Poisson Summer School 2026: Antwerpen

part of
Poisson Event 2026 Antwerp & Leuven

3 – 7 August 2026

Sponsored by:

Contents

Important Information

Addresses

Lecture Room: s.M 001 De Meerminne building
Sint-Jacobsstraat 2, 2000 Antwerpen.

ASH Hostel: Italiëlei 237, 2000 Antwerpen, Belgium

Contacts

Official email: poisson2026school@uantwerpen.be

Local Organizer committee

Prof. dr. S. Hohloch, and dr. F. Zadra.

Wifi

You can use your Eduroam account within the university buildings. Otherwise, the organizers will provide temporary access.

Emergency numbers

Police : 101
Fire and Ambulance : 112

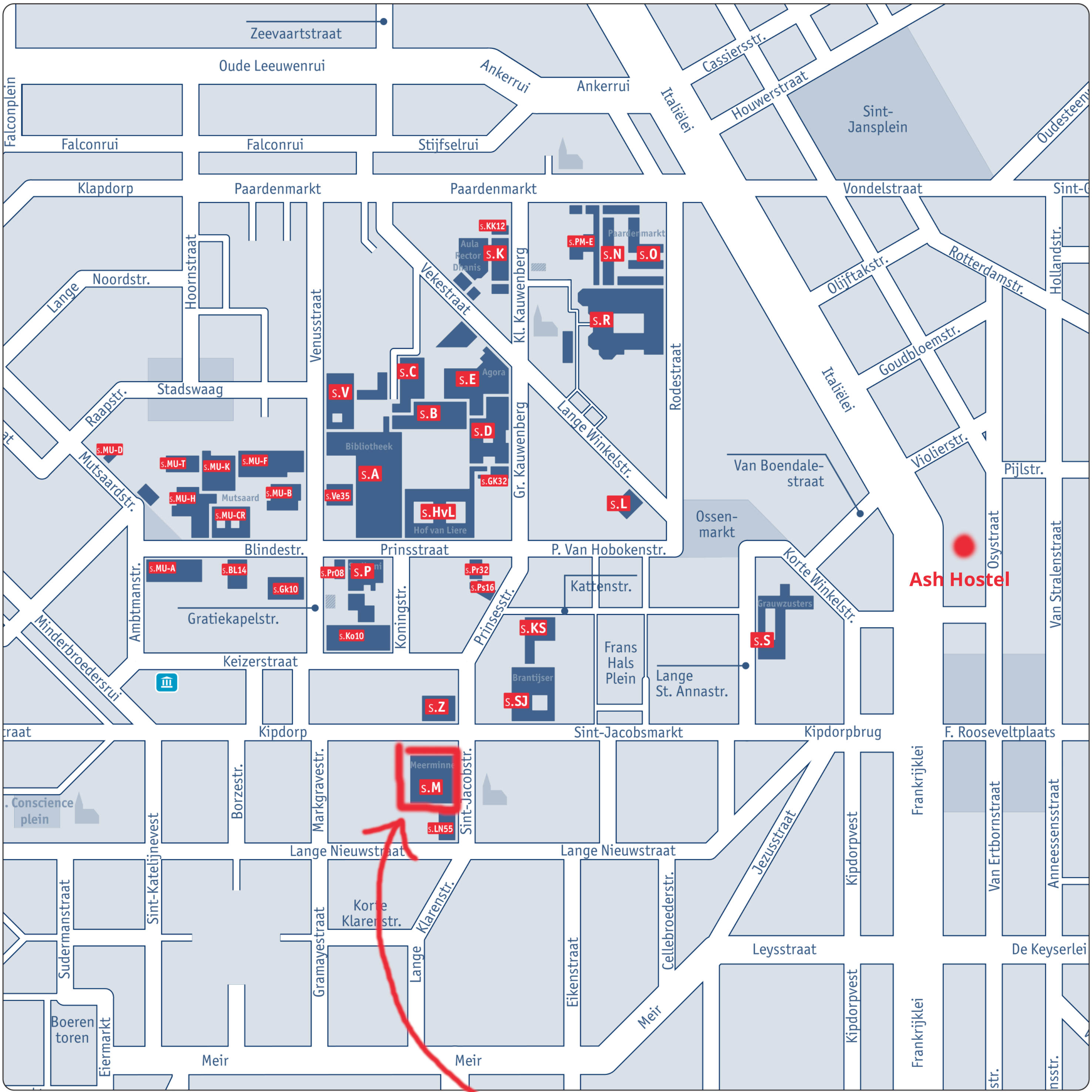
Venue

The lectures will take place at the City Campus (*Stadscampus*) in the **De Meerminne** building, located at Sint-Jacobsstraat 2, 2000 Antwerpen. Please refer to the map on the following page for the exact location or click on the address to open Google Maps.

Public transportation in Antwerp is available via bus and tram networks. For route planning, schedules, and ticket information, please visit the official portals:

- Visit Antwerp Public Transport Guide
- De Lijn (Bus & Tram Services)

Stadscampus



s.A - Library, Prinsstraat 13
s.B - Prinsstraat 13
s.BL14 - **Open University / Centrum West** - Blindestraat 14
s.C - Prinsstraat 13
s.D - Grote Kauwenberg 18
s.E - **Agora/Sports centre** - Grote Kauwenberg 2
s.Gk10 - **International Relations Office** - Gratiekapelstraat 10
s.GK32 - **Ruusbroec association** - Grote Kauwenberg 32-34
s.HvL - **Hof van Liere** - Prinsstraat 13
s.HvL - **University Club** - Prinsstraat 13b
s.K - **Aula Rector Dhanis** - Kleine Kauwenberg 14
s.KK12 - **Linguapolis** - Kleine Kauwenberg 12
s.Ko10 - **komida** / **Labotheek** - Koningstraat 8
s.L - Lange Winkelstraat 40-42

s.M - **De Meerminne** - Sint-Jacobstraat 2
s.MU - **Mutsaard** - **Faculty of Design Sciences**- Mutsaardstraat 29
s.MU-A - **Mutsaard** - **Product development** - Ambtmanstraat 1
s.P - **Scribani** - Prinsstraat 10
s.Pr08 - **Linguapolis** - Prinsstraat 8
s.Pr32 - **Zomaar een dak** - Prinsstraat 32
s.PM - Paardenmarkt 92
s.Ps16 - **Universitas - Rubi - Student Council** - Prinsesstraat 16
s.R - Rodestraat 14
s.S - **Grauwzusters** - Lange Sint-Annastraat 7
s.SJ - **Het Brantijser** - Sint-Jacobsmarkt 13
s.V - Venusstraat 23
s.Ve35 - **Moral consultant / Prevention Service** - Venusstraat 35
s.Z - **Peter Benoit** - Kipdorp 61

University of Antwerp

Schedule and Lectures Information

Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
09:00 AM					
09:15 AM	Registration	Jiang-Hua Lu	Tara Holm	Miquel Cueca Ten	Miquel Cueca Ten
09:30 AM					
09:45 AM					
10:00 AM	Opening / Instruction	Jiang-Hua Lu	Simone Gutt	Simone Gutt	Miquel Cueca Ten
10:15 AM					
10:30 AM	**Coffee Break (10:30 – 11:00 AM)**				
11:00 AM					
11:15 AM	Jiang-Hua Lu	Alexey Bolsinov	Simone Gutt	Simone Gutt	Simone Gutt
11:30 AM					
11:45 AM					
12:00 PM	Jiang-Hua Lu	Alexey Bolsinov	Tara Holm	Miquel Cueca Ten	Tara Holm
12:15 PM					
12:30 PM	**Lunch Break (12:30 – 02:30 PM)**				
02:30 PM					
02:45 PM	Alexey Bolsinov	Alexey Bolsinov		Tara Holm	Exercises: M. Cueca Ten
03:00 PM					
03:15 PM					
03:30 PM	**Coffee Break**			**Coffee Break**	
04:00 PM					
04:15 PM	Pitch talk / Poster	Exercises: Jiang-Hua Lu		Exercises: Tara Holm	
04:30 PM					
04:45 PM					
05:00 PM					
05:15 PM		Exercises: A. Bolsinov		Best Posters Award	
05:30 PM					
05:45 PM					
06:00 PM	**Reception**				

Jiang-Hua Lu

University of Hong Kong, China

Title: "Introduction to Poisson structures via polynomial Poisson brackets"

Abstract: After a very brief introduction to Poisson geometry, we explain how to construct a class of polynomial Poisson structures, and we study some of their properties. The lectures are mostly based on a recent joint work with Mykola Matviichuk.

Alexey Bolsinov

Loughborough University, UK

Title: "Integrable systems: from Poisson to Nijenhuis"

Abstract: The goal of this mini-course is to introduce students to the basics of Nijenhuis geometry, drawing parallels with Poisson geometry (Lectures 1 and 2). These two fields are remarkably similar in many ways. It's no surprise that they are excellent partners in so-called Poisson-Nijenhuis structures, which play a crucial role in the theory of integrable Hamiltonian systems. Lectures 3 and 4 are devoted to this topic, leading finally to a solution to the classical Eisenhart-Stäckel problem on integrable systems with integrals quadratic in momenta.

Tara Holm

Cornell University, USA

Title: "Hamiltonian Group Actions and Fixed Points"

Abstract: Symmetry plays a central role in symplectic geometry and momentum maps are a powerful tool for studying it. This minicourse will introduce Hamiltonian actions of compact Lie groups on symplectic manifolds, with particular focus on actions of tori and the significance of their fixed points. Beginning with the momentum map and its basic properties, we will explore how the topology of fixed point components together with local isotropy data can be used to assemble global topological and geometric features of the ambient manifold. We will examine localization techniques, convexity theorems, and fixed-point formulas that use symmetries and their fixed points to compute invariants such as (equivariant) cohomology and (equivariant) characteristic classes. Along the way, we will discuss numerous examples, including toric manifolds, coadjoint orbits, and moduli spaces. Depending on time and audience interest, we may also discuss recent developments and open questions concerning Hamiltonian torus actions, equivariant topology, and the classification of symplectic manifolds with large symmetry groups. The course is intended for graduate students with some background in differential geometry and aims to give a broad overview grounded in concrete examples.

Simone Gutt

ULB, Belgium

Title: "Symplectic connections"

Abstract: An affine connection gives a mean to transport a tangent vector -and more generally any tensor- from one point to another along a curve in a manifold.
Connections are used in differential geometry, for instance to express differential operators on a manifold in a coordinate free way, or to prove that some subgroups of the diffeomorphism group are Lie groups.
They were first introduced in Riemannian geometry, where one studies a manifold endowed with a metric, i.e. a positive definite symmetric bilinear product in each tangent space depending smoothly on the point. In that situation, there is one and only one affine connection which is torsion free and such that the metric tensor is parallel. It is called the Levi Civita connection and is an essential tool in the study of those geometries.
In symplectic geometry, one studies a manifold endowed with a symplectic structure, which is a non degenerate 2-form, i.e. a skewsymmetric non degenerate bilinear product in each tangent space depending smoothly on the point, asking furthermore this 2-form to be closed. In that case there always exist affine connections which are torsion free and such that the symplectic 2-form is parallel, but there is no unicity.
This course on symplectic connections has three parts:
Part 1 contains the definition of a symplectic connection on a symplectic manifold, gives properties of the curvature of such a connection, describes possible choices of symplectic connections with examples, and includes properties of the space of all symplectic connections.
In Part 2 we briefly recall the theory of deformation quantization and show how symplectic connections are linked to deformation quantization in the symplectic framework.
Part 3 studies particular classes of symplectic connections. We show that imposing conditions on the curvature of a symplectic connection, such as being of Ricci-type, gives very strong rigidity properties.

Miquel Cueca Ten

KU Leuven, Belgium

Title: "Courant Algebroids and Their Integrations"

Abstract: The problem of integrating Poisson manifolds into symplectic groupoids, as proposed by Karasev and Weinstein in the 1980s, resulted in a drastic change in the Poisson geometry community. Today, symplectic groupoids are a central object of study in Poisson geometry. In this mini-course, I will explain how Courant algebroids can be integrated into 2-shifted symplectic Lie 2-groupoids and present several concrete examples, including quadratic Lie algebras, Drinfeld doubles, and exact Courant algebroids.

Poster Abstract

Manin triples on multiplicative Courant algebroids — Ana Carolina Mancur

We extend the characterization of Lie bialgebroids via Manin triples to the context of double structures over Lie groupoids. We consider Lie bialgebroid groupoids, given by LA-groupoids in duality, and establish their correspondence with multiplicative Manin triples, i.e., CA-groupoids equipped with a pair of complementary multiplicative Dirac structures. As an application, we give a new viewpoint to the co-quadratic Lie algebroids of Lang, Qiao, and Yin (2021) and the Manin triple description of Lie bialgebroid crossed modules.

Lie–Rinehart and Poisson algebras over C^∞-rings — Ruben Louis

This is joint work with E. Lerman. We define the analogue of Lie–Rinehart algebras over C^∞-rings. We show that given a Poisson C^∞-ring $\mathscr{A}$, its module $\Omega^1_{\mathscr{A}}$ of C^∞-Kähler differentials is (part of) a Lie–Rinehart algebra. Conversely, given a Lie–Rinehart algebra $\mathscr{M} \xrightarrow{\rho} \mathrm{Der}(\mathscr{A})$ over a C^∞-ring $\mathscr{A}$, there is a natural Poisson bracket on the C^∞-ring $\mathcal{F}(\mathscr{M})$ associated with the $\mathscr{A}$-module $\mathscr{M}$ (the C^∞-ring analogue of an $\mathscr{A}$-algebra freely generated by the module $\mathscr{M}$). In the case where $\mathscr{A}$ is the C^∞-ring of smooth functions on a manifold M and $\mathscr{M}$ is the module $\Gamma(E)$ of sections of a Lie algebroid $E \to M$, the C^∞-ring $\mathcal{F}(\Gamma(E))$ is the ring of functions $C^\infty(E^*)$ on the total space of the vector bundle $E^* \to M$ dual to the vector bundle E.

Molino's Structure Theorem for Riemannian Groupoids and Its Morita Invariance — Yuhang Zhang

Molino's theory concerns Riemannian foliations. After passing to the transverse orthogonal frame bundle, leaf closures organize into a canonical fibration and reveal a hidden structural Lie algebra. I'll explain how to transport this picture from foliations to regular proper Riemannian Lie groupoids. Starting from a Riemannian groupoid, we build the transverse orthonormal frame bundle and analyze the induced lifted foliation. The closure of this lifted geometry is again described by a proper groupoid-level object,which produces a Molino fibration and a structural Lie algebra on the fibers. I'll also discuss Morita invariance: the resulting Molino package does not depend on the chosen presentation, which naturally leads to a stack-level viewpoint and sets up applications to transverse index theory.

Pseudo Poisson manifold structure on a fiber bundle — Vann Borhen NKOU

In this work, we introduce the notion of pseudo derivation of associative commutative algebra which generalizes the notion of derivation. If a derivation is given, then we construct a pseudo derivation. We show that the set of all pseudo derivations is a Lie algebra over R. We applied this notion to the algebra of the smooth functions defined on a fiber bundle, and we define a pseudo Poisson manifold structure on a fiber bundle which generalizes the notion of the Poisson manifold structure on a fiber bundle. If a Poisson manifold structure is given, we construct a pseudo Poisson structure. We establish some representations and study the cohomology groups of order 0 and 1.

Lie-Poisson and Euler-Poincaré Reduction in Geometric Mechanics — Fatih Sayin

Symmetry enables the reduction of mechanical systems to lower-dimensional dynamics. This poster presents the two fundamental approaches to such symmetry reduction: Lie-Poisson reduction on the Hamiltonian side and Euler-Poincaré reduction on the Lagrangian side. We derive the Euler-Poincaré equations on a Lie algebra and the Lie-Poisson equations on its dual, emphasizing their variational and Hamiltonian structures. Their equivalence for regular Lagrangians is established via the Legendre transform, with rigid body dynamics serving as a motivating example.

Geometric and Combinatorial Structures in Graded Modules Motivated by Poisson-Type Decompositions — Giriraj Ghosh

Poisson geometry provides a natural framework for understanding geometric structures via algebraic and combinatorial invariants, often encoded through graded objects and linear algebraic data. Motivated by these ideas, we study graded module structures arising from filtered constructions, with particular emphasis on explicit basis selection and matrix-based reductions. In this work, we investigate persistence-type graded modules over coefficient fields and selected non-field rings, focusing on geometric and combinatorial mechanisms underlying their algebraic decompositions. Inspired by techniques from Poisson geometry, such as stratification by symplectic leaves and local normal forms, we develop a matrix reduction framework that constructs graded bases reflecting both combinatorial filtration data and geometric constraints. Our approach extends classical persistence algorithms by incorporating graded pivot strategies and inner-product motivated normalizations, yielding bases that are canonical up to graded isomorphism over fields. We show that, in this setting, the resulting bases recover standard interval decompositions, while the geometric viewpoint provides additional intuition analogous to local Poisson normal forms. Preliminary examples demonstrate how these constructions capture structural invariants through purely linear algebraic operations. This work aims to bridge ideas from Poisson geometry, combinatorial topology, and linear algebra, offering an algebraic perspective on geometric decomposition phenomena in graded and filtered settings.

VB-groupoids and representations up to homotopy — Caio Domiciano Pires dos Santos

A classical result in Lie theory establishes a one-to-one correspondence between representations of a Lie group and group objects in the category of vector bundles. In this talk, we discuss how this correspondence extends to the setting of Lie groupoids, where the naive notion of representation turns out to be too rigid to capture the relevant geometry — in particular, Lie groupoids do not generally admit well-defined adjoint representations. The appropriate generalization is provided by the notion of representation up to homotopy, due to Arias Abad and Crainic, and by the geometric framework of VB-groupoids. We describe how these two structures are related, with the tangent bundle of a Lie groupoid serving as the canonical model for the adjoint representation. We will also discuss a classification result for such representations due to Gracia-Saz and Mehta and the cohomological invariants that arise naturally from it.

The character-homogeneous Hochschild-Kostant-Rosenberg Theorem — Minona Linda Schäfer

The Hochschild-Kostant-Rosenberg (HKR) theorem establishes a quasi-isomorphism between the differential Hochschild cochain complex consisting of multidifferential operators and the complex of polyvector fields. A conceptual proof by constructing global homotopies was given by [1]. As a refinement one can study the compatibility of this quasi-isomorphism with symmetries, such as Lie group or Lie algebra actions, and the induced invariant subcomplexes, which leads to an invariant HKR theorem. A special case is the homogeneous HKR theorem, where the symmetry is the fiberwise scaling action on a vector bundle generated by the Euler vector field. Using the functoriality of the involved maps from the construction in [1], it can be shown that in this case the quasi-isomorphism preserves the induced grading by the homogeneity degree. Furthermore, this framework admits a generalization to a weighted form of homogeneity, where the grading is determined by a character of a Lie group or Lie algebra action and one obtains a character-homogeneous HKR theorem.

[1] M. Dippell, C. Esposito, J. Schnitzer, S. Waldmann, Global Homotopies for Differential Hochschild Cohomologies, Preprint, https://arxiv.org/abs/2410.15903, (2024)

Jacobi Hamiltonian Integrators: Structure-Preserving Numerical Methods for Jacobi Dynamics — Gonçalo Oliveira

We develop a framework for constructing structure-preserving numerical integrators for Hamiltonian systems defined on Jacobi manifolds. While Hamiltonian mechanics traditionally relies on symplectic and Poisson geometry to model conservative systems, Jacobi geometry generalizes these structures to include time-dependent, dissipative, and thermodynamic phenomena. Building on Poisson Hamiltonian Integrators (PHI), we introduce Jacobi Hamiltonian Integrators by exploiting the correspondence between Jacobi manifolds and homogeneous Poisson manifolds. This approach allows us to extend geometric integration techniques while preserving the homogeneity structure intrinsic to Jacobi dynamics. We establish the theoretical tools required for this construction, including homogeneous symplectic and Poisson geometry, bi-realizations, and homogeneous Hamilton-Jacobi theory. The resulting integrators preserve essential geometric features and provide a natural framework for numerically simulating dissipative and time-dependent Hamiltonian systems within the Jacobi setting.

Stratified Vector Fields on Orbit Spaces of Proper Lie Groupoids — Juan Sebastian Herrera Carmona

This poster reports on an ongoing project with Mateus de Melo (UFES) and Fabricio Valencia (USP). We study vector fields on the orbit space of a proper Lie groupoid that are tangent to the stratification determined by Morita types. We describe their underlying structure and relate them to multiplicative vector fields on the Lie groupoid presenting the orbit space.

Poisson Riemannian map on Poisson warped product space — Buddhadev Pal

In this article, we introduce the concept of Poisson Riemannian map between Poisson manifolds. Then, we discuss the Poisson Riemannian map between the Poisson warped product spaces. We also provide some applications corresponding to Poisson Riemannian map.

Homotopy-Coherent Bisimplicial Resolutions for Two-Step Deformation and Descent Problems — Fatima Maayane

Many deformation-type questions in geometry are controlled by homotopical algebra: one studies objects up to weak equivalence and extracts invariants through derived constructions. In practice, one often needs two layers at once, for example a resolution direction and a descent direction, which leads naturally to bisimplicial objects. This poster reports on work in progress toward a theory of homotopy-coherent bisimplicial resolutions in model categories and more general Dwyer-Kan homotopical categories. Building on the Reedy viewpoint for simplicial and cosimplicial resolutions, we propose a bisimplicial analogue designed to provide well-behaved replacements for constant bisimplicial diagrams. We outline how coherence data controls comparisons, how totalization packages the two directions, and how this perspective can support derived-functor computations. While motivated by examples from deformation and Poisson-related contexts where dg and L-infinity structures appear, the present contribution is mainly foundational: definitions, constructions, and a roadmap of expected properties.

Multiplicative Ehresmann connections for Lie groupoid fibrations — Matthijs Lau

We introduce multiplicative connections on surjective submersions of Lie groupoids, extending both classical Ehresmann connections on surjective submersions and multiplicative connections on Lie groupoid extensions. We investigate the existence of such connections, showing that general existence results fail beyond the extension case, while positive results hold for uniform Lie groupoid fibrations and for locally trivial families of Lie groupoids. Our main results concern completeness. For Lie groupoid fibrations, we prove that the completeness of a multiplicative connection is governed by the induced connection on the kernel bundle, and in certain cases by the base connection. This yields existence results for complete multiplicative connections on families of Lie groupoids under suitable topological assumptions, generalising the classical theory of complete connections on fibre bundles.

Shifted contact higher Lie groupoids — Antonio Maglio

Contact structures are, in many respects, the odd-dimensional counterparts of symplectic structures. Shifted symplectic structures are Morita-invariant objects on Lie groupoids, originally introduced by Getzler and more recently studied by Cueca and Zhu. In this poster, we introduce a definition of shifted contact structures on higher Lie groupoids, with particular emphasis on the construction of the kernel and curvature of the line bundle-valued 1-form involved. This definition extends the one recently proposed by Vitagliano, Tortorella, and myself.

Adjoint Integrations of Lie algebroids — Pooja Joshi

We study the category of integrations of a Lie algebroid and establish precise criteria for the existence of a minimal integration. For regular foliations, minimality is realized by Winkelnkemper's holonomy groupoid. This framework was extended to singular foliations by Androulidakis and Skandalis, with a path-based realization subsequently provided by Garmendia and Villatoro. We generalize the Garmendia-Villatoro path construction to arbitrary Lie algebroids-integrable or not-and prove the holonomy groupoid is always longitudinally smooth: each source fiber carries a canonical smooth structure compatible with the Lie algebroid, regardless of transverse singularities. This yields a canonical geometric object unifying regular, singular, and non-integrable settings. Joint work with Joel Villatoro

Integration of Transitive Lie Algebroids: Sprays, Splittings and Obstructions — Karen Fonseca Rodrigues Nascimento

The integration of Lie algebroids into Lie groupoids is a fundamental problem arising from the generalization of Lie's third theorem, with obstructions being identified in the well known work of Crainic and Fernandes. On the other hand, local integration can always be achieved through the explicit construction of the local Lie groupoid using spray vector fields, as developed by the work of Cabrera, M?rcut and Salazar. However, even in the transitive case, global integrability is not always possible. For transitive Lie algebroids, the global obstructions to integrability admit a geometric interpretation explained in the work of Meirenken, where the monodromy groups - the objects governing the obstruction to integrability - are interpreted as coming from the classification of principal bundles over 2-spheres. In terms of local groupoids, the work of Fernandes and Michiels provides another approach, describing the global obstruction locally as a failure of associativity. Our goal is to explore the connection between these two approaches for the transitive case with the later aim of understanding more general cases. In this work we present preliminary results from our study.

Deformations of normal Lie subgroups — Ilias Ermeidis

Despite the foundational contributions to the study of deformations of Lie-theoretic objects and the substantial progress achieved over the years, a systematic deformation theory for normal Lie subgroups has yet to be developed.

In this poster, we investigate the Lie groupoid cohomology underlying the deformation problem of normal Lie subgroups, characterize trivial deformations in terms of infinitesimal data, and establish a rigidity result under an appropriate cohomological vanishing assumption. Furthermore, we elucidate its connections with several well-established deformation cohomology theories.

This work is based on ongoing joint work with João Nuno Mestre.

Hamiltonian hydrodynamic reductions of the one-dimensional Vlasov-Poisson equations — Rayan Oufar

We investigate Hamiltonian fluid reductions of the one-dimensional Vlasov-Poisson equations. Our approach utilizes the hydrodynamic Poisson bracket framework, which allows us to systematically identify fundamental normal variables derived from the analysis of the Casimir invariants of the resulting Poisson bracket. This framework is then applied to analyze several well-established Hamiltonian closures of the one-dimensional Vlasov equation, including the multi-delta distribution and the waterbag models. Our key finding is that all of these seemingly distinct closures consistently lead to the formulation of a unified form of parametric closures: When expressed in terms of the identified normal variables, the parameterization across all these closures is revealed to be polynomial and of the same degree. All these parametric closures are uniquely generated from one of the moments, called μ_2, a cubic polynomial in the normal variables. This result establishes a structural connection between these different physical models, offering a path toward a more unified and simplified description of the one-dimensional Vlasov-Poisson dynamics through its reduced hydrodynamic forms with an arbitrary number of fluid variables.

One-Shifted Coisotropic Structures and Courant Morphisms — Tianhao Ye

We introduce a notion of 1-shifted coisotropic morphism from Lie groupoids to quasi-Poisson groupoids via Courant morphisms. This notion encompasses coisotropic subgroupoids, morphisms of Manin pairs (e.g. Hamiltonian quasi-Poisson spaces) as well as 1-shifted coisotropic structures into quasi-symplectic groupoids in the sense of M. Mayrand. We study several properties of these objects, including Morita invariance and transverse coisotropic intersections.

Blown-up singular Riemannian foliations — Laura Ribeiro dos Santos

In this work we investigate new applications of the blow-up desingularization method in the context of singular Riemannian foliations. First, we relate the dynamics of such a foliation, which is governed by the so-called Molino sheaf, with that of its blow-up. In the particular case of singular Killing foliations, this leads to a strong constraint: the leaves of such foliations are all closed, provided the Euler characteristic of the ambient manifold is non-vanishing and its singular strata are all odd-codimensional. Next, we show that the space of leaf closures of a singular Killing foliation is the Gromov–Hausdorff limit of a sequence of orbifolds, whose dimensions are the codimension of the foliation. Finally, we relate the basic cohomology of a singular Riemannian foliation with that of its blow-up, generalizing well-known, classical analogous results in algebraic and complex geometry.

Contact geometries and their quantization — Can Görmez

We study the quantization of classical mechanical systems described by contact manifolds. Formal deformation quantization of such systems involves the construction of a Fedosov-type connection on a bundle of Hilbert spaces, typically the symplectic spinor bundle. We address the extension of this construction beyond formal flatness for contact homogeneous spheres and pseudospheres. By employing a Holstein–Primakoff realization, we derive a closed-form expression for the flat connection. Imposing convergence and unitarity on this connection induces a natural filtration on the symplectic spinor bundle, governed by representations of the respective homogeneous model's principal group. We then utilize these structures to explicitly construct quantum observables and study the quantization of the Poisson algebra of Reeb-invariant functions on spheres.

Higher Form Brackets for even Nambu–Poisson Algebras — Ana Maria Chaparro Castageda

Let $\boldsymbol{k}$ be a field of characteristic zero and $A = \boldsymbol{k}[x_1, \ldots, x_n]/I$, where $I = (f_1, \ldots, f_k)$, be an affine algebra. We study Nambu–Poisson brackets on A of arity $m \geq 2$, focusing on the case when m is even. We construct an L_∞-algebroid on the cotangent complex $\mathbb{L}_{A|\boldsymbol{k}}$, generalizing previous work on the case where A is a Poisson algebra. This structure is referred to as the higher form brackets. The main tool is a P_∞-structure on a resolvent R of A. These P_∞- and L_∞-structures are merely $\mathbb{Z}_2$-graded for $m \neq 2$. As a corollary, we obtain the structure of a minimal L_∞-algebroid on the André–Quillen homology $\mathrm{D}.(A|\boldsymbol{k}, A)$ and a module thereof on $\mathrm{D}.(A|\boldsymbol{k}, M)$ for an A-module M. We discuss several examples and propose a method for obtaining new ones, called the outer tensor product. We compare our higher form brackets with the form bracket of Vaisman. We introduce the notion of a Lie–Rinehart m-algebra, of which the form bracket of a Nambu–Poisson bracket of even arity is an example. Finally, we find a flat Nambu connection on the conormal module.

Generic Poisson structures with $\mathfrak{so}(3, \mathbb{R})$-type singularities — Jorn van Voorthuizen

Generic Poisson structures, introduced by Pedro Frejlich, are defined by transversality to the rank stratification of bivectors. In even dimensions, this notion recovers log-symplectic structures. In odd dimensions, the corank is necessarily 1 or 3. In the corank-3 case, the isotropy Lie algebra is isomorphic to $\mathfrak{so}(3, \mathbb{R})$ or $\mathfrak{sl}(2, \mathbb{R})$.

We focus on singular leaves with $\mathfrak{so}(3, \mathbb{R})$-type isotropy. For such leaves, we obtain a complete classification of germs of Poisson structures by isomorphism classes of principal $\mathrm{SO}(3, \mathbb{R})$-bundles over the leaf, together with a germ of a path in its second de Rham cohomology. Our approach uses the Vorobjev coupling construction.

Normal forms for complex analytic Dirac structures — Rodrigo de Oliveira Baptista

As it is known since the late 50's, any analytic manifold can be extended to a complex manifold equipped with a global conjugation map which is unique on a small neighbourhood around the oringinal analytic manifold. From this extension process, it is also possible to construct holomorphic extensions of other geometric objects such as vector bundles, Lie algebroids and Dirac structures. In this context, we present normal form results for complex analytic Dirac structures by first extending the structure to a holomorphic Dirac structure on the extension of the analytic manifold, applying normal forms in the holomorphic world (which are obtained in a very analogous manner to the those for smooth manifolds) and then pulling-back the normal form to the analytic world. In particular, we are able to obtain a simpler proof of a result of Michael Bailey for the normal form of generalised complex structures of complex type at a point in the analytic setting.

On globally invariant Euler–Lagrange equations for curves — Wijnand Steneker

Invariant Lagrangians yield invariant Euler-Lagrange equations, and it was discussed in the literature how to compute those using various local methods. The focus of this paper is on global algebraic differential invariants. In this case the computation can be modified in several aspects. We will discuss relations with previous approaches and some foundational aspects. The theory of invariant Euler-Lagrange equations was applied to curves with respect to the motion group in the Euclidean plane and space. We expand those computations to the next dimension four (Minkowski spacetime), which already exhibits computational challenges. We also provide formulas for other examples, namely the projective and conformal (Moebius) groups and relate to some recent applications. Based on joint work with Boris Kruglikov and Eivind Schneider.

LA-groups and matched pairs — Camilo Angulo

We study the structure of an LA-group identifying its underlying VB-group with a representation up to homotopy. We specify a complementary action up to homotopy of the Lie algebra of units on the Lie algebroid of arrows that accounts for the extra structure. We identify the equations that the representation and the action need to verify in order to assemble into an LA-group. As an application, we present some extreme examples of representations and actions and prove their integrability.

Towards a deformation theory of generalized complex structures on transitive Courant algebroids — Paula Naomi Pilatus

In generalized geometry, one studies geometric structures on Courant algebroids, a generalization of the tangent bundle of a manifold. This framework unifies various classical structures; in particular, generalized complex structures encompass both complex and symplectic geometry. The deformation theory of generalized complex structures on exact Courant algebroids, i.e.Courant algebroids isomorphic to the generalized tangent bundle $TM \oplus T^*M$, was already developed by Gualtieri. More specifically, Gualtieri extended a proof by Kuranishi for the existence of locally complete families of complex deformations, to prove the existence of locally complete families of generalized complex deformations up to Courant algebroid automorphisms. Our main objective is to extend Gualtieri's deformation theorem to the broader class of transitive Courant algebroids. Before this can be achieved, the analytic foundations of the classical deformation theorems of Kuranishi and Gualtieri need to be revisited. In this work we use Hamilton-Nash-Moser theory, to reprove the theorems of Kuranishi and Gualtieri and obtain a first extension of Gualtieri's theorem to a subclass of transitive Courant algebroids that strictly contains the exact ones.

Approximation of solutions for BKM systems by finite-gap solutions — Manuel

Quaschner

BKM systems (introduced by Bolsinov, Konyaev and Matveev) are a family of integrable PDEs studied in the research program on Nijenhuis geometry and generalizing many of the famous integrable PDEs. There are particular solutions of these PDEs coming from finite-dimensional integrable systems, the so called finite gap solutions. On the poster we want to explain, whether and in which sense one can approximate solutions with an arbitrary smooth initial curve for some BKM system using these finite gap solutions. Based on joint work with Wijnand Steneker. (Maybe the abstract might change)

Poisson Manifolds and Their Role in Modern Mathematical Physics — Muhammad Saad Ali Gill

Title: Poisson Manifolds and Their Role in Modern Mathematical Physics . Abstract. Within the framework of contemporary theoretical physics, geometric structures provide powerful tools for describing complex dynamical systems. Among these structures, the concept of a Poisson Geometry has emerged as a fundamental bridge between classical mechanics, differential geometry, and modern Mathematical Physics. A Poisson manifold is a smooth manifold equipped with a Poisson bracket that satisfies bilinearity, antisymmetry, the Jacobi identity, and the Leibniz rule. This structure allows the formulation of Hamiltonian dynamics in a generalized geometric framework, extending the traditional formalism of Symplectic Geometry. In classical mechanics, Poisson manifolds naturally arise when describing Hamiltonian systems with constraints or reduced phase spaces. Unlike symplectic manifolds, which require non-degenerate structures, Poisson manifolds permit degeneracy and thus provide a more flexible mathematical framework. This flexibility makes them particularly useful in the study of systems with symmetries and conserved quantities. The decomposition of Poisson manifolds into symplectic leaves reveals an intrinsic geometric stratification that plays a crucial role in understanding the qualitative behavior of dynamical systems. Furthermore, Poisson geometry forms the mathematical foundation for several developments in modern physics. It plays a significant role in the formulation of Hamiltonian Mechanics, integrable systems, and geometric quantization. In the context of quantum theory, the concept of Deformation Quantization provides a mechanism for transitioning from classical observables to quantum operators by deforming the algebra of functions defined on a Poisson manifold. This approach has profound implications for understanding the classical-quantum correspondence and the mathematical structure of quantum field theories. Recent research has also6 highlighted the relevance of Poisson structures in areas such as gauge theory, non-linear dynamical systems, and topological field theory. The interplay between algebraic structures, geometry, and physics demonstrates how Poisson manifolds serve as a unifying language across multiple scientific disciplines. By providing both conceptual clarity and analytical tools, Poisson geometry continues to influence the development of modern mathematical physics. This poster presents an overview of the fundamental theory of Poisson manifolds and examines their applications in Hamiltonian dynamics, integrable systems, and quantization. The objective is to highlight how geometric methods contribute to a deeper understanding of physical phenomena and to illustrate the continuing importance of Poisson structures in contemporary theoretical research. Keywords: Poisson Geometry; Poisson Manifolds; Hamiltonian Systems; Deformation Quantization; Mathematical Physics.

Multiplicative sections of twisted CA-groupoids — Emma Alejandra Cupitra Vergara

We study the complex of multiplicative sections of twisted multiplicative Courant algebroids, also known as twisted CA-groupoids. We show that this complex carries the structure of a 2-term ∞-Leibniz algebra. Moreover, we prove that for exact twisted CA-groupoids, this 2-term ∞-Leibniz algebra is invariant under Morita equivalence.

Stokes matrices and integration of Ginzburg-Weinstein diffeomorphism — Zikang Wang

We find an explicit symplectic diffeomorphism between the cotangent bundle of the Lie algebra $u(n)^*$ and the symplectic groupoid $U(n) \times U(n)^*$. The construction stems from the isomonodromy deformation of a meromorphic linear ODE with two second-order poles. By expressing the Stokes matrices of the ODE in terms of the asymptotic parameters of the corresponding nonlinear isomonodromy equations, we obtain, via the Riemann-Hilbert-Birkhoff map, an explicit global symplectomorphism.

Equivariant cosymplectic geometry — Pablo Nicolas Martinez

Symplectic reduction encapsulates and expands the notion of symmetry in classical mechanics. The framework of equivariant cohomology provides an algebraic setting where many structural results, such as localization formulae and surjectivity results à la Kirwan, admit a clean description.

In this work we introduce an equivariant framework to discuss Hamiltonian group actions in the setting of cosymplectic geometry. We are naturally lead to define the notion of equivariant cosymplectic structure, which bears close relationship with cosymplectic reduction following Albert. Building on this notion we obtain equivariant obstruction classes which extend the work of Guillemin, Miranda, and Pires. We then show that, under mild compactness assumptions, the equivariant de Rham, foliated, and Poisson cohomologies of such spaces are equivariantly formal.

We also use the notion of compact symplectic thickening and its Hamiltonian counterpart to translate results from the theory of Hamiltonian G-actions on symplectic manifolds. We prove a convexity theorem for toric Hamiltonian actions and a Delzant classification theorem for toric cosymplectic manifolds. We show that localization formulae are closely related to the modular period of the cosymplectic structure and obtain a Duistermaat–Heckman variation formula. Finally, we show that Kirwan's surjectivity in cohomology persists to the cosymplectic setting.

This is joint work with Eva Miranda.

A geometric approach to the splitting of invariant manifolds — Oscar Cosserat

In this poster, we introduce an explicit near-integrable family of Hamiltonian diffeomorphisms on the cotangent bundle of the 2-torus. We describe some of its hyperbolic properties. Then, we explain how the so-called "Irwin-Chaperon method" applies to obtain a holomorphic graph-parametrization of the invariant manifolds. We conclude with a brief outlook on how this approach provides lower-bounds for the splitting of the invariant manifolds of the considered dynamical system.

Homotopy Groups and the Eilenberg-Steenrod axioms. — Beatriz de Faria

One way to characterize a homology theory is by verifying whether a sequence of functors from the category of topological spaces to the category of abelian groups, satisfies a collection of axioms known as the Eilenberg-Steenrod axioms. In this poster, we present a construction of homotopy groups using function spaces. This approach allows us to analyze which of the Eilenberg-Steenrod axioms are satisfied by homotopy groups and which ones are not. We conclude by observing that homotopy does not constitute a homology theory; nevertheless, it remains a fundamental and indispensable tool in algebraic topology.

Remarks on the contact Marsden-Meyer-Weinstein reduction — Bartosz Maciej Zawora

The Marsden-Meyer-Weinstein (MMW) reduction theorem for contact manifolds has brought significant attention of many researchers. The first generalisation of the classical MMW reduction theorem for a contact manifold was proven by C. Albert in 1989. However, this result applies only to coorientable contact manifolds and depends on the contact form choice within its conformal class. Since then, numerous results on the reduction theorem have appeared, including a recent reduction scheme for the case when the contact manifold is non-coorientable, devised by K. Grabowska and J. Grabowski, which introduces new conditions and geometric tools to address the limitations of Albert's work. The poster provides an overview of the essential definitions related to contact geometry and the reduction theorem. Moreover, it reviews various approaches to the geometric formulation of the contact MMW reduction theorem, highlighting their disadvantages. In particular, the technical condition introduced by C. Willet is analysed, demonstrating its necessity via a counterexample. Finally, a new version of the contact MMW reduction theorem that requires no additional conditions is presented.

Holomorphic Picard Groups — Aidan Lindberg

The collection of Morita autoequivalences of a holomorphic symplectic groupoid forms a 2-group, called its Picard 2-group. My poster presents my thesis work, giving explicit presentations of this 2-group, proving the associated 1-group is a finite dimensional complex Lie group, and describing its Lie algebra in terms of holomorphic Poisson geometry.

Representations up to homotopy from weighted Lie groupoids — Adam Maskalaniec

Weighted Lie groupoids have emerged as a generalisation of VB-groupoids, incorporating a compatible non-negative grading that extends the classical linear structure. It is a well-known result that VB-groupoids correspond to 2-term representations up to homotopy of Lie groupoids. While the infinitesimal counterpart of this relation-linking weighted Lie algebroids to higher-term representations up to homotopy-has been recently established, the global analogue for Lie groupoids has remained an open problem. In this work, we fill this gap by constructing a correspondence, up to isomorphism, between weighted Lie groupoids and higher term representations up to homotopy. In doing so, we provide a geometric framework for higher-term representations and complete the structural picture for the differentiation and integration of these objects. As an application of our theory, we demonstrate that the Shvarts embedding functor of a super Lie groupoid, applied to a Grassmann algebra, naturally yields a weighted groupoid, providing a canonical geometric source for these structures. Furthermore, we demonstrate that higher-term representations up to homotopy provide a convenient framework for extending the classical correspondence between Harish-Chandra pairs and super Lie groups to the setting of super Lie groupoids.

Deformations of Lie algebroid morphisms — Sebasti n Daza

We will show a model for the deformation complex of Lie algebroid morphisms. As applications we construct deformation theories for G-structures on effective orbifolds, representations of Lie algebroids and stability of isotropy algebras.

Fat Lie Theory — Lennart Obster

On the poster, we discuss a new point of view on the representation theory of Lie algebroids and Lie groupoids: fat Lie theory. More precisely, a category of fat extensions is introduced, and we will explicitly demonstrate the correspondences between fat extensions, 2-term representations up to homotopy (which we introduce abstractly), VB-groupoids/algebroids and PB-groupoids/algebroids. Through a generalisation of work on so-called core diagrams of Brown and Mackenzie (for groupoids), and Jotz and Mackenzie (for algebroids), we also show that fat extensions are very similar to a structure we call core extension (and literally in the regular case). Core extensions correspond to (vertically/horizontally) core-transitive double groupoids/algebroids. Regular fat extensions, in turn, correspond to a class of general linear double groupoids. Also the functorial aspects are discussed, upgrading in particular the correspondence between VB-groupoids and PB-groupoids (of Cattafi and Garmendia) to an equivalence of categories.

Cohomology vs Monodromy: Comparing Integrability Obstructions for Transitive Lie Algebroids — Alessio Giannotta

The integrability problem for transitive Lie algebroids can be looked at from different perspectives, revealing an interplay between cohomological methods and homotopical constructions. Several apparently different approaches appear in the literature: Mackenzie introduced a cohomological obstruction defined via sheaf-theoretic methods. On the other hand, Crainic and Fernandes used a path space approach and characterized integrability in terms of the monodromy. Recently, Meinrenken formulated the monodromy in terms of a clutching construction. We show that all of these agree. In particular, we identify the Crainic-Fernandes monodromy map with the Mackenzie obstruction class through the natural pairing between cohomology and homotopy. (Joint work with Paolo Antonini.)

Poisson Desingularization via Weighted Blowups — Boris Zupancic

Hironaka's theorem on resolution of singularities via blowups fails in Poisson geometry, since blowups generally destroy Poisson structures. However, there exists a more general operation called a weighted blowup, which may provide a viable alternative. Weighted blowups have proven useful in the recent literature on resolution of singularities; for instance, Abramovich-Temkin-Wlodarczyk have shown that (in the non-Poisson setting) fast functorial resolution of singularities can always be achieved by sequentially blowing up the worst singularities via a canonical choice of weighted blowup. We take a similar approach to show that appropriate choices of weighted blowups produce reduction of singularities in low-dimensional Poisson geometry. In joint work with Simon Lapointe, Mykola Matviichuk and Brent Pym, we obtain: (1) a criterion for lifting a Poisson structure to a weighted blowup, (2) a classification of normal forms of Poisson varieties not admitting any weighted blowup, in low-dimension, and (3) a theorem on the extent to which weighted blowups can reduce the singularities of Poisson varieties, in low-dimension.

Fixed Loci and Equivariant Cohomology of Differentiable Stacks — Leone Parasporo

Equivariant cohomology studies spaces with group actions through algebraic models such as those of Borel and Cartan, while localization expresses global equivariant integrals in terms of fixed-point data. Differentiable stacks, described via Lie groupoids and Morita equivalence, provide a geometric framework that generalizes manifolds. In this setting, equivariant cohomology can be defined through generalized Borel and Cartan models associated with simplicial manifolds arising from stack atlases. For a compact torus acting on a differentiable stack, we distinguish the stabilizer-theoretic fixed locus from the homotopy fixed locus: at an object of the stack, the first requires the extended stabilizer to be surjective, whereas the second requires a smooth group-theoretic splitting. This produces canonical $H^*(BT)$-linear maps in equivariant cohomology. We then isolate the precise geometric hypotheses under which the usual localization argument extends, and under these assumptions, restriction becomes an isomorphism after inverting the relevant weights, with the inverse determined by the equivariant Euler class. For compact oriented orbifold stacks, we obtain the stack-normalized ABBV formula, including the isotropy factors hidden by passage to the coarse or effective orbifold. The circle action on the complex weighted projective line provides an explicit test case.

Critical metrics for cosymplectic and other structures — Søren István Adorján

We consider Riemannian metrics compatible with a class of odd-dimensional geometric structures. In dimension 3 they coincide with stable Hamiltonian structures, which include both contact and cosymplectic structures. We equip the space of compatible metrics with a functional and investigate when critical metrics exist. We show that in dimension 3 the situation is rigid: Either the structure is covered by one of two invariant Lie group models (the Reeb flow is algebraic Anosov) or the Reeb field is Killing and an underlying almost contact metric structure is normal. The proof uses tools from hyperbolic dynamics. What happens in higher dimension? Do we have the same dichotomy of "Killing or Lie group model"? Which Lie group models can even occur? Joint work with Angel Gonzalez-Prieto, Daniel Peralta-Salas, and Eva Miranda.

Towards p-adic Supergeometry — Fawzy Hegab

We Introduce a new class of geometric spaces which on which "p-adic supersymmetry" can be studied. They are in spirit a p-adic of the theory of supermanifolds from mathematical physics, but their mathematical construction is more connected to p-adic geometry. These mathematical objects mix features from both of p-adic geometry and supergeometry.

Tepui Fibrations — Alfonso Garmendia

Tepui fibrations is a fibration $X \to M$ from a diffeological space X to a manifold M, describing a variety of different examples.

Some geometric properties of the Newton transformations operators — Mohammed Abdelmalek

Let M be a compact oriented hypersurface in an oriented, and connected manifold with constant sectional curvature. In this work we define and study the Newton transformations operators . These operators are defined in function of the shape operator and the symmetric functions and the principal curvatures. We give some algebraic and geometric properties of these operators.

Modern approaches to Poisson geometry and applications — Khadidja Sabri

Poisson geometry provides a unifying framework in differential geometry and Hamiltonian mechanics. This poster presents modern approaches to the theory, including symplectic groupoids, Poisson cohomology, and methods for integrating geometric structures. Some applications in mathematical physics and dynamical systems theory are also discussed.

Dimer Duality and Symplectic Cohomology — Dahye Cho

From Bocklandt's mirror symmetry on dimers on Riemann surfaces, we provide how to compute the symplectic cohomology ring structure explicitly.

Generalized complex manifolds of non-constant type — M Prashant Krishnan

Various results for strong generalized holomorphic principal bundles over regular generalized complex manifolds, have been proved by Debjit Pal. I am looking at what happens when the assumption of regularity is dropped. I have defined the sheaf of generalized holomorphic functions in this setting, and am working on the Atiyah sequence and Dolbeault cohomology. If possible, I will prove some additional results as well.

Families of Toeplitz Operators on Contact Fibrations and Applications to Star Products — Erfan Rezaei Gharehbolagh

On this poster we provide a prequantization of certain integral symplectic fibrations and prove a familiy version of the Boothby-Wang-theorem. Given a compact contact fibration there is a natural algebra of pseudodifferential operators associated to it. We show the existence of certain families of idempotents,so called Szege projections, in this algebra and define families of Toeplitz operators. Using the Toeplitz operators, we are able to generalize a theorem of Guillemin and to provide an analytic construction of the star product to the Poisson manifold, underlying a sympletic fibration. This is joint work with Clement Cren.

Poisson geometry of truncated polynomials — Aldo Witte

We describe a family of Poisson structures arising from the space of truncated polynomials in one variable. These are Poisson structures generalizing b^k-symplectic structures with fascinating properties.

Generalized cluster Algebras are subquotients of cluster algebras — Rolando Ramos

Generalized cluster algebras are generalizations of cluster algebras with higher order exchange relations. In traditional cluster algebras, the mutation rule can be recovered as unique involution transformations of log-canonical bases satisfying certain additional restrictions. Various examples of generalized cluster algebras have been found and they were conjectured to be subalgebras of cluster algebras. In this work we realized generalized cluster algebras as subquotients of cluster algebras.

A Chern-Weil theory for Lie groupoids with Cartan connections — Luca Accornero

We extend the connection-curvature construction of characteristic classes of principal bundles to principal groupoid bundles where the structure groupoid carries a Cartan connection

Explicit integrations of elliptic tangent bundles — Bas Wensink

Elliptic tangent bundles are Lie algebroids that arise in generalised complex geometry. As a consequence of a theorem of Debord, or as a consequence of the integrability theorem of Crainic-Fernandes, these Lie algebroids are all integrable. In this poster, I will show explicit models of such integrations and discuss obstructions to the existence of Hausdorff integrations.

Stachura's cocycle — Arthur Massar

Dual unitary 2-cocycles are the operator algebraic analogue of Drinfel'd twists and play an important role in the quantization of triangular Poisson–Lie groups and deformations of C^*-algebras. In 2013, Stachura constructed such a cocycle on the $ax+b$ group, providing one of the first example which was not induced from an abelian subgroup. Later in 2021, Bieliavsky–Gayral–Neshveyev–Tuset produced further examples on semi-direct products $Q \times V$ with V abelian, by making use of the Kohn–Nirenberg quantization. In this poster we will generalize Stachura's construction to obtain unitary 2-cocycles on suitable bicrossed products of locally compact groups.

Contact Fibrations, Prequantization and Index Theory — Erfan Rezaei

Given a contact fibration, we construct smooth families of Szege projections on the fibers. This allows us to define smooth families of Toeplitz operators. We apply these operators to construct a deformation quantization of prequantizable symplectic fibrations, recovering a result of Kravchenko in an analytic way. We also derive a family index for these families of Toeplitz operators. To this end, we generalize an index formula of Baum and van Erp to families.

Lie (∞-)algebroid homotopy and twisted cohomologies. — Rosa Marchesini

Lie algebroid homotopy is defined as a Lie algebroid morphism $T : A \longrightarrow B$ where I is an open interval containing 0 and 1. It plays a fundamental role in the study of integrability and has appeared in several works in Higher Lie Theory. In particular, Balcerzak first proved that Lie algebroid cohomology is invariant under Lie algebroid homotopy. This poster presents joint work with M. Jotz establishing the homotopy invariance of twisted Lie algebroid cohomology, and it outlines ongoing work with R. Louis extending these ideas to Lie ∞-algebroids. Moreover, it discusses constructions of Lie algebroid homotopies and computations of a broad family of cohomology theories. The approach is closely related to local splitting results and submersions by Lie algebroids and provides a common framework encompassing Lie algebroid cohomology with coefficients in representations (up to homotopy), deformation cohomology, and universal cohomology of singular foliations. As special cases, it recovers Poisson, foliated and equivariant de Rham, Chevalley-Eilenberg, and de Rham cohomology. Computational consequences of homotopy invariance, including Poincaré-lemma-type and Kenneth-type results, are highlighted, together with the geometric information encoded by these cohomology theories.

Frobenius Theorem for Z-graded Manifolds — Rudolf Smolka

The Frobenius theorem is an irreplaceable tool in the toolbox of every differential geometrist. It is sometimes useful to distinguish two versions of the theorem - a local and a global one. The local Frobenius theorem states that for every involutive regular distribution there locally exists a flat coordinate chart. It is known to hold for graded manifolds of many different gradings. On the other hand, the global Frobenius theorem equates involutive regular distributions with foliations by integral submanifolds. In this poster we show theorems and examples which demonstrate that in the realm of Z-graded geometry things may not be so simple. For instance, one may have a non-involutive distribution for which there is a foliation by integral submanifolds.

Algebroid Desingularizable Poisson Structures — Shane Rankin

We introduce algebroid desingularizable Poisson manifolds, a class of Poisson manifolds induced by symplectic Lie algebroids with almost-injective anchors, generalizing structures including log-symplectic, b^m-symplectic, and E-symplectic manifolds. We give an infinitesimal obstruction to the existence of such an algebroid for a general Poisson manifold, and then characterize the linear case by showing that the dual of a real finite-dimensional Lie algebra, equipped with the KKS Poisson structure is desingularizable if and only if it possesses an abelian ideal of dimension $dim(g) - r$, where $2r$ is the maximal coadjoint orbit dimension.

Drinfeld Correspondence in Infinite Dimensions — Praful Rahangdale

We establish the Drinfeld correspondence between Poisson-Lie groups and their infinitesimal counterparts, Lie bialgebras, in infinite-dimensional settings. Specifically, we extend this correspondence to regular Lie groups modeled on convenient vector spaces, with a particular focus on those modeled on nuclear Fréchet and nuclear Silva spaces. Important examples of interest include the smooth loop group $C^\infty(\mathbb{S}^1, G)$ and the analytic loop group $C^\omega(\mathbb{S}^1, G)$ of a 1-connected real Lie group G, as well as $\widetilde{\mathrm{Diff}^\infty(M)}_0$ and $\widetilde{\mathrm{Diff}^\omega(M)}_0$—the universal covering groups of the identity components of the groups of smooth and real-analytic diffeomorphisms of a compact manifold M.

Higher homotopy structures associated with dg-manifolds. — Martha Valentina Guarin Escudero

Inspired by Kapranov's construction of an L infinity algebra associated to the holomorphic tangent bundle of a Kahler manifold, Mehta, Stienon, and Xu proved that the space of vector fields on a dg-manifold can be endowed with an L infinity algebra. Such a structure involves natural geometrical objects, such as the Lie derivative and Atiyah classes. Now, we intend to uncover what sort of homotopical structures arise when we consider a Hamiltonian dg manifold. We claim that we can indeed find a Poisson homotopy algebra that extends the previously mentioned Homotopy Lie algebra.

p-adic symplectic geometry — Luis Crespo

We have explored recently the field of symplectic geometry and integrable systems where the field of real numbers has been replaced by the field of p-adic numbers. This new area of research has proved to be extremely rich. Some classical results like Darboux's Theorem still hold as such in the p-adic case, while others, like Gromov's nonsqueezing theorem, do not hold at all. We have also extended the Weierstrass-Williamson classification of critical points of integrable systems to the p-adic case in dimension 2 and 4, and it has many more classes than its real counterpart.

Poisson linearization in dimension 4 — Florian Zeiser

The existence of a local normal form for a Poisson structure can be reduced to the question of linearization due to Weinstein's splitting theorem. Up to dimension 4, the linearization problem has been answered for all but one linear Poisson structure. We show that the remaining case has a positive answer, i.e. any Poisson structure whose linear part is given by the linear Poisson structure is linearizable. The same holds for any finite product of this linear Poisson structure.

Obstructions to the existence of a Dirac complement — Tom Ariel

Dirac structures originate from physics, controlling the geometry in systems with both symmetries and constraints. Works by Weinstein, Courant, and Dorfman gave a more general definition of a Dirac structure as involutive lagrangian subbundles in a Courant algebroid over a manifold. Dirac complements to a given Dirac structure play a role in the deformation theory of said Dirac structure and in the structure theory of the Courant algebroid itself. In this poster we present two obstructions for the existence of a Dirac complement. The first is in terms of a cohomology class, which we call the obstruction class, defined for any curved DGLA. We give examples of Dirac structures where this class does not vanish, and relate it to classical cohomologies such as Chevalley-Eilenberg and de Rham. The second is for a class of Courant algebroids over a point, defined for any quadratic Lie algebra g. We show that in the case the pairing on g is definite (for example, g is compact semisimple), a certain Dirac structure in g, which is related to the Cartan-Dirac structure on any Lie group integrating g, admits a complement if and only if g is abelian. This result stands in contrast to a result by Alekseev-Bursztyn-Meinrenken, which shows a Dirac complement exists if g is complex semisimple.

Emergent Geometry and Analogue Gravity in Bose-Einstein Condensates — Elias Thierens

What if spacetime were not fundamental? Bose-Einstein condensates provide a remarkable example in which geometric structures resembling curved spacetime emerge from the collective dynamics of ultracold matter. Starting from the Gross-Pitaevskii equation, one finds that small excitations behave as though they propagate in an effective Lorentzian geometry, complete with analogue horizons and black-hole-like phenomena. This talk presents the mathematics behind this emergence, highlighting the interplay between geometry, symmetry, and dynamics. The resulting picture not only reveals unexpected geometric features of Bose-Einstein condensates but also offers a tangible framework in which ideas related to emergent spacetime and quantum gravity can be explored.

New results about generalized Tribonacci and generalized Tribonacci–Lucas quaternion-like polynomials — Abdeldjabar Hamdi

we introduce the generalized tribonacci and generalized tribonacci quaternions like polynomial. We start with some basic identities.Thereafter, We obtain Binet's formula, generating functions, and the summa- tion formula for this type of quaternion. Keywords: tribonacci like polynomials, tribonacci-lucas polynomials, generalized tribonacci quaternions like

Cohomology Book of Poisson Structures — Hudson Lima

We compute the Poisson cohomology of the linear Poisson structure dual to the n-dimensional Lie algebra defined by $[e_0, e_i] = e_i, [e_i, e_j] = 0, i, j = 1, ..., n-1$

Moduli Spaces of flat Multiplicative Ehresmann connections — Aline Leite Vilela Doliveira

A classical result due to Atiyah and Bott establishes that the moduli space of flat principal bundle connections admits a symplectic structure under certain conditions. The notion of principal connection was generalized to groupoids, first by Laurent-Gengoux, Stienon and Xu, and later by Fernandes and Marcut, through what they called multiplicative Ehresmann connections (MECs).

In this work, we define three versions of the moduli space for flat MECs and take the first steps toward understanding how these generalized moduli spaces carry some geometric structure that generalizes the symplectic structure in the classical case.

Reduction for mutually completely orthogonal actions of matrix groups —

Teodora Almăjan

The commuting Hamiltonian actions of two Lie groups on a symplectic manifold are said to be mutually completely orthogonal (MCO) if their orbits are symplectically orthogonal to each other. We introduce the notion of reduction for MCO actions, e.g. the $(\mathrm{GL}(n), \mathrm{GL}(m))$ pair reduces to $(\mathrm{SL}(n), \mathrm{GL}(m))$. We prove that the MCO pair $(\mathrm{U}(n), \mathrm{U}(m))$ reduces to $(\mathrm{SU}(n), \mathrm{U}(m))$, and that also $\mathrm{SU}(p, q)$ and $\mathrm{U}(m)$ admit MCO actions. (Poster based on joint work with Cornelia Vizman.)

Geodesically Equivalent Metrics and Separation of Variables — Dinmukhammed (Dimash) Akpan

The aim of this poster is to describe a connection between two seemingly unrelated areas: geodesically equivalent metrics and the theory of separation of variables.

Two (pseudo-)Riemannian metrics g and $\bar{g}$ on a manifold M are called geodesically equivalent if they have the same geodesics as unparameterized curves. Besides the trivial case $\bar{g} = cg$, the problem of describing nontrivial geodesically equivalent metrics goes back to Beltrami (1865).

A classical result states that, in dimension two, a metric g admits a nontrivial geodesically equivalent metric if and only if its geodesic flow possesses a nontrivial first integral quadratic in the momenta. On the other hand, the existence of such quadratic integrals is closely related to the separation of variables for natural Hamiltonian systems.

Furthermore, every pair of geodesically equivalent metrics $(g, \bar{g})$ naturally determines a Nijenhuis operator L. Nijenhuis operators also play a central role in geometric approaches to separation of variables. This provides a common framework for both theories and explains how their relationship arises through Nijenhuis geometry.

Diffeological Riemannian orbifolds — David Miyamoto

Diffeology provides a lightweight framework to equip arbitrary subsets, quotients, and mapping spaces with a notion of smooth structure. We show that the data of a Riemannian metric on an orbifold Lie groupoid is equivalent to the data of a Riemannian metric on its diffeological orbit space. More generally, we show that a 2-metric on a Lie groupoid induces a Riemannian metric on its diffeological orbit space only if the Lie groupoid is regular, and that properness is a sufficient but not necessary condition. For example, for irrational α, the data of a 2-metric on the stack presented by $(\mathbb{Z} + \alpha\mathbb{Z}) \circlearrowright \mathbb{R}$ (i.e., an invariant metric) is equivalent to the data of a diffeological Riemannian metric on the irrational torus $\mathbb{R}/(\mathbb{Z} + \alpha\mathbb{Z})$.

Stokes phenomenon and quantum supergroup $U_q(\mathfrak{gl}(m|n))$ — Qiao Li

We study the Stokes phenomenon of the quantum confluent hypergeometric supersystem, certain meromorphic linear system of ordinary differential equation with a second order pole, associated to the Lie superalgebra $\mathfrak{gl}_{m|n}$. We prove that its Stokes supermatrices satisfy the Yang-Baxter equation, and thus give rise to the quantum supergroup $U_q(\mathfrak{gl}(m|n))$.

Nijenhuis structures and Morita equivalence — Andrés I. Rodríguez

This work presents a framework for the Morita equivalence of multiplicative $(1,1)$-tensor fields and Nijenhuis groupoids, formulated via principal bibundles.

Furthermore, we explore the infinitesimal counterpart of this theory, establishing a global-to-infinitesimal Lie correspondence for the Morita equivalence of infinitesimal multiplicative (IM) tensor fields. This framework naturally extends to compatible geometries, such as Dirac–Nijenhuis and Poisson–Nijenhuis structures. Specifically, we demonstrate that hierarchies of compatible structures are preserved under Morita equivalence, and we prove that the Poisson–Nijenhuis modular class is a Morita invariant.

Finally, to address the homotopy invariance of these structures under Morita transfer, we introduce the category of vector-valued forms on a Lie groupoid and endow it with the structure of a strict Lie 2-algebra governed by the Frölicher–Nijenhuis bracket. Within this higher algebraic framework, quasi-Nijenhuis groupoids are recovered as Maurer–Cartan elements.