

Terry Lyons

**The expected signature of a stochastic process. Some new PDE's and some applications**

Work with Ni Hao, Nicolas Victoir, Christian Litterer, Wonjung Lee...

How can one describe a probability measure of paths? And how should one approximate to this measure so as to capture the effect of this randomly evolving system. Markovian measures were efficiently described by Stroock and Varadhan through the Martingale problem. But there are many measures on paths that are not Markovian and a new tool, the expected signature provides a systematic ways of describing such measures in terms of their effects.

Even in the Markovian context, considerable value can be extracted from computing the expected signature as it can be used to construct Cubatures on path space and when combined with a technique known as recombination, it is developing into a new and powerful approach to some numerical problems. The key is that it allows managed populations of carefully selected scenarios that effectively capture tail behaviour.