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Liquid flat sheet jets characterization

The development of sub-micrometer-thickness flat sheet jets has enabled several novel achievements in science. The micrometer thickness, high stability, and optical flatness of the flat sheets are key characteristics required for the successful exploitation of these systems, especially for the spectroscopic study of aqueous samples [1,2].
Recently, several methods of achieving flat jets of ~μm thickness in a vacuum have been described, in our case, we focus on the use of a commercially available glass chip based on the gas dynamic virtual nozzles principle [3].

To be able to offer, in the recent future, the micro-thickness flat-sheet to the user community, a novel prototype of the glass-chips adapter has been developed. Thus, the main objective of this project is to implement and commission the new design of the flat-sheet chip adapter as well as the resultant flat-sheet characterization.
The flat sheet characterization (study of the sheet dimensions depending on the flow and aqueous solutions) includes the implementation of a new system to characterize the jet thickness based on the white light interferometer and the use of the advanced laser setup to characterize the jet speed.

At the end of the project, the student will be familiar with the microfluidics environment (experimental science), more specifically liquid flat sheets, and with advanced optical and technical lab equipment.

[1] Ekimova M., et al. A liquid flat jet system for solution phase soft-x-ray spectroscopy. Struct. Dyn. 2015, 2, 054301.
[2] Menzi S., et al. Generation and simple characterization of flat, liquid jets. Rev. Sci. Instrum. 2020, 91, 105109.
[3] Koralek, J. et al. Generation and characterization of ultrathin free-flowing liquid sheets. Nat. Commun. 2018, 9, 1-8.

Field

A4: Development of experimental techniques (methodology oriented)

DESY Place

Hamburg

DESY Division

other

DESY Group

EuXFEL, SEC

Special Qualifications:

Primary author: RIPADO VALERIO, Joana (Eur.XFEL (European XFEL))