Sagar Bhandari

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

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
Graduate Student / Post-doctoral Fellow with Dr. Robert M. Westervelt, 2009-2016

Imaging electron flow in 2D materials using a scanning probe technique

- Imaged magnetic focusing of electrons in hBN-graphene-hBN heterostructures.
- Imaged electron flow in hBN-MoS_2-hBN device
- Imaged quantum dot formation in MoS_2 nanostructures
- 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 graphene using 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 Dr. 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 Dr. 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 Dr. David Branning, 2005-2009

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

Research Assistant with Dr. Christoph Geiss, 2005-2009

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

SKILLS and TECHNIQUES

- Low temperature / low noise electronic measurements
- Low temperature scanned probe measurements
- Layered materials on hexagonal boron nitride fabrication
- E-beam lithography, photo lithography
- Scanning electron microscopy (SEM)
- MATLAB, Labview, COMSOL, Maxwell

TEACHING and WRITING 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 Theodre R. Blakeslee II teaching fellow award.

TALKS

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.

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, 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, "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.

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, 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.

Contributed Talk, S. Bhandari, G.-H. Lee, Ke 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.

PUBLICATIONS

Sagar Bhandari, Ke Wang, Kenji Watanabe, Takashi Taniguchi, Phillip Kim, Robert M. Westervelt, "Imaging Electron Flow and Quantum Dot Formation in MoS_2 Nanostructures " arXiv:1701.07532 [cond-mat.mes-hall], 2017.

Sagar Bhandari, Ke Wang, Kenji Watanabe, Takashi Taniguchi, Phillip Kim, Robert M. Westervelt, "Imaging Electron Motion in Few Layer MoS_2 Device " Journal of Physics: Conference Series, in press, 2017

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, in press, 2017.

Sagar Bhandari, Gil-Ho Lee, Philip Kim, Robert M. Westervelt, "Analysis of Scanned Probe Images for Magnetic Focusing in Graphene " Journal of Electronic Materials, DOI: 10.1007/s11664-017-5350-y, 2017.

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

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.

E. 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).

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

W. Wang, **S. Bhandari**, W. Yi, E. M. Kaxiras, R. M. Westervelt. *Direct Imaging of Atomic Scale Ripples in Graphene.* 2012. Nano Lett. 12 (5).

D. Branning, **S. Bhandari**, M. Beck. *Low-Cost coincidence-counting electronics for*

undergraduate quantum optics, AJP 77(7): 667-670, 2009.

S. Bhandari, P. Gautam, D.J. Ahlgren. *Implementation of RF communication with TDMA algorithm in swarm robots*, TEPRA 2008