INTERNSHIP PROPOSAL

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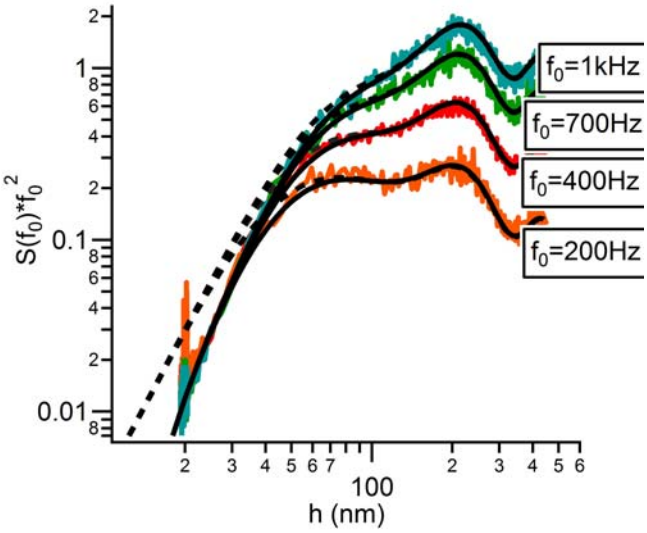
Properties of nanometric liquid films

In the vicinity of a solid wall, the structure of a liquid may be modified : for instance, in some liquids, a layering has been observed at nanometric distances from a wall. The resulting dynamics of the liquid at those distances remains a matter for debate. One difficulty is that the formed structure may be disturbed by an applied shear.

We have developed an optical technique in order to form thin liquid films lying on solid substrates and study their properties in a non invasive way. We use the spontaneous thermal fluctuations of the free surface of the liquid in order to probe its properties. In a recent work, we have evidenced a layer of immobile molecules within molecular distances from the wall [Phys. Rev. Lett., 114, 227801 (2015)]. The internship will consist in using a similar experimental system in order to address different questions on nanometric liquid films ; for instance, how does the immobile layer evolve close to the solidification temperature of the liquid ? or how does an induced flow modify that layer ? The results are expected to open new perspectives on the properties of nanometric liquid films, which will be the subject of a thesis.



Evidence for a 4nm-thick immobile layer close to a glass wall in hexadecane. A quantity obtained from the spectrum of the surface fluctuations of the film is shown as a function of the film thicknesses, at different frequencies. The dotted line represents what is expected for a zero slip velocity boundary condition, whereas the full line corresponding to to a slip length of -4nm better describes the experimental data.