ESAM SEMINAR SPEAKER



The Mathematics of Diffusive Signaling and the Role of Receptor Clustering in Chemoreception

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Cells receive chemical signals at localized surface receptors, process the data and make decisions on where to move or what to do. Receptors occupy only a small fraction of the cell surface area, yet they exhibit exquisite sensory capacity. In this talk I will give an overview of the mathematics of this phenomenon and discuss recent results focusing on receptor organization. In many cell types, receptors have very particular spatial organization or *clustering* - the biophysical role of which is not fully understood. In this talk I will explore how the number and configuration of receptors allows cells to deduce directional information on the source of diffusing particles. This involves a wide array of mathematical techniques from asymptotic analysis, homogenization theory, computational PDEs and Bayesian statistical methodologies. Our results show that receptor organization plays a large role in how cells decode their environmental situation and infer the location of distant sources.

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