WINTER SEMESTER 2026/2027

RTG 2756 CYTAC SEMINAR SERIES

TUESDAY, NOVEMBER 17
17:00 IN HS5

CYTAC

RTG 2756

DR. HERVÉ TURLIER

Center for Integrative Biology (CNRS), Université de Toulouse

FROM IMAGES TO MECHANISMS: LEARNING TISSUE MORPHOGENESIS

Advances in fluorescence microscopy now provide increasingly detailed 3D images of tissues and embryos, but extracting quantative physical information from these data remains a major challenge. In this talk, I will present our recent work aimed at connecting mechanical modeling with imaging data. I will first introduce computational tissue models based on foam-like descriptions of multicellular systems, which incorporate viscous dissipation, cell division, and mechanochemical feedback. I will then describe a 3D tension inference approach that enables us to infer mechanical information directly from microscopy images and to build detailed mechanical atlases of embryos and tissues. Next, I will present a differentiable modeling approach that couples mechanical simulations with target-oriented optimization, as well as a reinforcement-learning framework designed to learn tissue morphogenesis, providing a new route toward solving inverse mechanical problems in development. Altogether, these approaches aim to integrate biophysics, imaging, and AI to uncover the principles governing cell and tissue morphogenesis.

