

# Junlan Lu

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I am a highly motivated and ambitious individual interested in creating value and learning more about the world. I am currently seeking employment for software engineer, machine learning engineer, computer vision engineer, research scientist, imaging scientist positions.

## Education

- 2019 – 2024 **Ph.D. in Medical Physics**, *Duke University*, Durham, NC, GPA 3.93/4.0.  
Advisor: Professor Bastiaan Driehuys Expertise: Hyperpolarized Gas MRI, Image Processing, Machine Learning
- 2016 – 2019 **B.S. in Engineering Physics**, *Cornell University*, Ithaca, NY, GPA: 3.86/4.3; with honors thesis.  
Advisor: Professor Gennady Shvets Expertise: Nanofabrication, FTIR Spectroscopy, Optical Characterization

## Experience

### Industry

- Summer 2023 **Research Intern**, *Google - AR Team*, Mountain View, CA.  
◦ Developed diffusion model algorithms to perform continuous super-resolution for AR applications.
- Summer 2022 **Research Intern, Student Researcher**, *Google - Android Camera Team*, Mountain View, CA.  
◦ Developed deep learning based methods to enhance resolution and quality using pixel camera photos.
- Summer 2021 **Computer Vision Intern**, *Kitware - Computer Vision Team*, Durham, NC.  
◦ Engineered model to enhance satellite images through cross-domain single-image super-resolution.  
◦ Increased performance metrics of PSNR and SSIM significantly compared to current methods.

### Academic

- 2019 – Present **Graduate Researcher**, *Duke Driehuys Lab*, Durham, NC.  
◦ Developed deep learning models to automatically segment thoracic cavity in  $^{129}\text{Xe}$  MR images.  
◦ Developed RF inhomogeneity correction technique using radial sampling acquisition techniques.
- Summer 2018 **Caltech SURF Fellow**, *Caltech Atwater Lab*, Pasadena, CA.  
◦ 2D materials heterostructure development and performed optical characterization.
- Summer 2017 **REU intern**, *Princeton Lyon Lab*, Princeton, NJ.  
◦ Developed NbSi sputtering process to thermalize electron motion at cryogenic temps for quantum computing; characterized material with AFM, SEM, EDX, and XPS.
- 2015 – 2016 **Intern**, *Princeton Plasma Physics Lab*, Princeton, NJ.  
◦ Contributed to the PTOLEMY project, focusing on the detection of Big Bang neutrinos.  
◦ Assisted in crafting various experimental components and measuring critical experimental parameters.
- Summer 2015 **Intern**, *Princeton Puchalla Lab*, Princeton, NJ.  
◦ Explored AC electro-osmotic flow techniques for microsphere movement in PDMS microchannels.  
◦ Investigated the potential of photoactive PDMS as a replacement for conventional soft-lithography.

## Publications

### Journal

- Journal **Optimized quantitative mapping of cardiopulmonary oscillations using hyperpolarized  $^{129}\text{Xe}$  gas exchange MRI: Digital phantoms and clinical evaluation in CTEPH.** J. Lu, ..., B. Driehuys. *Magnetic Resonance in Medicine* 2023. [Link]
- Journal **Combining neural networks and image synthesis to enable automatic thoracic cavity segmentation of hyperpolarized  $^{129}\text{Xe}$  MRI without proton scans.** Leewiwatwong, S., J. Lu, ..., B. *Magnetic Resonance Imaging* 2023. [Link]
- Journal **Establishing a hemoglobin adjustment for  $^{129}\text{Xe}$  gas exchange MRI and MRS.** Bechtel, A., J. Lu, ... , Driehuys, B. *Magnetic Resonance in Medicine* 2023. [Link]
- Journal **Bias Field Correcting Hyperpolarized  $^{129}\text{Xe}$  Ventilation MRI Using Templates Derived by RF-Depolarization Mapping.** J. Lu, ..., B. Driehuys. *Magnetic Resonance in Medicine* 2022. [Link]

- Journal **Utilizing flip angle/TR equivalence to reduce breath hold duration in hyperpolarized  $^{129}\text{Xe}$  1-point Dixon gas exchange imaging.** Niedbalski, P., J. Lu, ... , B. Driehuys. Magnetic Resonance in Medicine 2022. [Link]
- Journal **Noninvasive diagnosis of pulmonary hypertension with hyperpolarised  $^{129}\text{Xe}$  magnetic resonance imaging and spectroscopy.** Bier, E., Alenezi, F., J. Lu, ..., B. Driehuys, S. Rajagopal. European Respiratory Journal 2022. [Link]
- Journal **Using hyperpolarized  $^{129}\text{Xe}$  gas-exchange MRI to model the regional airspace, membrane, and capillary contributions to diffusing capacity.** Wang, Z., Rankine, L., Bier, E., Mummy, D., J. Lu, ..., B. Driehuys. Journal of Applied Physiology 2021. [Link]
- Journal **Regional Gas Exchange Measured by  $^{129}\text{Xe}$  MRI Before and After Combination Bronchodilators Treatment in Chronic Obstructive Pulmonary Disease.** Mummy, D., Coleman, E., Wang, Z., Bier, E., J. Lu, ..., B. Driehuys, Y. Huang. Journal of Magnetic Resonance Imaging 2021. [Link]
- Journal **Hyperpolarized  $^{129}\text{Xe}$  Pulmonary MRI and Asymptomatic Atrial Septal Defect.** Matheson, A., Cunningham, R., Bier, E., J. Lu, ..., S. Blisset. Chest 2021. [Link]
- Journal **Infrared spectroscopy of live cells from a flowing solution using electrically-biased plasmonic metasurfaces.** Kelp, G., Li, J., J. Lu, ..., G. Shvets. Lab on a Chip 2020. [Link]
- Conference  **$^{129}\text{Xe}$  MRI With Optimized Bias Field Correction To Assess Ventilation Gradients In Individuals With Normal Lung Function.** K. Du, J. Lu, ..., and B. Driehuys. Presented at ATS, 2024.
- Conference **Assessing Cross-Site Variability in  $^{129}\text{Xe}$  Spectroscopy Measurements Across Major Scanner Platform.** S. Leewiatwong, ..., J. Lu, ..., and B. Driehuys. Presented at ISMRM, 2024.
- Conference **Establishing a Standardized Healthy Reference Distribution for Multi-Site  $^{129}\text{Xe}$  Gas Exchange MRI Across Major Scanner Platforms.** S. Leewiatwong, ..., J. Lu, ..., and B. Driehuys. Presented at ISMRM, 2024.
- Conference **Combining Hyperpolarized  $^{129}\text{Xe}$  MR Imaging and Spectroscopy to Estimate Pulmonary Vascular Resistance.** A. Costelle, ..., J. Lu, ..., and B. Driehuys. Presented at ISMRM, 2024.
- Conference **Combining Hyperpolarized  $^{129}\text{Xe}$  MR Imaging and Spectroscopy to Estimate Pulmonary Vascular Resistance.** A. Costelle, ..., J. Lu, ..., and B. Driehuys. Presented at ATS, 2024.
- Conference **Analysis of Histogram Rescaling on Hyperpolarized  $^{129}\text{Xe}$  MRI Ventilation Distribution: A Deep Learning-Based Study of Trachea Segmentation.** J. Lu, ..., and B. Driehuys. Presented at ISMRM, 2024.
- Conference **Repeatability of Cardiopulmonary Oscillations Imaged with  $^{129}\text{Xe}$  MRI.** J. Lu, ..., and B. Driehuys. Presented at ISMRM, 2024.
- Conference **Dynamic Changes in Hyperpolarized  $^{129}\text{Xe}$  MRI Measures After Initiation of Therapy in Patients With Idiopathic Pulmonary Fibrosis Associate With Lung Function.** A. Swaminathan, .. J. Lu, ..., and R. Tighe. ATS 2023. [Link]
- Conference **Remote Pneumatic Dose Administration For  $^{129}\text{Xe}$  MRI: Effects On Lung Inflation And Patient Experience.** A. Church, S. Zhang, J. Lu, ..., and B. Driehuys. ISMRM 2023.
- Conference **Improved  $^{129}\text{Xe}$  MRI Of Cardiopulmonary Oscillations In Patients With Chronic Thromboembolic Pulmonary Hypertension.** J. Lu, ... , and B. Driehuys. ISMRM 2023.
- Conference **Healthy Reference Distributions For  $^{129}\text{Xe}$  Gas Exchange MRI With Consideration Of Sex And Hemoglobin.** A. Bechtel, D. Mummy, J. Lu, ... , and B. Driehuys. ISMRM 2023.
- Conference **Repeatability Of Pulmonary  $^{129}\text{Xe}$  Static Spectroscopy And Dynamic Spectroscopy Fit Methods: A Reader Study.** A. Bechtel, A. Costelle, E. Bier, J. Lu, ... , and B. Driehuys. ISMRM 2023.
- Conference **Quantifying Cardiogenic Oscillations Of Hyperpolarized  $^{129}\text{Xe}$  Gas Exchange MR Spectra In A Healthy Reference Cohort.** A. Costelle, J. Lu, ... , and B. Driehuys. ISMRM 2023.
- Conference **Optimizing Hyperpolarized  $^{129}\text{Xe}$  MRI Of Cardiopulmonary Oscillations Using A Digital Phantom.** J. Lu, E. Bier, S. Leewiatwong, D. Mummy, S. Kabir, F. Alanezi, S. Rajagopal, S. H. Robertson, P. J. Niedbalski, and B. Driehuys. ISMRM 2023.

- Conference  **$^{129}\text{Xe}$  Gas-Transfer MRI RBC-to-Barrier Ratio in Post-Acute COVID19 Syndrome: Clinically-relevant?** A. Matheson, ..., **J. Lu**, ..., and G. Parraga. ISMRM 2022.
- Conference **Establishing a hemoglobin correction for  $^{129}\text{Xe}$  gas exchange MRI.** A. Bechtel, ..., **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **Evaluating physiological gradients after bias field correction of Hyperpolarized  $^{129}\text{Xe}$  Gas Ventilation MRI.** **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **A general framework of synthesizing  $^{129}\text{Xe}$  MRI data for improved segmentation model training.** **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **Practical RF-pulse shape designs to minimize off-resonance artifacts in dissolved-phase hyperpolarized  $^{129}\text{Xe}$  MR.** **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **Ventilation Defect Synthesis in Hyperpolarized  $^{129}\text{Xe}$  Ventilation MRI to Accelerate Training of Segmentation Models.** S. Leewiwatwong, **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **Hyperpolarized  $^{129}\text{Xe}$  MRI and spectroscopy in healthy control subjects reveals age-related changes in measurements of pulmonary gas exchange.** D. Mummy, ..., **J. Lu**, ..., and B. Driehuys. ISMRM 2022.
- Conference **Hyperpolarized  $^{129}\text{Xe}$  MRI and spectroscopy of healthy subjects reveal age-related changes in gas exchange function.** D. Mummy, A. Swaminathan, **J. Lu**, ..., and B. Driehuys. International Workshop on Pulmonary Functional Imaging 2022.
- Conference **Changes in hyperpolarized  $^{129}\text{Xe}$  MRI metrics three months after initiation of therapy in patients with idiopathic pulmonary fibrosis (IPF).** D. Mummy, **J. Lu**, ..., and R. Tighe. 21st International Colloquium on Lung and Airway Fibrosis (ICLAF).
- Conference **Within-session repeatability of pulmonary  $^{129}\text{Xe}$  static and dynamic spectroscopy.** E. Bier, D. Mummy, **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.
- Conference **Extension of a diagnostic model for pulmonary hypertension with hyperpolarized  $^{129}\text{Xe}$  magnetic resonance imaging and spectroscopy.** E. Bier, F. Alenezi, **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.
- Conference **Deep learning-based thoracic cavity segmentation for hyperpolarized  $^{129}\text{Xe}$  MRI.** S. Leewiwatwong, **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.
- Conference **Convolutional Neural Networks for Super-resolution of Hyperpolarized  $^{129}\text{Xe}$  MR Images of the Lung.** **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.
- Conference **Template-based bias field correction of Hyperpolarized  $^{129}\text{Xe}$  Gas Ventilation MRI.** **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.
- Conference **Hyperpolarized  $^{129}\text{Xe}$  MRI in the Imaging of Chronic Lung Allograft Dysfunction.** E. Bier, **J. Lu**, ..., and H.A. Ali. ATS 2021. [Link]
- Conference **Within-Session Repeatability of Pulmonary  $^{129}\text{Xe}$  Static and Dynamic Spectroscopy.** E. Bier, **J. Lu**, ..., and B. Driehuys. ATS 2021. [Link]
- Conference **Bias Field Correction in Hyperpolarized  $^{129}\text{Xe}$  Gas Ventilation MRI.** **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2020.
- Conference **Noninvasive Diagnosis of Pulmonary Hypertension with Hyperpolarized  $^{129}\text{Xe}$  Magnetic Resonance Imaging and Spectroscopy.** E. Bier, ..., **J. Lu**, and B. Driehuys. American Thoracic Society 2020.

## Awards

- **Best Poster Award: Applied Sciences**, *Cornell Undergraduate Research Board Spring Symposium* (2019)
- **NSF Graduate Research Fellowship** (2019)
- **Peer Advisor Outstanding Service Award**, *Cornell University* (2019) Awarded for outstanding mentorship
- **Frank and Rosa Rhodes Scholarship**, *Cornell University* (2018) Awarded to two students in the College of Engineering for academic excellence and leadership
- **Tau Beta Pi**, *Cornell University* (2018) Engineering honors society
- **Best Poster Design Award**, *Cornell Undergraduate Research Board Fall Symposium* (2018)

- **Dean's List**, *Cornell University* (2016, 2017, 2018)
- **Engineering Learning Initiatives (ELI) grant**, *Cornell University* (2018)

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## Skills

Teaching	Mechanics, Electricity and Magnetism, Waves, Medical Imaging
Software	Python, C++, MATLAB, PyTorch, Jax, Tensorflow, OpenCV, Unix, Git, R
Hardware	3D Printing, 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, Photolithography, Photoluminescence Spectroscopy, Raman Spectroscopy, Scanning Electron Microscopy, Siemens MRI scanner, Sputtering, X-ray Photoelectron Spectroscopy