



IIIème Cycle Romand de Mathématiques

Cours du semestre d'automne 2008 à l'EPFL

Title	Poisson Lie groups and Poisson homogeneous spaces
Instructor	Prof. Jiang-Hua Lu (University of Hongkong, visiting CIB)
Time	September 15 - December 19, 2008, Wednesday, 15:45 - 17:00
Place	EPF Lausanne, room CM 1 106
Objectives	To introduce the basics of Poisson geometry and to exhibit close connections between Poisson geometry and Lie theory
Audience	PhD students, advanced Master students
Content	<p>Poisson structures provide the geometrical setting for Hamiltonian mechanics. Although the first Poisson structure was discovered in 1809 by the French mathematician Simeon-Denis Poisson (1781-1840) in his study of celestial mechanics, the geometry of Poisson structures, or Poisson geometry has become a research field of its own only in the last 40 years or so. A special class of Poisson manifolds, namely Poisson Lie groups and Poisson homogeneous spaces, came about in the 1980's with the discovery of quantum groups. The study of such Poisson manifolds provides rich connections between Poisson geometry and Lie theory.</p> <p>In this course, after a brief introduction to Poisson geometry, we will turn to Poisson Lie groups and Poisson homogeneous spaces. We will show how every connected complex or real semi-simple Lie group can be made into a Poisson Lie group, and we will study in detail some of their Poisson homogeneous spaces such as flag varieties and semi-simple symmetric spaces. Among applications to Lie theory, we show how certain maps and integrals in harmonic analysis on Lie groups can be computed by using Poisson structures.</p>
Prerequisite	Linear algebra and basics on differential manifolds and Lie groups. Prior knowledge of semi-simple Lie groups and Lie algebras would be very helpful.
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