Nonlinear parabolic stochastic evolution equations in critical spaces

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Critical spaces for non-linear equations are important due to scaling invariance, and in particular this plays a central role in fluid dynamics. In this talk we introduce and discuss local/global well-posedness, and blow-up criteria for stochastic parabolic evolution equations in critical spaces. Our results extend the celebrated theory of Prüss, Wilke and Simonett for deterministic PDEs. Due to the presence of noise it is unclear that a stochastic version of the theory is possible, but we will show that a suitable variation of the theory remains valid. We will also explain some features which are new in both the deterministic and stochastic framework. Our theory is applicable to a large class of semilinear and quasilinear parabolic problems which includes many of the classical SPDE. Applications to stochastic Navier-Stokes equations with gradient noise will be also discussed.

This is a joint work with Mark Veraar (TU Delft).