AKSOE 9 Special Session: Young Scientist Award

Zeit: Montag 16:00–18:00 Raum: TU A151

Hauptvortrag AKSOE 9.1 Mo 16:00 TU A151

The Dynamics of Networks, and their Relevance to Infectious Diseases, IT, and Many Other Things — •Robert M. May — Department of Zoology, University of Oxford, Oxford OX1 3PS

The transmission of infection among humans or other animals, the spread of viruses or worms among computers, and the way ecosystems respond to disturbance are three examples of nonlinear dynamical systems whose behaviour depends upon the nature of the network of connections among nodes (that is individuals, computers, species, respectively). Recent and current concern about HIV/AIDS, SARS, and foot and mouth disease among livestock have prompted advances in our understanding of the interplay between network patterns and effective control measures. Separate, but ultimately related, work has recently focussed (often in the context of "homeland security") on protecting IT networks from attack. Perhaps surprisingly, this work has made relatively little contact with older questions about ecosystem resilience. My talk aims to be an opinionated overview of all this.

AKSOE 9.2 Mo 17:00 TU A151

Young Scientist Award

AKSOE 9.3 Mo 17:15 TU A151

Presentation of the laureate

Efficient immunization: how physics can help — •Reuven Cohen — Dept. of Computer Science and Applied Mathematics, Weizmann Institute of Science, 76100 Rehovot, Israel

In recent years many technological, social and biological networks have been studied. These studies have shown that thesenetworks belong to a new class of networks, and one of their main characteristics is a wide degree distribution.We will discuss the special proprieties of such networks. We demonstrate how percolation theory, used in statistical physics forvarious models, from oil extraction to egg boiling, can be used to study the stability of the Internet, or to analyze epidemic spreading in populations and computer networks. We show the strengths and weaknesses of heterogeneous networks and demonstrate how this knowledge may be used to evaluate and design immunization strategies. Finally, we present a new strategy for efficient immunization which requires no prior knowledge of the network topology.