25th Marian Smoluchowski Symposium on Statistical Physics

Kraków, Poland, September 9-13, 2012

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25th Marian Smoluchowski Symposium on Statistical Physics

Sunday 09 September 2012 - Thursday 13 September 2012

Book of abstracts

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Proceedings

As usual, proceedings of the Symposium are going to be published as a special issue of *Acta Physica Polonica B*, a refereed journal recognized by The European Physical Society and Philadelphia Institute of Scientific Information. Everybody is encouraged to contribute, but the invited talks are particularly welcome. However, **all** contributions will go through the regular editorial process, inculding peer review.

Please, visit the publishers' website for instructions to authors. Please, send your contribution to the following address only: **zfs@th.if.uj.edu.pl**. Your contribution should by typeset in LaTeX, figures in Encapsulated PostScript. We are sorry but we will not be able to handle other formats, including MS Word. Please, include a PDF of your contribution with your submission.

The submission deadline is **January 4, 2013**.

Poster Session / 27

Scaling limits of multidimensional Levy walks

Mr. TEUERLE, Marek [1]; Dr. MAGDZIARZ, Marcin [1]; Mr. ZEBROWSKI, Piotr [2]

[1] *Wroclaw University of Technology*

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We present the scaling limit of multidimensional Levy walk and we describe the detailed structure of the limiting process. It occurs that the scaling limit is a multidimensional subordinated Levy-stable motion with the parent process and subordinator being strongly dependent processes. The corresponding Langevin picture of scaling limit is derived. We also introduce an useful method of simulating Levy walks, which approximates the limiting process. Our approach can be used when one works with real-life data described by the limiting process. Namely, by estimating the spectral measure from the data we are able to recover a full description of L´evy walk approximating the limiting process. We also give examples of analytical representations of spectral measure, which cover large class of possible application in the modeling of real-life phenomena.

Monday Session / 79

Maxwell's Demon and information thermodynamics

Prof. UEDA, Masahito [1]

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The three fundamental inequalities concerning information thermodynamics are discussed. They place the fundamental bounds on the work that can be extracted from the heat engine and the minimum energy costs for measurement and erasure of information. We also discuss a Jarzynski-like equality in the presence of feedback control, and its experimental verification.

Poster Session / 57

Stochastic model for a biological complex system: analysis of the bacterial growth in food products

Dr. VALENTI, Davide [1]; Prof. SPAGNOLO, Bernardo [2]; Prof. GIUFFRIDA, Alessandro [3]; Prof. ZIINO, Graziella [3]; Prof. PANEBIANCO, Antonio [3]

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The Physics of Complex Systems has recently taken a more and more important role in the description of natural systems because of the interactions, both deterministic and noisy, between such systems and the environment. In particular the noise plays a relevant role in biological systems, whose dynamics is strongly influenced by environmental variables subject to random fluctuations. In this work a stochastic model is exploited to reproduce the growth of bacteria in food of animal origin. Specifically the dynamics of a bacterial species, Listeria monocytogenes, is analyzed in the presence of lactic acid bacteria (LAB) during the period of the fermentation of meat products. The model, based on a generalization of the Lotka-Volterra equations in the presence of noise sources, takes into account the random fluctuations of physical and chemical variables such as temperature, pH and activity water, which are treated as stochastic variables. The presence in the model of appropriate levels of noise allows to obtain theoretical results in a good agreement with experimental data.