Physik-Kolloquium

Dienstag, den 29.10.2019, 17.00 Uhr

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Effective mixing in cells displaying laminar flow

Transport in cells is a challenge to physical understanding, because diffusive transport is slow beyond micrometre scales, while the flow is still laminar. Commonly, the particle dispersal is minute in such circumstances. In my lecture, I shall discuss the unicellular slime mould Physarum polycephalum. It forms giant cells which extend over areas of up to a couple of square centimetres. The cell forms an extended vascular network in which protoplasm is transported through the cell due to peristaltic pumping. The flow in the veins is always laminar and it reverses its direction periodically, i.e., it performs shuttle streaming. However, particles suspended in this laminar flow are effectively and rapidly distributed within the cell. The origin of this effective mixing is elucidated by micro-particle imaging velocimetry and by following virtual tracers in the determined flow fields.