UCDAVIS UNIVERSITY OF CALIFORNIA Hydrologic Sciences Graduate Group Presents

## Special Colloquium Series, Spring & Fall 2005:

### Between Nature and Science:
### Advanced Modeling Concepts for Environmental Sciences



# Didier Sornette

**University of California Los Angeles**


## Endogenous versus exogenous origins of crises

October 12th
4:00-5:00pm
PES 3001
Light refreshments provided

Are large biological extinctions such as the Cretaceous/Tertiary KT boundary due to a meteorite, extreme volcanic activity or self-organized critical extinction cascades? Are commercial successes due to a progressive reputation cascade or the result of a well orchestrated advertisement? Are financial crashes due to external shocks or to self-organized instabilities, are intermittent bursts of financial volatility resulting from external shocks or from cumulative effects of news in a long-memory system? Are earthquakes witnesses of tectonic forces or actors triggering other earthquakes close to a critical self-sustained triggering process?

Determining the chain of causality for extreme events in complex systems requires disentangling interwoven exogenous and endogenous contributions with either no clear or too many signatures. Here, I review several efforts carried out with collaborators, which suggest a general strategy for understanding the organization of several complex systems under the dual effect of endogenous and exogenous fluctuations. The studied examples are: earthquake foreshocks, mainshock, aftershocks, Internet download shocks, book sale shocks, social shocks, financial volatility shocks, and financial crashes. Simple models are offered to quantitatively relate the endogenous organization to the exogenous response of the system.
Suggestions for applications of these ideas toother problems including illnesses and climate are discussed.

***Didier Sornette*** *graduated from Ecole Normale Superieure (ENS Ulm, Paris) and received his PhD at University of Nice on Statistical Physics of interfaces in Physical Sciences. Didier's present fields of research interest include: social sciences, finance and economics: decision theory, behavioral decision making, societal risks, bubbles and crashes, large and extreme risks, theory of derivatives, portfolio optimization, trading strategies, insurance, macro-economics, agent-based models, market microstructures. Physics of complex systems and pattern formation in spatio-temporal structures, dynamical system theory, pattern recognition, self-organized criticality, prediction of complex systems, time series analysis; Rupture in random media, theory of earthquakes and of tectonic deformations, rupture and earthquake prediction. Didier has authored and coauthored more than 330 research papers in refereed international journals and more than 120 papers in books and conference proceedings\; has been editor of two proceedings of two international conferences; and has authored two textbooks and one monograph.*

### *Upcoming Speakers:*

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|---|---|---|
| 10/20 | **Carlos Puente** | From complexity to peace |
| 10/27 | **Raissa D'Souza** | TBA |
| 11/3 | **Don Turcotte** | TBA |
| 11/10 | **Melanie Mitchell** | The prospects and perils of complex systems modeling |
| 11/17 | **Michelle Girvan** | TBA |
| 12/1 | **Elizabeth Bradley** | Nonlinear dynamics, modeling, and the environmental sciences: ideas and tools |


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