

**Abstract for GR-TR Conference on Statistical Mechanics  
and Dynamical Systems**

Talk Invited

Invited Talk

---

**Tempering quantitative tools for an improved analysis of  
complex systems**

Sílvio M. Duarte Queirós\*

Istituto dei Sistemi Complessi – CNR  
via dei Taurini, 19. 00158 Rome, Italy

\* Electronic Address: [sdqueiro@gmail.com](mailto:sdqueiro@gmail.com)

The analysis of complex phenomena, either natural or man-made, poses very interesting challenges not only about the impact of the findings and their impact, but on development of reliable quantitative tools that turn raw data sets into valuable information as well.

In this talk, one discusses recent developments introduced in the analysis of non-stationary and non-equilibrium time series ubiquitous in complex systems.

First, one sets forth techniques regarding the approximation of non-stationary time series of measurements by juxtaposing patches of segments of local stationarity. In the long-term, the distribution of the observable is defined as mixture of short of long wavelength statistics related to the concept of superstatistics, which is one of the proposals that aims at explaining the emergence of a Tsallis statistics in complexity.

Next, one discusses tools for the trustworthy assessment of the dynamical nature in stationary time series as well as the inference of stochastic dynamical equations from an accurate estimation of the Kramers-Moyal coefficients taking into account the sample rating.

Both points will be exemplified with mainstream instances of complexity.

---

[1] C. Anteneodo, SMDQ (2010) Phys. Rev. E **82**:041122.

[2] S. Camargo, SMDQ, C. Anteneodo (2011) Phys. Rev. E **84**:046702; *idem* (2012) work in progress.