Ciclo Seminari - Modelli e Metodi Matematici per Sistemi Complessi

Dipartimento di Scienze Matematiche,
Politecnico di Torino,
Corso Duca degli Abruzzi 24, I-10129 Torino, Italy

Programma

1. **Vehicular Traffic and Crowd Dynamics - 11 Ottobre 2013**

2. **Mathematical Models in Social Dynamics - 29 Novembre 2013**

3. **Kinetic Theory Methods Toward Applications - 16-17 Dicembre 2013**

4. **Darwinian Dynamics and Complexity in Biology - Date da definirsi**

Organizzato da Nicola Bellomo e Elena De Angelis

Mathematical Models in Social Dynamics - 29 Novembre, 2013

Aula Buzano - Dipartimento di Scienze Matematiche - Politecnico di Torino

- **14.00 - Giuseppe Toscani** (Dipartimento di Matematica Università di Pavia)

  Knowledge and Ingenuity - A Kinetic Approach.

- **14.40 - Stefano De Michelis** (Dipartimento di Matematica Università di Pavia)

  Models for Human Communication

- **15.30 - Giulia Ajmone Marsan** (Organization for Economic Co-Operation and Development)

  "Complex systems: a new approach to economic challenges?"

- **16.10 - Break**

- **16.30 - Fabio Fagnani**

  "Centrality and influence in social networks"

- **17.10 - Giacomo Como**

  "Disagreement in opinion dynamics models"

- **18.00 - Tavola Rotonda** (Coordinano G. Fotia, CRS4 Cagliari e N. Bellomo)

Unraveling *Complex* Systems. We are surrounded by complex systems. Familiar examples include power grids, transportation systems, financial markets, the Internet, and structures underlying everything from the environment to cells in our bodies. Mathematics and statistics can guide us in understanding these systems in enhancing their reliability and improving their performance. (From `http://www.mathaware.org`).

L.H. Hartwell (Nobel laureate 2001). Although living systems obey the laws of physics and chemistry, the notion of function or purpose differentiate biology from other natural sciences. Organisms exist to reproduce, whereas, outside religious belief rocks and stars have no purpose. Selection for function has produced the living cell, with a unique set of properties which distinguish it from inanimate systems of interacting molecules. Cells exist far from thermal equilibrium by harvesting energy from their environment. (*Nature*, 1999).

R. May. In the physical sciences, mathematical theory and experimental investigation have always marched together. Mathematics has been less intrusive in the life sciences, possibly because they have been until recently descriptive, lacking the invariance principles and fundamental natural constants of physics. (*Science*, 2003).

G. Jona Lasinio. La vita rappresenta una fase avanzata di un processo evolutivo e selettivo. Mi pare difficile spiegare il vivente ignorando la sua dimensione storica. La dinamica delle popolazioni, di cui esiste una teoria matematica ancora in uno stato abbastanza primitivo dovrà spiegare l'emergere per selezione delle dinamiche proprie del singolo vivente. (*Quaderni della Scuola Normale Pisa*).

N. Bellomo, H. Berestycki, F. Brezzi, J. P. Nadal. The study of complex systems, namely systems of many individuals interacting in a non-linear manner, has received in recent years a remarkable increase of interest among applied mathematicians, physicists as well as researchers in various other fields as economy or social sciences. Their collective overall behavior is determined by the dynamics of their interactions. On the other hand, a traditional modeling of individual dynamics does not lead in a straightforward way to a mathematical description of collective emerging behaviors. (*Mathematical Models and Methods in Applied Sciences*, 2010)

N.N. Taleb "A Black Swan is a highly improbable event with three principal characteristics: It is unpredictable; it carries a massive impact; and, after the fact, we concoct an explanation that makes it appear less random, and more predictable, than it was". (*N.N. Taleb, The Black Swan: The Impact of the Highly Improbable, Random House, New York City, (2007).*