**Date:** **May 14th**

**Time:** **11:00 AM**

**Location:** **Ames 234**

**Speaker:** **Dr. Carlos E. Puente**
**Hydrology and Institute of Theoretical Dynamics, University of California, Davis**

**Title:** **"From Plato to Borges: Projections Galore and Treasures Inside the Bell"**

## Abstract

The construction of a multitude of interesting patterns, defined as projections of simple multifractal measures supported by fractal interpolating functions, is reviewed. It is illustrated, via a variety of examples, how these ideas bring forth a new Platonic vision to address the complexity of some of nature's tangled patterns over one, two, and three dimensions, including relevant applications to geophysics: (a) rainfall time series and fields, (b) river network's width functions, (c) two and three-dimensional contaminant plumes within porous medium, and (d) general chaotic and stochastic signals with diverse power-law power spectra, as found on several applications.

Also reviewed is a universal connection between arbitrary diffuse measures and the univariate and bivariate Gaussian distributions, as found when the fractal interpolating functions become plane- and space filling, respectively. It is explained how the latter yields an infinite class of two-dimensional symmetric crystalline sets (Borges' alephs) making up exotic kaleidoscopes of arbitrary symmetries, that decompose the bivariate Gaussian distribution in nontrivial ways. It is shown that such mathematical designs include the structure of natural ice crystals and the rosette structure of relevant biochemical units, including even life's own DNA.