

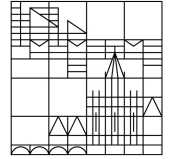
Physikalisches Festkolloquium

Anlässlich des
80. Geburtstages von
Prof. Wolfgang Dieterich

Di 12.07.22
15:15 Uhr
R 513

Anschließend Sektempfang

Universität
Konstanz



Dr. H. Eduardo Roman
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From Condensed Matter to Financial Time Series: A Random Walk Across Complex Systems

I will briefly review applications of the concept of random walks in condensed matter physics, ranging from ionic systems to random conductor/insulator mixtures at different concentrations. The latter will lead to us to the issue of fractal structures and how the random walks features are changed due to the presence of scale invariant properties. A key emergent concept is that of anomalous diffusion and long-time memory. A fractional diffusion equation is discussed, aimed at describing the asymptotic behaviour in both space and time of the distribution function of anomalous diffusing particles. This scheme helps us to attack the issue of modelling long-time memory present in time series for a number of complex systems. Examples are provided on the anomalous behaviour of handwriting in dysgraphic school children, on air temperature and sea level fluctuations, on the analysis of chaotic signals from cold plasma devices, and on financial time series in stock markets. Applications of random walks, linear polymer models, percolation, and fractals are illustrated from recent works within the context of protein evolution, polymer deposition, spreading of infections in a population, and in the description of extreme wetting properties of plasma treated surfaces. Finally, I will discuss recent applications of optimized noise sensors networks to study the temporal fluctuations of complex sound landscapes in large urban zones.

