

International Conference of Humboldt-Kolleg Series in Kiev, Ukraine

“Humboldt Cosmos: Science and Society”. ($H_C S^2$ -Kiev2009)

www.humboldt.org.ua/kolleg

19-22 November, 2009

HONORARY PATRONAGE

Ambassador, Dr. Hans Juergen Heimsoeth, German Embassy, Kiev,
Ukraine

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Prof. Dr. hab. Yaroslav S.Yatskiv – Main Astronomical Observatory of
Ukrainian National Academy of Science, President of the Ukrainian
Astronomical Association.

HONORARY SCIENTIFIC PATRONAGE:

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Main topic:

Cosmology & astrophysics experience in S^2 – science&society.

Additional topics:

Mathematical & analytical method implications in S^2 – science&society.

Geopolitics & economy in Society.

Venue:

The Kiev Main Astronomical Observatory of Ukrainian National Academy of
Science, Acad. Zabolotnogo str., 27.

The Taras Shevchenko National University of Kiev, Volodymyrsjka str., 60.

The Astronomical Observatory of the Taras Shevchenko National University of
Kiev Observatorna str., 3.

Introduction

***“The Starry Sky Above Me and
the Moral Law Within Me”***

Immanuel Kant

The Humboldt-Kolleg “**Humboldt Cosmos: Science and Society**” ($H_C S^2$ -Kiev2009, www.humboldt.org.ua/kolleg) is organized by the Humboldt-Club Ukraine in close cooperation with the German Embassy, kindly supported by the Alexander von Humboldt Foundation and contributes to “the Days of German Science and Research in the Ukraine”. The Club continues on the series of recent Humboldt-Kollegs organized by Humboldt-Clubs in Poland, Belarus, Moldavia and the Ukraine and follows the best traditions promoting, in particular, young researchers. The Kolleg aims to address multidisciplinary issues of various aspects of S^2 - Science and Society and the scope is not limited, therefore, by the mentioned above main groups.

In the International Year of Astronomy 2009 (<http://www.astronomy2009.org/>) particular attention is, naturally, devoted to Astronomy, Astrophysics & Cosmology, especially, their impact in modern science, technology, economy, philosophy, theology, religion and/or Society. The childhood from Immanuel Kant cited above is brought, thereby, by the International Astronomical Union and UNESCO to a new global level in understanding and exploring by the Society a place in the Universe. Respectively, some of the Kolleg events occur at astronomical places in Kiev: historical – the Astronomical Observatory of the Taras Shevchenko National University of Kiev, and modern - the Kiev Main Astronomical Observatory of Ukrainian National Academy of Science.

Moreover, the invited plenary talks at the first day of the Kolleg opening will discuss the modern status of monitoring problems of the Space, the Solar System and the Earth with the use of the Earth based and the Cosmic Satellite based observatories emphasizing, thereby, the importance of multipoint measurements in space plasma to reveal the multiscale MHD/kinetic nature of nonlinear physical processes controlling the key elements in the chain of solar-terrestrial relations (Prof. Dr. L.M. Zelenyi, Space Research Institute (IKI) of Russian Academy of Sciences), as well as the history of Astronomical observations their place and role in society development (Prof. Dr. B.I. Hnatyk, Astronomical Observatory of the Taras Shevchenko National University of Kiev).

The further scientific program explores such a direction. The parallel Half Plenary Sessions will address I- the composition, the main energy production mechanisms in the Universe and the energy sources fundamentals at the Earth based environment as well as II- various mathematical and analytical methods. Geopolitical and economical aspects will be mainly concentrated on *Kondratyev waves* and modern view on reasons and periodicity of crises, Significance and relationship for the support of projects and individuals in science.

Kondratyev Vladimir
Kolleg chairman

FINANCIAL CRISIS PHENOMENA: ANALYSIS, SIMULATION AND PREDICTION. ECONOPHYSIC'S APPROACH

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With the beginning of the global financial crisis, which attracts the attention of the international community, the inability of existing methods to predict the events became obvious [1]. Creation, testing, adaptation of the models to the concrete financial market segments for the purpose of monitoring, early prediction, prevention and notification of financial crises is gaining currency nowadays.

Econophysics is an interdisciplinary research field, applying theories and methods originally developed by physicists in order to solve problems in economics, usually those including uncertainty or stochastic processes and nonlinear dynamics. Its application to the study of financial markets has also been termed statistical finance referring to its roots in statistical physics. The new paradigm of relativistic quantum econophysics is proposed [2].

We developed and implemented econophysical methods, the most important of which are considered in the work [3]. Among the others the following can be named:

- multifractality spectrum research. The change of multifractal spectrum's width indicates the systems complexity. When the crisis is approaching the spectrum width decreases in the pre-crisis period and restores itself during the post-crisis one.
- system's entropic indexes dynamics estimation. In this case different types of the entropy are calculated. The analysis of their dynamics gives an opportunity to keep track of the system's complexity and makes it possible to construct the crisis' precursors.
- conduction of the (cross-) recurrence analysis. We managed to develop a tool for the computation of the number of measures, based on the recurrent points. The calculation of these and some other measures in the movable windows of a given width makes possible to get the information about the crisis phenomenon.
- time series irreversibility research. Quantitative characteristics are brought in, which allow to analyze the appearance and relaxation of the so-called crisis "bubbles". The method is important in the determination of the recession's duration and depth.

Other methods and approaches of the crisis management such as complex Markov chains, game models, agent-based technologies, neural networks etc. are also discussed [4].

References:

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3. Ganchuk A., Derbentsev V., Soloviev V. Multifractal properties of the Ukraine stock market // arXiv:physics/0608009.
4. Soloviev V., Saptsin V. and Chabanenko D. Prediction of financial time series with the technology of high-order Markov chains, Working Group on Physics of Socio-economic Systems (AGSOE).-Drezden, 2009, URL <http://www.dpg-verhandlungen.de/2009/dresden/agsoe.pdf>

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