



## **Discharge plasma R&D at ELI-Beamlines: simulations and experiments**

Action: EuPRAXIA PP / WP10 / 1<sup>st</sup> meeting / March 15, 2023

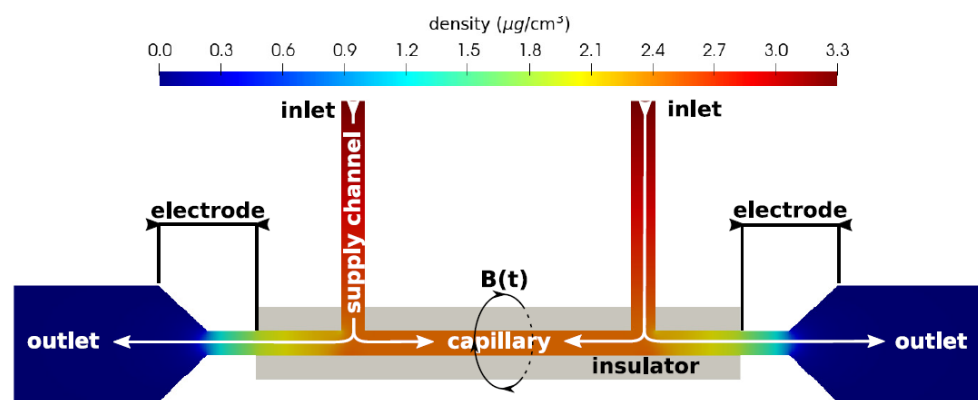
Author: Alexander Molodozhentsev



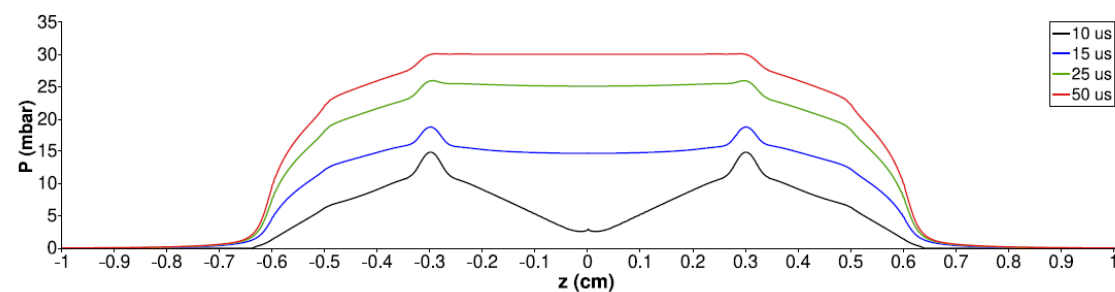
## Main goal:

- Discharge plasma formation in Sapphire capillary for the LUIS-LWFA setup (modelling and measurement)
- High-repetition rate operation (5 Hz  $\rightarrow$  20 ... 50 Hz) in the case of a 'short' capillary (10-20 mm)

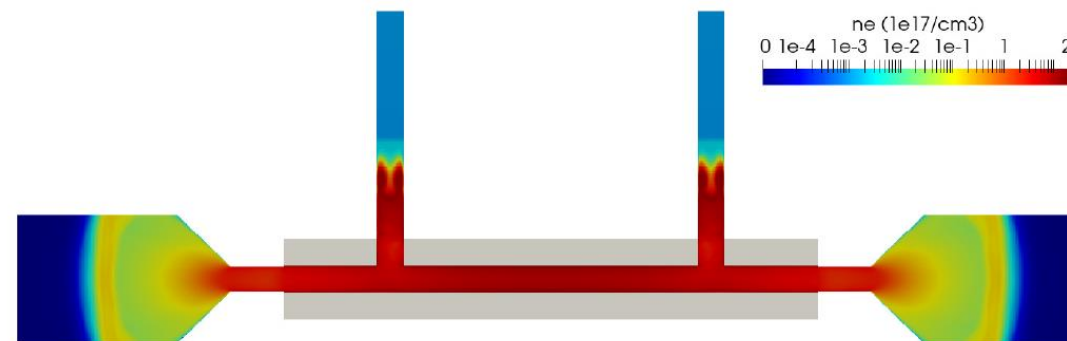
## Gas filling process



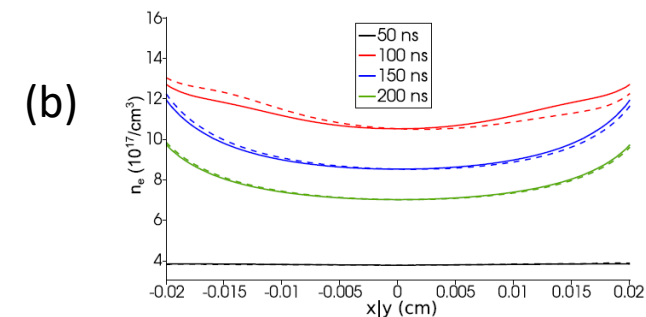
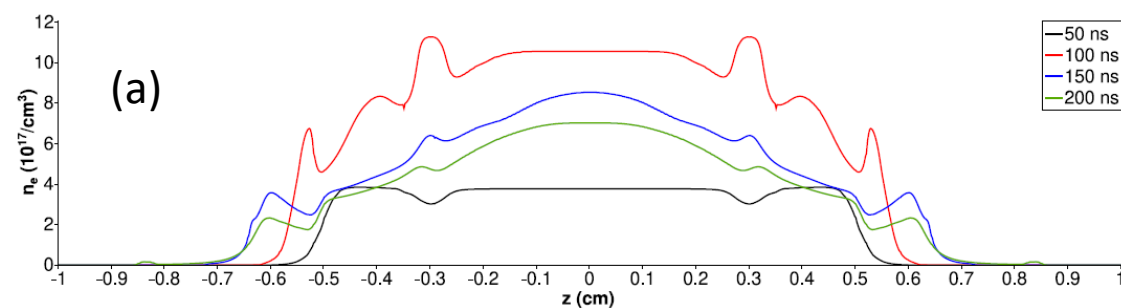
## Gas pressure along the capillary channel



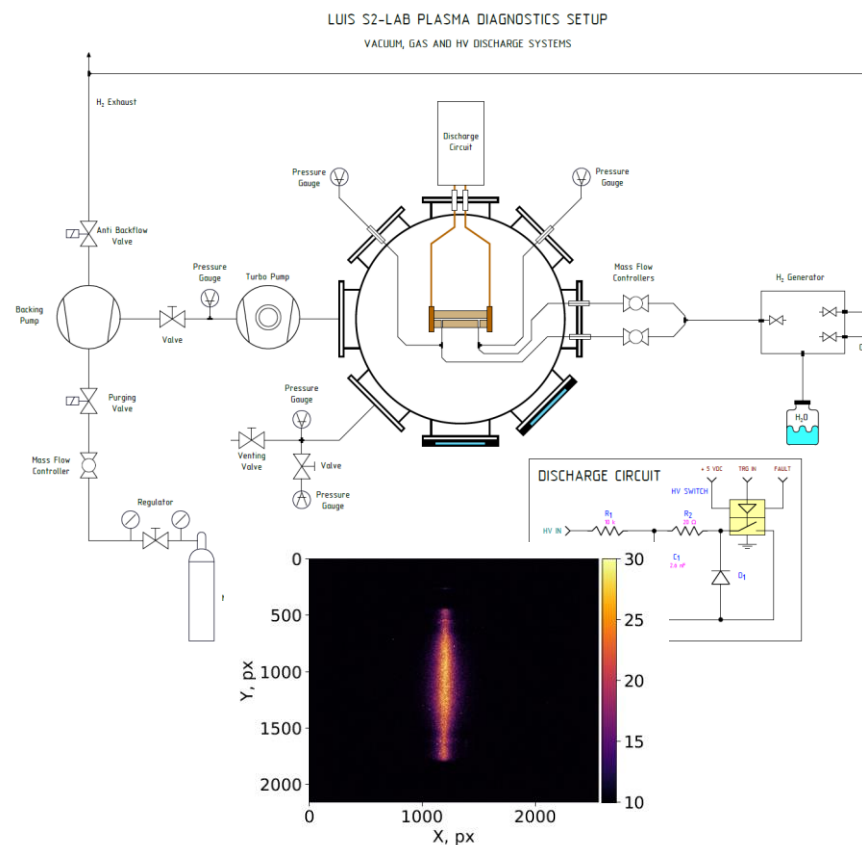
## Discharge plasma formation



## Plasma density : (a) along and (b) across the channel

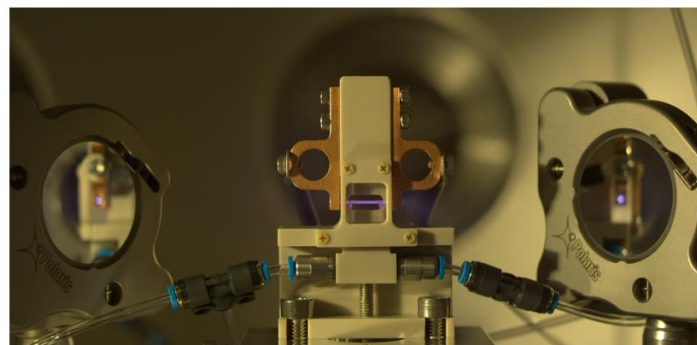
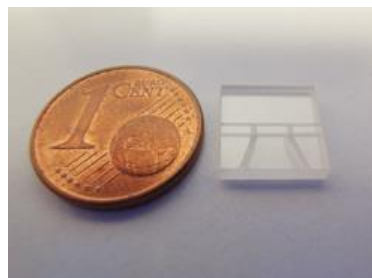


## Emission spectroscopy setup

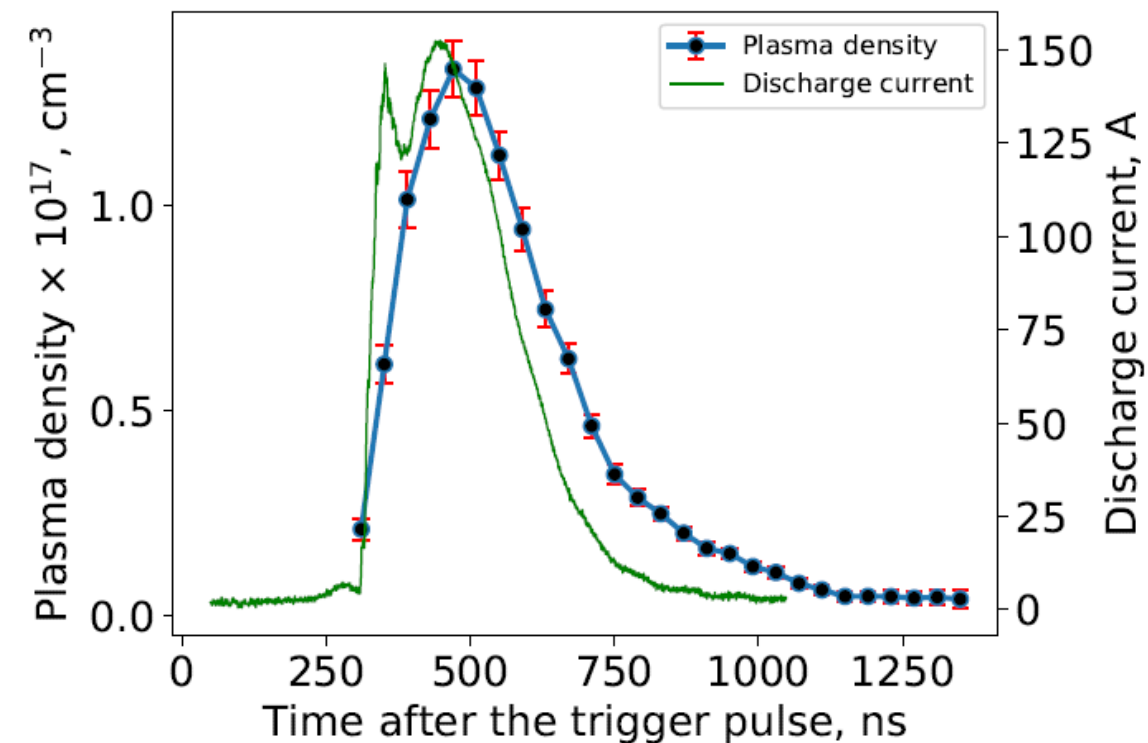


Typical image from Spectrometer

## Plasma density in the middle of the Sapphire capillary



View of the setup inside of the test-vacuum chamber



## Summary

- ✓ We develop discharge plasma source for LWFA
- ✓ We work on discharge plasma diagnostic to study the dynamics of the plasma formation in capillary
- ✓ We are aiming to incorporate different plasma diagnostic approaches to characterize the plasma density in the longitudinal and transverse planes
- ✓ We are open to collaborate with EuPRAXIA partners