SETH TAYLOR, McGill University
A functional discretization of the coadjoint action on the diffeomorphism group

The coadjoint orbits of a Lie group play a fundamental role in the geometry underlying many continuum mechanical systems. In this talk, we will present a geometric integrator designed to preserve this infinite-dimensional geometric structure under discretization without using a finite-dimensional analogue. The key idea behind the construction is the use of a functional discretization of the coadjoint action which avoids truncating the solution in the dual of the Lie algebra. We will present an analysis and numerical results of the application of this integrator, illustrating its unique resolution properties for invariant Hamiltonian systems on the space of diffeomorphisms of a compact manifold. The talk is based on joint work with Jean-Christophe Nave and Xi-Yuan Yin.