TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

Fakultät für Mathematik
Chemnitzer Mathematisches Colloquium

Prof. Dr. Patrick Dondl

Universität Freiburg

Dimension Reduction via Γ-Convergence for a Capillarity Problem

Γ-convergence is a notion of variational convergence that ensures minimizers (and minimum values) of a sequence of functionals converge to those of a limiting functional – making it the natural tool for deriving effective models as singular limits of energy minimization problems. In this talk, we will discuss how Γ-convergence can be used systematically for dimension reduction in problems arising in materials science and physics and highlight some subtleties that arise, in particular the notion of Γ-equivalence and its role in identifying the "correct" limiting functional when several candidates exist.
As a concrete application, we consider the problem of a liquid confined between two rough plates whose separation tends to zero. Using a Γ-expansion of Gauss' capillary energy, one obtains a hierarchy of reduced problems: at leading order, the energy depends only on the area of the wetted regions on the plates, while the next-order correction involves their perimeter, weighted by the gap profile and adhesion coefficients. This structure naturally suggests a phase-field approximation suitable for numerical simulation.

Das Kolloquium wird von Prof. Dr. Philipp Reiter geleitet.

Zeit: Donnerstag, 29.01.2026, 16:00 Uhr
Ort: Reichenhainer Str. 90
Raum C10.001