

Global Structure of Completely Integrable Systems in Dimension 4

Gabriela Gutiérrez Guillén

Université Marie et Louis Pasteur, Besançon, France

gabriela.gutierrez-guillen@univ-fcomte.fr

Abstract

When studying conservative physical phenomena within the framework of classical mechanics, we often encounter completely integrable systems. Such systems admit a particularly rich topological and geometric structure on phase space, allowing for local action-angle coordinates that linearize the dynamics on invariant tori and define a torus bundle structure. However, Hamiltonian monodromy appears as a topological obstruction to the global existence of such coordinates, and thus to the triviality of the associated fibration.

In this talk, I will revisit geometrically these concepts in the setting of integrable systems on \mathbb{R}^4 . Then, using spectral Lax pairs, I will show how one can associate a Riemann surface to the system with the property that the computation of Hamiltonian monodromy reduces to the calculation of the residue at infinity of a meromorphic 1-form on this surface. I will conclude with an overview of some perspectives and possible extensions of this work.