NEURAL ENGINEERING SEMINAR SERIES

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Measuring and Modeling Seizures and Seizure Associated Spreading Depolarization

https://psu.zoom.us/j/94639233394

August 31, 2022

12:15 -1:15 p.m. (E.T.)

W306 Millennium Science Complex

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ABSTRACT: The epilepsies are a spectrum of brain disorders characterized by recurrent unprovoked seizures – events in which portions of brain stop functioning, and often result in significant loss of behavioral control and consciousness. Over the last decade, my group has demonstrated in animal models that spontaneous seizures often lead to seizure-associated spreading depolarization events. I will describe recent work from my group investigating tissue level oxygenation and if fluctuations in its supply lead to these events. I will also describe a new modeling framework that allows us to use membrane-level models of neural function to create meso-scale models with the aim to predict why the epileptic brain is not seizing all the time.

BIOGRAPHY: Bruce J. Gluckman earned his BS (1988) in Engineering Physics from the University of Illinois at Urbana-Champaign, and his Ph.D. in Experimental Physics at the University of Pennsylvania. After a postdoctoral fellowship with the Naval Surface Warfare Center, and a Research Assistant Professorship with Children's National Medical Center and the George Washington University, he joined the faculty at George Mason University in 1998 with appointments in the Department of Physics and Astronomy and the Krasnow Institute for Advanced Study. In 2006, he joined Penn State University with appointments in the Department of Engineering Science and Mechanics (ESM) (tenured) and in the Department of Neurosurgery, where he co-founded the Penn State Center for Neural Engineering, which he now serves as Director.

Dr. Gluckman's work in neural engineering has focused on understanding the generation of organized activity in neural systems, the details of how to measure and interact with such systems, and how to link models – both theoretical and computational – to experiment. His current research includes: the design of instrumentation, electronics and control systems and sensor development for recording and modulating brain activity; the study of seizure dynamics; the modeling and observation of biological regulatory systems such as sleep and their interaction with brain function and their interaction with disease dynamics and progression such as epilepsy and Alzheimer's disease; modeling and measurement of the multiscale material physics of brain tissue; assimilation of clinical data such as blood glucose into physiological models for development of better clinical treatments; and the links between infectious diseases such as malaria and the development of neurological diseases such as epilepsy.