

# Physikalisches Kolloquium

des Physikalischen Instituts

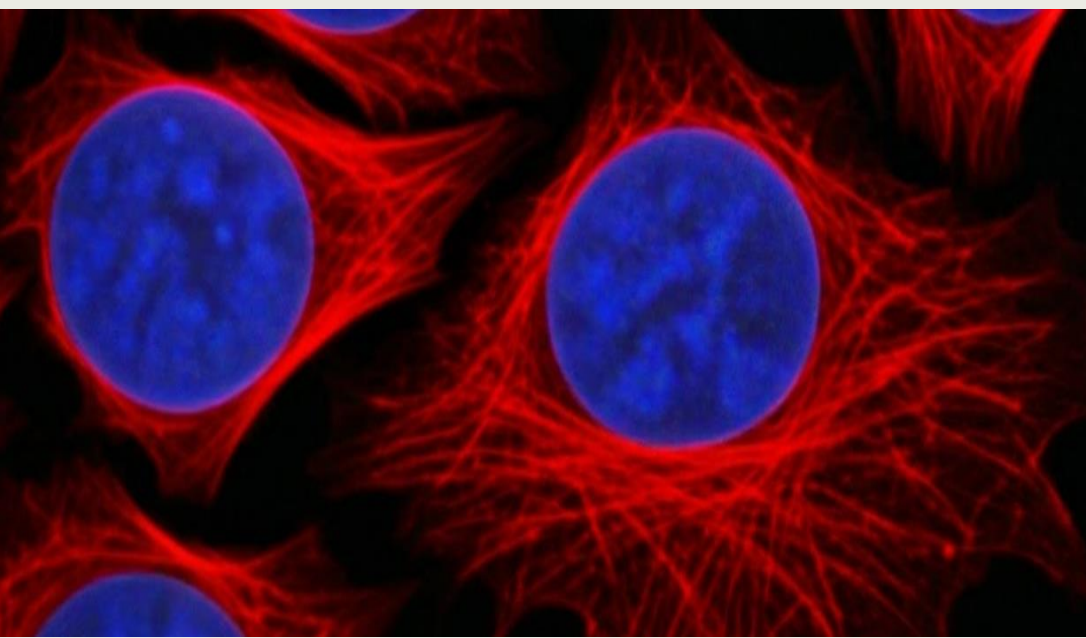


UNIVERSITÄT  
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## Using cellular phase transitions to understand cancer

Cells within tissues can undergo physical transitions—such as jamming and unjamming—that drastically alter their collective behavior and mechanical properties. These phase transitions influence how tissues grow, move, and respond to their environment, and are increasingly recognized as important in both healthy development and disease. We explore how such transitions shape the organization and dynamics of epithelial cell assemblies. Our recent findings identify the small GTPase RAB5a as a key regulator of unjamming, enabling collective motion in both 2D monolayers and 3D spheroids. Alterations of its expression levels promote stronger mechanical interaction with the surrounding matrix and support invasive behavior through unjamming. Moreover, unjamming induces large density fluctuations that generate nuclear stress and lead to the release of DNA into the cytoplasm, potentially activating innate immune pathways. These insights highlight how mechanical state changes in tissues can contribute to cancer progression and offer new perspectives on the physical basis of disease.

**Date: Tuesday, 24<sup>th</sup> June 2025 | Time: 5 pm to 6pm | Room: H18 (NWII)**



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