VIENNA COMPUTATIONAL MATERIALS LABORATORY
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MELTING TRANSITION OF HARD DISKS

A TALK BY PROF. DR. WERNER KRAUTH,
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DATE / TIME	23.01.2012, 04:00 p.m. (CET)
LOCATION	Seminar Room 138C, Vienna University of Technology, "Freihaus"-building, 9th floor, "yellow" – Wiedner Hauptstraße 8-10, A-1040 Vienna, AUSTRIA)

The hard-disk model has exerted outstanding influence on computational physics and statistical mechanics. Decades ago, hard disks were the first system to be studied by Markov-chain Monte Carlo methods and by molecular dynamics. It was in hard disks, through numerical simulations, that a two-dimensional melting transition was first seen to occur even though such systems cannot develop long-range crystalline order. Analysis of the system was made difficult by the absence of powerful simulation methods.

In recent years, we have developed a number of powerful Monte Carlo algorithms for hard disks and related systems. I will in particular show how the powerful event-chain Monte Carlo algorithm which has allowed us to prove that hard disks melt with a first-order transition from the liquid to the hexatic and a continuous transition from the hexatic to the solid.