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}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 **Combining neural networks and image synthesis to enable automatic thoracic cavity segmentation of hyperpolarized ^{129}Xe MRI without proton scans.** Leewiwatwong, S., **J. Lu**, ..., B. Magnetic Resonance Imaging 2023. [Link]

Journal **Establishing a hemoglobin adjustment for ^{129}Xe gas exchange MRI and MRS.** Bechtel, A., **J. Lu**, ... , Driehuys, B. Magnetic Resonance in Medicine 2023. [Link]

Journal **Bias Field Correcting Hyperpolarized ^{129}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}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}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}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}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}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

Conference **Dynamic Changes in Hyperpolarized ^{129}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}Xe MRI: Effects On Lung Inflation And Patient Experience.** A. Church, S. Zhang, **J. Lu**, ..., and B. Driehuys. ISMRM 2023.

Conference **Improved ^{129}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}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}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 129Xe Gas Exchange MR Spectra In A Healthy Reference Cohort.** A. Costelle, **J. Lu**, ... , and B. Driehuys. ISMRM 2023.

Conference **Optimizing Hyperpolarized 129Xe MRI Of Cardiopulmonary Oscillations Using A Digital Phantom. J. Lu**, E. Bier, S. Leewiwatwong, D. Mummy, S. Kabir, F. Alanezi, S. Rajagopal, S. H. Robertson, P. J. Niedbalski, and B. Driehuys. ISMRM 2023.

Conference **^{129}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}Xe gas exchange MRI.** A. Bechtel, ..., **J. Lu**, .., and B. Driehuys. ISMRM 2022.

Conference **Evaluating physiological gradients after bias field correction of Hyperpolarized ^{129}Xe Gas Ventilation MRI. J. Lu**, ..., and B. Driehuys. ISMRM 2022.

Conference **A general framework of synthesizing ^{129}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}Xe MR. J. Lu**, ..., and B. Driehuys. ISMRM 2022.

Conference **Ventilation Defect Synthesis in Hyperpolarized ^{129}Xe Ventilation MRI to Accelerate Training of Segmentation Models.** S. Leewiwatwong, **J. Lu**, ..., and B. Driehuys. ISMRM 2022.

Conference **Hyperpolarized ^{129}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}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}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}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}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}Xe MRI.** S. Leewiwatwong, **J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.

Conference **Convolutional Neural Networks for Super-resolution of Hyperpolarized ^{129}Xe MR Images of the Lung. J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.

Conference **Template-based bias field correction of Hyperpolarized ^{129}Xe Gas Ventilation MRI. J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2021.

Conference **Hyperpolarized ^{129}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}Xe Static and Dynamic Spectroscopy.** E. Bier, **J. Lu**, ..., and B. Driehuys. ATS 2021. [Link]

Conference **Bias Field Correction in Hyperpolarized ^{129}Xe Gas Ventilation MRI. J. Lu**, ..., and B. Driehuys. Presented at ISMRM, 2020.

Conference **Noninvasive Diagnosis of Pulmonary Hypertension with Hyperpolarized ^{129}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)

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