MAY 21st – MAY 25th 2018

NEW METHODS IN FINSLER GEOMETRY

International Conference

Centro di Ricerca Matematica Ennio De Giorgi

Matematica nelle Scienze Naturali e Sociali

Organizers

Marco Abate
Università di Pisa

Alberto Abbondandolo
Universität Bochum

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Organised in partnership with the Clay Mathematics Institute

Info

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Ennio De Giorgi
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http://crm.sns.it/event/415/

Confirmed invited speakers

SHIRI ARTSTEIN-AVIDAN
Tel Aviv University

FLORENT BALACHEFF
Université de Lille

GAUTAM BHARALI
Indian Institute of Science Bangalore

ROBERT BRYANT
Duke University

DMITRI BURAGO
Pennsylvania State University

SERGEI IVANOV
University of St.Petersburg

MISHA KAPOVICH
University of California at Davis

XIAOHUAN MO
Beijing University

ZOLTÁN MUZSNAY
University of Debrecen

YURI NIKOLAYEVSKY
University of Melbourne

CHUNHUI QIU
Xiamen University

HANS-BERT RADEMACHER
Universität Leipzig

PEDRO SALOMÃO
Universidade de São Paulo

ANDREA SPIRO
Università di Camerino

MARC TROYANOV
Université de Lausanne

MING XU
Beijing Normal University

Registration: There is no registration fee, but we kindly ask for a registration via http://crm.sns.it/event/415/ **before April, 2**

Presentation/financial support: those who are interested in giving a short presentation or presenting a poster, should register and apply **before February, 6**. Some support for lodging may be available.

Elaborazione a cura del Servizio Comunicazione e Relazioni Esterne | SNS

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New Methods in Finsler Geometry

Pisa, May 21-25, 2018

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New Methods in Finsler Geometry

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Abstracts of presentations.

Invited lectures:

Title: Duality for Convex Caustics

speaker: Shiri Artstein-Avidan (Tel Aviv University (TAU))

abstract: We shall survey some known, some open, and some new results and questions related to billiard dynamics in convex domains.

Title: Length product of homologically independent closed geodesics

speaker: Florent Balacheff (University of Lille)

abstract: In this talk, we will consider generalizations of Minkowski's second theorem to Riemannian and Finsler manifolds. For example we will explain why graphs, Finsler tori or Finsler surfaces with normalized volume always admit a Z_2-homology basis induced by closed geodesics whose length product is bounded from above by some constant depending only on their topology. Based on a joint work with S. Karam and H. Parlier.

Title: A notion of visibility based on the Kobayashi distance, and applications

speaker: Gautam Bharali (Indian Institute of Science, Bangalore)

abstract: Given any metric space, there are several notions of it being negatively curved. In this talk, we single out a weak notion of negative curvature (which, in fact, is a consequence of negative curvature in the Riemannian category) that turns out to be very useful in proving results about holomorphic maps. This property is a form of visibility, the underlying metric spaces being bounded domains in C^n equipped with the Kobayashi distance. In this talk, we shall present a general quantitative condition for a domain to be a visibility space in the sense alluded to above. A class of domains known as Goldilocks domains - introduced in recent work work with Andrew Zimmer - possess this visibility property. This is a rather broad class of domains that includes, for instance, all pseudoconvex domains of finite type. It also includes a range of convex domains for which it is known that the Kobayashi distance is *not* Gromov hyperbolic. Among the phenomena that one can demonstrate for such visibility spaces is a form of the Wolff-Denjoy theorem. We shall give a proof of this result, focusing on the role of visibility in our proof. If time permits, we shall look at other applications and at domains that do not have the “Goldilocks” properties but are visibility spaces in the above-mentioned sense. This talk presents joint work with Andrew Zimmer and with Anwoy Maitra.

Title: Finsler metrics with constant positive flag curvature and holonomy

speaker: Robert Bryant (Duke University)

abstract: In this talk, I will describe a couple of cases in which Finsler geometry leads to connections with special holonomy. In particular, I will describe how a Finsler metric with constant positive flag curvature induces a canonical Kähler metric on its space of geodesics and how certain such Finsler metrics determine (and are determined by) spaces carrying a torsion-free connection whose holonomy is 'exotic' in the sense that it is not on the lists of the currently accepted groups that can be holonomy of torsion-free connections.

Title: Three mini-talks on Finsler Geometry and beyond

speaker: Dimitri Burago (Pennsylvania State University)

abstract: The talk contains three elementary stories in Finsler geometry: Dual lens maps in Finsler geometry and their applications to Dynamics; A new formula for the area of a convex polygon and area-minimizers in normed spaces; Surviving with weak controls and applications to homogenization of the G-Equation. On Joint works with S. Ivanov and partially Dong Chen and Alexei Novikov.

Title: Intrinsic versus extrinsic geometry of Finsler surfaces

speaker: Sergei Ivanov (Steklov Institute of Mathematics at St.Petersburg)

abstract: By Gauss' Theorema Egregium, the intrinsic metric of a surface in the Euclidean 3-space determines its extrinsic Gauss curvature. In particular it determines whether the second fundamental form at a point is of elliptic, hyperbolic, or parabolic type. These three types are affine invariant and they make sense for surfaces in non-Euclidean normed 3-spaces. This suggests the following question: Given two isometric embeddings of a Finsler 2-manifold into Minkowski 3-spaces, do they necessarily have the same type of the second fundamental form at a given point? I will show that the answer is affirmative for a certain class of Finsler metrics. (In general, the question remains open.)

Title: Finsler geometry of Riemannian symmetric spaces

speaker: Misha Kapovich (University of California, Davis)

abstract: I will talk about my work with Bernhard Leeb on applications of Finsler geometry to study of coarse geometry of symmetric spaces and discrete group actions on these spaces. While symmetric spaces are Riemannian manifolds, they also have a family of invariant "polyhedral" Finsler metrics. The latter, in many ways, provide better insight into geometry of symmetric spaces than their Riemannian counterparts.

Title: Busemann convex Finsler manifolds

speaker: Alexander Lytchak (University at Cologne)

abstract: In the talk I will discuss the proof of the fact that Finsler manifolds non-positively curved in the sense of Busemann are exactly the Berwald manifolds of non-positive flag curvature. This result obtained jointly with Sergei Ivanov answers a question going back to Herbert Busemann and formulated by Zhongmin Shen.

Title: Weyl-Zoll structures and Finsler 2-spheres of constant positive curvature

speaker: Thomas Mettler (Institute of Mathematics, Goethe University Frankfurt)

abstract: I will discuss the following result: Every Weyl-Zoll structure on the 2-sphere with positive definite symmetrised Ricci curvature gives rise to a Finsler 2-sphere of constant positive curvature and with 2π −periodic geodesic flow. Conversely every Finsler 2-sphere of constant positive curvature with 2π −periodic geodesic flow gives rise to a Weyl-Zoll structure on the 2-sphere whose symmetrised Ricci curvature is positive definite.

Title: Homogeneous Finsler spaces with positive flag curvature, classification and related topics

speaker: Ming Xu (Capital Normal University, Beijing)

abstract: This talk is based on my joint works with Shaoqiang Deng, Wolfgang Ziller, Libing Huang, Zhiguang Hu and Lei Zhang. Firstly, I will briefly survey the history of the classification for homogeneous spaces of positive curvature. Secondly, I will introduce our joint works on this classification project in the context of homogeneous Finsler geometry. Thirdly, I will use a few minutes to discuss the tools we used. Finally, I will introduce a new thought for studying the positive curvature problem in Finsler geometry, defining a weaker version of positive curvature condition which only appear in Finsler geometry, the (FP) condition, i.e. for any tangent plane at any point, we can find a suitable flag pole such that the corresponding flag curvature is positive. Non-negatively curved Finsler metrics satisfying the (FP) condition seem very close to the classical positive flag curvature condition. Suprisingly, we can find many examples of compact coset spaces which admit homogeneous Finsler metrics satisfying the non-negatively curved condition and the (FP) condition, but not the positively curved condition.

Title: On Finsler surfaces of constant flag curvature

speaker: Xiaohuan Mo (Peking University)

abstract: In this lecture, we discuss Finsler surfaces of constant (flag) curvature. First, we show that the space of those with two dimensional isometric group depends on two arbitrary constants. We also give a new technique to recover Finsler metrics from the specified two constants. Using this technique we obtain some new Finsler surfaces of constant flag curvature with two dimensional isometric group. Then we show that the space of Finsler metrics with constant flag curvature of which admits a Killing field depends on two arbitrary functions of one variable. Furthermore we find an approach to calculate these functions for spherically symmetric Finsler surfaces of constant flag curvature. In particular, we obtain the normal form of the Funk metric on the unit disk $\mathbf{D}^2$. These results are partially joint with Professor Robert Bryant.

Title: On the holonomy of Finsler manifolds

speaker: Zoltán Muzsnay (University of Debrecen)

abstract: 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. In recent papers, a method was developed to investigate the holonomy through Lie algebras, tangent to the holonomy group. The holonomy algebra, the curvature algebra, and the infinitesimal holonomy algebra can provide valuable information about the holonomy. As a working example, we show that the holonomy group of a locally projectively flat Finsler manifold of constant curvature is finite dimensional if and only if it is flat or Riemannian. We also show that the holonomy group of a projectively flat simply connected Randers surface of non-zero constant curvature is maximal and its closure is isomorphic to the orientation preserving diffeomorphism group of the circle. These results are surprising because they show that even in the case when the geodesic structure is simple (the geodesics are straight lines), the holonomy group can still be a very large group.

Title: Locally conformally Berwald manifolds and compact quotients of reducible manifolds by homotheties

speaker: Yuri A. Nikolayevsky (La Trobe University, Melbourne)

abstract: Our aim is to understand the structure of locally conformally Berwald metrics on closed manifolds which are not globally conformally Berwald. We first show, using the Binet-Legendre metric, that the characterisation of such metrics is equivalent to characterising incomplete, simply-connected, Riemannian manifolds with reducible holonomy group whose quotient by a group of homotheties is closed. We then prove a de Rham type splitting theorem which states that such a manifold is a cylinder over an incomplete non-flat manifold.

This is a joint work with Vladimir Matveev.

Title: Applications of a Finsler non-linear connection

speaker: Takayoshi Ootsuka (Ochanomizu University)

abstract: We will propose a new definition of Finsler non-linear connection which can be applicable to singular Finsler metric $L(x, dx)$ from the point-Finsler viewpoint. We define a non-linear covariant derivative, $\nabla dx^\alpha = -dx^\mu \otimes N^\alpha{}_\mu(x, dx)$, on the basis of the cotangent bundle, and suppose the $N^\alpha{}_\mu$ satisfy, $\frac{\partial N^\alpha{}_\mu}{\partial dx^\nu} - \frac{\partial N^\alpha{}_\nu}{\partial dx^\mu} = 0$, $\quad \frac{\partial L}{\partial x^\mu} - N^\alpha{}_\mu \frac{\partial L}{\partial dx^\alpha} = 0$. We prove the existence and uniqueness of such a non-linear connection on arbitrary singular Finsler manifold (M, L). Using this non-linear connection, the Euler-Lagrange equations can be written as auto-parallel equations on a certain constraint surface, and we can classify constrained systems, which are described singular Finsler metrics, as first or second class without introducing Hamiltonian structures. Furthermore we can give another definition of Killing symmetry, and construct fluid mechanics and deformed gravity on Finsler manifolds with our non-linear connection.

Title: Bumpy metrics, closed geodesics, and minimal index growth

speaker: Hans-Bert Rademacher (University of Leipzig)

abstract: In this talk we discuss existence results for closed geodesics on a compact manifold endowed with a bumpy non-reversible Finsler metric.

We present a simplified proof for the existence of a second closed geodesic on a sphere of dimension n. Earlier proofs were given independently by Duan and Long and the author. If we we assume that there is only one closed geodesic one can show that some iterate is of minimal index growth. But this leads immediately to a contradiction as pointed out by Goresky and Hingston.

Title: Sharp systolic inequalities for spheres of revolution

speaker: Pedro Salomão (University of São Paulo)

abstract: In a joint work with Abbondandolo, Bramham and Hryniewicz, we study systolic inequalities for spheres of revolution. The systolic ratio of a Riemannian metric on the 2-sphere is defined as the quotient of the square of the length of the shortest closed geodesic by the area. This notion naturally extends to Finsler metrics, considering the Holmes-Thompson area. We show that the systolic ratio of a sphere of revolution S is bounded from above by π, and is equal to π if and only if S is Zoll, that is all of its geodesics are closed and have the same prime period. We also show that the systolic inequality is strictly less than π for non-reversible Finsler metrics on S induced by suitable rotational invariant killing vector fields.

Title: Finsler metrics of complex domains with Monge-Ampere exhaustions

speaker: Andrea Spiro (University of Camerino)

abstract: A smooth Monge-Ampre exhaustion on a smoothly bounded strongly pseudo-convex domain is a continuous strictly plurisubharmonic exhaustion , which is at each point different from the unique minimum point z and such that $u := \log \tau$ satisfies the homogeneous complex Monge-Ampre equation $(dd^c u)^n = 0$. The class of domains admitting at least one such exhaustion includes all strictly convex domains with smooth boundaries and many others. In this talk we present a recent result with Giorgio Patrizio on existence of an infinite number of smooth Monge-Ampre exhaustions on each smooth domain of $\mathbb{C}^n$ that admits at least one Monge-Ampre exhaustion - namely there exists at least one such exhaustion per each point of the domain. This implies that the Kobayashi pseudo-metric of any such domain is actually a smooth complex Finsler metric with very special differential geometric properties.

Title: Chains in CR geometry as geodesics of a Kropina metric

speaker: Taiji Marugame (Institute of Mathematics, Academia Sinica)

abstract: With the help of a generalization of the Fermat principle in general relativity, we show that chains in CR geometry are geodesics of a certain Kropina metric constructed by the CR structure. Further, we study projective equivalence of Kropina metrics and show that if the corresponding 1-form is nonintegrable, two projectively equivalent metrics are trivially projectively equivalent. As an application, we show that sufficiently many chains determine CR structure up to conjugacy, thus generalizing and reproving a famous Theorem of Jih-Hsin Cheng 1978.

The talk is based on new unpublished results joint with Jih-Hsin Cheng, Vladimir S. Matveev and Richard Montgomery.

Title: A cardboard model for SOL geometry

speaker: Marc Troyanov (École Polytechnique Fédérale de Lausanne)

abstract: SOL is one of the classical eight Thurston's homogenous geometries (perhaps the most exotic one). A model of SOL is R^3 with Riemannian metric $ds^2 = dz^2 + exp(2z)dx^2 + exp(-2z)dy^2$ Supposeone wants to "see" the shape of large spheres in SOl (in the coordinate xyz-space), one should then be able to compute the distance between 2 points. But that is very complicate. On the other hand if one replace the Riemannian metric by a specific Finsler metric then one can explicitly compute distances and draw spheres. The Finsler metric is not the Riemannian metric of the original problem, but it is asymptotic in a precise sense and therefore the Finsler balls are very accurate models of the Riemannian balls. The Finsler metric is inspired by cardboards models in architecture and will be defined and discussed in the talk. The method can be generalized to other (Solvable groups) geometries.

Communications:

Title: Minimal Boundaries in Tonelli Lagrangian Systems
(Parallel session on Symplectic Geometry Methods in Finsler Geometry)

speaker: Marco Mazzucchelli (École Normale Supérieure de Lyon)

abstract: In this talk, which is based on joint work with Luca Asselle and Gabriele Benedetti, I will present a few recent results concerning action minimizing periodic orbits of Tonelli Lagrangian systems on an orientable closed surface. I will show that in every level of a suitable "subcritical" energy range there is a "minimal boundary": a global minimizer of the Lagrangian action on the space of smooth boundaries of open sets of the surface. When the surface is a sphere, this result will imply the existence of a locally minimizing periodic orbit and of infinitely many mountain pass periodic orbits on every energy level just above the so-called Mañé critical value. This provides a remarkable class of Finsler metrics on the 2-sphere having infinitely many closed geodesics.

Title: Relativity theory and modified indicatrices
(First parallel session on Finsler Geometry and General Relativity)

speaker: Ettore Minguzzi (Università Degli Studi Di Firenze)

abstract: In general relativity the velocity space is described by the hyperboloid H^3. By considering alternative velocity spaces one is lead to Lorentz-Finsler geometry. I present some recent proposals for modifications of the velocity space of general relativity, in particular I shall describe the nice properties of a theory based on affine sphere indicatrices.

Talk partly based on the paper "Affine Sphere Relativity" Communications in Mathematical Physics 350 (2017) 749–801

Title: Finsler spacetimes
(First parallel session on Finsler Geometry and General Relativity)

speaker: Christian Pfeifer (University of Tartu, Laboratory of theoretical physics)

abstract: The mathematical foundation of general relativity is the description of the gravitational interaction through the Lorentzian metric geometry of the spacetime manifold. Moreover the geometry of spacetime provides a precise notion of causality, observers and their measurement and the stage on which physics takes place. Finsler geometry is a long known generalisation of Riemannian metric geometry and there are numerous attempts to apply it as geometry of spacetime in physics. However there appear severe problems in the standard formulation of Finsler geometry when it is used as generalisation of indefinite Lorentzian metric geometry due to the existence of non-trivial null directions. In this talk I present the Finsler spacetime framework which overcomes these problems and makes Finsler geometry available as generalisation of Lorentzian metric geometry and thus as geometry of spacetime. I begin with a short review of indefinite Finsler geometry and the problems with non-trivial null directions in its standard formulation. After this review I present our definition of Finsler spacetimes which overcomes these issues, I discuss how to obtain action based generalisations of the Einstein equations as dynamical equations for Finsler spacetimes and I outline how observer measurements are modelled. Finally I will discuss how to obtain a Finsler spacetime geometry from fundamental physical field equations and open questions which appear in this context. This talk is based on the articles https://arxiv.org/abs/1112.564, https://arxiv.org/abs/1801.07724. It introduces the formalism on which the analysis of the VGR Berwald spacetimes presented by A. Fuster is built.

Title: Closed magnetic geodesics on orbifolds
(Parallel session on Symplectic Geometry Methods in Finsler Geometry)

speaker: Felix Schmaeschke

abstract: We consider closed manifolds equipped with a locally-free action of a compact Lie group and a Riemannian metric that is invariant with respect that action. We study the geodesic flow of such Riemannian manifolds. In particular, we are interested in the existence of geodesics which are closed up to the action of some element in the group, as they project to closed magnetic geodesics in the orbifold, which is obtained as the quotient of the manifold by the group. Solving a critical point problem for a Lagrangian-type action functional defined on the free loop space of the manifold, we prove that on any (effective) orbifold and for almost all positive constants k, there exists a closed contractible magnetic geodesic with energy k, provided that the orbfBenifold is not rationally aspherical or not developable. This talk is about a joint project with Luca Asselle.

Title: Finsler spacetimes and Killing vectors field
(Second parallel session on Finsler Geometry and General Relativity)

speaker: Erasmo Caponio (Dipartimento di Meccanica, Matematica e management - Politecnico di Bari)

abstract: We quickly review the notion of Finsler spacetime and introduce a class defined on product, $1+n$ dimensional, manifolds $R \times M$, where M is endowed with a classical Finsler metric F_1 and another fiberwise positive homogeneous Lagrangian F_2. In this class the vector field ∂t, where t is the natural coordinate on $\mathbb{R}$, is a timelike Killing vector field. We study its causality showing in particular that, under some conditions on $F_1,\ F_2$, it can be reduced to the one of a simpler class.

Title: Foliations on Finsler manifolds
(Parallel Session on Local Finsler Geometry)

speaker: Robert Wolack

abstract: We present an introduction to the general theory of foliations on Finsler manifolds with particular attention paid to various associated geometrical objects, like connections, curvatures etc., relating their properties to the foliation.

Title: Construction of supergravity from a superparticle Lagrangian
(Second parallel session on Finsler Geometry and General Relativity)

speaker: Ryoko Yahagi (Ochanomizu University)

abstract: We show a straightforward approach to construct a supergravity model out of a superparticle model with a nonlinear super Finsler connection. We use Casalbuoni-Brink-Schwarz superparticle model (CBS model) and its extension on a curved spacetime, which is described on a super Finsler manifold. We apply the same way Einstein took to construct the theory of gravity to the CBS model, hoping it leads to supergravity. The first step is to rewrite the equations of motion in the form of auto-parallel equations expressed with the super Finsler connection. After that, we calculate the curvature that contains both Grassmann even and odd parts.

Title: On isotropic Projective Ricci curvature of special Finsler metrics
(Parallel Session on Local Finsler Geometry)

speaker: Bahaman Rezaei

abstract: In this paper, we study Finsler metrics with weak, isotropic or flat projective Ricci curvature (briefly, ***PRic***-curvature). First, we prove a rigidity result that shows for a complete Finsler manifold inequality ***PRic ≥ Ric*** holds if and only if ***S=0***. Then, special projective Ricci curvature of ***C***-reducible Finsler metrics are studied. The necessary and sufficient conditions of these metrics to be weak or isotropic projective Ricci curvature are found. So we show that C-reducible Douglas metric of isotropic PRic-curvature must be ***PRic*** flat.

Title: Lorentzian length spaces and its application to Lorentz-Finsler structures
(Second parallel session on Finsler Geometry and General Relativity)

speaker: Clemens Sämann

abstract: We introduce an analogue of the theory of length spaces into the setting of Lorentzian geometry and causality theory. The role of the metric is taken over by the time separation function, in terms of which all basic notions are formulated. In this way we recover many fundamental results in greater generality, while at the same time clarifying the minimal requirements for and the interdependence of the basic building blocks of the theory. A main focus of this work is the introduction of synthetic curvature bounds, akin to the theory of Alexandrov and ***CAT(k)***- spaces, based on triangle comparison. Applications include Lorentz-Finsler structures, Lorentzian manifolds with metrics of low regularity and certain approaches to quantum gravity. This is joint work with Michael Kunzinger.

Preprint: https://arxiv.org/abs/1711.08990

Title: A Cheeger-Gromov-Taylor Type Compactness Theorem for Finsler
(Parallel Session on Local Finsler Geometry)

speaker: Homare Tadano (Tokyo University of Science)

abstract: In this talk, we shall give a new compactness theorem for complete Finsler Ricci solitons. Our compactness theorem may be regarded as a natural generalization of the classical compactness theorem due to Cheeger-Gromov-Taylor (J. Differential Geom. 17 (1982)) in Finsler geometry.

Title: Murthy Einstein theory of Finsler-Randers cosmological model
(Second parallel session on Finsler Geometry and General Relativity)

speaker: Senajji Kampalappa Narasimha Murthy (Kuvempu University, Shivamogga, Karnataka(State))

abstract: In the present paper, we have investigated the Finsler-Randers cosmological models in modified theories of gravity. Then, obtained the solution with the corresponding models of scalar factor. Further, we studied the behaviour of model in Einstein theory by considering the physical variables $Z_t = -e^{-t}, Z_t = -t^{-n}$ and this positive variables.

Title: On spherically symmetric Finsler metrics with special curvature properties
(Parallel Session on Local Finsler Geometry)

speaker: Bankteshwar Tiwari (BANARAS HINDU UNIVERSITY VARANASI-INDIA)

abstract: In the present talk the spherically symmetric Finsler metrics with special curvature properties will be discussed. We classify the polynomial metric with isotropic E-curvature. Further we find a condition under which a polynomial metric reduces to a Randers metric.

Title: Causal structures and related geometries
(Second parallel session on Finsler Geometry and General Relativity)

speaker: Omid Makhmali

abstract: In this talk the study of causal structures will be motivated, which are defined as a field of tangentially non-degenerate projective hypersurfaces in the projectivized tangent bundle of a manifold. The relation of causal structures to conformal structures is an analogue of what Finsler structures are to Riemannian structures. The solution of the local equivalence of causal structures on manifolds of dimension at least four reveals that these geometries are parabolic and the harmonic curvature (which is torsion) is given by the Fubini cubic forms of the null cones and a generalization of the sectional Weyl curvature. In dimension four the notion of self-duality for indenite conformal structures will be extended to causal structures via the existence of a 3-parameter family of surfaces. Finally, motivated by the work of An-Nurowski, causal structures arising from a pair of Finsler surfaces will be used to develop a notion of rolling for Finsler surfaces which results in examples of G_2-contact structures.

Title: Finsler metrics with 3-dimensional projective symmetry algebra in dimension 2 (Parallel Session on Local Finsler Geometry)

speaker: Julius Lang (Friedrich-Schiller University Jena)

abstract: Every Finsler metric induces a path geometry by its geodesics, and a vector field preserving this path geometry is called a projective symmetry. We show that every Finsler metric admitting at least three independent projective symmetries is either projective equivalent to a Riemannian metric or to a metric for which all projective symmetries are affine symmetries.