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Friday, Oct 27, 11:00 am. Osborne A204

Bacterial flagellar dynamics in anisotropic media

Bacterial navigation of anisotropic fluids plays a significant role in biofilm formation, bacterial colonization of the mucosal linings of the lungs and reproductive tract, and the organization of the gut microbiome. In these settings, hydrodynamic interactions force bacteria to swim along a preferred direction rather than the classical run-and-tumble motion in three dimensions. In this seminar, I will discuss bacterial flagellar dynamics in man-made and natural anisotropic fluids exemplified by a bio-compatible nematic liquid crystal and cervical mucus. I will discuss our recent discovery of unidirectional swimming and motion reversal in both systems, supporting the model of mucus as an effective liquid crystal, and will showcase our findings of new mechanisms of bacterial environment exploration, which is dominated by mechanical interactions between the flagella and the complex fluid.

Short Bio

Prof. Figueroa received a Ph.D. in Physics from the Sorbonne University in Paris (2017), and both M.S. and B.S. in Physics from the University of Havana, Cuba. After Ph.D., Prof Figueroa was a postdoctoral scholar in Biomedical Engineering at The Pennsylvania State University. She joined the faculty at the Physics Department of the University of Colorado Boulder in 2020. Her group studies the transport of swimming cells, bacteria, and viruses, in geometrically complex environments like porous media and catheters, and in complex and anisotropic fluids like mucus and liquid crystals.