THE CONLEY CONJECTURE FOR TONELLI SYSTEMS

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ABSTRACT. On a closed configuration space M, a time-periodic Lagrangian function $L : \mathbb{R}/\mathbb{Z} \times TM \to \mathbb{R}$ is called Tonelli when its restriction to any fiber of TM is superlinear with positive definite Hessian. In this talk I shall prove that, for any Tonelli Lagrangian with global Euler-Lagrange flow, the associated Euler-Lagrange system admits infinitely many periodic solutions. More precisely, I will show that there are infinitely many contractible periodic orbits with a priori bounded mean action and either infinitely many of them are 1-periodic or their basic period is unbounded. This result confirms the Conley conjecture for Tonelli Hamiltonian systems on the cotangent bundle of closed manifolds.