Symplectic and Poisson geometry
Géométrie symplectique et de Poisson
(Org: **Lisa Jeffrey** (University of Toronto) and/et **Derek Krepski** (University of Manitoba))

DANIEL ALVARÉZ, University of Toronto
Symplectic double groupoids and generalized Kähler metrics

I'll explain how the generalized Kähler class can be defined in terms of Morita equivalences of symplectic double groupoids and I'll explain how this framework allows us to determine the fundamental degrees of freedom of a generalized Kähler metric in full generality. If time permits I'll describe how these ideas can be explicitly illustrated in the case of compact Lie groups. This is joint work with Marco Gualtieri and Yucong Jiang.

TATYANA BARRON, University of Western Ontario
Kaehler quantization and entropy

In geometric quantization, Lagrangian states or coherent states on a symplectic manifold M are sections of the prequantum line bundle on M determined by an appropriate submanifold of M. What are the entanglement properties of these states ? Or, to pose a different question, is the entanglement entropy (a concept from quantum information theory) a useful invariant ? I will report on recent joint results with A. Kazachek and with M. Saikia.

FRANCIS BISCHOFF, University of Regina
Jets of foliations and b^k-Poisson structures

The b^k-tangent bundle, first introduced by Scott, is a Lie algebroid consisting of vector fields tangent to a hypersurface D to order k. Although this algebroid depends on the choice of a local defining function for D, all functions give rise to isotopic Lie algebroids. In this talk I will introduce a wider class of Lie algebroids that are locally of b^k-type but which are classified, up to isotopy, by a local system on D. These algebroids allow us to define a new class of Poisson structures which are symplectic away from D. I will discuss the properties of these Poisson structures and the ways they differ from ordinary b^k-Poisson structures. This is joint work with Álvaro del Pino and Aldo Witte.

CASEY BLACKER, George Mason University
Geometric and algebraic reduction of multisymplectic manifolds

A symplectic Hamiltonian manifold consists of a Lie group action on a symplectic manifold, together with the additional structure of a moment map, which encodes the group action in terms of the assignment of Hamiltonian vector fields. In special cases, the moment map determines a smooth submanifold to which the Lie group action restricts and the resulting quotient inherits the structure of symplectic manifold. In every case, it is possible to construct a reduced Poisson algebra that plays the role of the space of smooth functions on the reduced symplectic manifold.

In this talk, we will discuss an adaptation of these ideas to the multisymplectic setting. Specifically, we will exhibit a geometric reduction procedure for multisymplectic manifolds in the presence of a Hamiltonian action, an algebraic reduction procedure for the associated L-infinity algebras of classical observables, and a comparison of these two construction. This is joint work with Antonio Miti and Leonid Ryvkin.

PETER CROOKS, Utah State University
Scheme-theoretic coisotropic reduction

I will present a purely scheme-theoretic version of Hamiltonian reduction along a coisotropic subvariety. This will yield algebro-geometric counterparts of certain results in symplectic geometry. If time permits, I will outline the importance of these counterparts to Moore-Tachikawa topological quantum field theories. This represents joint work with Maxence Mayrand.

DINAMO DJOUNVOUNA, University of Manitoba
Construction of a Lie 2-algebra associated with a quasi-Hamiltonian G-space

Any 2-plectic manifold gives rise to a Lie 2-algebra, as established by Rogers. In contrast, a quasi-Hamiltonian G-space (M, ω, Φ) results in a closed relative differential form (ω, η) through the algebraic mapping cone.

This raises the question: Is there an analogous Lie 2-algebra associated with a quasi-Hamiltonian G-space? This talk will demonstrate that a similar construction to Rogers' theorem can be applied in the relative context. Specifically, we will show that a quasi-Hamiltonian G-space can give rise to a Lie 2-algebra.

MARK HAMILTON, Mount Allison University
Lagrangian fibrations, quantization, and integral-integral affine geometry

The geometry of Lagrangian fibrations has been studied by a number of authors, and turns out to be quite rigid; as one example, the Arnold-Liouville theorem implies that the base B of a Lagrangian fibration $M \to B$ can be equipped with an integral affine structure. In the presence of a prequantization $L \to M$, more can be said. In this talk we will review some facts about Lagrangian fibrations and describe an "Enhanced Arnold-Liouville Theorem" that equips B with what we call an *integral-integral affine* structure. We will also discuss some results from "integral-integral affine geometry" and their relation to quantization.

DAN HUDSON, University of Toronto
On deformation spaces of Lie groupoids and Lie algebroids

Deformation spaces of Lie groupoids are an important tool in the index theory of pseudodifferential operators. In this talk I will describe the geometric data needed to define a deformation space in the context of Lie groupoids and Lie algebroids, and how differentiation and integration works in this setting. If time permits, I will also explain a related blow-up procedure and describe a "tangent groupoid" for a filtered manifold with boundary.

CALEB JONKER, University of Toronto
Graded symplectic geometry and the generalized Kahler-Ricci flow

Bi-Hermitian geometry, initally discovered by physicists in their investigation of supersymmetric string theory, was later rediscovered by Gualtieri as part of Hitchin's generalized geometry program. This discovery unearthed many beautiful connections to Poisson and Dirac geometry. One of these that has only recently begun to be investigated is the connection of bi-Hermitian (also known as generalized Kahler geometry) to graded symplectic geometry. I will give an overview of these developments. In particular, I will explain how the generalized Kahler-Ricci flow, which also has origins in string theory, can be described as the flow by a Hamiltonian vector field on a graded symplectic manifold.

SAIKIA MANIMUGDHA, University of Western Ontario
Restrictions of holomorphic sections to products

In this talk, we explore how quantum states relate to subsets of a product of two compact connected Kahler manifolds. We shall introduce a few concepts from quantum information theory, such as separable and entangled quantum states. Then, we shall see a particular way to associate quantum states with subsets using the techniques of geometric quantization. In the end, we shall present a result which states that the quantum states associated this way are separable when the subset is a finite union of products.

RUXANDRA MORARU, University of Waterloo
Born geometry

A Born structure on a $2n$-manifold M consists of a quadruple (I, J, K, g) where g is a pseudo-Riemannian metric on M of split signature (n, n) and (I, J, K) is a para-hypercomplex structure on M such that gI and gJ are both symmetric, and gK is skew-symmetric. Born structures are thus para-hypercomplex structures together with special types of pseudo-Riemannian metrics. These structures were introduced in 2014 by L. Freidel, R. G. Leigh and D. Minic as a geometric background for a duality symmetric formulation of string theory called metastring theory. In this talk, I will describe some of their geometry and explain how they fit into the context of generalized geometry.

ETHAN ROSS, University of Toronto
Singular Riemannian Foliations and Foliate Vector Fields

Singular Riemannian Foliations (SRFs) are a class of reasonably well-behaved singular foliations (in the sense of Stefan-Sussmann) which appear quite naturally when studying isometric group actions or riemannian submersions with singularities. One nice feature of SRFs is that they induce a canonical decomposition of the underlying manifold into embedded submanifolds equipped with regular Riemannian foliations. In this talk, I will demonstrate that this additional decomposition is in fact a singular foliation and provide a new proof that the pieces of this decomposition form a stratification.