SPARC activities

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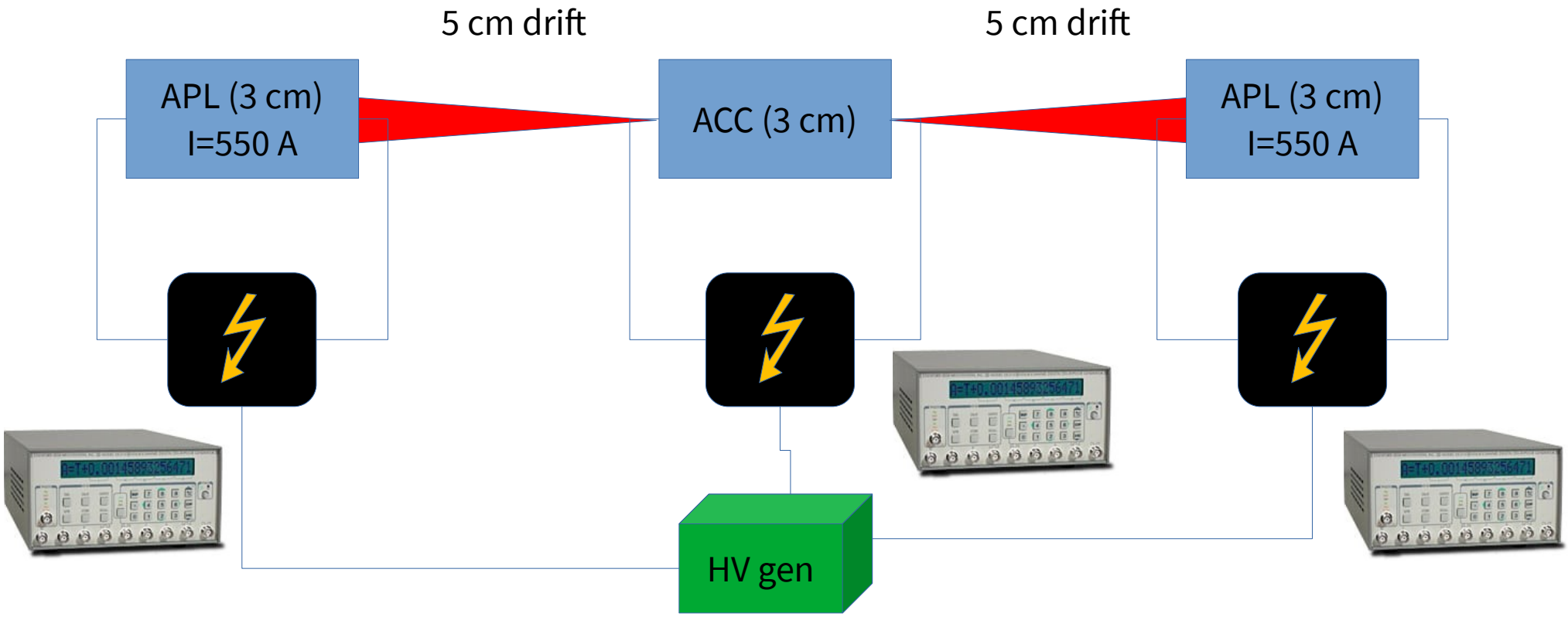
On behalf of the SPARC_LAB collaboration

Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

Basic idea of the “all-in-one” capillary

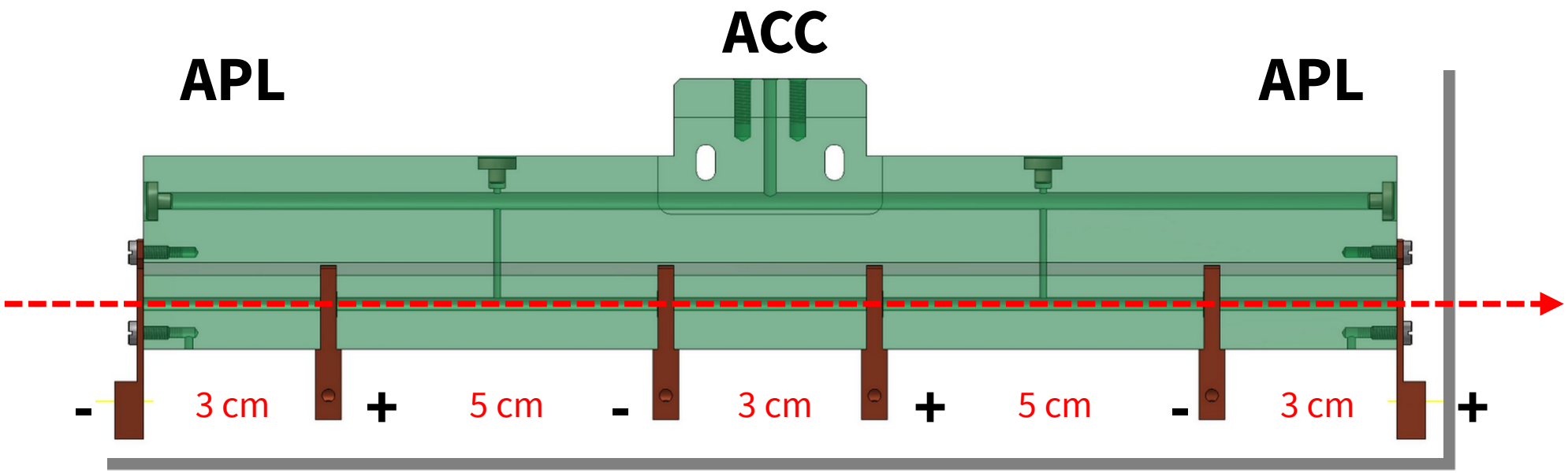


3 capillaries driven by their own discharge pulser for independent tuning

Need to change the delay to adjust the APL focusing and ACC plasma density

Get rid of PMQs, exploit an “all plasma” solution for both acceleration/focusing

Technical drawing

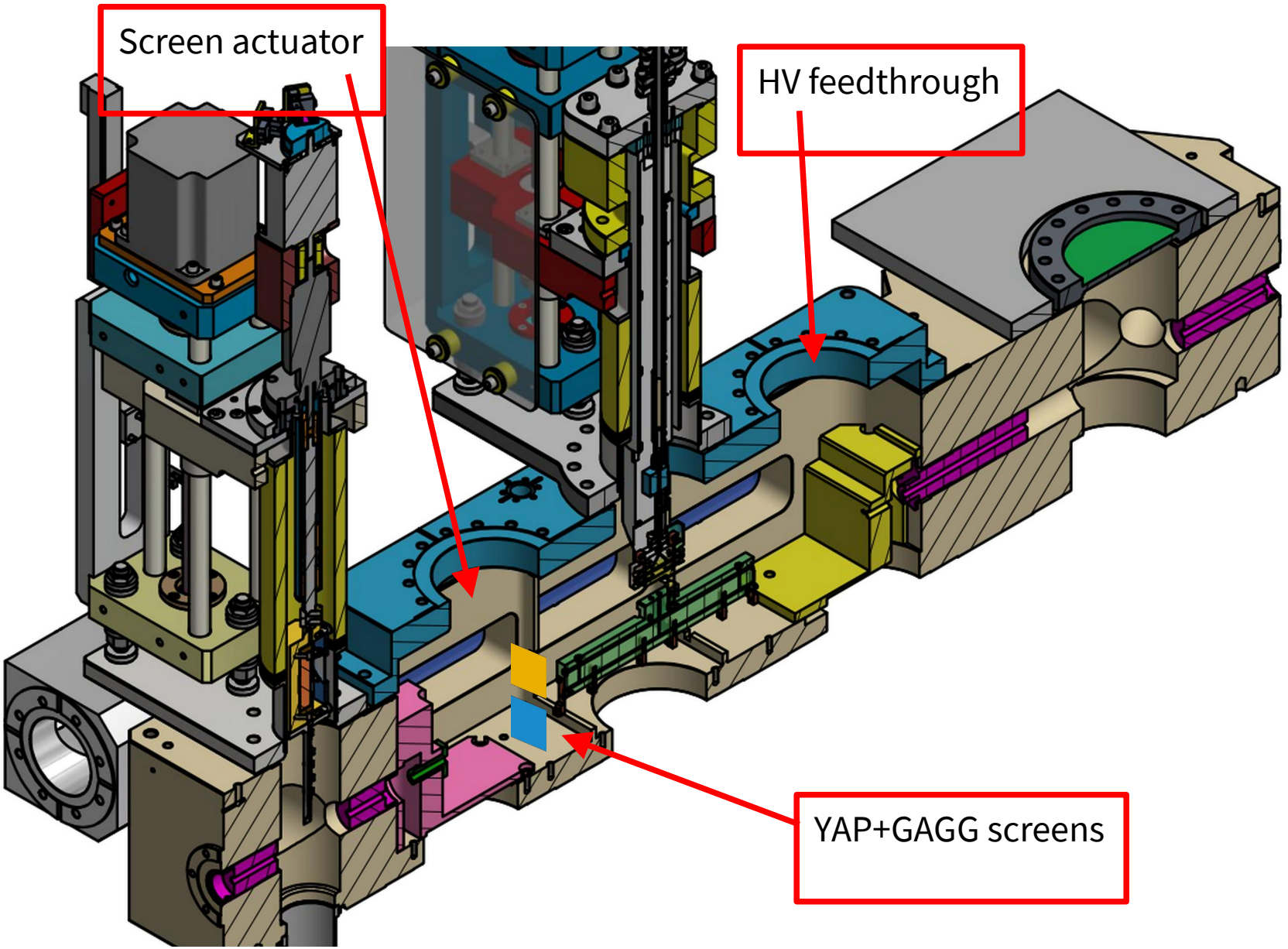


2 inlets to guarantee cylindrical symmetry over the 3 stages

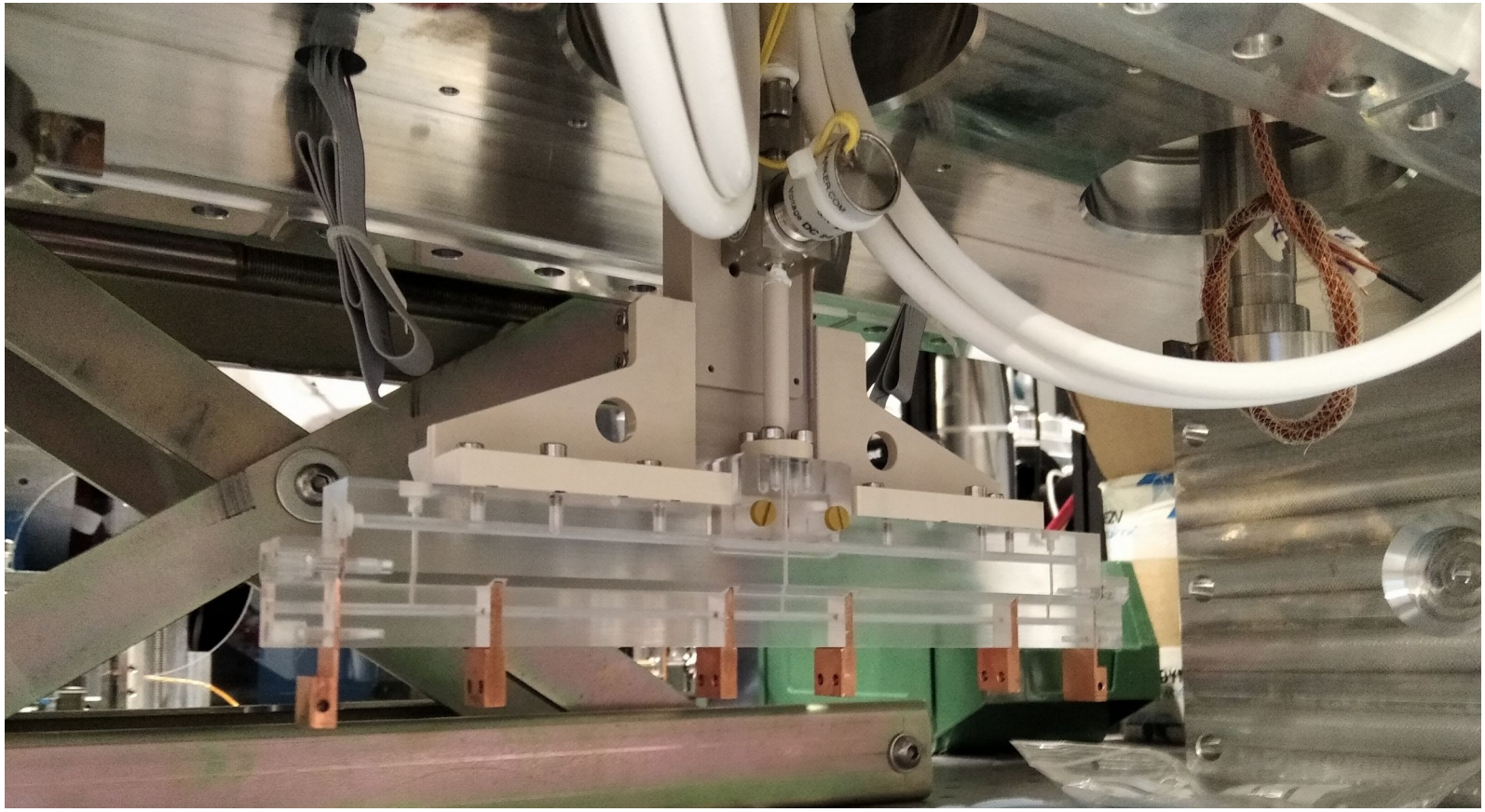
2 mm hole diameter

~20 cm total length

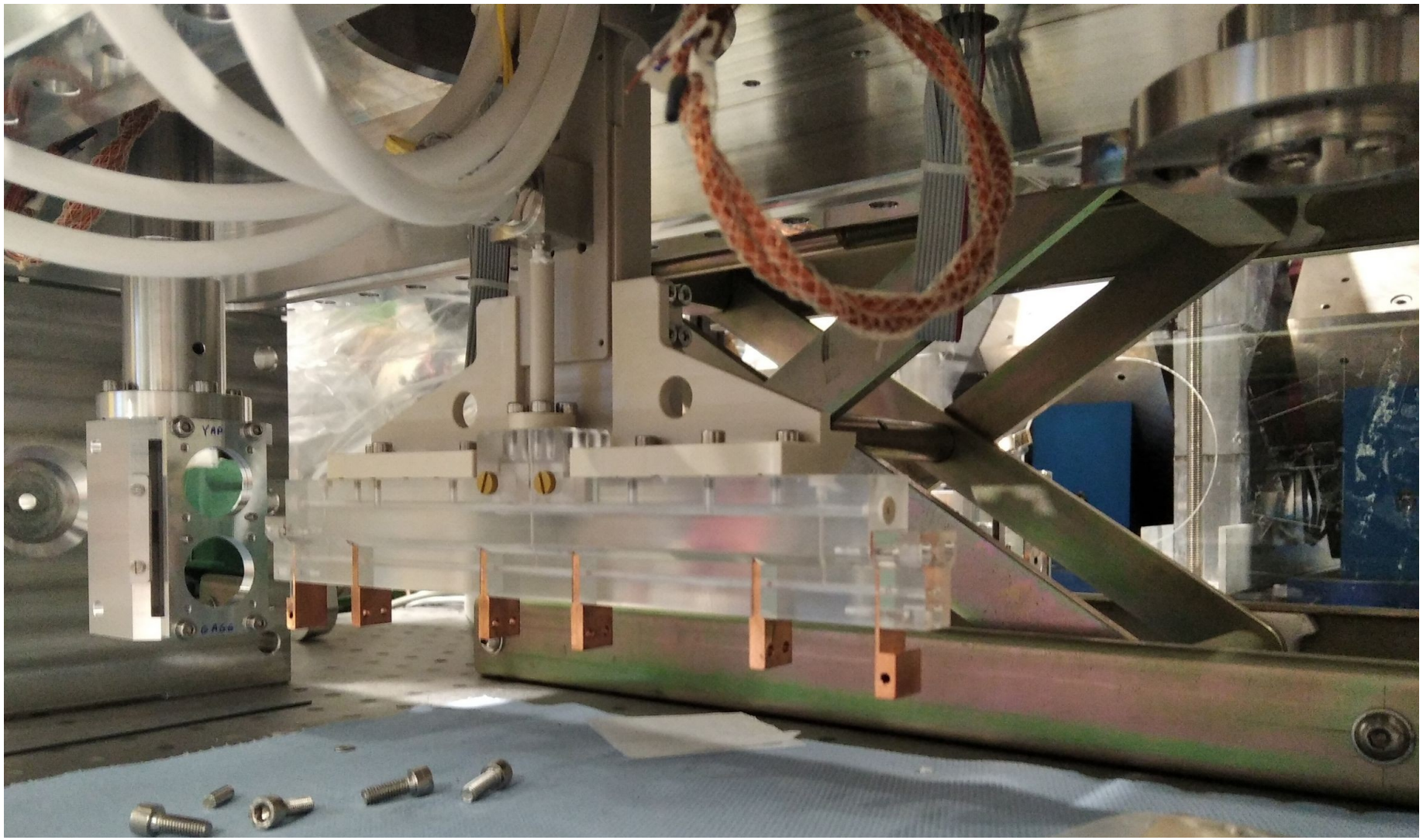
COMB chamber setup



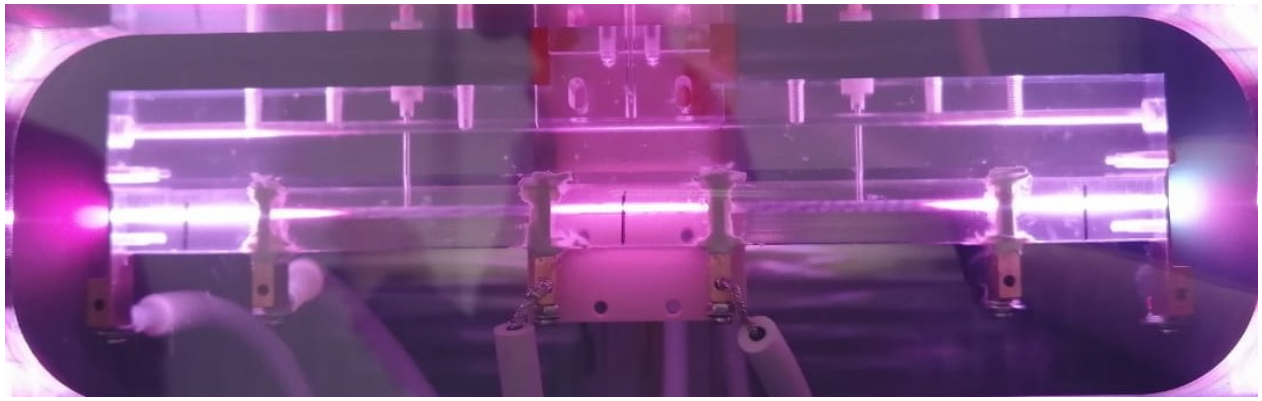
Installation

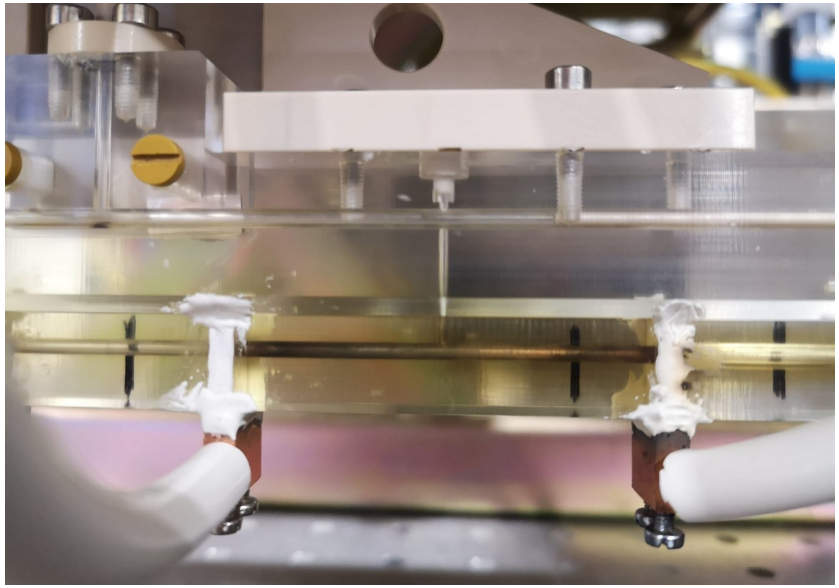


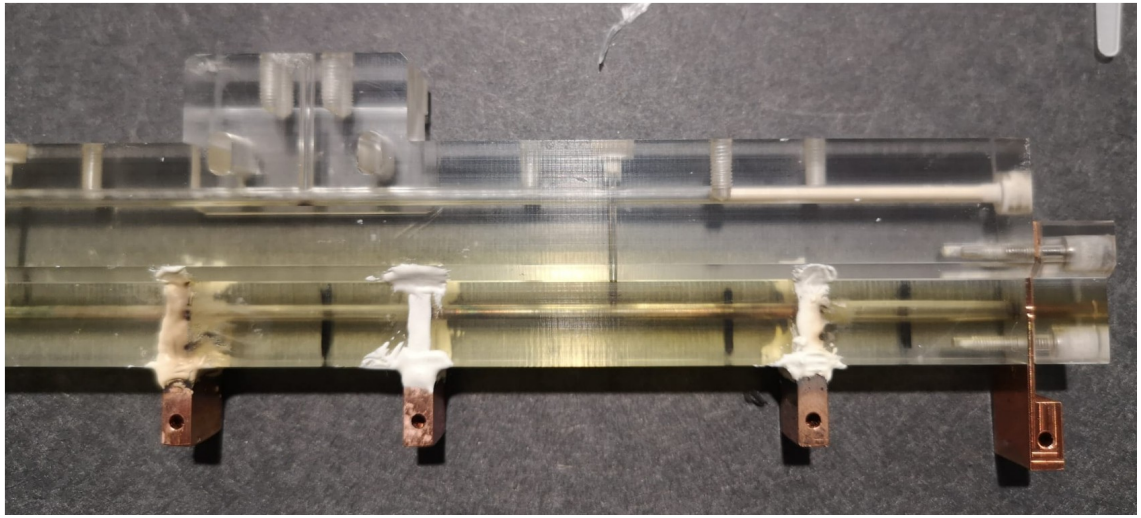
Installation



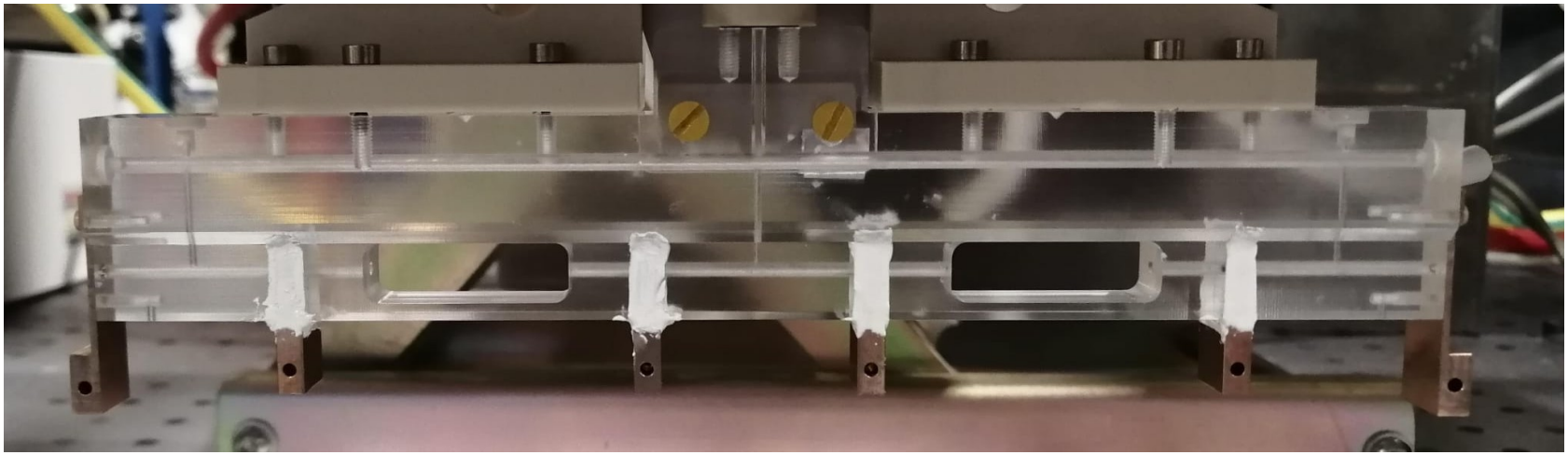
Aging of capillary after few weeks

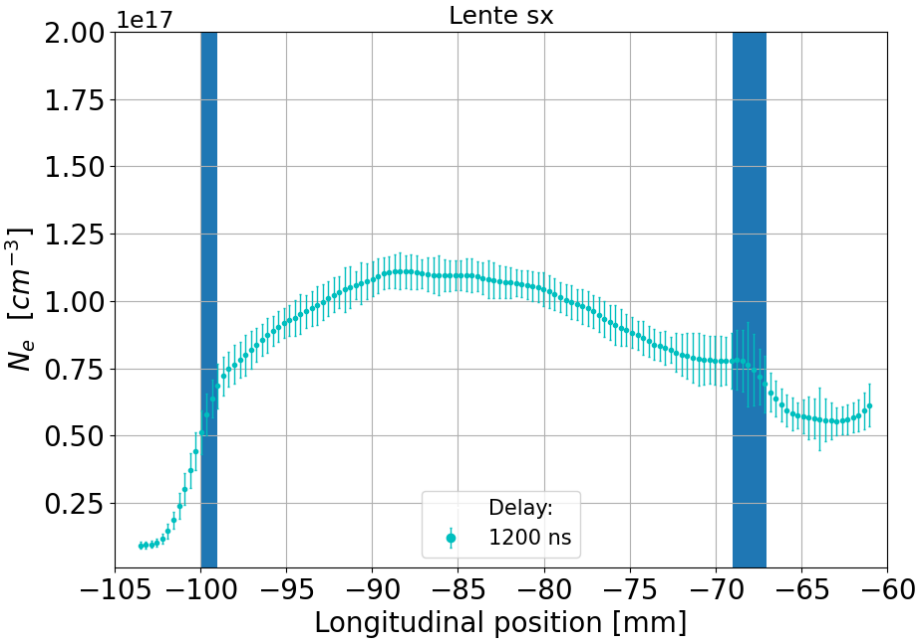


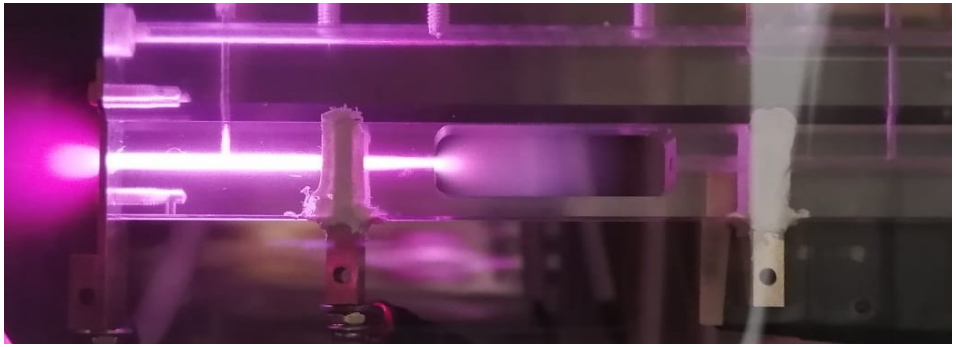


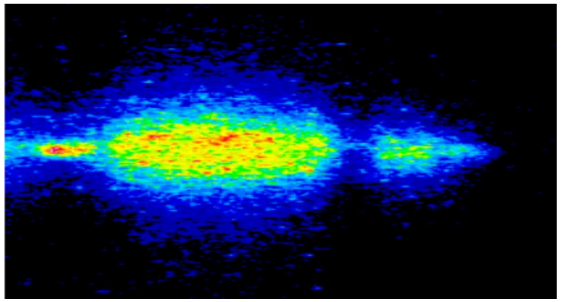


New capillary installation









Acceleration Division requests

We had a strong support in the past months by D. Pellegrini that developed the 3 discharge circuits, the HV mixer and all the trigger electronics.

Depending on the experimental results we'll achieve in July, we may need additional support from D. Pellegrini for September/October/November activities.

Same is valid for the vacuum group, in particular V. Lollo and M. Zottola who helped us with the installations related to the COMB vacuum chamber.

Starting from November/December a long shutdown is expected due to SABINA installations (see G. Di Pirro slides).

At that time we'd like the support of the mechanical and vacuum services to remove the AC3QUADs and move back the C-band accelerating section. This will allow to install another chamber with its own pumping stage between the COMB chamber and the C-band section

Some considerations

The detailed SPARC_LAB scientific program will be planned in September, according to the experimental results achieved in July

Need to merge as much as possible the SABINA and EuAPS installations to minimize the shutdown time and leave room to the scientific R&D

Next milestones to achieve include

- *High-gradient acceleration with high-quality beam*
- *Tests of new PMQs vs active plasma lens*
- *New FEL run with improved beam parameters (energy, spread, emittance) to reach saturation*
- *Recovery time experiment for high repetition rates*
- *(Long-term) timing-jitter tests with the new solid-state modulators (once purchased and installed)*