MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Thursday, January 26, 2017
4:30 – 5:20 PM
Barnard/EPS 103

Harnessing Quantum Science at the Nanoscale with Engineered Materials

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Abstract:

The field of quantum science and engineering in recent years has led to dramatic conceptual and practical advances in optical technologies, including high-speed quantum cryptography, quantum repeater networks, quantum-enhanced sensing and detection of bioaerosols and toxic materials. The next frontier is the transferring of these capabilities right at the nanoscale and harness the laws of quantum physics to deliver devices with novel functionalities. To this end, engineered nanophotonic materials composed of subwavelength-scale metallic and dielectric building blocks, offer an appealing perspective by bringing light tightly at the nanoscale and molding their flow on these length scales.

In this colloquium, I will present our work on harnessing quantum coherence and interference effects, beyond its conventional atomic, molecular and optical physics platform, to nanoengineered materials. I will discuss employing engineered surfaces -*metasurfaces*- integrated with quantum emitters for quantum photonic applications at single-photon level. I will show how an optimally designed metasurfaces can be uniquely exploited to tailor the quantum vacuum over macroscopic distances. In an outlook, I shall discuss the integration of metasurfaces with micro-fabricated atom chips that offers miniaturized platform for quantum optics with cold atoms. Such metasurface atom chip may open up new vistas for quantum technologies in sensing, metrology and communications.

Host: Randy Babbitt

***** Refreshments served in the Barnard Hall second floor atrium at 3:45 *****
Dr. Jha is a candidate for Physics Faculty Position