Dynamics and Symmetry
Dynamique et symétrie
(Org: **Archishman Saha** (University of Michigan) and/et **Cristina Stoica** (Wilfrid Laurier University))

STEPHEN ANCO, Brock University

LENNARD BAKKER, Brigham Young University

CARLOS R. BARRERA-ANZALDO, Instituto Tecnológico Autónomo de México
Curving Lagrange points: more equilibria, more stability

We study the relative equilibria of the restricted circular three-body problem in two-dimensional spaces of constant curvature, which generalize the Lagrangian points $L_1, \ldots, L_5$. Fixing the Riemannian distance between the primaries, we provide rigorous proofs of phenomena observed numerically by Kilin (1999) and Martínez and Simó (2017). In positive curvature, new equilibria arise alongside the classical ones, whose existence is enforced by the compactness of the sphere. Finally, we show that positive curvature enlarges the range of mass ratios for which L_4 and L_5 are elliptic, and that one of the new equilibria is Lyapunov stable. This is joint work with Luis C. García-Naranjo and Miguel Ayala.

CONNOR JACKMAN, ITAM (Mexico)

GIUSY MAZZONE, Queen's University

PHILIP MORRISON, Univ of Texas at Austin

DAN OFFIN, Queen's University

ARCHISHMAN SAHA, University of Michigan

NICOLA SANSONETTO, University of Verona
Geometric structure of certain nonholonomic systems with symmetry: integrability and Hamiltonisation

In Hamiltonian mechanics the conservation of the momentum map establishes a well understood relation between the presence of symmetries and the existence of conserved quantities. If constraints in the velocities are taken into account, the situation

changes drastically: the variational and hence the Hamiltonian features typical of conservative holonomic mechanics are broken and in particular Noether's Theorem does not hold anymore. Besides that, in the last forty years there has been various approaches to extend Noether Theorem to the nonholonomic framework, and many interesting structures and results, as nonholonomic momentum map, nonholonomic reduction, Hamiltonisation and gauge momenta have been introduced and obtained. In this talk I will firstly recall the basic concepts of nonholonomic systems, symmetries, nonholonomic momentum maps, horizontal gauge momenta, and Hamiltonisation. Then I will give a result that allows to determine the number of horizontal gauge momenta that certain nonholonomic systems with symmetry may admit and also a method to compute them. I will then relate the existence of horizontal gauge momenta to the problem of Hamiltonisation and integrability of certain type systems.

This talk is based on an ongoing collaboration with Paula Balseiro from Fluminense Federal University - Brazil.

MANUELE SANTOPRETE, Wilfrid Laurier University

TANYA SCHMAH, University of Ottawa