

# Joint CQSE and CASTS Seminar

2018  
Nov. 16, Friday

TIME Nov. 16, 2018, 14:30 ~ 15:30  
TITLE Non-linear optics using Cooper-pair box quantum meta-materials  
SPEAKER Prof. Watson Kuo  
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PLACE Rm716, CCMS & New Physics Building, NTU

## Abstract

I will talk about a theoretical work on electromagnetic waves propagating in open Cooper-Pair Boxes (CPBs) system. The results demonstrate an ensemble of CPBs as highly non-linear meta-material for electromagnetic waves. Incorporating the CPBs in a ring resonator or a Fabry-Perot cavity, one finds that: (1) With weak environmental couplings and CPBs in superconducting phase dominant regime, the non-linearity is enhanced and the system exhibits regular optical hysteresis. (2) With finite environmental couplings and CPBs in charge dominant regime, the Josephson effect and environmental effect can constructively interplay to produce a gain. I will also talk about our recent progress on realizing topologically-non-trivial Su-Schrieffer-Heeger model using classical meta-materials at microwave frequencies.

