Curriculum Vitae

Avinash Rustagi

Postdoctoral Research Associate
School of Electrical and Computer Engineering
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Professional Employment

- July 2018 - Present: Postdoctoral Research Associate, School of Electrical and Computer Engineering, Purdue University.
- Sep 2016 - July 2018: Postdoctoral Research Scholar, Department of Physics, North Carolina State University.
- May 2016 - Aug 2016: OPS Research Assistant, Department of Physics, University of Florida.

Education

- Ph.D. in Physics, University of Florida (2016).
- M.Sc. in Physics, Indian Institute of Technology, Kanpur, India (2010).
- B.Sc. in Physics, St. Stephens College, Delhi, India (2008).

Research Interests

- Quantum information processing with magnons, Quantum sensing of novel phases.
- Spintronics, van der Waal Magnonics.
- Many body theory: Correlations in electron-hole systems, Ultrafast carrier and lattice dynamics, Non-equilibrium Bethe-Salpeter equation.
- Electronic structure calculations: Density Functional Theory.
- Optical and Transport Properties: Magneto-optics, Semiclassical Transport, Terahertz generation, Coherent Phonons.

Honors and Awards

- Notable poster-College of Science, NC State Postdoctoral Research Symposium (2018).
- College of Liberal Arts and Sciences (CLAS) Dissertation Fellowship funded by Threadgill Scholarship Program, Univ. of Florida (2016).
- 5^{th} International Symposium on Terahertz Nanoscience Student Award, Martinique (2014).
- Certificate of Outstanding Achievement for Academic Excellence, Univ. of Florida (2010-2014).
- Center for Condensed Matter Sciences Summer Fellowship, Univ. of Florida (2011).
- General Proficiency Medal for Academic Excellence, Indian Institute of Technology, Kanpur (2008-2010).

- Academic Excellence Award, Indian Institute of Technology, Kanpur (2009-2010).
- University Gold Medal for First Rank in B.Sc. Physics, St. Stephens College, Delhi (2008).
- The Sumitomo Corporation-St. Stephens College Scholarship (2005-2008).
- Ramesh Goel Memorial and Tushar Nagia prizes for best student, St. Stephens College, Delhi (2006-2007).

Computational Skills

- Quantum computing programming - Qiskit.
- Micromagnetic simulations - mumax and OOMMF.
- Programming in C++ (Parallel programming using MPI and OpenMP), Python, MATLAB, FORTRAN, Mathematica, and Shell Script.
- Density Functional Theory - Quantum Espresso for electronic structure calculations.

Publications

Published

22. A. B. Solanki, S. Bogdanov, **A. Rustagi**, N. R. Dilley, T. Shen, M. M. Rahman, W. Tong, P. Debashish, Z.Chen, J. Appenzellar, Y. P. Chen, V. M. Shalaev, and P. Upadhyaya - *Electric field control of interaction between magnons and quantum defect spins* **arXiv 2012.01497 (2020)**.
21. **Avinash Rustagi**, Iacopo Bertelli, Toeno van der Sar, and Pramey Upadhayaya - *Sensing chiral magnetic noise via quantum impurity relaxometry* **[Phys. Rev. B 102, 220403 (Rapid Communications) (2020)**.
20. R. L. Wilmington, H. Ardekani, **A. Rustagi**, A. Bataller, A. F. Kemper, R. A. Younts, and K. Gundogdu - *Fermi liquid theory sheds light on "Hot" EHL in 1L-MoS_2* **[arXiv 2010.09609 (2020)] [In production Phys. Rev. B]**.
19. J. Huang, Z. Wang, H. Pang, H. Wu, H. Cao, S. Mo, **A. Rustagi**, A. F. Kemper, R. J. Birgeneau, M. Wang, and M. Yi - *Flatband-Induced Itinerant Ferromagnetism in $RbCo_2Se_2$* **[Under review (2020)]**
18. Alexander F. Kemper and **Avinash Rustagi** - *Observing coherences with time-resolved photoemission* **[arXiv 2005.08978 (2020)]**.
17. **Avinash Rustagi**, Abhishek Solanki, Yaroslav Tserkovnyak, and Pramey Upadhyaya - *Coupled spin-charge dynamics in magnetic van der Waals heterostructures* **[Phys. Rev. B 102, 094421 (2020)]**.
16. Terry Y.T. Hung, **A. Rustagi**, S. Zhang, P. Upadhyaya, and Z. Chen - *Experimental observation of coupled valley and spin Hall effect in p-doped WSe_2 devices* **[InfoMat. 2020; 1-7 (2020)]**.
15. Y. Jiang, Z. Lu, J. Gigliotti, **A. Rustagi**, L. Chen, C. Berger, W. A. de Heer, C. J. Stanton, D. Smirnov, and Z. Jiang - *Valley and Zeeman Splittings in Multilayer Epitaxial Graphene Revealed by Circular Polarization Resolved Magneto-infrared Spectroscopy* **[Nano Letters 2019, 19, 10, 7043-7049]**.

14. J. Kaiser, **A. Rustagi**, K. Y. Camsari, J. Z. Sun, S. Datta, and P. Upadhyaya - *Subnanosecond Fluctuations in Low-Barrier Magnets* **[Phys. Rev. Applied 12, 054056 (2019)]**.
13. **Avinash Rustagi**, and Alexander F. Kemper - *Coherent Excitonic Quantum Beats in Time-Resolved Photoemission Measurements* **[Phys. Rev. B 99, 125303 (2019)]**.
12. A. W. Bataller, R. Younts, **A. Rustagi**, Y. Yu, H. Ardekani, A. F. Kemper, L. Cao, and K. Gundogdu - *Dense Electron-Hole Plasma Formation and Ultra-Long Charge Lifetime in Monolayer MoS_2 via Material Tuning* **[Nano Letters 2019, 19, 1104-1111]**.
11. O. Abdurazakov, D. Nevola, **A. Rustagi**, J. K. Freericks, D. B. Dougherty, and A. F. Kemper - *Non-equilibrium Electron Dynamics in Pump-Probe Spectroscopy: Role of excited phonon populations* **[Phys. Rev. B 98, 245110 (2018)]**.
10. **Avinash Rustagi**, and Alexander F. Kemper - *Photoemission signature of excitons* **[Phys. Rev. B 97, 235310 (2018)]**.
9. **Avinash Rustagi**, and Alexander F. Kemper - *Theoretical phase diagram for the room temperature Electron-Hole Liquid in photo-excited quasi-2D monolayer MoS_2* **[Nano Letters 2018 18 (1), 455-459]**.
8. Kunie Ishioka, **Avinash Rustagi**, Andreas Beyer, Wolfgang Stolz, Kerstin Volz, Ulrich Hoefer, Hrvoje Petek, and Christopher J. Stanton - *Sub-picosecond acoustic pulses generated at buried GaP/Si interfaces* **[Appl. Phys. Lett. 111, 062105(2017)]**.
7. Kevin L. Pollock, Hoang Q. Doan, **Avinash Rustagi**, Christopher J. Stanton, and Tanja Cuk - *Detecting the Photoexcited Carrier Distribution Across GaAs/Transition Metal Oxide Interfaces by Coherent Longitudinal Acoustic Phonons* **[J. Phys. Chem. Lett., 2017, 8, pp 922928]**.
6. Kunie Ishioka, **Avinash Rustagi**, Ulrich Hofer, Hrvoje Petek, Christopher J. Stanton - *Intrinsic coherent acoustic phonons in the indirect band gap semiconductors Si and GaP* **[Phys. Rev. B 95, 035205 (2017)]**.
5. **A. Rustagi** and C. J. Stanton - *Terahertz radiation from accelerating charge carriers in graphene under ultrafast photoexcitation* **[Phys. Rev. B 94, 195207 (2016)]**.
4. K. Ishioka, K. Brixius, A. Beyer, **A. Rustagi**, C. J. Stanton, W. Stolz, K. Volz, U. Hofer and H. Petek - *Coherent phonon spectroscopy characterization of electronic bands at buried semiconductor heterointerfaces* **[Appl. Phys. Lett. 108, 051607 (2016)]**.
3. K. Ishioka, K. Brixius, U. Höfer, **A. Rustagi** , E. Thatcher, C. J. Stanton and H. Petek - *Dynamically Coupled Plasmon-Phonon Modes in GaP; an Indirect-Gap, Polar Semiconductor* **[Phys. Rev. B 92, 205203 (2015)]**.
2. **A. Rustagi** and C. J. Stanton - *Hot-electron noise properties of graphene-like systems* **[Phys. Rev. B 90, 245424 (2014)]**.
1. L. G. Booshehri, C. H. Mielke, D. G. Rickel, S. A. Crooker, Q. Zhang, L. Ren, E. H. Hroz, **A. Rustagi**, C. J. Stanton, Z. Jin, Z. Sun, Z. Yan, J. M. Tour, and J. Kono - *Circular polarization dependent cyclotron resonance in large-area graphene in ultrahigh magnetic fields* **[Phys. Rev. B 85, 205407 (2012)]**.

In preparation

2. Mohammad Mushfiqur Rahman, **Avinash Rustagi**, Yaroslav Tserkovnyak, and Pramey Upadhyaya - *Electrical generation and tunable routing of domain wall spin waves in van der Waals antiferromagnets* **(2020)**.
1. **Avinash Rustagi**, Shivam Kajale, Yaroslav Tserkovnyak, and Pramey Upadhyaya - *Coherently driving quantum spins via electrically induced non-linear magnetization precessions: a pathway towards high Q-factors* **(2020)**.

Invited and Conference Talks

10. *Quantum-classical spin hybrids: leveraging spintronic tools for information processing applications*[Link], SPIE Nanoscience + Engineering (2020).
9. *Quantum-Classical Spin Hybrids - a new platform for developing quantum probes and hybrid quantum technologies*, Indiana University-Purdue University Indianapolis, IN (2020).
8. *Coherent Electrical Driving of Quantum Spins via Localized Magnons*, APS March Meeting, Boston, MA (2019).
7. *Room Temperature EHL in monolayer MoS_2*, APS March Meeting, Los Angeles, CA (2018).
6. *Photoemission signature of excitons*, 84^{th} annual meeting of SESAPS, Milledgeville, GA (2017).
5. *Non-Equilibrium exciton dynamics in model systems*, APS March Meeting, New Orleans, LA (2017).
4. *Coupled Plasmon Phonon Dynamics in GaP: an indirect gap polar semiconductor*, APS March Meeting, Baltimore, MD (2016).
3. *THz radiation from accelerating photo-excited carriers in graphene*, 5^{th} International Symposium on Terahertz Nanoscience, Martinique (2015).
2. *Terahertz radiation from accelerating carriers in graphene*, APS March Meeting, Denver, CO (2014).
1. *Noise properties of graphene like systems*, APS March Meeting, Baltimore, MD (2013).

Teaching Experience

- Teaching Assistant, PHY 2053 Lab, Dept. of Physics, Univ. of Florida (2010-2011).
- Occasional Lectures— ECE 606 at Purdue Univ. (Fall 2018) and PHY 3101 at Univ. of Florida (Fall 2013, Fall 2012).
- Substitute Teaching Assistant, PHY 2054, Dept. of Physics, Univ. of Florida (Fall 2015).

Professional Membership and Services

Member: American Physical Society
Peer Reviewer: Nature Communications, Physical Review Letters, Physical Review B, Applied Physics Letters, Optics Communications.