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Openness of momentum maps and symmetric Hamiltonian dynamics

Equilibria and periodic orbits are key to understanding a Hamiltonian system (or any dynamical system for that matter), and theorems on their persistence (Poincaré) or bifurcation (Weinstein-Moser) under energy perturbation are classical. Now, physical Hamiltonian systems usually come with symmetries; then the key is *relative equilibria* and *relative periodic orbits*. This talk presents a series of theorems on their persistence and bifurcation under momentum perturbation. To overcome difficulties with singular momentum values and noncompact groups, unavoidable in physical applications, we need to prove delicate results in symplectic geometry, but once proved they can be used indelicately and lead to the sharpest possible theorems.