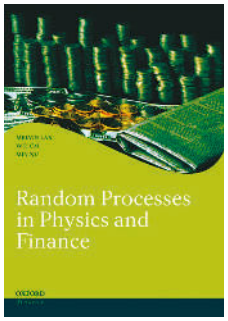
Noise in physic$



RANDOM PROCESSES IN PHYSICS AND FINANCE BY MELVIN LAX, WEI CAI AND MIN XU

Oxford Univ. Press: 2006. 342 pp. £49.95

Most top universities around the world now offer a course on random processes in physics. During the last years (1985–2001) of his long and productive career, Melvin Lax, one of the protagonists in the study of fluctuations in classical and quantum systems of the last century and the first author of the book *Random Processes in Physics and Finance*, taught a course with the same title for physics students at the City College of City University of New York. His lecture notes naturally led to the book. After Lax passed away in December 2002, his co-authors Wei Cai and Min Xu revised his lecture notes and added some specific chapters.

Melvin Lax was a careful teacher. His colleagues at CUNY have reported that he prepared his lectures with exceptional care and, in many of the advanced courses that he taught, he wrote extensive and detailed notes. This is certainly the case in his course on random processes in physics and finance. In fact, the book reflects both the deep knowledge of the author about random processes and his teaching ability.

The book considers classical aspects of the modelling of random processes in physics. It discusses several aspects of brownian motion, markovian processes, thermal noise and shot noise, using the fluctuation–dissipation theorem as the basis for understanding many aspects of noisy systems. Lax analysed in great detail the Fokker–Planck equation and presented all the subtleties of its relation with a Langevin treatment. The book contains a series of physical applications of these concepts — ranging from the van der Pol oscillator, noise in homogeneous semiconductors to signal extraction in the presence of smoothing and noise. Two of the seventeen chapters are related to applications in finance.

Random Processes in Physics and Finance is essentially about markovian and gaussian processes. Alternative widespread concepts used today in the modelling of other classes of random processes in physics and other disciplines, such as long-range correlated and/or stable random processes are completely absent or just cited in a few sentences. This is probably the most serious limitation of the book. A reader also interested in random processes different from markovian and gaussian ones should complement this book with other monographs.

But in spite of this limitation, the book will be of great interest to all physicists dealing with random processes. Melvin Lax, Wei Cai and Min Xu provide a presentation of key concepts of the theoretical description of random processes, which is often enlightening not only for students but also for the experts.

I am less sure that this book will be particularly relevant for scholars or practitioners in finance. The amount of material related to finance is rather limited and covers topics that are not of major interest for either economists or econophysicists. Specifically, the only chapter fully focused on financial applications primarily deals with the discussion of the relative roles of Ito and Stratonovich calculus in the setting and resolution of the Black–Scholes model. This is certainly not a hot topic in the econophysics or finance literature. The chapter about spectral analysis of economic time series might be more useful, although the concepts presented in it are rather general and not very specialized for financial applications. Widely investigated topics of econophysics — such as the analytical and numerical investigation of agent-based models, the empirical characterization of new 'stylized facts', the growth dynamics of firms, the multivariate characterization of the co-evolution of returns of a portfolio of financial assets investigated with tools of random matrix theory and/or hierarchical clustering, to name a few — are absent from the book.

Random Processes in Physics and Finance is a great book on classical aspects of random processes in physics. The applications to finance are less convincing.

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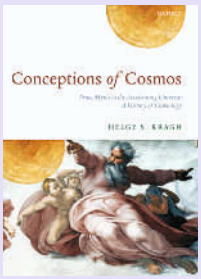
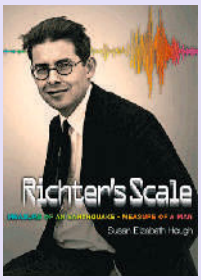


Conceptions of Cosmos: From Myths to the Accelerating Universe by Helge S. Kragh

Oxford Univ. Press: 2007. 276 pp. £35

Although the book emphasizes the growth of cosmology research in the twentieth century, Kragh argues that "cosmology as a science dates back much further in time" — from the days of Aristotle and Ptolemy to Copernicus and others.



Richter's Scale: Measure of an Earthquake, Measure of a Man by Susan Elizabeth Hough

Princeton Univ. Press: 2007. 336 pp. $27.95

Despite Richter's name cropping up in every earthquake report, very little is known about him. Hough pieces together a very private man who was perhaps more difficult to measure than earthquakes.