

Conference chairs:

Professor Dr. Helga Baum (Berlin)
Professor Dr. Ines Kath (Greifswald)

Information and Registration:

Alfried Krupp Wissenschaftskolleg Greifswald
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Please apply for the summer academy via the following URL: www.wiko-greifswald.de/anmeldung

The summer academy is open to all those interested in mathematics and theoretical physics. The conference language is English. No registration fee is charged.

In order to take part in the academy, a registration is required. Application deadline is July 10, 2009.

A summer academy organized by the Alfried Krupp Wissenschaftskolleg Greifswald, financially supported by the Alfried Krupp von Bohlen und Halbach-Stiftung, Essen and the Deutsche Forschungsgemeinschaft, Bonn.

Pseudo-Riemannian metrics on manifolds are a generalization of Riemannian metrics to the indefinite case. The most popular examples are metrics with Lorentzian signature, which occur as models for space-times in general relativity. Whereas the Riemannian situation is well studied and a rather satisfactory theory including special geometric structures or manifolds with special curvature properties was established, similar results for pseudo-Riemannian manifolds are rare and even many basic problems are still unsolved. However, in recent years enormous progress was made in this field. A strong motivation for this development comes from theoretical physics, in particular from supergravity and string theory, where a deeper understanding of geometric structures of higher dimensional manifolds with indefinite metrics of different signature is needed.

The Summer Academy on Lorentzian Geometry will deal with the geometry of pseudo-Riemannian manifolds with special holonomy, the classification of pseudo-Riemannian homogeneous and symmetric spaces, the transformation groups in pseudo-Riemannian geometry, the classification of pseudo-Riemannian manifolds with special curvature properties, its applications to general relativity, to supergravity and string theory, and operators of Laplacian and Dirac type on Lorentzian manifolds.

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Alfried Krupp Wissenschaftskolleg
Greifswald

Lorentzian Geometry

(Analysis and Geometry of pseudo-Riemannian Manifolds)

Summer Academy
July 20 - 22, 2009

Monday, July 20, 2009

8.45 am – 9.00 am

Welcome address of the Academic Director of the Alfried Krupp Wissenschaftskolleg Greifswald and opening of the conference

9.00 am – 10.00 am

Geometric conditions leading to Patterson-Walker extension metrics

Andrzej Derdzinski (Columbus, Oh.)

10.00 am – 11.00 am

Nilpotent groups of conformal flows on pseudo-Riemannian manifold

Karin Melnick (New Haven, Conn.)

11.00 am – 11.30 am

Coffee break

11.30 am – 12.30 pm

Submanifold geometry and Berger-type theorems

Carlos Olmos (Córdoba)

12.30 pm – 3.00 pm

Lunch break

3.00 pm – 4.00 pm

Pseudo-Riemannian manifolds with many Killing spinors

Dmitri Alekseevsky (Edinburgh)

4.00 pm – 4.30 pm

Coffee break

4.30 pm – 5.30 pm

Cohomogeneity one actions on symmetric spaces of noncompact type

Jürgen Berndt (London)

5.30 pm – 6.30 pm

Non-semisimple variants of classical pseudo-Riemannian symmetric spaces

Martin Olbrich (Luxembourg)

Tuesday, July 21, 2009

9.00 am – 10.00 am

Dirac type operators on Lorentzian manifolds

Christian Bär (Potsdam)

10.00 am – 11.00 am

Hidden symmetries and the wave equation on Kerr

Lars Andersson (Potsdam)

11.00 am – 11.30 am

Coffee break

11.30 am – 12.30 pm

Short talks

Pluriminimal immersions of pseudo-Riemannian manifolds into indefinite euclidean spaces

Marie-Amélie Lawn

Real bi-graded Clifford modules, the Majorana equation and the Standard Model Action

Jürgen Tolksdorf

12.30 pm – 3.00 pm

Lunch break

3.00 pm – 4.00 pm

The Einstein-Maxwell equations and complex hyperbolic plane

Alan Rendall (Potsdam)

4.00 pm – 4.30 pm

Coffee break

4.30 pm – 5.30 pm

On higher dimensional black holes

Piotr T. Chruściel (Oxford)

5.30 pm – 6.30 pm

Causal variational principles in discrete and continuum space-times

Felix Finster (Regensburg)

Wednesday, July 22, 2009

9.00 am – 10.00 am

Half-flat structures and special holonomy

Vicente Cortés (Hamburg)

10.00 am – 11.00 am

Conformal pp-waves and their ambient metrics

Thomas Leistner (Hamburg)

11.00 am – 11.30 am

Coffee break

11.30 am – 1:00 pm

Short talks

Geometrical Aspects of Time-Machines

Mike Scherfner

Generalized gravitational instantons

Kishore Marathe

Conformal structures associated to generic rank 2 distributions in dimension 5

Katja Sagerschnig

1:00 pm – 3.00 pm

Lunch break

3.00 pm – 4.00 pm

Some global Ricci and scalar curvature problems in Lorentzian geometry

Marc Nardmann (Regensburg/ Cambridge, Mass.)

4.00 pm – 4.30 pm

Coffee break

4.30 pm – 5.30 pm

Projective transformation of pseudo-Riemannian manifolds: rigidity of Einstein manifolds and Lichnerowich conjecture

Vladimir Matveev (Jena)

5.30 pm – 6.30 pm

Projectively equivalent pseudo-Riemannian metrics and integrable $so(p,q)$ -tops

Alexey Bolsinov (Loughborough)