

Dynamics Days Central Asia:

21st Century Silk Road: Science for Peace

On June 2-5 an international online conference has been organized at Nazarbayev University, Nur- Sultan, Kazakhstan(<https://ssh.nu.edu.kz/6th-dynamics-days-central-asia/>). During the conference new results were discussed in the areas of dynamical systems, nonlinear dynamics, chaos and, more broadly, complexity science. In particular, the main focus was on nonlinear and stochastic mechanics, chaotic attractors and complex networks applied to epidemic spreading, statistical physics and biological networks modeling brain dynamics, mathematical physics and mechanical engineering, quantum networks, fluid mechanics and integrable systems. It was a very successful online meeting, with 33 invited speakers from UK, Greece, Germany, India, Italy, Iran, South Korea, Russia, China, Pakistan, Uzbekistan, Belgium, Slovenia, Spain, South Africa, Indonesia, Turkey and Kazakhstan. There were 130 participants from China, India, Russia, Iran, Kazakhstan, UK, Greece, Slovenia, Turkey, Kurdistan, Brazil, USA, South Africa, Hungary, Spain, France and Germany.

The conference, chaired by professor Anastasios Bountis, Nazarbayev University, is part of an international series of conferences launched in 2015 by a group of internationally known scientists. The idea is to contribute to high-level training in Central Asia countries and at the same time contribute to the peace process by putting teachers and students from the most diverse countries in contact and interacting in common discussions from Iran to Israel, Afghanistan, Pakistan, Kazakhstan etc. Indeed, Central Asia is a very complex area from the political, economic, religious point of view with several problems of different type. On the other hand, science can have a strong unifying power among people. Indeed, people agree or disagree on scientific matters independently on their religious belief, on their philosophy or political opinions. So, we think it is particularly important for this area to create opportunities in which teachers and students of different countries meet together. Our ambition is to give our small contribution to what we have called the **“21st century silk road: Science for peace”**. Our plan is to organize each year a dynamics days conference in a different country of this CA area. The first conference was organized in 2015 in the Mirzo Uluug'bek madrassa in Samarkanda (<http://dynamicsdays-ca.sci.uz/>) by prof. Davron

Matrasulov, president of Uzbekistan's physical society. We are now planning to have next year meeting in Baku, Azerbaijan,

Notice that Central Asia is a part of the world in rapid economic and demographic development. It comprises several nations including five republics of the former Soviet Union. From the historical point of view, it is an essential part of the silk road. The total population is quite large and is expected to double in the next 40 years. The population is mainly composed of young people and therefore it has a high potential and it is attractive for investments in education and research. At the moment the academic community is, for the most part, rather isolated and with not much collaboration with Europe.

The general, main topic of this series of meetings is on *complexity*, with applications ranging from natural to social sciences, from neuroscience (the brain is a complex system) to epidemiology (prediction and spread of epidemics). It is a highly interdisciplinary theme and one of the liveliest in contemporary science. In essence, in the presence of a process whose evolution depends on many factors interacting with each other, the behaviour of the system cannot be understood from the properties of the individual constituents. Examples of complex systems are natural systems, ranging from biomolecules and living cells to human, social systems and the ecosphere as well as sophisticated artificial systems such as the internet or any large-scale distributed software system.

Complex systems require an interdisciplinary approach. In fact, the universal questions they ask can be formulated similarly for a very broad spectrum of disciplines - from biology to computer networks to human societies. Furthermore, the standard methods in the respective specialist disciplines rarely take into account the many-level approach that is necessary in the context of complex systems and that can only be achieved through an integrated and multidisciplinary approach.

In the current context of globalization and the growing importance of long-distance interactions through the various networks, the analysis of complex systems will help to explore the various issues related to economic development, social cohesion, or the environment on different geographical scales. Finally, the rapidly growing influence of information and communication technologies and the large number of decentralized networks that depend on these new technologies require the study and the solutions that come from research in complex systems. In particular, the current trend from processors to networks leads to the emergence of the so-called "widespread intelligence" which plays a growing role in how the networks of the future will be designed and managed.

But, as stressed above, the most important purpose of this initiative is that, in our opinion, is the best way to contribute to the peace process by bringing together young scholars and researchers, in part the future ruling class, not only from the countries of Central Asia but also from the confined countries of the Caucasus and South Asia.



Prof. Theo Geisel, prof G. Casati and prof. Davron Matrasulov (from left to right) at the Uluug'bek madrassa, Samarkanda

Prof. Giulio Casati

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