

Mahavir Singh

Assistant Professor (tenured)
Molecular Biophysics Unit
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EDUCATION:

- 2002-2007 **Ph.D. (magna cum laude) in Chemistry and Biochemistry**
MPI Biochemistry and TU Munich, Germany
Mentor: Prof. Tad A. Holak
Director: Prof. Robert Huber
- 1999-2001 **M.Sc. Biochemistry**
South Campus, Delhi University
- 1996-1999 **B.Sc. Biochemistry**
Deshbandhu College, Delhi University

RESEARCH/PROFESSIONAL EXPERIENCE:

- May 2014 – Present **Assistant Professor (tenured)**
Molecular Biophysics Unit, IISc, India
- Jun 2016 – Present **Associate faculty**
NMR Research Centre, IISc, India
- Jan 2015 – Jun 2020 **Ramalingaswami Fellow**
DBT, India
- Jul 2012 – Apr 2014 **Associate Research Scientist**
UCLA, USA (PI: Prof. Juli Feigon)
- Jul 2006 – Jun 2012 **Postdoctoral Research Associate**
UCLA, USA (PI: Prof. Juli Feigon)
- Jul 2002 – Mar 2006 **Ph.D. Graduate Research**
MPI Biochemistry, Germany (Adviser: Prof. Tad A. Holak)
- Sep 2001 – Dec 2001 **JRF, CSIR, India**
AIIMS, India (Advisor: Prof. Subrata Sinha)
- 2001 – 2001 **M.Sc. Dissertations**
Dept. of Biochemistry, University of Delhi, India

TEACHING EXPERIENCE:

Regular course at IISc:

- **General Biochemistry** – Undergraduate course at IISc (2015-2020)
- **Molecular Spectroscopy** – PhD graduate course at IISc (2014-2017, 2019, 2020)
- **Conformational and Structural aspects of biopolymers** – (2020 ongoing)

Short term courses offered at Centre for Continuing Education, IISc:

- Biophysical methods to study structure and functions of proteins and nucleic acids (2-6 Dec 2019)
Instructor and Coordinator
- Genome editing by CRISPR/Cas-9 system (18-22 Nov 2019)
Instructor
- Recent advances in RNA biology (03-07 Dec 2018)
Instructor and Coordinator
- Recent advances in genetic engineering and transgenic technology (25-19 Jun 2018)
Instructor
- Protein structure and engineering (10-14 Jul 2017)
Instructor and Coordinator
- Genetic Engineering - Principles and Applications (24-28 Apr 2017)
Instructor
- Applications of NMR spectroscopy in Structural and Conformational Analysis (21-25 Nov 2016)
Instructor

Workshops:

- Integrative Modeling of Macromolecular RNA Structures (26-29 Aug 2018)
Co-organizer and instructor
Workshop was sponsored by Indian Academy of Sciences

FELLOWSHIPS AND RECOGNITIONS:

Jan 2019	Featured article in the special 'Future of Biochemistry - Asia Pacific' issue of Biochemistry.
Oct 2019	Received Tata Trust travel grant to attend EMBO/EMBL conference 'The Non-coding genome'.
Jan 2015	Early Career Award from DST India.
Oct 2014	Ramalingaswami Re-entry Fellowship from DBT, India.
May 2012	Postdoctoral research excellence award from MBI and Biochemistry Dept. UCLA.
May 2012	Chancellor nomination certificate for postdoctoral research excellence, UCLA.
Mar 2012	Travel award from RNA society to attend 17th RNA society meeting, An Arbor, Michigan.
Dec 2004	Crystal award from Prof. Dr. Robert Huber (Chemistry Nobel laureate 1988).
2000-2001	JRF and eligibility for lectureship award from CSIR and UGC, India

EXTRAMURAL GRANTS AWARDED:

- IRPHA, DST grant to work on aspect of SARS-Cov2 Start date: 19 Sep 2020
Duration: 3 years
- Indo-Polish (DST, India and NAWA, Poland) grant Start date: 30 Sep 2020
Duration: 2 years
- Awarded small grant from International RNA Society (for organizing RNA Salon)
2019, 2020
- Grant through DBT, Basic Science Task Force Start date: 20 Aug 2017
Duration: 3 years
- Grant through DBT, Centre of Excellence Scheme Start date: 2 Nov 2016
Duration: 4 years
- Early Career Award from DST, INDIA Start date: 23 Mar 2016
Duration: 3 years

- Ramalingaswami Fellowship from DBT, INDIA
Duration: 5 years

Start date: 1 Jan 2015

LIST OF RESEARCH PUBLICATIONS:

After joining IISc (May 2014 onwards)

*Corresponding author

§Equal contribution

Published manuscript:

1. Jadhav, P.V.[§], Sinha, V.K.[§], Chugh, S., Kotyada, C., Bachhav, D., Singh, R., Rothweiler, U. *, and **Singh, M.** * (2020). 2.09 Å resolution structure of E. coli HigBA toxin-antitoxin complex reveals an ordered DNA-binding domain and intrinsic dynamics in antitoxin. *Biochemical Journal*. doi: 10.1042/BCJ20200363. *In press*.
2. Ghosh, M. and **Singh, M.** * (2020) Structure specific recognition of telomere repeats containing RNA by the RGG-box of hnRNPA1. *Nucleic Acids Research*. May 7;48(8):4492-4506. doi: 10.1093/nar/gkaa134.
3. Giri, M.[§]. Maulik, A.[§]. and **Singh, M.** * (2019) Signatures of specific DNA binding by the AT-rich interaction domain of BAF250a. *Biochemistry*. Jan 14. 59(1):100-113. doi: 10.1021/acs.biochem.9b00852.
This manuscript was featured in 'Future of Biochemistry – Asia Pacific' issue of the journal.
4. Ravi V., Jain A., Khan D., Ahamed F., Mishra S., Giri M., Inbaraj M., Krishna S., Sarikhani M., Maity S., Kumar S., Shrinivas P.A., Shah R.A., Dave P., Rajendran R., Desingu P.A., Varshney U., Das S., Kolthur-Seetharam U., Rajakumari S., **Singh M.** and Sundaresan N.R. * (2019) SIRT6 transcriptionally regulates global protein synthesis through transcription factor Sp1 independent of its deacetylase activity. *Nucleic Acids Research*. Sep 26;47(17):9115-9131. doi: 10.1093/nar/gkz648.
5. Maulik, A.[§]. Giri, M.[§]. and **Singh, M.** * (2019) Molecular Determinants of Complex Formation between DNA and the AT-rich Interaction Domain of BAF250a. *Febs Letters*. Jul 19. 593(19):2716-2729. doi:10.1002/1873-3468.
This manuscript was featured as 'Editor's choice article' in FEBS Letters.
6. Bastiray, A. Giri, M. and **Singh, M.** * (2018) Sequential backbone resonance assignment of AT-rich interaction domain of human BAF200. *Biomolecular NMR Assignments*. Apr;13(1):115-119. doi: 10.1007/s12104-018-9862-z.
7. Sandhya, S.[§], Maulik, A.[§] Giri, M. and **Singh, M.** * (2018) Domain architecture of BAF250a reveals the ARID and ARM-repeat domains with implication in function and assembly of the BAF remodeling complex. *Plos One*. Oct. 11. 13(10):e0205267. doi: 10.1371/journal.pone.0205267. eCollection 2018.
8. Ghosh, M. and **Singh, M.** * (2018) RGG-box in hnRNPA1 specifically recognizes the telomere G-quadruplex DNA and enhances the G-quadruplex unfolding ability of UP1 domain. *Nucleic Acids Research*. Nov 2. 46(19):10246-10261. doi: 10.1093/nar/gky854.
9. Sarikhani, M., Mishra, S., Maity, S., Kotyada, C., Wolfgeher, D., Gupta, M.P., **Singh, M.** and Sundaresan, N.R. * (2018) SIRT2 deacetylase regulates the activity of GSK3 isoforms independent of inhibitory phosphorylation. *eLife*. 2018 Mar 5;7. pii: e32952. doi: 10.7554/eLife.32952.
10. Sarikhani, M., Mishra, S., Desingu, P.A., Kotyada, C., Wolfgeher, D., Gupta, M.P., **Singh, M.** and Sundaresan, N.R. * (2018) SIRT2 regulates oxidative stress-induced cell death through deacetylation of c-Jun NH2-terminal kinase. *Cell Death and Differentiation*. Feb 15. doi: 10.1038/s41418-018-0069-8.

11. Kotyada, C., Maulik, A., Srivastava, A. and **Singh, M.*** (2017) Mechanistic Insights into the Differential Catalysis by RheB and Its Mutants: Y35A and Y35A-D65A. ACS Omega, 2, 6691-6702. doi: 10.1021/acsomega.7b01025

12. **Singh, M.**, Wang, Z., Cascio, D. and Feigon, J.* (2015) Structure and interactions of the CS domain of human H/ACA RNP assembly protein Shq1. Journal of molecular biology, 427, 807-823. doi: 10.1016/j.jmb.2014.12.012

Manuscripts currently under review/revision/preparation:

13. Iyer V., Tushir, S., Verma, S., Maulik A., **Singh M.**, Mishra R., and Tatu U.* (2020). The role of cis-elements, nuclear factors and chromatin in trans-splicing based expression of Heat shock protein 90 in Giardia lamblia. *Under Review.*

14. Maulik, A. and **Singh, M.*** (2020) Sequence and phylogenetic analysis of lincRNA-21 revealed structurally conserved domains and motifs. *Under preparations.*

15. Manikandan, P., Sandhya, S., Paul S., Srinivasan N., Rothweiler U., and **Singh, M.*** (2020) Stepwise assembly and structure of type III toxin-antitoxin complex from E. coli. *Under preparations.*

16. Giri, M. and Singh, M.* (2020) NMR resonance assignment and secondary structure of AT-rich interaction domains of BAF250b. *Under preparations.*

17. Giri, M., xyz., and Singh, M.* (2020) Subtle structural differences dictates the mode of DNA binding in ARIDs of BAF250a and BAF250b. *Under preparations.*

18 Jadhav, P.V.[§], Sinha, V.K.[§], Rothweiler, U., and **Singh, M.** (2020) Subtle structural differences dictates the mode of DNA binding in ARIDs of BAF250a and BAF250b. *Under preparations.*

Before joining IISc (before May 2014):

16. **Singh, M.**, Choi, C.P. and Feigon, J.* (2013) xRRM: a new class of RRM found in the telomerase La family protein p65. RNA biology, 10, 353-359.

This article was featured on the cover-page of the journal.

17. **Singh, M.**, Wang, Z., Koo, B.K., Patel, A., Cascio, D., Collins, K. and Feigon, J.* (2012) Structural basis for telomerase RNA recognition and RNP assembly by the holoenzyme La family protein p65. Molecular cell, 47, 16-26.

18. **Singh, M.**[§], Gonzales, F.A.[§], Cascio, D., Heckmann, N., Chanfreau, G. and Feigon, J.* (2009) Structure and functional studies of the CS domain of the essential H/ACA ribonucleoparticle assembly protein SHQ1. The Journal of biological chemistry, 284, 1906-1916.

19. **Singh, M.**, Popowicz, G.M., Krajewski, M. and Holak, T.A.* (2007) Structural ramification for acetyl-lysine recognition by the bromodomain of human BRG1 protein, a central ATPase of the SWI/SNF remodeling complex. Chembiochem: a European journal of chemical biology, 8, 1308-1316.

20. **Singh, M.**, D'Silva, L. and Holak, T.A.* (2006) DNA-binding properties of the recombinant high-mobility-group-like AT-hook-containing region from human BRG1 protein. Biological chemistry, 387, 1469-1478.

8. Souvik Ghosh
PhD student
Year of joining 2020

Postdoctoral/Early career fellow mentored:

1. Dr. Aditi Maulik
PhD, Calcutta University
Mar to Jul 2016
Currently DBT Alliance Early Career Fellow in our lab
2. Dr. K. Padamapriya
PhD, IIT-Roorkee
Mar to Oct 2017
3. Dr. Vikrant Kumar Sinha
PhD, Pondicherry University
Nov 2017 – Present
4. Dr. Vikrant Kumar Sinha
PhD, Pondicherry University
Nov 2017 – Present
5. Dr. Swati Srivastava
PhD, CIMAP-CSIR, Lucknow

Junior research fellows/project assistants mentored:

1. Mr. Girish Kumar Kaitholil
MSc, Mahatma Gandhi University, Kerala
Jul to Dec 2014
2. Ms. Akula Deepa
MSc from Sri Venkateswara University
Jan to Aug 2015
3. Ms. Chaithanya Kotyada
PG from IBAB, Bangalore
Feb 2016 to Jan 2018
4. Ms. Devleena Bandopadhyay
MSc, University of Calcutta
Sep 2017 to Jun 2018
5. Ms. Nowrin Fathma
MSc, SRM University, Chennai
Feb 2018 to Feb 2019
6. Mr. Souradip Paul
MSc, Bose Institute and University of Calcutta
Sep 2018 to Jun 2019

MSc thesis dissertation project (registered at other universities):

1. Mr. Shuvra Shekhar
MSc, KIIT, Bhubneshwar
Jan to May 2016
2. Mr. Digvijay Bachav
MSc, DYB Patil University, Pune
Jul 2016 to Apr 2017
3. Ms. Niharika Nema
MSc, MS University of Baroda, Gujarat
May to Oct 2018
4. Magaly Gracia
MSc, VIT, Vellore
Dec 2017 to May 2018
5. Ms. Pratiksha P. Bhat
B.E. Biotechnology, MSRIT, Bengaluru

May to Oct 2018

6. Vidyashree V. MSc, VIT, Vellore
Jan to Mar 2020

Short term/summer trainees mentored:

1. Ms. Niharika Nema MSc, MS University of Baroda, Gujarat
May to Jul 2014

2. Ms. Rashina Lokhandwala MSc, MS University of Baroda, Gujarat
May to Jun 2016

3. Ms. Purna Shah MSc, MS University of Baroda, Gujarat
May to Jun 2017

4. Mr. D. Sairam MSc, VIT, Vellore
Jun to Jul 2017

5. Mr. Abhishek Bastiray UG summer project, IISc
May to Jul 2016

6. MS. Surbhi Munda UG summer project, IISc
May to Jul 2017

7. Ms. Jessica Badosa UG summer project, IISc
May to Jul 2018

8. Mr. Nived Krishnan S. UG summer project, IISc
May to Jul 2019

9. Mr. Sree K. Roop UG summer project, IISc
May to Jul 2019

10. Shristhi Mishra MSc, MS University of Baroda, Gujarat
Period: May to Jul 2019

CONFERENCES:

Invited talks and presentations:

Oct 2020 Invited talk at National Magnetic Resonance Society of India Webinar series

Mar 2020 Invited lecture at Dayananda Sagar College of Engineering, Bengaluru, as a part of the Science Day celebration

Feb 2020 26th National Magnetic Resonance Society Meeting & International Conference on NMR- from Molecules to Human Behaviour and Beyond

Dec 2019 Invited talk at Discussion meeting on 'Signals and Sensors', NCBS, TIFR

Dec 2019 Invited talk at NMR Research Centre – users workshop, IISc

Oct 2019 Invited guest lecture at Dept. of Chemistry, Arctic University of Norway, Tromso

May 2019 Invited talk at inStem, GKVK Campus, Bengaluru

Mar 2018 Invited talk at 42nd Annual Meeting of the Indian Biophysical Society, IISER Pune

Feb 2018 Invited talk at 24th Conference of the National Magnetic Resonance Society of India, IISER Mohali

Feb 2018 Talk at 8th Ramalingaswami Conclave, DBT, NIPGR, New Delhi

Jan 2017 Invited talk on 'Understanding the telomere and telomerase functions through structural biology approaches' in Ramaiah Institute of Technology, Bengaluru

Jan 2017 Talk at 6th Ramalingaswami Conclave, DBT, IISER Pune

Dec 2016 Chaired a session at 'Practical aspects of membrane protein crystallization' workshop held at IISc

Oct 2016 Invited Lecture on "Biology meets physics" delivered to 12th standard girl students from the 'Chethana Program' for Biological Science Division, IISc

Nov 2014 Invited talk at 43rd National crystallography Seminar, CDRI, Lucknow, India

Feb 2013 Poster presentation and participation at Young Investigator Meet, Jodhpur, India

Jan 2013 Invited lecture to chemistry and biology interface graduate students at UCLA.

Oct 2012 Talk at the Molecular Biology Institute, UCLA lake Arrowhead retreat.

Oct 2012 Talk at Young Investigator Meet of India, Boston, USA.

May 2012 Talk at 17th RNA society meeting, University of Michigan, An Arbor, USA.

Sep 2010 Participation in Sackler Colloquia of the National Academy of Sciences, USA.

Aug 2008 Poster presentation at XXI ICMRBS NMR conference, Hyderabad, India.

Jun 2008 Poster presentation at GRC on 'Nucleic acids', Salve Regina University, USA.

Jan 2007 NIH meeting assistant for Keystone Symposia 'Frontiers of NMR in structure biology', SLC, USA.

Jul 2005 Talk at MPI for Biochemistry graduate retreat at Ringberg castle, Munich, Germany.

Jan 2005 Poster presentation at XXIII ICMRBS NMR conference, San Diego, USA.

Session chair, judge etc.:

Feb 2020 Session Chair at 26th National Magnetic Resonance Society Meeting & International Conference on NMR- from Molecules to Human Behaviour and Beyond

Jan 2019 Best poster judge at Annual talks of NCBS, Bangalore

Feb 2017 Best poster judge at 7th Asia Pacific NMR and 23rd Annual meeting of the National Magnetic Resonance Society (NMRS) of India, IISc Bangalore

Dec 2016 Chaired a session at 'Practical aspects of membrane protein crystallization' workshop held at IISc Bangalore

COMMITTEE WORK AT IISC:

Jul 2020 to Present Departmental faculty representative, Institute's Wellness Committee

Aug 2018 – Present Departmental representative for Integrated PhD program

Nov 2018 – Present MBU Departmental Curriculum Committee member

Jul 2017 – Present Faculty-in-charge for MBU central facility instruments

2016, 18, 2019 Member, Best thesis award selection committee, MBU

2016 – 2017 Member, Daycare setup committee, IISc

2016 Faculty-in-charge, MBU for IISc Open day

2015-2016 Chair, MBU Nu Biophysical Student's Society

2014, 2018, 2019 Member, Interview Committee, IntPhD program of the Division of Biological Sciences

2014 – 2020 Senate nominee for comprehensive examinations

2018, 2019 Member, KVPY interview committee

2014 – 2018 Member, Application screening and interview committee, Ph.D. program at the Molecular Biophysics Unit.

OTHER PROFESSIONAL ACTIVITIES:

- Reviewer for PhD theses from:
 - University of Pondicherry
 - Indian Institute of Technology, Gandhi Nagar, Gujarat.
- Reviewer for several journals including:

- Nucleic Acids Research
- Biochemical Journal
- ACS Omega
- Proteins – structure, function and bioinformatics
- IUBMB-Life,
- Scientific Reports
- PLOS One
- Analysts
- Current Science
- Proceedings of the Indian National Science Academy
- Journal of Genetics
- Reviewer for several DST SERB EMR grant applications
- Reviewer for several DBT EMR grant applications
- Reviewer for CSIR-STAR grant application

MEMBERSHIP OF PROFESSIONAL BODIES:

- Member of Indian Biophysical Society Life member
- Member of Indian Crystallography Association Life member
- Member of National Magnetic Resonance Society of India Life member

OTHER RELATED PROFESSIONAL EXPERIENCE:

Completed 4th APS X-ray Data collection workshop and CCP4 School in June 2011 held at Argonne National Laboratory.