

# UCCS Mathematics Colloquium

Thursday, September 9<sup>th</sup>

UC 307

12:30 pm – 1:30 pm

(Refreshments at 12:15)

Dr. Yi Zhu, University of Colorado at Boulder

## Unified description of Bloch envelope dynamics in the 2D nonlinear periodic lattices

**Abstract:** The propagation of wave envelopes in two-dimensional simple periodic lattices is studied. A discrete approximation, known as the tight-binding approximation, is employed with an associated Fredholm alternative, in order to find the equations governing a class of nonlinear discrete envelopes in simple two dimensional periodic lattices. When the envelopes vary slowly, the continuous envelope equations are derived from the discrete system. The coefficients of the linearized evolution equation are related to the linear dispersion relation in both the discrete and the continuous cases. This agrees with the continuous envelope equations which was derived directly via a multi-scale expansion. The continuous systems are nonlinear Schrödinger type equations.