On existence and equilibration for Keller-Segel-type gradient flow systems

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In my talk, I will present a variant of the Keller-Segel model for chemotaxis. The biological process of chemotaxis describes the movement of microorganisms in response to spatial gradients of certain chemical signalling substances. The mathematical model comprises two coupled nonlinear parabolic partial differential equations and formally exhibits gradient flow structure with respect to a mixed Wasserstein-L^2 distance. I will present a method of proof for the existence of global weak solutions to the system at hand using techniques related to gradient flows, e.g. the construction of a time-discrete approximate solution via the so-called minimizing movement scheme. Furthermore, I will outline an entropy method leading to exponential convergence of the solution to the unique stationary state of the considered system under suitable assumptions on the model parameters and the initial conditions. This is joint work with Daniel Matthes.