PRAFULLKUMAR TALE

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Fields of Interests

- Parameterized Complexity
- Conditional Lower Bounds
- Graph Theory
- Graph Algorithms
- Algorithmic Engineering

Work Experiences

CISPA Helmholtz Center for Information Security, Saarbrücken, Germany July 2020 – present
Position: Post-Doctoral Researcher

Max-Planck Institute for Informatics (MPII), Saarbrücken, Germany March 2020 – June 2020
Position: Post-Doctoral Researcher

University Of Bergen, Bergen, Norway Jan 2019 – June 2019
Position: Researcher (An internship during Ph.D.)

Ebay/PayPal Pvt Ltd June 2012 – July 2013
Position: Software Engineer

Education

The Institute of Mathematical Sciences (IMSc), HBNI, Chennai Aug 2015 – Feb 2020
Ph.D. in Theoretical Computer Sciences

The Institute of Mathematical Sciences (IMSc), HBNI, Chennai Aug 2013 – Aug 2015
Master of Science in Theoretical Computer Sciences

Indian Institute of Technology (IIT), Roorkee July 2007 – May 2012
Master of Science in Applied Mathematics (Five-year Integrated Degree Program)

Academic Achievements and Scholarships

○ **Best Student Paper Award at IPEC** 2016
Awarded Best Student Paper Award for our paper titled 'Dynamic Parameterized Problems' at International Symposium on Parameterized and Exact Computation, IPEC 2016.

○ **National Board for Higher Mathematics (NBHM)** 2010 *(Declined)*
Selected for M.A./M.Sc. Scholarship conducted by NBHM and funded by Department of Atomic

Energy, Govt of India. Only twenty-two students throughout the nation were selected in that year.

◦ **Innovation in Science Pursuit for Inspired Research (INSPIRE)** 2008 *(Declined)*
Awarded Innovation in Science Pursuit for Inspired Research (INSPIRE) scholarship by the Department of Science and Technology, Govt of India, for perusing basic science at Indian Institute of Technology.

◦ **Kishore Vaigyanik Protsahan Yojana (KVPY)** 2008 to 2012
Recipient of Kishore Vaigyanik Protsahan Yojana scholarship awarded by Department of Science and Technology, Govt of India in 2007. It is the highest-paid scholarship at the graduate level.

◦ **Merit-cum-means Scholarships (MCM)** 2007 to 2008
Awarded merit-cum-means scholarships by Indian Institute of Technology for being second in the Mathematics department in the academic year 2007.

◦ **IIT Joint Entrance Examination – 2007**
Secured All India Rank 3289 in IIT-JEE and 3524 in AIEEE. (Among the top 1 % of students in the nation.)

◦ **National Talent Search Examination (NTSE)** 2005 to 2007
Awarded with National Talent Search Examination in the year 2005. This scholarship is given to the top 750 students in India.

◦ **Physics Olympiad – 2006**
In the top 1 % (out of 42000 students) at the National level in the Physics Olympiad conducted by the Indian Association of Physics Teachers (IAPT).

Publications[1]

23. **Romeo and Juliet Meeting in Forest Like Regions**
with Neeldhara Misra, Manas Mulpuri, Gaurav Viramgami

22. **Domination and Cut Problems on Chordal Graphs with Bounded Leafage**
with Esther Galby, Daniel Marx, Philipp Schepper, Roohani Sharma
[C-20] (To appear) International Symposium on Parameterized and Exact Computation (**IPEC**), 2022

21. **Metric Dimension Parameterized by Feedback Vertex Set and Other Structural Parameters**
with Esther Galby, Liana Khazaliya, Fionn Mc Inerney, Roohani Sharma
[C-19] (To appear) Mathematical Foundations of Computer Science (**MFCS**), 2022

20. **Reducing the Vertex Cover Number via Edge Contractions**
with Paloma T. Lima, Vinicius F. dos Santos, Ignasi Sau, Uéverton S. Souza
[C-18] (To appear) Mathematical Foundations of Computer Science (**MFCS**), 2022

[1]The norm in the theoretical computer science community is to publish a preliminary version of results in conferences (which often have page limits) and a full version in journals.

19. **The Complexity of Contracting Bipartite Graphs into Small Cycles**
with R. Krithika, Roohani Sharma
[C-17] (To appear) Graph-Theoretic Concepts in Computer Science (**WG**), 2022

18. **Parameterized Complexity of Weighted Multicut in Trees**
with Esther Galby, Dániel Marx, Philipp Schepper, Roohani Sharma
[C-16] (To appear) Graph-Theoretic Concepts in Computer Science (**WG**), 2022

17. **A Framework for Parameterized Subexponential Algorithms for Generalized Cycle Hitting Problems on Planar Graphs**
with Dániel Marx, Pranabendu Misra, Daniel Neuen
[C-15] ACM-SIAM Symposium on Discrete Algorithms (**SODA**), 2022

16. **Sparsification Lower Bound for Linear Spanners in Directed Graphs**
(This is a single author paper without a conference version.)
[J-12] Theoretical Computer Science (**TCS**), Volume 898: 69-74 (2022)

15. **α-approximate Reductions: a Novel Source of Heuristics for Better Approximation Algorithms**
with Fredrik Manne, Geevarghese Philip, Saket Saurabh

14. **On the Parameterized Approximability of Contraction to Classes of Chordal Graphs**
with Spoorthy Gunda, Pallavi Jain, Daniel Lokshtanov, Saket Saurabh
[C-14] Approximation, Randomization, and Combinatorial Optimization **APPROX/RANDOM**, 2020
[J-11] ACM Transactions on Computation Theory (**ToCT**), Volume 13(4): 27:1-27:40 (2021)

13. **Parameterized Complexity of Maximum Edge-Colorable Subgraph**
with Akanksha Agrawal, Madhumita Kundu, Abhishek Sahu, Saket Saurabh
[C-13] Annual International Computing and Combinatorics Conference (**COCOON**), 2020
[J-10] (To appear) **Algorithmica**

12. **On the Parameterized Complexity of Maximum Degree Contraction**
with Saket Saurabh
[C-12] International Symposium on Parameterized And Exact Computation (**IPEC**), 2020
[J-09] **Algorithmica**, Volume 84: 405 – 435 (2022)

11. **On the Parameterized Complexity of Grid Contraction**
with Saket Saurabh, Ueverton Dos Santos Souza
[C-11] Scandinavian Symposium and Workshops on Algorithm Theory (**SWAT**), 2020
[J-08] Journal of Computer and System Sciences (**JCSS**), Volume 129: 22-38 (2022)

10. **Subset Feedback Vertex Set in Chordal and Split Graphs**
with Geevarghese Philip, Varun Rajan, Saket Saurabh
[C-10] International Conference on Algorithms and Complexity (**CIAC**), 2019
[J-07] **Algorithmica**, Volume 81 (9): 3586-3629 (2019)

9. **Path Contraction Faster than 2^n**
with Akanksha Agrawal, Fedor Fomin, Daniel Lokshtanov, Saket Saurabh

[C-09] International Colloquium on Automata, Languages and Programming (**ICALP**), 2019
[J-06] SIAM Journal on Discrete Mathematics (**SIDMA**), 34(2): 1302-1325 (2020)

8. **An FPT Algorithm for Contraction to Cactus**
with R. Krithika, Pranabendu Misra
[C-08] Annual International Computing and Combinatorics Conference (**COCOON**), 2018

7. **Exact and Parameterized Algorithms for (k, i)-Coloring**
with Diptapriyo Majumdar, Rian Neogi, Venkatesh Raman
[C-07] Algorithms and Discrete Applied Mathematics, (**CALDAM**), 2017

6. **Paths to Trees and Cacti**
with Akanksha Agrawal, Lawqueen Kanesh, Saket Saurabh
[C-06] International Conference on Algorithms and Complexity (**CIAC**), 2017
[J-05] Theoretical Computer Science (**TCS**), Volume 860: 98-116 (2021)

5. **On the Parameterized Complexity of Contraction to Generalization of Trees**
with Akanksha Agarwal, Saket Saurabh
[C-05] International Symposium on Parameterized and Exact Computation (**IPEC**), 2017
[J-04] Theory of Computing Systems (**ToCS**) Volume 63 (3): 587-614 (2019)

4. **Parameterized and Exact Algorithms for Class Domination Coloring**
with R. Krithika, Ashutosh Rai, Saket Saurabh
[C-04] **SOFSEM** 2017: Theory and Practice of Computer Science
[J-03] Discrete Applied Mathematics (**DAM**), Volume 291: 286-299 (2021)

3. **Lossy Kernels for Graph Contraction Problems**
with R. Krithika, Pranabendu Misra, Ashutosh Rai
[C-03] Foundations of Software Technology and Theoretical Computer Science (**FSTTCS**), 2016

2. **Dynamic Parameterized Problems**
with R. Krithika, Abhishek Sahu
[C-02] International Symposium on Parameterized and Exact Computation **IPEC**, 2016
[J-02] **Algorithmica**, Volume 80(9): 2637-2655 (2018)

1. **Harmonious Coloring: Parameterized Algorithms and Upper Bounds**
with Sudeshna Kolay, Ragukumar Pandurangan, Fahad Panolan, Venkatesh Raman
[C-01] Graph-Theoretic Concepts in Computer Science (**WG**), 2016
[J-01] Theoretical Computer Science (**TCS**), Volume 772: 132-142 (2019)

Reviewer for

Journals:

- Algorithmica (2022), (2018)
- Journal of Computer and System Sciences (**JCSS**) (2021), (2021), (2020), (2020)
- Theoretical Computer Science **(TCS)** (2021), (2019), (2019)
- Discrete Mathematics & Theoretical Computer Science (**DMTCS**) (2021)
- Discrete Applied Mathematics (**DAM**) (2021)

Conferences:

- SODA (2023)
- ISAAC (2022)
- ESA (2022) $\times 2$
- WG (2022) $\times 2$
- ISAAC (2021)
- WG (2021)
- ISAAC (2020)
- COCOON (2020)
- ESA (2020)
- ICALP (2020)
- STACS (2020)
- ESA (2019)
- IPEC (2018)
- COCOON (2018)
- IPEC (2017)
- IPEC (2016)

Research Visits

University of Bergen, Bergen, Norway — May 2017 – July 2017

University of Bergen, Bergen, Norway — Sep 2016 – Nov 2016

Max-Planck Institute for Informatics (MPII), Saarbrücken, Germany — June 2015 – July 2015

Invited Talks

($T3$) **Parameterized Approximation Algorithms Workshop (PAAW) 2022**:
Title : Parameterized Approximability of Contraction to Classes of Chordal Graphs
Date : 4^{th} July 2022

($T2$) **Parameterized Complexity 301**:
Title : Graph Contraction: Old and New Developments
Date : 31^{st} December 2020

($T1$) **Parameterized Complexity Seminar**:
Title : Parameterized Approximability of Contraction to Classes of Chordal Graphs
Date : 24^{th} November 2020

Teaching Experience

• Teaching Assistant to the course *Parameterized Algorithm* by Prof. Saket Saurabh during Jan-May 2016 at The Institute Of Mathematical Sciences, Chennai.

• Instructor for five workshops on *Introduction to MATLAB*. Each workshop was held at Institute Computer Centre, IIT Roorkee, for two hours daily spread over three days and had participation of more than 60 students.

Programming Experience

○ **Lossy Kernelization in Practice** Jan 2019 – June 2019
We posit that a carefully crafted lossy reduction rule can yield improved approximation solution in practice. I have implemented (in C++ and CPLEX) different algorithms to solve Dominating Set on sparse graphs for various benchmark instances to support our hypothesis.

○ **The Parameterized Algorithms and Computational Experiments Challenge (PACE)**
Implemented various algorithms to solve the following problems on large graphs: Vertex Cover using C++ (in 2019), Steiner Tree using C++ (in 2018), and Minimum Fill-In using Python (in 2017).

○ **SymPy – Open Source Project** March 2011 – May 2012
One of the authors of SymPy, an open-source Python library for symbolic mathematics. I have contributed to its development by submitting functions, reviewing pull requests, fixing patches.

Conferences and Workshops Attended

○ **ICGT 2022** July 4 – 8, 2022
Attended 11^{th} workshop on International Colloquium on Graph Theory and Combinatorics at Montpellier, France.

○ **WG 2022** June 22 – 24, 2022
Attended 48^{th} edition of the International Workshop on Graph-Theoretic Concepts in Computer Science at Tubingen, Germany, and presented our work.

○ **IPEC 2020** December 14 – 18, 2020
(Virtually) Attended 15^{th} International Symposium on Parameterized and Exact Computation, and presented our work.

○ **SWAT 2020** June 22 – 24, 2020
(Virtually) Attended 17^{th} Scandinavian Symposium and Workshops on Algorithm Theory and presented our work.

○ **Algorithmic Tractability via Sparsifiers** August 9 – 12, 2019
Attended workshop on tools used to sparsify the instances of hard problems that arise algorithmically. This workshop was organized in Leh, India, and supported by the ERC Grant LOPRE and the Institute of Mathematical Sciences.

○ **WorKer 2019** June 3 – 7, 2019
Attended a workshop on Kernelization organized by the University of Bergen (UiB) at UiB, Norway.

○ **CIAC 2017** May 24 – 26, 2017
Attended Algorithms and Complexity - 10^{th} International Conference, CIAC 2017 in Athens, Greece and presented our work.

○ **Rangoli Of Algorithms (RoA) and FSTTCS 2016** December 11 – 12, 2016
Attended RoA as a part of the IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science organized at Chennai Mathematical Institute, India.

◦ **CTD 2016** April 28 – 29, 2016
Attended Chennai Theory Day organized by Chennai Mathematical Institute and presented research work on various graph coloring.

◦ **WorKer 2015** June 1 – 4, 2015
Attended workshop on Kernelization organized by the University of Bergen at Sophus Lie Conference Center, Norway.

◦ **FSTTCS 2014** December 15 – 17, 2014
Attended IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science organized at India International Centre, New Delhi.

◦ **Advanced School on Parameterized Algorithms & Kernelization (ASPAK)** Mar 3 – 8, 2014
This school was focused on several recent advances in parameterized algorithms and kernelization. It covered many fundamental as well as few advanced techniques.

◦ **Workshop on Social Networks** Feb 20 – 24, 2012
Attended the workshop jointly organized by IIT–Madras, IMSc, and IMI Chennai. Many prominent speakers from diversified areas such as Computer Science, Mathematics, Physics, History, and Social Studies delivered lectures regarding the growth and effect of social networks.

◦ **National Workshop on Computer Algebra System (CAS)** Jan 27 – 31, 2011
Attended the workshop hosted by Bhaskaracharya Pratishthana, Pune, as a crash course for following mathematical software - GAP, Pari-GP, SAGE & Maxima.

◦ **SciPy.in 2010** Dec 13 – 18, 2010
Participated in an International Conference on Python for education and scientific computing hosted by FOSSEE at IIIT-Hyderabad, ISB, and Mahindra Satyam. Contributed to the function "Parametric_plot" to matplotlib during sprint sessions.

◦ **Sage Days 25, India** Aug 9 – 13, 2010
Participated in an international conference on the open source mathematical software SAGE hosted by FOSSEE at IIT Bombay. Contributed to the 'Textbook Completion' project during sprint sessions.

References

◦ **Prof. Saket Saurabh**
The Institute of Mathematical Sciences, HBNI, Chennai, India
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◦ **Prof. Dániel Marx**
CISPA Helmholtz Center for Information Security, Saarbrücken, Germany
Email: marx@cispa.de

◦ **Prof. Geevarghese Philip**
Chennai Mathematical Institute, Chennai, India
Email: gphilip@cmi.ac.in

○ **Prof. Ignasi Sau**
LIRMM, Université de Montpellier, CNRS, Montpellier, France
Email: ignasi.sau@lirmm.fr