LadHyX Seminar – November 4th, 10:45 am

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Chemical self-propulsion of symmetric objects

Over the past two decades, chemically driven self-propelled objects, such as Janus particles, have become one of the most widely studied systems in active matter. Their motion relies on chemical gradients that modify the surrounding environment, generating interfacial flows or phoretic effects, such as diffusio-osmosis..

Depending on the system, propulsion can arise from , diffusiophoresis in the fluid bulk, diffusioosmosis near solid surfaces, or Marangoni stresses at fluid interfaces. In all cases, symmetry breaking plays a key role in generating motion.

In this presentation, I will discuss several chemically active systems: a camphor disk, a dichloromethane droplet, a colloidal raft composed of a hematite core surrounded by silica particles, and a hematite platelet. Although these objects appear symmetric, they can spontaneously propel themselves. I will focus on the physical mechanisms responsible for this symmetry breaking and the resulting motion.