Boston University

Department of Physics
590 Commonwealth Avenue
Boston, MA 02215

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POSTDOCTORAL FELLOWSHIP OPPORTUNITY
in PHYSIOLOGIC DYNAMICS and NETWORK PHYSIOLOGY

Keck Laboratory for Network Physiology,
Physics Department, Boston University

Our group focuses on understanding physiologic dynamics and the mechanisms of neural regulation and network interactions of physiological systems, where we utilize concepts and methods from statistical physics and nonlinear dynamics. Our studies have shown that physiologic fluctuations carry important information of diagnostic and prognostic value, and that physiological systems are controlled by feedback mechanisms and exhibit emergent properties across space and time scales, similar to certain physical systems characterized by scale-invariant behavior and self-organized criticality. We investigate how physiologic dynamics change under different physiologic states (such as sleep stages, circadian phases, levels of physical activity) and under pathologic perturbations (cardiac, respiratory and sleep disorders; multiple organ failure). The research in the laboratory focuses on several physiological systems separately as well as on their interactions as a network. The investigations encompass analytic and modeling approaches that transcend time and space scales from the cellular to the system level with the aim to understand how physiologic states and functions emerge out of complex dynamics of physiological systems and their networked interactions.

We seek a post-doctoral fellow to join our team who will participate in ongoing projects on physiologic and brain dynamics related to sleep and sleep-stage transitions, and to develop research in the new field of Network Physiology. The projects will involve analysis of multi-channel recordings with focus on empirical findings, modeling the role of neuronal groups in sleep regulation, and developing novel dynamic network approaches to understand basic mechanisms of physiologic regulation in the context of network interactions across organ systems.

Research in the Keck Laboratory for Network Physiology is interdisciplinary at the interface of physics and applied mathematics, biomedical engineering and signal processing, neuroscience and physiology. The successful candidate will be encouraged to collaborate (and will possibly have a secondary affiliation) with the Department of Neurology at Beth Israel Hospital, the Division of Sleep Medicine at Brigham and Women's Hospital and the Intensive Care Unit/MICU at Massachusetts General Hospital, Harvard Medical School, where our laboratory has active collaborations. The rich environment at Boston University offers many opportunities for career development and education.

The candidate will have knowledge of data processing, nonlinear time series methods, scaling and synchronization analysis, stochastic modeling and networks. A background in physics or biomedical engineering is desirable. The initial appointment will be for 1 year, renewable annually thereafter. The position will be supported by a prestigious W. M. Keck foundation award to the Laboratory for Network Physiology, and the candidate will carry the title "W. M. Keck Foundation supported researcher".

Candidates should send a letter of interest, CV, and contact information for three references in electronic format to:

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