**XINGFU ZOU**, University of Western Ontario

*Evolution of anti-predation response of prey in a general patchy environment*

In this talk, I report some recent results on the evolution of anti-predation responses of a prey when perceiving the presence of its predator in a patch environment. To this end, we consider a ODE model on the patches in which two subspecies with distinct anti-predation response levels that affect the respective growths (cost) and predating rate (benefit) as well as their dispersion rates. We derive formulas for the invasion exponent and evolutionarily stable strategy. Our main techniques are from the theory of adaptive dynamics and a graph-theoretic approach based on the tree-cycle identity. In the scenario that the dispersion rate is increasing in fear level and the growth rate is decreasing in the fear level, our results indicate that the prey species with lower fear effect will invade in the heterogeneous environment. We also present some numerical simulations results to testify our theoretical findings, and discuss the effects of the monotonicity of mobility and fitness on evolutionarily stable strategy and convergence stable strategy. This is a joint work with Dan Huang.