1163-65-632 **Margaret H Regan*** (mregan@math.duke.edu). *Machine learning the discriminant locus.*

Parameterized systems of polynomial equations arise in many applications in science and engineering with the real solutions describing, for example, equilibria of a dynamical system, linkages satisfying design constraints, and scene reconstruction in computer vision. Since different parameter values can have a different number of real solutions, the parameter space is decomposed into regions whose boundary forms the real discriminant locus. In this talk, I will discuss a novel sampling method for multidimensional parameter spaces and how it is used in various machine learning algorithms to locate the real discriminant locus as a supervised classification problem, where the classes are the number of real solutions. Examples such as the Kuramoto model will be used to show the efficacy of the methods. Finally, an application to real parameter homotopy methods will be presented. This project is joint work with Edgar Bernal, Jonathan Hauenstein, Dhagash Mehta, and Tingting Tang. (Received September 10, 2020)