

Inaugural Murray and Adylin Rosenblatt Endowed Lectures in Applied Mathematics
University of California, San Diego

FRIDAY, OCTOBER 21, 2016

5-6.15 PM: Robert Engle, New York University

Title: *Dynamic Conditional Beta*

Abstract: Dynamic Conditional Beta (DCB) is an approach to estimating regressions with time varying parameters. The conditional covariance matrices of the exogenous and dependent variable for each time period are used to formulate the dynamic beta. Joint estimation of the covariance matrices and other regression parameters is developed. Tests of the hypothesis that betas are constant are non-nested tests and several approaches are developed including a novel nested model. The methodology is applied to industry multifactor asset pricing and to global systemic risk estimation with non-synchronous prices.

SATURDAY, OCTOBER 22, 2016

**1.45-3 PM: Catherine Constable, Institute of Geophysics and Planetary Physics,
Scripps Institution of Oceanography, University of California, San Diego**

Title: *Earth's Magnetic Field: Random Reversals, Stochastic Models, and Physical Interpretations*

Abstract: Direct observations of the modern geomagnetic field enable us to understand its role in protecting us from the depredations of the solar wind and associated space weather, while paleomagnetic studies provide geological evidence that the field is intimately linked with the history and thermal evolution of our planet. In the past the magnetic field has reversed polarity many times: such reversals occur when its overall strength decays, and there are departures from the usual spatial structure which at Earth's surface predominantly resembles that of an axially aligned dipole. Reversals are one element of a continuum of geomagnetic field behavior which also includes geomagnetic excursions (often viewed as unsuccessful reversals), and paleosecular variation. The fragmentary and noisy nature of the geological record combined with distance from the field's source in Earth's liquid outer core provide a limited view, but one that has been partially characterized by time series analysis, and development of stochastic models describing the variability. Analyses of changes in the dipole moment have revealed distinct statistical characteristics associated with growth and decay of field strength in some frequency ranges. Paleomagnetic studies are complemented by computationally challenging numerical simulations of geomagnetic field variations. Access to details within the numerical model allow the evolution of large scale physical processes to be studied directly, and it is of great interest to determine whether these computational results have Earth-like properties. The parameter regime accessible to these simulations is far from ideal, but their adequacy can be assessed and future development guided by comparisons of their statistical properties with robust results from paleomagnetic observations. Progress in geomagnetic studies has been greatly facilitated by the application of statistical methods related to stochastic processes and time series analysis, and there remains significant scope for continued improvement in our understanding. This is likely to prove particularly important for understanding the scenarios that can lead to geomagnetic reversals.