Title: Shear-driven behavior of confined klinotactic and magnetotactic swimmers

Abstract:

In this talk, I give an overview of our recent studies in the newly emerged field of active soft matter, involving self-propelled Brownian particles, known also as swimmers. Our works involve computational modeling of klinotactic as well as magnetotactic swimmers in confined geometries, such as cavities and narrow fluid channels. In the latter case, the swimmers are subjected to imposed shear flows, where we show that a host of intriguing effects, such as population splitting, orientational pinning, focusing due to wall-induced hydrodynamic images and, when a transverse field is applied, subtle swimmer migration behaviors, such as reverse migration and net upstream swimmer flux occur. I discuss the importance of these phenomena from a theoretical point of view, but also show that they can pave the way for potential strategies in particle separation applications in nano-/microfluidic experiments.