Physics Department Colloquium

Super-resolution Imaging of Plasmonic Nanostructures

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SERC # 110 A, 3pm

Refreshments served at 2.45pm

Abstract

Noble metal nanoparticles can support localized surface plasmons, which lead to strong nanoparticle coloration and enhanced electromagnetic fields at the nanoparticle surface that are the basis of surface-enhanced spectroscopies such as surface-enhanced Raman scattering (SERS). While extensive theoretical calculations have been performed that predict how these plasmon-enhanced electromagnetic fields are distributed on the nanoparticle surface, confirming these results using optical techniques is extremely challenging due to the diffraction limit of light, which prevents objects smaller than roughly half the wavelength of light from being resolved. Because the metal nanoparticles are smaller than the wavelength of light, they appear as diffraction-limited spots in optical images, obscuring the local electromagnetic field enhancements as well as the position of molecules residing in these regions of strong plasmonic enhancement. This talk will describe plasmon-coupled super-resolution single molecule imaging techniques as a new tool to beat the diffraction limit by over an order of magnitude, providing the necessary resolution to optically image local electromagnetic field enhancements and probe plasmon-coupled molecular emission.