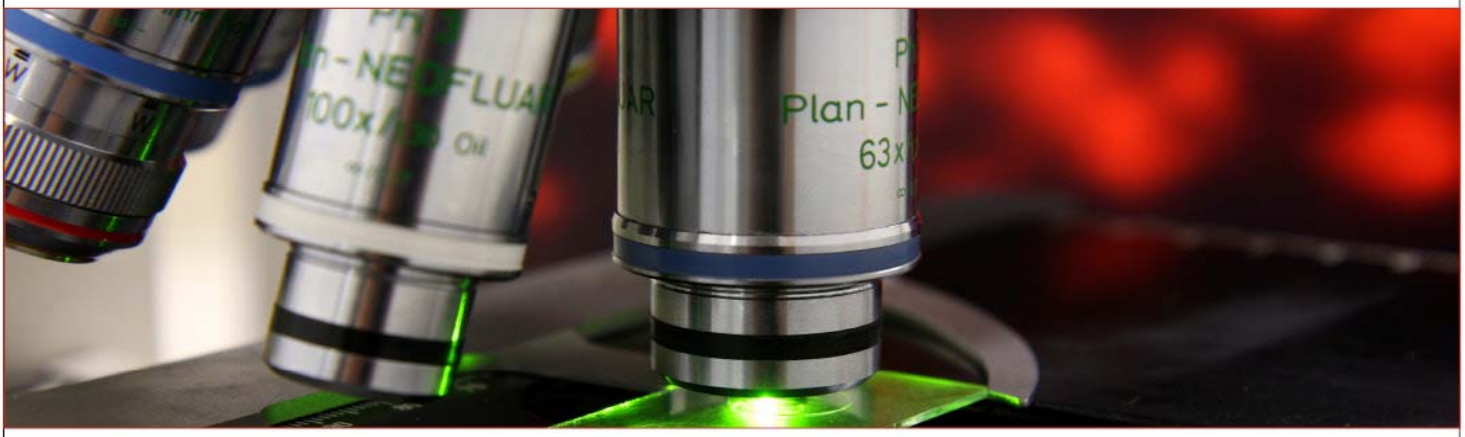
SÉMINAIRES ET CONFÉRENCES



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« Uncovering cell states, their transitions and regulatory networks for cell engineering»

Stem cells have huge potential for regenerative and therapeutic medicine. Its realization however depends on our fundamental understanding of the mechanisms that underpin their cell states. Advances in cell reprogramming have invoked a provocative new concept that cells may sometimes exist in a metastable dynamic state. For instance, under similar conditions stem cells exhibit multiple cell states with varying degrees of potency. Similarly, cancer progression is highly heterogeneous consisting mosaic of cell states. The molecular nature of cell states, the mechanisms for their transitions and the fundamental reasons for the heterogeneity are poorly understood. While the traditional inside-out approach has extensively helped map the molecular components and understand their role in cellular processes, the outside-in strategy of systems and synthetic biology offers novel solutions to predict and control cell behavior. In this talk, I will discuss how we are utilizing quantitative experiments in combination with computational analysis and models to understand the nature of stem cell states at the individual cell level. This *systems perspective* has allowed us to identify the key regulators, characterize their network dynamics and modulate the cell behavior. The resulting knowledge further allows us to control and reverse engineer the cell states for potentially useful purposes such as regenerative medicine.

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