Großes Physikalisches Kolloquium an der Universität zu Köln

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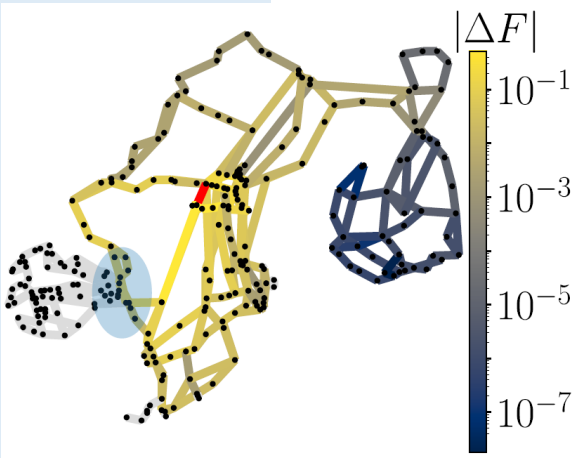
16^{30} Uhr
HS III

Statistical Physics for Sustainable and Secure Energy Systems

The mitigation of climate change requires a comprehensive transformation of our energy system. Power plants based on fossil fuel must be replaced by renewable energy sources, which challenges the operation and stability of the electric power system. In my talk, I will review the key challenges and discuss how methods and ideas from theoretical physics can contribute to their solution.



I will focus on two topics: (i) Renewable power fluctuates on many time scales, making it increasingly difficult to balance generation and load. Methods from stochastic time series analysis are essential to quantify these fluctuations and to understand their impact on power system operation. (ii) Damages of transmission and generation infrastructures are the biggest threat for system stability. Network science helps to understand how failures spread and enables the design of resilient grid structures.