



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

**PHYSICS COLLOQUIUM**

**Thursday, 13 October 2011**

**17:00 -18:00**

**3<sup>rd</sup> Floor Seminar Room**

**“Autocatalytic Feedback Loops Amplify Microscopic  
Random Events to Systemic Complex Changes”**

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**Abstract**

For a long while it was customary in many disciplines to formalize a collective of many similar objects in terms of a "mean field" / "representative agent" characterized by the average of their individual properties and behaviour. In reality such collectives may possess completely new properties and behaviour than their components. They often constitute the elementary objects of a higher level of organization. The "representative agent"/"mean field"/continuum/linear way of thinking missed the very rare events that are responsible for dramatic systemic transitions: the emergence of life from chemistry, conscience from life, society from conscious individuals, etc. Ignoring this connection between the elementary objects of one science and the collective phenomena underlying them (relegated to another science) prevented scientists from achieving many syntheses and insights and kept the classical sciences as isolated sub-cultures. In the present talk I will substantiate that the answer may be: "autocatalytic feedback loops".

These autocatalytic processes are responsible for many of the sudden changes that threaten the climate, the environment ecology, the social order, or the economic stability around the world. The introduction of external elements that trigger in the system new autocatalytic loops may highly and rapidly destabilize the previous state of the system.