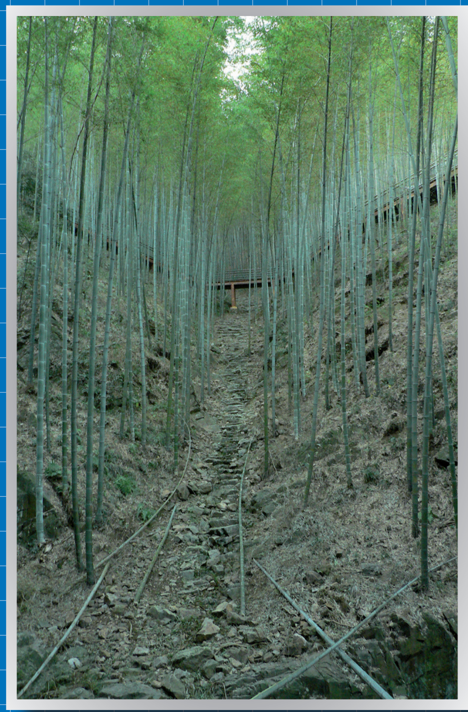
Berlin Mathematical School

BMS Friday Colloquium

Friday, 18 December 2009, 2:00 pm

Tea before the lecture starts at 1 pm. After the lecture there will be the BMS End-of-Year party!

BMS Loft, Urania
An der Urania 17, 10787 Berlin

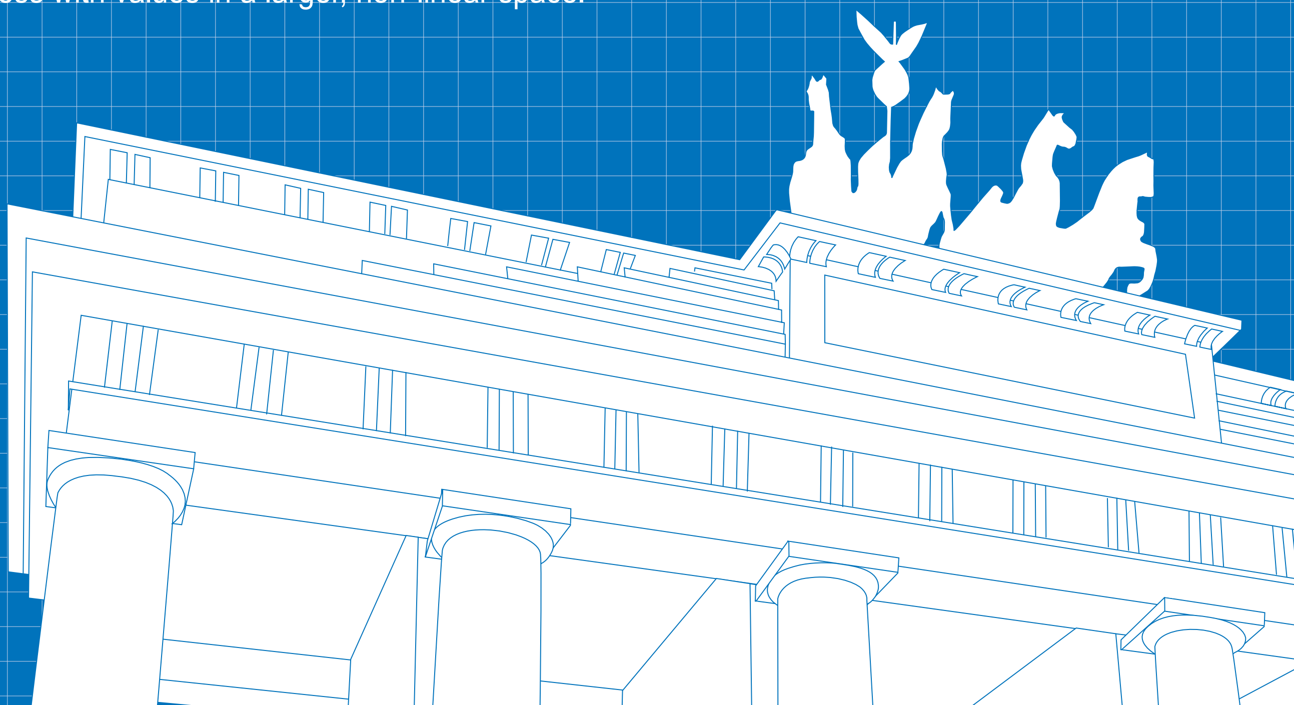


Peter K. Friz (TU Berlin):

"Rough paths and the Gap Between Deterministic and Stochastic Differential Equations"

A good model of random noise, e.g. Brownian motion, cannot evolve smoothly in time (otherwise it would be predictable on a small time scale and cease to be random). As a result, stochastic perturbations of differential equations are intrinsically irregular and require fundamentally new methods and theories. Why is one interested in adding random noise to dfferential equations? Sometimes it is the simple desire to make a physical model more realistic; sometimes because this randomness is fundamental to the model itself as is the case for the stock market.

The theory of stochastic differential equations by Itō is one of the great achievements of 20th century mathematics. With all its benefits, it can be fragile and some questions that arise naturally in applications require major effort or cannot be treated at all. In essence, these restrictions come from the fact that Itō stochastic integrals are (continuous) of fair games and certain (fair) transformations of these games. Life would be much easier if one could fix a noise-scenario (a Brownian path, say) and then apply a standard theory of (deterministic) differential equations. It was only realized by T. Lyons in 1998 that this is indeed possible and the corresponding theory has been named rough path theory. There is a conceptual price to pay: Brownian motion on the familiar Euclidean space has to be replaced by stochastic process with values in a larger, non-linear space.



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