SOE 6: Poster Session

Time: Monday 18:00–20:00 Location: Poster C

Please note: Posters may and should be on display all day.

SOE 6.1 Mon 18:00 Poster C

Employment, Production and Consumption Model: Patterns of Phase Transitions — •Hynek Lavička[1,2,3], Lin Lin[4], and Jan Novotný[1,5,6] — [1]Department of Physics, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, B\v{r}ehov\' a 7, 115 19 Praha 1, Czech Republic — [2]Doppler Institute for Mathematical Physics and Applied Mathematics, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, B\v{r}ehov\' a 7, 115 19 Praha 1, Czech Republic — [3]Bogolyubov Laboratory of Theoretical Physics, Joint Institute of Nuclear Research, 141980 Dubna, Russia — [4]Department of Economics, University of Kiel, Olshausenstrasse 40, 24118 Kiel, Germany — [5]CERGE-EI, Charles University, Politick\' ych v\v ez\v n\r u 7, 111 21, Praha 1, Czech Republic — [6]Nuclear Physics Institute, p.r.i., \v{R}e\v{z} near Prague, 250 68 \v{R}e\v{z}, Czech Republic

We have simulated the model of Employment, Production and Consumption (EPC) using Monte Carlo. The EPC model is an agent-based model that mimics very basic rules of industrial economy. From perspective of physics, the nature of the interactions in the EPC model represents multi-agent interactions where the relations among agents follow the key laws for circulation of capital and money. Monte Carlo simulations of the stochastic model reveal phase transition. The two phases are the phase with full unemployment and the phase with nearly full employment.

SOE 6.2 Mon 18:00 Poster C

Patterns of cooperation — •Anne-Ly Do and Thilo Gross — MPI for the Physics of Complex Systems, Dresden

We study the self-assembly of a complex network of cooperative interactions among rational, self-interested agents. The agents can maintain different levels of cooperation with different, self-chosen partners. Further, they continuously, selectively, and independently adapt the amount of resources allocated to each of their interactions in order to maximize the obtained payoff. We show analytically that the system approaches a state in which the agents make identical investments, and links produce identical benefits. Despite this high degree of social coordination some agents manage to secure privileged topological positions in the network enabling them to extract high payoffs.

SOE 6.3 Mon 18:00 Poster C

Evolution of cooperation on dynamical networks: An analytical approach — •Bin Wu[1,2], Arne Traulsen[1], and Long Wang[2] — [1]Max Planck Institute for Evolutionary Biology, August-Thienemann-Str. 2, 24306 Plön, Germany — [2]Center for Systems and Control, College of Engineering Peking University, Beijing 100871, China

We investigate how the dynamics of a social network can change the cooperativeness of agents in the network. We focus on the fragility of social tie, i.e. the probability to break a link, in the Prisoner*s Dilemma. Individuals either update their strategies by imitating their neighbors or break their social ties and establish new relationships. The pairwise comparison rule [1] is employed for the strategy evolution. For the linking dynamics, a random link is selected and it breaks with a probability that depends on the relationship type. Subsequently, a new link to a random neighbor is established. In contrast to earlier work [2], the total number of links is constant. The model can be solved analytically under time scale separation. This leads to a simple rule for the evolution of cooperation, that is, the more fragile CD links are (or the less fragile CC ones are), the more likely cooperation prevails [3]. Our work may shed light on the ubiquitous cooperation in the real world where social networks are dynamic.

[1] Szabó and Tőke, Phys. Rev. E 58, 69 - 73 (1998).

[2] Pacheco, Traulsen and Nowak, Phys. Rev. Lett. 97, 258103 (2006).

[3] Wu, et al. (submitted).

SOE 6.4 Mon 18:00 Poster C

Interevent times distribution in Voter-like models — •Juan Fernández-Gracia and Víctor M. Eguíluz — IFISC (UIB-CSIC), Palma de Mallorca, Spain

Motivated by the evidence of non-poissonian distributions in human activity patterns[1] and its impact on interactions on a network[2][3] we study the interevent times distribution on voter-like models of opinion formation. The Voter-model has been used for long time for studying out of equilibrium processes of consensus formation. The distribution of times between consecutive changes of state of a node is investigated for various variations of the voter model on different topologies.

[1]On Universality in Human Correspondence activity. R.Dean Malmgren, et al. Science 325,1696 (2009) DOI: 10.1126/science.1174562

[2]Impact of Human Activity Patterns on the Dynamics of Information Diffusion. José L. Iribarren, Esteban Moro. PRL 103, 038702 (2009)

[3]Impact of Non-Poissonian Activity Patterns on Spreading Processes. Alexei Vazquez, Balázs Rácz, András Lukács, Albert-László Barabási. PRL 98, 158702 (2007)

SOE 6.5 Mon 18:00 Poster C

Correlation Network Analysis of Climate Data — •Jakob Runge — Potsdam Institut für Klimafolgenforschung and Humboldt Universität zu Berlin

The contribution has been withdrawn.

SOE 6.6 Mon 18:00 Poster C

Self-organized critical improvidence — •Tobias Tubbenhauer[1], Stefan Bornholdt[1], and Thomas Lux[2] — [1]Institut für Theoretische Physik, Universität Bremen, Otto-Hahn-Allee, 28359 Bremen — [2]Institut für Volkswirtschaftslehre, Universität Kiel, Olshausenstraße 40, 24118 Kiel

Risk is an inherent property of stock markets [1,2]. Motivated by the dynamics of the recent financial crisis, we here study the balance between the willingness to take risks and the desire for security of investors in an agent-based artificial market. In the clash of these two conflicting interests we observe dynamical regimes that are reminiscent of the currently observed risk taking behavior of investors after the recent market crisis. We observe critical behavior in the dynamics of our toy market, indicating that the behavior of the agents quickly leads to new systemic risk, even shortly after a major crash.

[1] E. Samanidou, E. Zschischang, D. Stauffer, and T. Lux, Agent-based Models of Financial Markets, Rep. Prog. Phys. 70, 409 - 450 (2007)

[2] T. Lux, D. Colander, A. Haas, M. Goldberg, K. Juselius, A. Kirman, and B. Sloth, The Financial Crises and the Systemic Failure of Academic Economics, Critical Review 21, 249 - 267 (2009)

SOE 6.7 Mon 18:00 Poster C

Infectious diseases on livestock trade networks — •Hartmut Lentz[1,2], Thomas Selhorst[2], and Igor M. Sokolov[1] — [1]Humboldt University, Berlin — [2]Federal Research Institute for Animal Health, Wusterhausen

The spread of animal diseases is encouraged by trading of livestock. This might cause enormous economic losses. In Germany, veterinary authorities are obliged to report every movement of pigs to the central database (HI-Tier database). The database contains a network of all holdings belonging to the pork chain of production consisting of about 120.000 holdings (nodes) and and 3.5 million trade transactions. This yields a static weighted and directed network with about 300.000 edges. The geographical proximity between all holdings is known and can be used to model the disease spread by e.g. rodents. The dynamic of the spread of infectious diseases on networks is still not well understood. It is commonly investigated using stochastic agent based models. In these models it is difficult to obtain an understanding of the disease on a global level. To address this problem we introduce a time continuous SIR model and investigate its solutions. We consider the temporal behavior of the total number of infected and their dispersal.

SOE 6.8 Mon 18:00 Poster C

Individualized Trust in Social Networks — •Oliver Richters and Tiago P. Peixoto — TU Darmstadt, Fakultät für Physik

Non-centralized recommendation based decision making is a central feature of several social and technological processes, such as market dynamics, peer-to-peer file-sharing, and webs of trust of digital certification. We propose a metric for calculating transitive trust in social networks, based on the direct trust among agents. Our metric fully captures the individualized nature of trust, and does not rely on any specific topological characteristic of the network, contrary to similar methods proposed in the literature. Further, we investigate the general properties of trust in random networks, according to different strategies of choice of direct trust between agents.