



# Raghav Govind JHA

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 Date of Birth: January 23, 1989    Citizenship: Indian

## Employment

September 2019 - August 2022	Postdoctoral Fellow, Perimeter Institute for Theoretical Physics, Canada
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## Education

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

## Publications and preprints (Authors are mostly listed in alphabetical order)

Citations (as per iNSPIRE database): 156, h-index: 7

1. Non-perturbative phase structure of the bosonic BMN matrix model  
[arXiv:2201.08791](#) (to be published in JHEP)  
N. S. Dhindsa, R. G. Jha, A. Samlodia, A. Joseph, and D. Schaich
2. Thermal phase structure of dimensionally reduced super-Yang–Mills  
[arXiv:2201.03097](#)  
D. Schaich, R. G. Jha, A. Joseph
3. Tensor renormalization of three-dimensional Potts model  
[arXiv:2201.01789](#)  
R. G. Jha
4. Introduction to Monte Carlo for Matrix Models  
[arXiv:2111.02410](#), *SciPost Phys. Lect. Notes* 46 (2022)  
R. G. Jha
5. Large-N limit of two-dimensional Yang–Mills theory with four supercharges  
[arXiv:2109.01001](#)  
N. S. Dhindsa, R. G. Jha, A. Joseph, and D. Schaich
6. Tensor renormalization group study of the 3d  $O(2)$  model  
[arXiv:2105.08066](#), *Phys. Rev. D* 104, 094517 (2021)  
J. Bloch, R. G. Jha, R. Lohmayer, M. Meister

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7. Three-dimensional super-Yang–Mills theory on the lattice and dual black branes  
[arXiv:2010.00026](#), *Phys. Rev. D* **102**, 106009 (2020)  
S. Catterall, J. Giedt, R. G. Jha, D. Schaich, T. Wiseman
  8. Positive geometries for all scalar theories from twisted intersection theory  
[arXiv:2006.15359](#), *Phys. Rev. Research* **2**, 033119 (2020)  
R. G. Jha, N. Kalyanapuram
  9. Critical analysis of two-dimensional classical XY model  
[arXiv:2004.06314](#), *J. Stat. Mech.* (2020) 083203  
R. G. Jha
  10. Thermal phase structure of a supersymmetric matrix model  
[arXiv:2003.01298](#), *PoS LATTICE2019* (2020) 069  
D. Schaich, R. G. Jha, A. Joseph
  11. Finite N unitary matrix models  
[arXiv:2003.00341](#)  
R. G. Jha
  12. Tensor renormalization group study of the non-Abelian Higgs model in two dimensions  
[arXiv:1901.11443](#), *Phys. Rev. D* **99**, 114507 (2019)  
A. Bazavov, S. Catterall, R. G. Jha, J. U-Yockey
  13. Lattice quantum gravity with scalar fields  
[arXiv:1810.09946](#), *PoS LATTICE2018* (2019) 043  
R. G. Jha, J. Laiho, J. U-Yockey
  14. The properties of D1-branes from lattice super Yang–Mills theory using gauge/gravity duality  
[arXiv:1809.00797](#), *PoS LATTICE2018* (2019) 308  
R. G. Jha
  15. Removal of the trace mode in lattice  $\mathcal{N} = 4$  super Yang-Mills theory  
[arXiv:1808.04735](#), *Phys. Rev. D* **98**, 095017 (2018)  
S. Catterall, J. Giedt, R. G. Jha
  16. Nonperturbative study of dynamical SUSY breaking in  $\mathcal{N} = (2, 2)$  Yang-Mills  
[arXiv:1801.00012](#), *Phys. Rev. D* **97**, 054504 (2018)  
S. Catterall, R. G. Jha, A. Joseph
  17. Truncation of lattice  $\mathcal{N} = 4$  super Yang-Mills  
*EPJ Web of Conferences* **175**, 11008 (2018)  
S. Catterall, J. Giedt, R. G. Jha
  18. Testing the holographic principle using lattice simulations  
[arXiv:1710.06398](#), *EPJ Web of Conferences* **175**, 08004 (2018)  
R. G. Jha, S. Catterall, D. Schaich, T. Wiseman
  19. Testing holography using lattice super-Yang-Mills on a 2-torus  
[arXiv:1709.07025](#), *Phys. Rev. D* **97**, 086020 (2018)  
S. Catterall, R. G. Jha, D. Schaich, T. Wiseman

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## Talks and Posters

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### Invited Talks/Seminars/School Lectures [18]

- › Holography with large matrices on the lattice (March 24, 2022) at Institute of Nuclear Sciences, Universidad Nacional Autónoma de México, Mexico City, Mexico [[Slides\(PDF\)](#)]
- › Large N matrix models using Monte Carlo and Bootstrap (February 22, 2022) at University of Surrey, Surrey, UK [Online] [[Slides\(PDF\)](#)]
- › 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, Waterloo, 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, Ireland [[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, India [[Slides\(PDF\)](#)]
- › Probing holographic dualities with lattice supersymmetric Yang-Mills theories (February 25, 2021) [Online] at Massachusetts Institute of Technology, Boston, USA [[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, 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, 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 \(YouTube\)](#)]
- › Testing holography through lattice simulations (April 4, 2017) at Yukawa Institute for Theoretical Physics, Kyoto, Japan [[Slides\(PDF\)](#)]
- › Supersymmetry on the lattice (April 17, 2016) at April Meeting 2016 - Salt Lake City, Utah, USA [[Slides\(PDF\)](#)]

### Contributed Talks and Posters [3]

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

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## 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 Awards

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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) conducted by Indian Association of Physics Teachers (IAPT) 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,  $\LaTeX$ , and Bash
- › Quantum: QisKit (IBM), Cirq (Google)

## 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  $\approx$  12M 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-

## References

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1. Simon Catterall - Professor of Physics, Syracuse University, NY, USA  
✉ [smcatter@syr.edu](mailto:smcatter@syr.edu) ☎ +13154435978
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  
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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  
✉ [balachandran38@gmail.com](mailto:balachandran38@gmail.com)

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