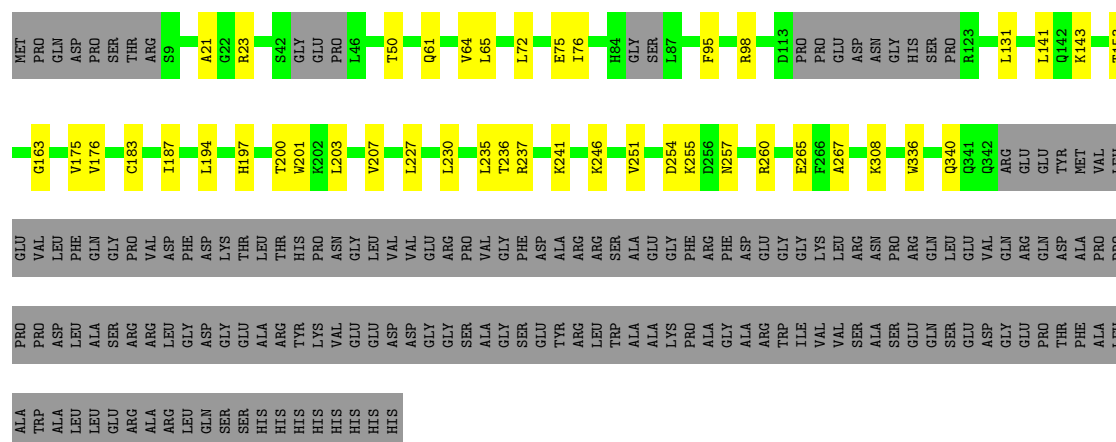
- Molecule 1: Stimulator of interferon genes protein, Immune protein Tsi3



- Molecule 1: Stimulator of interferon genes protein, Immune protein Tsi3

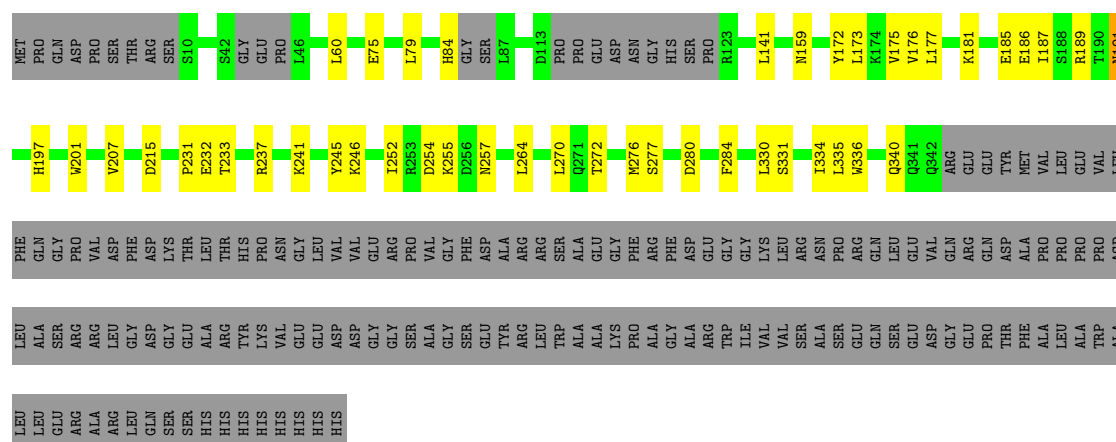


Chain G:  57% 9% 35%



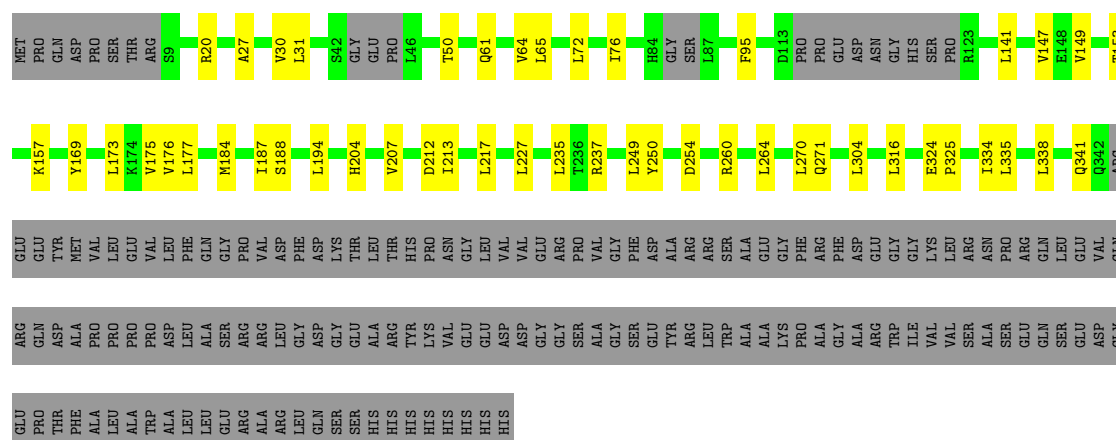
- Molecule 1: Stimulator of interferon genes protein, Immune protein Tsi3

Chain E:  56% 9% 35%



- Molecule 1: Stimulator of interferon genes protein, Immune protein Tsi3

Chain H:  56% 10% 35%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1057869	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.10	0/2484	0.28	0/3375
1	B	0.10	0/2499	0.28	0/3394
1	C	0.10	0/2484	0.28	0/3375
1	D	0.10	0/2484	0.27	0/3375
1	E	0.10	0/2484	0.28	0/3375
1	F	0.11	0/2499	0.27	0/3394
1	G	0.10	0/2499	0.28	0/3394
1	H	0.11	0/2499	0.28	0/3394
All	All	0.10	0/19932	0.28	0/27076

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [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	2435	0	2426	28	0
1	B	2449	0	2431	28	0
1	C	2435	0	2426	30	0
1	D	2435	0	2426	34	0
1	E	2435	0	2426	31	0
1	F	2449	0	2431	34	0
1	G	2449	0	2431	31	0
1	H	2449	0	2431	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	19536	0	19428	220	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 6.

All (220) 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)
1:E:254:ASP:OD1	1:E:255:LYS:N	2.16	0.79
1:C:254:ASP:OD1	1:C:255:LYS:N	2.16	0.77
1:C:232:GLU:OE2	1:C:246:LYS:NZ	2.21	0.70
1:C:233:THR:HB	1:C:245:TYR:HB2	1.74	0.70
1:E:232:GLU:OE2	1:E:246:LYS:NZ	2.20	0.69
1:E:233:THR:HB	1:E:245:TYR:HB2	1.74	0.69
1:D:277:SER:HA	1:D:284:PHE:HB3	1.75	0.68
1:A:277:SER:HA	1:A:284:PHE:HB3	1.75	0.68
1:A:160:VAL:HG13	1:B:163:GLY:HA2	1.77	0.66
1:H:207:VAL:HG23	1:H:270:LEU:HD11	1.81	0.62
1:F:207:VAL:HG23	1:F:270:LEU:HD11	1.82	0.62
1:D:233:THR:HB	1:D:245:TYR:HB2	1.82	0.61
1:F:20:ARG:HH21	1:F:147:VAL:HG13	1.65	0.61
1:A:233:THR:HB	1:A:245:TYR:HB2	1.84	0.60
1:C:277:SER:HA	1:C:284:PHE:HB3	1.83	0.60
1:E:277:SER:HA	1:E:284:PHE:HB3	1.83	0.59
1:H:204:HIS:NE2	1:H:341:GLN:OE1	2.34	0.59
1:E:186:GLU:HG3	1:E:187:ILE:HD12	1.84	0.58
1:A:164:LEU:HB3	1:A:269:PRO:HB3	1.85	0.58
1:D:164:LEU:HB3	1:D:269:PRO:HB3	1.85	0.58
1:C:186:GLU:HG3	1:C:187:ILE:HD12	1.84	0.58
1:A:228:ALA:HB2	1:G:230:LEU:HD13	1.85	0.57
1:G:197:HIS:O	1:G:201:TRP:NE1	2.38	0.57
1:A:207:VAL:HG23	1:A:270:LEU:HD11	1.87	0.56
1:D:207:VAL:HG23	1:D:270:LEU:HD11	1.87	0.56
1:F:175:VAL:HG23	1:F:176:VAL:HG13	1.88	0.56
1:B:183:CYS:O	1:B:187:ILE:HG12	2.06	0.55
1:F:204:HIS:NE2	1:F:341:GLN:OE1	2.35	0.55
1:H:227:LEU:HD23	1:H:249:LEU:HD23	1.89	0.55
1:H:175:VAL:HG23	1:H:176:VAL:HG13	1.88	0.55
1:D:160:VAL:HG13	1:G:163:GLY:HA2	1.88	0.55
1:E:272:THR:O	1:E:276:MET:HG2	2.07	0.55
1:C:272:THR:O	1:C:276:MET:HG2	2.07	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:229:ASP:OD1	1:F:246:LYS:NZ	2.38	0.54
1:G:183:CYS:O	1:G:187:ILE:HG12	2.07	0.54
1:A:20:ARG:NH2	1:B:75:GLU:OE2	2.40	0.53
1:F:169:TYR:HA	1:F:173:LEU:HB2	1.90	0.53
1:G:254:ASP:OD2	1:G:260:ARG:NH1	2.36	0.53
1:H:169:TYR:HA	1:H:173:LEU:HB2	1.91	0.53
1:F:227:LEU:HB2	1:F:251:VAL:HG13	1.90	0.53
1:B:197:HIS:O	1:B:201:TRP:NE1	2.41	0.53
1:F:65:LEU:HA	1:F:95:PHE:HE1	1.75	0.52
1:B:200:THR:HG22	1:B:200:THR:O	2.10	0.52
1:F:72:LEU:O	1:F:76:ILE:HG12	2.10	0.52
1:H:65:LEU:HA	1:H:95:PHE:HE1	1.75	0.52
1:B:65:LEU:HA	1:B:95:PHE:HE1	1.76	0.51
1:C:246:LYS:HG3	1:F:235:LEU:HD11	1.91	0.51
1:F:227:LEU:HD23	1:F:249:LEU:HD23	1.92	0.51
1:A:255:LYS:O	1:A:257:ASN:N	2.42	0.51
1:B:160:VAL:HG11	1:B:276:MET:HE1	1.93	0.51
1:H:72:LEU:O	1:H:76:ILE:HG12	2.10	0.51
1:E:246:LYS:HG3	1:H:235:LEU:HD11	1.92	0.51
1:D:20:ARG:NH2	1:G:75:GLU:OE2	2.40	0.50
1:A:254:ASP:OD1	1:A:335:LEU:HD11	2.11	0.50
1:H:254:ASP:OD2	1:H:260:ARG:NH1	2.41	0.50
1:G:65:LEU:HA	1:G:95:PHE:HE1	1.76	0.50
1:H:20:ARG:HH22	1:H:147:VAL:HG13	1.77	0.50
1:A:97:PRO:HD2	1:B:143:LYS:HE2	1.93	0.50
1:D:159:ASN:HD21	1:G:153:THR:HG23	1.76	0.50
1:G:200:THR:HG22	1:G:200:THR:O	2.12	0.50
1:B:175:VAL:HG13	1:B:176:VAL:HG13	1.93	0.50
1:D:97:PRO:HD2	1:G:143:LYS:HE2	1.94	0.50
1:D:255:LYS:O	1:D:257:ASN:N	2.43	0.50
1:E:197:HIS:O	1:E:201:TRP:NE1	2.44	0.49
1:B:227:LEU:HB2	1:B:251:VAL:HG23	1.95	0.49
1:B:72:LEU:O	1:B:76:ILE:HG12	2.13	0.48
1:H:334:ILE:O	1:H:338:LEU:HD23	2.13	0.48
1:A:99:TRP:H	1:A:99:TRP:CD1	2.31	0.48
1:G:175:VAL:HG13	1:G:176:VAL:HG13	1.95	0.48
1:B:203:LEU:HD11	1:B:265:GLU:HG3	1.95	0.48
1:D:235:LEU:HB2	1:D:243:ARG:HB2	1.96	0.48
1:F:176:VAL:HG23	1:F:177:LEU:HD12	1.95	0.48
1:G:72:LEU:O	1:G:76:ILE:HG12	2.14	0.48
1:C:141:LEU:HD23	1:C:141:LEU:H	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:176:VAL:HG23	1:H:177:LEU:HD12	1.95	0.47
1:D:141:LEU:H	1:D:141:LEU:HD23	1.79	0.47
1:E:141:LEU:HD23	1:E:141:LEU:H	1.79	0.47
1:H:188:SER:HB2	1:H:194:LEU:HD11	1.96	0.47
1:B:202:LYS:HD2	1:B:341:GLN:OE1	2.13	0.47
1:H:217:LEU:HD21	1:H:264:LEU:HD22	1.95	0.47
1:D:99:TRP:H	1:D:99:TRP:CD1	2.31	0.47
1:A:141:LEU:HD23	1:A:141:LEU:H	1.80	0.47
1:B:308:LYS:HE3	1:F:212:ASP:HB3	1.96	0.47
1:C:197:HIS:O	1:C:201:TRP:NE1	2.47	0.47
1:G:230:LEU:HB2	1:G:246:LYS:HE3	1.97	0.47
1:B:254:ASP:OD2	1:B:260:ARG:NH1	2.35	0.47
1:F:254:ASP:HA	1:F:335:LEU:HD11	1.97	0.47
1:G:254:ASP:OD1	1:G:255:LYS:N	2.42	0.47
1:E:181:LYS:O	1:E:185:GLU:HG2	2.14	0.47
1:C:181:LYS:O	1:C:185:GLU:HG2	2.14	0.47
1:F:61:GLN:O	1:F:64:VAL:HG22	2.15	0.47
1:F:188:SER:HB2	1:F:194:LEU:HD11	1.97	0.47
1:G:141:LEU:HD23	1:G:141:LEU:H	1.80	0.47
1:G:207:VAL:HG12	1:G:267:ALA:HB2	1.97	0.47
1:E:336:TRP:O	1:E:340:GLN:HG2	2.15	0.47
1:A:154:GLU:OE1	1:B:82:ARG:NH2	2.48	0.47
1:H:254:ASP:HA	1:H:335:LEU:HD11	1.97	0.47
1:A:331:SER:O	1:A:335:LEU:HD23	2.15	0.47
1:E:331:SER:O	1:E:335:LEU:HD23	2.15	0.46
1:A:143:LYS:HZ1	1:B:98:ARG:H	1.62	0.46
1:F:336:TRP:NE1	1:F:340:GLN:HE21	2.13	0.46
1:D:254:ASP:OD1	1:D:255:LYS:N	2.44	0.46
1:G:236:THR:HG22	1:G:241:LYS:HA	1.98	0.46
1:B:141:LEU:HD23	1:B:141:LEU:H	1.80	0.46
1:C:336:TRP:O	1:C:340:GLN:HG2	2.15	0.46
1:D:143:LYS:HZ1	1:G:98:ARG:H	1.63	0.46
1:H:61:GLN:O	1:H:64:VAL:HG22	2.15	0.46
1:B:230:LEU:HD13	1:D:228:ALA:HB2	1.98	0.46
1:F:262:CYS:SG	1:F:338:LEU:HD11	2.56	0.46
1:A:215:ASP:OD1	1:A:216:ASP:N	2.47	0.46
1:B:194:LEU:HD23	1:B:194:LEU:H	1.81	0.46
1:H:264:LEU:HD21	1:H:334:ILE:HD13	1.98	0.46
1:B:207:VAL:HG12	1:B:267:ALA:HB2	1.97	0.46
1:C:255:LYS:O	1:C:257:ASN:N	2.43	0.46
1:F:230:LEU:H	1:F:246:LYS:HE3	1.81	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:246:LYS:HE2	1:H:235:LEU:HD11	1.97	0.46
1:C:331:SER:O	1:C:335:LEU:HD23	2.15	0.46
1:G:203:LEU:HD11	1:G:265:GLU:HG3	1.98	0.46
1:C:79:LEU:O	1:C:84:HIS:N	2.49	0.46
1:C:246:LYS:HE2	1:F:235:LEU:HD11	1.96	0.46
1:A:252:ILE:HD12	1:A:335:LEU:HD22	1.97	0.45
1:H:141:LEU:HD23	1:H:141:LEU:H	1.81	0.45
1:B:61:GLN:O	1:B:64:VAL:HG22	2.17	0.45
1:G:61:GLN:O	1:G:64:VAL:HG22	2.17	0.45
1:G:194:LEU:HD23	1:G:194:LEU:H	1.82	0.45
1:E:246:LYS:HB2	1:H:237:ARG:HA	1.99	0.45
1:A:246:LYS:HB2	1:B:237:ARG:HA	1.98	0.45
1:E:191:ASN:HD22	1:E:191:ASN:N	2.15	0.45
1:H:217:LEU:HD23	1:H:250:TYR:CE2	2.52	0.45
1:C:191:ASN:N	1:C:191:ASN:HD22	2.14	0.45
1:G:227:LEU:HB2	1:G:251:VAL:HG23	1.99	0.45
1:E:79:LEU:O	1:E:84:HIS:N	2.50	0.45
1:H:184:MET:HA	1:H:187:ILE:HB	1.99	0.45
1:A:235:LEU:HB2	1:A:243:ARG:HB2	1.99	0.44
1:D:246:LYS:HB2	1:G:237:ARG:HA	1.99	0.44
1:C:246:LYS:HB2	1:F:237:ARG:HA	2.00	0.44
1:D:234:ILE:HG23	1:D:242:ARG:HD3	1.99	0.44
1:A:234:ILE:HG23	1:A:242:ARG:HD3	2.00	0.43
1:F:254:ASP:OD2	1:F:260:ARG:NH1	2.42	0.43
1:B:236:THR:HG22	1:B:241:LYS:HA	1.99	0.43
1:G:308:LYS:HE3	1:H:212:ASP:HB3	2.00	0.43
1:H:173:LEU:HD13	1:H:304:LEU:HD21	2.00	0.43
1:C:288:GLN:H	1:C:288:GLN:HG3	1.70	0.43
1:D:177:LEU:HD23	1:D:177:LEU:HA	1.87	0.43
1:E:173:LEU:O	1:E:177:LEU:HB2	2.18	0.43
1:F:179:ARG:HE	1:F:179:ARG:HB2	1.67	0.43
1:F:231:PRO:HG3	1:E:231:PRO:HD3	2.01	0.43
1:E:255:LYS:O	1:E:257:ASN:N	2.43	0.43
1:D:253:ARG:HH11	1:D:253:ARG:HG3	1.83	0.43
1:D:35:CYS:HB3	1:G:131:LEU:HD21	2.00	0.43
1:D:254:ASP:CG	1:D:255:LYS:H	2.26	0.43
1:E:215:ASP:OD1	1:E:215:ASP:N	2.51	0.43
1:A:242:ARG:NH1	1:D:232:GLU:HB2	2.34	0.42
1:C:173:LEU:O	1:C:177:LEU:HB2	2.18	0.42
1:D:207:VAL:O	1:D:207:VAL:HG13	2.19	0.42
1:C:172:TYR:O	1:C:176:VAL:HG22	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:159:ASN:HD21	1:H:153:THR:HB	1.84	0.42
1:A:211:CYS:HB3	1:A:274:CYS:HB2	2.01	0.42
1:E:60:LEU:HD23	1:E:60:LEU:H	1.84	0.42
1:E:186:GLU:O	1:E:189:ARG:HG2	2.20	0.42
1:D:316:LEU:HD23	1:D:316:LEU:H	1.85	0.42
1:E:172:TYR:O	1:E:176:VAL:HG22	2.19	0.42
1:A:177:LEU:HD23	1:A:177:LEU:HA	1.87	0.42
1:F:149:VAL:O	1:F:153:THR:HG23	2.20	0.42
1:F:173:LEU:HD13	1:F:304:LEU:HD21	2.00	0.42
1:H:324:GLU:HA	1:H:325:PRO:HD3	1.94	0.42
1:B:335:LEU:HD23	1:B:338:LEU:HD12	2.02	0.42
1:F:207:VAL:O	1:F:207:VAL:HG13	2.19	0.42
1:D:280:ASP:OD1	1:D:280:ASP:N	2.51	0.42
1:G:246:LYS:HE2	1:G:246:LYS:HB2	1.86	0.42
1:D:215:ASP:OD1	1:D:216:ASP:N	2.53	0.42
1:C:215:ASP:OD1	1:C:215:ASP:N	2.51	0.42
1:G:336:TRP:O	1:G:340:GLN:HG2	2.20	0.42
1:H:207:VAL:O	1:H:207:VAL:HG13	2.19	0.42
1:A:207:VAL:HG13	1:A:207:VAL:O	2.19	0.42
1:A:316:LEU:H	1:A:316:LEU:HD23	1.84	0.42
1:C:207:VAL:HA	1:C:270:LEU:HD11	2.02	0.42
1:D:252:ILE:HD12	1:D:335:LEU:HD22	2.02	0.42
1:C:60:LEU:H	1:C:60:LEU:HD23	1.84	0.41
1:C:186:GLU:O	1:C:189:ARG:HG2	2.20	0.41
1:E:252:ILE:HD11	1:E:264:LEU:HD11	2.02	0.41
1:H:27:ALA:O	1:H:31:LEU:HD23	2.20	0.41
1:F:27:ALA:HA	1:F:30:VAL:HG22	2.03	0.41
1:H:27:ALA:HA	1:H:30:VAL:HG22	2.03	0.41
1:B:254:ASP:OD1	1:B:255:LYS:N	2.42	0.41
1:D:159:ASN:ND2	1:G:153:THR:HG23	2.36	0.41
1:A:35:CYS:HB3	1:B:131:LEU:HD21	2.01	0.41
1:F:216:ASP:HB3	1:F:219:LYS:HE2	2.02	0.41
1:H:149:VAL:O	1:H:153:THR:HG23	2.20	0.41
1:E:280:ASP:OD1	1:E:280:ASP:N	2.53	0.41
1:E:330:LEU:O	1:E:334:ILE:HG13	2.20	0.41
1:C:237:ARG:HG2	1:C:241:LYS:HD3	2.01	0.41
1:F:27:ALA:O	1:F:31:LEU:HD23	2.21	0.41
1:C:280:ASP:N	1:C:280:ASP:OD1	2.53	0.41
1:C:330:LEU:O	1:C:334:ILE:HG13	2.20	0.41
1:A:34:VAL:HA	1:A:37:VAL:HG22	2.03	0.41
1:C:159:ASN:HD21	1:F:153:THR:HB	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:324:GLU:HA	1:F:325:PRO:HD3	1.95	0.41
1:D:211:CYS:HB3	1:D:274:CYS:HB2	2.02	0.41
1:D:246:LYS:HG3	1:G:235:LEU:HD11	2.03	0.41
1:G:255:LYS:O	1:G:257:ASN:N	2.50	0.41
1:E:175:VAL:HG13	1:E:176:VAL:HG13	2.03	0.41
1:E:237:ARG:HG2	1:E:241:LYS:HD3	2.01	0.41
1:H:213:ILE:HG13	1:H:271:GLN:HG3	2.03	0.41
1:B:230:LEU:HB2	1:B:246:LYS:HE3	2.02	0.41
1:C:29:CYS:O	1:C:32:LEU:HB2	2.21	0.41
1:H:157:LYS:HE3	1:H:157:LYS:HB3	1.74	0.41
1:H:335:LEU:HD23	1:H:335:LEU:HA	1.92	0.41
1:A:160:VAL:HG12	1:A:164:LEU:HG	2.02	0.40
1:C:175:VAL:HG13	1:C:176:VAL:HG13	2.03	0.40
1:D:331:SER:O	1:D:335:LEU:HD23	2.22	0.40
1:D:34:VAL:HA	1:D:37:VAL:HG22	2.03	0.40
1:F:255:LYS:O	1:F:257:ASN:N	2.50	0.40
1:D:150:SER:O	1:D:154:GLU:HG3	2.21	0.40
1:G:21:ALA:HB3	1:G:23:ARG:HE	1.86	0.40
1:E:75:GLU:OE2	1:H:20:ARG:NH1	2.54	0.40
1:H:316:LEU:H	1:H:316:LEU:HD23	1.87	0.40
1:D:186:GLU:HG3	1:D:187:ILE:HD12	2.03	0.40
1:F:316:LEU:HD23	1:F:316:LEU:H	1.87	0.40
1:E:207:VAL:HA	1:E:270:LEU:HD11	2.03	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	
1	A	311/490 (64%)	300 (96%)	11 (4%)	0	100	100
1	B	312/490 (64%)	303 (97%)	9 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	311/490 (64%)	302 (97%)	9 (3%)	0	100	100
1	D	311/490 (64%)	300 (96%)	11 (4%)	0	100	100
1	E	311/490 (64%)	303 (97%)	8 (3%)	0	100	100
1	F	312/490 (64%)	303 (97%)	9 (3%)	0	100	100
1	G	312/490 (64%)	302 (97%)	10 (3%)	0	100	100
1	H	312/490 (64%)	304 (97%)	8 (3%)	0	100	100
All	All	2492/3920 (64%)	2417 (97%)	75 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	252/417 (60%)	251 (100%)	1 (0%)	89	93
1	B	253/417 (61%)	252 (100%)	1 (0%)	89	93
1	C	252/417 (60%)	251 (100%)	1 (0%)	89	93
1	D	252/417 (60%)	251 (100%)	1 (0%)	89	93
1	E	252/417 (60%)	251 (100%)	1 (0%)	89	93
1	F	253/417 (61%)	252 (100%)	1 (0%)	89	93
1	G	253/417 (61%)	252 (100%)	1 (0%)	89	93
1	H	253/417 (61%)	252 (100%)	1 (0%)	89	93
All	All	2020/3336 (61%)	2012 (100%)	8 (0%)	88	93

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	THR
1	B	50	THR
1	C	191	ASN
1	F	50	THR

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Mol	Chain	Res	Type
1	D	50	THR
1	G	50	THR
1	E	191	ASN
1	H	50	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	83	HIS
1	A	84	HIS
1	A	191	ASN
1	A	340	GLN
1	C	83	HIS
1	C	84	HIS
1	C	191	ASN
1	C	197	HIS
1	C	340	GLN
1	F	84	HIS
1	F	278	GLN
1	F	340	GLN
1	D	83	HIS
1	D	84	HIS
1	D	159	ASN
1	D	191	ASN
1	D	340	GLN
1	G	341	GLN
1	E	83	HIS
1	E	84	HIS
1	E	191	ASN
1	E	197	HIS
1	E	340	GLN
1	H	84	HIS
1	H	162	HIS
1	H	278	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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.