Abstract:

The ability to produce and manipulate multiphoton quantum states is not only crucial for improving our fundamental understanding of quantum mechanics, but also for the development of modern quantum technologies. In the past few years, techniques for photon subtraction have enabled the engineering of novel families of quantum states of light, which have been employed to pursue a rich variety of studies ranging from fundamental tests of quantum theory to novel applications, such as quantum imaging and quantum metrology. Interestingly, it has been predicted the possibility of generating mesoscopic, correlated states of light with sub-Poissonian, Poissonian or super-Poissonian statistics by subtracting photons from two-mode squeezed vacuum states. However, the probability of subtracting more than one photon from conventional spontaneous parametric down-conversion sources is very small, thus rendering the experimental generation of correlated photon-subtracted states extremely difficult.

In this talk, I will show you how we have overcome the low-efficiency problem by making use of a bright source of spontaneous parametric down-conversion, together with photon-number resolving detectors, to demonstrate the first experimental generation of correlated photon-subtracted states. In addition, I will report on our progress on the investigation of Hong-Ou-Mandel (HOM) interferometry with mesoscopic states of light.

*Physics colloquium is scheduled for 2018-2019 academic year for every Thursday, 3:30 PM in LD 010. Changes to the schedule will be posted at www.physics.iupui.edu