
CLEMENT SOUBRIER, UBC

*Experimental analysis of *M. smegmatis* morphological feature dynamics and modelling using reaction-diffusion systems.*

Atomic Force Microscopy (AFM) is a quantitative scanning technology capturing cell surface mechanical properties such as height, chemical adhesion or stiffness. Recent advances in coupling AFM-based nanoscale spatial resolution with temporal data has allowed to observe the dynamics of cellular morphology at an unprecedented scale, and study key cellular mechanisms over long time range.

In this talk, we analyze experimental data to investigate *Mycobacterium smegmatis* morphology over time, and model pattern dynamics using a reaction-diffusion system. This non pathogenic and fast growing bacterium is commonly studied as a model for harmful mycobacteria such as *M. tuberculosis*, since they share a similar cell wall structure. Upon using our pipeline to reduce the cell surface geometry to its center-line and measure height variation along it, we confirm the presence of peaks and troughs on the cell surface, as consistent features of the morphology. We also show how these features relate to bi-phasic and asymmetric polar growth dynamics, as well as division site selection. Finally, we show that a minimal reaction-diffusion model on a growing domain can reproduce and maintain similar feature over time, enabling a better understanding of yet unknown morphology controlling pathways.