

Abstract

Oberwolfach Workshop:

Variational Methods for Evolution

Dates:

13 - 19 September 2020 (Code: 2038)

Organizers:

Alexander Mielke, Berlin
Mark Peletier, Eindhoven
Dejan Slepcev, Pittsburgh

Variational principles for evolutionary systems allow for the usage of the rich toolbox provided by the theory of the calculus of variations. Such principles are available for Hamiltonian systems in classical mechanics, gradient flows for dissipative systems, but also time-incremental minimization techniques for more general evolutionary problems. The new challenges arise via the interplay of two or more functionals (e.g. a free energy and a dissipation potential), thus encompassing a large variety of applications in the modeling of materials and fluids, in biology, in multi-agent systems, and in data science.

The variational methods for evolution have seen a rapid growth over the last two decades, and this workshop aims to continue the successful line of meetings (after 2014 and 2017), while evolving and branching into new directions. We bring together a wide scope of mathematical researchers from calculus of variations, partial differential equations, analysis, and stochastics, but also applied and computational scientists to discuss and exchange ideas. We will focus on variational tools such as energy-dissipation principles, evolutionary Gamma convergence, unbalanced optimal transport, large-deviation principles for time-continuous Markov processes, and stochastic gradient descent methods.