Minicolloque n° MMM13 ☑ **Oral** ☐ **Poster**

Too fast to grow: Dynamics of pendant drops sliding on a thin film [1]

Etienne Jambon-Puillet[a*], Pier Giuseppe Ledda[b], François Gallaire[b] et P.-T. Brun[a]

a. Department of Chemical and Biological Engineering, Princeton University, Princeton, New-Jersey 08540, USA
b. Laboratory of Fluid Mechanics and Instabilities, École Polytechnique Fédérale de Lausanne, Lausanne, CH-1015, Switzerland

* email: ejambon@princeton.edu

Pendant drops suspended on the underside of a wet substrate are known to accumulate fluid from the surrounding thin liquid film, a process that often results in dripping. The growth of such drops is hastened by their ability to translate over an otherwise uniform horizontal film. Here we show that this scenario is surprisingly reversed when the substrate is slightly tilted (≈ 2 deg); drops become too fast to grow and shrink over the course of their motion. Combining experiments and numerical simulations, we rationalize the transition between the conventional growth regime and the previously unknown decay regime we report. Using an analytical treatment of the Landau-Levich meniscus that connects the drop to the film, we quantitatively predict the drop dynamics in the two flow regimes and the value of the critical inclination angle where the transition between them occurs.

[1] E. Jambon-Puillet, et al. arXiv:2012.05941 (2020).

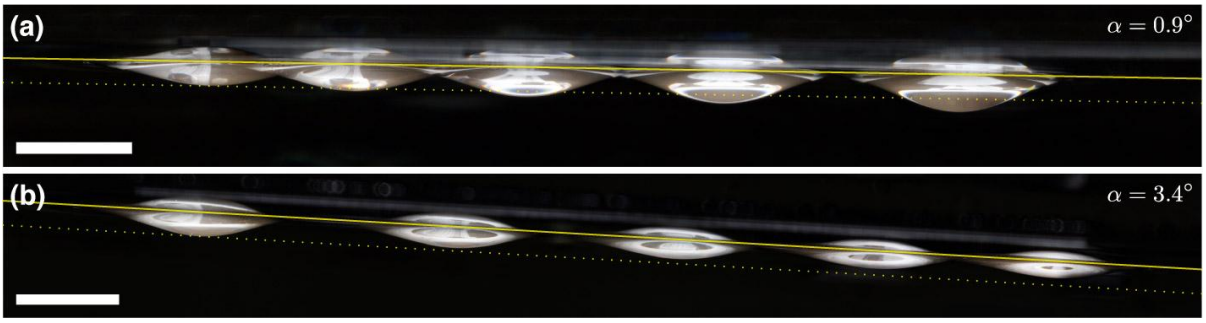

Figure 1: Chronophotographies of two drops sliding on a 89 µm thick film at low **(a)** and high **(b)** inclination angles α (scale bars are 5 mm). The pictures include the reflexion of the drop on the substrate. The solid lines indicate the position of the substrate. The dotted lines mark the initial amplitudes of the drops.