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Periodic Orbits in Symplectic Geometry and the Weinstein Conjecture

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Periodic orbits for Hamiltonian systems play a particular role in symplectic geometry. For example, they carry the obstructions for symplectic rigidity phenomena. The Weinstein conjecture from 1978 states that under certain geometric assumptions an autonomous Hamiltonian system constrained to a compact regular energy surface should have at least one periodic orbit.
In 1993 Hofer related the problem to holomorphic curve theory which lead to a large number of situations in which the Weinstein conjecture could be established. The conjecture was recently settled in dimension three by C. Taubes. The method is however very particular since it relates the holomorphic curve approach to Seiberg-Witten-Floer homology, which is a 3-manifold invariant for which no generalization to higher dimensions is known. The general
conjecture in higher dimensions is wide open, though one knows it is related to Gromov-Witten theory and Floer theory, which however only touch certain aspects of the conjecture.

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