**Department of Biomathematics Seminar Series:**
**Frontiers in Systems and Integrative Biology**

# Anomalous Diffusion and Random Encounters in Living Systems


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## 4:00 PM
## A2-342 MDCC, Moss Auditorium
**Marion Davies Children's Clinic**


**ABSTRACT:**
The last twenty years have seen a revolution in tracking data of biological agents across unprecedented spatial and temporal scales. An important observation from these studies is that path trajectories of living organisms can appear random, but are often poorly described by classical Brownian motion. The analysis of this data can be controversial because practitioners tend to rely on summary statistics that can be produced by multiple, distinct stochastic process models. Furthermore, these summary statistics inappropriately compress the data, destroying details of non-Brownian characteristics that contain vital clues to mechanisms of transport and interaction. In this talk, I will survey the mathematical and statistical challenges that have arisen from my work on the movement of foreign agents, including viruses and synthetic microparticle probes, in human mucus. My collaborators and I have demonstrated that the behavior of individual particles is well-described by the integrated Generalized Langevin Equation, a Gaussian process that features tunable autocorrelation in time. Physicists have postulated that the memory in particle paths is related to certain viscoelastic features of the fluid environment. I will detail the stochastic PDE framework necessary to probe this hypothesis and detail some successes (and failures!) in describing population scale dynamics in such a way to predict the rate at which these agents penetrate the human body's first line of defense.


Host: Van Savage, Ph.D.

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