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## Laser-capillary interaction for the EXIN project

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The EXIN project is under development within the SPARC\_LAB facility of the National Laboratory of Frascati (LNF-INFN).

This project aims to accelerate preexisting electron bunches with high brightness exploiting the wakefield plasma acceleration technique while preserving the initial quality. The electron bunches are generated by the SPARC photo injector with an energy of about 80MeV, a normalized emittance of  $\sim 1$  mm-mrad, a charge  $Q \sim 10$ -20 pC and a repetition rate 1-10 Hz.

The wakefield is excited inside a capillary by high intensity laser pulses produced by the FLAME 200TW laser interacting with a gas/plasma.

Nowadays, the plasma wakefield acceleration is worldwide studied thanks to the high accelerating gradient that can be reached. At LNF we are focusing on the possibility of obtaining high quality accelerated bunches exploiting these high gradient.

The chosen acceleration regime is the “quasi non linear” with normalized laser intensity  $a_0 \sim 1.3$  and a plasma density corresponding to a wavelength  $\lambda_{\text{plasma}} \sim 100 \mu\text{m}$ . These values determine the range of the laser and capillary parameters to be employed.

We discuss the choice of the experimental parameters and we present the laser-capillary matching condition and the interaction point layout.

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