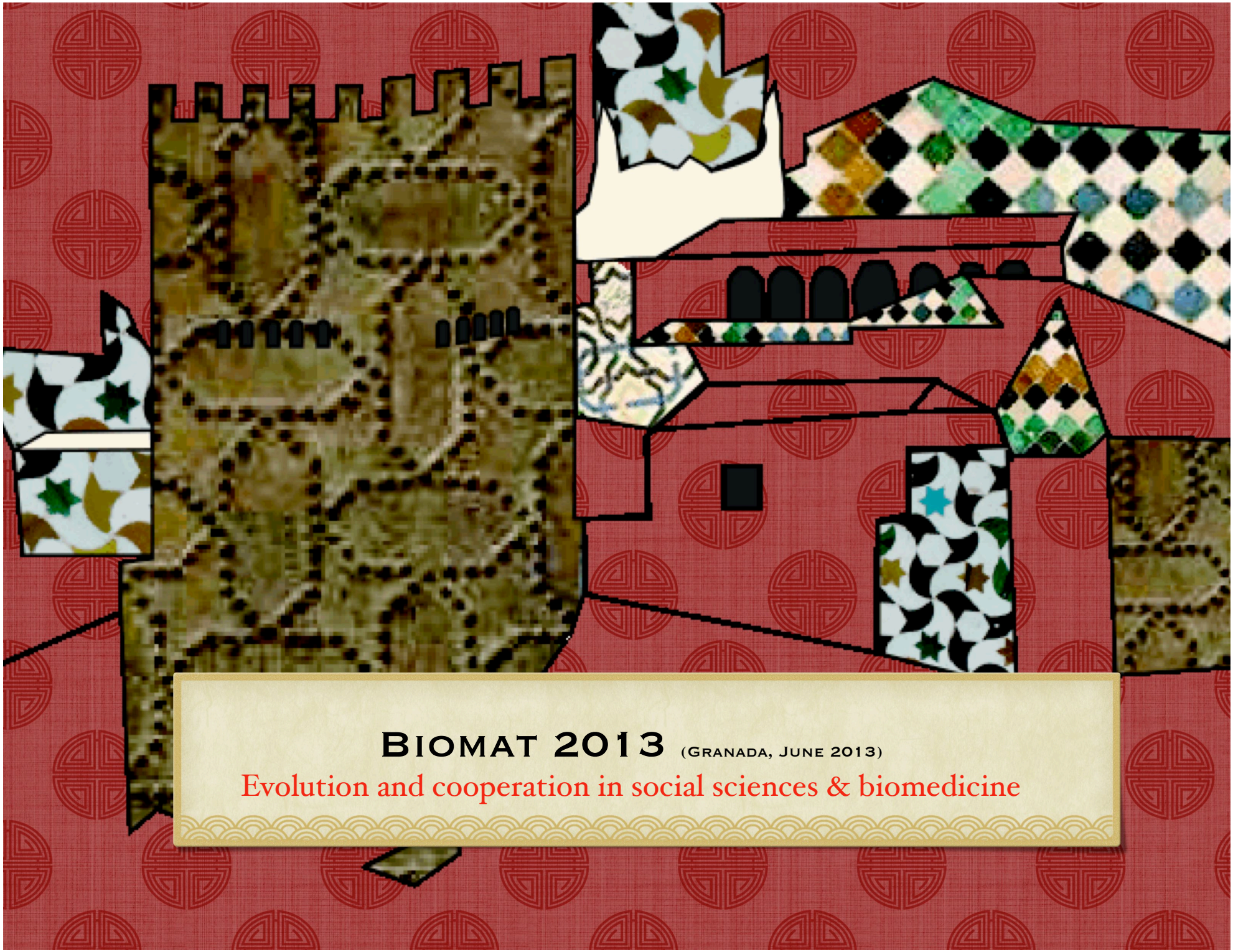


BIOMAT 2013 (GRANADA, JUNE 2013)

Evolution and cooperation in social sciences & biomedicine

BIOMAT 2013

MATHS OF PLANET EATH

Evolution and cooperation in social sciences and biomedicine

In connection with the Mathematics of Planet Earth initiative, BIOMAT 2013 is devoted to the study of the dynamics of processes involved in population dynamics, particular attention being payed to collective emergent behaviors and social problems.
This program has been completed with the 3rd meeting of young researchers modeling biological processes

Lectures

Tomás **ALARCÓN**
(CRM, Barcelona, Spain)
An introduction to stochastic methods in mathematical Biology

Mario **PRIMICERIO**
(Università degli Studi di Firenze, Italy)
Mathematical models for social changes and criminology

Karl **SIGMUND**
(Universität Wien, Austria)
On the evolution of cooperation

Juan Carlos **NUÑO**
(Universidad Politécnica de Madrid, Spain)
Fare evasion and social networks

Koby **RUBINSTEIN**
(Technion Institute of Technology, Israel)
Mathematical challenges in medicine

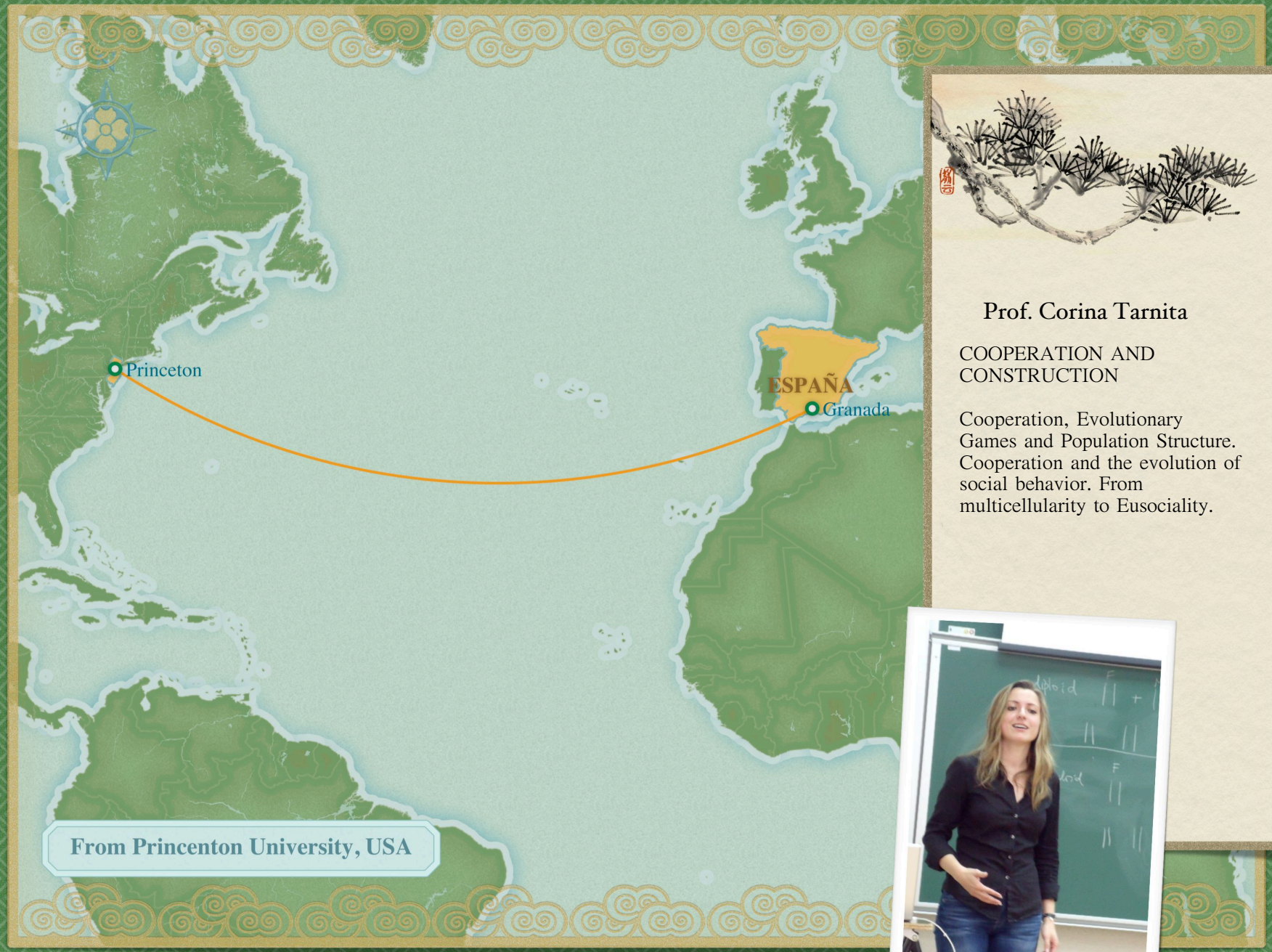
Corina E. **TARNITA**
(Princenton University, USA)
Cooperation and the evolution of social behavior: from multicellularity to eusociality

Prof. Karl Sigmund

ON THE EVOLUTION OF COOPERATION

Social learning and social dilemmas. The iterated Prisoner's Dilemma. Trust and Threat. Mutual Aid, Coercion and Compulsion.

Adam Smith: Man intends only his own gain, and he is in this, as in many other cases, led by an **invisible hand** to promote an end which was no part of his intention.
Joseph Stiglitz: The reason that the invisible hand often seems invisible is that it is often not there.



Prof. Corina Tarnita

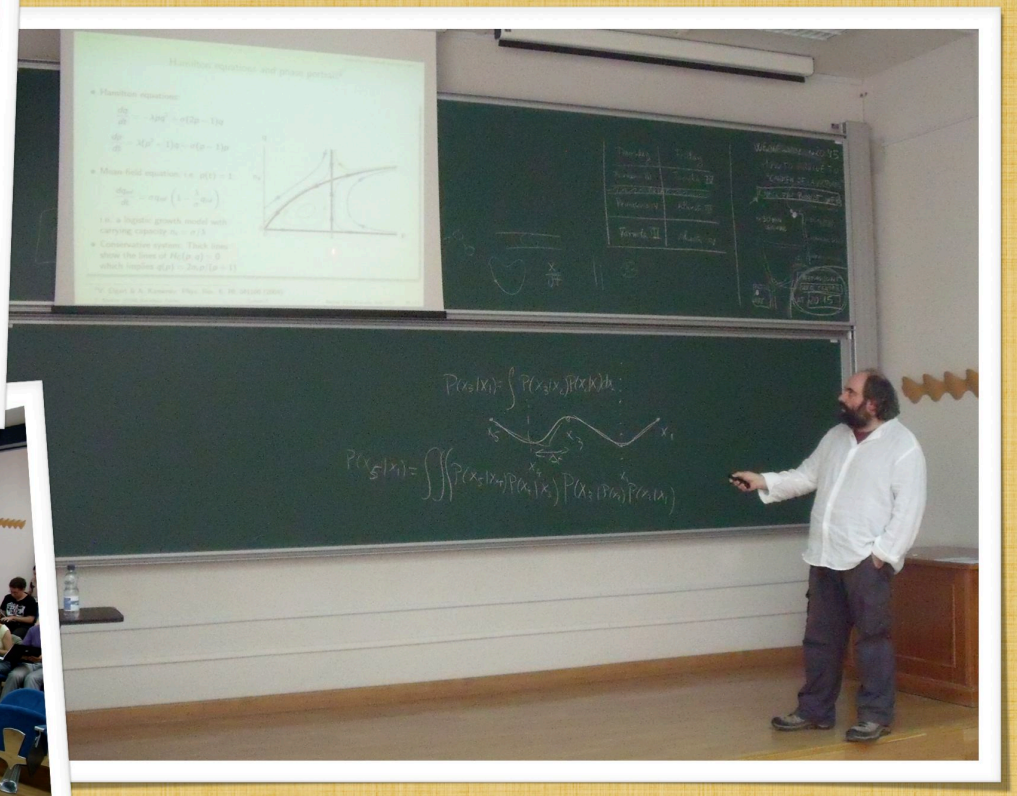
COOPERATION AND CONSTRUCTION

Cooperation, Evolutionary Games and Population Structure. Cooperation and the evolution of social behavior. From multicellularity to Eusociality.

Prof. Tomás Alarcón

STOCHASTIC METHODS IN MATHEMATICAL BIOLOGY

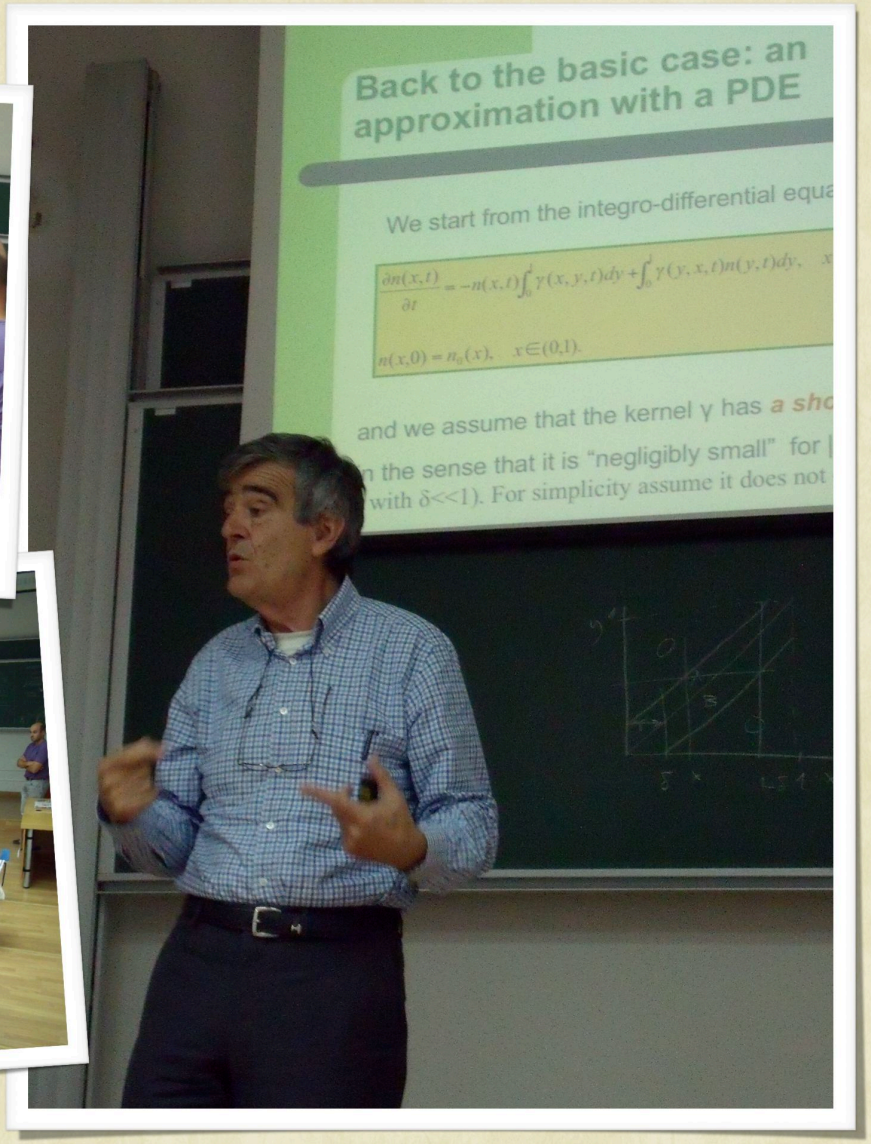
Stochastic effects, rare events. Asymptotic techniques of the WKB type. Numerical techniques. Stochastic multiscale modeling of cellular populations.



Prof. Mario Primicerio

MATHEMATICAL MODELS FOR SOCIAL CHANGES AND CRIMINOLOGY

Mathematical strategies aimed ad contrasting and controlling criminality. Agent-based models, game theory and populations dynamics. Space-dependent problems. Simulations with cellular automata.


Back to the basic case: an approximation with a PDE
We start from the integro-differential equa
$\frac{\partial n(x,t)}{\partial t} = -n(x,t)\int_0^1 \gamma(x,y,t)dy + \int_0^1 \gamma(y,x,t)n(y,t)dy,$
$n(x,0) = n_0(x), \quad x \in (0,1).$
and we assume that the kernel γ has a sho
the sense that it is "negligibly small" for
with δ<<1). For simplicity assume it does not

Prof. Koby Rubinstein

MATHEMATICAL
CHALLENGES
IN BIOMEDICINE

Mathematical models for the inner ear. Innovative technology in visual optics. Database analysis with applications to cancer treatment.

Prof. Juan Carlos Nuño

FARE EVASION AND SOCIAL NETWORKS

Young Researchers Modeling Biological Processes.

(2013 - 3rd meeting)

Joanna **Balbus** (Wroclaw University of Technology, Poland), Irene **García-Camacha** (Universidad de Castilla-La Mancha, Spain), Esther **Ibáñez-Marcelo** (Centre de Recerca Matemàtica, Spain), Damián **Knopoff** (Politecnico di Torino, Italy), Jesús **Montejo-Gámez** (Universidad de Granada, Spain), Tatsuya **Sasaki**, (Universität Wien, Austria), Robert **Strehl** (TU Dortmund, Germany)

JSMB-SMB
OSAKA 2014

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HOPE TO SEE YOU SOON AGAIN...