

# Joint CQSE & NCTS Seminar

2023  
Apr. 21, Friday

TIME Apr. 21, 2023, 14:30~15:30pm  
TITLE Quantum impurities coupled to a Fermi gas: From statistics of transport to atomtronics  
SPEAKER Prof. Jhih-Shih You  
(Department of Physics, National Taiwan Normal University)  
PLACE NCTS Physics Lecture Hall, 4F, Chee-Chun Leung Cosmology Hall, NTU  
ONLINE <https://nationaltaiwanuniversity-zbn.my.webex.com/>



## **Abstract:**

In this talk, I will first discuss the real-time Ramsey response of heavy quantum impurities immersed in a Fermi gas at zero and at finite temperature. Then I will introduce an ultracold atom setup, analogous to a spintronics device, which generates spin transport induced by an impurity atom immersed in a spin-imbalanced two-component Fermi gas. By manipulating the internal spin degrees of freedom of the Fermi system, one can directly investigate the full counting statistics of spin flips. Moreover, since the impurity interacts with a many-body environment that is out of equilibrium, our setup provides a way to realize the non-equilibrium orthogonality catastrophe. For the impurity response at late time, we are able to derive analytical expressions, which reveal an intimate connection of the decay rate of the Ramsey contrast and the full counting statistics of spin flips. Our study paves a way for controlling and harnessing fermionic many-body states in atomtronics.

## **Biography Brief:**

### RESEARCH INTERESTS:

Theoretical study on condensed matter and ultra-cold physics, with particular focus on quantum geometry, topological matter, non-equilibrium phenomena, nonHermitian physics and quantum phase transitions.

### ACADEMIC HISTORY:

-Assistant Professor, Aug. 2020- Present

Department of Physics, National Taiwan Normal University, Taiwan

-Postdoctoral Scholar, Oct. 2017–Jul. 2020

Institute for Theoretical Solid State Physics, Leibniz Institute for Solid State and Materials Research in Dresden (IFW Dresden), Germany

-Postdoctoral Fellow, Sep. 2015–Sept. 2017

Department of Physics, Harvard University, USA

-Visiting Student, Sep. 2013 –Aug. 2015

Department of Physics, University of California, San Diego, USA

EDUCATION:

BS & MS & PhD, Department of Physics, National Tsing Hua University, Taiwan, 2015.

ACADEMIC SERVICES:

Referee for PRX, PRL, PRA, PRB, PR Materials, SciPost Physics, 2D Materials , Nano Letter, Nature.

