

Curriculum-Vitae

Dr. Satyaki Kar

May 18, 2024



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PRESENT DESIGNATION:

Assistant Professor at Aghorekamini Prakashchandra Mahavidyalaya, Bengai, West Bengal, India (Since Dec. 2019).

EDUCATION:

- **Doctor of Philosophy (Ph.D)** in Physics from **Florida State University**, Tallahassee, Florida, USA (2004 -10) under Ph.D. **Supervisor: 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.
- Senior Research Associate or Scientists' Pool Officer from CSIR, India between 2015-2018.

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).

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 Bhubaneswar, 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 interactions.
- **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 interactions.
- **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.
- **QMAT - 2023** organized by NISER, Bhubaneswar, India. (27-30 Nov., 2023)
Talk-title: Edge state behavior in a Su-Schrieffer-Heeger like model with periodically modulated hopping.
- **ICTP Conference (2023) at Trieste, Italy** on “Conference on Fractionalization and Emergent Gauge Fields in Quantum Matter” on 4-8 Dec., 2023.
Poster-title: Edge state behavior in a Su-Schrieffer-Heeger like model with periodically modulated hopping.
- **National Conference for Modern Physics 2024** at Adamas University, Kolkata, India. (23-24 Feb., 2024)
Talk-title: Edge state behavior in a Su-Schrieffer-Heeger like model with periodically modulated hopping.

ACADEMIC VISITS & SEMINARS

- **IIT Mandi, November 2021** Seminar given at School of Basic Sciences on 08.11.2021.
Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **IOP Bhubaneswar, March 2022** Seminar given on 11.03.2022.
Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **IIT Madras, June 2022** Seminar given in Department of Physics on 13.06.2022.
Talk-title: Quantum Oscillation in Topological Nodal line semimetals.

- **PRL, Ahmedabad, August 2022** Seminar given on 30.08.2022.
Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **IIT Bombay, September 2022** Seminar given in Department of Physics on 06.09.2022.
Talk-title: Quantum Oscillation in Topological Nodal line semimetals.
- **NIT Sikkim, June 2023** Seminar given in Department of Physics on 07.06.2023.
Talk-title: Quantum Oscillation in Topological 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. Zettili, Wiley Publication. ISBN: 9789354640773, Published 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 $Zn_2VO(PO_4)_2$ through chemical substitution . [**Phys. Rev. B 87, 054431 (2013)**] Sudipta Kanungo, **Satyaki Kar** , T. Saha-Dasgupta.

IV. Quasi-2D J1-J2 antiferromagnet $Zn_2VO(PO_4)_2$ 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. Jayanavar.
- 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. [**J. Phys. Cond.-Mat.** **34**, **465601** (2022)] R. Sen, **S. Kar**.
- XXII.** Edge state behavior in a Su-Schrieffer-Heeger like model with periodically modulated hopping. [**J. Phys. Cond.-Mat.** **36**, **065301** (2024)] **S. Kar**.
- XXIII.** Topological solitons in a Su-Schrieffer-Heeger chain with periodic hop-

ping modulation, domain wall, and disorder. [[Phys. Rev. B 109, 195124 \(2024\)](#)] [S. Mandal](#), [S. Kar](#).

RESEARCH GRANTS

- Recipient of Start Up Research Grant (SRG/2019/002143), sponsored by SERB, India, for two years' tenure from 2020 to 2022.
Amount~ INR 16 lakhs.
- Recipient of Core Research Grant (CRG/2022/002781), sponsored by SERB, India, for three years' tenure from 2022 to 2025.
Amount~ INR 23 Lakhs.

PRESENT DOCTORAL RESEARCH SCHOLARS

1. Mr. Surajit Mandal,
2. Mr. Bhaskar Pandit.

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 June, 2022.

LIST OF REFEREES/COLLABORATORS

Tanusri Saha-Dasgupta (Research collaborator)
Professor of Physics, IACS, Kolkata, India Email: mcstsd@iacs.res.in Phone: 91 33 2473 4971 (ext. 2184)

Krishnendu Sengupta (Research Collaborator)
Professor of Physics IACS, Kolkata, India. Email: tpks@iacs.res.in Phone: 91

33 2473 4971 (ext. 1192)

Banasri Basu (Research collaborator)

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33 2575 3037

Pinaki Sengupta (Research Collaborator)

Associate Professor, School of Physical & Mathematical Sciences, NTU, Singa-
pore Email: PSENGUPTA@NTU.EDU.SG Phone: 65 65921801

Sudhakar Yarlagadda (Research collaborator)

Retired Professor of Physics, SINP, Kolkata, India Email: y.sudhakar@saha.ac.in
Phone: 91 33 2337 0379 (ext. 2469)

Efstratios Manousakis (Ph.D. Supervisor)

Professor of Physics Florida State University, FL, USA Email: manousakis@gmail.com
Phone: 1 850 644 3713

Chapters in Books

Topic	Details of Publication
“Relativistic Quantum Mechanics”	Indian Adaption of the “Quantum Mechanics - Concepts and Applications” by N. Zettili, Wiley Publication. ISBN: 9789354640773, Published December 2021)

Published Books

Sl. No.	Title of the Book	Publisher	ISBN	Year	Level
1.	Hole Dynamics in a 2D Quantum Antiferromagnet : Effects of Temperature, Phonons, Doping and Stripes - A Self Consistent Born Approximation Treatment	Lambert Academic Publishing - Germany.	978-3-8465-9710-1	2011	International

Papers in Journals

Sl. No.	Title with page No.	Journal	ISSN	Whether peer reviewed. Impact Factor, if any	No. of co-author	Whether you are the main author
1.	Mixed-order transition and tricritical point associated with checkerboard supersolidity in a two dimensional $t_2 - V$ model. Phys.Rev.B 101, 035147 (2020)	Physical Review B https://doi.org/10.1103/PhysRevB.101.035147	2469-9969	PEER REVIEWED	2	No
2.	Dominant Factors Determining Differences of COVID-19 Fatalities Be-	<i>Science and Culture</i> https://www.cgcri.res.in/wp-content/uploa	0036-8156	PEER REVIEWED	1	No

	tween India and Other Large-Population Regions. <i>Vol. 86, No.5-6, 164 (2020)</i>	ds/2020/science_culture/May-June%20cover%202020.pdf				
3.	Weyl Semimetals: Down the Discovery of Topological Phases Asian Jour. Res. and Rev. in Phys. 4(1) 34-45 (2021)	Asian Journal of Research and Reviews in Physics https://doi.org/10.9734/ajrp/2021/v4i130136	2582-5992	PEER REVIEWED	1	Yes
4.	Quantum Oscillation and Landau-Zener transition in untilted Nodal line semimetals under a time-periodic magnetic field. <i>J. Phys. Cond. - Mat. 33, 225601 (2021)</i>	Journals of Physics: Condensed Matter https://iopscience.iop.org/article/10.1088/1361-648X/abe8a2	1361-648X	PEER REVIEWED	Nil	Yes
5.	Dynamic spin fluctuations in the frustrated spin chain compound Li ₃ Cu ₂ SbO ₆ . <i>Phys.Rev.B 103, 174423 (2021)</i>	Physical Review B https://doi.org/10.1103/PhysRevB.103.174423	2469-9969	PEER REVIEWED	10	No
6	Fermi Level Fluctuations, Reduced Effective Masses and Zeeman Effect during Quantum Oscillations in Nodal Line Semimetals. J. Phys. Cond.-Mat. 34, 035601 (2022)	Journals of Physics: Condensed Matter https://iopscience.iop.org/article/10.1088/1361-648X/ac2c40	1361-648X	PEER REVIEWED	1	Yes
7	Chiral anomaly induced magnetoconductances in an irradiated Type-I Weyl Semimetal. J. Phys. Cond.-Mat. 34, 465601 (2022)	Journals of Physics: Condensed Matter https://iopscience.iop.org/article/10.1088/1361-648X/ac2c40	1361-648X	PEER REVIEWED	1	Yes

		61-648X/ac916f				
8	Edge state behavior in a Su-Schrieffer-Heeger like model with periodically modulated hopping. J. Phys. Cond.-Mat. 36, 065301 (2024)	Journals of Physics: Condensed Matter https://iopscience.iop.org/article/10.1088/1361-648X/ad0766	1361-648X	PEER REVIEWED	Nil	Yes
9	Topological solitons in a Su-Schrieffer-Heeger chain with periodic hopping modulation, domain wall, and disorder. Phys. Rev. B 109, 195124 (2024)	Physical Review B https://doi.org/10.1103/PhysRevB.109.195124	2469-9969	PEER REVIEWED	1	Yes