Graduate Talk

Linklessly embeddable graphs

An embedding of a graph G in R^3 is called linkless if any two disjoint circuits of G are unlinked. We give an introduction to linklessly embeddable graphs and show how they can be characterized by Colin de Verdiere's graph parameter based on eigenvalues. (Joint work with László Lovász.)

Colloquium

Matchings, dimers, and scheduling

We discuss the solution of a problem of Erdős and Rényi (1968) on counting matchings in bipartite graphs. It relates to the Van der Waerden conjecture on permanents. The method turns out to have interesting consequences also for the Ising problem (counting dimers) and for school scheduling algorithms.

Colloquium

State graph parameters

The chromatic number of a graph is a special case of a 'state graph parameters'. They occur in statistical mechanics to describe the 'energy' of a graph. We give a precise definition of and introduction to these graph parameters and characterize them by the positive semidefiniteness of certain derived matrices. (Joint work with Michael H. Freedman and László Lovász.)