Normal forms for singular dynamics

Yvain Bruned[1]

Universite de Lorraine, CNRS, IECL, F-54000 Nancy, France
Email: yvain.bruned@univ-lorraine.fr

Abstract

Conference organised in Nancy from 3 to 5 of June 2025, funded by the ERC Starting Grant LoRDeT (Low Regularity Dynamics via Decorated Trees) https://cordis.europa.eu/project/id/101075208. The PI of the project is Yvain Bruned.

Tuesday 3 June 2025

Talks take place at IECL, Salle de Conférences.

- 14h00-14h50: Tadahiro Oh.

  T.B.A.

- 14h50-15h40: Jacky Cresson.

  T.B.A.

- 15h40-16h10: Coffee break.
- 16h10-17h00: Dario Bambusi.

  Almost global existence for Hamiltonian PDEs on boundaryless compact manifolds

  Taking the nonlinear Klein Gordon equation as a model problem, I will present a result on the qualitative behaviour of solutions of Hamiltonian PDEs on compact boundaryless Riemannian manifolds. Precisely, one has that solutions corresponding to smooth and small initial data remain small and smooth for times of order ϵ^{-r}, $\forall r$. Here ϵ is the size of the initial datum. The proofs is based on variants of Birkhoff normal form.
  I will start by reviewing the classical method of Birkhoff normal form for finite dimensional Hamiltonian systems, then I will recall the theory for equations in one space dimensions and finally I will present the ideas leading to the theory in higher space dimension.

Joint work with J. Bernier, B. Grebert, R. Imekratz.

- 19h30-22h30: Conference dinner at Grand Café Foy.

Wednesday 4 June 2025

Talks take place at IECL, Salle de Conférences.

- 9h30-10h20: Yvain Bruned.

  T.B.A.

- 10h50-11h40: Tristan Robert.

  T.B.A

- 11h40-12h30: Frédéric Fauvet.

  Explicit linearization of multi-dimensional germs and vector fields through Ecalle's tree expansions

  We provide explicit formulas of non-recursive type for the linearizing transformations of a non-resonant analytic germ of diffeomorphism at a fixed point or a non-resonant analytic germ of vector field at a singular point, in any complex dimension. The formal expressions we obtain rely on a part of Ecalle's tree-based combinatorics called "arbomould calculus" and they have the same shape for dynamical systems with discrete or continuous time respectively. They allow us to recover in a straightforward way, under Bruno's arithmetical condition, the sharpest estimates so far for the domains of convergence of the analytic linearizing changes of variables.
  Joint work with Frédéric Menous, U. Paris–Saclay and David Sauzin, CNRS–Paris Observatory.

- 12h30-14h30: Lunch.

  Talks take place at IECL, Salle Döblin.

- 14h30-15h20: Katharina Schratz.

  T.B.A

- 15h20-15h50: Coffee break.
- 15h50-16h40: Anne-Sophie De Suzzoni.

  T.B.A

- 16h40-17h30: Kurusch Ebrahimi-Fard.

T.B.A.

Thursday 5 June 2025

Talks take place at IECL, Salle Döblin.

- 9h00-9h50: Loïc Foissy.

  Strange pre- and post-Lie structures on rooted trees

  We present a construction of pre-Lie on rooted trees whose edges and vertices are decorated, with a grafting product twisted by an action of a map acting on both edges and vertices. We show that this construction indeed gives a pre-Lie algebra if, and only if, a certain commutation relation is satisfied. Then, this pre-Lie algebra can be extended as a post-Lie algebra through a semi-direct product.
  A particular example is used for normal forms in the study of stochastics PDEs. Here, the set of decorations of edges and vertices is $\mathbb{N}^{d+1}$ and the acting map is the exponentiation of a simpler map.

- 9h50-10h20: Coffee break.

- 10h20-11h10: Jacob Armstrong-Goodall.

  T.B.A.

- 11h10-12h00: Leonardo Tolomeo.

  T.B.A.