



PHYSIKALISCHES KOLLOQUIUM

Referent: **Prof. Dr. Marc Timme**
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Institute for Theoretical Physics & Center for Advancing
Electronics Dresden (cfaed) @TU Dresden



Thema: **Nonlinear Dynamics of Power Grids
Braess' Paradox, Critical Links and Nonlocal Rerouting**
(Antrittsvorlesung)

Zeit und Ort: Dienstag, 24.10.2017, 16:40 Uhr
Rechnagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Sprecher der Fakultät Physik Prof. Dr. Roland Ketzmerick

Kurzfassung: Robust energy supply and distribution fundamentally underlies our economy, industry and daily life. The ongoing switch of energy sources from fossil to renewable creates a multitude of challenges for operating future-compliant power grids. Renewable-source generation is intrinsically smaller, more distributed, more heterogeneous, fluctuating, correlated and thus requires system-wide planning, balance and control. In this talk I highlight some of the challenges from the perspective of network dynamical systems. In particular, I show why collective aspects of network dynamics as emerging through a multitude of co-acting nonlinearities play a crucial role in the existence of relevant invariant dynamics, their (in)stability, the prediction of critical links and non-local rerouting of flows. A mechanistic understanding of the collective power grid dynamics is thus crucial to design, plan, operate and control them.

Biographie: Having studied Physics and Applied Mathematics at the University of Würzburg, Germany, and the State University of New York at Stony Brook, USA, Marc Timme received his Doctorate in Theoretical Physics at the University of Göttingen. After two research stays at the Max Planck Institute for Flow Research and at Cornell University (USA), Marc was selected as one of four scientists nationwide to head a Max Planck Research Group in the Chemical Physical Technical section of the Max Planck Society and established a group on Network Dynamics at the Max Planck Institute for Dynamics and Self-Organization in Göttingen. Shortly thereafter, he was named Adjunct Professor at the Institute for Nonlinear Dynamics of the University of Göttingen. Since three years, he is active as co-chair of the socio-economic physics division of the German Physical Society. For his research achievements, he received an award by the Berliner-Ungewitter Foundation, the Otto Hahn Medal of the Max Planck Society and a Research Fellowship of the National Research Center of Italy.

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