Raghav Govind JHA

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Date of Birth: January 23, 1989 Citizenship: Indian

Employment

2022 -	Postdoctoral Researcher, Thomas Jefferson National Accelerator Facility (JLab), VA, USA
2019 - 2022	Postdoctoral Fellow, Perimeter Institute for Theoretical Physics, Canada

Education

2013 – 2019	**Ph.D. Physics,** *Syracuse University,* Syracuse, New York, USA Thesis: Holography, large N, and *supersymmetry* on the lattice defended on April 2, 2019
2011 – 2013	**M.Sc. Physics,** *St. Xavier's College & Bose Institute,* Kolkata, India
2010 – 2011	**M.S. in Nanomaterials,** *Sorbonne Université*, Paris, France [1]
2007 – 2010	**B.Sc. Physics (Honours),** *St. Stephen's College,* Delhi, India

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

Total citations [2] (as per iNSPIRE HEP): 177, h-index: 8

1. Non-perturbative phase structure of the bosonic BMN matrix model
   arXiv:2201.08791, JHEP 05 (2022) 169
   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 $3\mathrm{d}$ $\mathrm{O}(2)$ model
   arXiv:2105.08066, Phys. Rev. D 104, 094517 (2021)
   J. Bloch, R. G. Jha, R. Lohmayer, M. Meister
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

1. Before 2017, it was called UPMC Paris VI
2. For paper-wise citation, please refer to iNSPIRE

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 $\mathrm{D}1$-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

Talks and Posters

Invited Talks/Seminars/School Lectures [20]

› Introduction to Quantum Computation using QISKIT (June 22 and 23, 2022) - Two lectures for Summer School 2022 at Rensselaer Polytechnic Institute, USA [Online] [Lecture 1 & 2]

- New approach to continuous spin models in two and three dimensions (May 17, 2022) at Numerical Methods in Theoretical Physics conference, APCTP, Pohang, South Korea [Online] [Slides(PDF)]
- 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, Sonepat, 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 $2 \leqslant d < 4$ 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, 36th Annual International Symposium on Lattice Field Theory [Poster]

Teaching Experience

- 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

- 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^{th} 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

- Classical: C/C++, Python, Julia, Matlab, Mathematica, LaTeX, and Bash
- Quantum: QisKit (IBM), Cirq (Google)

Professional Services and Grants

- Quantum Fields and Strings Seminar Organizer at Perimeter Institute [January 2020 - March 2021].
- Referee for Physical Review D and Physical Review Letters (since 2020), European Physical Journal (EPJ) (since 2022), Machine Learning: Science and Technology (an IOP Journal) (since 2021)
- Awarded DiRAC computing grant in 2022 for $\approx$ 24M core-hours
- Awarded USQCD computing grants of $\approx$ 12M core-hours on Fermilab pi0 machine each year in 2017 & 2018.

Mentorship Experience

- Nikhil Kalyanapuram (Perimeter Scholar International (PSI) student at Perimeter Institute, now PhD candidate at Penn State) 2019-2020
- Navdeep Singh Dhindsa (PhD student at IISER Mohali) 2020-
- Abhishek Samlodia (BS-MS student at IISER Mohali, now PhD candidate at Syracuse University) 2021-

› Nikhil Bansal (BS-MS student at IISER Mohali) 2022-

Work in progress

› Scattering in Ising Field Theory using Matrix Product States (MPS) [Expected in 2022]
› Phase structure of BMN matrix model at finite couplings at large N [Expected in 2022]
› Scalar bound states in $\mathcal{N} = (2, 2)$ SYM at large N and finite temperatures [Expected in 2022]
› Parallel software for large N supersymmetric gauge theories [Expected in 2022 or Spring 2023]

References

1. Simon Catterall - Professor of Physics, Syracuse University, NY, USA
   smcatter@syr.edu +13154435978
2. Toby Wiseman - Professor of Theoretical Physics, Imperial College, London, UK
   t.wiseman@imperial.ac.uk +442075947832
3. Pedro Vieira - Faculty at Perimeter Institute, Waterloo, Canada and ICTP-SAIFR, São Paulo, Brazil
   pedrogvieira@gmail.com +15195697600 (8611)
4. Joel Giedt - Associate Professor, Rensselaer Polytechnic Institute, Troy, NY, USA
   giedtj@rpi.edu +15182766455
5. David Schaich - Lecturer in Theoretical Particle Physics, University of Liverpool, Liverpool, UK
   david.schaich@liverpool.ac.uk +447568168895
6. A. P. Balachandran - Emeritus Professor of Physics, Syracuse University, NY, USA
   balachandran38@gmail.com

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