The Geometry of Integrable Systems

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Abstract

Integrable systems are systems of differential equations that originated in classical mechanics to describe many well-known dynamical systems such as motions of planets, water propagation and harmonic oscillators, to name a few. Using Hamilton's formulation of mechanics, integrable systems can be described in a more algebraic way as Lagrangian fibrations on a symplectic space. Integrable systems have now become important objects of study in both differential and algebraic geometry, with the Hitchin integrable system even playing a major role in the Geometric Langlands Program. In this talk, I plan to present important examples of integrable systems and discuss some of their geometric properties. For the talk, I will only assume prior knowledge of linear algebra (in particular, bilinear forms), multivariable calculus, as well as basic knowledge of systems of differential equations, and will introduce all the notions of geometry I need.