



Institut für Mathematik

# Seminar zur Stochastik

Dienstag, 12. Juni 2018  
14 Uhr c. t.  
SR 114, August-Bebel-Str. 4

**Herr Prof. Dr. Gerald Trutnau**  
(Seoul National University, South Korea)

## “Existence and uniqueness results for Itô-SDEs with locally integrable drifts and Sobolev diffusion coefficients”

**Abstract:** Using elliptic regularity results for sub-Markovian  $C_0$ -semigroups of contractions in  $L^p$ -spaces, we construct for every starting point weak solutions to SDEs in  $d$ -dimensional Euclidean space up to their explosion times under the following conditions. For arbitrary but fixed  $p > d$  the diffusion coefficient  $A = (a_{ij})$  is supposed to be locally uniformly strictly elliptic with functions  $a_{ij} \in H_{loc}^{1,p}(\mathbf{R}^d)$  and for the drift coefficient  $G = (g_1, \dots, g_d)$ , we assume  $g_i \in L_{loc}^p(\mathbf{R}^d)$ . Subsequently, we develop non-explosion criteria which allow for linear growth, singularities of the drift coefficient inside an arbitrarily large compact set, and an interplay between the drift and the diffusion coefficient. Moreover, we show strict irreducibility of the solution, which by construction is a strong Markov process with continuous sample paths on the one-point compactification of  $\mathbf{R}^d$ . Constraining our conditions for existence further and respectively to the conditions of several well-known articles, as for instance Gyöngy and Martinez (CMJ 2001), X. Zhang (SPA 2005, EJP 2011), Krylov and Röckner (PTRF 2005) and Fang and T.-S. Zhang (PTRF 2005), where pathwise unique and strong solutions are constructed up to their explosion times, we must have that both solutions coincide. This leads as an application to new non-explosion criteria for the solutions constructed in the mentioned papers and thereby to new pathwise uniqueness results up to infinity for Itô-SDEs with merely locally integrable drifts and Sobolev diffusion coefficients. This is joint work with Haesung Lee (Seoul National University)

**Alle Interessenten sind herzlich eingeladen**

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