



## SFB-Seminar

### ZEIT:

10.1.2012, 16:00 Uhr - 19:00 Uhr

### ORT:

Konrad-Zuse-Zentrum für Informationstechnik Berlin  
Takustr. 7  
14195 Berlin-Dahlem

### PROGRAMM:

16:00 - 17:00 **Batu Güneysu**

#### **Hydrogen Type Stability Problems on Manifolds**

In this talk, I will explain how classical results on the stability of Hydrogen  $\square$ -type atoms can be extended to certain abstract Riemannian 3-manifolds. This clarifies which geometric and topological properties of the Euclidean space are actually needed to formulate and prove such stability results.

17:00 - 17:30 Kaffeepause

17:30 - 18:30 **Vladimir Matveev**

#### **How to Reconstruct a Metric by its Unparameterized Geodesics**

We discuss whether it is possible to reconstruct a metric by its unparameterized geodesics, and how to do it effectively. We explain why this problem is interesting for general relativity. We show how to understand whether all curves from a sufficiently big family are unparameterized geodesics of a certain affine connection, and how to reconstruct algorithmically a generic 4-dimensional metric by  $\square$  its unparameterized geodesics. The algorithm works most effectively if the metric is Ricci-flat. We also prove that almost every metric does not allow nontrivial geodesic equivalence, and construct all pairs of 4-dimensional geodesically equivalent metrics of Lorenz signature. If the time allows, I will also explain how this theory helped to solve

### Kontakt:

Humboldt-Universität zu Berlin . Institut für Mathematik  
SFB 647 . Unter den Linden 6 . 10099 Berlin  
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727  
sfb647@math.hu-berlin.de

[www.raumzeitmaterie.de](http://www.raumzeitmaterie.de)

two problems explicitly formulated by Sophus Lie in 1882, and the semi- $\square$ Riemannian two-dimensional version of the projective Lichnerowicz-Obata conjecture.

The new results of the talk are based on the papers  
arXiv:1010.4699, arXiv:1002.3934, arXiv:0806.3169,  
arXiv:0802.2344, arXiv:0705.3592 joint with Bryant, Bolsinov,  
Kiosak, Manno, Pucacco.

**Kontakt:**

Humboldt-Universität zu Berlin . Institut für Mathematik  
SFB 647 . Unter den Linden 6 . 10099 Berlin  
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727  
sfb647@math.hu-berlin.de

[www.raumzeitmaterie.de](http://www.raumzeitmaterie.de)