Two or infinitely many Reeb orbits

Michael Hutchings (University of California) floerhomology@gmail.com

Resumo/Abstract:
A basic problem in Hamiltonian mechanics is to understand the periodic orbits of Hamiltonian vector fields. An important special case of this question is to understand periodic orbits of the Reeb vector field (called "Reeb orbits" for short) of a contact form on an odd-dimensional manifold. In particular, the Weinstein conjecture asserts that every contact form on a closed manifold has at least one Reeb orbit. This was proved in the three-dimensional case by Taubes; the higher dimensional case remains open. In this talk we will present a stronger result in the three-dimensional case, proved in joint work with Dan Cristofaro-Gardiner and Dan Pomerleano. The result is that for every contact form on a closed connected three-manifold satisfying two assumptions, there are either two or infinitely many Reeb orbits. (The assumptions are that the contact form is "nondegenerate", which holds generically, and that the associated contact structure has torsion first Chern class, which holds for example whenever the three-manifold is a rational homology sphere.)