

Title: Decision-making dynamics in the basal ganglia: a theory and a complication

Jonathan Rubin, Ph.D.

Professor and Department Chair of Mathematics

University of Pittsburgh, USA

Abstract: The basal ganglia are a collection of brain areas that are connected by a variety of synaptic pathways and are a site of significant reward-related dopamine release. These properties suggest a possible role for the basal ganglia in action selection, guided by reinforcement learning. In this talk, I will discuss a framework for how this function might be performed and computational results identifying putative low-dimensional control ensembles that may be involved in tuning decision policy. I will also present some recent experimental results and theory that run counter to the classical view of basal ganglia pathways and call for a re-evaluation of certain aspects of this framework.

Short Biography: Dr. Jonathan Rubin is Professor and Chair in the Department of Mathematics at the University of Pittsburgh, where he has been a faculty member since 2000. His background is in dynamical systems and his research, which includes mathematical analysis as well as more applied work in collaboration with experimentalists, specialties include multiple timescale dynamics, neuronal bursting and rhythm generation, and basal ganglia dynamics. He is a member of the 2021 Class of SIAM Fellows.