



Transformation groups in pseudo-Riemannian geometry

ZEIT:

29.6.2006 - 1.7.2006

ORT:

Max Planck Institute for Mathematics in the Sciences
room Sophus-Lie-Seminarraum (A 01)
Inselstraße 22
04103 Leipzig

PROGRAMM:**29.6.2006**

9:00 - 9:50 **Dmitri Alekseevsky (University of Hull, United Kingdom)**

Einstein symmetric spaces

We discuss the structure of pseudo-Riemannian Einstein symmetric spaces. In particular, we present a classification of quaternionic Kaehler and para-quaternionic Kaehler symmetric spaces with non-zero scalar curvature. We describe also some class of Ricci-flat Kaehler symmetric spaces.

10:00 - 10:50 **Jost Eschenburg (Universität Augsburg, Germany)**

Semi-Riemannian extrinsic symmetric spaces

10:50 - 11:30 Kaffeepause

11:30 - 12:20 **Sergio Console (Università di Torino, Italy)**

Submanifolds and holonomy (I)

In the present talk I survey applications of holonomic methods to the study of submanifold geometry, showing the consequences of some

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sort of extrinsic version of de Rham decomposition and Berger's Theorem, the so-called Normal Holonomy Theorem.

12:20 - 15:00 Mittagspause

15:00 - 15:50 **Carlos Olmos (Universidad Nacional de Córdoba, Argentina)**

Submanifold and holonomy (II)

15:50 - 16:20 Kaffeepause

16:20 - 17:10 **Antonio José Di Scala (Politecnico di Torino, Italy)**

The normal holonomy group of submanifolds with parallel second fundamental form

17:20 - 18:10 **Martin Olbrich (Georg-August Universität Göttingen, Germany)**

Indefinite hyper-Kähler symmetric spaces

30.6.2006

9:00 - 9:50 **Shirley Bromberg (Universidad Autonoma Metropolitana, Iztapalapa, Mexico)**

Left-invariant pseudo-Riemannian metrics on Lie groups (I)

10:00 - 10:50 **Alberto Medina (Université Montpellier 2, France)**

Left-invariant pseudo-Riemannian metrics on Lie groups (II)

10:50 - 11:30 Kaffeepause

11:30 - 12:20 **Michel Goze (Université de Haute Alsace , France)**

3-symmetric homogeneous spaces and Lie algebras graded by groups

12:20 - 15:00 Mittagspause

15:00 - 15:50 **Michel Cahen (Université Libre de Bruxelles , Belgium)**

Quantizing symmetric spaces

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15:50 - 16:20 Kaffeepause

16:20 - 17:10 **José Miguel Figueroa-O'Farrill (University of Edinburgh, United Kingdom)**

String backgrounds from Lie groups: beyond the WZW model

I will explain the role of Lie groups in the construction of (exact) string backgrounds. I will review the appearance of Lie groups admitting a bi-invariant metric in the so-called Wess-Zumino-Witten model and will then report on some work in progress with Nouredine Mohammedi in Tours on constructing exact string backgrounds out of left-invariant metrics on Lie groups.

17:20 - 18:10 **Said Benayadi (Université de Metz, France)**

Metric Lie superalgebras with reductive even parts

We study the structures of (even or odd)-metric (or quadratic) Lie superalgebras over an algebraically closed field of null characteristic. In particular, we characterize the socles and we give inductive descriptions of these Lie superalgebras.

1.7.2006

9:00 - 9:50 **Ernst Heintze (Universität Augsburg, Germany)**

Infinite dimensional symmetric spaces of Kac-Moody type

Quotients of a Kac-Moody group by the fixed point set of an involution are in some sense the closest generalization of Riemannian symmetric spaces to infinite dimensions. These spaces carry a natural metric of Lorentz type but otherwise share many properties with their finite dimensional counter parts.

10:00 - 10:50 **Abdelghani Zeghib (École Normale Supérieure de Lyon, France)**

On the conformal group of Finsler manifolds

We generalize to the Finsler case, the Lelong-Ferrand-Obata Theorem about the compactness of conformal groups of compact Riemannian manifolds, except, the standard sphere.

10:50 - 11:30 Kaffeepause

11:30 - 12:20 **Lionel Berard-Bergery (Université Henri Poincaré Nancy 1, France)**

Invariant subspaces for the holonomy of pseudo-riemannian

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manifolds and applications

12:20 - 14:30 Mittagspause

14:30 - 15:20 **Vicente Cortés Suárez (Universität Hamburg, Germany)**

The twistor spaces of a para-quaternionic Kähler manifold

We develop the twistor theory of G -structures for which the (linear) Lie algebra of the structure group contains an involution, instead of a complex structure. The twistor space Z of such a G -structure is endowed with a field of involutions σ and a σ -invariant distribution $\mathcal{D}$. We study the conditions for the integrability of $\mathcal{D}$ and for the (para-)holomorphicity of $\mathcal{D}$. Then we apply this theory to para-quaternionic Kähler manifolds of non-zero scalar curvature, which admit two natural twistor spaces Z_1 , Z_2 , such that $Z_1 \cong Z_2$. We prove that in both cases $\mathcal{D}$ is integrable (recovering results of Blair, Davidov and Muskarov) and that $\mathcal{D}$ defines a holomorphic (complex) or para-holomorphic (para-complex) contact structure. Furthermore, we determine all the solutions of the Einstein equation for the canonical one-parameter family of pseudo-Riemannian metrics on M . In particular, we find that there is a unique Kähler-Einstein (complex) or para-Kähler-Einstein (para-complex) metric. Finally, we prove that any Kähler or para-Kähler submanifold of a para-quaternionic Kähler manifold is minimal and describe all such submanifolds in terms of complex (complex) or para-complex (para-complex) submanifolds of M tangent to the contact distribution. (This is joint work with Dmitri Alekseevsky.)

15:20 - 15:50 Kaffeepause

15:50 - 16:40 **Charles Boubel (École normale supérieure de Lyon, France)**

Lorentzian flows on compact 3-manifolds

16:50 - 17:40 **Thomas Neukirchner (Humboldt Universität Berlin, Germany)**

Examples of compact homogeneous Lorentz manifolds with special holonomy

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