Differential Geometry and its Applications

DGA2019

Programme and Abstracts

September 1–7
University of Hradec Králové
Hradec Králové, Czech Republic

http://dga2019.uhk.cz

The 14th Conference on Differential Geometry and its Applications
Programme and Abstracts
Hradec Králové 2019

1. Conference Schedule

The scientific programme will run from 9:00 on Monday, September 2, to around 18:00 on Friday, September 6; it is composed of plenary talks and eight programme sections. The rough scheme of the programme is given in the table below. The Latin capital letters within the session blocks indicate the individual sections.

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30	Registration				
9:00					
9:30					
10:00					
10:30	plenary	A C G/H	plenary	A B G	plenary
11:00					
11:30					
12:00					
12:30					
13:00					
13:30					
14:00				poster session	
14:30					
15:00					
15:30	A B H	E D H	Excursions		A B C
16:00				A B D/F	
16:30					
17:00					
17:30					
18:00					

Along with the invited talks, there are also contributions by the participants in the form of contributed talks or posters, as decided by the chairs of the individual sections.

The plenary lectures will be in the Aula of Building A. The programme in sections will be in the lecture rooms S1, S2, S6 and S7 in Building S.

2. General Information

About the conference

The tradition of the international conference Differential Geometry and its Applications goes back more than 38 years and the current DGA meeting is the 14th one in the series.

The conferences take place regularly at one of the Czech universities every three years. The previous three meetings were in Brno, preceded by Olomouc (2007), Prague (2004), Opava (2001), Brno (1998, 1995), etc.

Social Programme

During the conference week three social events are planned: the Welcome Party, trips to various parts of Hradec Králové Region, and the Farewell Party.

Welcome Party, September 1, 2019, from 6pm till 11pm.

Farewell Party, September 6, 2019, from 7pm till 12pm.

The Welcome and Farewell parties will take place in Building A of the University of Hradec Králové.
Address: Hradecká 1227/4, Hradec Králové.

Conference trips (excursions), September 4, 2019

The excursions are fully covered in the conference fees, including the registered accompanying persons. Participants will be asked to fix the choice of one of the excursions during their registration at the desk or before Tuesday. The individual excursions have limited capacity. Buses will depart on September 4 at 13:30 from Building A.

Option A) The Broumov Walls: guided tour through the national nature reservation and dinner.

Option B) Opočno Castle: a guided tour of the castle Opočno and dinner.

Option C) Náchod Brewery: a tour through Náchod Brewery with beer testing and dinner.

3. Programme

PLENARY SECTION
Invited Talks

MONDAY • 9:00-12:30 • ROOM: A1

- *Christian Bär* (9:00–9:50)
  Counter-intuitive approximations

Coffee break

- *Monika Ludwig* (10:30–11:20)
  Geometric Valuation Theory
- *Herbert Edelsbrunner* (11:30–12:20)
  Shape reconstruction and distortion in Bregman space

Lunch (12:25–13:25)

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SECTION A
Riemannian Geometry and Geometric Analysis

MONDAY • 14:00–17:50 • ROOM: S1

- *Andreas Arvanitoyeorgos* (14:00–14:30)
  $\delta(r)$-ideal biconservative hypersurfaces in Euclidean space
- *Tomasz Zawadzki* (14:30–15:00)
  Variations of functionals of metric on a manifold with a distribution
- *Sandro Caeiro-Oliveira* (15:00–15:30)
  Homogeneous critical metrics

Coffee break

- *Mitsuhiro Itoh* (16:00–16:40)
  Spherical Fourier transform on harmonic manifolds and Gauss hypergeometric equations
- *Balázs Csikós* (16:45–17:15)
  On the total scalar curvature of tubes in a 3-dimensional Riemannian manifold
- *Seher Kaya* (17:20–17:50)
  Maximal surfaces of Riemman type in Lorentz-Minkowski space

Section B
Geometric Structures and Representation Theory

Monday • 14:00–18:00 • Room: S2

- *Ilka Agricola* (14:00–14:40)
  Generalizations of 3-Sasaki manifolds and connections with skew torsion
- *Andrea Santi* (14:50–15:20)
  G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part I.

Coffee break

- *Dennis The* (16:00–16:30)
  G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part II.
- *Boris Kruglikov* (16:40–17:20)
  G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part III.
- *Wolfgang Globke* (17:30–18:00)
  Rigidity of pseudo-Hermitian homogeneous spaces of finite volume

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Section H
Convex and Integral Geometry

Monday • 14:00–17:45 • Room: S7

- *Gil Solanes* (14:00–14:50)
  Lipschitz-Killing valuations in pseudo-riemannian manifolds
- *Jan Kotrbatý* (14:55–15:25)
  $Spin(9)$-invariant valuations in the octonionic plane

Coffee break

- *Judit Abardia-Evéquoz* (16:00–16:50)
  Flag area measures
- *Ivan Izmestiev* (16:55–17:45)
  Discrete spherical Laplacian

Section A
Riemannian Geometry and Geometric Analysis

Tuesday • 9:00–12:20 • Room: S1

- *Velichka Milousheva* (9:00–9:30)
  Local Theory of Surfaces with Parallel Normalized Mean Curvature Vector Field in Pseudo-Euclidean 4-Space
- *Yana Aleksieva-Ninova* (9:30–10:00)
  Local Theory of the Quasi-minimal Lorentz Surfaces in Pseudo-Euclidean 4-space with Neutral Metric

Coffee break

- *Teresa Arias-Marco* (10:30–11:10)
  Orbisurfaces and the Steklov problem
- *Stefan Bechtluft-Sachs* (11:15–11:45)
  Green's functions, Biot-Savart Operators and Linking Numbers on Negatively Curved Symmetric Spaces
- *Olga Pérez-Barral* (11:50—12:20)
  Ruled hypersurfaces in complex space forms

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Section C
Geometry and Physics

Tuesday • 9:00–12:35 • Room: S2

- *Marcella Palese* (9:00–9:30)
  Higher variations and conservation laws; with applications to a Yang-Mills theory on a Minkowskian background
- *Markus Dafinger* (9:30–10:00)
  Existence of a Variational Principle for PDEs with Symmetries and Current Conservation

Coffee break

- *Enrico Pagani* (10:30–11:00)
  Constrained calculus of variations for piecewise differentiable sections: first and second variation
- *Jordi Gaset Rifà* (11:00–11:30)
  Geometric equivalence and symmetries in field theories: the gravitational case

- *Igor Khavkine* (11:35–12:05)
  Conformal Killing Initial Data
- *Radosław Kycia* (12:05–12:35)
  Integrability of geodesics of totally geodesic metrics

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Section G
Homotopy Theoretic Structures in Differential Geometry

Tuesday • 9:00–10:00 • Room: S7

- *Pier Paolo La Pastina* (9:00–9:30)
  Deformations of VB-groupoids
- *Luca Accornero* (9:30–10:00)
  Cohomology of Haefliger groupoids and invariants of pseudogroup structures

Coffee break

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Section H
Convex and Integral Geometry

Tuesday • 10:30–12:35 • Room: S7

- *Florian Besau* (10:30–11:00)
  Polytopal Approximation in Hilbert Geometries
- *Andreas Kreuml* (11:00–11:30)
  Fractional Sobolev norms and BV functions on manifolds
- *Hiroshi Iriyeh* (11:35–12:05)
  On the volume product of three dimensional convex bodies with symmetries of a subgroup of O(3)
- *Jan Rataj* (12:05–12:35)
  On critical values of the distance from a subset of a Riemannian surface

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Section D
Finfsler Geometry

Tuesday • 14:00–17:50 • Room: S2

- *Bin Shen* (14:00–14:40)
  On variation of action integral in Finsler gravity
- *Julius Lang* (14:50–15:30)
  Three results on the projective geometry of Finsler surfaces

Coffee break

- *Zoltán Muzsnay* (16:00–16:40)
  On the holonomy of Finsler manifolds
- *Zdeněk Dušek* (16:45–17:15)
  Homogeneous geodesics in homogeneous Finsler manifolds
- *Bankteshwar Tiwari* (17:20—17:50)
  Structures on Finsler manifolds in presence of convex functions

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Section E
Nonlinear PDEs and Applications

Tuesday • 13:45–18:10 • Room: S6

- *Alexey Samokhin* (13:45–14:25)
  Nonlinear waves in a layered medium
- *Jakub Vašíček* (14:30–15:00)
  Symmetries and conservation laws for a generalization of Kawahara equation
- *Pavel Holba* (15:00–15:30)
  Coverings and nonlocal symmetries of two-dimensional differential equations

Coffee break

- *Artur Sergyeyev* (16:00–16:40)
  Integrable (3+1)-dimensional systems from contact geometry
- *Nina Khor'kova* (16:45–17:25)
  On exact solutions of the $k - \varepsilon$ turbulence model
- *Alexander Verbovetsky and Iosif Krasil'shchik* (17:30–18:10)
  Nonlocal Schouten and Nijenhuis brackets

Section H

Convex and Integral Geometry

Tuesday • 14:00–17:45 • Room: S7

- *Dušan Pokorný* (14:00–14:50)
  Integral geometry of WDC sets
- *Daniel Temesvari* (14:55–15:25)
  Cones generated by random points on half-spheres and convex hulls of Poisson point processes

Coffee break

- *Franz Schuster* (16:00–16:50)
  Affine Quermassintegrals and Minkowski Valuations
- *Andreas Bernig* (16:55–17:45)
  Dual area measures and hermitian integral geometry

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Plenary Section

Invited Talks

Wednesday • 9:00-12:30 • Room: A1

- *Lorenz Schwachhöfer* (9:00–9:50)
  An introduction to Information Geometry

Coffee break

- *Pierre Bieliavsky* (10:30–11:20)
  Symplectic symmetric spaces and quantisation
- *Henrique Bursztyn* (11:30–12:20)
  Deformation spaces and normal forms for Poisson and related structures

Lunch (12:25–13:25)

Free afternoon – excursions

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Section A
Riemannian Geometry and Geometric Analysis

Thursday • 9:00–12:20 • Room: S1

- *Sadahiro Maeda* (9:00–9:30)
  Length Spectrum of complete simply connected Sasakian Space Forms
- *Sebastian Klein* (9:30–10:00)
  The boundary of the space of CMC tori of spectral genus 2

Coffee break

- *Yuri Nikolayevsky* (10:30–11:10)
  Einstein extensions of Riemannian manifolds
- *Yusuke Sakane* (11:15–11:45)
  Einstein metrics on SU(2n)
- *Hiroyasu Satoh* (11:50–12:20)
  Volume entropy of harmonic Hadamard manifolds of hypergeometric type

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Section B
Geometric Structures and Representation Theory

Thursday • 9:00–12:30 • Room: S2

- *Igor Zelenko* (9:00–9:40)
  Uniformly degenerated CR structures and geometry of pairs of submanifolds in Lagrangian Grassmannians
- *Francesco Cattafi* (9:40–10:00)
  Formal integrability of geometric structures

Coffee break

- *Jan Gregorovic* (10:30–10:50)
  On the Beloshapka Rigidity Conjecture
- *Hideya Hashimoto* (10:55–11:15)
  Geometrical structures on homogeneous spaces related to G_2
- *Svatopluk Krýsl* (11:20–11:40)
  Elliptic Operators and Homogeneous Spaces
- *Mancho Manev* (11:45–12:05)
  On Manifolds with Almost Hypercomplex Structures and Hermitian-Norden Metrics

- *Henrik Winther* (12:10–12:30)
  Almost Quaternion Symplectic Structures

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Section G
Homotopy Theoretic Structures in Differential Geometry

Thursday • 9:00–12:25 • Room: S7

- *Georgy Sharygin* (9:00–9:30)
  Geometry of full symmetric Toda system on compact groups
- *Maxim Grigoriev* (9:30–10:00)
  Gauge PDEs as Q-bundles

Coffee break

- *Martina Stojić* (10:30–10:50)
  The symmetric monoidal category indproVect of filtered-cofiltered vector spaces
- *Zoran Škoda* (10:55–11:25)
  A connection between ordinary differential equations and a Hopf algebroid
- *Alexei Kotov* (11:30–12:00)
  The L-infinity algebra of a Leibniz algebra
- *Anton Galaev* (12:05–12:25)
  Losik classes for codimension one foliations

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Poster Session

Thursday • 14:00–15:00 • Building A

Noura Amri, Ricci Soliton Structures on Unit Tangent Sphere Bundles and Tangent Bundles
Stine Marie Berge, Convexity Properties for Harmonic Functions on Riemannian Manifolds
José Luis Carmona Jiménez, A generalization of Ambrose-Singer Theorem
Martin Doležal, Jet determination of sub-Riemannian geodesics
José Manuel Fernández-Barroso, Can one heard Riemannian properties with constant scalar curvature?
Sandor Balint Hajdu, Jacobi fields for second-order differential equations with

symmetry
Denis Husadzic, Singular BGG complexes over isotropic 2-Grassmannian
Lakrini Ibrahim, On harmonic sections of vector bundles
Kamran Khan, Biwarped product submanifolds of complex space forms
Yasmina Khellaf, An algorithmic method to study some geometric objects with Mathematica
Marius Kuhrt, Spinorial description of almost contact metric manifolds
Rakesh Kumar, On the geometry of Slant conformal Riemannian maps from almost Hermitian manifolds
Abdullah Magden, Curvature Properties of Sasakian Metrics on Second Order Tangent Bundle
Tianyu Ma, Geodesic rigidity of Levi-Civita connections admitting essential projective vector fields
Hristo Manev, Almost hypercomplex manifolds with Hermitian-Norden metrics and 4-dimensional indecomposable real Lie algebras depending on two parameters
Jana Musilová, Olga Rossi and Michal Čech, Classification of symmetries of non-holonomic mechanical systems
Ross Ogilvie, Harmonic tori in $\mathbb{S}^3$
Misa Ohashi, Fibre bundle structures on homogeneous spaces related to $Spin(6)$
Dhriti Patra, Ricci Solitons and Paracontact Geometry
Mariusz Plaszczyk, How many are projectable classical linear connections with prescribed Ricci tensor
Xavier Rivas, Symmetries and dissipation in contact mechanics
Samaneh Saberali, Conformally related Douglas metrics are Randers
Luca Schiavone, Evolutionary equations and constraints
Nikolaos Souris, The role of Cartan development in studying signatures of paths
Leander Stecker, Homogeneous 3-(α, δ)-Sasaki manifolds
Radek Suchánek, Cartan Gravity and Tractor Calculus
Kyoji Sugimoto, The classification of para-real forms of simple para-Hermitian symmetric spaces
Homare Tadano, Some Compactness Theorems for Transverse Ricci Solitons on Complete Sasaki Manifolds
Vit Tucek, BGG sequences from infinite-rank bundles
Petr Zima, Generalizations of Killing spinors
Vojtěch Žádník, Geometry of curves via tractors

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Section A

Riemannian Geometry and Geometric Analysis

Thursday • 15:00–17:50 • Room: S1

- *Rodrigo Mariño-Villar* (15:00–15:30)
  Weakly-Einstein Riemannian manifolds

Coffee break

- *Alberto Vázquez* (16:00–16:30)
  A nonisoparametric hypersurface with constant principal curvatures
- *Makiko Sumi Tanaka* (16:35–17:15)
  Maximal antipodal sets of classical compact symmetric spaces
- *Naoya Ando* (17:20–17:50)
  Surfaces with zero mean curvature vector in neutral 4-manifolds

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Section B

Geometric Structures and Representation Theory

Thursday • 15:00–17:45 • Room: S2

- *Luca Vitagliano* (15:00–15:30)
  Homogeneous G-Structures

Coffee break

- *Aleksandra Borówka* (16:00–16:30)
  Quaternion-Kähler manifolds near maximal fixed points sets of circle symmetries
- *Dmitri Alekseevsky* (16:40–17:20)
  Conformally flat homogeneous pseudo-Riemannian manifolds
- *Stefan Haller* (17:25–17:45)
  The heat kernel expansion of Rockland differential operators and applications to generic rank two distributions in dimension five

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Section D

Finsler Geometry

Thursday • 15:00–16:30 • Room: S7

- *Tayebeh Tabatabaeifar* (15:00–15:30)
  On Generalized Douglas-Weyl Randers Metrics

Coffee break

- *Pavel Andreev* (16:00–16:30)
  Quasihyperbolic Randers spaces

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Section F

Applied and Computational Differential Geometry and Topology

Thursday • 16:00–17:40 • Room: S6

- *Hong Van Le* (16:00–16:30)
  Bayesian nonparametrics over complete Riemannian manifolds
- *Evgeny Malkovich* (16:35–17:05)
  Geometric characteristics of the media with bimodal porous structure
- *Yaroslav Bazaikin* (17:10–17:40)
  Topological Analysis of 3D Seismic Diffraction Images and Characterization of Fractured Zones

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Plenary Section

Invited Talks

Friday • 9:00-12:30 • Room: A1

- *Andrew Swann* (9:00–9:50)
  Toric methods for Ricci-flat metrics

Coffee break

- *Hans-Bert Rademacher* (10:30–11:20)
  On the number of closed geodesics
- *Yurii Nikonorov* (11:30–12:20)
  On the structure of geodesic orbit Riemannian manifolds

Lunch (12:25–13:25)

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Section A
Riemannian Geometry and Geometric Analysis

Friday • 14:00–17:20 • Room: S1

- *Gianluca Bande* (14:00–14:30)
  Holomorphic spheres and four-dimensional symplectic pairs
- *Kazumi Tsukada* (14:30–15:00)
  Quaternionic differential geometry of complex submanifolds in a quaternion projective space
- *Roger Nakad* (15:00–15:30)
  Hypersurfaces of Spin^c manifolds with special spinor fields

Coffee break

- *Beniamino Cappelletti-Montano* (16:00–16:40)
  New results and questions on the theory of Sasakian immersions
- *Antonio De Nicola* (16:50–17:20)
  Almost formality of quasi-Sasakian and Vaisman manifolds with applications to nilmanifolds

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Section B
Geometric Structures and Representation Theory

Friday • 14:00–17:10 • Room: S2

- *Ioannis Chrysikos* (14:00–14:30)
  Homogeneous space admitting invariant Spin(7)-structures
- *Katharina Neusser* (14:35–15:05)
  Projective geometry of Sasaki-Einstein structures
- *Katja Sagerschnig* (15:10–15:40)
  On the An-Nurowski twistor construction

Coffee break

- *Josef Šilhan* (16:00–16:30)
  Symmetries of conformal overdetermined operators

- *Lenka Zalabová* (16:40–17:10)
  Special Metric and Scales in Parabolic Geometry

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Section C
Geometry and Physics

Friday • 14:00–17:05 • Room: S7

- *Xavier Gràcia* (14:00–14:30)
  Contact geometry and Hamiltonian field theory
- *Dana Smetanová* (14:35–15:05)
  Higher Order Hamiltonian Systems with Generalized Legendre Transformation
- *Sergey Agafonov* (15:10–15:40)
  Duality for systems of conservation laws

Coffee break

- *Mastooreh Farahmandy Motlagh* (16:00–16:30)
  Solution of the Einstein equation based on physician metrics
- *Eivind Schneider* (16:35–17:05)
  Differential invariants of Kundt waves

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4. Abstracts

Plenary Lectures

Christian Bär

Counter-intuitive approximations

Monday • 9:00–9:50 • Room: A1

The Nash-Kuiper embedding theorem is a prototypical example of a counter-intuitive approximation result: any short embedding of a Riemannian manifold into Euclidean space can be approximated by isometric ones. As a consequence, any surface can be isometrically C^1-embedded into an arbitrarily small ball in $\mathbb{R}^3$. For C^2-embeddings this is impossible due to curvature restrictions. We will present a general result which will allow for approximations by functions satisfying strongly overdetermined equations on open dense subsets. This will be illustrated by three examples: real functions, embeddings of surfaces, and abstract Riemannian metrics on manifolds. Our method is based on „weak flexibility", a concept introduced by Gromov in 1986. This is joint work with Bernhard Hanke.

Pierre Bieliavsky

Symplectic symmetric spaces and quantisation

Wednesday • 10:30–11:20 • Room: A1

I will review part of my work on the use of symmetric space techniques in equivariant deformation quantization within a non-formal framework (C^* or Fréchet algebras). If time permits, I will give some applications in locally compact quantum group theory.

Henrique Bursztyn

Deformation spaces and normal forms for Poisson and related structures

Wednesday • 11:30–12:20 • Room: A1

Poisson structures are known to have a rich local geometry. This talk will present results concerning the local behaviour of various geometric structures closely related to Poisson geometry (e.g. Lie and Courant algebroids, Dirac sructures, etc.). In each context, for suitable submanifolds, we obtain results identifying the given geometric structure with its linear approximation on the normal bundle; these results extend many classical local splitting theorems (such as Frobenius theorem for foliations, or Weinstein's splitting of Poisson structures). A key ingredient in the proof of these results are the „deformation spaces" associated with submanifolds.

Herbert Edelsbrunner

Shape reconstruction and distortion in Bregman space

Monday • 11:30–12:20 • Room: A1

How does the measure of dissimilarity affect the reconstruction of shape from point data, and how do we quantify the influence? We approach this question by extending popular Euclidean reconstruction algorithms to Bregman space. A particularly interesting Bregman divergence is the relative entropy, whose infinitesimal version defines the Fisher metric. We explain the connections and illustrate the findings with sample results of the implemented algorithms. Joint work with Katharina Oelsboeck and Hubert Wagner.

Monika Ludwig

Geometric Valuation Theory

Monday • 10:30–11:20 • Room: A1

A fundamental theorem of Hadwiger classifies all rigid-motion invariant and continuous functionals on convex bodies (that is, compact convex sets) in $\mathbb{R}^n$ that satisfy the inclusion-exclusion principle,

$$\mathrm{Z}(K) + \mathrm{Z}(L) = \mathrm{Z}(K \cup L) + \mathrm{Z}(K \cap L)$$

for convex bodies K, L such that $K \cup L$ is convex. Under weak additional assumptions, such a functional Z is a finitely additive measure and hence Hadwiger's theorem is a counterpart to the classification of Haar measures.

Hadwiger's theorem characterizes the most important functionals in Euclidean geometry, the $n+1$ intrinsic volumes, which include volume, surface area, and the Euler characteristic. In recent years, numerous further valuations defined on the space of convex bodies and more generally on function spaces were characterized by their properties.

An overview of these results will be given.

Yurii Nikonorov

On the structure of geodesic orbit Riemannian manifolds

Friday • 11:30–12:20 • Room: A1

This talk is devoted to geodesic orbit Riemannian manifolds that could be characterize by the property that any geodesic is an orbit of some one-parameter group of isometries. At first, we consider some structure results on geodesic orbit spaces, in particular, we discuss the structure of the nilradical and the radical of the Lie algebra of the isometry group. Some important subclasses (naturally reductive, normal homogeneous, generalized normal homogeneous, Clifford–Wolf homogeneous, weakly symmetric spaces) of the class of geodesic orbit spaces are planned to be discussed. Then we consider relationships between geodesic orbit spaces and Killing vector fields of constant length, as well as important totally geodesic submanifolds of geodesic orbit spaces (that inherit the property to be geodesic orbit). We also discuss some new tools to study geodesic orbit Riemannian spaces, related to compact Lie group representations with non-trivial principal isotropy algebras. In the final part of the talk, we discuss some partial classifications of geodesic orbit spaces and related unsolved problems.

Hans-Bert Rademacher

On the number of closed geodesics

Friday • 10:30–11:20 • Room: A1

It is an open question whether any Riemannian metric on a compact manifold has infinitely many geometrically distinct closed geodesics. We first revisit results for generic metrics in the case of simply-connected manifolds. The genericity assumption is defined in terms of the linearization of the local return map of the periodic orbits of the geodesic flow.

Then we discuss recent results obtained jointly with Iskander Taimanov on the number of closed geodesics on connected sums of non-simply connected and compact manifolds. In particular we conclude that any Riemannian metric on a three-dimensional compact manifold with infinite fundamental group has infinitely many closed geodesics.

Lorenz Schwachhöfer

An introduction to Information Geometry

Wednesday • 9:00–9:50 • Room: A1

Information Geometry is an interdisciplinary field applying differential geometric methods to the study of families of probability measures on some sample space. This leads to the term of *statistical manifolds* which are Riemannian manifolds (equipped with the *Fisher metric*) with an additional torsion free affine connection. There are several interesting characterizations of the Fisher metric by its invariance under certain transformations.

We shall give an historic account of Information Geometry, starting with the fundamental work by Amari, also giving an account of more recent results and applications.

Andrew Swann

Toric methods for Ricci-flat metrics

FRIDAY • 9:00–9:50 • ROOM: A1

The moment map is a powerful tool in symplectic geometry, with compact symplectic toric manifolds being described by their Delzant polytope. I will discuss what related ideas apply to different classes of Ricci-flat metrics, including hyperKähler, Calabi-Yau and holonomy G_2 or Spin(7) and give an overview of current results. While the hyperKähler situation is still based on symplectic moment maps associated to closed two-forms, the other cases involve constructions of multi-moment maps for forms of higher degree. I will describe joint work with Thomas Bruun Madsen, that leads to appropriate definitions of toric G_2 and toric Spin(7) geometries, gives local construction of examples and links global structure to embedded trivalent graphs in four manifolds.

A. Riemannian Geometry and Geometric Analysis

Yana Aleksieva-Ninova

Local Theory of the Quasi-minimal Lorentz Surfaces in Pseudo-Euclidean 4-space with Neutral Metric

TUESDAY • 9:30–10:00 • ROOM: S1

A Lorentz surface in the pseudo-Euclidean 4-space with neutral metric is said to be quasi-minimal if the mean curvature vector is lightlike at each point. Our approach to the study of quasi-minimal Lorentz surfaces is based on introducing an appropriate parametrization and a geometrically determined moving frame field on such a surface. Using the derivative formulas for this frame field and integrability conditions, we prove a Bonnet-type existence and uniqueness theorem for the class of quasi-minimal surfaces in terms of invariant functions.

Noura Amri

Ricci soliton structures on unit tangent sphere bundles and tangent bundles

Thursday • 14:00–15:00 • Poster

We consider g-natural pseudo-Riemannian metrics on the tangent bundle (unit tangent sphere bundle) of a Riemannian manifold and we give necessary and sufficient conditions for these metrics to give rise to a Ricci soliton.

Naoya Ando

Surfaces with zero mean curvature vector in neutral 4-manifolds

Thursday • 17:20–17:50 • Room: S1

Space-like surfaces and time-like surfaces with zero mean curvature vector in oriented neutral 4-manifolds are isotropic and compatible with the orientations of the spaces if and only if their lifts to the space-like and the time-like twistor spaces respectively are horizontal. In neutral Kaehler surfaces and paraKaehler surfaces, complex curves and paracomplex curves respectively are such surfaces and characterized by one additional condition. In neutral 4-dimensional space forms, the holomorphic quartic differentials defined on such surfaces vanish. There exist time-like surfaces with zero mean curvature vector and zero holomorphic quartic differential which are not compatible with the orientations of the spaces and the conformal Gauss maps of time-like surfaces of Willmore type and their analogues give such surfaces.

Teresa Arias-Marco

Orbisurfaces and the Steklov problem

Tuesday • 10:30–11:10 • Room: S1

Inverse spectral problems ask the extent to which spectral data encode geometric information. The classical setting seeks to understand the properties of a smooth Riemannian manifold that are encoded in its Laplace spectrum. Nowadays, it is focusing the attention to some modifications of this classical setting as: to change manifold by orbifold, or change Laplace spectrum by Steklov spectrum. Orbifolds generalize manifolds admitting special singular points. The Steklov problem has been deeply study on compact Riemannian manifold with boundary and it has applications in electrical impedance tomography. In the talk we will focus on how the geometry of a Riemannian orbisurface with boundary is related with the Steklov spectrum presenting some recent advances obtained on orbisurfaces in:

Teresa Arias-Marco, Emily B. Dryden, Carolyn S. Gordon, Asma Hassannezhad, Allie Ray,and Elizabeth Stanhope: Spectral geometry of the steklov problem on orbifolds, International Mathematics Research Notices, 2019(1):90-139, 2019.

Andreas Arvanitoyeorgos

$\delta(r)$-ideal biconservative hypersurfaces in Euclidean space

Monday • 14:00–14:30 • Room: S1

The notion of biconservative submanifolds was introduced by R. Caddeo et al. They are submanifolds with divergence free stress bienergy tensor, which also generalize the biharmonic submanifolds. Ideal submanifolds are submanifolds which receive the least possible tension from its ambient space and have many interesting applications. We have investigated $\delta(r)$-ideal biconservative hypersurfaces for every integer $r \in [2, n-1]$ in Euclidean space $\mathbb{E}^{n+1}$ $(n > 2)$ with an easy technique and proved that such hypersurfaces must be of constant mean curvature. Moreover, we prove that every $\delta(r)$-ideal biharmonic hypersurface in Euclidean space $\mathbb{E}^{n+1}(n > 2)$ must be minimal. This is joint work with Deepika

Gianluca Bande

Holomorphic spheres and four-dimensional symplectic pairs

Friday • 14:00–14:30 • Room: S1

In this talk I will present a recent result obtained with Paolo Ghiggini concerning symplectic pairs. After proving that a (closed) four-dimensional manifold endowed with a symplectic pair is symplectically minimal, we are able to classify four-dimensional manifolds endowed with symplectic pairs admitting embedded symplectic spheres with non-negative self-intersection. In the talk I firstly present the definition of a symplectic pair, some associated structures, some interesting examples and then I will discuss the classification result.

Stefan Bechtluft-Sachs

Green's functions, Biot-Savart Operators and Linking Numbers on Negatively Curved Symmetric Spaces

Tuesday • 11:15–11:45 • Room: S1

This is a joint work with Evangelia Samiou. We construct radial fundamental solutions for the differential form Laplacian on negatively curved symmetric spaces. At least one of these Green's functions also yields a Biot-Savart Opearator, i.e. a right inverse of the exterior differential on closed forms with image in the kernel of the codifferential. Any Biot-Savart operator gives rise to a Gauss linking integral.

Stine Marie Berge

Convexity Properties for Harmonic Functions on Riemannian Manifolds

THURSDAY • 14:00–15:00 • POSTER

In the 70's Almgren noticed that if $h : B_R \subset \mathbf{R}^n \to \mathbf{R}$ is a harmonic function, then the L^2-norm over the sphere with radius r, then

$$H(r) = \int_{S_r} h^2 \sigma_r,$$

has increasing logarithmic derivative, i.e. $N(r) = \frac{H'(r)}{H(r)}$ is increasing. Taking the derivative of N shows that this is equivalent to H satisfying the convexity inequality

$$\frac{H''(r)\,H(r) - H'(r)^2 + \frac{1}{r} H(r)\,H'(r)}{H(r)^2} \geq 0.$$

The function N is called the (Almgren's) frequency function. It can be shown that N is equal to $2d + n - 1$ when h is a homogeneous harmonic polynomial of degree d. One can view the frequency function as telling the „degree" of the harmonic function in the sense that when $s < r < R$ we have that

$$\left(\frac{r}{s}\right)^{N(s)} \leq \frac{H(r)}{H(s)} \leq \left(\frac{r}{s}\right)^{N(r)}.$$

In joint work with Eugenia Malinnikova, we examined similar integrals over a more general class of parameterized surfaces. To specify, let $(M, \mathbf{g})$ be a Riemannian manifolds and $h : \Omega \subset M \to \mathbf{R}$ be a harmonic function. Let $f : \Omega \to [0, R)$ be a regular function satisfying some additional conditions. Then define the parameterized family of surfaces $S_t = f^{-1}(t)$ and define

$$H(t) = \int_{S_t} h^2 \, |\mathrm{grad} f| \, \sigma_t.$$

We show that H again satisfies a convexity property similar to the one above. In this talk we sketch the proof of the convexity property. Finally, we illustrate the usefulness of the convexity result by examining some explicit parameterized families of surfaces, e.g. geodesic spheres and ellipses.

Sandro Caeiro-Oliveira

Homogeneous critical metrics

MONDAY • 15:00–15:30 • ROOM: S1

Let (M, g) be a compact Riemannian manifold and consider the functional on the space of metrics of volume one, $\mathcal{M}_1$, given by

$$\mathcal{F}_t : g \in \mathcal{M}_1 \mapsto \int_M \{\|\rho\|^2 + t\tau^2\} dvol_g,$$

where ρ and τ denote the Ricci tensor and the scalar curvature of (M, g). Critical metrics for any quadratic curvature invariant in dimension three are $\mathcal{F}_t$-critical for some $t \in \mathbb{R}$ and conversely. Some special cases, corresponding to given values of t have been extensively investigated in the literature ([A],[CMM],[GV]).

Clearly, any Einstein metric is $\mathcal{F}_t$-critical for any t. The purpose of this contribution is to show the existence of three-dimensional homogeneous critical metrics which are not Einstein for any $t \in \mathbb{R}$ and to investigate their properties.

[A] Michael T. Anderson, Extrema of curvature functionals on the space of metrics on 3-manifolds, Calc. Var. Partial Differential Equations 5 (1997), 199-269.
[CMM] Giovanni Catino, Paolo Mastrolia, Dario D. Monticelli, A variational characterization of flat spaces in dimension three, Pacific J. Math. 282 (2016), 285-292.
[GV] Matthew J. Gursky,Jeff A. Viaclovsky, A new variational characterization of three-dimensional space forms,Invent. math. 145, 251-278 (2001).

Beniamino Cappelletti-Montano

New results and questions on the theory of Sasakian immersions

FRIDAY • 16:00–16:40 • ROOM: S1

Sasakian manifolds can be considered as the odd-dimensional counterpart of Käahler manifolds. Recently, there has been a renewed interest in Sasakian geometry, due to the foundamental work of Boyer and Galicki, as well as to the interplays with theoretical physics, especially string theory.

In this talk I would like to discuss some results and open problems on *Sasakian immersions*. By a Sasakian immersion we mean an isometric immersion from a Sasakian manifold S_1 into another one S_2, which preserves the Sasakian structure. While the theory of Käahler immersions has widely developed in the last decades, since the pioneeristic work of Calabi, there are very few results (and many interesting open questions) about Sasakian immersions.

As first step we consider the immersion of an η-Einstein compact Sasakian manifold into the most kwnown Sasakian manifold: the sphere. We obtain a complete classification of such manifolds when the codimension of the immersion is 4. Moreover, we exhibit infinite families of compact Sasakian η-Einstein manifolds which cannot admit a Sasakian immersion into any odd-dimensional sphere. Finally, we show that, after possibly deforming the metric D-homothetically, a homogeneous Sasakian manifold can be Sasakian immersed into some odd-dimensional sphere if and only if S is regular and either S is simply-connected or its fundamental group is finite cyclic.

Some conjectures and open problems will be pointed out.

In the last part of the talk we address the non-compact case, presenting some results on Sasakian immersions into Sasakian space forms.

This talk is part of a collaboration with Andrea Loi of the University of Cagliari (Italy).

Balázs Csikós

On the total scalar curvature of tubes in a 3-dimensional Riemannian manifold

Monday • 16:45–17:15 • Room: S1

This is a joint work with Amr Elnashar and Márton Horváth. In a previous work, B. Csikós and M. Horváth proved that the following three properties are equivalent for a connected Riemannian manifold of dimension at least 4:
(i) the manifold is locally harmonic;
(ii) the total scalar curvature of a tube of small radius about a regular curve depends only on the length of the curve and the radius of the tube;
(iii) property (ii) holds for tubes about geodesic segments.

We show that in dimension three, this theorem fails to be true. Instead of local harmonicity, property (ii) is equivalent to the D'Atri property. It is also equivalent to the condition that the total scalar curvature of any geodesic hemisphere of small radius is equal to 4π. Properties (ii) and (iii) are equivalent for compact manifolds, but the non-compact case is still under investigation. This research was supported by the NKFIH/OTKA grant K-128862.

Antonio De Nicola

Almost formality of quasi-Sasakian and Vaisman manifolds with applications to nilmanifolds

Friday • 16:50–17:20 • Room: S1

We provide models that are as close as possible to being formal in the sense of Rational Homotopy theory for a large class of compact manifolds that admit a transversely Kaehler structure, including Vaisman and quasi-Sasakian manifolds. As an application we are able to classify the corresponding nilmanifolds.

José Manuel Fernández-Barroso

Can one heard Riemannian properties with constant scalar curvature?

Thursday • 14:00–15:00 • Poster

M. Kac defined that a property of a Riemannian manifold can be *heard* if it can be determined from the eigenvalue spectrum of the associated Laplace operator on functions. Since then many local properties related with the curvature operator has been proved to be inaudible as to be a D'Atri space or to be a type $\mathcal{A}$ manifold (T. Arias-Marco, D. Schueth: On inaudible curvature properties of closed Riemannian manifolds, Ann. Global Anal. Geom. 37 (2010), no. 4, 339-349).

Now, we study more properties as the property of being k-D'Atri and the subclass of closed Riemannian manifolds with constant scalar curvature namely $\mathcal{C}^{\perp}$ in the sense of A. Gray (Einstein-like manifolds which are not Einstein, Geom. Dedicata 7 (1978), no. 3, 259-280).

Joint work with Teresa Arias-Marco.

Lakrini Ibrahim

On harmonic sections of vector bundles

Thursday • 14:00–15:00 • Poster

Let (E, π, M) be a vector bundle over a Riemannian manifold and assume E is endowed with a fiber metric h and a compatible connection D. R. Albuquerque introduced the class of spherically symmetric metrics (**SS-metrics**) on vector bundles. In the first part of this talk, we will discuss sections which are harmonic maps or vertically harmonic sections of vector bundles endowed with SS-metrics. In the second part, we will give some classes of harmonic functions, and finally we shall discuss harmonic morphisms between vector bundle manifolds when endowed with SS-metrics.

Mitsuhiro Itoh

Spherical Fourier transform on harmonic manifolds and Gauss hypergeometric equations

Monday • 16:00–16:40 • Room: S1

A new class of harmonic manifolds is defined in terms of Gauss hypergeometric equations. On a harmonic manifold (X^n, g), $n \geq 3$ the radiality is important. A spherical Fourier transform is well defined for radial functions, when (X, g) is Hadamard and of volume entropy $Q > 0$, by using radial eigen-functions $\varphi_\lambda(r)$ of Δ_g, called spherical functions. By using Busemann function $b_\theta(\cdot)$ on X, the $\varphi_\lambda(r)$, $\lambda \in \mathbf{C}$ is obtained directly by taking average of the λ-Poisson kernel $P_\lambda(x, \theta) = \exp\{-(Q/2 - i\lambda)b_\theta\}$, $\theta \in \partial X_\infty$ over a geodesic sphere of radius r. The convolution rule holds for the spherical Fourier transform on a harmonic Hadamard manifold of $Q > 0$. We report that we can further develop the spherical Fourier analysis on (X^n, g), when (X, g) is assumed to be of hypergeometric type, i.e., a $\varphi_\lambda(r)$ be converted into a hypergeometric function, as shown in [1],[2]. An inversion formula, a Plancherel theorem are available, same as in a Damek-Ricci space case. They are verified from the Green's Formula and the Riemann-Lebesgue Lemma, by using the connection formulas of hypergeometric functions. That (X, g) is of hypergeometric type is characterized geometrically in terms of the volume density $\Theta(r)$ of geodesic spheres as $\Theta(r) = k \sinh^{2c_1} r/2 \cosh^{2c_2} r/2$, $r > 0$ for $k > 0$, $c_1 > 0$ and c_2, $c_1 + c_2 > 0$.

[1] M.Itoh and H.Satoh, Harmonic Hadamard manifolds and Gauss hypergeometric differential equations, PRIMS, 55, 2019.
[2] M.Itoh and H.Satoh, in prep,.

Seher Kaya

Maximal surfaces of Riemman type in Lorentz-Minkowski space

Monday • 17:20–17:50 • Room: S1

The non-rotational minimal surfaces foliated by circles were discovered by Riemann in 1867. These surfaces are known in the literature as the Riemann minimal examples and have the property that the circles of the foliation are contained in parallel planes. In this talk we investigate the counterpart of the Riemann minimal examples in the Lorentz-Minkowski space L3. We consider maximal surfaces in L3, that is, spacelike surfaces with zero mean curvature and, besides the rotational examples, we study those surfaces foliated by circles in parallel planes. An important difference with the Euclidean setting is that in L3 there are three types of circles depending on the causal character of the planes containing the circles and thus, this class of surfaces is richer with new features. A first study of these surfaces from the viewpoint of the Weierstrass representation was done in by Lopez, F.J., Lopez, R., Souam, R. In this talk we give a new approach of the maximal surfaces of Riemann type viewing these surfaces as the zeroes of a regular function. Our study focuses in the analytic parametrization of the surface following a similar work as Perez and Meeks have done in R3. Among the results that we establish, we are able to find explicit parametrization of some maximal surfaces of Riemann type which is a bit surprising in comparison with the Euclidean case. A special case appears when the radii of the circles is constant, being classfied all these surfaces. Finally, although our surfaces are spacelike, they can extend as timelike surfaces with zero mean curvature and foliated by circles appearing regions of singularity points, which can be conical points or curves of singularities. This is a joint work with Rafael Lopez (University of Granada, Spain)(ArXiv: 1812.00589)

Sebastian Klein

The boundary of the space of CMC tori of spectral genus 2

THURSDAY • 9:30–10:00 • ROOM: S1

The soul conjecture by Pinkall and Sterling states that every closed curve in $\mathbb{R}^3$ is the limiting curve of a sequence of constant mean curvature (CMC) tori. This conjecture relates two different integrable systems: The non-linear Schrödinger equation describes closed curves, and the sinh-Gordon equation describes CMC tori. Hence one approach to understanding this limit process is to investigate the boundary of the space of spectral curves of CMC tori. Every CMC torus has finite spectral genus, and the space $\mathcal{P}^g$ of spectral curves of CMC tori with fixed genus g is totally disconnected. A natural strategy for the study of the boundary of $\mathcal{P}^g$ is to embed $\mathcal{P}^g$ into a larger space and take the closure there. In the talk, I will discuss the simplest non-trivial case, $g = 2$. The spectral curves in $\mathcal{P}^2$ each have two “finite” pairs of branch points, and one “infinite” pair at the marked points $\lambda = 0$, $\lambda = \infty$. I will consider two different embeddings of $\mathcal{P}^2$. 1.) $\mathcal{P}^2$ is naturally embedded into the space $\mathcal{H}^2$ of spectral curves of CMC immersions of spectral genus

2. The closure of $\mathcal{P}^2$ in $\mathcal{H}^2$ consists of curves where at least one of the two "finite" pairs of branch points have coalesced at the Sym point, and I will characterise the possible positions of the remaining "finite" pair. 2.) By blowing up the spectral parameter λ, one obtains a blow-up $\mathcal{A}^2$ of $\mathcal{H}^2$. The closure of $\mathcal{P}^2$ in $\mathcal{A}^2$ corresponds to limits where one or both "finite" pairs of branch points coalesce with the "infinite" pair. Again I will characterise the possible configurations of branch points in the limit.

Rakesh Kumar

On the geometry of Slant conformal Riemannian maps from almost Hermitian manifolds

Thursday • 14:00–15:00 • Poster

As a generalization of conformal Riemannian maps and slant submanifolds, we define slant conformal Riemannian maps from almost Hermitian manifolds to Riemannian manifolds. We study the geometry of foliations by using the existence of slant conformal Riemannian maps. We also investigate the conditions for such maps to be a horizontally homothetic Riemannian map and derive some necessary and sufficient conditions for slant conformal Riemannian maps to be totally geodesic maps.

Sadahiro Maeda

Length Spectrum of complete simply connected Sasakian Space Forms

Thursday • 9:00–9:30 • Room: S1

We investigate the distribution of lengths of closed geodesics on complete and simply connected Sasakian space forms of dimension greater than 1. When its constant ϕ-sectional curvature k is irrational and satisfies $k > -9/4$ or $k < -4$, we can see that two closed geodesics on this manifold are congruent to each other in strong sense by an isometry of this manifold if and only if they have a common length. When k is rational and $k \neq -3, 1$, the number of congruence classes of closed geodesics of given length is finite, but not uniformly finite, and its growth order with respect to their lengths is less than polynomial order.

Abdullah Magden

Curvature Properties of Sasakian Metrics on Second Order Tangent Bundle

Thursday • 14:00–15:00 • Poster

Let M be an $n-$dimensional Riemannian manifold with a Riemannian metric g and T^2M be its second-order tangent bundle with Sasaki metric S^g. In this paper, firstly, we calculate Riemannian curvature tensor, scalar curvature and sectional curvature tensor fields of Sasaki metric on T^2M and prove that T^2M is a manifold of constant sectional curvature or of constant scalar curvature, respectively. Then, we search weakly symmetry property of Sasaki metric and we show that it is characterized in terms of flatness of the base metric and Sasaki metric. The work is supported by the Scientific and Technological Research Council of Turkey, AR-GE 3001 Project No. 118F190.

Rodrigo Mariño-Villar

Weakly-Einstein Riemannian manifolds

THURSDAY • 15:00–15:30 • ROOM: S1

Let M be a compact surface. The Gauss-Bonnet Theorem shows that the functional $g \mapsto \int_M \tau_g \, vol_g$ is constant on the space of metrics and thus the Ricci tensor satisfies $\rho = \frac{1}{2}\tau g$. Generalizations of the Gauss-Bonnet Theorem to higher dimensions provide new universal curvature identities. The functional defined by the Gauss-Bonnet integrand $g \mapsto \int_M \{\|R\|^2 - 4\|\rho\|^2 + \tau^2\} \, vol_g$ is constant in dimension four. Hence any compact four-dimensional Riemannian manifold is critical and Berger [Be] showed that

$$\left(\check{R} - \frac{\|R\|^2}{4} g\right) + \tau \left(\rho - \frac{\tau}{4} g\right) - 2 \left(\check{\rho} - \frac{\|\rho\|^2}{4} g\right) - 2 \left(R[\rho] - \frac{\|\rho\|^2}{4} g\right) = 0,$$

where $\check{R}$, $\check{\rho}$ and $R[\rho]$ are the symmetric $(0,2)$-tensor fields given by $\check{R}_{ij} = R_{iabc} R_j{}^{abc}$, $\check{\rho}_{ij} = \rho_{ia} \rho^a{}_j$ and $R[\rho]_{ij} = R_{iabj} \rho^{ab}$. The tensor fields $\check{R}$, $\check{\rho}$ and $R[\rho]$ provide natural Riemannian invariants, algebraically the simplest ones after the Ricci tensor. Any Einstein metric is weakly-Einstein since the $(0,2)$-tensor fields $\check{R}$, $\check{\rho}$ and $R[\rho]$ are multiples of the metric tensor. The purpose of this lecture is to provide examples and classification results in the four-dimensional case for non-Einstein Riemannian manifolds which are weakly-Einstein.

[Be] M. Berger, Quelques formules de variation pour une structure riemannienne, *Ann. Sci. Éc. Norm. Super. (4)* **3** (1970), 285–294.

Velichka Milousheva

Local Theory of Surfaces with Parallel Normalized Mean Curvature Vector Field in Pseudo-Euclidean 4-Space

Tuesday • 9:00–9:30 • Room: S1

We study surfaces with parallel normalized mean curvature vector field in pseudo-Euclidean 4-space. On any such surface we introduce special isothermal parameters (which we call canonical parameters) that allow us to describe these surfaces in terms of three invariant functions. We prove that any surface with parallel normalized mean curvature vector field parametrized by canonical parameters is determined uniquely up to a motion by the three invariant functions satisfying a system of three partial differential equations.

Roger Nakad

Hypersurfaces of Spin^c *manifolds with special spinor fields*

Friday • 15:00–15:30 • Room: S1

In this talk, we prove that every totally umbilical hypersurface $M^{m\geq 4}$ of a Riemannian Spin^c manifold carrying a parallel or a real Killing spinor is either a totally geodesic hypersurface or an extrinsic hypersphere. As applications, we prove that there are no extrinsic hyperspheres in complete manifolds with holonomy G_2 or Spin(7) and in some special Sasakian manifolds. This is joint work with Nadine Grosse (University of Freiburg, Germany).

Yuri Nikolayevsky

Einstein extensions of Riemannian manifolds

Thursday • 10:30–11:10 • Room: S1

Given a Riemannian space N of dimension n and a field D of symmetric endomorphisms on N, we define the extension M of N by D to be the Riemannian manifold of dimension $n+1$ obtained from N by a construction similar to extending a Lie group by a derivation of its Lie algebra. We find the conditions on N and D which imply that the extension M is Einstein. In particular, we show that in this case, D has constant eigenvalues; moreover, they are all integer (up to scaling) if $\det D \neq 0$. They must satisfy certain arithmetic relations which imply that there are only finitely many eigenvalue types of D in every dimension (a similar result is known for Einstein solvmanifolds). We give the characterisation of Einstein extensions for particular eigenvalue types of D, including the complete classification for the case when D has two eigenvalues, one of which is multiplicity free. In the most interesting case, the extension is obtained, by an explicit procedure, from an almost Kähler Ricci flat manifold (in particular, from a Calabi-Yau manifold). We also show that all Einstein extensions of dimension four are Einstein solvmanifolds. A similar result holds valid in the case when N is a Lie group with a left-invariant metric, under some additional assumptions. This is a joint work with D. Alekseevsky.

Ross Ogilvie

Harmonic tori in $\mathbb{S}^3$

Thursday • 14:00–15:00 • Poster

The focus of this talk is to discuss harmonic maps from a 2-torus to the 3-sphere, which may be characterised by means of their 'spectral curves', a hyperelliptic curve with certain symmetries. We will describe how spectral curves arise, and then give a description of the space of harmonic maps whose spectral curve is genus zero or one. Emphasis will be given to specific examples, such as the Clifford torus and related surfaces of constant mean curvature.

Dhriti Patra

Ricci Solitons and Paracontact Geometry

Thursday • 14:00–15:00 • Poster

In this article, first we prove that if a metric of a para Sasakian manifold is a Ricci soliton, then either it is an Einstein (and V Killing) or a η-Einstein (and V leaves ψ-invariant) manifold. Next, we prove that if a K-paracontact metric g is a gradient Ricci soliton, then it becomes a expanding soliton which is Einstein with constant scalar curvature. Further, we study the Ricci soliton where the potential vector field V is point wise collinear with the Reeb vector field on paracontact manifold. Lastly, we consider the gradient Ricci soliton on (k, μ)-paracontact manifold.

Olga Pérez-Barral

Ruled hypersurfaces in complex space forms

Tuesday • 11:50–12:20 • Room: S1

A ruled hypersurface in a nonflat complex space form is a submanifold of real codimension one which is foliated by totally geodesic complex hypersurfaces of the ambient space. Lohnherr and Reckziegel classified ruled minimal hypersurfaces in nonflat complex space forms into three types.

In this talk I will present a joint work with Miguel Domínguez-Vázquez (to appear in Journal of Geometry and Physics) in which we have proven that ruled hypersurfaces with constant mean curvature in nonflat complex space forms are minimal. Moreover, I will give a characterization of the homogeneous ruled hypersurface in a complex hyperbolic space (the so-called Lohnherr hypersurface) as the only ruled one having constant second fundamental form. Finally, I will comment on the nonexistence of nonminimal biharmonic ruled hypersurfaces in nonflat complex space forms.

Mariusz Plaszczyk

How many are projectable classical linear connections with prescribed Ricci tensor

THURSDAY • 14:00–15:00 • POSTER

How many are projectable classical linear connections with a prescribed Ricci tensor and a prescribed trace of torsion tensor on the total space of a fibered manifold? The questions are answered in the analytic case by using the Cauchy-Kowalevski theorem. In the C^∞ case, we answer how many are classical linear connections with a prescribed Ricci tensor on a 2-dimensional manifold. In the C^∞ case, we also deduce that any 2-form on the total space of a fibered manifold with at least 2-dimensional fibres can be realized locally as the Ricci tensor of a projectable classical linear connection.

Yusuke Sakane

Einstein metrics on SU(2n)

THURSDAY • 11:15–11:45 • ROOM: S1

In 1979, D′Atri and Ziller studied left invariant Einstein metrics on the compact semi-simple Lie groups and found a lot of naturally reductive Einstein metrics. They asked whether there are non naturally reductive Einstein metrics on compact Lie groups. For this question, now we know there are non naturally reductive Einstein metrics on compact simple Lie groups, except SU(3), SU(4) and SO(5). In this talk we discuss new invariant Einstein metrics on the compact Lie group SU($2n$) ($n \geq 3$) which are not naturally reductive. We consider the compact Lie group SU($2n$) as total space over the generalized Wallach spaces SU($2n$)/U(n) and consider Ad(U(n))-invariant metrics on the Lie group SU($2n$) to obtain these invariant Einstein metrics. This talk is based on the joint work with Arvanitoyeorgos and Statha.

Hiroyasu Satoh

Volume entropy of harmonic Hadamard manifolds of hypergeometric type

THURSDAY • 11:50–12:20 • ROOM: S1

A harmonic manifold is a Riemannian manifold (X, g) whose volume density function $\sqrt{\det(g_{ij})}$, where $g_{ij} = g\left(\frac{\partial}{\partial x^i}, \frac{\partial}{\partial x^j}\right)$ are components of the Riemannian metric g with respect to a normal coordinate system $\{x_1, x_2, \ldots, x_n\}$ at an arbitrary point $o \in X$, is radial function. We defined the notion of harmonic manifolds of *hypergeometric type*, which is a class of harmonic manifolds including rank-one symmetric space of non-compact type and Damek-Ricci spaces, motivated to develop the theory of the spherical Fourier transform on harmonic manifolds by referring an idea in Anker-Damek-Yacoub(1996) and Rouvière(2003). In this talk, we show some properties of harmonic Hadamard manifold of hypergeometric type. In particular, we prove that the volume entropy Q of an n-dimensional harmonic Hadamard manifold (X, g) of hypergeometric type, normalized as $\mathrm{Ric}_g = -(n-1)g$, satisfies the inequality $\frac{2\sqrt{2}(n-1)}{3} \leq Q \leq n-1$ and the equality $Q = n-1$ holds if and only if (X, g) is the real hyperbolic space of constant sectional curvature -1. Moreover, we present some examples of harmonic Hadamard manifolds whose volume entropy equals to $\frac{2\sqrt{2}(n-1)}{3}$. This is based on joint work with Mitsuhiro Itoh.

Nikolaos Souris

The role of Cartan development in studying signatures of paths

THURSDAY • 14:00–15:00 • POSTER

The signature of a path $X : [0,1] \to \mathbb{R}^d$ is the formal series of iterated integrals of the form $\int \cdots \int_{0<t_1<\cdots<t_n<1} dX_{t_1} \cdots dX_{t_n}$. The signature of differentiable paths was studied by Chen as a tool for developing a de Rham theory for path spaces. In the non-differentiable setting, the signature has recently become an important tool in stochastic analysis, where it has been used for establishing a deterministic approach to differential equations controlled by random paths such as the Brownian motion. In this talk, we discuss the role of differential geometry in addressing central questions about the signature of (not necessarily regular) paths. More specifically, we discuss how we can recover information about a path from its signature by using the Cartan development of the path on the hyperbolic space and on the group $Sl_2\mathbb{R}$ endowed with a Lorentzian metric.

Leander Stecker

Homogeneous 3-(α, δ)***-Sasaki manifolds***

THURSDAY • 14:00–15:00 • POSTER

We discuss a recently defined class of 3-contact metric structures generalizing the 3-Sasaki case. These manifolds, called 3-(α, δ)-Sasaki manifolds, admit a connection ∇ with skew-torsion specifically adapted to their geometry. We will construct the homogeneous 3-(α, δ)-Sasaki manifolds and describe their connection ∇ and ∇-curvature operator.Joint work with Ilka Agricola (Marburg) and Giulia Dileo (Bari).

Kyoji Sugimoto

The classification of para-real forms of simple para-Hermitian symmetric spaces.

THURSDAY • 14:00–15:00 • POSTER

This presentation is based on a joint work with Takuya Shimokawa. Boumuki classified real forms of simple irreducible pseudo-Hermitian symmetric spaces in 2014. We introduce a notion of para-real forms of a para-Hermitian symmetric space. And we classified the para-real forms of absolutely simple para-Hermitian symmetric spaces of hyperbolic orbit type. We can use similar methods as those used in the classification of real forms of pseudo-Hermitian symmetric spaces.

Makiko Sumi Tanaka

Maximal antipodal sets of classical compact symmetric spaces

THURSDAY • 16:35–17:15 • ROOM: S1

A subset S of a compact Riemannian symmetric space M is called an antipodal set if it satisfies $s_x(y) = y$ for any x, y in S, where s_x denotes the geodesic symmetry at x on M. An antipodal set is finite. The maximum of the cardinalities of antipodal sets of M is called the 2-number of M, which was introduced by Chen-Nagano and they determined the 2-numbers of almost all compact irreducible Riemannian symmetric spaces. In recent years antipodal sets have been studied as interesting objects not only in differential geometry but also in symplectic geometry, combinatorics, quandle theory, and so on. Tasaki and I classified maximal antipodal subgroups of some compact classical Lie groups and their quotient groups. In this talk, I will explain the classification of maximal antipodal sets of some compact Riemannian symmetric spaces of classical type and their quotient spaces. We use nice embeddings of these symmetric spaces into compact Lie groups and our former results. This talk is based on a joint work with Hiroyuki Tasaki.

Homare Tadano

Some Compactness Theorems for Transverse Ricci Solitons on Complete Sasaki Manifolds

Thursday • 14:00–15:00 • Poster

The aim of this talk is to discuss the compactness of complete Ricci solitons. Ricci solitons were introduced by R. Hamilton in 1982 and are natural generalizations of Einstein manifolds. They correspond to self-similar solutions to the Ricci flow and often arise as singularity models of the flow. The importance of Ricci solitons was demonstrated by G. Perelman, where they played crucial roles in his affirmative resolution of the Poincaré conjecture.

In this talk, after we review basic facts on Ricci solitons, I would like to give some new compactness theorems for complete Ricci solitons. Our results generalize the compactness theorems due to W. Ambrose (1957), J. Cheeger, M. Gromov, and M. Taylor (1982), M. Fernández-López and E. García-Río (2008), M. Limoncu (2010, 2012), Z. Qian (1997), Y. Soylu (2017), G. Wei and W. Wylie (2009), and S. Zhang (2014). Moreover, I would also like to extend such compactness theorems for complete Ricci solitons to the case of transverse Ricci solitons on complete Sasaki manifolds.

Kazumi Tsukada

Quaternionic differential geometry of complex submanifolds in a quaternion projective space

Friday • 14:30–15:00 • Room: S1

We study a kind of complex submanifolds in a quaternion projective space $\mathbb{H}P^n$, which we call transversally complex submanifolds, from the viewpoint of quaternionic differential geometry. There are interesting examples of transversally complex immersions of Hermitian symmetric spaces. We treat them applying the theory of the quaternionic vector bundles. For a transversally complex immersion $f : M \to \mathbb{H}P^n$, a key notion is a Gauss map associated with f, which is a map $S : M \to \mathrm{End}(\mathbb{H}^{n+1})$ with $S^2 = -\mathrm{id}$. Another way is to use Q-connections which are torsionfree affine connections preserving the quaternionic structure.

Given a Q-connection, we can develop the usual submanifold theory in the affine differential geometry.

Our theory is an attempt of a generalization of the theory „Conformal geometry of surfaces in S^4 and quaternions" by Burstall, Ferus, Leschke, Pedit, and Pinkall ((∗) : Springer L. N. in Math. Vol.1772, 2002). Our proposal is the following:

the theory of (∗)		Its generalization
$GL(2,\mathbb{H})$-geometry of $\mathbb{H}P^1$ = Conformal geometry of S^4	⇒	$GL(n+1,\mathbb{H})$-geom. of $\mathbb{H}P^n$ = Quatern. diff. geom. of $\mathbb{H}P^n$
Riemann surfaces of $S^4 = \mathbb{H}P^1$	⇒	Half-dim. complex submfs. of $\mathbb{H}P^n$

Alberto Vázquez

A nonisoparametric hypersurface with constant principal curvatures

THURSDAY • 16:00–16:30 • ROOM: S1

A hypersurface M of a Riemannian manifold $\overline{M}$ is called isoparametric if it and all its sufficiently close (locally defined) parallel hypersurfaces have constant mean curvature. Cartan proved that a hypersurface in a Riemannian manifold of constant curvature has constant principal curvatures if and only if it is isoparametric. In fact, there are many examples of isoparametric hypersurfaces with nonconstant principal curvatures in spaces with nonconstant curvature [J. C. Díaz-Ramos, M. Domínguez-Vázquez, *Adv. Math.* (2013)]. However, it seems that there are no examples in the literature of hypersurfaces with constant principal curvatures which are not isoparametric. In this talk I will present such an example in a conformally flat (compact) manifold [A. Rodríguez-Vázquez, to appear in *Proc. Amer. Math. Soc.*].

Tomasz Zawadzki

Variations of functionals of metric on a manifold with a distribution

MONDAY • 14:30–15:00 • ROOM: S1

Several quantities that describe geometry of a distribution on a manifold, such as norms of the second fundamental form and integrability tensor, mixed scalar curvature etc., will be considered as functions of a Riemannian metric. Formulas for their variations with respect to the metric will be presented and examples of critical metrics will be given. Part of the talk is based on joint work with Vladimir Rovenski.

B. Geometric Structures and Representation Theory

Ilka Agricola

Generalizations of 3-Sasaki manifolds and connections with skew torsion

Monday • 14:00–14:40 • Room: S2

We define and investigate new classes of almost 3-contact metric manifolds, with two guiding ideas in mind: first, what geometric objects are best suited for capturing the key properties of almost 3-contact metric manifolds, and second, the newly defined classes should admit 'good' metric connections with skew torsion with interesting applications: these include a well-behaved metric cone, the existence of a generalized Killing spinor, and remarkable curvature properties. This is joint work with Giulia Dileo (Bari) and Leander Stecker (Marburg).

Dmitri Alekseevsky

Conformally flat homogeneous pseudo-Riemannian manifolds

Thursday • 16:40–17:20 • Room: S2

In a short note 1923, W.H. Brinkmann remarked that the conditions that a Riemannian manifold (M, g) is conformally flat are equivalent to Gauss- Codazzi equations for isometric embedding of the manifold as a hypersurface in the isotropic cone V_0 of the Minkowski vector space V. This result was extended by A.C.Asperti and M. Dajczer, who proved that any simply connected conformally flat Riemannian manifold can be realized as a hypersurface in V_0.

K. Honda and K. Tsukada noted that the Brinkmann result valids also in pseudo-Riemannian case. They use it for description of conformally flat pseudo-Riemannian manifolds with nilpotent Ricci operator and for classification of Lorentzian conformally flat homogeneous manifolds which satisfy some condition.

In this talk we describe some class of homogeneous conformally flat psudo-Riemannian manifolds and classify all such simply connected manifolds of Lorentz signature.

The approach is based on Brinkmann-Asperti-Dajczer theorem and Dynkin description of maximal subgroups of pseudo-orthogonal groups.

Note that the classification of homogeneous (non necessary simply connected) conformally flat Riemannian manifolds had been done in a joint paper with B.N. Kimmelfeld and classification of conformally flat Lorentzian manifolds with special holonomy was obtained by A.S. Galaev.

Aleksandra Borówka

Quaternion-Kähler manifolds near maximal fixed points sets of circle symmetries

Thursday • 16:00–16:30 • Room: S2

Quaternionic Feix-Kaledin construction gives a classification of quaternionic structures near maximal fixed point set S of rotating circle symmetries using a geometry on S: starting form a c-projective 2n-manifold S with c-projective curvature of type (1,1) together with a line bundle with a connection with curvature of type (1,1) on S one explicitly constructs a twistor space Z of a quaternionic 4n-manifold with a rotating circle symmetry such that S is a component of the fixed points set. Moreover any such quaternionic manifolds arise locally in this way. In this talk we will present an application of this results for quaternion Kähler manifolds with rotating isometries. More precisely, we will give necessary and sufficient conditions for existence of a holomorphic contact distribution on the twistor space Z encoding a compatible quaternion Kähler structure. As a consequence we will see that locally all such metrics arise as twists (using a line bundle with a connection of a special type on S) of hyperkähler metrics obtained by B. Feix on cotangent bundle. This is related to the hyperkähler/quaternion Kähler correspondence arising from the physical concept of c-map.

José Luis Carmona Jiménez

A generalization of Ambrose-Singer Theorem.

Thursday • 14:00–15:00 • Poster

In 1926, Élie Cartan gave an algebraic description of (locally) symmetric spaces, years later, in 1958 Ambrose-Singer generalized the result of Cartan for homogeneous reductive Riemannian manifolds, simply connected and complete. Finally, in 1980 the Ambrose-Singer theorem was extended by Kiricenko for Riemannian homogeneous manifolds with a geometric structure defined by tensors. All these results have a Levi-Civita metric structure. Now, we show a characterization in terms of Ambrose-Singer Theorem for simply connected homogeneous manifolds with a geometric structure defined by tensors, not necessary a Levi-Civita metric structure. This result might open a new way to study more general homogeneous manifolds. For example, symplectic homogeneous manifolds.

Francesco Cattafi

Formal integrability of geometric structures

Thursday • 9:40–10:00 • Room: S2

A Γ-structure on a manifold is a maximal atlas whose changes of coordinates take values in a Lie pseudogroup Γ on $\mathbb{R}^n$. As a special case, one can consider a Γ defined starting from a Lie subgroup $G \subseteq GL(n, \mathbb{R})$; in this case, a Γ-structure coincides with the standard notion of an integrable G-structure. For instance, for G the symplectic group, one obtains symplectic structures.

In this talk we are going to review these notions and present a new characterisation of formal integrability in the setting of Γ-structures. This will be obtained by introducing the concept of principal Pfaffian bundle and studying its prolongations to higher orders; we draw inspiration from similar results for G-structures, which we are going to recover. This is joint work with Marius Crainic.

Ioannis Chrysikos

Homogeneous space admitting invariant Spin(7)-structures

Friday • 14:00–14:30 • Room: S2

We discuss the classification of all canonical presentations of compact, simply connected, homogeneous 8-manifolds M=G/H of a compact simply connected Lie group G, admitting invariant Spin(7)-structures. For each presentation, we exhibit explicit examples of invariant Spin(7)-structures and describe their type in terms of Fernández classification. This is a joint work with D. Alekseevsky, A. Fino and A. Raffero.

Martin Doležal

Jet determination of sub-Riemannian geodesics

Thursday • 14:00–15:00 • Poster

On Riemannian manifolds, there is exactly one parameterized geodesic in each direction. This is not true on sub-Riemannian manifolds since first derivatives of geodesics belong to a distribution and all points are still achievable by geodesics. The question becomes, how many derivatives of geodesic we need for unique description of a geodesic? I will present results of my current work on this subject.

Wolfgang Globke

Rigidity of pseudo-Hermitian homogeneous spaces of finite volume

MONDAY • 17:30–18:00 • ROOM: S2

An interesting question in pseudo-Riemannian geometry is when a compact or finite-volume pseudo-Riemannian manifold can have a non-properly acting isometry group. In full generality, this is a vastly complex problem, and to make it tractable, one imposes additional constraints. Here, we investigate the case of homogeneous manifolds with compatible complex structures, that is, a pseudo-Hermitian homogeneous spaces. It turns out that the identity components of their holomorphic isomety groups is always compact. Under additional assumptions on the topology, this can be strengthened further. We also compare this situation with that of compact homogeneous symplectic manifolds and compact homogeneous pseudo-Kähler manifolds.

Jan Gregorovic

On the Beloshapka Rigidity Conjecture

THURSDAY • 10:30–10:50 • ROOM: S2

A wellknown Conjecture due to Beloshapka asserts that all totally nondegenerate polynomial models of Levi-nondegenerate CR manifolds with the length at least 3 of their Levi-Tanaka algebra are rigid, that is, any point preserving automorphism of them is completely determined by the restriction of its differential at the fixed point onto the complex tangent space. In my talk, I will present a proof of this Conjecture.

Stefan Haller

The heat kernel expansion of Rockland differential operators and applications to generic rank two distributions in dimension five

THURSDAY • 17:25–17:45 • ROOM: S2

The short-time heat kernel expansion of elliptic operators provides a link between local and global features of classical geometries. Many geometric structures related to (non-)involutive distributions can be described in terms of an underlying filtered manifold. These include contact structures, Engel manifolds, and all regular parabolic geometries. Filtered analogues of classical (elliptic) operators tend to be Rockland, hence hypoelliptic. Remarkably, the heat kernel expansion of Rockland differential operators on general filtered manifolds has the same structure as the one for elliptic operators. These results have been obtained using a recently introduced calculus of pseudodifferential operators generalizing the Heisenberg calculus. In this talk we will illustrate the aforementioned analysis by applying it to an intriguing five dimensional geometry related to the exceptional Lie group G_2.

Hideya Hashimoto

Geometrical structures on homogeneous spaces related to G_2

Thursday • 10:55–11:15 • Room: S2

We describe the geometric structures related to the Quaternionic Käahler structure on $G_2/SO(4)$ by using the structure equations obtained by Calabi and Bryant. And write down the fibre bundle structures related to a Quaternionic Käahler manifold $G_2/SO(4)$ and a Nearly Käahler manifold $G_2/SU(3)$ which are controlled by the Twistor space $G_2/U(2)_-$. Mainly, we describe the Twistor space $G_2/U(2)_+$ over Quaternionic Käahler manifold $G_2/SO(4)$. Also we give the 3-Sasakian structure on $G_2/SU(2)_{\mathrm{II}}$ related to $G_2/SO(4)$ and its cone.

Denis Husadzic

Singular BGG complexes over isotropic 2-Grassmannian

Thursday • 14:00–15:00 • Poster

We construct exact sequences of invariant differential operators acting on sections of certain homogeneous vector bundles in singular infinitesimal character, over the isotropic 2-Grassmannian. This space is equal to G/P, where G is $\mathrm{Sp}(2n, \mathbb{C})$, and P its standard parabolic subgroup having the Levi factor $\mathrm{GL}(2, \mathbb{C}) \times \mathrm{Sp}(2n-4, \mathbb{C})$. The constructed sequences are analogues of the Bernstein-Gelfand-Gelfand resolutions. We do this by considering the Penrose transform over an appropriate double fibration. The result differs from the Hermitian situation. Joint work with Rafael Mrdjen.

Yasmina Khellaf

An algorithmic method to study some geometric objects with Mathematica

Thursday • 14:00–15:00 • Poster

Suppose X and Y are two vector fields on Euclidean n-space. For various reasons, for example occurring in the theory of sub-Riemannian geometry and sub-elliptic operators, we would like to compute the commutator $[X^2, Y^2]$ of the squared operators X^2 and Y^2. We present an improvement over the naive computation and its implementation in Mathematica. The improved procedure will be illustrated with some geometrically natural examples.

Boris Kruglikov

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part III.

MONDAY • 16:40–17:20 • ROOM: S2

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part III: Deformation. Abstract: We realize the simple Lie superalgebra G(3) as supersymmetry of various geometric structures, most importantly super-versions of the Hilbert–Cartan equation and Cartan's involutive PDE system that exhibit G(2) symmetry. We provide symmetries explicitly and compute, via the Spencer cohomology groups, the Tanaka–Weisfeiler prolongation of the negatively graded Lie superalgebras associated with two particular choices of parabolics. We explicitly discuss curved models of non-holonomic superdistributions with growth vector $(2|4, 1|2, 2|0)$, obtained as super-deformations of submaximally symmetric models of rank 2 distributions in a 5-dimensional space. The second Spencer cohomology group gives a binary quadric, thereby providing a "square-root" of Cartan's classical binary quartic invariant for (2,3,5)-distributions.

This is part III of the series of lectures joint with Andrea Santi and Dennis The. It is focused on deformation aspects.

Svatopluk Krýsl

Elliptic Operators and Homogeneous spaces

THURSDAY • 11:20–11:40 • ROOM: S2

We give a description of the cohomology of elliptic complexes on homogeneous Hilbert bundles over homogeneous spaces.

Marius Kuhrt

Spinorial description of almost contact metric manifolds

THURSDAY • 14:00–15:00 • POSTER

Given an almost contact metric spin manifold $(M^{2k+1}, g, \varphi, \xi)$ we associate to it a two dimensional subbundle $E \subset \Sigma M$ of the spinor bundle. A large subclass of almost contact metric manifolds can be described by the study of the sections of E, the so called characteristic spinors. This generalizes the well known correspondence between Killing spinors and Einstein-Sasakian manifolds on odd dimensional manifolds. Furthermore in dimension 7 we give a construction of almost contact metric manifolds given a suitable two dimensional subbundle of ΣM.

Joint work with Ilka Agricola (Marburg).

Tianyu Ma

Geodesic rigidity of Levi-Civita connections admitting essential projective vector fields

Thursday • 14:00–15:00 • Poster

We prove a connected 3-dimensional Riemannian manifold or a closed connected semi-Riemannian manifold $M^n (n > 1)$ admitting a projective vector field with a non-linearizable singularity is projectively flat.

Hristo Manev

Almost hypercomplex manifolds with Hermitian-Norden metrics and 4-dimensional indecomposable real Lie algebras depending on two parameters

Thursday • 14:00–15:00 • Poster

The object of investigations are almost hypercomplex structure with Hermitian-Norden metrics on 4-dimensional Lie groups considered as smooth manifolds. There are studied both the basic classes of a classification of 4-dimensional indecomposable real Lie algebras depending on two parameters. Some geometric characteristics of the respective almost hypercomplex manifolds with Hermitian-Norden metrics are obtained.

Mancho Manev

On Manifolds with Almost Hypercomplex Structures and Hermitian-Norden Metrics

Thursday • 11:45–12:05 • Room: S2

The report provides an overview of the author's latest results on this topic. In the beginning, some facts are given concerning almost hypercomplex manifolds with Hermitian-Norden metrics known from papers of the author and collaborators. Next, integrable hypercomplex structures with Hermitian-Norden metrics on Lie groups of dimension 4 are considered. The corresponding five types of invariant hypercomplex structures with Hermitian-Norden metric are constructed. The different cases regarding the signature of the basic pseudo-Riemannian metric are considered. Further, the tangent bundles of an almost Norden manifold and the diagonal (resp. complete) lift of the Norden metric are considered as a $4n$-dimensional manifold. It is equipped with an almost hypercomplex Hermitian-Norden structure and characterized geometrically. On the other hand, it is introduced an associated Nijenhuis tensor of endomorphisms in the tangent bundle of a considered manifold. There are studied relations between the six associated Nijenhuis tensors of an almost hypercomplex structure as well as their vanishing. It is given a geometric interpretation of these tensors for an almost hypercomplex structure and Hermitian-Norden metrics. Finally, an appropriate example is given. Next, quaternionic Käahler manifolds corresponding to almost hypercomplex manifolds with Hermitian-Norden metrics are considered. Some necessary and sufficient conditions for the studied manifolds to be isotropic hyper-Käahlerian and flat are found. The class of the non-hyper-Käahler quaternionic Käahler manifold of the considered type is determined. Finally, some results are given for two natural connections with parallel torsion on the studied manifolds belonging to different basic classes.

Katharina Neusser

Projective geometry of Sasaki-Einstein structures

Friday • 14:35–15:05 • Room: S2

This talk will be concerned with Sasaki manifolds, which can be characterized as (pseudo-)Riemannian manifolds whose metric cone is Kähler. We will show that Sasaki manifolds admit a natural description in terms of projective differential geometry. In particular, we will see that Sasaki-Einstein manifolds may be characterized as projective manifolds equipped with certain unitary holonomy reductions of their canonical Cartan connections. This characterization will also allow us to describe a natural geometric compactification of complete non-compact (indefinite) Sasaki-Einstein manifolds. This talk is based on joint work with Rod Gover and Travis Willse.

Misa Ohashi

Fibre bundle structures on homogeneous spaces related to $Spin(6)$

Thursday • 14:00–15:00 • Poster

The purpose of this talk is to give some fibre bundle structures related to the spinor group $Spin(6)$ which is a double covering group of the special orthogonal group $SO(6)$. The spinor group $Spin(6)$ is isomorphic to the special unitary group $SU(4)$. We give explicit representation of this isomorphism by using the action of $Spin(7)$ to Cayley algebra. From this representation, we obtain some fibre bundle structures on some homogeneous spaces related to $Spin(6)$. One of them is an $SO(4)$-bundle over Grassmaniann manifold $\mathrm{Gr}_3^+(\mathbb{R}^6) \cong SO(6)/(SO(3) \times SO(3)) \cong Spin(6)/SO(4) \cong SU(4)/SO(4)$. Other is $Spin(5)$-bundle over $S^5 \cong SO(6)/SO(5) \cong Spin(6)/Spin(5) \cong SU(4)/Sp(2)$. From these structures, we give the relationship between the non-flat totally geodesic surface in $Spin(6)/SO(4)$ and such surface in $Sp(2)/U(2) \cong Spin(5)/U(2)$.

Katja Sagerschnig

On the An-Nurowski twistor construction

FRIDAY • 15:10–15:40 • ROOM: S2

Daniel An and Paweł Nurowski recast the construction of $(2,3,5)$ distributions on configuration spaces of two rolling bodies in terms of 4-dimensional split-signature conformal geometry. From this point of view, the construction is familiar from twistor theory. In this talk we attempt to answer the question which $(2,3,5)$ distributions arise via the An-Nurowski construction from 4-dimensional conformal structures. This leads us to observations about the geometries involved in the construction, which are of independent interest. The talk is based on joint work with Michael Eastwood and Dennis The.

Andrea Santi

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part I.

MONDAY • 14:50–15:20 • ROOM: S2

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part I: Algebra. Abstract: We realize the simple Lie superalgebra G(3) as supersymmetry of various geometric structures, most importantly super-versions of the Hilbert–Cartan equation and Cartan's involutive PDE system that exhibit G(2) symmetry. We provide symmetries explicitly and compute, via the Spencer cohomology groups, the Tanaka–Weisfeiler prolongation of the negatively graded Lie superalgebras associated with two particular choices of parabolics. We explicitly discuss curved models of non-holonomic superdistributions with growth vector $(2|4, 1|2, 2|0)$, obtained as super-deformations of submaximally symmetric models of rank 2 distributions in a 5-dimensional space. The second Spencer cohomology group gives a binary quadric, thereby providing a "square-root" of Cartan's classical binary quartic invariant for (2,3,5)-distributions.

This is part I of the series of lectures joint with Boris Kruglikov and Dennis The. It is focused on algebraic aspects.

Josef Šilhan

Symmetries of conformal overdetermined operators

Friday • 16:00–16:30 • Room: S2

Symmetries of a differential operator F are basically differential operators which preserve the null space of F. Such symmetries were studied particularly for physically important operators such as the Laplace or the Dirac. In fact, these operators are in suitable sense conformally invariant, which plays an essential role in the study of their symmetries. We shall focus on symmetries of basic conformal overdetermined operators. Specifically, we shall consider the case when F is the twistor operator and also the operator which controls existence of Einstein metrics in the conformal class. First we consider the locally flat case when the space of nontrivial symmetries is finite dimensional; then we shall discuss curvature obstructions for curved symmetries.

Dennis The

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part II

Monday • 16:00–16:30 • Room: S2

G(3) supergeometry and a supersymmetric extension of the Hilbert-Cartan equation. Part II: Geometry. Abstract: We realize the simple Lie superalgebra G(3) as supersymmetry of various geometric structures, most importantly super-versions of the Hilbert–Cartan equation and Cartan's involutive PDE system that exhibit G(2) symmetry. We provide symmetries explicitly and compute, via the Spencer cohomology groups, the Tanaka–Weisfeiler prolongation of the negatively graded Lie superalgebras associated with two particular choices of parabolics. We explicitly discuss curved models of non-holonomic superdistributions with growth vector $(2|4, 1|2, 2|0)$, obtained as super-deformations of submaximally symmetric models of rank 2 distributions in a 5-dimensional space. The second Spencer cohomology group gives a binary quadric, thereby providing a "square-root" of Cartan's classical binary quartic invariant for (2,3,5)-distributions.

This is part II of the series of lectures joint with Boris Kruglikov and Andrea Santi. It is focused on geometric aspects.

Vit Tucek

BGG sequences from infinite-rank bundles

THURSDAY • 14:00–15:00 • POSTER

BGG sequences are sequences of differential operators acting between section of vector bundles associated to any Cartan geometry modeled on G/P with $P \leq G$ parabolic subgroup and a finite-dimensional representation V of the semisimple Lie group G. All BGG operators are overdetermined with dimension of the kernel bounded by the dimension of V. I will present a generalization of Calderbank-Diemer construction that in particular works for bundles whose fiber is (formal completion of) unitarizable highest weight module. The resulting operators still satisfy curve $\mathcal{A}_\infty$ relations. Unitarizable highest weight modules were classified in the eitghties and exists only when G/P is Hermitian symmetric space. As interesting examples one obtains Yamabe and Dirac operator.

Luca Vitagliano

Homogeneous G-Structures

THURSDAY • 15:00–15:30 • ROOM: S2

The theory of G-structures serves as a unified framework for a large class of geometric structures, including symplectic, complex and Riemannian structures, as well as foliations and many others. Surprisingly, contact geometry - the „odd-dimensional counterpart" of symplectic geometry - does not fit naturally into this picture. In this talk, we introduce the notion of a homogeneous G-structure, encompassing contact structures as integrable instances, as well as some other interesting examples that appear in the literature. This is joint work with A. Tortorella, and O. Yudilevich.

Henrik Winther

Almost Quaternion Symplectic Structures

THURSDAY • 12:10–12:30 • ROOM: S2

Let (M, Q) be an almost quaternionic manifold. The space of two-forms $\Omega^2(M)$ decomposes into two invariant complementary sub-bundles by the quaternionic structure group. One of these bundles is characterized by being trivial as an $Sp(1)$-module, and we will say that its sections are of scalar type. An almost quaternion symplectic structure is then an almost quaternionic manifold equipped with a non-degenerate two-form of scalar type. This is equivalent to a G-structure reduction to $G = Sp(1)SO^*(2n)$. We will discuss properties of such structures, sources of examples, and their differential geometry, in particular differential invariants. Joint work with I. Chrysikos.

Vojtěch Žádník

Geometry of curves via tractors

THURSDAY • 14:00–15:00 • POSTER

We study geometric invariants of curves in parabolic geometries using tractor calculus. With several concrete illustrations we show some typical constructs and underline remarkable similarities for otherwise hardly comparable situations. Based on the joint work with Josef Šilhan.

Lenka Zalabová

Special Metric and Scales in Parabolic Geometry

FRIDAY • 16:40–17:10 • ROOM: S2

Conformal circles form a distinguished class of curves that are invariantly defined by the conformal structure. In general, one needs to know an initial direction and acceleration to determine a conformal circle. Then it is natural to ask the question of whether there is a metric in the conformal class so that all its geodesics are conformal circles. We discuss this question using methods that can be applied to general parabolic geometry and we generalize our method to CR geometries and Lagrangian contact geometries. This is a joint work with M. Eastwood.

Igor Zelenko

Uniformly degenerated CR structures and geometry of pairs of submanifolds in Lagrangian Grassmannians.

THURSDAY • 9:00–9:40 • ROOM: S2

The talk is devoted to the description of the method of construction of absolute parallelism for 2 (and higher)-nondegenerate uniformly degenerate CR structure via the passage to special geometries on space of leaves corresponding to Levi kernels (in the complexified picture): this space of leaves is endowed with the contact distribution and in the Lagrangian Grassmannian of each fiber a pair of submanifolds (of the dimension equal to the dimension of the Levi kernel) is given. This method is an alternative to our previous one (with C. Porter) which used the bigraded analog of the Tanaka prolongation. It gives a new interesting point of view on the notion of regular symbols and allows us to treat simultaneously both regular and nonregular symbols as well as much more general cases (of higher nondegeneracy) than in the previous methods. The talk is based on the joint work with B. Doubrov and D. Sykes.

Petr Zima

Generalizations of Killing spinors

Thursday • 14:00–15:00 • Poster

Generalized Killing spinors are solutions of a first order system of PDEs which generalizes the Killing spinors by replacing the Killing number with a symmetric endomorphism field which can have more distinct eigenvalues. The eigendistributions of the endomorphism field can be viewed as part of an additional special Riemannian structure and in this sense the equations are not invariant with respect to the spin-Riemannian structure alone.

We introduce another generalization of Killing spinors given by a second order system which is invariant. We compare these two notions and in particular show that the so called canonical spinor of a 3-Sasakian manifold which is an example of generalized Killing spinor is also a solution of our second order equations. We also suggest further generalizations of higher order which can be of interest for future research.

C. Geometry and Physics

Sergey Agafonov

Duality for systems of conservation laws

Friday • 15:10–15:40 • Room: S7

For any one-dimensional system of conservation laws admitting at least 2 additional conservation laws, we define a dual system, describe the properties of thus introduced duality, and present some relevant examples, in particular, Hamiltonian systems and systems of Temple class.

Markus Dafinger

Existence of a Variational Principle for PDEs with Symmetries and Current Conservation

Tuesday • 9:30–10:00 • Room: S2

We prove that under certain assumptions a partial differential equation can be derived from a variational principle. It is well-known from

Noether's theorem that symmetries of a variational functional lead to conservation laws of the corresponding Euler-Lagrange equation. We reverse this statement and prove that a differential equation which satisfies sufficiently many symmetries and corresponding conservation laws leads to a variational functional whose Euler-Lagrange equation is the given differential equation.

Mastooreh Farahmandy Motlagh

Solution of the Einstein equation based on physician metrics

FRIDAY • 16:00–16:30 • ROOM: S7

In this paper, we have some notes about anstaz of the Schwarzschild and Friedmann- Robertson- Walker (FRW) metrics. First of all, we suppose condition $d\log(F) = d\log(\bar{F})$ and we obtain $\bar{F}$ is constant along its geodesic and geodesic of F.Moreover we compute Weyl and Douglas tensors for F^2 and conclude that $R_{ijk} = 0$ and this conclude that $W_{ijk} = 0$, thus F^2 is the Ads Schwarzschild Finsler metric and therefore F^2 is conformally flat.We provide a Finslerian extention of Friedmann- Lemaitre- Robertson- Walker metric based on solution of the geodesic equation.Since the vacuum field equation in Finsler spacetime is equivalent to the vanishing of the Ricci scalar, we obtain the energy- momentum tensor is zero.

Jordi Gaset Rifà

Geometric equivalence and symmetries in field theories: the gravitational case

TUESDAY • 11:00–11:30 • ROOM: S2

In General Relativity there is several models and geometric formulations which describe the same physical phenomenology. The discussion about the relation of this models and in what sense they are equivalent can be traced back to the early works of Einstein. The gravitational case will be used as an example to explore the equivalence of field theories from a multisymplectic point of view. This property is related to the symmetries and gauge freedom of the systems. The equivalence between the models of Einstein-Hilbert and Einstein-Palatini will be presented in detail.

Xavier Gràcia

Contact geometry and Hamiltonian field theory

FRIDAY • 14:00–14:30 • ROOM: S7

We present a geometric framework that allows to introduce dissipation terms in Hamiltonian field theories. It is based on the notions of k-contact structure and k-contact Hamiltonian system, and is a generalisation of both the contact Hamiltonian systems in mechanics and the k-symplectic Hamiltonian systems in field theory. Two relevant applications are the damped vibrating string and Burgers' equation.

Sandor Balint Hajdu

Jacobi fields for second-order differential equations with symmetry

Thursday • 14:00–15:00 • Poster

We study stability properties of relative equilibria, for systems of second-order ordinary differential equations (SODE) with symmetry. First, we recall a generalization to SODEs of the notion of a Jacobi field. Then, we investigate certain stability aspects of equilibrium points of the reduced dynamical system by means of an analysis of the Jacobi endomorphism.

Kamran Khan

Biwarped product submanifolds of complex space forms

Thursday • 14:00–15:00 • Poster

The class of biwarped product manifolds is a generalized class of product manifolds and a special case of multiply warped product manifolds. In this article, biwarped product submanifolds of the type $N_T \times_{\psi_1} N_\perp \times_{\psi_2} N_\theta$ embedded in the complex space forms are studied. Some characterizing inequalities for the existence of such type of submanifolds are derived. Moreover, we also estimate the squared norm of the second fundamental form in terms of the warping function and the slant function. This inequality generalizes the result obtained by B. Y. Chen. By the application of derived inequality, we compute the Dirichlet energies of the warping functions involved. A non-trivial example of these warped product submanifolds is provided.

Igor Khavkine

Conformal Killing Initial Data

Tuesday • 11:35–12:05 • Room: S2

We find necessary and sufficient conditions ensuring that the vacuum development of an initial data set of the Einstein's field equations admits a conformal Killing vector. We refer to these conditions as conformal

Killing initial data (CKID) and they extend the well-known Killing initial data that have been known for a long time. The procedure used to find the CKID is a classical argument based on the computation of a suitable propagation identity. The propagation identity is valid in any pseudo-Riemannian signature. In Lorentzian signature it involves hyperbolic operators, while in Riemannian it involves elliptic ones, which may be of independent interest. (Based on arXiv:1905.01231, with A. García-Parrado.)

Radosław Kycia

Integrability of geodesics of totally geodesic metrics

Tuesday • 12:05–12:35 • Room: S2

Analysis of the geodesics in the space of signature (1,3) that splits in two-dimensional distributions resulting from the Weyl tensor eignespaces - hyperbolic and elliptic ones will be presented. Similar model of General Theory of Relativity coupled to Electromagnetism will be explained. Analysis of geodesic integrability will be outlined. This will be the brief overview of the manuscript [1].

[1] Kycia R.A., Ułan M. (2019) Integrability of Geodesics of Totally Geodesic Metrics. In: Kycia R., Ułan M., Schneider E. (eds) Nonlinear PDEs, Their Geometry, and Applications. Tutorials, Schools, and Workshops in the Mathematical Sciences. Birkhäuser, Cham.

Jana Musilová, Olga Rossi and Michal Čech

Classification of symmetries of non-holonomic mechanical systems

Thursday • 14:00–15:00 • Poster

Various types of symmetries of non-holonomic mechanical systems are considered, as e.g. Noetherian type symmetries, symmetries of the canonical distribution (the distribution playing a key role in non-holonomic mechanics), symmetries of equations of motion, etc. Some results of current studies concerning the classification of symmetries of non-holonomic systems are presented. An illustrative example is shown from the point of view of (Noetherian) symmetries: a relativistic particle moving in magnetic field.

Enrico Pagani

Constrained calculus of variations for piecewise differentiable sections: first and second variation.

Tuesday • 10:30–11:00 • Room: S2

A geometric setup for constrained variational calculus is presented. The analysis deals with the study of the extremals of an action functional defined on piecewise differentiable sections, subject to differentiable, nonholonomic constraints. A covariant representation of the second variation, based on a family of local gauge transformations of the original Lagrangian will be proposed. The necessity of pursuing a local adaptation process, rather than the global one in absence of corners, is seen to depend on the value of certain attributes of the extremaloid, called the corners' strengths. Necessary and sufficient conditions for minimality of an extremaloid are proved and an example is exhibited.

References: * E. Massa, G. Luria, E. Pagani, Geometric constrained variational calculus. III: The second variation (Part II), Int. J. Geom. Methods Mod. Phys. Vol. 13 (2016) 1650038-1-39 * E. Massa, E. Pagani, On the notion of Jacobi fields in constrained calculus of variations, Communications in Mathematics 24 (2016) 91-113 * E. Massa, E. Pagani, Deformation of piecewise differentiable curves in constrained variational calculus, Differential Geometry and its Applications 54 (2017) 298-313

Marcella Palese

Higher variations and conservation laws; with applications to a Yang-Mills theory on a Minkowskian background

Tuesday • 9:00–9:30 • Room: S2

We investigate the relation between Jacobi fields, symmetries of higher variations and conserved currents; in particular we prove that a pair of Jacobi fields always generates a (weakly) conserved current. Applications to a Yang-Mills theory on a Minkowskian background are given. Joint work with L. Accornero.

Xavier Rivas

Symmetries and dissipation in contact mechanics

Thursday • 14:00–15:00 • Poster

Contact geometry allows to describe mechanical systems with dissipation, both in the Hamiltonian and Lagrangian formulations. For these kinds of systems, the concepts of symmetries and their associated dissipation laws are introduced and developed. Some interesting examples are discussed.

Luca Schiavone

Evolutionary equations and constraints

THURSDAY • 14:00–15:00 • POSTER

Maxwell equations describe the dynamical content of Classical Electrodynamics. They split into a set of evolutionary equations and a set of equations that do not involve time derivatives. The latter represent only a constraint on the Cauchy data for the former ones. Given a notion of reference frame over the Spacetime, M, in terms of a particular 1-1 tensor field, it is possible to obtain original formulation of Maxwell equations starting with the (Poincare) covariant formulation given in terms of two differential 2-forms, F and G, over M obeying $dF = 0$ and $dG = I$, I being a differential 3-form containing sources of the Electromagnetic field. This shows that the splitting of the equations of motion in terms of evolutionary and constraint ones depends on the reference frame. What is a constraint equation in a reference frame may appear as a combination of constraints and evolutionary equations in another one. A natural question arises. Is it possible to obtain the full set of equations of motion only starting with constraints considered in a sufficient set of reference frames? The answer we give is in the affirmative provided we consider all reference frames connected to a fiducial one by means of a Poincare transformation. Even if a proof using coordinates on M is possible, we use an intrinsic approach which places more emphasis on the geometrical structures involved. In particular, from the mathematical point of view, what will emerge is that the closure of differential forms on the leaves of a certain number of foliations of M, implies the closure of differential forms over the whole M. From the Physical point of view this allows to show that a covariantization (under the Poincare group) of constraint equations gives rise to all Maxwell equations.

Eivind Schneider

Differential invariants of Kundt waves

FRIDAY • 16:35–17:05 • ROOM: S7

Kundt waves are special Lorentzian spacetimes with vanishing polynomial scalar curvature invariants, meaning that they cannot be distinguished by the "normal methods". We start with the four-dimensional Kundt waves written down in special coordinates so that their metric takes a particularly simple form, depending on one function of three variables. Then we solve the equivalence problem for metrics of this form by computing generators for the algebra of rational differential invariants under the Lie pseudogroup preserving the form of the metric.

We show that the algebra of differential invariants is generated by three differential invariants and three invariant derivations. Joint work with Boris Kruglikov and David McNutt.

Dana Smetanová

Higher Order Hamiltonian Systems with Generalized Legendre Transformation

Friday • 14:35–15:05 • Room: S7

The aim of this talk is to report some recent results regarding second order Lagrangians corresponding to 2nd and 3rd order Euler-Lagrange forms. The associated Hamiltonian systems are found. The generalized Legendre transformation and geometrical correspondence between solutions of the Hamilton equations and the Euler-Lagrange equations are studied. The theory is illustrated on examples.

Radek Suchánek

Cartan Gravity and Tractor Calculus

Thursday • 14:00–15:00 • Poster

One of the main aims of the theory called Cartan gravity, introduced by Westman and Zlosnik in 2012, is to reduce differences in the mathematical description of gravity and other fundamental forces and thus provide a possible framework for their unification. The description of gravity as a Yang-Mills gauge theory is formulated in the following way. The gauge field is a connection 1-form with values in the Lie algebra of $\mathrm{SO}(1,4)$ or $\mathrm{SO}(2,3)$. Such an approach was already considered by Mansouri and MacDowell in 1977 in their Unified theory of gravity and supergravity. It enables one to encapsulate both variables of the more standard approaches such as Palatini formulation, i.e. connection form and soldering form, into one object transforming as a gauge field. Moreover, the symmetry group of Cartan gravity is chosen to contain $\mathrm{SO}(1,3)$ as a subgroup. Then, a spontaneous symmetry breaking can be considered having $\mathrm{SO}(1,3)$ as the remnant group of symmetries. The coupling to matter fields is done via the gauge prescription using the covariant derivative. Moreover, the geometrical approach utilizes Cartan's idea of attaching a model space to a spacetime manifold and tracking the movement without slipping of the model space along the spacetime.

Our aim is to employ the tractor calculus which might be a promising tool to provide computational simplifications and clarity in the geometrical setup of Cartan gravity.

D. Finsler Geometry

Pavel Andreev

Quasihyperbolic Randers spaces

Thursday • 16:00–16:30 • Room: S7

The notion of quasihiperbolic spaces was introduced by H.Busemann as a generalization of Lobachevskii space to Finsler geometry. We apply the Busemann's definition to the case of Randers space, describe the geodesics of quasihypebolic Randers space and some other geometric objects.

Zdeněk Dušek

Homogeneous geodesics in homogeneous Finsler manifolds

Tuesday • 16:45–17:15 • Room: S2

Recent results about homogeneous geodesics in homogeneous Finsler manifolds will be discussed. Namely, the existence of homogeneous geodesics in homogeneous Finsler manifolds and the structure of homogeneous geodesics in some Finsler g.o. spaces. The work is in progress.

Julius Lang

Three results on the projective geometry of Finsler surfaces

Tuesday • 14:50–15:30 • Room: S2

Two Finsler metrics having the same geodesics up to orientation preserving reparametrization, are called projectively equivalent. A trivial example are metrics obtained from each other by a scaling constant and addition of a closed 1-form. I prove that on a closed surface of genus at least two, this is the only possibility how two analytical Finsler metrics can be projectively equivalent.

A vector field is called projective for a Finsler metric F, if the pushforward along its flow preserves the projective class of the metric. The set of projective vector fields forms a finite-dimensional Lie algebra, whose maximal dimension (if $\dim M = 2$) is 8 and submaximal 3. I give a description of the geodesics in the submaximal case.

Finally (depending on time), a projective transformation is a map, that takes each geodesic of a Finsler metric to some geodesic of another metric. I prove that such a map between surfaces must automatically be as smooth as the two systems of geodesics are. For higher dimension, this is a result by F. Brickell from 1965.

Zoltán Muzsnay

On the holonomy of Finsler manifolds

Tuesday • 16:00–16:40 • Room: S2

The holonomy group of a Riemannian or Finslerian manifold can be introduced in a very natural way: it is the group generated by parallel translations along loops. Riemannian holonomy groups have been extensively studied and by now, their complete classification is known. On Finslerian holonomy, however, only a few results are known and they show, that it can be essentially different from the Riemannian one. We present how the holonomy algebra, the curvature algebra, and the infinitesimal holonomy algebra can be used to obtain information about the holonomy group. We discuss various new results showing that even in the case when the geodesic structure is simple, the holonomy group can still be a very large, infinite-dimensional group.

Samaneh Saberali

Conformally related Douglas metrics are Randers

Thursday • 14:00–15:00 • Poster

A Finsler metric F is called Douglas, if there exists an affine connection $\Gamma = (\Gamma^i_{jk})$ such that each geodesic of F, after some re-parameterisation, is a geodesic of Γ. We assume w.l.o.g. that Γ is torsion free. Partition of unity argument shows that the existence of such a connection locally, in a neighborhood of any point, implies its existence globally. Prominent examples of Douglas metrics are Riemannian metrics (in this as Γ we can take the Levi-Civita connection), Berwald metrics (in this case as Γ we can take the associated connection) and locally projectively flat metrics (in this case, in the local coordinates such that the geodesics are straight lines one can take $\Gamma \equiv 0$). In the present paper we study the following question: can two conformally related Finsler metrics F and $\sigma(x)F$ be both Douglas? We do not require that the connection Γ is the same for both metrics, in fact, two conformally equivalent metrics cannot have the same (unparameterized) geodesics unless the conformal coefficient is constant. Of course two conformally related Riemannian metrics are both Douglas.

Bin Shen

On variation of action integral in Finsler gravity

TUESDAY • 14:00–14:30 • ROOM: S2

In this talk, a generalized action integral of both gravity and matter is defined on the sphere bundle over Finsler space-time manifold M with a Lorentz-Finsler metric. The Euler-Lagrange equation of this functional, a generalization of the Riemann-Einstein gravity equation is obtained by using some divergence theorems. Fibres of the sphere bundle are unbounded according to the pseudo-Finsler metric. Moreover, solutions of vacuum Finsler gravity equation under the weakly Landsberg condition are discussed and some concrete examples are provided. At last, we raise some questions for further study.

Tayebeh Tabatabaeifar

On Generalized Douglas-Weyl Randers Metrics

THURSDAY • 15:00–15:30 • ROOM: S7

We characterize generalized Douglas-Weyl Randers metric $F = \alpha + \beta$ in terms of its Zermelo navigation data (h, W). Then, we study the Randers metric induced by some important classes of almost contact metrics. Furthermore, we construct a family of generalized Douglas-Weyl Randers metrics which are not R-quadratic. We show that the Randers metric induced by a Kenmotsu manifold is a Douglas metric which is not of isotropic S-curvature. We also prove that the Randers metric induced by a Kenmotsu or Sasakian manifold is not Einsteinian.

Bankteshwar Tiwari

Structures on Finsler manifolds in presence of convex functions

TUESDAY • 17:20–17:50 • ROOM: S2

The metric, topological and differential structures of Riemannian manifold in the presence of convex functions have been actively studied in second half of 20th century, while their simple generalizations to Finsler case is not very trivial because of non-symmetric property of distance function. In the present talk we discuss some of the results generalized to Finsler case.

Pavel Holba

Coverings and nonlocal symmetries of two-dimensional differential equations

Tuesday • 15:00–15:30 • Room: S6

In [1,2] we studied the Lie algebras of nonlocal symmetries of some 2D reductions of the universal hierarchy equation, the rdDym equation and the 3D Pavlov equation in one possible reduced covering for each 2D equation. In this talk we will discuss different reduced coverings of the 2D equations in question and present the nonlocal symmetries in these new coverings.

[1] Holba, P., Krasil'shchik, I. S., Morozov, O. I., & Vojčák, P. (2017). 2D reductions of the equation $u_{yy} = u_{tx} + u_y u_{xx} - u_x u_{xy}$ and their nonlocal symmetries. *Journal of Nonlinear Mathematical Physics*, 24(sup1), 36-47.
[2] Holba, P., Krasil'shchik, I. S., Morozov, O. I., & Vojčák, P. (2018). Reductions of the Universal Hierarchy and rdDym Equations and Their Symmetry Properties. *Lobachevskii Journal of Mathematics*, 39(5), 673-681.

Nina Khor'kova

On exact solutions of the $k - \varepsilon$ turbulence model

Tuesday • 16:45–17:25 • Room: S6

Within the framework of the geometric theory of PDE, I will discuss methods of finding of exact solutions for partial differential equations with more than two independent variables.

Iosif Krasil'shchik

Nonlocal Schouten and Nijenhuis brackets

Monday • 15:00–15:30 • Room: L1

Joint talk with A. Verbovetsky.

Alexey Samokhin

Nonlinear waves in a layered medium

Tuesday • 13:45–14:25 • Room: S6

We use the KdV-B equation $u_t = f(x)u_{xx} + 2uu_x + u_{xxx}$ to model a behavior of the soliton which, while moving in non-dissipative medium encounters a barrier with dissipation. The modelling included the case of a finite width dissipative layer as well as a wave passing from a non-dissipative layer into a dissipative one. Other interactions of nonlinear waves for this equation are also described.

Artur Sergyeyev

Integrable (3+1)-dimensional systems from contact geometry

TUESDAY • 16:00–16:40 • ROOM: S6

The search for integrable partial differential systems in four independent variables is a longstanding problem of mathematical physics. In the present talk we address this problem and show that such systems are significantly less exceptional than it appeared before: in addition to a few previously known examples like the (anti)self-dual Yang-Mills equations there is a large entirely new class of integrable (3+1)-dimensional systems with Lax pairs of a novel kind related to contact vector fields. In particular, we present explicit form for two infinite families of integrable (3+1)-dimensional systems from this class along with their Lax pairs. For further details please see A. Sergyeyev, Lett. Math. Phys. 108 (2018), no. 2, 359-376, arXiv:1401.2122.

Jakub Vašíček

Symmetries and conservation laws for a generalization of Kawahara equation

TUESDAY • 14:30–15:00 • ROOM: S6

We give a complete classification of generalized and formal symmetries and local conservation laws for a nonlinear evolution equation which generalizes the Kawahara equation having important applications in the study of plasma waves and capillary-gravity water waves. In particular, we show that the equation under study admits no genuinely generalized symmetries and has only finitely many local conservation laws, and thus this equation is not symmetry integrable.

Alexander Verbovetsky

Nonlocal Schouten and Nijenhuis brackets

TUESDAY • 17:30–18:10 • ROOM: S6

In this talk, we discuss a geometric approach to nonlocal Schouten and Nijenhuis brackets on differential equations. We look at Hamiltonian and recursion operators, Magri scheme, comparison with the Dirac structures. This is joint work with Joseph Krasil'shchik.

F. Applied and Computational Differential Geometry and Topology

Yaroslav Bazaikin

Topological Analysis of 3D Seismic Diffraction Images and Characterization of Fractured Zones

Thursday • 17:10–17:40 • Room: S6

A merge tree approach is suggested for topological analysis of 3D diffraction images. Filtration of 3D domain by excursion sets which correspond to seismic amplitude field is considered. Merge tree is constructed via this filtration and collects in addition basic information on geometrical properties of connected components on each filtration level. Accurate analysis of the merge tree including developing special methods of noise elimination provides workflow for recovery of fracture network characteristics from seismic data. Numerical examples with synthetic and real models demonstrate detailed, reliable reconstruction of the characteristics of the fracture corridors. This is a joint work with M. Protasov, T. Khachkova and D. Kolyukhin.

Hong Van Le

Bayesian nonparametrics over complete Riemannian manifolds

Thursday • 16:00–16:30 • Room: S6

Bayesian modelling is the most simple and elegant framework of probabilistic approach to modelling in sciences and engineering. Nowadays most advanced methods in Bayesian modelling utilize Bayesian nonparametrics that considers a prior measure on the space of probability measures over a measurable space. In this talk I shall present a categorical approach to Bayesian nonparametrics over complete Riemannian manifolds. In particular I shall present a new formula for posterior distributions over a subset in a complete Riemannian manifold and a new categorical proof of the existence of Dirichlet measures over any measurable space. This is based on a joint work with Jürgen Jost, Duc Hoang Luu and Tat Dat Tran (arXiv:1905.11448).

Evgeny Malkovich

Geometric characteristics of the media with bimodal porous structure

Thursday • 16:35–17:05 • Room: S6

Coke deactivation of the catalyst pellets is a massive problem that can be managed by introducing artificial pores into the catalyst body. In considered approach the catalyst porous media was modelled as a set of Poisson distributed spherical grains with spherical voids simulating macropores. Coke depositions were modelled as radii growth of the catalyst grains. We compute porosity, tortuosity and specific surface area of the constructed media at every deactivation stage and showed that diffusion processes passes with higher rates for the macroporous catalysts.

G. Homotopy Theoretic Structures in Differential Geometry

Luca Accornero

Cohomology of Haefliger groupoids and invariants of pseudogroup structures

Tuesday • 9:30–10:00 • Room: S7

A pseudogroup is a subset of the set of locally defined diffeomorphisms on a manifold that satisfies suitable group-like and sheaf-like properties. Pseudogroups are worth looking at in geometry because several geometric structures can be described by means of a principal pseudogroup bundle.

In the seventies, Bott and Haefliger managed to describe some invariants of transitive pseudogroup structures on a manifold (in particular, of foliations) by looking at the infinite jet groupoid associated to a pseudogroup. This object has a suitably defined differentiable cohomology, which has an infinitesimal description in terms of Gelfand-Fuchs cohomology. The classifying map of a pseudogroup structure induces a characteristic map from this cohomology to the de Rham cohomology of the manifold considered; this map can be described also directly, which makes it more computable.

In this talk, we describe a new approach to this subject, which explores and emphasises the role of the multiplicative flat connection (called Cartan connection) on the infinite jet of a pseudogroup. This allows us to define the relevant cohomology for all groupoids carrying such kinds of connections; thanks to a Van Est type of argument, the infinitesimal description and the characteristic map are generalised as well.

Anton Galaev

Losik classes for codimension one foliations

Thursday • 12:05–12:25 • Room: S7

This is a joint work with Yaroslav Bazaikin. Following Losik's approach to Gelfand formal geometry, certain characteristic classes for codimension one foliations coming from Gelfand-Fuchs cohomology are considered. Sufficient conditions for non-triviality in terms of the dynamical properties of generators of the holonomy groups are found. The non-triviality for the Reeb foliation is shown; this is in contrast with some classical theorems on the Godbillon-Vey class, e.g, the Mizutani-Morita-Tsuboi Theorem about triviality of the Godbillon-Vey class of foliations almost without holonomy is not true for the classes under consideration. It is shown that the considered classes are trivial for a large class of foliations without holonomy. The question of triviality is related to ergodic theory of dynamical systems on the circle and to the problem of smooth conjugacy of local diffeomorphisms. Certain classes are obstructions for the existence of transverse affine and projective connections.

Maxim Grigoriev

Gauge PDEs as Q-bundles

Thursday • 9:30–10:00 • Room: S7

A gauge PDE is a natural notion which arises by abstracting what physicists call a local gauge field theory defined in terms of BV-BRST differential (not necessarily Lagrangian). We study supergeometry of gauge PDEs paying particular attention to globally well-defined definitions and equivalences of such objects. We demonstrate that a natural geometrical language to work with gauge PDEs is that of Q-bundles. In particular, we demonstrate that any gauge PDE can be embedded into a super-jet bundle of the Q-bundle. This gives a globally well-defined version of the so-called parent formulation. In the case of reparameterization-invariant systems, the parent formulation takes the form of an AKSZ-type sigma model with an infinite-dimensional target space.

Alexei Kotov

The L-infinity algebra of a Leibniz algebra

Thursday • 11:30–12:00 • Room: S7

A Leibniz algebra is a vector space together with a multiplication which is, being not skew-symmetric in general, a subject to a left Jacobi identity. Any Leibniz algebra gives rise to an L-infinity structure in two ways; we show that these two constructions are equivalent.

Pier Paolo La Pastina

Deformations of VB-groupoids

Tuesday • 9:00–9:30 • Room: S7

VB-groupoids can be understood as vector bundles in the category of Lie groupoids. They encompass several classical objects, such as Lie group representations, 2-vector spaces, Lie group actions on vector bundles; moreover, they provide geometric pictures for 2-term representations up to homotopy of Lie groupoids, in particular the adjoint representation. In this talk, I will attach to every VB-groupoid a cochain complex controlling its deformations and discuss some features, such as Morita invariance, as well as some examples and applications. I will also compare it to its infinitesimal counterpart, the linear deformation complex of a VB-algebroid, via a Van Est map. This is joint work with Luca Vitagliano.

Georgy Sharygin

Geometry of full symmetric Toda system on compact groups

Thursday • 9:00–9:30 • Room: S7

The full symmetric Toda system is a generalization of the usual (3-diagonal) system; it can be further generalized to the case of Cartan decomposition of an arbitrary real semisimple Lie algebra. In this case the integrability of the system is known, but the constructions of the involute families of integrals are usually quite complicated. In my talk I will describe a construction of commutative family of vector fields on the compact group, analogous to the family of first integrals in involution. This construction is based on the structure of representations of the original group. I will also describe the relation of this construction with Sorin and Chernyakov's and Reshetikhin and Schrader's constructions, proving the noncommutative integrability of the system.

Martina Stojić

The symmetric monoidal category indproVect of filtered-cofiltered vector spaces

Thursday • 10:30–10:50 • Room: S7

For the dual of a countably infinite dimensional filtered Hopf algebra to be viewed as a Hopf algebra, completed tensor product has to be introduced. Morphisms including such Hopf algebras and their duals have to combine both tensor products. This is formalized here by objects in a larger category of vector spaces with certain structure and morphisms that are linear maps that respect this structure: the symmetric monoidal category indproVect of filtered-cofiltered vector spaces. It is a concrete category equivalent to the category of strict ind-pro-objects of countable cofinality in the category of vector spaces. Its tensor product is equal to the usual one when between filtered vector spaces, objects of the subcategory indVect, and equal to the completed one when between cofiltered vector spaces, objects of the subcategory proVect. Hence, for example, Heisenberg doubles of countably infinite dimensional filtered Hopf algebras can be defined. There is a natural notion of a formal base of a cofiltered vector space, and of formal sums, which are infinite sums representing elements of cofiltered vector spaces.

Zoran Škoda

A connection between ordinary differential equations and a Hopf algebroid

Thursday • 10:55–11:25 • Room: S7

A Hopf algebroid of differential operators around the unit of a Lie group is quite related to the mathematics of flows on the Lie group. While there are many recursive and iterative methods for finding formal integral curves, and related exponential maps in given coordinates, the inverse from exponential map to the original coordinates in which the vector fields are expressed is less directly known. An indirect method using the Hopf algebroid structure gives us an explicit recursion for the coefficients of the power series for the inverse map.

H. Convex and Integral Geometry

Judit Abardia-Evéquoz

Flag area measures

Monday • 16:00–16:50 • Room: S7

A flag area measure on a finite-dimensional euclidean vector space is a continuous translation invariant valuation with values in the space of signed measures on the flag manifold consisting of a unit vector and a $(p+1)$-dimensional linear subspace containing the vector, with $0 \leq p \leq n-1$. Flag area measures play an important role in convex and integral geometry. In this talk, we will present a general construction of $SO(n)$-covariant flag area measures, which generalizes an already known formula for flag area measures evaluated on polytopes. The construction involves elementary symmetric polynomials in the squared cosines of the principal angles between two subspaces. We will also show that the described flag area measures are all the $SO(n)$-covariant ones, which satisfy additionally a natural notion of smoothness: we show that every smooth $SO(n)$-covariant flag area measure is a linear combination of the constructed ones. This is joint work with Andreas Bernig and Susanna Dann.

Andreas Bernig

Dual area measures and hermitian integral geometry

Tuesday • 16:55–17:45 • Room: S7

Area measures are valuations on convex bodies with values in the space of signed measures on the unit sphere. As shown by Wannerer, translation- and G-invariant area measures satisfy a local additive kinematic formula for every group G acting transitively on the unit sphere. We introduce a new convolution product on the space of dual area measures which is closely related to the kinematic formulas. In the hermitian case, this yields to simplifications of the local additive kinematic formulas due to Wannerer.

We also give some summary on recent developments in hermitian integral geometry (this last part is joint work with Fu, Solanes and Wannerer).

Florian Besau

Polytopal Approximation in Hilbert Geometries

Tuesday • 10:30–11:00 • Room: S7

Hilbert constructed a special class of metric spaces where straight lines are geodesics. These metric spaces are Finsler manifolds and are now known as Hilbert geometries.

A Hilbert geometry is defined on an bounded open convex set, where the distance between two points is defined using the cross ratio between the four points on the line spanned by the two points and the intersection of the line with the boundary of the convex set. This construction is projective and therefore Hilbert geometries are invariant with respect to projective transformations that preserve the convex set, or in other words, a projective map that acts bijective on the the convex set gives rise to an isometry of the metric space.

In this talk I will present asymptotic results on approximation of convex bodies in Hilbert geometries by best and random polytopes.

Based on joint work together with Monika Ludwig and Elisabeth Werner and work in progress with Christoph Thäle.

Hiroshi Iriyeh

On the volume product of three dimensional convex bodies with symmetries of a subgroup of O(3)

TUESDAY • 11:35–12:05 • ROOM: S7

Mahler's conjecture is one of the classical open problems in the area of convex geometry. It states that for a centrally symmetric convex body K in the n-dimensional Euclidean space the product of the volume of K and that of the polar K° is greater than or equal to $4^n/n!$. This conjecture is still open for $n > 3$. It is natural to study the volume product of convex bodies with a suitable symmetry other than centrally symmetric one. In our previous paper(arXiv:1706.01749), to solve Mahler's conjecture for $n = 3$ we introduced the method „signed volume estimate" of a piece of K, which can be regarded as a natural generalization of the method used by M. Meyer for unconditional convex bodies. In this talk, we consider the volume product functional on the set of G-invariant three dimensional convex bodies, where G is a discrete subgroup of the orthogonal group $O(3)$. By using the signed volume estimate, we will give sharp lower bounds of the functional for many cases. In particular, in the case where G is the alternating group A_4, the sharp lower bound gives a new partial result of non-symmetric Mahler conjecture for $n = 3$. The talk is based on a joint work with Masataka Shibata.

Ivan Izmestiev

Discrete spherical Laplacian

MONDAY • 16:55–17:45 • ROOM: S7

With every Delaunay triangulation of the sphere one associates a non-negative definite quadratic form on the finite-dimensional vector space $\mathbb{R}^V$, where V is the vertex set of the triangulation. We survey spectral properties of this quadratic form.

Jan Kotrbatý

$Spin(9)$*-invariant valuations in the octonionic plane*

MONDAY • 14:55–15:25 • ROOM: S7

Valuations are finitely additive functionals on convex bodies in $\mathbb{R}^n$. According to Alesker's Abstract Hadwiger-type theorem, the vector space of continuous translation-invariant valuations that are also invariant under a subgroup $G \subseteq SO(n)$ of rotations is finite-dimensional if and only if G acts transitively on the unit sphere S^{n-1}. As a consequence, kinematic formulas exist for every such a group, in a complete analogy to the classical case $G = SO(n)$. Furthermore, Alesker defined a natural product of such valuations and it is due to the so-called Fundamental theorem of algebraic integral geometry proven by Bernig and Fu that the knowledge of the product is crucial for determination of the a priori unknown constants appearing in the kinematic formulas.

In spite of a great effort and a vast variety of achieved results, the algebras of G-invariant valuations and consequently the respective kinematic formulas had not yet been described for all of the items of the well-known list of groups with transitive action on a sphere. In particular, the cases of symplectic groups, closely related to the quaternions, as well as the case of $Spin(9)$, the subgroup of $SO(16)$ preserving octonionic lines in $\mathbb{O}^2$, remain open.

Within our talk, the algebra of $Spin(9)$-invariant valuations will be presented. Namely, a basis will be given in terms of invariant differential forms and then the product structure will be described.

This is a joint work with Thomas Wannerer.

Andreas Kreuml

Fractional Sobolev norms and BV functions on manifolds

Tuesday • 11:00–11:30 • Room: S7

We extend the notions of fractional Sobolev seminorms and fractional perimeters to compact Riemannian manifolds. The dependence of both of these functionals on a parameter $0 < s < 1$ raises the question of convergence in the limit cases. For $s \to 1$, their asymptotic behaviour can be modeled by a larger class of non-linear integral operators, whose kernels concentrate on one point in the limit. Using a suitable covering of the manifold allows us to establish convergence of the functionals in question to $W^{1,p}$- and BV-seminorms which generalizes results by Bourgain, Brezis & Mironescu, and Dávila. In particular, the limit of fractional perimeters yields the perimeter functional which extends the notion of surface area to a broad class of sets.

Joint work with Olaf Mordhorst.

Dušan Pokorný

Integral geometry of WDC sets

Tuesday • 14:00–14:50 • Room: S7

I will start with a short overview of older results about WDC sets. Then I will talk about some new results about the structure of WDC sets and their generalization to (special) locally finite unions of WDC sets. These results are (partially) a joint work with L. Zajíček.

Jan Rataj

On critical values of the distance from a subset of a Riemannian surface

TUESDAY • 12:05–12:35 • ROOM: S7

If X is a connected complete two-dimensional Riemannian manifold, F its nonempty compact subset and $0 < c < C < \infty$ then the set of critical values in $[c, C]$ of the distance function $x \mapsto \mathrm{dist}(x, F)$ has zero $\frac{1}{2}$-dimensional Minkowski content. This extends a result of Fu (1986) from the Euclidean plane. It can be shown that a close result is in certain sense optimal. (Joint work with Luděk Zajíček.)

Franz Schuster

Affine Quermassintegrals and Minkowski Valuations

TUESDAY • 16:00–16:50 • ROOM: S7

The Blaschke-Santaló and the polar Petty projection inequality are two of the best known and most powerful affine isoperimetric inequalities in convex geometric analysis. In particular, they are significantly stronger than the classical Euclidean Urysohn and *the* isoperimetric inequality, respectively. In 1988, Lutwak conjectured that for convex bodies in $\mathbb{R}^n$ and each $i \in \{1, \ldots, n-1\}$ an affine isoperimetric inequality holds for the socalled ith affine quermassintegral. The special cases $i = 1$ and $i = n - 1$ being the Blaschke-Santaló and the polar Petty projection inequality, respectively.

In this talk, we present new isoperimetric inequalities for Minkowski valuations intertwining rigid motions of degree $i = 1$ and $i = n - 1$. These inequalities not only improve the classical Euclidean Urysohn and *the* isoperimetric inequality but interpolate between these Euclidean inequalities and the Blaschke-Santaló and the polar Petty projection inequality, respectively. Moreover, among these large families of isoperimetric inequalities, the affine ones turn out to be the strongest inequalities. Finally, we also relate the polar volume of Minkowski valuations of degree $2 \leq i \leq n-2$ to Lutwak's conjecture on affine quermassintegrals.

Gil Solanes

Lipschitz-Killing valuations in pseudo-riemannian manifolds

MONDAY • 14:00–14:50 • ROOM: S7

The Lipschitz-Killing invariants discovered by H. Weyl are among the most fundamental quantities that can be assigned to a compact riemannian manifold. Besides Weyl's tube formula, they appear in seemingly unrelated situations such as the kinematic formula of Blaschke-Santaló-Chern and the heat kernel of differential forms.

Notably, the Lipschitz-Killing invariants can also be defined on sufficiently nice compact subsets of any riemannian manifold. In this form, they belong to a class of functionals called (smooth) valuations, and they provide a natural extension of the classical quermassintegrals of euclidean convex bodies.

In the talk we will present a joint work with Andreas Bernig and Dmitry Faifman where the Lipschitz-Killing valuations are generalized to the setting of pseudo-riemannian manifolds.

Daniel Temesvari

Cones generated by random points on half-spheres and convex hulls of Poisson point processes

Tuesday • 14:55–15:25 • Room: S7

Let $U_1, U_2, \ldots$ be random points sampled uniformly and independently from the d-dimensional upper half-sphere. We show that, as $n \to \infty$, the f-vector of the $(d+1)$-dimensional convex cone C_n generated by $U_1, \ldots, U_n$ weakly converges to a certain limiting random vector, without any normalization. We also show convergence of all moments of the f-vector of C_n and identify the limiting constants for the expectations. We prove that the expected Grassmann angles of C_n can be expressed through the expected f-vector. This yields convergence of expected Grassmann angles and conic intrinsic volumes and answers thereby a question of Bárány, Hug, Reitzner and Schneider [Random points in halfspheres, *Rand. Struct. Alg.*, 2017]. Our approach is based on the observation that the random cone C_n weakly converges, after a suitable rescaling, to a random cone whose intersection with the tangent hyperplane of the half-sphere at its north pole is the convex hull of the Poisson point process with power-law intensity function proportional to $\|x\|^{-(d+\gamma)}$, where $\gamma = 1$. We compute the expected number of facets, the expected intrinsic volumes and the expected T-functional of this random convex hull for arbitrary $\gamma > 0$.

5. List of DGA2019 participants

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Ilka Agricola; Philipps-Universität Marburg; Germany
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Naoya Ando; Kumamoto University; Japan
Pavel Andreev; Northern (Arctic) Federal University; Russia
Teresa Arias-Marco; Universidad de Extremadura; Spain
Andreas Arvanitoyeorgos; University of Patras; Greece

Gianluca Bande; University of Cagliari; Italy
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Andreas Bernig; Goethe University Frankfurt; Germany
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Boris Blagojević; University of Zagreb; Croatia
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Marcella Palese; University of Torino; Italy
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