DEPARTMENT OF PHYSICS & ASTRONOMY

CONDENSED MATTER SEMINAR

Haoliang Liu

Department Physics & Astronomy

University of Utah

Parity Time Symmetry in Magnonics

In this talk we tie together Magnonics and $\mathcal{PT}$ symmetry. Magnonic circuits have recently attracted great interest, because of the low energy consumption, high operation frequency and potential to replace conventional electronic devices. We couple Magnonics with non-Hermitian Hamiltonians that may still have real eigenvalues provided that a combined parity-time ($\mathcal{PT}$) symmetry exists. The prospect of $\mathcal{PT}$ symmetry based on balanced gain and loss has been explored in several physical systems such as Photonics, Acoustics and Electronics. The eigenvalues spectra in such systems undergo a transition from real to complex at exceptional points (EP), where the $\mathcal{PT}$ symmetry is broken. Here we demonstrate the existence of EP in Magnonic devices comprise of two-coupled ferromagnetic (FM) films having different magnon losses. We show that the magnonic eignfrequencies and damping rates in the devices change from crossing to anti-crossing at the EP when the coupling strength increases. Also the magnonic dispersion relations in the devices comprise of two branches; a strong 'acoustic-like' mode, and a weak 'optic-like' mode. In addition, upon microwave radiation the $\mathcal{PT}$ magnonic devices act as magnon resonance cavity with unique response compared to conventional magnonic systems.

Tuesday, October 22, 2019

JFB 334

4:00 pm

Refreshments will be served in JFB 334 at 3:45 pm