On a Lower Bound for the Energy Functional on a Family of Hamiltonian Minimal Lagrangian Tori in CP2

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In this project we study the energy functional on the set of Lagrangian tori in CP^2. The energy conjecture asserting that the value of energy functional for any Lagrangian torus in CP^2 is not less than the value for the Clifford torus was formulated by Montiel and Urbano. The main result of the present study is that the value of the energy functional for a family Hamiltonian minimal Lagrangian tori in CP^2 is strictly larger than for the Clifford torus. The proof relies on analytic bounds for elliptic integrals. The novelty of the project is that it is devoted to the study of Riemannian geometry of Lagrangian submanifolds in Kaehler-Einstein manifolds, a largely unexplored topic in modern geometry. We can conclude from our result that the Riemannian geometry of the mentioned Hamiltonian minimal Lagrangian tori is subject to severe limitations imposed by the energy conjecture. The Hamiltonian minimal Lagrangian tori considered admit U (1)-group of symmetries which greatly simplifies the computations. An interesting problem would be to prove the energy conjecture without the symmetry assumption.

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