



## SFB-Seminartag

### ZEIT:

18.7.2006, 15:00 Uhr - 18:00 Uhr

### ORT:

Humboldt-Universität zu Berlin  
Unter den Linden 6  
Hauptgebäude, Hörsaal 3075  
10099 Berlin

### PROGRAMM:

15:00 - 16:00 **Dr. Felix Schulze (FU Berlin)**

#### **Nonlinear evolution by mean curvature and isoperimetric inequalities**

Evolving smooth, compact hypersurfaces in  $\mathbb{R}^{n+1}$  with normal speed equal to a positive power  $k$  of the mean curvature improves a certain 'isoperimetric difference' for  $k \geq n-1$ .

As singularities may develop before the volume goes to zero, we develop a weak level-set formulation for such flows and show that the above monotonicity is still valid. This proves the isoperimetric inequality for  $n \leq 7$ . Extending this to complete, simply connected 3-dimensional manifolds with nonpositive sectional curvature, we give a new proof for the Euclidean isoperimetric inequality on such manifolds.

16:30 - 17:30 **Dr. Konstantin Pankrashkin (HU Berlin)**

#### **Schrodinger operators on equilateral quantum graphs**

Quantum graphs are one-dimensional singular manifolds together with differential operators on them (other names: quantum networks, quantum wires, metric graphs). Such objects have become very popular in the spectral theory, geometric analysis, and mathematical physics in the last years. We provide a description of the spectra of Schrodinger operators on a class of quantum graphs with identical

### 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)

edges in terms of the corresponding discrete Hamiltonians on the underlying combinatorial structures. This gives a rigorous justification of the de Gennes-Alexander correspondence between the tight-binding and quantum network spectra (as used in condensed matter physics) and extends the use of Hill determinants for periodic Sturm-Liouville problems to more general structures. Using this correspondence we provide some global estimates for the spectral gaps, which hold independently of the graph structure. Some open questions and perspectives will be discussed.

**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)