UNIVERSITÄT DUISBURG ESSEN

PHYSIK E=

Physikalisches Kolloquium

Mittwoch, 08.06.2011
17:00 Uhr
Hörsaal MC 122

Unterstützt von / Supported by

Alexander von Humboldt Stiftung/Foundation

Humboldt Lecture

Non-equilibrium Statistical Mechanics: a growing frontier of “pure and applied” theoretical physics

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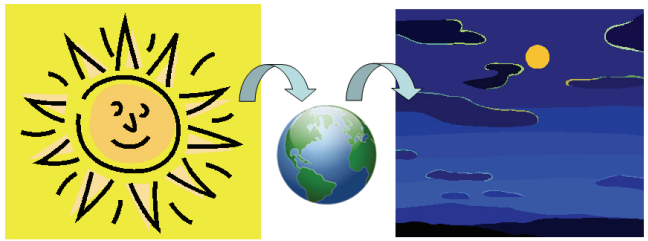
Virginia Tech



$P^*, K^* = ???$

Founded over a century ago, statistical mechanics (SM) for systems in thermal equilibrium has been so successful that, nowadays, it forms part of our physics core curriculum. On the other hand, most of "real life" phenomena occur under non-equilibrium conditions. Unfortunately, statistical mechanics for such systems is far from being well established. The goal of understanding complex collective behavior from simple microscopic rules (of evolution, say) remains elusive. As an example of the difficulties we face, consider predicting the existence of a tree from an appropriate collection of H,C,O,N,... atoms!

Over the last two decades, an increasing number of condensed matter theorists are devoting their efforts to this frontier. After a brief summary of the crucial differences between text-book equilibrium SM and non-equilibrium SM, I will give a bird's-eye view of some key issues, ranging from the "fundamental" to (a small set of) the "applied." The methods used also span a wide spectrum, from "easy" computer simulations to sophisticated field theoretic techniques. These will be illustrated in the context of an overview of our work, as well as a simple model for transport.