Name/Contact of Project: Prof. Amit Ashok, College of Optical Sciences, University of Arizona

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Project Name: Non-traditional Imaging for Two-point Optical Super-resolution

Project Description: Traditional imaging system design employs a detector array in the image plane. Diffraction limits the two-point resolution of the imaging system, and this is commonly referred to as the Rayleigh limit. Recently, it has been shown that non-traditional modal measurements, such as Hermite-Gaussian or Sinc-Bessel [1-2], achieve the ultimate performance limit for the two-point resolution problem surpassing the “Rayleigh limit,” leading to sub-Rayleigh resolution. In this project, the student will work on the experimental verification of these new fundamental results. The experiment design will employ multiple point sources, spatial light modulator, and single photon sensitive detector array to gather data. This work will involve careful calibration of experiment and rigorous analysis of experimental data. The student will get an opportunity to conduct hands-on lab experiments and contribute to cutting edge research in the area of imaging science.

Required Skills:

- Experience with optics and opto-mechanics for setting up lab experiment
- Experience with Labview/Matlab or related programming language
- Ability to maintain detailed lab records and write technical report
- Communicate effectively with peers and mentor, and work as a team player

Ideal Skills:

- Experience with spatial light modulator such as LCD or LCoS
- Experience with single photon sensitive detector array, e.g. EMCCD, SPAD array

References:
