1145-55-2067 **Lu Xian*** (`lxian@macalester.edu`), 1600 Grand Avenue, Saint Paul, MN, and **Lori Ziegelmeier** and **Maitrayee Deka**. *Using Order Parameters and Persistent Homology to Analyze Biological Aggregations.* Preliminary report.

In this project, we explore the dynamics of biological aggregations which are groups of organisms, such as fish schools, bird flocks, and insect swarms, formed through social interaction and coordinated behaviors like attraction, repulsion, and/or alignment. We aim to classify by parameter numerical simulations generated from the highly-cited Vicsek model using both topology and the classic alignment order parameter. The topology approach computes the persistent homology at all time values of a simulation and summarizes this information as a crocker plot. The order parameter approach computes the normalized average of the velocity (that is, the alignment), producing a time series of the simulation. The outputs of both approaches for every simulation are input as feature vectors to machine learning clustering algorithms. We show that clustering with topology yields better results than clustering with order parameter, and therefore, topology can be used as a reasonable means for parameter identification. (Received September 25, 2018)