Gradient flows and optimal transport: continuous, discrete, and quantum

Abstract.
At the end of the 1990s it was discovered by Jordan/Kinderlehrer/Otto that the diffusion equation is a gradient flow in the space of probability measures, where the driving functional is the Boltzmann-Shannon entropy, and the dissipation mechanism is given by the 2-Wasserstein metric from optimal transport. This result has been the starting point for striking developments at the interface of analysis, probability, and metric geometry.

The first talk (by Lorenzo Portinale) gives an introduction to this area of research, with a focus on gradient flows in metric spaces and in particular the 2-Wasserstein space from optimal transport.

The second talk (by Jan Maas) will review work on gradient flows for discrete stochastic dynamics and dissipative quantum systems. We discuss connections to discrete Ricci curvature and entropy inequalities. The talk is based on joint works with Matthias Erbar and with Eric Carlen.