Sharp lower error bounds for strong approximation of SDEs with a drift coefficient of Sobolev regularity $s \in (1/2, 1)$

Thomas Müller-Gronbach
University of Passau, Germany
thomas.mueller-gronbach@uni-passau.de

We study strong approximation of scalar SDEs $dX_t = \mu(X_t)\,dt + dW_t$ at time $t = 1$ in the case that μ is bounded and has fractional Sobolev regularity $s \in (0, 1)$. Recently, it has been shown in [1] that in this case the equidistant Euler scheme achieves a root mean squared error of order $(1 + s)/2$, up to an arbitrary small ϵ, in terms of the number of evaluations of the driving Brownian motion W. In this talk we show that, for $s \in (1/2, 1)$, this order can not be improved in general.

References [1] K. Dareiotis, M. Gerencsér and K. Lê. Quantifying a convergence theorem of Gyöngy and Krylov. arXiv:2101.12185v2 (2022).

Joint work with Simon Ellinger (University of Passau, Germany) and Larisa Yaroslavtseva (University of Graz, Austria).