



THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Distinguished Lecture Series

Room 1 ,Ziskind Building
on Tuesday, Dec 26, 2017
at 11:15

Allen Tannenbaum
Stony Brook University

Optimal Mass Transport and the Robustness of Complex Networks

Abstract:

Today's technological world is increasingly dependent upon the reliability, robustness, quality of service and timeliness of networks including those of power distribution, financial, transportation, communication, biological, and social. For the time-critical functionality in transferring resources and information, a key requirement is the ability to adapt and reconfigure in response to structural and dynamic changes, while avoiding disruption of service and catastrophic failures. We will outline some of the major problems for the development of the necessary theory and tools that will permit the understanding of network dynamics in a multiscale manner.

Many interesting networks consist of a finite but very large number of nodes or agents that interact with each other. The main challenge when dealing with such networks is to understand and regulate the collective behavior. Our goal is to develop mathematical models and optimization tools for treating the **Big Data** nature of large scale networks while providing the means to understand and regulate the collective behavior and the dynamical interactions (short and long-range) across such networks.

The key mathematical technique will be based upon the use optimal mass transport theory and resulting notions of curvature applied to weighted graphs in order to characterize network robustness. Examples will be given from biology, finance, and transportation.