Aubry-Mather Theory and Lorentzian Geometry

Aubry-Mather theory lies at the junction of Hamiltonian dynamical systems and global variational analysis. From the point of Hamiltonian systems it can be interpreted as a partial generalization of KAM theory to general convex Hamiltonian systems. From the perspective of global variational analysis it gives answers to the question of the existence and the properties of "bi-infinite" minimal solutions of one-dimensional variational problems. In my talk I will give two motivations for Aubry-Mather theory, one coming from invariant tori in Hamiltonian dynamics and one residing in variational analysis. After that I will describe a few important results of Aubry-Mather theory of strictly convex Lagrangian systems. In the second part of my talk I will present my work dealing with a generalization of Aubry-Mather theory to Lorentzian manifolds.