PHYSICS & ASTRONOMY COLLOQUIUM
UNIVERSITY OF WISCONSIN – STEVENS POINT

FRIDAY, Nov 16, 2012
2:00 PM Room A106 SCI

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Optical atom traps and localization of light - weak localization in high density ensemble of ultra-cold Rb atoms

Pasad Kulatunga is a visiting assistant professor of physics at Lawrence University. After spending a year at the University of Colombo, Sri Lanka, Dr. Kulatunga obtained his undergraduate degree from UW Whitewater and a PhD in atomic, molecular and optical physics from Old Dominion University. From 2002-2005, he was a postdoctoral researcher at UW Madison working in the field of neutral atom quantum computing. He has taught at Hobart and William Smith College in NY and since 2011 is at Lawrence University as a visiting assistant professor.

ABSTRACT: Weak localization of light or coherent backscattering (CBS) of light is a phenomena in which partial waves traversing momentum-reversed (time-reversed) scattering paths interfere constructively in the backscattering direction leading to an enhancement of scattered light intensity. The enhancement of intensity is proportional to a reduction of light transported in the scattering medium. Thus the CBS signal is a measure of localization of light in the scattering medium. We are building an apparatus to observe weak localization of photons in a high density sample of ultra-cold atoms. First we slow the atoms from room temperature (300 m/s) to less than 10 cm/s in a magneto-optical trap (MOT) where the atom number density is 10^{11} atoms/cm^3. In order to increase the atomic density the atoms in the MOT are transferred to a far detuned microscopic dipole trap created by a laser focused to a waist of approximately 5μm. We have successfully loaded the MOT and are now in the process of loading the high density microscopic dipole trap. Once this is achieved we will look at the CBS signal as a function of the atom number density and the scattering cross section. The goal of the project is to reach the Joffe-Regel region where mean free path length is about the wavelength of the scattering radiation.

Faculty, staff and students are cordially invited to attend.
Refreshments will be served beginning at 1:45 pm