






# Raghav Govind JHA

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 Date of Birth : January 23, 1989   Citizenship : Indian

## Employment

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September 2019	Postdoctoral Fellow, Perimeter Institute for Theoretical Physics, Canada
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## Education

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2013 – 2019	Ph.D. Physics, Syracuse University, Syracuse, New York, USA Thesis : <a href="#">Holography, large N, and supersymmetry on the lattice</a>
2011 – 2013	M.Sc. Physics, St. Xavier's College & Bose Institute, Kolkata, India
2010 – 2011	M.S. in Nanomaterials, Université Pierre et Marie Curie (UPMC Paris VI) Paris, France
2007 – 2010	B.Sc. Physics (Honours), St. Stephen's College, Delhi, India

## Publications and preprints

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Citations (as per iNSPIRE) : 134, h-index : 7

1. Thermal phase structure of dimensionally reduced super-Yang–Mills [[arXiv:2201.03097](#)]
2. Tensor renormalization of three-dimensional Potts model [[arXiv:2201.01789](#)]
3. Introduction to Monte Carlo for Matrix Models [[arXiv:2111.02410](#)]
4. Large-N limit of two-dimensional Yang–Mills theory with four supercharges [[arXiv:2109.01001](#)]
5. Tensor renormalization group study of the 3d O(2) model [Phys. Rev. D 104, 094517 (2021)] [[arXiv:2105.08066](#)]
6. Three-dimensional super-Yang–Mills theory on the lattice and dual black branes [Phys. Rev. D 102, 106009 (2020)] [[arXiv:2010.00026](#)]
7. Positive geometries for all scalar theories from twisted intersection theory [Phys. Rev. Research 2, 033119 (2020)] [[arXiv:2006.15359](#)]
8. Critical analysis of two-dimensional classical XY model [J. Stat. Mech. (2020) 083203] [[arXiv:2004.06314](#)]
9. Thermal phase structure of a supersymmetric matrix model [PoS LATTICE2019 (2020) 069] [[arXiv:2003.01298](#)]
10. Finite N unitary matrix models [[arXiv:2003.00341](#)]
11. Tensor renormalization group study of the non-Abelian Higgs model in two dimensions [Phys. Rev. D 99, 114507 (2019)] [[arXiv:1901.11443](#)]
12. Lattice quantum gravity with scalar fields [PoS LATTICE2018 (2019) 043] [[arXiv:1810.09946](#)]

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13. The properties of D1-branes from lattice super Yang–Mills theory using gauge/gravity duality [PoS LATTICE2018 (2019) 308] [[arXiv:1809.00797](#)]
  14. Removal of the trace mode in lattice  $\mathcal{N} = 4$  super Yang–Mills theory [Phys. Rev. D 98, 095017 (2018)] [[arXiv:1808.04735](#)]
  15. Nonperturbative study of dynamical SUSY breaking in  $\mathcal{N} = (2, 2)$  Yang–Mills [Phys. Rev. D 97, 054504 (2018)] [[arXiv:1801.00012](#)]
  16. Truncation of lattice  $\mathcal{N} = 4$  super Yang–Mills [EPJ Web of Conferences 175, 11008 (2018)]
  17. Testing the holographic principle using lattice simulations [EPJ Web of Conferences 175, 08004 (2018)] [[arXiv:1710.06398](#)]
  18. Testing holography using lattice super–Yang–Mills on a 2-torus [Phys. Rev. D 97, 086020 (2018)] [[arXiv:1709.07025](#)]

## Talks & Posters

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### Invited Talks/Seminars/School Lectures [16]

- › Introduction to tensor networks and spin systems (January 11, 2022) at Azim Premji University, Bengaluru, India
- › Tensor networks and spin models (December 7, 2021) at Indian Institute of Science Education and Research (IISER) Mohali, India [[Slides\(PDF\)](#)]
- › Real-space tensor renormalization for spin models in three dimensions (November 19, 2021) at Perimeter Institute, Canada
- › Solving matrix models at large and finite  $N$  (June 28 and 29, 2021) - Two lectures for Summer School 2021 at Rensselaer Polytechnic Institute, USA [Online] [[Lecture 1 & 2](#)]
- › Holographic gauge theories on the lattice at (June 23, 2021) [Online] at Dublin Institute for Advanced Studies, Dublin [[Slides\(PDF\)](#)] [[Video \(YouTube\)](#)]
- › Old and new methods for new and old problems in Physics (March 8, 2021) [Online] at Indian Institute of Technology (IIT) Madras [[Slides\(PDF\)](#)]
- › Probing holographic dualities with lattice supersymmetric Yang–Mills theories (February 25, 2021) [Online] at Massachusetts Institute of Technology [[Slides\(PDF\)](#)] [[Video \(YouTube\)](#)]
- › New tool for old problems - Tensor network approach to spin models and gauge theories (October 14, 2020) [Online] at University of Liverpool, UK [[Slides\(PDF\)](#)]
- › Tensor Networks : Algorithm & Applications (June 10 and 11, 2020) - Two lectures for CyberTraining Summer School 2020 at Rensselaer Polytechnic Institute, USA [Online due to COVID-19 pandemic] [[Lecture 1 & 2](#)]
- › Numerical Approaches to Holography (August 28, 2019) at Ashoka University, Haryana, Sonapat, India [[Slides\(PDF\)](#)]
- › Numerical Approaches to Holography (August 8, 2019) at Indian Institute of Science Education and Research (IISER) Mohali, India
- › Holographic dualities and tensor renormalization group study of gauge theories (March 11, 2019) at Perimeter Institute, Waterloo, Canada [[Video \(PIRSA\)](#)]
- › Supersymmetry breaking and gauge/gravity duality on the lattice (April 6, 2018) at UC Boulder, Colorado, USA [[Slides\(PDF\)](#)]
- › Recent results from lattice supersymmetry in  $2 \leq d < 4$  dimensions (January 31, 2018) at ICTS, Bangalore, India [[Video \(YouTube\)](#)]

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- › Testing holography through lattice simulations (April 4, 2017) at Yukawa Institute for Theoretical Physics, Kyoto, Japan [PDF]
  - › Supersymmetry on the lattice (April 17, 2016) at April Meeting 2016 - Salt Lake City, Utah, USA [Slides(PDF)]

### Contributed Talks [2]

- › Testing holographic principle through lattice studies (June 22, 2017) at Lattice 2017, Granada, Spain
- › Lattice quantum gravity with scalar fields (July 23, 2018) at Lattice 2018, East Lansing, Michigan, USA

### Poster [1]

- › The properties of D1-branes from lattice super Yang–Mills theory using gauge/gravity duality at Lattice 2018 (36<sup>th</sup> Annual International Symposium on Lattice Field Theory) 24 July 2018

## Teaching Experience

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- › Recitation Instructor for PHY 216 (General Physics II for Honors and Majors) and Grader for PHY 662 (Quantum Mechanics II) Spring 2019
  - › Recitation Instructor for PHY 215 (General Physics I for Honors and Majors) and Grader for PHY 312 (Relativity & Cosmology) 2018
  - › Grader for PHY 424 (Electromagnetism) and PHY 360 (Waves and Oscillations) Fall 2016
  - › Recitation Instructor for PHY 212 General Physics II Spring 2016
  - › Grader for PHY 641 (Statistical Mechanics) and PHY 731 (Electromagnetic theory) 2015
  - › Recitation Instructor for PHY 211 General Physics I 2014
  - › Lab Instructor for PHY 101 General Physics Fall 2013

## Academic Achievements

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- › Henry Levinstein Fellowship for Outstanding Senior Graduate Student - Department of Physics, Syracuse University [USD 2000] 2017
  - › College of Arts and Sciences Fellowship for best performance in introductory Graduate Courses - Syracuse University [USD 1700] 2014
  - › CSIR/UGC-NET - Junior Research Fellowship (JRF) by Government of India 2013
  - › Erasmus Mundus Scholarship for pursuing M.S at UPMC, University of Paris VI [EUR 12000] 2010
  - › National Top 25 Students (out of 5153 students) in National Graduate Physics Examination (NGPE) 2009
  - › KVPY (Kishore Vaigyanik Protsahan Yojana) Scholarship by Department of Science & Technology, Government of India [about USD 3500 in two years] 2008
  - › Merit certificate by University of Delhi (11<sup>th</sup> in the university out of  $\approx 1200$  students) 2008
  - › NIUS (National Initiative on Undergraduate Sciences) Fellowship by Tata Institute of Fundamental Research (TIFR), Mumbai 2008

## Computer Skills

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- › Classical : C/C++, Python, Julia, Matlab, Mathematica, L<sup>A</sup>T<sub>E</sub>X, and Bash
  - › Quantum : QisKit (IBM), Cirq (Google)

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## Professional Services and Grants

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- › Quantum Fields and Strings Seminar Organizer at Perimeter Institute [January 2020 - March 2021].
- › Referee for Physical Review D and Physical Review Letters (since 2020), and Machine Learning : Science and Technology (an IOP Journal) (since 2021)
- › Awarded USQCD computing grants of  $\approx 12\text{M}$  core-hours on Fermilab pi0 machine each year in 2017 & 2018.

## Mentorship Experience

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- › Nikhil Kalyanapuram (PSI student at Perimeter Institute, now PhD candidate at Penn State) 2019-2020
- › Navdeep Dhindsa (PhD student at IISER Mohali) 2020-
- › Vamika Longia (PhD student at IISER Mohali) 2021-












## Work in progress

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- › Large N phase transitions in matrix models [Expected by end of January 2022]
- › Inelastic scattering in Ising Field Theory [Expected in Spring 2022]
- › Phase structure of BMN matrix model at finite couplings [Expected in Spring 2022]
- › Scalar bound states in  $\mathcal{N} = (2, 2)$  SYM at large N and finite temperatures [Expected in Summer 2022]
- › Parallel software for large N supersymmetric gauge theories [D. Schaich, RGJ, et al., Expected in 2022 or early 2023]

## References

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1. Simon Catterall - Professor of Physics, Syracuse University, NY, USA  
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2. Toby Wiseman - Professor of Theoretical Physics, Imperial College, London, UK  
 [t.wiseman@imperial.ac.uk](mailto:t.wiseman@imperial.ac.uk)  +442075947832
3. Pedro Vieira - Faculty at Perimeter Institute, Waterloo, Canada and ICTP-SAIFR, São Paulo, Brazil  
 [pedrovgvieira@gmail.com](mailto:pedrovgvieira@gmail.com)  +15195697600 (8611)
4. Joel Giedt - Associate Professor, Rensselaer Polytechnic Institute, Troy, NY, USA  
 [giedtj@rpi.edu](mailto:giedtj@rpi.edu)  +15182766455
5. David Schaich - Lecturer in Theoretical Particle Physics, University of Liverpool, Liverpool, UK  
 [david.schaich@liverpool.ac.uk](mailto:david.schaich@liverpool.ac.uk)  +447568168895
6. A. P. Balachandran - Emeritus Professor of Physics, Syracuse University, NY, USA  
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