

# Rajat Mittal

## Personal Information

### Education:

|                                                   |         |           |
|---------------------------------------------------|---------|-----------|
| Ph.D., Department of Computer Science             | January | Jan 2011  |
| Rutgers University, Piscataway, NJ                |         |           |
| Bachelor of Technology, Computer Science and Eng. |         | 2000-2004 |
| Indian Institute of Technology, Mumbai, India     |         |           |

*Date of birth: 05-01-1983*

### Professional / research experience:

|                                             |                       |
|---------------------------------------------|-----------------------|
| Associate Professor, CSE Dept., IIT Kanpur  | July 2021 - Present   |
| Assistant Professor, CSE Dept., IIT Kanpur  | Dec. 2013 - June 2021 |
| Postdoctoral Fellow, IQC, Univ. of Waterloo | Feb.2011- Nov. 2013   |

## Teaching

### Courses (UG/PG) taught:

*Ethics (UG core); Complexity measures for Boolean functions (PG elective); Mathematics for computer science 3 (probability) (UG core); Topics in linear programming (PG elective); Quantum computing (PG elective); Discrete mathematics (UG core); Linear algebraic tools in computer science (PG elective); Introduction to programming (UG core); Technical communication (UG core), Abstract algebra (UG core), Applications of semidefinite programming (PG elective).*

### New courses introduced:

*Complexity measures for Boolean functions; Topics in linear programming; Linear algebraic tools in computer science; Applications of semidefinite programming.*

**Note: student survey ratings are not admissible as per senate resolution**

## Supervision of Bachelor/Master thesis

*Master's thesis: Mtech (5 graduated + 2 ongoing), MS (1)*

## PhD Supervision

*Phd thesis: 1 (open seminar done)*

## **Knowledge Dissemination**

*Conducted a 5-week workshop for the employees of Fractal analytics on “Quantum algorithms”.*

*Co-organizer for workshop on “Pedagogy for introduction to programming course”.*

*Given lectures in multiple FDP’s on “Quantum computing”.*

## **Publications**

### **Journal papers:**

Efficiently factoring polynomials modulo  $p^4$ ; with A. Dwivedi and N. Saxena; Journal of Symbolic Computation 2020.

Extended nonlocal games and monogamy-of-entanglement games; with N. Johnston, V. Russo and J. Watrous, Royal Society A 2016.

### **Referred conference papers:**

Certificate games; with S. Chakraborty, A. Gal, S. Laplante and A. Sunny; ITCS 2023.

Tight Chang's-lemma-type bounds for Boolean functions; with S. Chakraborty, N. Mande, T. Molli, M. Paraashar and S. Sanyal; FSTTCS 2021.

On algorithms to find  $p$ -ordering; with A. Gulati and S. Chakrabarti; CALDAM 2021.

Counting basic-irreducible factors mod  $p^k$  in deterministic poly-time and  $p$ -adic applications; with A. Dwivedi and N. Saxena; CCC 2019.

Efficiently factoring polynomials modulo  $p^4$ ; with A. Dwivedi and N. Saxena; ISSAC 2019.

Stabilizer codes from modified symplectic form; with T. Gandhi and P. Kurur; ISIT 2019.

Irreducibility and deterministic  $r$ -th root finding over finite fields; with V. Bhargava, G. Ivanyos and N. Saxena; ISSAC 2017.

Extended nonlocal games and monogamy-of-entanglement games; with N. Johnston, V. Russo and J. Watrous, Royal Society A 2016.

Characterization of binary constraint system games; with R. Cleve; ICALP 2014 and QIP 2014.

Quantum query complexity of state conversion; with T. Lee, B. Reichardt, R. Spalek and M. Szegedy; FOCS 2011 and QIP 2012.

Product theorems via semidefinite programming; with T. Lee; ICALP 2008.

Product rules in semidefinite programming; with M. Szegedy; FCT 2007.

### **Preprints:**

Lower bounds on quantum query complexity for symmetric functions; with Sanjay S Nair and Sunayana Patro; accepted as QIP2022 poster; in submission.

Square root bound on the least power non-residues; with M. Forbes, N. Kayal and C. Saha, 2011.

### **Development**

*List development / demonstration of technologies, products, patents, technology transfer etc.*

### **Funding**

*Inspire Faculty Fellow (DST), 2015-2020 (PI)*

### **Consultancy**

*List consultancy projects with details of funding, duration, whether PI or co-PI*

### **Peer Recognition**

*1989 Batch faculty teaching award for innovation in teaching 2021*

*Excellence in teaching award 2019, IIT Kanpur*

*Inspire faculty fellow, 2015.*

### **Contributions to the institute**

- Member of SPEC from 2021-
- DSAC convener from 2021-
- Member of Waste Management Committee from 2015-2019
- ACA faculty coordinator from 2015-2021
- Convener of the committee for website on e-lectures
- Part of the team to furnish RM building
- Department theory course review committee
- Department Mtech course curriculum review committee
- DPGC member from 2016-2018.
- DUGC member from 2016.

### **Contributions outside the institute**

Program committee member for QIP 2022, AQIS 2016

Organizing committee member for FSTTCS2017

Member of the IARCS council from 2021-

Reviewer for STOC, FOCS, MFCS, ISAAC, ALGO, QIP, QIC, CCC, ICALP, TOC, FSTTCS, JCSS.

### **Others**

*Invited talks:*

Non local games and decision tree complexity, ISI Kolkata, Dec 2022.

Quantum algorithms, Bank of America Global Markets Innovation Summit 2022.

Quantum query complexity, IRIF France, June 2022.

Degree of symmetric Boolean functions, Workshop on Analysis of Boolean Functions, Kolkata 2020.

Counting roots of polynomials modulo prime power, ISI Kolkata 2020.

Stabilizer codes from modified symplectic form, CWI Amsterdam, 2019.

$r$ -th non-residue, IMSc 2017.

Quadratic non-residue, TIMC-AMS 2016 (International Conference of The Indian Mathematics Consortium (TIMC) with AMS), Varanasi.

Quadratic non-residue, CMI Chennai 2016.

Product rule in semidefinite programming, CTW 2009, China.

Product rule via semidefinite programming, Center for Computational Intractability Meeting 2008, Princeton.