



Old Dominion University

Department of Physics

Colloquium

Tuesday, November 5, 2019

"Atomic Metamaterials: Progress and Challenges"

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Abstract:

Metamaterials are engineered structures with optical properties that cannot be found in nature. Over the last two decades, there has been a growing interest in metamaterials with a negative index of refraction ($n < 0$) due to their possible exciting practical applications. For example, it has been predicted that such metamaterials can be used to construct lenses that can image objects with a resolution much smaller than the wavelength of light.

Negative index metamaterials are traditionally constructed from periodic metal or metal/dielectric structures whose resonances are engineered to produce the desired optical response. We have been exploring an alternative approach where we use sharp optical resonances of atomic or ionic ensembles: i.e, we use the resonances provided to us by nature. In this talk I will review this "atomic metamaterials" approach. Although we have not yet been able to achieve a negative index with this approach, we were recently able to overcome one of the key obstacles and obtain magnetic response in the optical region. I will discuss our recent experiments where we studied optical magnetic response from a europium-doped crystal at cryogenic temperatures.

Presentation: **OCNPS 200 @ 3:00 pm**

Refreshments: **OCNPS Atrium @ 2:30 pm**

All interested persons are cordially invited to attend.