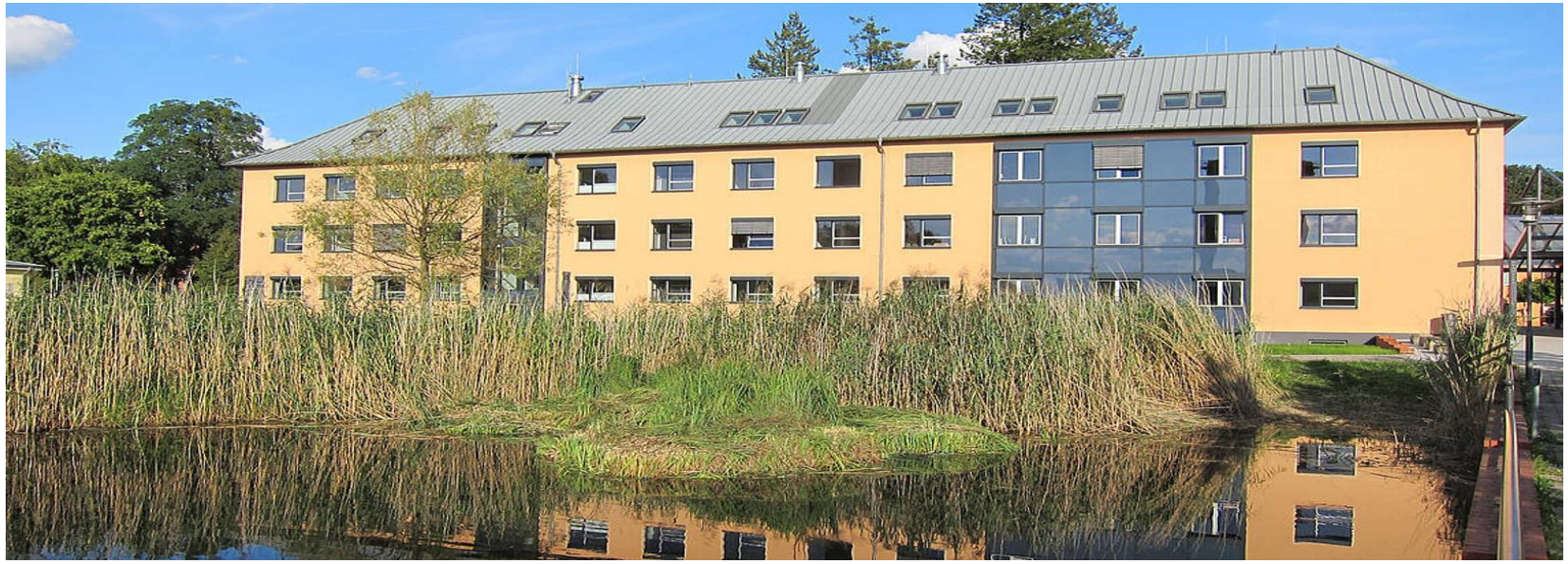
Institut für Mathematik

Universität Potsdam 25 JAHRE

Interaction between mathematics and physics: symmetries and randomness

Institute colloquium



08.11.2017

Campus Golm

Haus 9

Raum 2.22

14:00 **Rupert Frank (LMU, München)**

" Symmetry and Reflection Positivity "

There are many examples in mathematics, both pure and applied, in which problems with symmetric formulations have non-symmetric solutions. Sometimes this symmetry breaking is total, as in the example of turbulence, but often the symmetry breaking is only partial. One technique that can sometimes be used to constrain the symmetry breaking is reflection positivity.

It is a simple and useful concept that will be explained in the talk, together with some examples. One of these concerns the minimum eigenvalues of the Laplace operator on a distorted hexagonal lattice. Another example that we will discuss is a functional inequality due to Onofri.

15:00

15:30 **Simone Warzel (TU, München)**

"The Phase Diagram of Random Matrix Models via Dyson's Brownian motion"

Real symmetric random matrices arise in many branches of mathematics. Historically, they first featured as effective descriptions of energy spectra in atomic physics. In this talk, I will illustrate the basic interesting questions in the field using the simple example of the Rosenzweig-Porter (RP) model. The latter interpolates between the trivial random diagonal and the famous. Gaussian Orthogonal Ensemble and serves as a prototype for the universality class of localisation-delocalization transitions expected in more general disordered quantum systems. The RP model can be described by a set of stochastic differential equations known as Dyson's Brownian motion (DBM).
In the second part of the talk I will explain how the inherent energy- and time-scales in DBM manifest themselves in the phase diagram. A method of characteristics well known from the Burger's equation is a basic ingredient.
(This talk is partially based on a series of joint works with Per von Sosten.)