MULTI04 Scientific Report

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From July, 19 to September 17, 2004, the two-months seminar *From Many-Particle Physics to Multi-Agent Systems* (MULTI04) took place at the MPI PKS. The seminar was accompanied by two workshops *I: Driven Many-Particle Systems - Hopping Particles, Granular Media, and Colloidal Systems*, 26-29 July 2004, *II: Multi-Agent Systems - Swarms, Ecology, and Society*, 29 August - 3 September 2004. Both, the seminar and the workshops, were part of the activities of the European Network of Excellence (NoE) "Complex Systems" (EXYSTENCE) and were jointly financed by EXYSTENCE and the MPIPKS. The event attracted a total of 80 participants. 22 of them were staying at the MPI PKS for a longer period (2.5 - 4 weeks), while the others participated in two different workshops. The participants did not just come from all over Europe, the Americas, and Asia, they also represented a large variety of scientific areas, ranging from physics, biology, informatics, to economics, the social sciences, and the humanities.

The seminar/workshops mainly focused on transdisciplinary aspects of Complex Systems, in order to develop a commonality of concepts and methods applicable to different fields. In particular, the aim was at the transfer of methods developed primarily in statistical physics to deal with many-particle systems in other scientific areas – where they are often called multi-agent systems – such as biology, artificial intelligence, or social sciences.

The participants included leading experts in their field, such as H. J. Herrmann (U Stuttgart) or S. Luding (U Delft) for granular material, D. Rubenstein (Princeton U) or S. Simpson (Oxford U) for collective biological motion, E. Ben-Jacob (U Tel-Aviv) or J. L. Deneubourg (Free U Brussels) for bacterial and insect societies, E. Bonabeau (Boston) for management sciences, or K. Nagel (Technical U Berlin) for traffic simulations. But there were also many young scientists from different areas, interested in transdisciplinary topics, who mostly stayed for a longer period (2.5 - 4 weeks). Apart from contributing to the two different workshops, they presented their work during a series of talks at the MPI PKS. The close interaction among the senior and the junior participants (in shared offices), also resulted in many common scientific projects.

The scientific aim of the seminar/workshops – to establish collaborations between physicists who want to apply their methods to interdisciplinary problems and scientists from other fields interested in formal methods developed for interacting particle system – was fully matched. In particular, many participants from the social sciences for the first time got involved in intensive collaborations with physicists, and the other way round – which was considered as very fruitful. It is expected to have about 12 different journal publications (according to a survey among the participants). Further a book on "Collective Biological Motion" published with Springer (Eds. I. Couzin, F.S.) is planned, which to a large extent reflects the common viewpoints of the second workshop.

The whole program of MULTI04 as well as other activieties, detailed aims and scope of the seminar/workshops is documented in the Internet at: `http://www.mpipks-dresden.mpg.de/~multi04/`