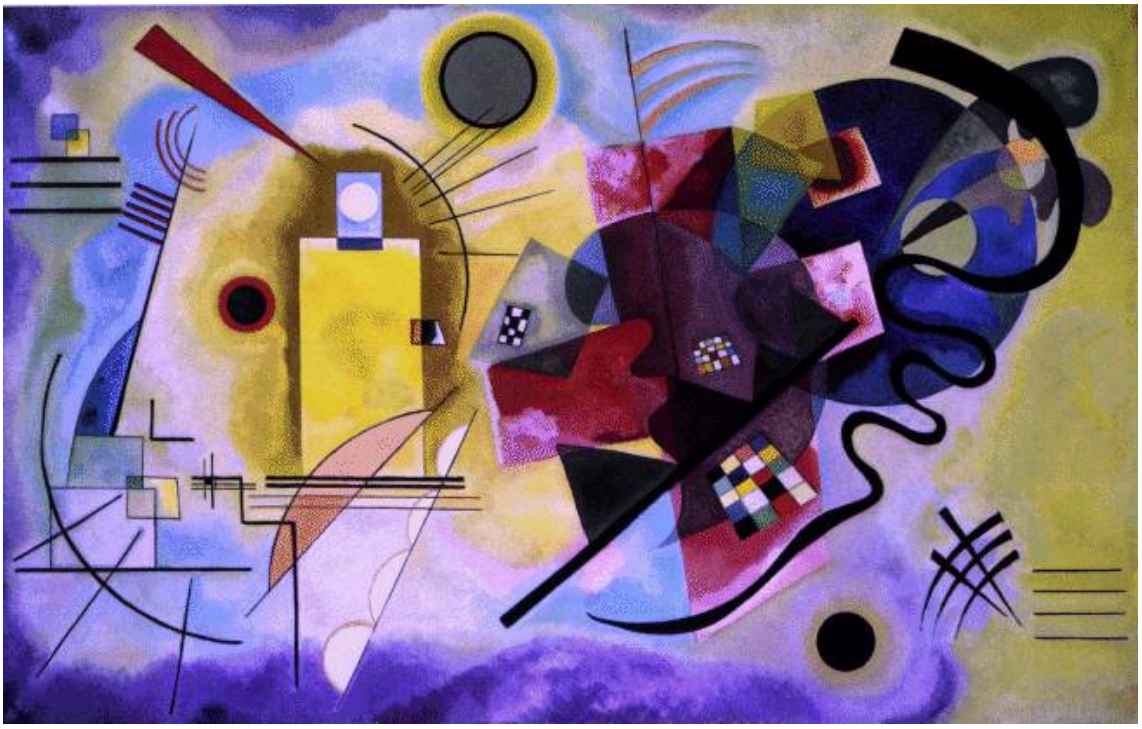
6^{th} Giovanni Paladin Memorial

Large deviations and rare events in physics and biology

Dipartimento di Fisica, Università "Sapienza" Roma,
September 23-25, 2013



Invited Speakers

E.G. Altmann (MPIPKS Dresden, Germany)

J. Bec (CNRS Nice, France)

G. Benettin (University of Padova, Italy)

R. Burioni (University of Parma, Italy)

A. Crisanti (University "Sapienza" of Rome, Italy)

L. Gammaitoni (University of Perugia, Italy)

K. Gawedzki (ENS Lyon, France)

J. Kurchan (ESPCI Paris, France)

A. S. Lanotte (CNR-ISAC Lecce, Italy)

S. Lepri (CNR-ISC Florence, Italy)

P. Muratore-Ginanneschi (University of Helsinki, Finland)

I. Pagonabarraga Mora (University of Barcelona, Spain)

S. Pigolotti (Univesity of Catalugna, Barcelona, Spain)

F. Ritort (University of Barcelona, Spain)

K. Sekimoto (Université Paris Diderot, France)

K. Sneppen (Niels Bohr Institute, Copenhagen, Denmark)

I. Sokolov (Humboldt University Berlin, Germany)

Organizers

F. Cecconi (CNR-ISC Rome, Italy)

M. Cencini (CNR-ISC Rome, Italy)

A. Puglisi (CNR-ISC Rome, Italy)

A. Vulpiani (University "Sapienza" of Rome, Italy)

INVITED SPEAKERS

abstracts

Nonlinear relaxation in Quantum and Mesoscopic Systems

Bernardo Spagnolo, Davide Valenti, Dominique Persano Adorno, Claudio Guarcello, Luca Magazzù, S. Spezia, Nicola Pizzolato

Department of Physics and Chemistry, Group of Interdisciplinary Physics, Palermo University, Palermo, Italy

The nonlinear relaxation of three mesoscopic and quantum systems are investigated. Specifically we study the nonlinear relaxation in: (i) a long Josephson junction (LJJ) driven by a non-Gaussian Lévy noise current; (ii) a metastable quantum open system driven by an external periodical driving; and (iii) the electron spin relaxation process in n-type GaAs crystals driven by a fluctuating electric field. In the first system the LJJ phase evolution is described by the perturbed Sine-Gordon equation. Two well known noise induced effects are found: the noise enhanced stability and resonant activation phenomena. We investigate the mean escape time as a function of the bias current frequency, noise intensity and length of the junction. Moreover, the role of the soliton dynamics, induced by the noise on the switching events of the LJJ, is highlighted. In the second system, the asymptotic population of the metastable state as a function of the bath temperature, coupling strength and parameters of the external driving, that is frequency and amplitude, is analyzed in the framework of Caldeira-Leggett model and discrete variable representation. The asymptotic population of the metastable state, as a function of the driving frequency, displays a strong non monotonic behavior with a maximum, showing a quantum noise induced stability effect. Finally, the electron spin relaxation process is analyzed in the presence of two different sources of fluctuations: (a) a symmetric dichotomous noise and (b) a Gaussian correlated noise. Monte Carlo numerical simulations show, in both cases, an enhancement of the spin relaxation time by increasing the amplitude of the external noise. Moreover, we find that the electron spin lifetime versus the noise correlation time shows: (a) a monotonic increasing behavior in the case of dichotomous random fluctuations, and (b) a nonmonotonic behavior with a maximum in the case of bulks subjected to a Gaussian correlated noise.