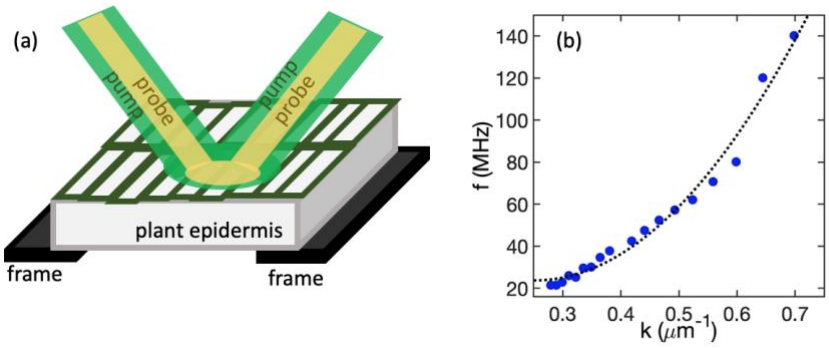
# M2 Internship in Laser Ultrasonics

# at
# Institut Lumière Matière,
# Université Claude Bernard Lyon 1

## Probing the mechanics of plant epidermises with laser-generated guided waves

**Context and Objectives**: Thin cellulose films and membranes extracted from plant epidermises are emerging as a sustainable solution to replace traditional, petroleum-based polymers in various technological areas due to their natural abundance, environmentally benign fabrication, and multi-functionality. While considerable efforts have been recently devoted to better understand the optical, electrical, and thermal properties of these materials, their mechanical behavior has remained less explored. In this context, the proposed Master's internship aims at characterizing the mechanical properties of cellulose-based thin films taken from dehydrated plant scales with laser-generated ultrasonic guided waves.




As part of this, the Master student will help implement the necessary tools to:

1) Fabricate micron-thick free-standing films using dehydrated plant epidermises (Fig 1a).
2) Utilize Laser Ultrasonics setups to measure the acoustic dispersion curves of guided acoustic waves in these films (Fig 1b).
3) Analyze the measured signals and compare them to analytical and/or numerical models.

**Duration:** The internship is scheduled to start on February 2024, for a duration of 6 months.

**Environment:** The candidate will work in the Biophysics team at ILM, under the supervision of Maroun Abi Ghanem and Thomas Dehoux.

**Requirements:** The candidate is expected to have a strong background in acoustics and elastic wave propagation in solids, as well as lasers and optical setups. Knowledge of finite element modeling (preferably COMSOL Multiphysics) is a plus.

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