



**En partenariat avec Targeted
Technological Actions on AI (ATC-AI).**

Smita Krishnaswamy

Yale School of Medicine

Associate Professor of Genetics and of Computer Science

**« Inferring and Characterizing Cellular and Neural
Dynamics with Geometric and Topological Deep
Learning »**

Thursday 14 march 2024, at 12:00 pm
Auditorium F. Jacob

Hosted by Laura Cantini, laura.cantini@pasteur.fr

In this talk I will cover our work inferring cellular dynamics during differentiation and disease with neural ODE networks that are regularized to follow the data geometry or manifold. First I will cover Mioflow for dynamic optimal transport-based derivation of single cell trajectories from static snapshot scRNA-seq data. Then I will discuss RITINI, our recent graph ODE network which allows us to learn gene regulation that underlies cellular dynamics. I will showcase applications of these in triple negative breast cancer and human embryonic stem cell differentiation. Finally, I will cover learnable geometric scattering (LEGS) networks, a multiscale wavelet-based neural network that allows us to classify and characterize populations of cells, and their trajectories. I will also show some applications of these techniques to neural activity dynamics.