

# APPLIED MATHEMATICS COLLOQUIUM

## RANDOM FUNCTIONS, RANDOM ODES, AND CHEBFUN

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Abstract: What is a random function? What is noise? The standard answers are nonsmooth, defined pointwise via the Wiener process and Brownian motion. In the Chebfun project, we have found it more natural to work with smooth random functions defined by finite Fourier series with random coefficients. The length of the series is determined by a wavelength parameter  $\lambda$ . Integrals give smooth random walks, which approach Brownian paths as  $\lambda \rightarrow 0$ , and smooth random ODEs, which approach stochastic DEs of the Stratonovich variety. Numerical explorations become very easy in this framework. There are plenty of conceptual challenges in this subject, starting with the fact that white noise has infinite amplitude and infinite energy, a paradox that goes back two different ways to Einstein in 1905.

**Monday September 25<sup>th</sup>, 2017**  
**4:30PM**  
**MIT, Room 4-237**

Applied Math Colloquium: <https://math.mit.edu/amc/fall17/>  
Math Department: <http://www-math.mit.edu>

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