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DK Seminar

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Convex Lyapunov functionals for non-convex gradient flows: two examples

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Abstract: Various diffusion equations can be written as a gradient flow, i.e., their solutions are curves of steepest descent (with respect to a suitable metric) in some energy landscape (of a suitable potential). If the potential is strictly convex in the considered metric, then one immediately obtains quantitative estimates on the speed of convergence of solutions towards equilibrium.

In this talk, I will discuss two examples in which the potential is not convex, but still good estimates on the long-time asymptotics can be derived by variational methods. The first example (joint with S.Linisi and G.Savare) is a family of fourth order degenerate parabolic equations, which arise e.g. in models for lubrication. The second example (joint work with J.Zinsl) is a system of two nonlinear diffusion equations modeling the aggregation of bacteria.