universität innsbruck

Department of
Theoretical Physics

Theory Colloquium

Prof. Hartmut Löwen, Heinrich-Heine-Universität Düsseldorf

"Active Matter: a new playground of nonequilibrium physics"

Abstract

Abstract: Ordinary materials are "passive" in the sense that their constituents are typically made by inert articles which are subjected to thermal fluctuations, internal interactions and external fields but do not move on their own. Living systems, like schools of fish, swarms of birds, pedestrians and swimming microbes are called "active matter" since they are composed of self-propelled constituents. Active matter is intrinsically in nonequilibrium and exhibits a plethora of novel phenomena as revealed by a recent combined effort of statistical theory, computer simulation and real-space experiments. After an introduction into the physics of active matter focusing on biological and artificial microswimmers as key examples of active soft matter [1], a number of single-particle and collective phenomena in active matter will be adressed ranging from motility-induced phase separation [2] to inertial delay effects of granular vibrobots [2].

[1] For a review, see: C. Bechinger, R. di Leonardo, H. Löwen, C. Reichhardt, G. Volpe, G. Volpe,
Active particles in complex and crowded environments,
Reviews of Modern Physics 88, 045006 (2016).

[2] C. Scholz, S. Jahanshahi, A. Ldov, H. Löwen,
Inertial delay of self-propelled particles, Nature Comm. 9, 5156 (2018).

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