

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Laboratoire de Physique des Solides

CNRS identification code: UMR 8502

Internship director's surname: Emmanuelle Rio

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Phone number:

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Internship location: Laboratoire de Physique des Solides, Orsay

Thesis possibility after internship: YES

Funding: NO

If YES, which type of funding:

Aerosol Production During the Breakup of Soap Films

Background and Challenges The bursting of bubbles on the ocean surface is a critical process for understanding exchanges between the ocean and the atmosphere. Indeed, when these bubbles burst, they eject microdroplets—known as “ejecta”—that carry salts and organic matter into the air. The physics of this phenomenon is based on the thinning and rupture of extremely fragile liquid films (thinner than 100 nm). The size of the ejecta is known to be determined by the thickness of the thin film; therefore, predicting it requires a thorough understanding of the dynamics of film thinning. Furthermore, the geometry of the film at the rupture site is also crucial. Thus, when a bubble bursts, the dynamics of the hole opening give rise to instabilities with very different wavelengths depending on the position where the rupture initiates (Fig. 1).

Course Objectives and Schedule The goal of this internship project is to characterize the influence of geometry on bubble rupture dynamics and the distribution of ejected droplets. The work will focus in particular on characterizing ejection mechanisms. By inducing ruptures through controlled perturbations (heated needles or wires), the intern will seek to establish a correlation between the overall shape and local curvature of the films, on the one hand, and the size of the resulting droplets, on the other. The project may be expanded to include the study of spontaneous ruptures. Using high-speed visualization tools, the goal will be to determine precisely when and where the film fails.

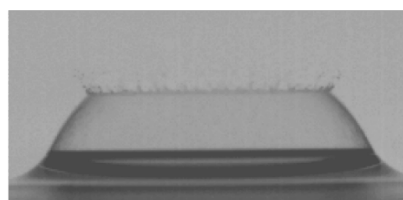
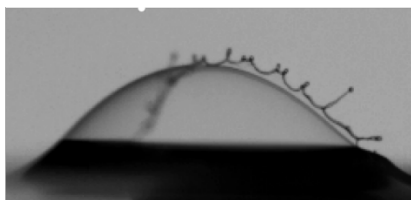


Figure 1: Observation of the ejecta produced when a bubble bursts. The droplet sizes vary significantly depending on the location of the rupture.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: NO

Soft Matter and Biological Physics: YES

Quantum Physics: NO

Theoretical Physics: NO