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ATINDRA NATH PAL

AT PRESENT

ASSISTANT PROFESSOR
DEPARTMENT OF PHYSICS
IIT KHARAGPUR
Since Jan 2017

WORK EXPERIENCE

POST DOCTORAL RESEARCH (FACULTY DEAN FELLOWSHIP) WEIZMANN INSTITUTE OF SCIENCE, ISRAEL.

August 2015-Jan 2017

Specialization: Molecular electronics, nanomagnetism, shot noise measurements in atomic chains.

Group leader: Dr. Oren Tal.

POST DOCTORAL RESEARCH IN THE NANOPHYSICS GROUP, ETH ZURICH, SWITZERLAND.

July 2012-June 2015

Specialization: Studying electronic transport in p-type hole gas, InAs 2DEG and InAs/GaSb broken gap quantum well, a possible candidate for 2D topological insulator.

Group leader: Prof. Klaus Ensslin.

PHD IN EXPERIMENTAL CONDENSED MATTER PHYSICS, INDIAN INSTITUTE OF SCIENCES, BANGALORE, INDIA.

August, 2006-January, 2012

Thesis title: "Physics of conductivity noise in graphene"

Supervisor: Prof. Arindam Ghosh.

Thesis referees: 1. Dr. David Horsell, University of Exeter, UK.

2. Dr. Kantimay Das Gupta, IIT Bombay, India.

EDUCATION

MSc in Physics (2004 – 2006)

Department of Physics, Indian Institute of Technology, Kanpur (IIT-K)

CGPA: 8.1 / 10

Master thesis with Prof. Y. N. Mohapatra, IIT Kanpur.

Bachelors (B.Sc) in Physics (2001 – 2004)

Ramakrishna Mission Vidyamandira, Belur Math, West Bengal, University of Calcutta

(First Class with Rank 16; Aggregate 69.5%)

Higher Secondary Examination (2001)

West Bengal Board of Higher Secondary Education (Aggregate: 81%)

Secondary Exam (class 10) (1999)

West Bengal Board of Secondary Education (Aggregate: 85%).

RESEARCH INTEREST

1. Transport in 2d topological insulator: InAs/GaSb
2. Molecular electronics and nanoscale magnetism
3. Transport in p-type hole gas based on GaAs/AlGaAs heterostructure
4. Low frequency noise and Shot noise measurements.
5. Transport in 2d materials: graphene, TMDC (MoS₂, WSe₂ etc.,)

TECHNICAL SKILLS

1. Transport Measurements in 2D systems, cryogenic measurement techniques, including operation of He-3 based systems (300 mK) and dilution refrigerators (10mK).
2. Molecular electronics, Mechanical break junction techniques to form atomic junctions.
3. Shot noise measurements.
4. Conductance Fluctuations Measurements: Measurement of 1/f noise in mesoscopic systems.
5. Extensive experience of fabrication of nanoscale devices: graphene, MOS₂, GaAs-hole gas, InAs 2DEG, InAs/GaSb systems.
6. Designing and wiring of low temperature cryostats (4K dipstick) and He3-system (Janis).
7. Designing ultra-low noise voltage amplifier.
8. Expertise in Atomic force microscopy.

TEACHING EXPERIENCE

1. Teaching assistant in ETH:
Course: Semiconductor Nanostructure by Prof. Thomas Ihn
2. Assistant in the advance physics lab (for Master students):
Experiment: Shot noise to determine electronic charge

PUBLICATIONS

1. Resistance noise in electrically biased bilayer graphene, **Atindra Nath Pal** and Arindam Ghosh, Physical Review Letters 102, 126805 (2009).
2. Ultra-low noise field-effect transistor from multilayer grapheme, **Atindra Nath**

- Pal** and Arindam Ghosh, Applied Physics Letters 95, 082105 (2009).
3. Large low-frequency resistance noise in chemical vapor deposited graphene, **Atindra Nath Pal**, Ageeth A. Bol and Arindam Ghosh, Applied Physics Letters 97, 133504 (2010).
 4. Microscopic Mechanism of $1/f$ Noise in Graphene: Role of Energy Band Dispersion, **Atindra Nath Pal**, Subhamoy Ghatak, Vidya Kochat, Sneha E. S., Arjun B.S., Srinivasan Raghavan, and Arindam Ghosh, ACS Nano 5, 2075 - 2081 (2011).
 5. High contrast imaging and thickness determination of graphene with in-column secondary electron microscopy, Vidya Kochat, **Atindra Nath Pal**, Subhamoy Ghatak, Sneha E. S., Arjun B. S., Anshita Gairola, S. A. Shivashankar, Srinivasan Raghavan and Arindam Ghosh, Journal of Applied Physics 110, 014315 (2011).
 6. The nature of electronic states in atomically thin MoS₂ field effect transistors, Subhamoy Ghatak, **Atindra Nath Pal** and Arindam Ghosh, ACS Nano 5, 7707 - 7712 (2011).
 7. Direct Observation of Valley Hybridization and Universal Symmetry of Graphene with Mesoscopic Conductance Fluctuations, **Atindra Nath Pal**, Vidya Kochat, and Arindam Ghosh, Physical Review Letters 109, 196601(2012).
 8. Suppression of bulk conductivity in InAs/GaSb broken gap composite quantum wells, Christophe Charpentier, Stefan Fält, Christian Reichl, Fabrizio Nichele, **Atindra Nath Pal**, Patrick Pietsch, Thomas Ihn, Klaus Ensslin, Werner Wegscheider, Applied Physics Letters 103, 112102 (2013).
 9. Insulating State and Giant Nonlocal Response in an InAs/GaSb Quantum Well in the Quantum Hall Regime, Fabrizio Nichele, **Atindra Nath Pal**, Patrick Pietsch, Thomas Ihn, Klaus Ensslin, Christophe Charpentier, and Werner Wegscheider, Physical Review Letters 112, 036802 (2014).
 10. Spin-orbit splitting and effective masses in p-type GaAs two-dimensional hole gases, Fabrizio Nichele, **Atindra Nath Pal**, Roland Winkler, Christian Gerl, Werner Wegscheider, Thomas Ihn, and Klaus Ensslin, Phys. Rev. B 89, 081306(R) (2014).
 11. Origin of flicker noise in graphene produced for large scale applications, Vidya Kochat, Anindita Sahoo, **Atindra Nath Pal**, Sneha E. S., Gopalakrishnan Ramalingam, Arjun B. S., Ryugu Tero, Tran Viet Thu, Yuji Tanizawa, Hiroshi Okada, Adarsh Sandhu, Srinivasan Raghavan, and Arindam Ghosh, IET Circuits, Devices & Systems 9 (1), 52-58 (2014).
 12. Fermi-Edge Transmission Resonance in Graphene Driven by a Single Coulomb Impurity, Paritosh Karnatak, Srijit Goswami, Vidya Kochat, **Atindra Nath Pal**, and Arindam Ghosh, Physical Review Letters 113, 026601 (2014).
 13. Influence of etching processes on electronic transport in mesoscopic InAs/GaSb quantum well devices. **Atindra Nath Pal**, Susanne Mueller, Thomas Ihn, Klaus Ensslin, Thomas Tschirky, Christophe Charpentier, Werner Wegscheider, AIP Advances 5, 077106 (2015), arXiv:1502.06697.
 14. Non-local transport via edge-states in InAs/GaSb coupled quantum wells. Susanne Mueller, **Atindra Nath Pal**, Matija Karalic, Thomas Tschirky, Christophe Charpentier, Werner Wegscheider, Klaus Ensslin, Thomas Ihn, Phys. Rev. B (R) 92, 081303 (2015), arXiv:1504.07032.
 15. Spin-orbit interaction in InAs/GaSb quantum well, Susanne Müller, **Atindra**

Nath Pal, Thomas Ihn, Klaus Ensslin, Thomas Tschirky, Christophe Charpentier, and Werner Wegscheider, (in preparation).

AWARDS AND ACHIEVEMENTS

1. MCM scholarship, IIT Kanpur (2004).
 2. Junior Research Fellowship (JRF), awarded by the Council for Scientific and Industrial Research (CSIR), Government of India (2006).
 3. Senior Research Fellowship (SRF), awarded by the Council for Scientific and Industrial Research (CSIR), Government of India (2008).
 4. Working experience in the Cavendish laboratory, Cambridge, U.K. in 2007.
 5. Best poster award in the Condensed Matter Workshop (CMPW 2009), at Indian Institute of Technology, Kanpur.
 6. **“Young Physicist Award-2011”** from Indian Physical Society (2011).
 7. **“Prof. Anil Kumar medal for best experimental thesis in physics in 2011” from IISc, Bangalore.**
 8. Faculty Dean Post-doctoral fellowship from Weizmann Institute of science, 2015.
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CONFERENCES ATTENDED

1. K. S. Krishnan Memorial Meeting on graphene, IMSc, Chennai (2006).
 2. Bangalore Nano Conference, Bangalore, India (2007).
 3. K. S. Krishnan Memorial Meeting on graphene, IMSc, Chennai (2008).
 4. Indian Condensed Matter Workshop (ICMW08) (International Centre for Theoretical Sciences), Mahabaleshwar, (2008).
 5. International Conference on Noise and Fluctuations, Pisa, Italy (2009).
 6. Centenary conference, IISc, Bangalore (2009).
 7. Indo-Japan Conference on Graphene, JNCASR, Bangalore (2009).
 8. Condensed Matter Workshop (CMPW) at Indian Institute of Technology, Kanpur, (2009).
 9. ICTS Condensed Matter Programme (ICMW09) (International Centre for Theoretical Sciences), Mahabaleshwar, (2009).
 10. ICONSAT 2010, Mumbai.
 11. International Conference on Quantum Effects in Solids of Today (I-ConQuEST) at National Physical Laboratory, Delhi, (2010).
 12. American Physical Society-March Meeting, Dallas, United States (2011).
 13. ICPS, ETH Zurich, Switzerland (2012).
 14. American Physical Society-March Meeting, Denver, United States (2014).
 15. International Conference on Physics of Semiconductors (ICPS)-2014, Austin, Texas.
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TALKS

1. International Conference on Noise and Fluctuations, Pisa, Italy (2009).
 2. American Physical Society-March Meeting, Dallas, United States (2011).
 3. QSIT meeting-2014, Arosa, Switzerland.
 4. American Physical Society-March Meeting, Denver, United States (2014).
 5. International Conference on Physics of Semiconductors (ICPS)-2014, Austin, Texas.
 6. Physics seminar at the Physics department, CALTECH-2014.
 7. Physics Seminar at the Physics Department, SUNY Buffalo-2014.
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POSTER PRESENTATIONS

1. Bangalore Nano Conference, Bangalore, India (2007).
 2. International Conference on Smart Materials, Structures and Systems, Bangalore, India (2008).
 3. Condensed Matter Workshop (CMPW 2009) at Indian Institute of Technology, Kanpur (2009).
 4. International Conference on Quantum Effects in Solids of Today (I-ConQuEST 2010) at NPL, Delhi, (2010).
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PERSONAL

Date of Birth: November 10, 1983

PROFILE

Nationality: Indian

Sex: Male

Marital Status: Married.

Permanent Address: Vill - Bajitpur, P.O. Laxminathpur Dist-Murshidabad, West Bengal
742303, India.
