

**Donnerstag, 07.11.2024, 15:30–17:30 Uhr**

Ort: Reichenhainer Str. 90,  
Zentrales Hörsaal- und Seminargebäude, Raum C10.013

**Gedenkkolloquium für Prof. Dr. Günter Radons**

## **Psychophysics of Musical Rhythms and the Mystery of Swing in Jazz**

**Prof. Dr. Theo Geisel**

MPI for Dynamics and Self-Organization and Bernstein Center for  
Computational Neuroscience, Göttingen

## **Boltzmann-Gibbs Statistics Meets Infinite Ergodic Theory**

**Prof. Dr. Eli Barkai**

Physics Dept., Bar Ilan University, Ramat Gan, Israel

## **Nonlinear Dynamics and Time Delays in Manufacturing**

**Dr. Andreas Otto**

Fraunhofer IWU, Chemnitz, Germany

Alle Zuhörer sind ab 15:15 Uhr zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:  
Prof. Dr. Robert Magerle, Tel. 0371-531-38033



[www.tu-chemnitz.de/physik](http://www.tu-chemnitz.de/physik)

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## **Psychophysics of Musical Rhythms and the Mystery of Swing in Jazz**

**Prof. Dr. Theo Geisel** – MPI for Dynamics and Self-Organization and Bernstein Center for Computational Neuroscience, Göttingen, Germany

How do humans synchronize their timing in musical performances and is it desirable that they play in synchrony and in-phase? The idea of perfect synchrony was challenged e.g. for the swing feel, a salient feature of jazz, which has eluded scientific clarification for a century. For much of this period it was considered arcane, arguing that swing can be felt but not explained, until the theory of 'participatory discrepancies' raised the controversial claim that swing is caused by microtiming deviations between different participating musicians and put a question mark on the synchronization of jazz musicians. In several projects we have clarified the controversy on the central role of microtiming deviations for the swing feel using data analytics and experiments in which we manipulated the timing of different instruments and measured the resulting swing feel through ratings of professional jazz musicians. We thereby showed that involuntary random microtiming deviations are irrelevant for swing, whereas a particular systematic microtiming deviation between musicians enhances the swing feel and is a key component of swing in jazz.

## **Boltzmann-Gibbs Statistics Meets Infinite Ergodic Theory**

**Prof. Dr. Eli Barkai** – Physics Dept., Bar Ilan University, Ramat Gan, Israel

Fermi pointed out that the Hydrogen atom in a thermal setting is unstable, as the canonical partition function of this simple system diverges. We show how a non-normalized Boltzmann Gibbs measure can still yield statistical averages and thermodynamic properties of physical observables, exploiting a model of Langevin dynamics of a Brownian particle in an asymptotically flat potential. The ergodic theory of such systems is known in mathematics as infinite (non-normalizable) ergodic theory. We will then discuss briefly these unusual ergodic properties in the context of a gas of laser cooled atoms.

## **Nonlinear Dynamics and Time Delays in Manufacturing**

**Dr. Andreas Otto** – Fraunhofer IWU, Chemnitz, Germany

Adaptability and resilience of production processes become more and more important in the manufacturing industry. Consequently, for minimizing ramp-up times and the number of scraped parts, it is essential to find optimal process parameters and understand the underlying physics behind the production processes. In this talk, we present some concrete examples from metal cutting and the machine tool industry in general. We show that an accurate modeling of the processes is only possible by taken into account nonlinear dynamics and time delay effects that leads to complex dynamical behavior and interesting results. Finally, some recent applications in the field of chatter detection, for milling tool design and for active damping of vibrations of robots are shown.

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