



Donnerstag, den 06. November 2025, um 14:30 Uhr, im Hörsaal 6

Prof. Dr. Bastian Harrach*

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***From inverse problems in PDEs
to convex semidefinite optimization***

Zusammenfassung/Abstract:

Medical diagnosis has been revolutionized by noninvasive imaging methods such as computerized tomography (CT) and magnetic resonance imaging (MRI). These great technologies are based on mathematics. If the patient's interior was known then we could numerically simulate the outcome of physical measurements performed on the patient. Medical imaging requires solving the corresponding inverse problem of determining the patient's interior from the performed measurements.

In this talk, we will start with an introduction to linear inverse problems in medical imaging. We will demonstrate the mathematical challenges arising from ill-posedness effects and explain the basic concept of regularization to overcome ill-posedness. We will then turn to novel imaging methods where the coefficient in a partial differential equation is to be determined from (partial) knowledge of the PDE solutions. This is a non-linear inverse problems that additionally suffers from the problem of local convergence. We will show recent result towards globally convergent methods that are based on a new relation between inverse coefficient problems and convex semidefinite programming.

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