SANTA FE INSTITUTE

NCM Satellite Session on the Complexity of the Nervous System

The science of complexity is fundamentally concerned with the study of many-body adaptive systems -- for example, an ant colony or a country's economy.

The brain is arguably the ultimate complex adaptive system, as it is made up of millions of individual entities (neurons) that interact across multiple spatial and temporal timescales in order to learn about the body and the environment.

Beginning in the last third of the twentieth century, frameworks have become to emerge that seek to explain the behavior of aggregated learning systems like the brain. These include network theory, scaling laws, and non-linear dynamics. The Santa Fe Institute at the center of these theoretical efforts.

In this one-day satellite session, we shall review recent progress in complexity science. Introducing the fundamental tools and concepts required to understand adaptive neural phenomena. Our goal is to candidly demonstrate what they can and what they cannot do. We shall illustrate their power to make sense of complicated data as applied to neural case studios.

April 30, 2018 – Outline Schedule for Satellite Session

Time	Speaker	Affiliation	Topic
8:30 – 9:30 am	**David Krakauer**	Santa Fe Institute	Introduction to complex systems - from applied mathematics to new ways of thinking about the brain
9:30 – 9:45 am	***BREAK***		
9:45 – 12:00 noon	**Artemy Kolchinsky**	Santa Fe Institute	Tutorial on artificial neural networks, machine learning, and AI
12:00 – 1:00 pm	***Lunch***		
1:00 – 2:00 pm	**Michelle Girvan**	Santa Fe Institute University of Maryland	Network theory - statics and dynamics of neural connections
2:00 – 3:00 pm	**Geoffrey West**	Santa Fe Institute	Scaling and the brain
3:00 – 3:30 pm	***Break***		
3:30 – 4:30 pm	**Jessica Flack**	Santa Fe Institute	Collective computation in society and the brain
4:30 – 5:30 pm	**Panel:** Krakauer, Kolchinsky, Girvan, West and Flack	Santa Fe Institute and University of Maryland	Questions and general discussion
5:30 pm	***Satellite Session Ends***		