

# Joint CQSE and CASTS Seminar

Weekly Seminar  
Mar. 13, 2015 (Friday)

TIME Mar. 13, 2015, 14:30 ~ 15:30  
TITLE Breakdown of Bose-Einstein Distribution in Photonic Crystals  
SPEAKER Prof. Wei-Min Zhang  
Department of Physics, National Cheng Kung University  
PLACE Rm716, CCMS & New Physics Building, NTU

## Abstract

In the last two decades, considerable advances have been made in the investigation of nano-photonics in photonic crystals. Previous theoretical investigations of photon dynamics were carried out at zero temperature. Here, we investigate micro/nano cavity photonics in photonic crystals at finite temperature. Due to photonic-band-gap-induced localized long-lived photon dynamics, we discover that cavity photons in photonic crystals do not obey Bose-Einstein statistical distribution. Within the photonic band gap and in the vicinity of the band edge, cavity photons combine the long-lived non-Markovian dynamics with thermal fluctuations together to form photon states that memorize the initial cavity state information. As a result, Bose-Einstein distribution is completely broken down in these regimes, even if the thermal energy is larger or much larger than the cavity detuning energy. In this investigation, a crossover phenomenon from equilibrium to nonequilibrium steady states is also revealed.

