1145-37-1511 **Angelika Manhart**, **Dhananjay Bhaskar**, **Jesse Milzman**, **John Nardini*** (jtnardin@ncsu.edu), **Chad Topaz**, **Kathleen Storey** (storeyk@umich.edu) and **Lori Ziegelmeier** (lziegel1@macalester.edu). *Deducing dynamical rules via machine learning and topology.*

The D'Orsogna model is an agent-based model frequently used to describe biological aggregations, such as schools of fish or flocks of birds, in which self-propelling individuals interact through tunable attractive and repulsive forces. In this study, we analyze simulations of the D'Orsogna model using a topological tool known as the CROCKER plot, which captures the persistent homology of particle positions and velocities over time. We use the topological data as input for machine learning techniques, both supervised and unsupervised, in order to classify emergent simulation behavior and to identify model parameters generating this behavior. We compare the classification performance of topological features with a more traditional parameter identification approach, involving the calculation of order parameters that describe global properties (avg. angular momentum, polarization, etc.) of swarms. (Received September 22, 2018)