

# Joint CQSE and CASTS Seminar

2019  
May. 24, Friday

TIME May. 24, 2019, 14:30 ~ 15:30  
TITLE Nuclear quantum memory of a single  $\gamma$  photon  
SPEAKER Prof. Wen-Te Liao  
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PLACE Rm716, CCMS & New Physics Building, NTU

## Abstract

A  $\gamma$ -ray-nuclear quantum interface is suggested as a new platform for quantum information processing, motivated by remarkable progresses in  $\gamma$ -ray quantum optics. The main advantages of a  $\gamma$  photon over an optical photon lie in its almost perfect detectability and much tighter, potentially sub-angstrom, focusability. Nuclear ensembles hold important advantages over atomic ensembles in a unique combination of high nuclear density in bulk solids with narrow, lifetime-broadening Mössbauer transitions even at room temperature. This may lead to the densest long-lived quantum memories and the smallest size photon processors. In this talk I will talk about our recent proposal of a technique for  $\gamma$  photon quantum memory through a Doppler frequency comb, produced by a set of resonantly absorbing nuclear targets that move with different velocities [1]. It provides a reliable storage, an on-demand generation, and a time sequencing of a single  $\gamma$  photon. This scheme presents the first  $\gamma$ -photon-nuclear-ensemble interface opening a new direction of research in quantum information science.

[1] arXiv:1812.11441 (2018)

