Physics Colloquium

Michigan Technological University

Thursday, March 21, 2013
at 4:00 pm
in Room 139 Fisher

Generation of Correlated and Entangled Photon-pair in a Short Highly Nonlinear Fiber

Yong Meng Sua
Advisor: Dr. Kim Fook Lee

Abstract: Direct generation of telecom wavelengths entangled photon pairs in optical fiber attracted enormous interest due to its well defined spatial mode and inherent compatibility with existing fiber optics technologies. We demonstrate the generation of high purity correlated and entangled photon pair at telecom wavelength via spontaneous four-waves mixing in a short highly nonlinear fiber (HNLF). We observe coincidence count to accidental coincidence count ratio (CAR) of 29±3 at room temperature (300K) and as high as 130±5 when the fiber is cooled to liquid-nitrogen temperatures (77K). Two photon interference with visibility >98% (>92%) and violation of Bell's inequality by >12 (≈5) standard deviations are observed at 77K (300K) without subtracting accidental-coincidence counts.

Adventures in Friedmann Cosmology-Negative Energy Density

Ravi Joshi
Advisor: Dr. Robert Nemiroff

Abstract: The mystery of the Universe has always fascinated the mankind. The feasible form of energy existing in the Universe is the positive energy. How would the Universe behave if the negative forms of energy exist and how would negative energy density affect a classic Friedmann cosmology? Although never measured and possibly unphysical, the evolution of a universe containing a significant cosmological abundance of any of a number of hypothetical stable negative energy components is explored. These negative energy Omega < 0 forms include negative phantom energy w<-1, negative cosmological constant w=-1, negative domain walls w=-2/3, negative cosmic strings $w=-1/3, negative mass w=0, negative radiation w=1/3, and negative ultralight w > 1/3. The Friedmann equations can only be balanced when negative energies are coupled to a greater magnitude of positive energy or positive curvature, and minimal cases of both of these are considered for the behavior of the Universe. In this talk, I will present the future and fate of such universes.

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