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Normal forms for Hamiltonian systems with symmetry

This talk presents results concerning the Birkhoff normal forms theory for Hamiltonian systems with non-commutative continuous symmetries around a relative equilibrium.

An appropriate slice theorem is used to locally decompose the phase space into the drift and slice directions, that is, coordinates along the symmetry group and complementary directions, respectively. The dynamics is described by a skew product system where the slice dynamics, a Hamiltonian system in the Poisson sense, drives the drift. The normal form for the slice equations is achieved by using structure preserving (Poisson) changes of coordinates. Further, the normalization of the slice equations induces the normalization of the drift equations.

This work is joint with Mark Roberts (Univ. of Surrey, UK) and Tanya Schmah (U of T).