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Pathwise large deviations for the rough Bergomi model

Joint with Antoine Jacquier and Henry Stone

The rough Bergomi model, introduced by Bayer, Friz and Gatheral (2016; *Quant. Finance* **16**(6), 887–904), is an option pricing model belonging to the recent crop of so-called 'rough volatility' models. In this model, the price S of the underlying security is modelled as

$$\frac{\mathrm{d}S_t}{S_t} = \sigma_t \mathrm{d}B_t,$$

using a standard Brownian motion B and volatility σ given by the stochastic (Wick) exponential of a 'rough' Riemann–Liouville process

$$\int_0^t (t-s)^\alpha \mathrm{d}W_s, \quad t \geq 0,$$

where $\alpha \in (-1/2, 0)$ and W is another standard Brownian motion, possibly correlated with B. While this model is able to reproduce market prices of options remarkably well, analytical understanding of pricing under the model is currently rather limited, as even vanilla payoffs need to be priced by Monte Carlo. In this talk, I will present a pathwise large deviations principle for a rescaled version of the price process S. As a corollary, one obtains a characterisation of the asymptotic behaviour of implied volatility near expiry under the rough Bergomi model. The talk is based on the recent preprint arXiv:1706.05291.