

## **Title: Towards Quantum Enhanced Nonlinear Optical Microscopy**

Abstract: Nonlinear optical microscopy techniques make use of the nonlinear optical process occurring at the focus of the microscope to form spatially mapped images of biological and nanostructure samples under both label-free and labelled imaging conditions. To study nonlinear optical processes with limited sample volume, high intensity optical pulses are often employed, which makes the imaging modality prone to photo bleaching and impractical for in-vivo imaging. The ultimate goal for reducing the input fluence level is to explore single photon or few photon level nonlinear optical processes. Fortuitously, the use of correlated photon pairs from a Spontaneous parametric down-conversion source offers favourable power scaling properties to enable high sensitivity imaging leveraging the inherent correlations in the interacting photons. In this talk, I will give an introduction to nonlinear optical imaging modalities, the current state-of-the-art research, and experimental efforts in pushing the incident photons to the photon-pair level to achieve better signal-to-noise when compared to attenuated classical un-correlated photon sources.