Modern Mathematics Workshop 2018

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SPEAKER TITLES/ABSTRACTS

Veronica Ciocanel

MBI

Bio:

Veronica Ciocanel received her PhD in Applied Mathematics from Brown University in 2017, where her work focused on modeling spatial differentiation in early developing organisms such as frog oocytes. She joined the Mathematical Biosciences Institute at Ohio State as a Postdoctoral Fellow, and in 2018 she was selected as a President's Postdoctoral Scholar at The Ohio State University. At OSU, she collaborates with Dr. Adriana Dawes (Mathematics, Molecular Genetics) to develop agent-based models providing insight into motor-filament interactions, which are key in formation of contractile rings in the worm reproductive system. In addition, she collaborates with Dr. Anthony Brown (Neuroscience) to develop stochastic models of axonal transport kinetics through nodes of Ranvier. She also enjoys student mentoring and outreach and has founded an undergraduate mathematical modeling contest at OSU.

Abstract:

"Modeling the Cytoskeleton Roads in Intracellular Transport"

The cellular cytoskeleton is essential in proper cell function as well as in organism development. These polymers provide the elaborate roads along which most intracellular protein transport occurs. I will discuss several examples where mathematical modeling, analysis, and simulation tools help us study and understand the interactions between these filaments roads and motor proteins in cells. In neurons, neurofilaments navigate axons and their constrictions to maintain a healthy speed of neuronal communication. We develop stochastic models that may provide insights into transport mechanisms through axonal constrictions. In the reproductive system of the worm C. elegans, we use agent-based modeling to study how myosin motors interact with actin filaments to maintain contractile rings that allow passage and nutrient transport for developing egg cells. In addition, we have recently become interested in using topological data analysis tools to assess maintenance and establishment of these ring structures.