# Poisson Geometry, Groupoids and Quantization

An instructional workshop on topics in Poisson geometry and related fields

**University of Auckland**
**24-25 November 2021**

## Abstracts

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**Speaker:** Maria-Amelia Salazar

**Title:** Groupoids: symmetries and beyond

**Abstract:** Historically, groups first appeared as spaces of global symmetries of some object, for examples, the symmetries of the plane tessellated by squares. However, to describe all the patterns that do not come from global symmetries, we need a generalization known as groupoids. Moreover, groupoids are used as tools in geometry, topology algebra etc. In this talk, I will explain the main notions underlying groupoids and I will illustrate how they have been used through some examples.

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**Speaker:** Cristián Ortiz

**Title:** Sections of vector bundles over Lie groupoids

**Abstract:** Lie groupoids can be seen as categorified manifolds and unify several geometric objects such as Lie groups, manifolds, Lie group actions, foliations and orbifolds, among others. In this talk I will start by recalling the notion of VB-groupoid, which is a categorified version of a vector bundle. Then I will explain in which sense the space of sections of a VB-groupoid has the structure of a 2-vector space, i.e. a categorified vector space. Finally, I will focus on the special case of multiplicative vector fields on Lie groupoids and their main properties.

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**Speaker:** Jethro van Ekeren

**Title:** Classical limits in field theory

**Abstract:** Poisson algebras describe observable quantities in classical mechanics, and arise as classical limits of algebras of quantum observables. Poisson vertex algebras play a similar role in field theory. After an introductory account of these notions, we will discuss some recent results on classical freeness of some conformal field theory models.

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**Speaker:** Alessia Mandini

**Title:** Hyperpolygons spaces: a view on moduli spaces of parabolic Higgs bundles via hyperkähler reduction

**Abstract:** Hyperpolygons spaces are a family of hyperkähler manifolds that can be obtained from coadjoint orbits by hyperkähler reduction. These spaces are isomorphic to certain families of parabolic Higgs bundles, when a suitable condition between the parabolic weights and the spectra of the coadjoint orbits is satisfied. In this talk I will present this construction in its simplest case and hint possible generalizations.

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**Speaker:** Alejandro Cabrera

**Title:** Quantization of Poisson brackets and its relation to Lie theory

**Abstract:** In this talk, we provide an introductory overview to the concepts behind quantization of Poisson brackets. We will stress its relation to the Lie theory of symplectic groupoids and mention some recent results on the subject.

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**Speaker:** Matias del Hoyo

**Title:** Stacks in Poisson geometry

**Abstract:** Lie groupoids, up to Morita equivalence, serve as models for stacks in differential geometry, giving finite-dimensional solutions to moduli problems. Poisson and Dirac structures are singular versions of symplectic structures, arising in mechanical systems subject to symmetries and constraints, and they admit a neat description in terms of Lie algebroids. In this talk, I will overview the notions of Lie groupoids, Morita equivalences, and differentiable stacks, and show how they play a key role in two fundamental problems of Poisson geometry: linearization and desingularization.

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