

## Strong $H^2$ convergence of the JKO scheme for the Fokker-Planck equation

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I will present a recent work in collaboration with G. Tosmpulatov (TU Wien). Refined inequalities based on the five-gradients-inequality allow to prove a new convergence result for the discrete solutions obtained via the Jordan-Kinderlehrer-Otto scheme for the linear Fokker-Planck equation. This equation is the gradient flow in  $W_2$  of a functional composed of the entropy plus a potential energy, and we will prove, when considering a convex and compact domain and suitable initial data, that the discrete solutions strongly converge in  $L^2$  in time  $H^2$  in space to the corresponding continuous solution of the PDE. The estimates we use are in the spirit of the results we obtained in another recent paper, joint with S. Di Marino, but we need to take into account positive remainder terms, which will actually play the major role in the estimates, I will also briefly address the difficulties in extending the result to other cases, in particular for non-linear diffusion.