

## ASHUTOSH RAI

### Assistant Professor

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## AREAS OF INTEREST

Theoretical Computer Science in general. Mainly interested in algorithmic approaches to deal with NP-completeness including Preprocessing or Data Reduction, Fixed Parameter Tractability and finding parameterized algorithms to graph modification problems.

## PROFESSIONAL EXPERIENCE

<i>Assistant Professor</i> , Department of Mathematics IIT-Delhi	October 2020- Present
<i>Assistant Professor</i> , Department of Computer Science IIIT-Delhi	August 2020- October 2020
<i>Postdoctoral Fellow</i> , Department of Applied Mathematics Faculty of Mathematics and Physics Charles University, Prague	September 2018- August 2020
<i>Postdoctoral Fellow</i> , Department of Computing Hong Kong Polytechnic University, Hong Kong Hosted by Prof. Yixin Cao	August 2017- August 2018
<i>Research Associate</i> , Department of Computing Hong Kong Polytechnic University, Hong Kong Hosted by Prof. Yixin Cao	October 2016- July 2017

## EDUCATION

<i>Ph. D.</i> , Theoretical Computer Science Institute of Mathematical Sciences, Chennai Advisors: Prof. Venkatesh Raman and Prof. Saket Saurabh	2012-2016
<i>M. Sc.</i> , Theoretical Computer Science Institute of Mathematical Sciences, Chennai	2010-2012
<i>M. Sc.</i> , Computer Science (Completed One Year) University of Pune GPA: 5.6/6	2009-2010
<i>B. Sc. (Hons.)</i> , Computer Science Banaras Hindu University, Varanasi Aggregate Score in Computer Science: 82.4%	2006-2009
<i>All India Senior School Certificate Examination</i>	

Sunbeam English School, Varanasi Aggregate Score: 86.8%	2005
All India Secondary School Examination NSVM, Ballia Aggregate Score: 85.2%	2003

## RESEARCH WORK

### Manuscripts under review

1. An Integral Linear Programming Relaxation for Parameterized Steiner Tree [\[pdf\]](#)  
with Andreas Emil Feldmann.

### Journal Articles

1. Generalized Pseudoforest Deletion: Algorithms and Uniform Kernel  
with Geevarghese Philip and Saket Saurabh  
in *SIAM Journal on Discrete Mathematics (SIDMA)*, Volume 32(2), Pages 882-901 (2018). [\[link\]](#) [\[preprint\]](#)
2. On the Kernelization Complexity of String Problems  
with Manu Basavaraju, Fahad Panolan, M. S. Ramanujan and Saket Saurabh  
in *Theoretical Computer Science*, Volume 730, Pages 21-31 (2018). [\[link\]](#) [\[preprint\]](#)
3. Parameterized Algorithms for Max Colorable Induced Subgraph problem on Perfect Graphs  
with Neeldhara Misra, Fahad Panolan, Venkatesh Raman and Saket Saurabh  
in *Algorithmica* (2018). [\[link\]](#) [\[preprint\]](#)
4. Bivariate complexity analysis of Almost Forest Deletion  
with Saket Saurabh  
in *Theoretical Computer Science*, Volume 708, Pages 18 – 33 (2018). [\[link\]](#) [\[preprint\]](#)
5. Faster Parameterized Algorithms for Deletion to Split Graphs  
with Esha Ghosh, Sudeshna Kolay, Mrinal Kumar, Pranabendu Misra, Fahad Panolan and M. S. Ramanujan  
in *Algorithmica*, Volume 71(4), Pages 989-1006 (2015). [\[link\]](#) [\[preprint\]](#)
6. Kernel lower bounds using co-nondeterminism: Finding induced hereditary subgraphs  
with Stefan Kratsch, Marcin Pilipczuk and Venkatesh Raman  
in *ACM Transactions on Computation Theory (TOCT)*, Volume 7(1), Pages 4:1-4:18 (2014). [\[link\]](#) [\[preprint\]](#)

### Conference Articles

1. Fixed-Parameter Tractability of the Weighted Edge Clique Partition Problem [\[pdf\]](#)  
with Andreas Emil Feldmann, and Davis Issac  
*International Symposium on Parameterized and Exact Computation (IPEC)* 2020.
2. Quick Separation in Chordal and Split Graphs [\[pdf\]](#)  
with Pranabendu Misra, Fahad Panolan, Saket Saurabh, and Roohani Sharma.  
*Mathematical Foundations of Computer Science (MFCS)* 2020.
3. A polynomial kernel for Diamond-free editing [\[pdf\]](#)  
with Yixin Cao, R. B. Sandeep and Junjie Ye  
*European Symposium on Algorithms (ESA)* 2018.

4. Parameterized and Exact Algorithms for Class Domination Coloring [[pdf](#)]  
with R. Krithika, Saket Saurabh and Prafullkumar Tale  
*International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM)* 2017.
5. Lossy Kernels for Graph Contraction Problems [[pdf](#)]  
with R. Krithika, Pranabendu Misra and Prafullkumar Tale  
*Foundations of Software Technology and Theoretical Computer Science (FSTTCS)* 2016.
6. Strong Graph Deletion: Bipartite Graphs [[pdf](#)]  
with M. S. Ramanujan  
*Foundations of Software Technology and Theoretical Computer Science (FSTTCS)* 2016.
7. A Parameterized Algorithm for Mixed-Cut [[pdf](#)]  
with M. S. Ramanujan and Saket Saurabh  
*Latin American Theoretical Informatics Symposium (LATIN)* 2016.
8. Generalized Pseudoforest Deletion: Algorithms and Uniform Kernel [[pdf](#)]  
with Geevarghese Philip and Saket Saurabh  
*Mathematical Foundations of Computer Science 2015 - 40th International Symposium, (MFCS)* 2015.
9. Bivariate Complexity Analysis of Almost Forest Deletion [[pdf](#)]  
with Saket Saurabh  
*Annual International Computing and Combinatorics Conference (COCOON)* 2015.
10. Kernel Lower Bounds on String Problems [[pdf](#)]  
with Manu Basawaraju, Fahad Panolan, Saket Saurabh and M. S. Ramanujan  
*Annual International Computing and Combinatorics Conference (COCOON)* 2014.
11. Polynomial Kernels for  $\lambda$ -extendible Properties Parameterized Above the Poljak-Turzík Bound [[pdf](#)]  
with Robert Crowston, Mark Jones, Gabriele Muciaccia, Geevarghese Philip and Saket Saurabh  
*Foundations of Software Technology and Theoretical Computer Science (FSTTCS)* 2013.
12. Parameterized Algorithms for Max Colorable Induced Subgraph problem on Perfect Graphs [[pdf](#)]  
with Neeldhara Misra, Fahad Panolan, Venkatesh Raman and Saket Saurabh  
*International Workshop on Graph-Theoretic Concepts in Computer Science (WG)* 2013.
13. Kernel lower bounds using co-nondeterminism: Finding induced hereditary subgraphs [[pdf](#)]  
with Stefan Kratsch, Marcin Pilipczuk and Venkatesh Raman  
*Scandinavian Symposium and Workshops on Algorithm Theory (SWAT)* 2012.
14. Faster Parameterized Algorithms for Deletion to Split Graphs [[pdf](#)]  
with Esha Ghosh, Sudeshna Kolay, Mrinal Kumar, Pranabendu Misra, Fahad Panolan and, M. S. Ramanujan  
*Scandinavian Symposium and Workshops on Algorithm Theory (SWAT)* 2012.
15. On the kernelization complexity of problems on graphs without long odd cycles [[pdf](#)]  
with Fahad Panolan  
*Annual International Computing and Combinatorics Conference (COCOON)* 2012.

## Theses

- Parameterized Algorithms for Graph Modification Problems [[pdf](#)]  
Ph. D. thesis
- Kernel Lower Bounds: A Survey [[pdf](#)]  
Master's thesis

### Teaching Experience

- Taught Complexity Theory at IIIT Delhi (Monsoon, 2020).
- Assisted Prof. Saket Saurabh for the course Advanced Graph Algorithms at Institute of Mathematical Sciences, Chennai (Early 2014).
- Tutored the course Combinatorics and Graph Theory I at Charles University, Prague (Spring 2018).

### Academic Vistis

- Visited Prof. Gregory Gutin, Royal Holloway, University of London, for a period of three weeks (March-April 2013).
- Visited Prof. Saket Saurabh, University of Bergen, for a period of four weeks (September-October 2014).
- Visited Dr. M. S. Ramanujan, Vienna Institute of Technology, for a period of one week (September 2015).
- Visited Prof. Aritra Banik, Indian Institute of Technology, Jodhpur, for a period of three weeks (September 2016).
- Visited Prof. Saket Saurabh, University of Bergen, for a period of one week (June 2019).

### CONFERENCES / WORKSHOPS ATTENDED

WorKer 2019, University of Bergen, Bergen, Norway  
HOMONOLO 2018, Nová Louka, Czech Republic  
COCOON 2017, Hong Kong Polytechnic University, Hong Kong SAR, China  
School on Parameterized Algorithms and Complexity, Bedlewo, Poland  
MFCS 2015, University of Milan, Milan, Italy  
SWAT 2012, University of Helsinki, Helsinki, Finland  
Workshop on Kernelization 2013, University of Warsaw, Warsaw, Poland  
FSTTCS 2010, IMSc, Chennai  
FSTTCS 2011, IITB, Mumbai  
FSTTCS 2012, IIIT, Hyderabad  
FSTTCS 2013, IIT, Guwahati  
IPEC 2010, IMSc, Chennai  
Mysore Park Workshop, 2011, 2012, 2013