Junlan Lu

LinkedIn: https://www.linkedin.com/in/junlanlu/
Personal Website: https://www.junlanlu.com

Email : junlan.lu@duke.edu
Mobile : +1-609-375-7928

Education

- **Duke University, GPA 3.93** — Durham, NC
  Doctor of Philosophy in Medical Physics — *Aug. 2019 – May 2024*
- **Cornell University, GPA: 3.86; *Magna Cum Laude* with honors** — Ithaca, NY
  Bachelor of Science in Engineering Physics — *Aug. 2016 – May 2019*

Industry Experience

- **Google - Android Camera Machine Intelligence Team** — Mountain View, CA
  Research Intern, Student Researcher — *June 2022 - December 2022*
  - **Reference-based Super-resolution and HDR enhancement**: Developed deep learning based methods to enhance resolution and quality using pixel camera photos.
- **Kitware - Computer Vision Team** — Durham, NC
  Computer Vision Intern — *May 2021 - Aug. 2021*
  - **Super-resolution**: Used deep learning for developing a supervised cross-domain single-image super-resolution model of satellite images. Increased performance metrics of PSNR and SSIM significantly compared to current state-of-the-art methods

Research Experience

- **Duke Driehuys Lab - Medical Imaging with Hyperpolarized 129Xe MRI** — Durham, NC
  *Graduate Researcher in **Professor Bastiaan Driehuys**'s Group* — *Aug 2019 - Present*
  - **Deep learning for automated segmentation**: Implemented 3D U-NET to automatically segment thoracic cavity in 129Xe MRI images
  - **Deep learning for image super resolution**: Implemented Single-image super-resolution deep learning models to enhance 129Xe MRI image resolution
  - **RF Inhomogeneity Correction**: Investigated RF inhomogeneity correction technique using radial sampling acquisition techniques
- **Caltech Atwater Lab - 2D Materials and Optics** — Pasadena, CA
  *Caltech SURF Fellow in **Professor Harry Atwater**'s Group* — *June 2018 - Aug. 2018*
  - **Exfoliation and Identification of Monolayer Transition Metal Dichalcogenides(TMDC's)**: Mechanically exfoliated different TMDC's from bulk crystal to form novel heterostructures. Optically characterized heterostructures with photoluminescence and Raman scattering measurements.
  - **Band Alignment Determination of TMDC Heterostructures**: Utilized Kelvin Probe Force Microscopy(KPFM) to determine band alignment and time-resolved photoluminescence to study carrier dynamics. Developed presentation skills and presented research in final summer symposium.
- **Princeton Lyon Lab - Experimental Quantum Computing** — Princeton, NJ
  *MRSEC REU Student in **Professor Stephen Lyon**'s Group* — *June 2017 - Aug. 2017*
  - **Sputtering NbSi**: Developed procedure for sputtering NbSi to thermalize electron motion in cryogenic temperatures for quantum computing systems.
  - **Determination of Electrical Properties of NbSi at Low Temperatures**: Characterized surface composition and roughness with atomic force microscopy (AFM), scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDX), and x-ray photoelectron spectroscopy (XPS). Developed analytical skills in MATLAB and presented results in final summer REU poster symposium.
- **Cornell Shvets Lab - Bioplasmonics** — Ithaca, NY
  *Undergraduate Researcher in **Professor Gennady Shvets**'s Group* — *Aug. 2016 - May 2019*
  - **Metasurface Fabrication**: Fabricated plasmon resonant metasurfaces with electron-beam lithography.
  - **Mouse Lung Tissue Biosensing**: Investigated spectroscopic features of cancerous and non-cancerous tissue with metasurface-enhanced IR spectroscopy.

- **Microsphere Dielectrophoresis**: Created Python script to track fluorescent microsphere velocities under dielectrophoresis.

- **Princeton Puchalla Lab - Microfluidics** Princeton, NJ
  *Lab Learning Program Intern and Volunteer in **Dr. Jason Puchalla**'s Group* *Jan. 2016; June 2015 - Sept. 2015*
  - **AC Electro-osmotic Flow Using Zeta Potential Modulation in Microchannels**: Fabricated experimental setup for driving microspheres using rectified AC electroosmotic flow in Polydimethylsiloxane (PDMS) microchannel.
  - **Photo-active PDMS**: Investigated the viability of using photoactive PDMS as a substitute for conventional soft-lithography. Created procedure in exposing and developing the PDMS.

- **Princeton Plasma Physics Lab - Experimental Cosmology** Princeton, NJ
  *Semester-long Intern with **Charlie Gentile*** *Sept. 2015 - May 2016*
  - **PTOLEMY ("Princeton Tritium Observatory for Light, Early Universe Massive Neutrino Yield")**: Assisted in manufacturing components and in measuring various experimental parameters for detecting Big Bang neutrinos.

Journal Publications

• LJ Rankine, **J. Lu** , .., and B. Driehuys. *Radiation-Induced Lung Injury Quantified by Hyperpolarized 129Xe MRI: Dose-Dependence and Association with Changes in Global Lung Function.* International Journal of Radiation Oncology, 2022.
• **J. Lu** , .., and B. Driehuys. *Bias Field Correcting Hyperpolarized 129Xe Ventilation MRI Using Templates Derived by RF-Depolarization Mapping.* Magnetic Resonance in Medicine, 2022.
• A. Matheson, ..., **J. Lu** , .., and B. Driehuys. *Hyperpolarized 129Xe Pulmonary MRI and Asymptomatic Atrial Septal Defect.* Chest, 2022.
• E. Bier, ..., **J. Lu** , .., and S. Rajagopal. *Noninvasive Diagnosis of Pulmonary Hypertension with Hyperpolarized 129Xe Magnetic Resonance Imaging and Spectroscopy.* ERJ Open Research, 2022.
• P. Niedbalski , ..., **J. Lu**, ..., and B. Driehuys. *Utilizing Flip Angle/TR Equivalence to Reduce Breath hold Duration in Hyperpolarized 129Xe 1-Point Dixon Gas Exchange Imaging.* Magnetic Resonance in Medicine, 2021.
• Z. Wang, ..., **J. Lu**, ..., and B. Driehuys. *Using hyperpolarized 129Xe gas-exchange MRI to model the regional airspace, membrane, and capillary contributions to diffusing capacity.* Journal of Applied Physiology, 2021.
• D. Mummy, ..., **J. Lu**,..., Y. Huang. *Regional Gas Exchange Measured by 129Xe Magnetic Resonance Imaging Before and After Combination Bronchodilators Treatment in Chronic Obstructive Pulmonary Disease.* Journal of Magnetic Resonance Imaging. 2021.
• G. Kelp, J. Li, **J. Lu**, ... G. Shvets. (2020) *Infrared spectroscopy of live cells from a flowing solution using electrically-biased plasmonic metasurfaces.* Lab Chip. doi:10.1039/C9LC01054H

Conference Publications

• A. Matheson, ..., **J. Lu** , .., and G. Parraga. *129Xe Gas-Transfer MRI RBC-to-Barrier Ratio in Post-Acute COVID19 Syndrome: Clinically-relevant?.* ISMRM 2022.
• A. Bechtel,..., **J. Lu** , .., and B. Driehuys. *Establishing a hemoglobin correction for 129Xe gas exchange MRI.* ISMRM 2022.
• **J. Lu** , .., and B. Driehuys. *Evaluating physiological gradients after bias field correction of Hyperpolarized 129Xe Gas Ventilation MRI.*ISMRM 2022.
• **J. Lu** , .., and B. Driehuys. *A general framework of synthesizing 129Xe MRI data for improved segmentation model training.* ISMRM 2022.
• **J. Lu** , .., and B. Driehuys. *Practical RF-pulse shape designs to minimize off-resonance artifacts in dissolved-phase hyperpolarized 129Xe MR.* ISMRM 2022.
• S. Leewiwatwong, **J. Lu** , .., and B. Driehuys. *Ventilation Defect Synthesis in Hyperpolarized 129Xe Ventilation MRI to Accelerate Training of Segmentation Models.* ISMRM 2022.
• D. Mummy, ..., **J. Lu** , .., and B. Driehuys. *Hyperpolarized 129Xe MRI and spectroscopy in healthy control subjects reveals age-related changes in measurements of pulmonary gas exchange.* ISMRM 2022.
• D. Mummy, A. Swaminathan. **J. Lu** , .., and B. Driehuys. *Hyperpolarized 129Xe MRI and spectroscopy of healthy subjects reveal age-related changes in gas exchange function.* International Workshop on Pulmonary Functional Imaging 2022.

•, D. Mummy, **J. Lu** , .., and R. Tighe. *Changes in hyperpolarized 129Xe MRI metrics three months after initiation of therapy in patients with idiopathic pulmonary fibrosis (IPF).* 21st International Colloquium on Lung and Airway Fibrosis (ICLAF).
• E. Bier, D. Mummy, **J. Lu**, ..., and B. Driehuys. *Within-session repeatability of pulmonary 129Xe static and dynamic spectroscopy.* Presented at ISMRM, 2021.
• E. Bier, F. Alenezi, **J. Lu**, ..., and B. Driehuys. *Extension of a diagnostic model for pulmonary hypertension with hyperpolarized 129Xe magnetic resonance imaging and spectroscopy.* Presented at ISMRM, 2021.
• S. Leewiwatwong, **J. Lu**, ..., and B. Driehuys. *Deep learning-based thoracic cavity segmentation for hyperpolarized 129Xe MRI.* Presented at ISMRM, 2021.
• **J. Lu**, ..., and B. Driehuys. *Convolutional Neural Networks for Super-resolution of Hyperpolarized 129Xe MR Images of the Lung.* Presented at ISMRM, 2021.
• **J. Lu**, ..., and B. Driehuys. *Template-based bias field correction of Hyperpolarized 129Xe Gas Ventilation MRI.* Presented at ISMRM, 2021.
• **J. Lu**, ..., and B. Driehuys. *Bias Field Correction in Hyperpolarized 129Xe Gas Ventilation MRI.* Presented at ISMRM, 2020.
• E. Bier,... **J. Lu** and B. Driehuys. (2020) *Noninvasive Diagnosis of Pulmonary Hypertension with Hyperpolarized 129Xe Magnetic Resonance Imaging and Spectroscopy.* American Thoracic Society.

Presentations

• G. Kelp, J. Li, **J. Lu**... G. Shvets. (2019) *Infrared spectroscopy of live cells from a flowing solution using electrically-biased plasmonic metasurfaces.* SPIE Photonics West 2019.
• **J. Lu**, A. Asfaw, and S. Lyon. *Electrical properties of NbSi thin films at cold temperatures.* Presented at the PCCM REU Summer Symposium, 2017.
• **J. Lu**, J. Li, and G. Shvets. *Biosensing with Plasmonic Metasurfaces.* Presented at the Cornell Undergraduate Research Board Fall Symposium, 2018.
• **J. Lu**, Z. A. Balushi, and H. A. Atwater. *Exploring band alignment in transition-metal dichalcogenide atomic layers.* Presented at the SURF Summer Symposium, 2018.

Awards and Honors

• **Peer Advisor Outstanding Service Award**, *Cornell University (*2019)
• **Best Poster Award: Applied Sciences**, *Cornell Undergraduate Research Board Spring Symposium* (2019)
• **NSF Graduate Research Fellowship**, *(*2019)
• **Frank and Rosa Rhodes Scholarship**, *Cornell University* (2018)
• **Best Poster Design Award**, *Cornell Undergraduate Research Board Fall Symposium* (2018)
• **Engineering Learning Initiatives (ELI) grant**, *Cornell University* (2018)
• **Tau Beta Pi**, *Cornell University* (2018)
• **RoboSub Competition 1st Place**, *Cornell University* (2017)
• **Dean's List**, *Cornell University* (2016, 2017, 2018)

Campus and Community involvement

- **Duke University Graduate and Professional Student Council Member (FA 2020 - Present)**: Responsible for representing graduate program in determining funding for graduate school organizations
- **Duke University Hospital Patient Experience Volunteer (FA 2019 - Present)**: Responsible for providing support services to nursing unit staff to enhance patient care.
- **Food Bank of Central & Eastern North Carolina Volunteer (FA 2019 - Present)**: Assisted in replenishing stocks, implementing food hygiene standards, maintaining storage spaces clean and organized, and loading and unloading food items. .
- **Cornell Engineering Peer Advisor (FA 2018)**: Planned and co-led weekly seminars for freshmen engineering students (class of 15+). Seminars centered around introducing freshmen to academic and social activities on campus .
- **Cornell Science Olympiad Invitational Volunteer (FA 2016 - Current)**: Event lead for events such as Game On, Wind Power, and Duct Tape Challenge. Assisted in the organization of Cornell Invitational (60+ schools in attendance)

which is planning to host the national competition in 2019. Led the initiative in introducing fun events to the invitational .

- **Cornell Autonomous Underwater Vehicle Project Team Member (FA 2016)**: Created team's sponsorship packet with Adobe Indesign as part of the business subteam that generated over $50K in sponsorship.

Teaching Experience

- **Head Graduate Teaching Assistant**: 1) Diagnostic Medical Imaging 2)Advanced Topics of Ionizing Based Imaging Modalities
- **Undergraduate Physics Teaching Assistant**: 1) Advanced waves, optics, and thermodynamics. 2)Waves and oscillations. 3) Introductory mechanics.
- **Private High School Physics Tutoring**: Hosted a private physics class of 10 high school students on Princeton University campus in partnership with the **Princeton Center for Complex Materials (PCCM) Education Outreach** team.

Relevant Skills

- **Programming/Software**: Adobe Suite • AutoCAD • C • C++• Computer Vision • Deep Learning • Final Cut Pro • Latex • MATLAB • Java • R & R Markdown • Python (includes numpy, scipy, pandas, tensorflow, keras, tkinter, pytorch packages) • ITK • ANTs • Siemens IDEA programming • Sublime text • Bash
- **Physics and Engineering**: Atomic Force Microscopy • Cryogenics • E-Beam Evaporation • E-Beam Lithography • Energy-dispersive X-ray spectroscopy • Fourier Transform Infrared Spectroscopy • Kelvin Probe Force Microscopy • Laser Cutting • Siemens MRI Magnetom scanner • Photolithography • (Time-Resolved) Photoluminescence Spectroscopy• Raman Spectroscopy • Scanning Electron Microscopy • Sputtering • X-ray Photoelectron Spectroscopy • 3D Printing