SOE 5: Award Ceremony: Young Scientist Award for Socio- and Econophysics

Time: Monday 16:00–18:00 Location: H44

Invited Talk SOE 5.1 Mon 16:00 H44

Tying the double knot: Robustness of interconnected networks — •Shlomo Havlin — Bar-Ilan University, ramat-Gan, Israel

After a decade of intense study on networks, almost all the research done has been concentrated on the case of a single network which does not interact with other networks. Such situations rarely, if ever, occur. Modern systems are coupled together and should be modeled by multiple interdependent networks. For example, a power station network and a computer communication network, are interdependent, since the comunication nodes rely for power supply on the power stations, while the power stations depend for their control on the proper functioning of the communication network. In interdependent networks, when nodes in one network fail, they cause dependent nodes in another network to also fail. This may happen iteratively and can lead to a cascade of failures. In fact, a failure of a very small fraction of nodes in one network may lead to the complete fragmentation of a system of many interdependent networks. We provide an analytical framework for understanding the robustness of interacting networks subject to such cascading failures. Surprisingly, analyzing complex systems as a set of interdependent networks may alter a basic assumption that network theory has relied on: while for a single network a broader degree distribution of the network nodes results in the network being more robust to random failures, for interdependent networks, the broader the distribution is, the more vulnerable the networks become. These findings pose a significant challenge to the future design of robust modern interdependent networks.

Presentation of the Young Scientist Award for Socio- and Econophysics to Dr. Dirk Brockmann, Northwestern University

Prize Talk SOE 5.2 Mon 17:00 H44

Unveiling the patterns of human mobility and global disease dynamics — •Dirk Brockmann — Northwestern University, Chicago

We are on the move. Every year, more than 3 billion passengers use the international air transportation network; our world is covered with a dense web of roads and highways, frequently operating at their maximum capacity; millions of commuters travel on an intricate system of railroads and public transportation services. Given the sheer complexity of human mobility patterns and transportation networks it may seem bold if not audacious to ask if basic underlying principles govern the evolution of these networks, whether mobility as a whole may follow fundamental laws, and what types of regularities are hidden within the complex way we travel. Nonetheless, a comprehensive understanding of human mobility is of fundamental importance in the development of models for the global spread of emergent infectious diseases, such as the recent H1N1 pandemic of 2009. I will report on our efforts to understand human mobility networks employing mobility proxies such as the geographic circulation of money, recent results on effective communities encoded in these networks and conclude with a discussion of our recent forecast of the time course of the HN1 pandemic in the United States.

After the awardee's talk, there will be a social gathering with beer and pretzels around the poster area C1.