



universität
wien

Fakultät für Mathematik

Antrittsvorlesung

Mathematisches Kolloquium

Mittwoch, 2. April 2025

Sky Lounge

EINLADUNG

Angelika Manhart

(University of Vienna)

„Across the scales: Using differential equations to explain cell biology“

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Abstract:

Mechanistic mathematical modelling is a powerful tool for understanding cell biological phenomena. One of the biggest challenges is the problem of scales: small scale events can result in large scale effects. In the two parts of my talk I will demonstrate the synergistic effects of mathematics and biology.

In the first part of the talk, I will focus on a fundamental question in cell biology: What determines the size and position of a cell's nucleus and how do they impact cell function and health, in particular in muscle cells? We use data-driven PDE and ODE models at different scales to test several modelling hypotheses. This allows identifying the most plausible model and draw conclusions about the underlying biological mechanisms.

In the second part of the talk will showcase a project in collective dynamics: How does the environment of a swarm of cells or other particles influence their behaviour. I will explain how to use coarse-graining techniques to derive and analyse a PDE model for pattern formation driven by swimmer-obstacle interactions.

14.45 Uhr: Kaffeejause

15.15 Uhr: Vortrag

Kleines Buffet im Anschluss

Radu Ioan Boț