# Großes Physikalisches Kolloquium an der Universität zu Köln

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## Lesson from smart slime: How active flow networks process information for complex behaviour

13.05.2025
$16^{30}$ Uhr
HS III

Propagating, storing and processing information is key to take smart decisions – for organisms as well as for autonomous devices. In search for the physical principles that allow for complex behaviour, the slime mould Physarum polycephalum stands out by solving complex optimization problems despite its simple make-up. Physarum's body is an interlaced network of fluid-filled tubes lacking any nervous system, in fact being a single gigantic cell. Yet, Physarum finds the shortest path through a maze. We unravel that Physarum's complex behaviour emerges from the physics of active flows shuffling through its tubular networks. Flows transport information, information that is stored in the architecture of the network. Thus, tubular adaptation drives processing of information into complex behaviour. Taking inspiration from the physical principles at work in Physarum we outline how to embed complex behaviour in active microfluidic devices and how to program human vasculature.