

WINTER SEMESTER 2024 / 2025

RTG 2756 CYTAC SEMINAR SERIES

TUESDAY, JANUARY 21  
17:00 IN HS5

CYTAC

RTG 2756

## PROF. DR. FLORIAN BERGER

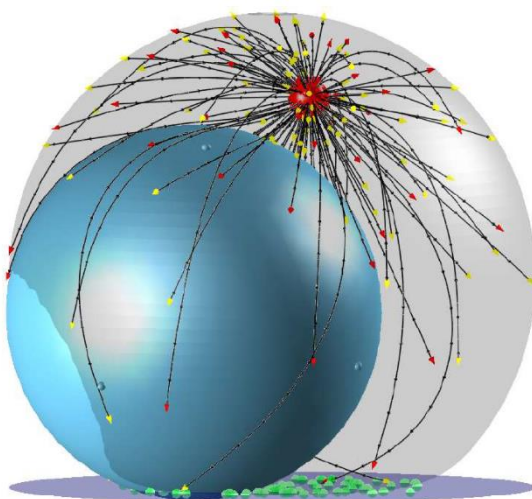
Cell Biology, Neurobiology and Biophysics

Center for Complex System Studies

Utrecht University

### ACTIVE PROCESSES IN BIOLOGY: OBSERVING, DESCRIBING, PERTURBING, AND CONTROLLING

*The physical understanding of a system is based on four steps: observing, describing, perturbing, and controlling. While this strategy was very successful in studying inanimate matter in the past, it poses new challenges when applied to active biological systems. In this presentation, I will explain three of our latest attempts to overcome some of these challenges: First, we promote the application of statistical models, including random fields, to connect fluorescence images to biophysical models. These statistical models can suggest biophysically relevant length scales that are not directly visible in the images. Second, to connect molecular mechanisms of the force production of molecular motors to cellular*



*behavior, we use physical descriptions that we implement in large-scale simulations. In particular, we show that tight regulation of the microtubule cytoskeleton by molecular motors in T cells is necessary for these cells to be activated when encountering pathogen cells. Third and lastly, we recently built a closed-loop feedback microscope to precisely control cellular and intracellular activity. We believe that the spatio-temporal control of active biological systems provides a novel way to study and understand their underlying functional principles.*