Closing lemmas in contact dynamics and holomorphic curves

Abstract:

Given a flow on a manifold, how to perturb it in order to create a periodic orbit passing through a given region? While the first results in this direction were obtained in the 1960-ies, various facets of this question remain largely open. I will review recent advances on this problem in the context of contact flows, which are closely related to Hamiltonian flows from classical mechanics. In particular, I'll discuss a proof of a conjecture of Irie stating that rotations of odd-dimensional ellipsoids admit a surprisingly large class of perturbations creating periodic orbits. The proof involves methods of modern symplectic topology including pseudo-holomorphic curves and contact homology. The talk is based on a joint work with Julian Chaidez, Ipsita Datta and Rohil Prasad, as well as a work in progress joint with Julian Chaidez.