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| RPI_Logo | **DEPARTMENT OF PHYSICS, APPLIED PHYSICS AND ASTRONOMY** |

**Department of Physics, Applied Physics & Astronomy**

**Colloquium**

**Wednesday, February 8, 2017**

**CII 3051, 4:00PM - 5:00PM**

**Host: Professor Humberto Terrones**

**Esther Wertz, Ph.D.**

Rensselaer Polytechnic Institute

“Understanding light-matter interactions at the single-molecule level”

Metal nanoparticles sustain a collective oscillation of their free electrons, called a localized surface plasmon resonance (LSPR), when excited by an electromagnetic wave. When this incident wave is resonant with the LSPR frequency, the field intensity is strongly increased in the near field of the nanoantenna. Plasmonics thus provides a unique setting for the manipulation of light via the confinement of the electromagnetic field to regions well below the diffraction limit. This has opened up a wide range of applications based on extreme light concentration, including nanophotonic lasers and amplifiers optical metamaterials, biochemical sensing and antennas transmitting and receiving light signals at the nanoscale. However, many difficulties remain in experimentally measuring the shape, size, and enhanced field properties of the localized electromagnetic modes in the vicinity of the nano-particles due to the limitations of optical microscopy. In this seminar, I will discuss how we can unravel the coupling of light to a nano-antenna through single-molecule fluorescence imaging. This technique is a powerful tool to optically study structures beyond the diffraction limit by localizing isolated fluorophores and fitting the emission profile to the microscope point-spread function. By using the random motion of single dye molecules in solution to stochastically scan the surface, and by assessing emission intensity, wavelength, and density of emitters as a function of position, we gain new insight into the properties of these systems and pave the way for the development of better plasmonic devices.