



## SFB Seminartag

### ZEIT:

24.10.2006, 15:00 Uhr - 18:00 Uhr

### ORT:

Humboldt-Universität zu Berlin  
Invalidenstr. 42, Nordbau, Hörsaal 8

### PROGRAMM:

15:00 - 16:00 **Pietro Majer (Universität Pisa)**

#### **A Morse complex for Lorentzian geodesics**

We prove the Morse relations for all geodesics connecting two non-conjugate points on a class of globally hyperbolic Lorentzian manifolds. We overcome the difficulties coming from the fact that the Morse index of every geodesic is infinite, and from the lack of the Palais-Smale condition, by using the Morse complex approach.

16:00 - 16:30 Pause

16:30 - 17:30 **Dr. Olaf Post (HU)**

#### **Spectra of metric graphs and their applications**

Metric (or quantum) graphs are models for nanoscale devices, such as quantum wires, and mesoscopic structures in the zero thickness limit.

They are of interest for example in the study of wave propagation on thin structures. A quantum graph consists of a classical combinatorial graph with edges and vertices and a one-dimensional Schrödinger-type operator associated with each edge and certain boundary conditions at each vertex. As such, a metric graph is distinguished from a combinatorial graph with a discrete Schrödinger operator associated with each of its vertices. In this talk we introduce the basic concepts of metric graphs and their spectral theory. Mathematically, the study of

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metric graphs is related to the study of differential operators on singular domains. As an application, we precise the meaning of "zero thickness limit", i.e., how structures with a thin but finite thickness can be approximated by a metric graph. We end the talk with open questions and perspectives.

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