

Computational Imaging · Optical Microscopy · Inverse Problems

Multi-Frame Reconstruction · Measurement Selection

github.com/bxresil · LinkedIn

Education

University of California, Berkeley

Berkeley, CA

B.A. in Physics · Minor in Electrical Engineering and Computer Sciences

Aug 2023 – Expected May 2027

Coursework

Signals and Systems (EE 120) · Electromagnetism and Optics (Physics 110B) · Abstract Linear Algebra (Math 110) · Quantum Mechanics (Physics 137A)

Fall 2026

Introduction to Optical Engineering (EE 118) · Microelectronic Devices and Circuits (EE 105) · Introduction to Circuits & Devices (EE 64)

Selected Publications & Presentations

- [1] **Bingxi Li.** "UIBS: a unified formulation for retrospective subset selection in spatial and temporal image stacking." *SPIE Sensors + Imaging 2026, Edinburgh, UK, Paper 14289-43*. Oral presentation, Sep 17, 2026; proceedings under review.
- [2] **Bingxi Li.** "FocusStack2XR: Provenance-Preserving Depth-Aware Visualization of Focal-Stacked Specimen Images." *IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2026*. Accepted poster paper.
- [3] **Bingxi Li.** "Experimental Study of Transmission and Color Shift in Neutral Density (ND) Filters." *Berkeley Scientific Journal, Prism, Fall 2025*.

Research Experience

Undergraduate Researcher — Computational Microscopy

Apr 2026 – Present

Na Ji Lab · UC Berkeley

Berkeley, CA

- Applied and analyzed a neural-field-based reconstruction pipeline for two-photon fluorescence microscopy data, including forward-model simulation, PSF estimation, wavefront-aberration estimation, and biological image-stack analysis.
- Investigated late-stage wavefront-error and model-parameter drift through controlled tests of learning rates, regularization, shear handling, and SLM/pupil geometry; compared recovered Zernike-mode coefficients against simulation references.
- Extended a GMM-based microscopy SNR analysis workflow across excitation powers and frame-averaging levels, testing segmentation and masking choices and comparing observed scaling against the square-root reference.

Undergraduate Researcher (URAP) — Specimen Imaging & Focus Stacking

Sep 2025 – Present

Essig Museum of Entomology · UC Berkeley

Berkeley, CA

- Acquired high-resolution specimen focal stacks using controlled illumination and motorized focus stepping; produced all-in-focus composites with Zerene Stacker PMax.
- Inspected fine structures and fusion artifacts across 24–127-slice stacks and organized source images for reproducible focal-stack analysis and provenance-aware visualization.

Independent Research

UIBS — Spatial and Temporal Image-Stack Selection

Feb 2026 – Present

- Formulated and implemented a shared greedy retained-count selection procedure for spatial and temporal stacking, using domain-specific focus-response and regularized residual-covariance proxies.
- Built a comparative evaluation across seven specimen focal stacks (519 JPEG images) and three 64-frame Nikon Z8 RAW runs, including matched dark measurements, a separate low-noise reference, and random, uniform, and domain-specific selection baselines.
- At an eight-slice budget, increased median dataset focus-response retention from **0.322** to **0.605** relative to uniform selection; single-operator ablations and lower-tail analysis characterized limits to the observed benefit.
- Audited score, mask, registration, sampling, and finite-sample sensitivity; traced the apparent deviation from square-root SNR scaling largely to finite-sample effects and benchmarked temporal selection against random and uniform baselines.

FocusStack2XR — Provenance-Aware Focal-Stack Visualization

Jun 2026 – Present

- Developed a desktop browser prototype linking all-in-focus specimen images to predicted source focal slices, with focus-index, confidence, validity-mask, and relative focus-depth overlays.
- Implemented slice navigation, overlay switching, and click-based source reporting in HTML/CSS/JavaScript; treated relative focus depth as an inspection cue rather than calibrated 3D geometry.
- Evaluated seven focal stacks across four specimen categories using Laplacian–Tenengrad cross-measure consistency and functional inspection baselines; documented transparent, reflective, and cluttered failure cases.

RAW-Domain Neutral-Density Filter Characterization

Sep 2025 – Oct 2025

- Designed a RAW-domain acquisition and analysis workflow for variable neutral-density filter transmittance and color shift using ColorChecker measurements under two illumination conditions.
- Compared one- to five-stop attenuation with the ideal stop law and quantified chromatic changes using RGB channel ratios and CIE Lab color-difference metrics.

Technical Skills

Programming	Python · MATLAB · Java · HTML/CSS/JavaScript · Git
Scientific Computing	PyTorch · NumPy · SciPy · OpenCV · scikit-image · rawpy
Imaging & Optics	forward modeling · learned-PSF analysis · wavefront and Zernike-mode aberration estimation · focus measures · affine registration · RAW-domain processing · SNR/noise-scaling analysis · multi-frame reconstruction
Research Tools	Fiji/ImageJ · Zerene Stacker · Nikon RAW/DNG workflows · LaTeX · Typst

Academic Engagement

Photobears Computational Imaging Community · UC Berkeley

Oct 2025 – Present

Seminar and technical-discussion participant.