Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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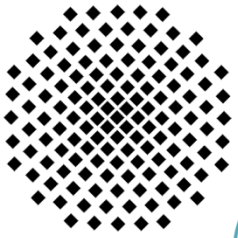

Dienstag, 15. Januar 2013	17:15 Uhr	Hörsaal V 57.01

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Breaking symmetry: From the molecules of life to nanopropulsion

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Abstract

Symmetry breaking is a useful and essential ingredient when assembling complex building blocks and ultimately micro- and nanomachines. At the molecular scale, the molecules of life are chiral and break mirror-image symmetry, and we consider whether simple engineering ideas can be used to generate chirality at the molecular scale. We then describe an optical effect that permits us to detect symmetry breaking in microscopic volumes. It is expected that any man-made nanomachine will require complex-shaped three dimensional building blocks with low or no symmetry. The minimization of surface energies, however, generally causes chemically synthesized micro and nanoparticles to have spherical (or high) symmetry. We describe a method that allows us to obtain 3D nanostructures with complex morphologies and useful properties. Finally, we explore micro and nanostructures that can be used for propulsion at low Reynolds numbers in liquids and that can overcome the constraint of non-reciprocity.