MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, January 15, 2016
4:10 – 5:00 PM
EPS103

Viscous Constraints on Microscale Approach and Propulsion

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Abstract:

At the microscale, hydrodynamic constraints lead to nonintuitive features of propulsion for engineered as well as living systems. I begin by describing the characteristics of microscale (low Reynolds number) flow, the challenges they present to biological propulsion, and how swimming microorganisms overcome those challenges. Then I describe some recent work exploring how viscous effects constrain the approach of swimming microorganisms to suspended target particles, which can be important for life processes including feeding, mating, and finding new habitats. Next I turn to engineered magnetic microswimmers, which have been investigated for biomedical applications. While inspiration from biology has helped their design, I discuss recent work in which we show that biomimetic strategies have neglected a large design space for such microrobots. In particular, even achiral rigid geometries can be propelled by rotating magnetic fields. Finally, I describe our ongoing work to take advantage of this increased design space for modular microrobotics, which requires the ability to robustly control approach and assembly.

Hosts:

- **Anton Vorontsov, MSU Physics**
- **Jim Wilking MSU Chemical & Biological Engineering and Center for Biofilm Engineering**

****** Refreshments served in the EPS second floor atrium at 3:45 ******