FACULTY MENTOR
Baghdadchi, Saharnaz

PROJECT TITLE
Trapping and manipulating particles with highly focused beams
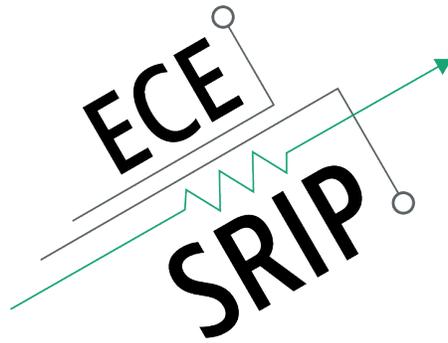
PROJECT DESCRIPTION
Highly focused beams are commonly used to manipulate nanoparticles in optical tweezer setups as they can trap smaller particles at the focus. Modulating the state of polarization in highly focused beams adds an extra degree of freedom to manipulate trapped particles and could lower the size limit of the particles that can be trapped. High NA lenses used for focusing light will alter the polarization of the incident light and change the spatial polarization distribution at the focus. We aim to analyze the spatial distribution of polarization at the focus of high NA lenses using a polarization nanoprobe. In addition, we intend to trap and manipulate particles using our previously designed polarization encoded highly focused beam and determine the size limit on the particles that can be trapped with the designed focused fields.

INTERNS NEEDED
1 MS student or 1 undergraduate student

PREREQUISITES
We are looking for candidates who are interested in optics and are willing to spend the time to learn the physics behind the experiments. Some experience with Labview is preferred.

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PROJECT TITLE
Imaging through scattering using spatially encoded optical beams

PROJECT DESCRIPTION
Scattering of photons inside inhomogeneous media is one of the major limiting factors in imaging biological tissues. Our newly developed single pixel imaging setup takes advantage of a novel set of spatially encoded projection patterns to generate an image of the objects hidden behind scattering materials. The choice of projection patterns has shown to reduce the number of required measurements to reconstruct an image of the hidden objects. We aim to further study different designs of incident light patterns and the effect of these new designs on the number of required projection patterns.

INTERNS NEEDED
1 MS student or 1 undergraduate student

PREREQUISITES
We are looking for candidates who are interested in optics and are willing to spend the time to learn the physics behind the experiments. Some experience with Labview is preferred.