

## **Almost Poisson brackets for nonholonomic mechanical systems with affine constraints and Hamiltonization.**

The equations of motion for mechanical systems with nonholonomic constraints do not arise from a variational principle and as a consequence they do not allow a Hamiltonian formulation. It is well-known that if the constraints are linear in the velocities the equations instead allow an “almost-Poisson” formulation in terms of a bracket of functions that does not satisfy the Jacobi identity. In the first part of my talk I will consider an extension of this construction to the case in which the constraints are affine instead of linear in the velocities. This construction relies on the geometry of affine vector bundles and permits the description of the equations of motion in terms of an almost-Poisson bracket in an extended phase space. In the second part of my talk I explain how, in some examples possessing symmetry, one can perform a reduction and the almost Poisson bracket on the extended space drops to a true Poisson bracket, thereby permitting a true Hamiltonian formulation of the reduced equations of motion.

This is a joint work with Juan C. Marrero, David Martin de Diego and Luis C. García Naranjo.