

# Joint CQSE and CASTS Seminar

Weekly Seminar  
May 20, 2016 (Friday)

TIME May 20, 2016, 14:30 ~ 15:30  
TITLE Lattice Chern Insulator in Spintronics  
SPEAKER Prof. Tsung-Wei Chen  
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## Abstract

One of the goals of spintronics is to manipulate spin and charge currents in a proper way that the net spin polarization accompanying the charge current can be controlled independently. The spin-orbit interaction mechanism in the bulk materials provides a good way to control the motion of spin and charge currents without breaking the time-reversal symmetry. However, the spin-orbit interaction results in the lock of spin and momentum. Unavoidably, the change in charge current direction leads to the change in the spin polarization. On the other hand, the charge current in the bulk would accompany dissipation heat due to the collision of charge carriers with impurities. Therefore, the spin polarization of edge currents plays an important role in the development of spintronics, such as the emergences of quantum spin Hall effect and topological insulators. In our study, the Chern insulator, breaking time-reversal symmetry without Landau levels, would enable us to control the number of edge currents and manipulates spin and edge currents independently when the spin-orbit coupling is taken into account.

