

**“Real-Time, Phase-Dependent
Reactivation of Memories in the
Mammalian Brain”**

Friday, May 5th, 2023
12:00 – 1:00 p.m.

McDonnell Douglas Auditorium

Reception: 4:00 – 5:00pm
Natural Sciences II, 3rd Floor Lobby



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Abstract: Memory processing in the mammalian brain is a dynamic cognitive task requiring coordination between various brain regions. Circumstantial evidence suggests that the theta rhythm, a 4-12 Hz population oscillation, is important for memory function in a variety of species, including rodents and humans. The SPEAR (separate phases for encoding and retrieval) model, a computational model based on in-vitro electrophysiological and anatomical data, proposes that different phases of theta (peak versus trough) separate recall of stored memories from encoding of new experiences. Using real-time optogenetic stimulation of memory-encoding neurons, we tested the hypothesis that recall-phase drive is more behaviorally effective. Our results support this model: appropriately phased driven activity drives more robust recall and shows other hallmarks of normal memory processing. Our results suggest that real-time processing will be an important component of memory prostheses in the future.

Biography: John A. White, Ph.D., is Professor and Chair of Biomedical Engineering at Boston University and President of the Biomedical Engineering Society. He has joint appointments in the Program in Neuroscience and the Department of Pharmacology and Experimental Therapeutics. He is PI and Program Director for BU BME's long-standing NIGMS training grant in Quantitative Biology and Physiology. Prof. White received his BS in BME from Louisiana Tech University (1984) and his PhD in BME from Johns Hopkins University (1990).

Dr. White's research group uses engineering and computational approaches to study computation in single neurons and networks. He is known for describing the biophysical bases of neuronal oscillations and the factors that limit signal-to-noise in neurons and neuronal networks. He is author of over 100 peer-reviewed publications and has given over 250 invited lectures. White is a Fellow of the Biomedical Engineering Society, the American Institute for Medical and Biological Engineering, and the International Academy of Medical and Biological Engineering.