Some remarks on stochastic thin-film equations

For liquid films with a thickness in the order of $10^1 - 10^3$ molecule layers, classical models of continuum mechanics do not always give a precise description of thin-film evolution: While morphologies of film dewetting are captured by thin-film models, discrepancies arise with respect to time-scales of dewetting.
In this talk, we study stochastic thin-film equations which differ from corresponding deterministic equations by multiplicative noise inside an additional convective term. We present numerical simulations which indicate that the aforementioned discrepancies may be overcome under the influence of noise.
In the main part of the talk, we prove existence of almost surely nonnegative martingale solutions. Our analysis relies on spatial semi-discretization, discrete variants of energy and entropy estimates combined with appropriate stopping time arguments as well as on recent tools for martingale convergence.
The results have been obtained in collaboration with K. Mecke and M. Rauscher and with J. Fischer, respectively.