Colloquium Notice

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Nanostructured Materials as the New Playing Field for Nonlinear Optics

In nonlinear optics, we study the material response to excitation by intense optical fields. Phenomena such as harmonic generation, ultrafast laser spectroscopy and super-resolution microscopy, have all emerged from fundamental understanding of the nonlinear material response.

In this talk, I will discuss how nanostructures provide a fertile ground for nonlinear optical interactions, and how “squeezing” light to the nanometric regime gives rise to unforeseen nonlinear phenomena and photonic devices with unmatched functionalities. By using modern nanofabrication tools such as focused ion beam and additive electron beam nanolithography, we can rationally design nanostructures to selectively enhance the nonlinear response and efficiently generate coherent optical beams at new optical frequencies. The nanoscale control over the phase of the optical waves leads to new implementation of the basic physical laws governing electromagnetic wave interactions, leading the way towards the realization of integrated photonics devices that can simultaneously generate and shape light beams. Using these ideas, we have recently demonstrated holograms that produce a “floating” visible image when illuminated by an invisible beam, and multi layered plasmonic devices with unique optical functionalities. Prospects for the incorporation of precise nonlinear phase control with state-of-the-art nanofabrication for fundamental studies and for practical device applications will be discussed.

[1] E. Almeida and Y. Prior. Scientific Reports 5, 10033 (2015)
[2] E. Almeida, G. Shalem and Y. Prior. Nature Communications 7, 10367 (2016)
[3] E. Almeida, O. Bitton and Y. Prior. Nature Communications 7, 12533 (2016)
[4] O. Avayu*, E. Almeida*, Y. Prior and Tal Ellenbogen. Nature Communications, in press (2017)

Monday
March 13, 2017
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326