WINTER SEMESTER 2025 / 2026

RTG 2756 CYTAC SEMINAR SERIES

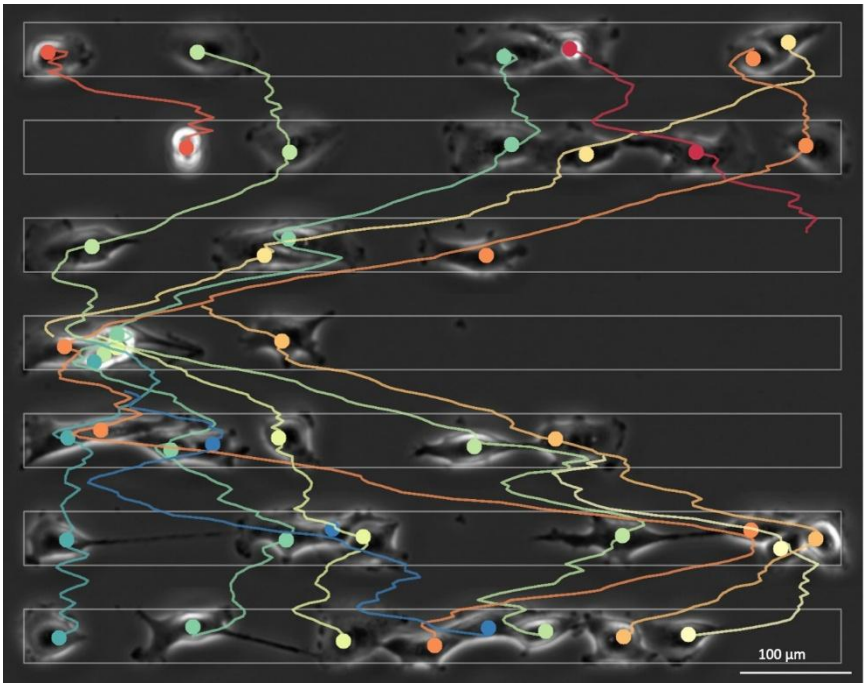
TUESDAY, FEBRUARY 3
17:00 IN HS5

CYTAC
RTG 2756

PROF. DR. CHASE BROEDERSZ

Theoretical Physics of Life, Vrije Universiteit Amsterdam

LEARNING THE INTERACTIONS AND DYNAMICS OF COLLECTIVE CELL MIGRATION



The majority of cells in our body do not move around—but when they do, it is for an important reason: single and collectively migrating cells shape us during development, they protect us during immune response but can also harm us during cancer progression. Yet, the underlying dynamics of how cells move and interact with each other and their environment remains unclear. I will discuss how data-driven theoretical approaches can be used to learn the dynamical laws underlying cell movement, morphology and interactions of cells in controlled artificial environments. By inferring a stochastic equation of motion directly from experimental data, we show that cells exhibit intricate non-linear deterministic dynamics that adapt to the geometry of confinement. We extend this approach to interacting systems, by tracking how trajectories of colliding pairs of cells scatter. This allows us to develop and constrain a phenomenological theory of contact-interactions between cells. Finally, I will discuss how our approach can be generalized to identify the interactions rules underlying the many-body stochastic dynamics that controls collective migration in multicellular systems.