Einladung

zum

Physikalischen Kolloquium
Montag, 24.10.2016
16:15 Uhr in N24/H13

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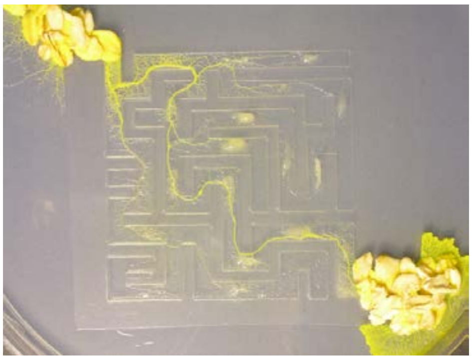
Biological Physics and Morphogenesis
Göttingen

Complex behaviour due to active fluid flows

Complex behaviors are typically associated with animals, but the capacity to integrate information and function as a coordinated individual is also a ubiquitous but poorly understood feature of organisms like slime molds and fungi. Plasmodial slime molds grow as tubular networks and use flexible, undifferentiated body plans to forage for food. How an individual communicates across its network remains a puzzle, but *Physarum polycephalum* has emerged as a novel model used to explore emergent behaviors. Within *P. polycephalum* cytoplasm is shuttled in a peristaltic wave driven by the cross-sectional contractions of tubes. Here, we show that *P. polycephalum* uses exactly these cytoplasmic flows to propagate signals. We track *P. polycephalum*'s response to a localized nutrient stimulus and observe a front of increased contraction amplitude propagating with a velocity comparable to the flow driven dispersion of particles. We implement a mathematical model to identify the following mechanism of signal propagation in accordance with experiments: The nutrient stimulus triggers the release of a signaling molecule, which is advected by fluid flows and moreover hijacks flow generation by increasing the contraction amplitude thereby increasing flows in a feedback loop. This mechanism enables us to explain previously puzzling phenomena, including the adaptation of the peristaltic wave to organism size and the ability of *P. polycephalum* to find the shortest route between food sources in a maze. A simple feedback appears to give rise to *P. polycephalum*'s complex behaviors, and the same mechanism is likely to function within the tens of thousands of additional species with behaviors alike.



Ab 16.00 Uhr Kaffee, Tee und Kekse vor dem Hörsaal H13
Organisation: Prof. Dr. F. Jelezko, Tel. 23750, Host: Prof. Dr. C. Gebhardt, Tel. 23364, off.: 23051