Adhip Agarwala

CONTACT INFORMATION

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DATE OF BIRTH

23^{rd}October, 1989

RESEARCH INTERESTS

Theoretical Quantum Condensed Matter
(topological phases, strongly correlated systems, driven systems)

DESIGNATION

Assistant Professor (March, 2022 onwards)

EDUCATION AND EXPERIENCE

Postdoctoral Fellow (April, 2021 - March, 2022),
Max Planck Institute for the Physics of Complex Systems,
Dresden-01187, Germany

Max Planck Prize Postdoctoral Fellow (December, 2017 - March, 2021),
International Centre for Theoretical Sciences,
Tata Institute of Fundamental Research, Bangalore.

Postdoctoral Fellow (July, 2017 - November, 2017),
International Centre for Theoretical Sciences,
Tata Institute of Fundamental Research, Bangalore.

Ph.D. (2018)
Thesis title: *"Excursions in ill-condensed quantum matter."*
Department of Physics,
Indian Institute of Science, Bangalore.
(*Thesis submitted: June, 2017. Thesis defence: March, 2018. Degree received: June, 2018)*

Master of Science in Physics (2012)
Indian Institute of Technology Delhi (IITD), New Delhi, India
Cumulative Performance Index (CPI) : **9.47** on a scale of 10

B.Sc in Physics with Honours (2010)
Hindu College, University of Delhi, New Delhi, India
Aggregate Percentage : **88**/100.

ACADEMIC AWARDS AND ACHIEVEMENTS

PhD Thesis published as a monograph under **"Springer Thesis"**
as *Recognizing outstanding PhD research* (2019).

Jagat Ram Chopra Award for **Best Master's Project** in 2011-2012
among Master of Science in Physics/Chemistry/Mathematics in IIT Delhi.

CSIR Junior Research Fellowship 2012

TEACHING ASSISTANTSHIP

1. Introduction to Topological Insulators and Topological Superconductors ($Aug', 2017$)
   Lectured by Prof. S. L. Sondhi, Princeton University
   GIAN School, IIT Delhi-110016.

2. Advanced Statistical Physics(PH325) ($Aug'2013 - Dec'2013$)
   Lectured by Prof. Vijay B. Shenoy, Indian Institute of Science
   Indian Institute of Science, Bangalore-560012
3. Advanced Statistical Physics(PH325) ($Aug'2014 - Dec'2014$)
   Lectured by Prof. Vijay B. Shenoy, Indian Institute of Science
   Indian Institute of Science, Bangalore-560012
4. Advanced Condensed Matter Physics(PH320) ($Aug'2015 - Dec'2015$)
   Prof. Vijay B. Shenoy, Indian Institute of Science
   Indian Institute of Science, Bangalore-560012
5. Advanced Condensed Matter Physics(PH320) ($Aug'2016 - Dec'2016$)
   Prof. Vijay B. Shenoy, Indian Institute of Science
   Indian Institute of Science, Bangalore-560012

Courses Taught

Refresher Course on Statistical Mechanics for B.Sc teachers (December, 2019)
Talent Development Centre, IISc, Bangalore (India)

Academic Visits

Guest Scientist (1^{st} Oct-25^{th} Oct, 2017)
Max Planck Institute for the Physics of Complex Systems, Dresden (Germany)

Guest Scientist (16^{th} Oct-13^{th} Nov, 2018)
Max Planck Institute for the Physics of Complex Systems, Dresden (Germany)

Guest Scientist (23^{rd} Aug, 2019 - 8^{th} November, 2019)
Max Planck Institute for the Physics of Complex Systems, Dresden (Germany)

Publications

1. Ayan Banerjee, Suraj S. Hegde, Adhip Agarwala, Awadhesh Narayan
   Chiral metals and entrapped insulators in a one-dimensional topological non-Hermitian system arXiv 2111.02223
2. Arup Kumar Paul, Ayan Ghosh, Souvik Chakraborty, Ujjal Roy, Ranit Dutta, K. Watanabe, T. Taniguchi, Animesh Panda, Adhip Agarwala, Subroto Mukerjee, Sumilan Banerjee, Anindya Das
   Interaction driven giant thermopower in magic-angle twisted bilayer graphene
   Nat. Phys. (2022)
3. Animesh Nanda, Adhip Agarwala, and Subhro Bhattacharjee
   Phases and Quantum Phase Transitions in Anisotropic Antiferromagnetic Kitaev-Heisenberg-Γ magnet Phys. Rev. B **104**, 195115 (2021)
4. Saikat Santra, Adhip Agarwala and Subhro Bhattacharjee
   Statistics tuned entanglement of the boundary modes in coupled Su-Schrieffer-Heeger chains
   Phys. Rev. B **103**, 195134 (2021)
5. Adhip Agarwala, Subhro Bhattacharjee, Johannes Knolle and Roderich Moessner
   Gapless state of interacting Majorana fermions in a strain-induced Landau level
   Phys. Rev. B **103**, 134427 (2021) (Editor's Suggestion)
6. Prateek Mukati, Adhip Agarwala, Subhro Bhattacharjee
   Topological and conventional phases of a three dimensional electron glass
   Phys. Rev. B **101**, 035142 (2020)
7. Adhip Agarwala, Vladimir Juricic, Bitan Roy
   Higher Order Topological Insulators in Amorphous Solids
   Phys. Rev. Research **2**, 012067 (2020) (Rapid Communication)

8. Adhip Agarwala, Gaurav Kr. Gupta, Vijay B. Shenoy and Subhro Bhattacharjee
Statistics-tuned phases of pseudofermions in one dimension
Phys. Rev. B **99**, 165125 (2019)

9. Adhip Agarwala, Shriya Pai and Vijay B. Shenoy
Fractalized Metals
arXiv 1803.01404 (2018)

10. Adhip Agarwala and Diptiman Sen
Effects of local periodic driving on transport and generation of bound states
Phys. Rev. B **96**, 104309 (2017)

11. Adhip Agarwala and Vijay B. Shenoy
Topological Insulators in Amorphous Systems
Phys. Rev. Lett. **118**, 236402 (2017) (Editor's Suggestion) (Featured in Physics)

12. Amogh Kinikar, T. Phanindra Sai, Semonti Bhattacharya, Adhip Agarwala, Tathagata Biswas, Sanjoy Sarker, H. R. Krishnamurthy, Manish Jain, Vijay B. Shenoy, and Arindam Ghosh
Quantized edge modes in atomic-scale graphitic point contacts
Nature Nanotechnology **12**, 564–568 (2017)

13. Adhip Agarwala
Killing the Hofstadter butterfly, one bond at a time
Eur. Phys. J. B **90**, 15 (2017)

14. Adhip Agarwala and Diptiman Sen
Effects of interactions on periodically driven dynamically localized systems
Phys. Rev. B **95**, 014305 (2017)

15. Adhip Agarwala, Arijit Haldar, and Vijay B. Shenoy
The tenfold way redux: Fermionic systems with N-body interactions
Annals of Physics **385**, 469 (2017)

16. Adhip Agarwala and Vijay B. Shenoy
Quantum impurities develop fractional local moments in spin-orbit coupled systems
Phys. Rev. B **93**, 241111 (2016) (Rapid Communication)

17. Adhip Agarwala, Utso Bhattacharya, Amit Dutta, and Diptiman Sen
Effects of periodic kicking on dispersion and wave packet dynamics in graphene
Phys. Rev. B **93**, 174301 (2016)

18. Fock space exploration by angle resolved transmission through quantum diffraction grating of cold atoms in an optical lattice
Adhip Agarwala, Madhurima Nath, Jasleen Lugani, K Thyagarajan and Sankalpa Ghosh
Phys. Rev. A **85**, 063606 (2012)

Pedagogical article

1. Exploring ideas in topological quantum phenomena: A journey through the SSH model
Anantha Hegde, Adarsh Kumar, Adhip Agarwala, Bhaskaran Muralidharan
https://arxiv.org/abs/2108.01460

Professional activities

Referee for Phys. Rev. Lett.; Phys. Rev. A,B,X; Nano Letters; *Science*

Co-organizer
first ICTS-Inhouse Symposium (2019), (23^{rd} April, 2019)
ICTS, Bangalore, India

Co-organizer
Novel Phases of Quantum Matter (2020), (23^{rd} December, 2019 - 2^{nd} January, 2020)
ICTS, Bangalore, India

Selected Talks, posters

(**Theoretical Physics Seminar)** " Exploring novel phases of quantum matter: Role of topology, entanglement and interactions", 7^{th} October (2021),
Saha Institute for Nuclear Physics, Kolkata (India)

(**Sabarmati Talk)** "Topological phases in electron glass, and other stories", 21^{st} July (2021), Indian Institute of Technology, Gandhinagar (India)

(Webinar) "Gapless state of interacting Majorana fermions in a strain-induced Landau level", 27^{th} January (2021), waiting for Highly Frustrated Magnetism 2021, MPIPKS, Dresden (Germany)

(Webinar) "Topological phases in electron glasses" 5^{th} November (2020)

Department of Physics, Pennsylvania State University (USA)

(Webinar) "Exploring novel phases of quantum condensed matter" 16^{th} September (2020)

Indian Institute of Science Education and Research, Pune, India

(Webinar) "Gapless state of interacting Majorana fermions in a strain-induced Landau level", 8^{th} September (2020), 3^{rd} Annual conference on quantum condensed matter,
SNBCBS, Kolkata (India)

(Talks) "Topological phases in electron glasses"

21^{st} August, (2019) Indian Institute of Technology Delhi (India)
20^{th} August, (2019) Ashoka University, Sonepat (India)
19^{th} August, (2019) Jawaharlal Nehru University, New Delhi (India)
16^{th} August, (2019) Indian Institute of Science Education and Research, Mohali (India)
10^{th}-14^{th} June, (2019) Discussion Meeting: Edge dynamics in topological phases, ICTS, Bangalore (India)

(Poster) " 'Fractional Quantum Hall effect' of a fractionalized liquid" 8^{th}-10^{th} July, (2019)
2^{nd} Annual conference on quantum condensed matter, IISc, Bangalore (India)

(Talk) "A Kitaev liquid, under strain" 23^{rd} April, (2019) ICTS-Inhouse, Bangalore (India)

(Two Lectures) on "Toy models and topological phases", 29^{th} March and 5^{th} April (2019), TQFT Series, ICTS, Bangalore (India)

(Talk) 'Fermions, Bosons and anything in between'; National Conference On Quantum Condensed Matter @ IISER Mohali, India 25th-27th July (2018)

(Poster) 'Fermions, Bosons and anything in between'; Topological phases in condensed matter and cold atom systems, 1st-13th October (2018) Cargese, (France).

(Poster) 'Fractional local moments in spin-orbit coupled systems'; School and Conference on Quantum Disordered Systems, Institute of Mathematical Sciences, Chennai, India(2016)

Selected Schools and conferences

"Focus Meeting on thermal transport and microscopic descriptions of alpha-RuCl3" 23^{rd}-24^{th} November (2021) MPIPKS, Dresden (Germany).

"Gapless Fermions - from Fermi liquids to strange metalss" $17^{th} - 28^{th}$ February (2020) MPIPKS, Dresden (Germany).

"Conference on Signatures of Topology in Condensed Matter" $21^{st} - 25^{th}$ October (2019) ICTP, Trieste (Italy).

"New Developments in Topological Condensed Matter" $2^{nd} - 13^{th}$ September (2019) Les Houches (France).

10^{th}-14^{th} June, (2019) Discussion Meeting: Edge dynamics in topological phases, ICTS, Bangalore (India)

"The 2nd Asia Pacific Workshop on Quantum Magnetism" 29^{th}Nov-7^{th}Dec(2018), Bangalore (India)

International conference "Correlated Magnetism: From Frustration To Topology" 31st October - 2nd November (2018), Dresden (Germany)

Global Young Scientists Summit in Singapore, 22nd-26th January (2018)

International Workshop on Emergent Phenomena in Quantum Hall Systems
Tata Institute of Fundamental Research, Mumbai, India (2016)

Quantum Entanglement in Macroscopic Matter
ICTS and Department of Physics, IISc, Bangalore, India (2015)

School on Topological Quantum Matter
Harish-Chandra Research Institute, Allahabad, India (2015)

POSITIONS OF RESPONSIBILITY

co-founded **STHAYI(2018)**,
A forum for policy, science and society.
ICTS, Bangalore.

PRESIDENT (2009-10)
STUDENT COORDINATOR(2008-09)
VOLUNTEER(2007-08)
National Service Scheme (NSS),
Hindu College, Delhi University

CO-CONVENER
Quantum Condensed Matter Journal Club,
Department of Physics,
Indian Institute of Science, Bangalore-560012

GROUP LEADER (2010)
100 Member Youth Delegation to China
Ministry of Youth Affairs and Sports, Government of India

MAGAZINE MANAGER (2008)
CO-EDITOR (2007)
'QUARKS'- Annual Physics Magazine,
Department of Physics, Hindu College, Delhi University

REFEREES

- **Prof. Roderich Moessner**
  Max Planck Institute for the Physics of Complex Systems, Dresden-01187
  Phone(s): +(49) 351 871-1103
  Email: moessner@pks.mpg.de

- **Prof. Subhro Bhattacharjee**
  International Centre for Theoretical Sciences, Bangalore-560089
  Phone(s): +(91)-80-6730-6250
  Email: subhro@icts.res.in

- **Prof. Vijay B. Shenoy**
  Department of Physics, IISc, Bangalore-560012
  Phone(s): +(91)-80-2293-2888
  Email: shenoy@iisc.ac.in

- **Prof. Diptiman Sen**
  Centre for High Energy Physics, IISc, Bangalore-560012
  Phone(s): +(91)-80-2293-2974
  Email: diptiman@iisc.ac.in

- **Prof. H. R. Krishnamurthy**
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  Email: hrkrish@physics.iisc.ernet.in

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  Email: smukerjee@physics.iisc.ernet.in