

Sagar Bhandari

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McKay 207, 9 Oxford Street, Harvard University, Cambridge, MA

CURRENT POSITION

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
Postdoctoral Fellow 2015- Present

EDUCATION

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
• Ph.D. in Applied Physics May 2015
 ◦ Dissertation Title “Imaging Electron Flow in Graphene”
• M.Sc. in Applied Physics May 2012

Trinity College Hartford, CT
• B.Sc., Physics 2009
• B.Sc., Electrical Engineering 2009
• Graduated valedictorian of the class

RESEARCH EXPERIENCE

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
Postdoctoral Fellow, Advisor: Prof. Robert M. Westervelt 2015- Present
Imaging electron flow in 2D materials using a liquid He cooled scanning probe microscope
• Imaged Andreev reflection in graphene device with superconducting contacts
• Imaged electron flow through collimating contacts in graphene device
• Imaged quantum dot formation in MoS₂ nanostructures
• Imaged electron flow in hBN-MoS₂-hBN device

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
Graduate Student, Advisor: Prof. Robert M. Westervelt 2009- 2015
Imaging electron flow in 2D materials using a liquid He cooled scanning probe microscope
• Imaged cyclotron orbits of electrons in graphene.
• Designed and implemented low temperature coarse positioning system in home built scanning probe.

Low temperature scanning capacitance probe

- Designed and implemented low temperature scanning capacitance probe.

Direct imaging of atomic scale ripples in a suspended graphene using a high-resolution transmission electron microscope (TEM)

- Fabricated suspended graphene samples on Silicon Nitride substrates and assisted in taking TEM images/ analyzing the data obtained on the ripples in graphene.

Trinity College, Department of Engineering Hartford, CT
Research Assistant with Prof. David Ahlgren 2005- 2009

- Designed and implemented communication algorithms in swarm robots for participation in Trinity College Fire Fighting Robot Contest.
- Designed and implemented a rat eyelid movement sensor for use at Mass Eye/Ear Infirmary in Dr. Tessa A. Hadlock's lab.
- Designed and built several firefighting autonomous robots for the competition.
- Mentored students and assisted in designing and building robots.

Research Assistant with Prof. Taikang Ning 2005- 2009

- Developed MATLAB code to analyze rat's ECG data.
- Designed microprocessor systems on FPGA devices.

Trinity College, Department of Physics Hartford, CT
Research Assistant with Prof. David Branning 2005- 2009

- Designed and implemented low-cost coincidence-counting electronics for quantum optics experiments.

Research Assistant with Prof. Christoph Geiss 2005- 2009

- Used Labview to upgrade the software for magnetic measurements on geological samples.

TEACHING EXPERIENCE

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
Teaching Assistant

Applied Physics 195 "Introduction of Solid State Physics" 2011

- Assisted in lectures and grading.
- Prepared and presented sections throughout the semester and two class lectures.

Trinity College Hartford, CT
Teaching Assistant 2007-2009

1. Engineering 120 "Introduction to Engineering Design: Mobile Robots"
2. Engineering 221 "Digital Circuits and Systems"
3. Engineering 307 "Semiconductor Electronics I"
4. Engineering 308 "Semiconductor Electronics II"
5. Engineering 323 "Microprocessor Systems"

- Assisted in lab, lectures and grading.
- Prepared and presented sections throughout the semester.
- Received Theodore R. Blakeslee II teaching fellow award.

MENTORING EXPERIENCE

Harvard University, School of Engineering and Applied Sciences Cambridge, MA
Research Mentor for Undergraduate students

- Andrew Lin, Project: Quantum point contacts in graphene MD/PhD Student at University of Pennsylvania now. 2013-2017

- Mary Keenan, Project: Imaging electrons in ballistic graphene devices 2016-2017
PhD Student in Physics at Harvard University now.
- Jeffrey Iuliano, Project: Fabricating hBN encapsulated graphene devices 2012-2013
PhD Student in Physics at Johns Hopkins University now.
- Kyle DiCamillo, Project: Fabrication and characterization of graphene 2012-2013
PhD Student in Physics at Georgetown University now.
- San Thiengi, Project: Fabrication and characterization of graphene 2011
PhD Student at Colorado School of Mines now.
- Bilan Yang, Project: Automating graphene fabrication 2015
Masters student in Mechanical Engineering department at Stanford University now.
- Rabeb Layouni, Project: Scanning capacitance microscopy tip fabrication 2015
Completed BS. in Chemical Engineering from UMass, Amherst.
- Alejandra Marin, Project: Simulating capacitance microscopy in MATLAB 2015
Pursuing BS. in Electrical Engineering at UMass, Lowell.
- Rylan Spencer, Project: Simulations for tip sample capacitance 2017
Undergraduate student at Dartmouth college.
- Alexander Kelser, Project: Imaging hydrodynamic flow of electrons in graphene 2017
Pursuing BS. in Physics at Harvard University.

CONFERENCE TALKS

Contributed Talk, S. Bhandari, G.-H. Lee, K. Watanabe, T. Taniguchi, P. Kim and R. M. Westervelt, “Imaging electron flow in atomically thin materials”, Hybrid Quantum Systems (HQS), Miyagi Zao, Japan, Sep 10 - Sep 13, 2017.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Watanabe, T. Taniguchi, P. Kim and R. M. Westervelt, “Imaging Andreev reflection under a magnetic field in graphene”, Low Temperature Physics Conference 28 (LT 28), Gothenburg, Sweden, Aug 8 - Aug 17, 2017.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Watanabe, T. Taniguchi, P. Kim and R. M. Westervelt, “Imaging electron flow through collimating contacts in graphene”, Mesoscopic Transport and Quantum Coherence (QTC), Espoo, Finland, Aug 5-Aug 8, 2017.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Watanabe, T. Taniguchi, P. Kim and R. M. Westervelt, “Imaging collimation of electron flow in graphene”, International Conference on Electronic Properties of Two-Dimensional Systems (EP2DS-22), Penn State, PA, July 31-Aug 4, 2017.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Wang, K. Watanabe, T. Taniguchi, P. Kim and R.M. Westervelt, "Imaging Electron Motion in 2D Materials," 20th International Conference on Electron Dynamics in Semiconductors (EDISON20), Buffalo, NY, July 16-21, 2017.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Wang, K. Watanabe, T. Taniguchi, P. Kim and R.M. Westervelt, "Imaging Electron Motion in Atomic Layer Systems," Quantum Materials and Devices Seminar, Harvard University, Sept.15, 2016.

Contributed Talk, S. Bhandari, G.-H. Lee, K. Watanabe, T. Taniguchi, P. Kim and R.M. Westervelt, "Imaging Electron Flow through Graphene in a Magnetic Field," Int. Conf. on Nanoscience and Technology (ICN+T 2016), Busan, Korea, Aug. 21-26, 2016.

Invited Talk, S. Bhandari, K. Wang, K. Watanabe, T. Taniguchi, P. Kim and R.M. Westervelt, "Imaging Electron Flow in a Few Layer MoS₂ Devices," Int. Conf. Physics of Semiconductors (ICPS 2016), Beijing, China, July 31 to Aug 5, 2016.

Contributed Talk, S. Bhandari, GH. Lee, P. Kim and R.M. Westervelt, "Analysis of Scanned Probe Images for Magnetic Focusing in Graphene," Int. Conf. on Superlattices, Nanostructures and Nanodevices (ICSNN 2016), in Hong Kong, China, July 25-30, 2016.

Contributed Talk, S. Bhandari, GH. Lee, P. Kim and R.M. Westervelt, "Imaging Magnetic Focusing of Electrons in Graphene," Int. Conf. Graphene 2016, Genova, Italy, April 19-22, 2016.

Contributed Talk, S. Bhandari, GH. Lee, P. Kim and R.M. Westervelt, "Imaging Magnetic Focusing of Electrons in Graphene," Int. Conf. on Electronic Properties of Two-Dimensional Systems (EP2DS), 2015, Sendai, Japan, July 26-31, 2015.

Contributed Talk, S. Bhandari, R. M. Westervelt, "Low Temperature Scanning Capacitance Probe for Imaging Electron Motion", Low Temperature Physics Conference, Buenos Aires, Argentina, August 6-13, 2014.

PUBLICATIONS

1. **Sagar Bhandari**, Gil-Ho Lee, Kenji Watanabe, Takashi Taniguchi, Philip Kim, Robert M. Westervelt, *Imaging Andreev Reflection in Graphene*, 2018 (in preparation)

2. **Sagar Bhandari**, Mary Keenan, Gil-Ho Lee, Kenji Watanabe, Takashi Taniguchi, Philip Kim, Robert M. Westervelt, *Imaging Hole Motion in Graphene*, 2018 (in preparation)

3. **Sagar Bhandari**, Gil-Ho Lee, Kenji Watanabe, Takashi Taniguchi, Philip Kim, Robert M. Westervelt, *Imaging Electron Flow from Collimating Contacts in Graphene*, 2D Materials, 5(2), 2018

4. **Sagar Bhandari**, Ke Wang, Kenji Watanabe, Takashi Taniguchi, Phillip Kim, Robert M. Westervelt, *Imaging Quantum Dot Formation in MoS₂ Nanostructures* (Submitted to Nanotech, IOP), 2018

5. **Sagar Bhandari**, Ke Wang, Kenji Watanabe, Takashi Taniguchi, Phillip Kim, Robert M. Westervelt, *Imaging Electron Motion in Few Layer MoS₂ Device*, Journal of Physics: Conference Series, 864(1), 012031, 2017

6. **Sagar Bhandari**, Andrew Lin, Robert M. Westervelt, *Investigating the Transition Region of Scanned Probe Images of the Cyclotron Orbit in Graphene*, Journal of Nanoelectronics and

Optoelectronics, 12(9), 952-955, 2017

7. **Sagar Bhandari**, Gil-Ho Lee, Philip Kim, Robert M. Westervelt, *Analysis of Scanned Probe Images for Magnetic Focusing in Graphene*, Journal of Electronic Materials, 46(7), 3837-3841, 2017

8. **Sagar Bhandari**, Robert Westervelt, *Imaging Electron Motion in Graphene*, Semiconductor Science and Technology, Vol. 32, No. 2, Special Issue on Hybrid Quantum Materials and Devices, 2017

9. **Sagar Bhandari**, Gil-Ho Lee, Anna Klales, Kenji Watanabe, Takashi Taniguchi, Eric Heller, Phillip Kim, Robert Westervelt, *Imaging Cyclotron Orbits of Electrons in Graphene*, Nano Letters, 2016, 16(3), pp 1690-1694

10. Estelle Kalfon-Cohen, **Sagar Bhandari**, Robert M. Westervelt, and David C. Bell. *Electronic Properties of TEM-Sculpted Structure in Graphene*, Microscopy and Microanalysis 19, no. S2, 1940-1941 (2013).

11. **Sagar Bhandari**, Robert M. Westervelt. *Low Temperature Scanning Capacitance Probe for Imaging Electron Motion*, 2014, J. Phys.: Conf. Ser. 568.

12. Weili Wang, **Sagar Bhandari**, Wei Yi, Efthimios M. Kaxiras, Robert M. Westervelt. *Direct Imaging of Atomic Scale Ripples in Graphene*. 2012. Nano Lett. 12 (5).

13. David Branning, **S. Bhandari**, Mark Beck. *Low-Cost coincidence-counting electronics for undergraduate quantum optics*, AJP 77(7): 667-670, 2009.

14. **Sagar Bhandari**, Prashanna Gautam, David J. Ahlgren. *Implementation of RF communication with TDMA algorithm in swarm robots*, TEPR 2008

REFERENCES

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