# The Mathematics of Dispersion for Optical Metamaterials

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Metamaterials are a class of man made dielectric media with exotic optical properties. Unlike photonic crystals metamaterials achieve novel spectral behavior through structural hierarchy and localized resonance. We develop the rigorous mathematical framework necessary for the computational design of negative index behavior inside electromagnetic metamaterials. It is shown that novel dispersive properties are achieved through the geometric interlacing of two distinct types of localized resonances. The theory is manifestly multiscale and provides a systematic basis for the computational design of microstructure for frequency dependent negative index and backward wave phenomena. Computational examples are presented that quantitatively show how microgeometry controls the dispersion curves for the metamaterial.

The lecture will take place in Thackeray 704 at 3:30pm.
Refreshments will start at 3:00pm.