



COLLOQUIUM

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**Dynamics and Bifurcations in a Predator-Prey System with
Holling Functional Responses and Allee Effects**

Friday Sept. 26th at 2:30pm in RT 1516

Bio: Dr. Chunhua Shan is a mathematician whose research interests include differential equations and dynamical systems. He received his Ph.D. in Mathematics at York University in Canada in 2013 under the direction of Huaiping Zhu. He then worked as a Visiting Assistant Professor at Georgia Institute of Technology before becoming a Postdoctoral Fellow at the University of Alberta, Canada. Currently, Dr. Shan is an Associate Professor at the University of Toledo.

Abstract: The transition between strong and weak Allee effects in prey populations represents a fundamental regime shift in ecology. In this talk, we examine the interplay between Holling-type functional responses and Allee effects in a predator-prey system. We demonstrate that the system exhibits complex dynamics and higher-codimension bifurcations. A new unfolding of nilpotent saddle of codimension 3 with a fixed invariant line is discovered and developed, and the existence of codimension 2 heteroclinic bifurcation is proven. Our work extends existing knowledge of predator-prey systems with Allee effects. The bifurcation analysis and corresponding diagrams allow for biological interpretations of predator-prey interactions.

Coffee available in RT 1517 before the talk at 2pm