

# Ru(Ruyan) Li

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## RESEARCH INTERESTS

Human intracranial EEG/ECoG; epilepsy neurophysiology; auditory/language cortex; cortical excitability; computational neuroscience; closed-loop stimulation; signal processing; aperiodic 1/f neural dynamics; translational neurotechnology and brain-computer interfaces.

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## EDUCATION

**University of Washington, Seattle | Expected Graduation:** June 2027

**B.S. Informatics, Data Science Option;** B.S. Neuroscience | Minor: Music (Voice)

**Major GPA:** 3.93/4.00 (Magna Cum Laude) | Dean's List

### Relevant Coursework:

Machine Learning; Linear Algebra; Statistical Modeling; Data Programming/Data Science; Neuroscience Systems; Molecular Biology; Microbiology; Organic Chemistry; Multivariable Calculus; Computer Algorithms

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## SELECTED PUBLICATIONS & PRESENTATIONS

### PEER-REVIEWED PUBLICATIONS

[1] Liu, Y.-M., Wang, W., Zhang, X., Lei, F., Qin, J.-J., Huang, X., **Li, R.**, Lin, L., Chen, M., Ji, Y.-X., Zhang, P., Zhang, X.-J., She, Z.-G., Cai, J., Xu, C., Shen, Z., & Li, H. (2023). [The rising death burden of atrial fibrillation and flutter in low-income regions and younger populations](#). *Frontiers in Epidemiology*, 3, 1122790.

[2] Chen, Z., Jin, Z.-X., Cai, J., **Li, R.**, Deng, K.-Q., Ji, Y.-X., Lei, F., Li, H.-P., Lu, Z., & Li, H. (2022). [Energy substrate metabolism and oxidative stress in metabolic cardiomyopathy](#). *Journal of Molecular Medicine*, 100(12), 1721–1739.

### RESEARCH PRESENTATIONS

[1] "Aperiodic Neural Activity Dynamics Across the Human Auditory-to-Language Processing Hierarchy." Oral presentation, accepted; forthcoming. *Gulf Coast Undergraduate Research Symposium (GCURS)*, Rice University, Houston, TX, Oct 2026.

[2] "Disentangling Rhythms and Noise: Aperiodic Neural Activity Dynamics in Human Auditory Cortex During Language Processing." Poster presentation. *Undergraduate Research Symposium*, University of Washington, Seattle, WA, May 2026.

[3] "Pain Sensitivity and Physical Activity in Older Adults with Knee Osteoarthritis." Poster and oral presentations. *SPARQ Research Symposium*, Seattle Children's Research Institute, Seattle, WA, Aug 2025.

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## RESEARCH EXPERIENCE

### Epilepsy Department – UW Harborview Medical Center

Seattle, Washington

*Automated EEG Analysis and Periodic Discharge Detection*

Sep 2026 – Present

PI: Dr. George Plummer

- Adapted a published periodic-discharge detection algorithm in Python/MATLAB to identify candidate events in clinical EEG recordings, piloting the workflow on sample EDF recordings and expanding to 24-hour.
- Developed an interactive EEG review tool supporting waveform visualization, manual correction of candidate detections, and export of annotations and event-level data.
- Collaborate with Dr. Plummer to evaluate filtering and amplitude-threshold settings and refine the workflow toward automated analysis of full-length patient recordings.

### Department of Neurology – Mayo Clinic

Rochester, Minnesota

*Undergraduate Research Intern*

Aug 2026 – Dec 2026

PI: Dr. Brian N. Lundstrom | Research Mentor: Dr. Tom Richner

- Selected for a computational neuroscience project examining whether fractional differentiation and multi-timescale neural adaptation support tempo-invariant prediction of rhythmic inputs.
- Developed MATLAB simulations comparing fractional, phase-based, and multi-timescale adaptation models, with cross-tempo generalization assessed using linear readouts.
- Evaluated robustness across model parameters and compare phase-based prediction with fixed-time prediction controls.

### GRID LAB – Department of Neurosurgery, UW

Seattle, Washington

*Undergraduate Research Assistant*

Jun 2025 – Present

PIs: Dr. Jeffrey Ojemann, Dr. Jeffrey Herron | Research Mentor: Dr. Jesse Miles

- Investigated how periodic and aperiodic neural dynamics vary across the human auditory-to-language processing hierarchy using intracranial ECoG/iEEG recordings from epilepsy patients.
- Developed reproducible Python/NWB pipelines for preprocessing, quality control, trial alignment, spectral analysis, and cross-patient aggregation of intracranial recordings.

- Quantify time-resolved aperiodic exponent and offset using multitaper spectral estimation and FOOOF/specparam to examine putative excitation/inhibition-related cortical state changes across regions and language conditions.
- Conduct patient-level and group-level analyses to evaluate condition- and region-dependent effects while accounting for inter-individual variability in electrode coverage and signal quality.

#### **HPB Section – Department of Surgery, UW Medicine**

**Seattle, Washington**

*Research Assistant*

*Jan 2026 – Present*

PI: Dr. Jonathan Sham

- Conduct clinical data abstraction and quality control for pancreatic and hepatobiliary surgical outcomes studies using Epic and REDCap.
- Apply standardized variable definitions, missingness/logic checks, and patient-level consistency review to support analysis-ready datasets.
- Collaborate with surgeon and research staff to resolve ambiguous chart information and improve reproducibility across contributors.

#### **Restorative Technologies Laboratory (Moritz Lab)**

**Seattle, Washington**

*Student Assistant*

*Oct 2023 – Jul 2025*

PI: Dr. Chet Moritz | Research Mentor: Viet Dang

- Contributed to spinal cord injury research examining neuron-specific optogenetic stimulation and forelimb recovery in rat models.
- Supported longitudinal studies of motor recovery, axonal growth, vascular changes, and functional outcomes after cervical spinal cord injury.
- Conducted behavioral conditioning and video-based forelimb recovery analysis; performed cryostat sectioning, immunohistochemistry, fluorescence microscopy, and tissue preparation.
- Assisted in constructing, soldering, and testing biocompatible LED neural stimulation implants for experimental use.

#### **Seattle Children's Research Institute – SPARQ Program**

**Seattle, Washington**

*Summer Research Intern (Clinical Data & Health Equity)*

*Jun 2025 – Aug 2025*

PI: Dr. Kushang Patel, Dr. Sean Rundell | Research Mentor: Elise Hoffman

- Analyzed clinical and behavioral data related to nociceptive pain, aging, and physical activity using R.
- Applied statistical and visualization methods to examine relationships among pain sensitivity, physical activity, and demographic variables in older adults with knee osteoarthritis.
- Produced visual summaries and exploratory analyses for multidisciplinary mentors and clinical research teams.

#### **Fred Hutch Cancer Center – Galloway Lab**

**Seattle, Washington**

*Summer Research Intern (Molecular Oncology & Protein Biology)*

*Jun 2024 – Jan 2025*

PI: Dr. Denise Galloway | Research Mentor: Dr. Nick Salisbury

- Led an independent project investigating Merkel Cell Polyomavirus gene regulation in Merkel cell carcinoma, with emphasis on ORF4/ALTO and NF-κB signaling.
- Performed in vitro experiments in human Merkel cell carcinoma cell lines, including lentiviral vector generation, transduction, pathway assays, molecular cloning, and protein-expression analyses.
- Analyzed experimental results and presented findings during lab meetings to receive feedback from postdoctoral fellows, research staff, and the PI.

#### **Jomo Kenyatta University of Agriculture & Technology (JKUAT)**

**Nairobi, Kenya**

*Summer Research Intern*

*Aug 2023 – Sep 2023*

PI: Dr. Xue Yan, Dr. Peter RAVEN | Research Mentor: Guoshi Zhang

- Contributed to research on the ecological and human health impacts of the Swak Dam, including water source analysis and biodiversity modeling

### **TEACHING & MENTORING**

#### **NEURO 302 – Peer Facilitator, University of Washington**

*Sep 2026 – Dec 2026*

- Demonstrate neuroscience laboratory experiments and assist students with experimental procedures and data interpretation.
- Review student lab reports and provide written feedback on scientific reasoning, data presentation, and technical communication.

#### **UW Career & Internship Center, Peer Coach**

*Sep 2025 – Jun 2026*

- Advised students through individual coaching and workshops on career exploration, resume development, interviewing, and professional communication.

## TECHNICAL SKILLS

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### Programming Languages

Python, R, SQL, MATLAB, Bash, Java, HTML/CSS/JavaScript

### Libraries, Frameworks & Tools

Pandas, NumPy, MNE-Python, PyNWB/NWB, FOOOF/specparam, Matplotlib, ggplot2, tidyverse, Git/GitHub, SLURM/HPC

### Computational / Statistical Methods

Regression, classification, KNN, random forest, AdaBoost, neural networks, deep learning foundations, k-means clustering, PCA, model evaluation, spectral analysis, multitaper spectral estimation, 1/f aperiodic parameterization, event-related neural signal analysis, signal preprocessing, quality control.

### Neuroscience & Wet Lab Methods

Human ECoG/iEEG analysis, behavioral conditioning, optogenetics support, cryostat tissue sectioning, immunohistochemistry, fluorescence microscopy, tissue preparation, molecular cloning, lentiviral vector preparation, lentiviral transduction, mammalian cell culture, Western blotting, signaling assays, protein expression analysis.

### Clinical / Biomedical Data Tools

Epic EHR, REDCap, clinical data abstraction, variable definition documentation, missingness and logic checks, patient-level data quality review.

**Languages:** English, Mandarin, Japanese (Advanced), Spanish (Basic).

## HONORS, FELLOWSHIPS & GRANTS

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Departmental Honors, Department of Neuroscience, University of Washington

Levinson Emerging Scholars Award, University of Washington — \$8,000 | Fall 2026

Mary Gates Research Scholarship, University of Washington — \$5,000 | Fall 2025

Mary Gates Leadership Scholarship, University of Washington — \$5,000 | Fall 2025

Statira Biggs Scholarship, University of Washington — \$1,000 | Spring 2026

Campus Sustainability Fund Grant, University of Washington — \$3,929 | Spring 2025

## CLINICAL EXPERIENCE

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**UW Medicine Information Technology Services / Radiology Team, Student Assistant**

*Jun 2026 – Present*

- Support clinical imaging and data workflows using Epic, ISCVS, data validation, and quality-control procedures.

**HPB Surgical Shadowing, Jonathan Sham, MD — UW Medicine**

- Observed open hepatopancreatobiliary procedures, including pancreaticoduodenectomy (Whipple) and distal pancreatectomy.

**Neurosurgical Shadowing, Andrew Ko, MD — Harborview Medical Center**

- Observed stereoelectroencephalography (sEEG) electrode implantation for epilepsy evaluation.

**Clinical Pain Psychology Shadowing, Gary Walco, PhD — Seattle Children's Hospital**

- Observed multidisciplinary pediatric pain assessment and clinical pain psychology practice.

**Swedish Hospital, Volunteer**

- Completed 118+ hours of direct patient care support in high-acuity clinical units.

## SELECTED LEADERSHIP & SERVICE

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**Cultural Harvest, Founder & Project Manager**

*Sep 2025 – Present*

- Founded and lead a Campus Sustainability Fund-supported initiative connecting cultural food traditions with sustainability, equity, and community storytelling.
- Coordinate campus partnerships, speakers, student teams, workshops, and public-facing programming.

**Arts & Sciences Advisory Council for Students (ASACS), Member**

- Provide student perspectives to college leadership on academic policies, course fees, student support, and undergraduate priorities.

**CIRCLE Student Advisory Board, Co-Chair**

*Oct 2023 – Mar 2026*

- Co-led initiatives supporting international students and coordinated programming, communications, and institutional partnerships.