



Computational Analysis and Modeling of Brain Connectivity

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ABSTRACT:

The relationship between structure and function is of central importance for all biological systems, and it remains a particularly important challenge for our understanding of neural systems. My talk will be about emerging links between aspects of brain structure (connectivity) and brain function (dynamics and embodiment). Brain networks can be characterized by attributes such as reciprocal pathways, short path lengths, high clustering, an abundance of specific motifs, and highly economical wiring volume or length. How do these structural attributes relate to functional characteristics of brain networks, to their dynamic patterns, to their processing power, robustness, or capacity to support flexible behavior in embodied systems? I will review a series of computational approaches ranging from graph theory to robotics that attempt to identify how complex brain networks are organized, how they process and integrate information, and how brain, body and environment dynamically interact..