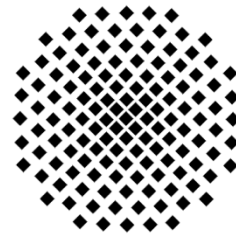


# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme

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Dienstag, 28. Mai 2019

16:15 Uhr

Hörsaal V 57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Udo Seifert, Universität Stuttgart, Telefon: 0711 - 685-64927

## Brownian Motion and Beyond

**Ralf Metzler**  
Universität Potsdam

### Abstract

Roughly 190 years ago Robert Brown reported the "rapid oscillatory motion" of microscopic particles, the first systematic study of what we now call Brownian motion. At the beginning of the 20<sup>th</sup> century Albert Einstein, Marian Smoluchowski, and Pierre Langevin formulated the mathematical laws of diffusion. Jean Perrin's experiments 110 years ago then prompted a very active field of ever refined diffusion experiments.

Despite the long-standing history of Brownian motion, after an historic introduction I will report several new developments in the field of diffusion and stochastic processes. This new research has been fuelled mainly by novel insights into complex microscopic systems such as living biological cells, made possible by Nobel-Prize winning techniques in laser physics, superresolution microscopy, or through supercomputing studies. Topics covered include Brownian yet non-Gaussian diffusion, the geometry-control of chemical reactions, and anomalous diffusion with a power-law time dependence of the mean squared displacement. For the latter, questions of ergodicity and ageing will be discussed.