Curriculum-Vitae

Satyaki Kar

July 14, 2022

Contacts:

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Designation:

Assistant Professor and HoD at Department of Physics, Aghorekamini Prakashchandra Mahavidyalaya, Bengai, West Bengal. (Since Dec. 2019).

Previous Research Experience:

- Post-Doctoral Fellow at Institute of Physics, Orissa, India. (Sept. '18 - March '19).
- Academic visitor at Saha Institute of Nuclear Physics. (June - August 2018).
- Scientific pool officer (CSIR-SRA) at IACS, Kolkata. (June 2015-June 2018).
- Research Associate at Saha Institute of Nuclear Physics. (Feb.2013 – June 2015).
- Research Associate at S.N. Bose National Centre for Basic Sciences. (May 2012 – Jan. 2013).

Previous Teaching Experience:

- Assistant Professor at Adamas University, Barasat, West Bengal. (April-Dec 2019).

- Visiting Assistant Professor at Department of Physics, University of North Florida. (Aug. 2010 – May 2012).

Education:

- **Doctor of Philosophy (Ph.D)** in Physics, Florida State University, Tallahassee, Florida, USA. (2004 -10)
  Subject Area: Condensed Matter Theory, Adviser: Dr. Efstratios Manousakis.
  Thesis Title: Role of phonons, doping and domain-walls in hole propagation in 2D quantum antiferromagnets.
- **Master of Science (M.S.)** in Physics, Florida State University, Tallahassee, Florida, USA. (2003-04)
- **Master of Science (M.Sc.)** in Physics, Jawaharlal Nehru University, New Delhi, India. (2000-02)
- **Bachelor of Science (Physics Honors, B.Sc.)** from Presidency College, Kolkata, India. (1997-00)

Awards and Fellowships:

- Junior Research Fellowship from CSIR, India in 2001.
- Lalchand Mookerjee Scholarship from Calcutta University, India in 2003.
- Graduate Teaching Assistance ship from Florida State University, USA during various semesters between 2003-2010.
- Graduate Research Assistance ship from Florida State University and MARTECH, USA during various semesters between 2003-2010.

Conferences and Schools:

- **American Physical Society (APS) March meeting 2007** at Denver, CO. Talk-title: Hole Dynamics in a 2D Striped-Ordered Quantum Antiferromagnet.
- **APS March meeting 2008** at New Orleans, LA Talk-title: Role of phonons and of finite temperature on the spectral function of a single hole in a quantum antiferromagnet.
- **APS March meeting 2009** at Pittsburg, PA. Talk-title: Role of phonons and of finite temperature on the spectral function of a single hole in a 2D quantum antiferromagnet. Poster-title: Single Hole Dynamics in a 2D quantum antiferromagnet in a stripe- ordered fluctuating background.
- **APS March meeting 2010** at Portland, OR. Talk-title: Finite hole-doping of the t-J and related model within the non-crossing approximation.
- **APS March meeting 2011** at Dallas, TX. Talk-title: Hole dynamics in a 2D doped quantum antiferromagnet within the non-crossing approximation.
- **APS March meeting 2012** at Boston, MA. Talk-title: Spin waves of 2D J1-J2 model and single hole dynamics via nearest neighbor hole hopping.
- **ICTP-JNU workshop** (at Delhi, India) on "Current trends in frustrated magnetism" in February, 2015. Presented a poster there (on the paper no. V, as shown below).
- **IOP workshop** (at Bhubaneshwar, India) on "Current trends in Condensed Matter Physics" in March, 2016.
- **COND-MAT Conference 2016** at PRL Ahmedabad, India. Poster-title: Checkerboard supersolidity in 2D Bose-Holstein model.
- **Discussion meeting on Non-Eqm. Quantum Many Body Physics** at HRI, Ahmedabad, India. (21-25 Nov., 2016)
- **Young Investigator Meet On Quantum Condensed Matter Theory** at SNBNCBS, Kolkata, India. (26-27 Oct., 2017)
  Talk-title: Andreev tunneling and Josephson current in light irradiated graphene.
- **School and conference on Driven Quantum Systems** at IACS, Kolkata, India. (12-21 Feb., 2018)
  Talk-title: Andreev tunneling and Josephson current in light irradiated graphene.

- **Conference on "Frontiers of Statistical Physics"** at ISI, Kolkata, India. (26-28 Feb., 2018)
  Talk-title: Entanglement in a Heisenberg spin system on a honeycomb lattice in presence of Dzyaloshinskii-Moriya interations.
- **12th India-Singapore Joint Condensed Matter Physics Symposium** at Puri, Odisha, India. (2-4 March, 2019)
  Poster-title: Entanglement in a Heisenberg spin system on a honeycomb lattice in presence of Dzyaloshinskii-Moriya interations.
- **National Conference for Modern Physics 2020** at Adamas University, Kolkata, India. (6-7 Feb., 2020)
  Talk-title: Mixed-order transition and tricritical point associated with checkerboard supersolidity in the two-dimensional $t_2 - V_1$ model.
- **QMAT - III online Conference 2020** organized by S.N.Bose National Centre for Basic Sciences, Kolkata, India. (7-11 Sept., 2020)
  Talk-title: Quantum Oscillation and Landau-Zener transition in Nodal line semimetals under a time-periodic magnetic field.
- **National Seminar: Young Scientists' Meet 2021** organized by Adamas University, Kolkata, India. (30-31 July, 2021)
  Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **Departmental Seminar 2021** organized by School of Basic Sciences, IIT Mandi, India. (8 Nov., 2021)
  Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **Departmental Seminar 2022** organized by Department of Physics, IIT Madras, India. (13 June, 2022)
  Talk-title: Quantum Oscillation in Nodal line semimetals.

Book/Chapter Published:

1. "Hole Dynamics in a 2D Quantum Antiferromagnet : Effects of Temperature, Phonons, Doping and Stripes - A Self Consistent Born Approximation Treatment" by **Satyaki Kar**, Lambert Academic Publishing - Germany. ISBN: 978-3-8465-9710-1 Published: December 1st, 2011. [This is in response to publisher's request of thesis publishing].
2. Chapter from Indian Adaption of the "Quantum Mechanics - Concepts and Applications" by N. Zettli, Wiley Publication. (To be published by December, 2021).

Publication in Journals:

I. Finite-temperature spectral function of a hole in a quantum antiferromagnet and the role of phonons **[Phys. Rev. B 78, 064508 (2008)] Satyaki Kar**,

Efstratios Manousakis.

II. Hole spectral functions in lightly doped quantum antiferromagnets. [**Phys. Rev. B 84, 205107 (2011)**] **Satyaki Kar**, Efstratios Manousakis.

III. Tuning of magnetic ground state of the spin $\frac{1}{2}$ square lattice compound Zn2VO(PO4)2 through chemical substitution . [**Phys. Rev. B 87, 054431 (2013)**] Sudipta Kanungo, **Satyaki Kar** , T. Saha-Dasgupta.

IV. Quasi-2D J1-J2 antiferromagnet Zn2VO(PO4)2 and its Ti substituted derivative – A spin-wave analysis. [**Physica B 432, 71 (2014)**] **Satyaki Kar** , T. Saha-Dasgupta.

V. Magnon dispersions and single hole motion in 2D frustrated antiferromagnets with four-sublattice structures. [**JMMM 393, 357 (2015)**] **Satyaki Kar**.

VI. Checkerboard supersolidity in 2D Bose-Holstein model. [**Annals of Physics 375, 322 (2016)**] **Satyaki Kar**, Sudhakar Yarlagadda.

VII. Spin gap tuning of quasi-1D spin 1 antiferromagnet $SrNi_2V_2O_8$ by bi-axial straining. [**Phys.Rev.B 93, 224404 (2016)**] Kartik Samanta, **Satyaki Kar**, Tanusri Saha Dasgupta.

VIII. Tuning towards dynamic freezing using a two-rate protocol. [**Phys.Rev.B 94, 075130 (2016)**] **Satyaki Kar**, Bhaskar Mukherjee, Krishnendu Sengupta.

IX. Two-rate periodic protocol for driving through many cycles. [**Phys.Rev.B 95, 085141 (2017)**] **Satyaki Kar**.

X. Magnons in a two dimensional transverse field XXZ model. [**Phys.Rev.B 96, 045126 (2017)**] **Satyaki Kar**, Keola Wierschem, Pinaki Sengupta.

XI. Andreev tunneling and Josephson current in light irradiated graphene. [**Cur. Ap. Phys. 18, 1087 (2018)**] Debabrata Sinha,**Satyaki Kar**.

XII. Study of supersolidity in the two-dimensional Hubbard-Holstein model. [**Eur. J. Phys. B 91: 205 (2018)**] A. Ghosh, **S. Kar**, S.Yarlagadda.

XIII. Interplay of Alternation and Further Neighbor Interaction in 1-d S=1/2 spin chain: A case study with Cs2CuAl4O8. [**Phys.Rev.B 98, 144412 (2018)**] B. Rahman, **S. Kar**, A. Vasilev, T. Saha-Dasgupta.

XIV. Photo-induced Entanglement in a Magnonic Floquet Topological Insulator. [**Phys.Rev.B 98, 245119 (2018)**] **Satyaki Kar**, Banasri Basu.

XV. Mixed-order transition and tricritical point associated with checkerboard supersolidity in a two dimensional $t_2 - V$ model. [**Phys.Rev.B 101, 035147 (2020)**] A. Ghosh, **S. Kar**, S.Yarlagadda.

XVI. Dominant Factors Determining Differences of COVID-19 Fatalities Between India and Other Large-Population Regions. [**Science and Culture, Vol. 86, No.5-6, 164 (2020)**] S. Yarlagadda, **S. Kar**.

XVII. Weyl Semimetals: Down the Discovery of Topological Phases. [**Asian Jour. Res. and Rev. in Phys. 4(1) 34-45 (2021)**] **S. Kar**, A. M. Jayannavar.

XVIII. Quantum Oscillation and Landau-Zener transition in untilted Nodal line semimetals under a time-periodic magnetic field. **[J. Phys. Cond.-Mat. 33, 225601 (2021)] S. Kar**.

XIX. Dynamic spin fluctuations in the frustrated spin chain compound $Li_3Cu_2SbO_6$. **[Phys.Rev.B 103, 174423 (2021)]** A. Bhattacharyya, T.K. Bhowmik, D.T. Adroja, B.Rahaman, **S. Kar**, T.Saha-Dasgupta, P.K. Biswas, T.P.Sinha, R.A. Ewings, D.D.Khalyavin, A.M.Strydom.

XX. Fermi Level Fluctuations, Reduced Effective Masses and Zeeman Effect during Quantum Oscillations in Nodal Line Semimetals. **[J. Phys. Cond.-Mat. 34, 035601 (2022)] S. Kar**, A. Saha.

XXI. Chiral anomaly induced magnetoconductances in an irradiated Type-I Weyl Semimetal. **[arXiv:2206.03731 (2022)]** R. Sen, **S. Kar.** (under review).

Research Grants

Recipient of Start Up Research Grant (SRG/2019/002143), sponsored by SERB, India, for two years' tenure from 2020 to 2022.

Reviewer of journals

I. Physical Review Letter, II. Physical Review B, III. Jour. Phys. - Cond. Mat., IV. Jour. Mag. Mag. Mat., V. Jour. App. Phys., VI. Jour. Phys. D.

Reviewer for research proposals

Refereed a SONATA BIS research proposal submitted to National Science Center, Poland in 2019.

Event Management

I. **Convener of National Webinar** on **"Specialized Topics in Physics"**, organized by Physics Department, AKPC Mahavidyalaya on 27th July, 2020.
II. **Convener of International Webinar** on **"Rendezvous with Quantum Physics"**, organized by Physics Department, AKPC Mahavidyalaya on 12-13 June, 2021.
III. **Convener of International Seminar** on **"Tools in Sciences"**, organized by Physics Department, AKPC Mahavidyalaya on 25th July, 2022.

List of Referees/Collaborators

Banasri Basu (Research collaborator)
Professor of Physics, ISI Kolkata, India Email: sribbasu@gmail.com Phone: 91 33 2575 3037

Tanusri Saha-Dasgupta (Research collaborator)
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Sudhakar Yarlagadda (Research collaborator)
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