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)**

formula3-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 Noureddine 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 inductives 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-Obatta 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 formula21 and a formula23-invariant distribution formula25. We study the conditions for the integrability of formula23 and for the (para-)holomorphicity of formula25. Then we apply this theory to para-quaternionic Kähler manifolds of non-zero scalar curvature, which admit two natural twistor spaces formula31, formula33, such that formula35 Id. We prove that in both cases formula23 is integrable (recovering results of Blair, Davidov and Muskarov) and that formula25 defines a holomorphic (formula41) or para-holomorphic (formula43) contact structure. Furthermore, we determine all the solutions of the Einstein equation for the canonical one-parameter family of pseudo-Riemannian metrics on formula45. In particular, we find that there is a unique Kähler-Einstein (formula41) or para-Kähler-Einstein (formula43) 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 (formula41), respectively, para-complex (formula43) submanifolds of formula45 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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