Title: Tension cell for measuring bubble dynamics.

Lab: Institute of Light and Matter
Team:Luminescence (http://ilm.univ-lyon1.fr/luminescence)
Supervisors: Dr. Gilles Ledoux
Contact: gilles.ledoux@univ-lyon1.fr,

The phase change transition from liquid to vapor, known as cavitation, is of interest in several engineering and scientific fields. Vapor bubble nucleation and growth is driven by a pressure drop below the liquid vapor pressure. Producing and exciting a bubble for single bubble experiments is most commonly done with the help of pulsed ultrasound in the liquid. Other options are the tube arrest method and a pulsed laser, both of which create a pressure wave to create the bubble. However, none of these methods allow for a precise and fast control of the growth and collapse time (interface dynamics).
We propose in this internship to investigate a novel method to grow and collapse a single cavitation bubble in a well-controlled manner, using a high force piezoelectric transducer to exert tension on a confined small volume of liquid. A particle would be placed in the liquid to serve as a nucleation point and at the same time as probe for monitoring the physical parameters of the bubble (temperature, pressure …). The presence of the particle will lower the cavitation threshold and allows for a predictable positioning of the inception bubble.
The internship will involve work on the tension cell itself as well as the development of the different optical diagnostics around the cell: photoluminescence, raman, high speed imagery …