

## Abstract

The Spiral2 low energy beam transport line uses a single chopper situated in the line section common to protons, deuterons and  $A/Q=3$  ions. The paper describes the design and the test of the power circuits, based on standard components and working up to 10 kV, at a 1 kHz repetition rate

## Conclusion

The pulse amplitude, jitter and transition time measured on the prototype fulfil the requirements, while a more powerful high voltage supply is required to achieve a 1 kHz repetition rate. A complete system (electronics and electrodes) is available today for beam tests and next efforts will be dedicated to the design of the alarm control card and of the computer control interface and to the manufacture of the final mechanical ensemble to be installed on the Spiral2 injector

## Acknowledgements

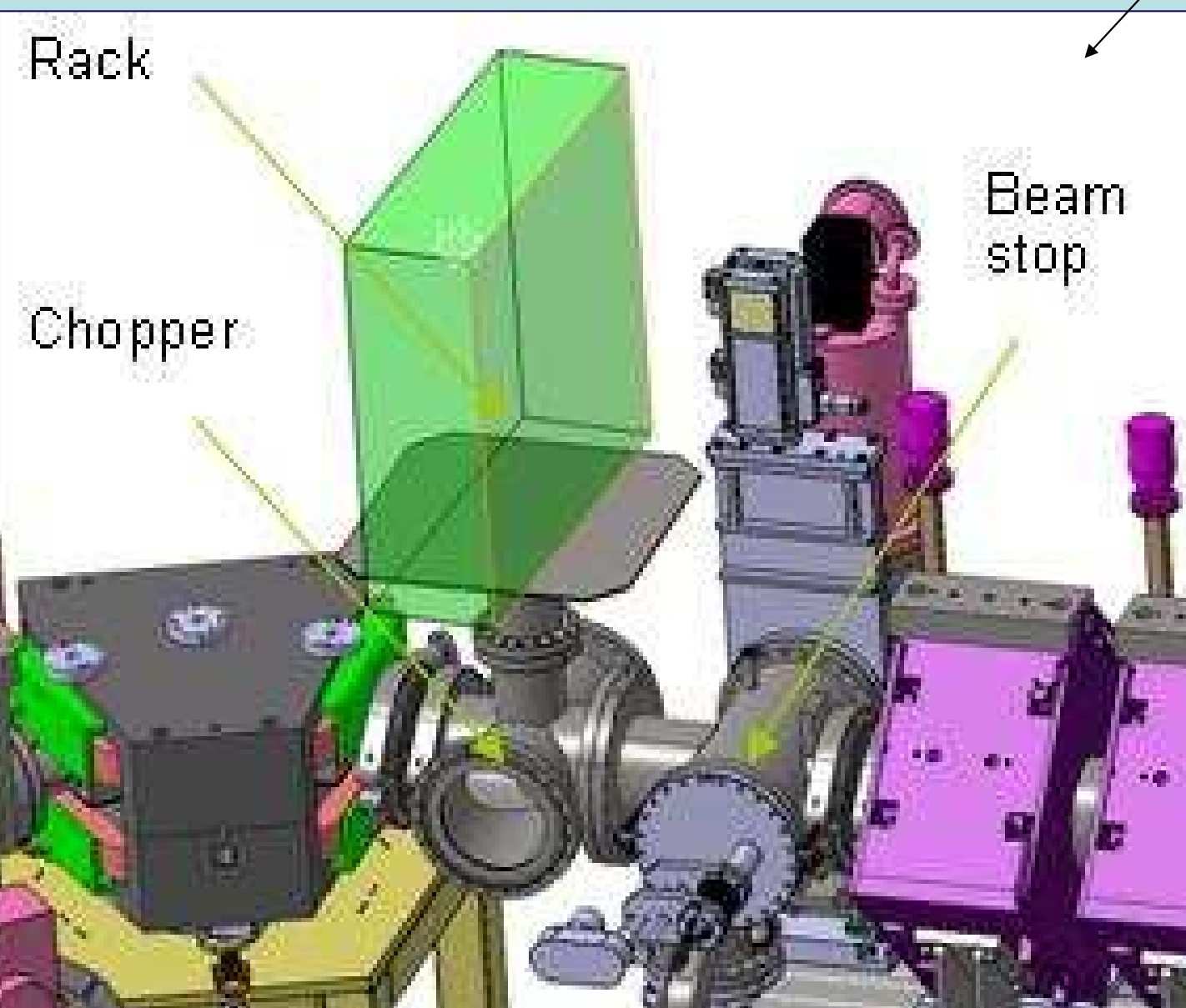
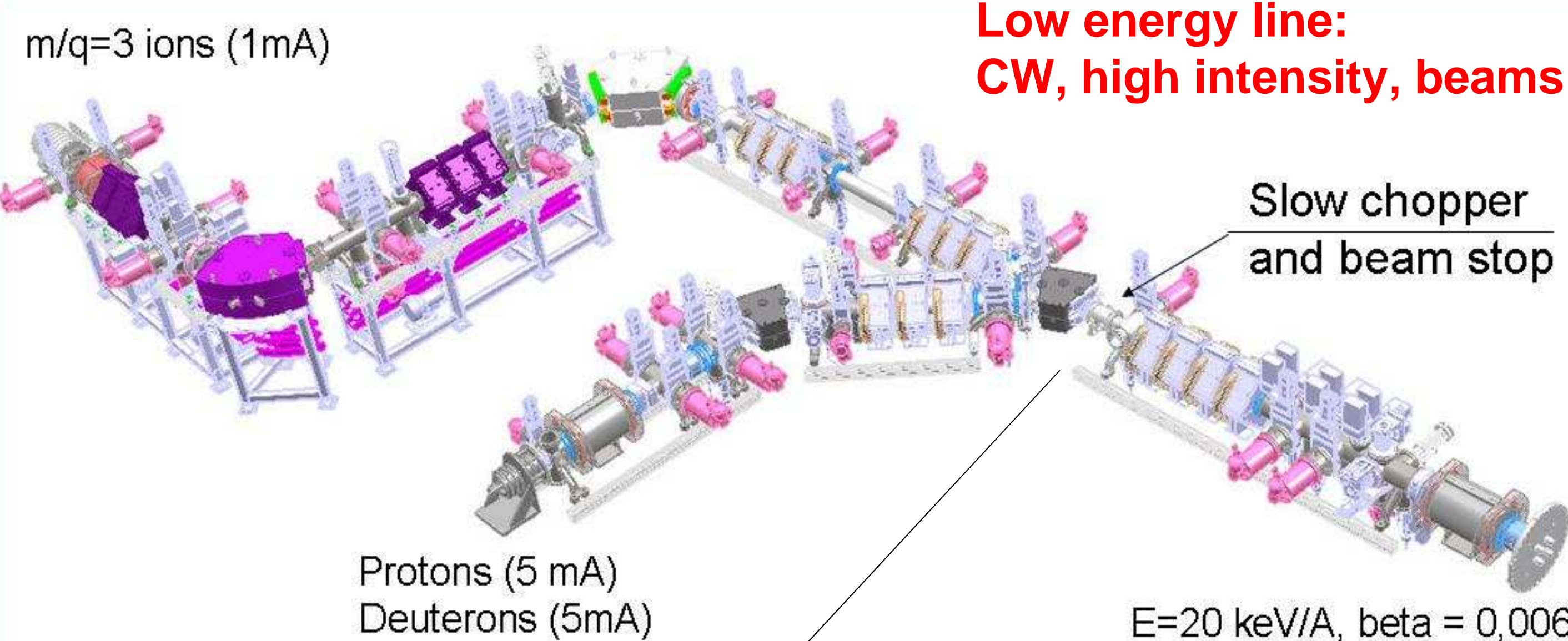
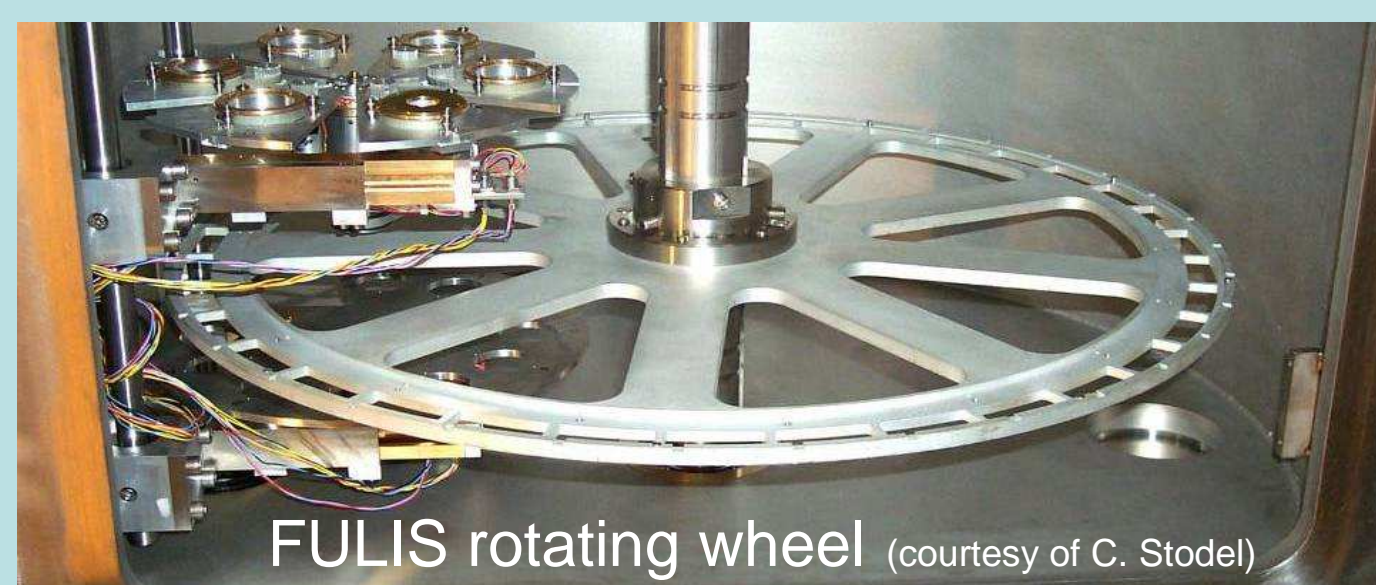
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## References

- [1] Behlke, high voltage switch application note
- [2] L. Calabretta et al. *The radiofrequency pulsing system at INFN-LNS*, Proceedings of Cyclotrons 2001, East Lansing, Michigan -USA

## CHOPPER APPLICATIONS

- Controlled attenuation of the beam intensity during accelerator tuning
- Fast cut of the beam when required
- Macrostructure for physics targets mounted on rotating wheel



## CHOPPER REQUIREMENTS

electrode hard-edge length	160 mm,
deflection at the end of the plates	10 mm.
Beam diameter	76 mm
flange to flange distance	250 mm
total deviating voltage	17 kV
pulse transient times	< 100 ns
amplitude stability	few %
•Electrode Voltage	9.2 kV
Repetition rate	1 kHz

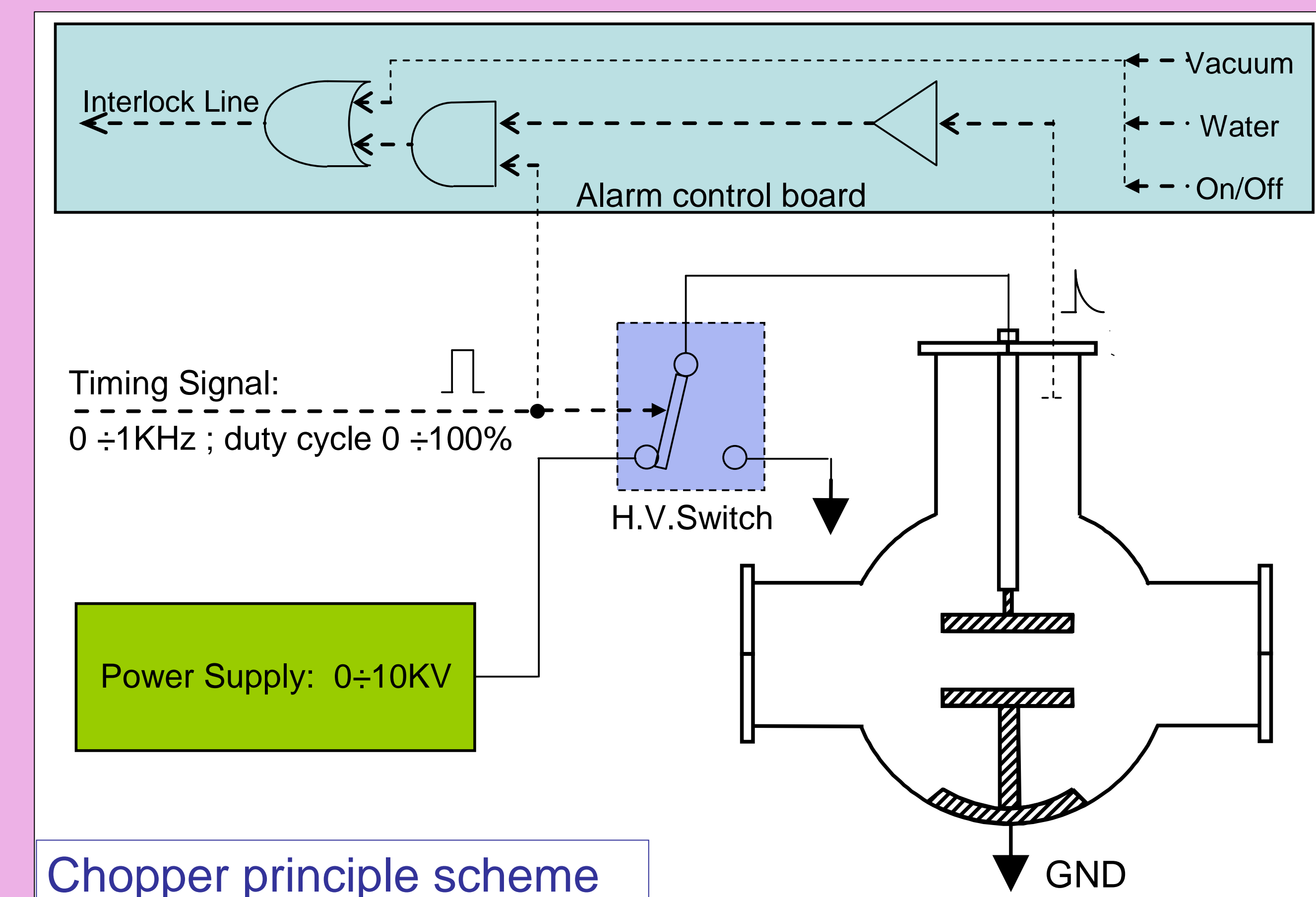
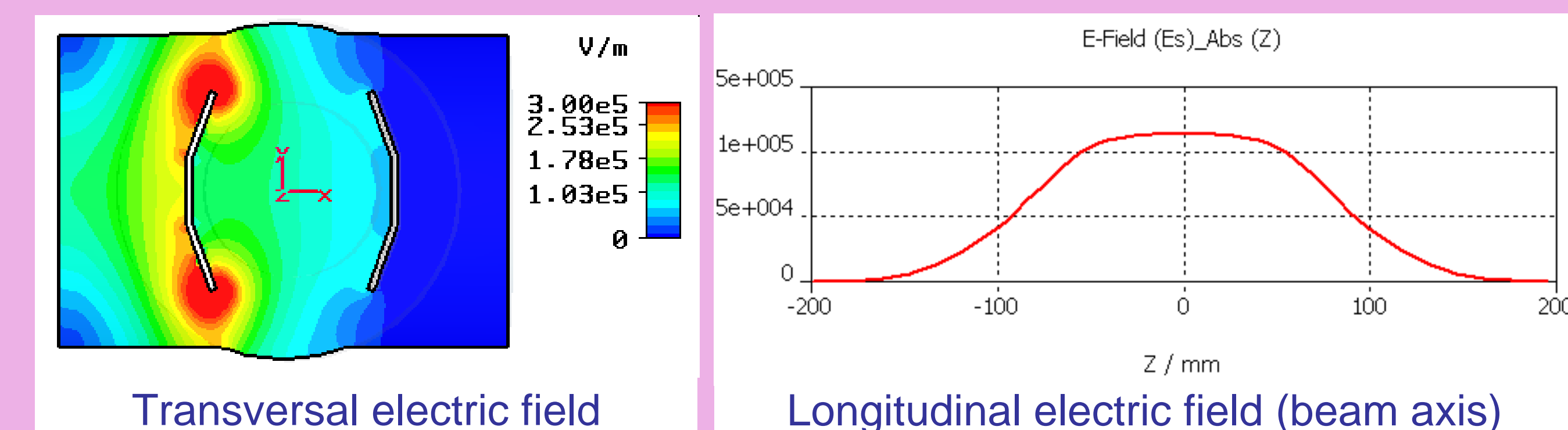
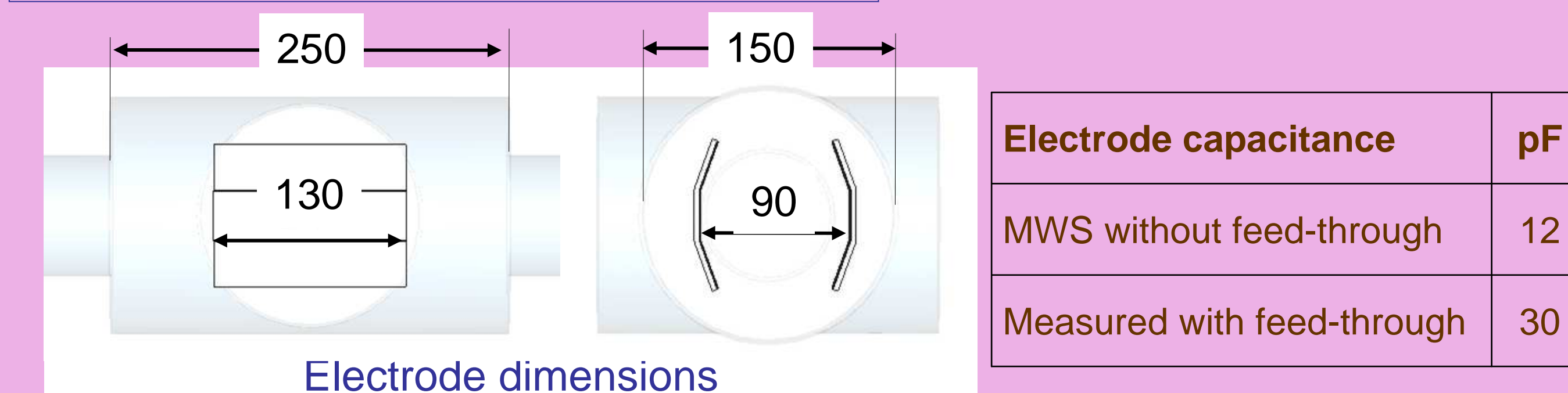
## SLOW CHOPPER DEVELOPMENT: 2-year program

2008 :

- electrode design and power circuit prototypes
- Industrial product for reliability and easy maintenance

2009 :

- Radiation tests of the electronics
- Tests on a beam line
- Final design



Power devices in the rack



## Selected Hardware

- Feed-through:  
Cabourn, SHV20
- HV Cable:  
Draka, HTC-50-7-2
- HV Power Supply:  
Spellman, MPS 10P10/24
- HV Switch:  
Behlke, HTS 151-03-GSM

## PROTOTYPE RESULTS

- Electronic rack tested on electrodes under vacuum, to validate the feed-trough operation too.
- Pulse shape, amplitude, transient times, stability and jitter OK
- Operating range to be increased via a more powerful high voltage supply

