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"Arnold diffusion and Mather theory"

Abstract: In the 1960s, Arnold discovered the first example of a drifting orbit in nearly integrable Hamiltonian systems, a phenomenon later called Arnold diffusion. He also conjectured that diffusion occurs for typical nearly integrable systems. Arnold's conjecture is proven for smooth systems, in 2.5 degrees of freedom, first in an announced proof by Mather, with alternative proofs given by Kaloshin-Zhang, and Cheng. More recently, progress has been made in higher degrees of freedom.

In this mini-course, we will describe the proof of 2.5 degrees of freedom by Kaloshin-Zhang, which combines the modern understanding of Mather theory, weak KAM theory, normal form theory, and hyperbolic invariant manifolds. We will also describe the recent results in higher degrees of freedom.