APS Scientific Computation Seminar Series

Speaker: Kevin W. Eliceiri, Ph.D., RRF Walter H. Helmerich Professor, Medical Physics and Biomedical Engineering Director, Center for Quantitative Cell Imaging, LOCI, Investigator, Morgridge Institute for Research

Title: Computational Optics of the Tumor Microenvironment

Date: October 23, 2023
Time: 1:00 p.m. (Central Time)

Location: Join ZoomGov Meeting
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Hosts: Mathew Cherukara and Nicholas Schwarz

Abstract: Dr. Kevin Eliceiri is the Walter H. Helmerich Research Chair and Professor of Medical Physics and Biomedical Engineering at the University of Wisconsin at Madison. He is an Investigator in the Morgridge Institute for Research and member of the Carbone Cancer Center and McPherson Eye Research Institute. He is director of the Center for Quantitative Cell Imaging dedicated to the development and application of optical and computational technologies for cell studies. The Eliceiri lab is the lead developer of several open-source imaging packages including FIJI and ImageJ. His instrumentation efforts involve novel forms of polarization, laser scanning and multiscale imaging. Dr. Eliceiri has authored more than 250 scientific papers on various aspects of optical imaging, image analysis, cancer, and live cell imaging. The cellular microenvironment in disease models is increasingly being recognized as a key contributing factor in disease onset and progression. Particularly in cancer, key features of the cellular microenvironment such as metabolic fluxes and organization of the collagen rich extracellular matrix (ECM) have been demonstrated to be candidate image-based biomarkers for cancer invasion and progression. However, despite the great promise of these microenvironment image features, their clinical application has been limited for several reasons including a lack of computational methods for extracting these signatures. We will overview our collaborative work to quantitate metabolism and ECM organization in a range of tumor models all using a combination of both intrinsic and extrinsic multiparametric optical signals. These signals include polarization, fluorescence intensity, spectra, and lifetime. We will discuss technical approaches and advances for each and early efforts to extend these to clinical pathology. We will also discuss the computational tools being used for this work including open-source software we are developing specifically for this.