



Drive Beam Injector Gun

Kévin Pepitone



LEETCHI



Low Energy Electron source

Drive Beam Injector Gun

at High Intensity

Kévin Pepitone



Status of LEETCHI for CLIC

Kévin Pepitone

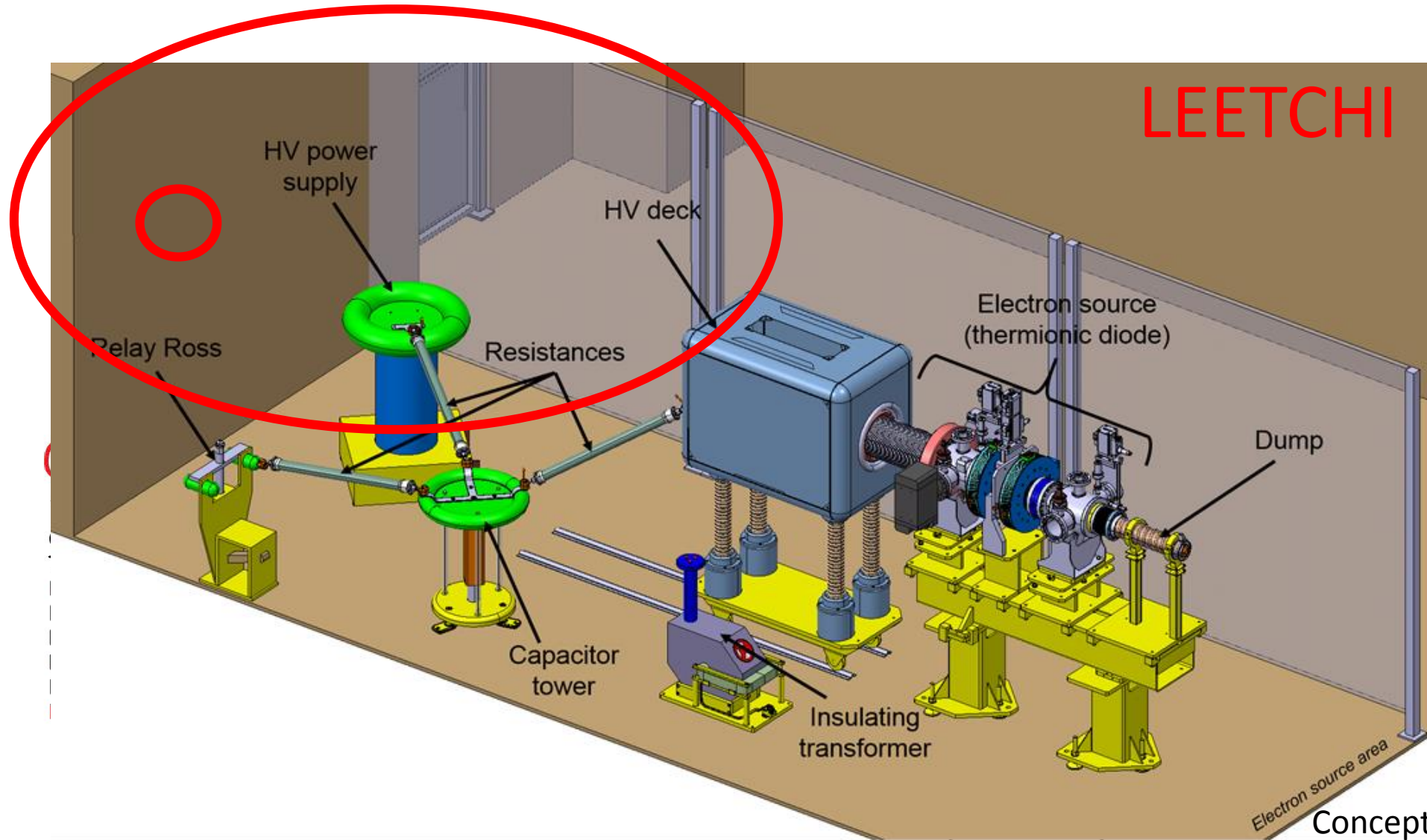


Outline



- Introduction and electron beam parameters
- Integration: experimental area, HV deck and control room
- Components: HV components and PLC system
- Diagnostics: electrical and optical diagnostics
- Simulations
- Perspectives
- Conclusions

Introduction



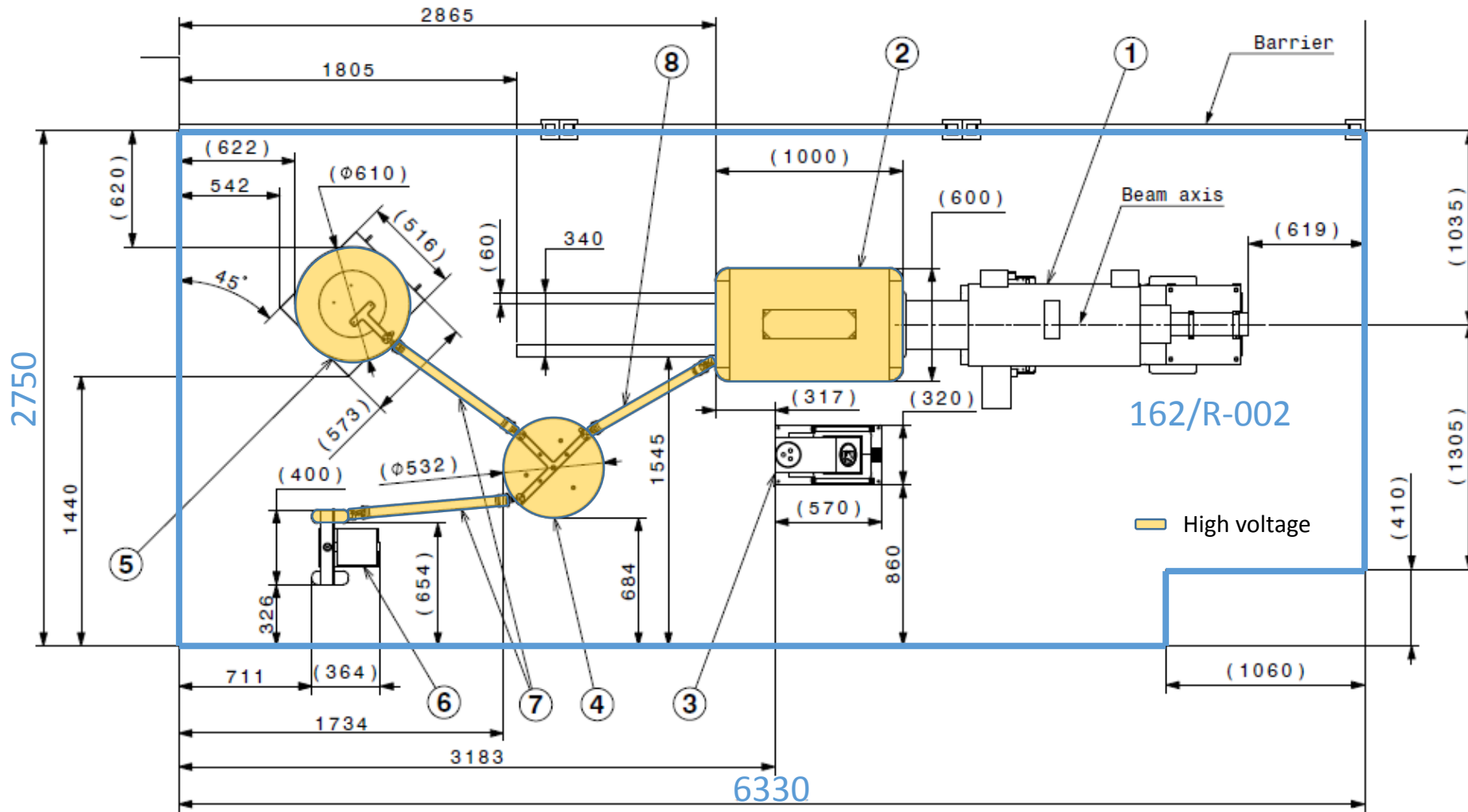
Conceptual design report
(EDMS 1234244)

Electron beam parameters

Parameters	Baseline
Beam energy	140 keV
Beam current	5 to 7 A
Pulse length	140 μs
Emittance (RMS)	< 20 mm mrad
Repetition rate	50 Hz
Beam power	4,9 to 6,9 kW
Shot to shot charge variation	0.1 %
Flat top charge variation	0.1 % after correction

From a thermionic cathode

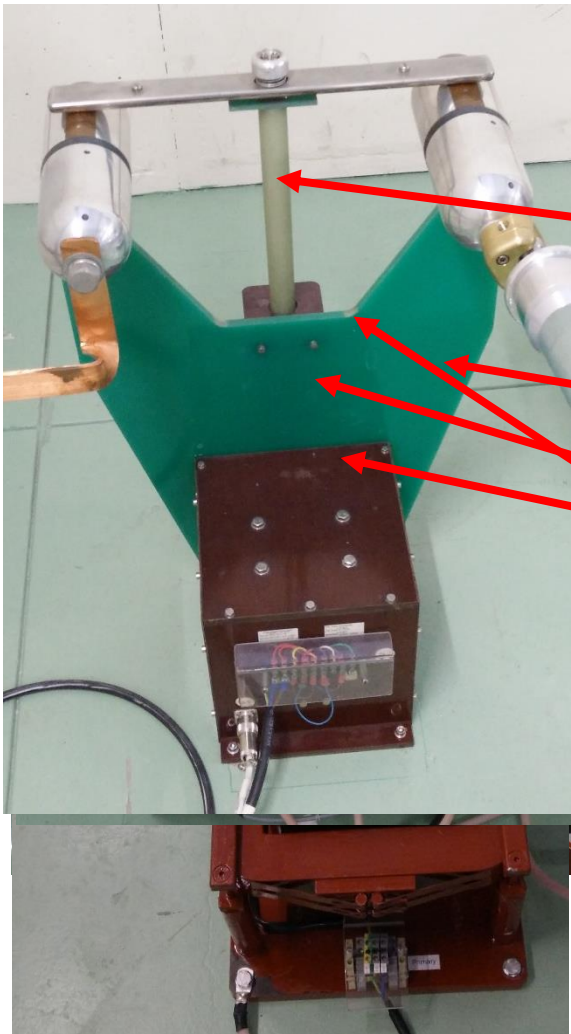
Integration



Top view
1:20

CLINFTLA0100

Integration – Experimental area



RFW Caps
Capacitor
150 pF/150 kV
or 200 pF/200 kV



Integration – HV deck

PLC

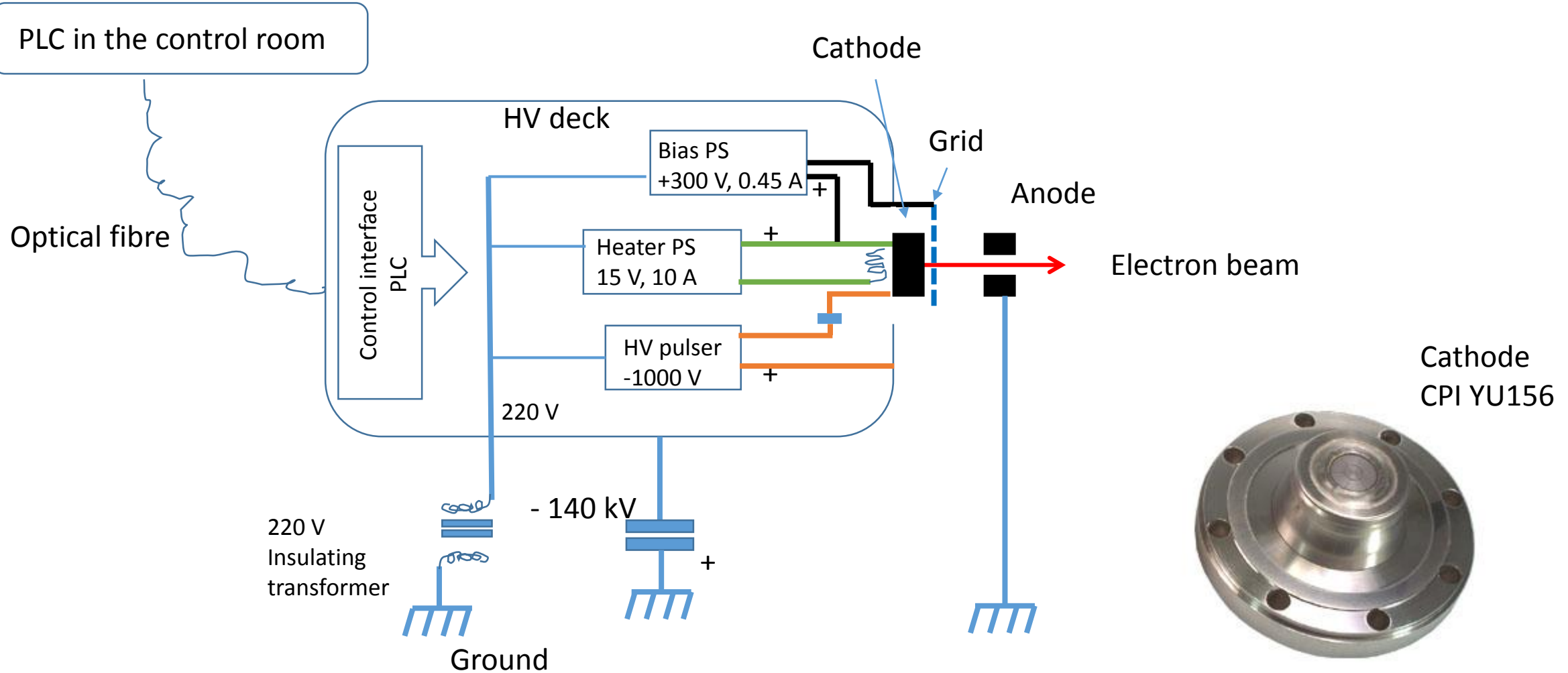
Heater power supply
15 V / 10 A

Bias power supply
300 V / 450 mA

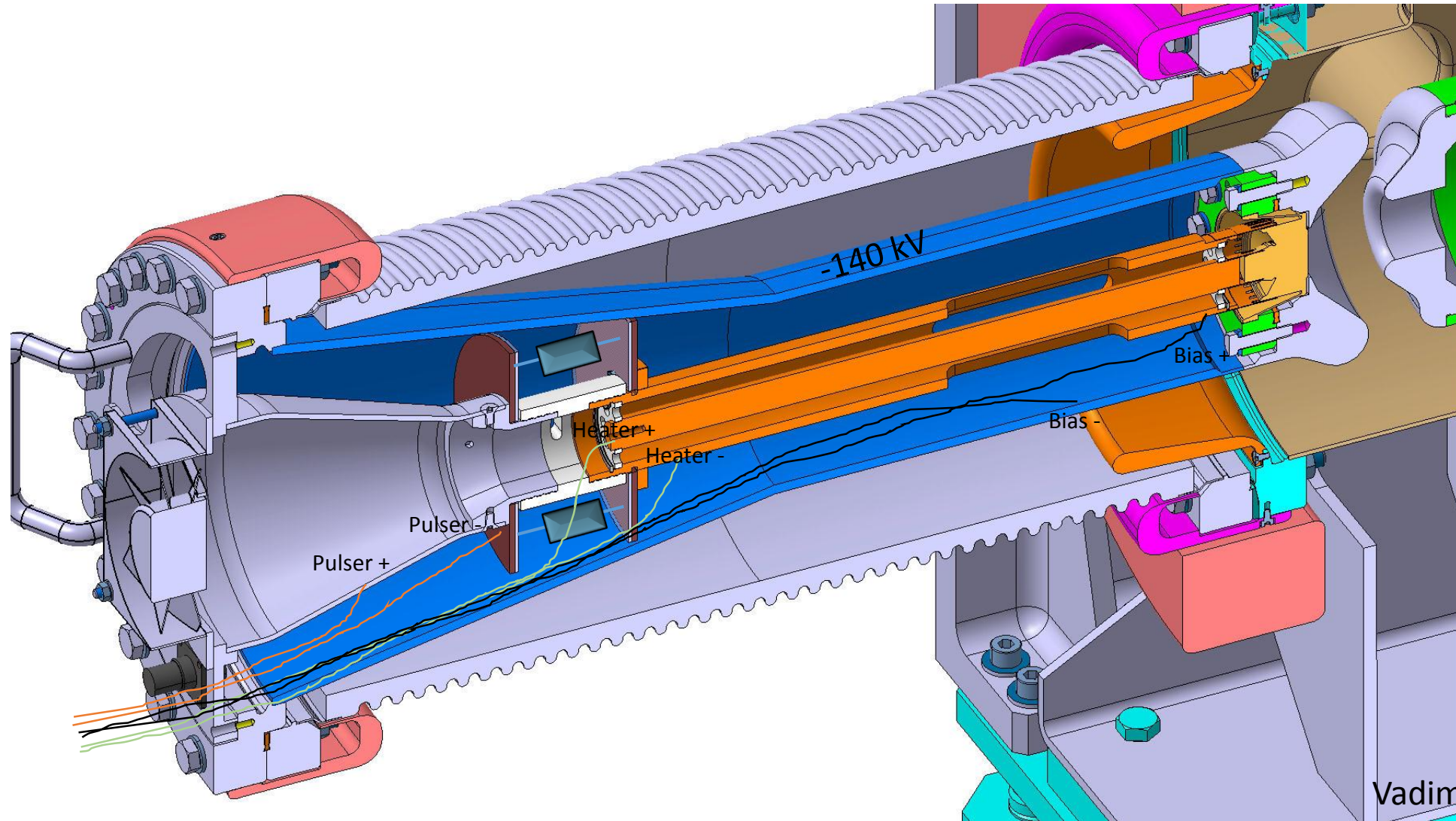
Pulsar power supply
-1000 V at repetition
rates up to 1 kHz



Cathode and connector



Cathode and connector

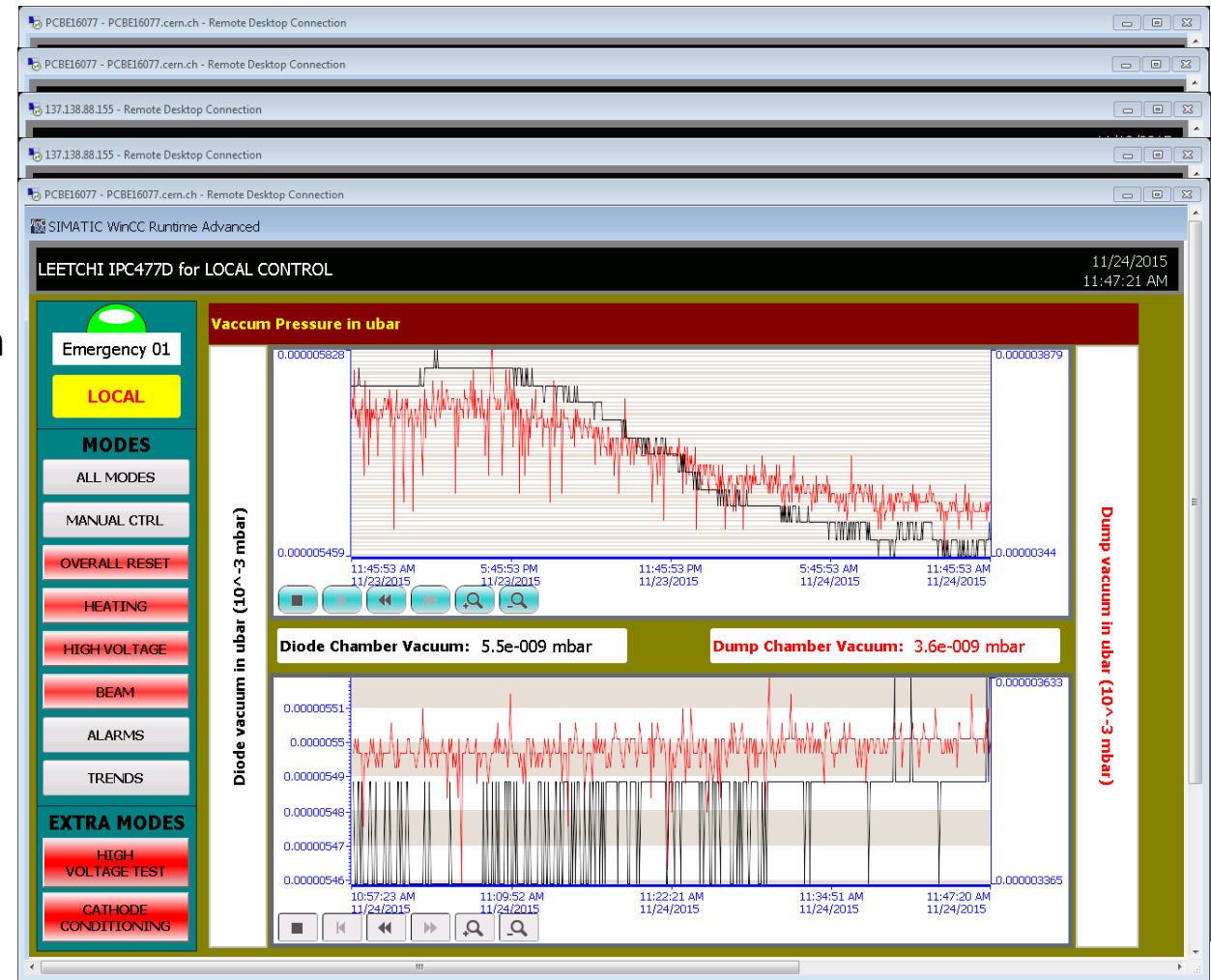


Vadim Soldatov

Integration – Control room

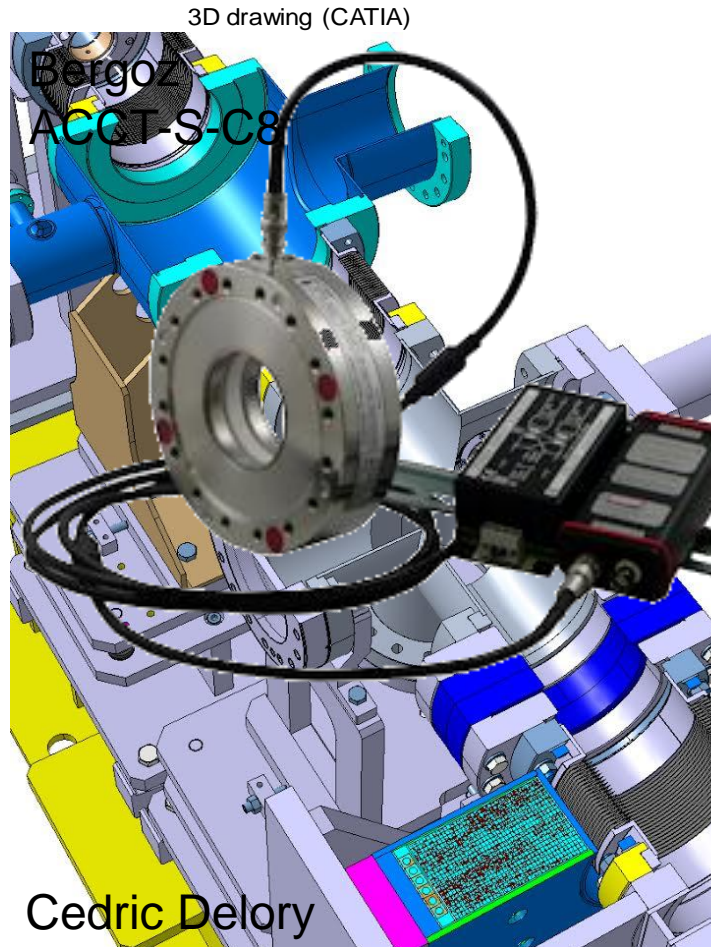
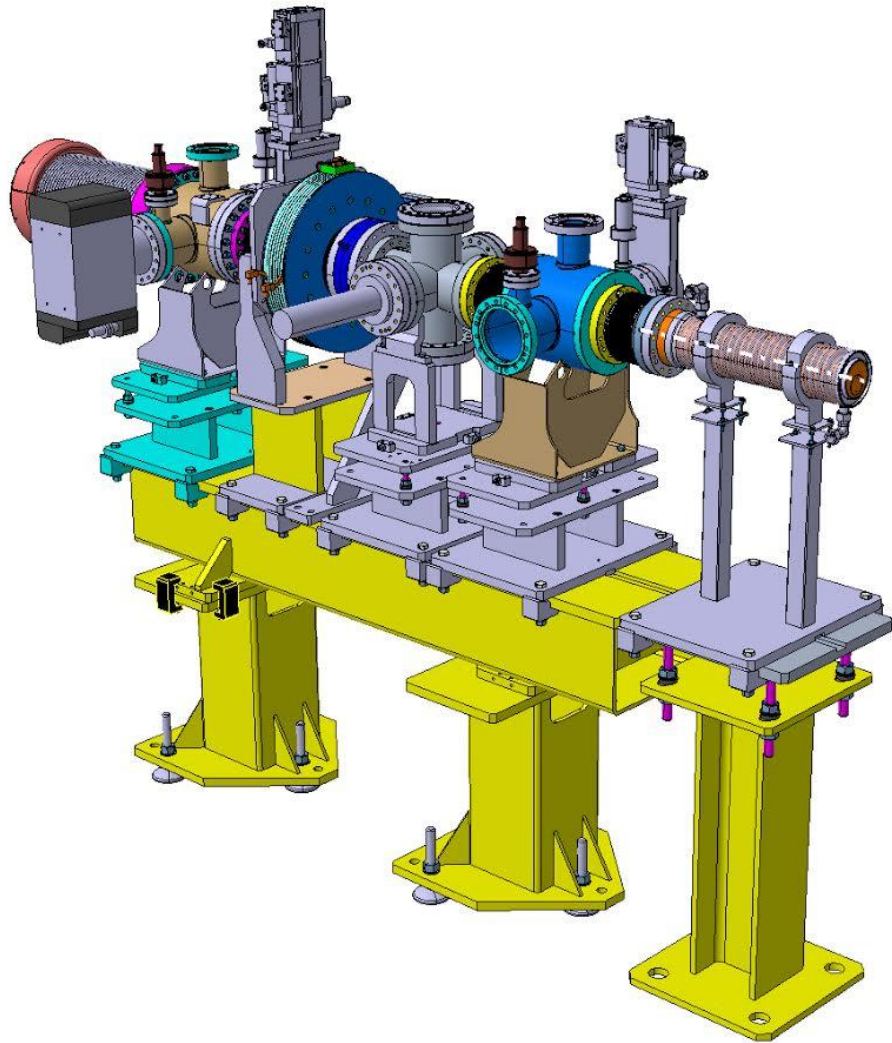


- PLC
- Media converter
- Vacuum gauges
- PLC touch screen
- HVPS remote
- Delay generator
- Ion pumps PS
- Solenoids PS
- Contactors

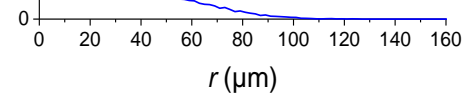


Danish Ali Nawaz

Dump and Diagnostics

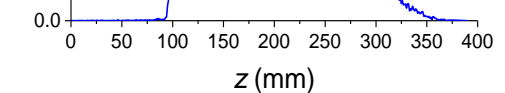
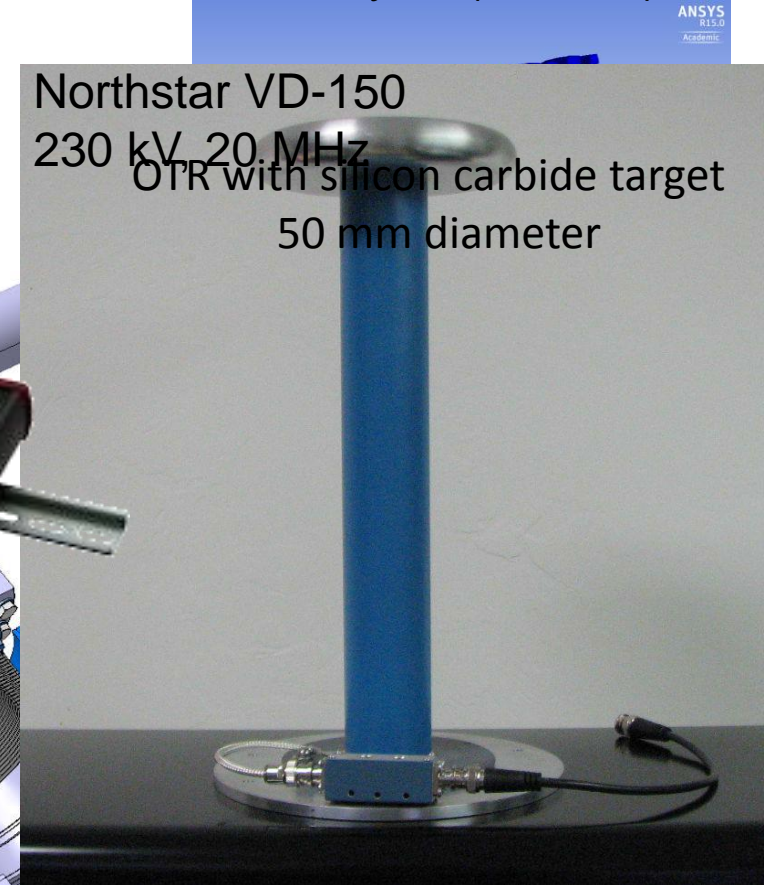


Cedric Delory



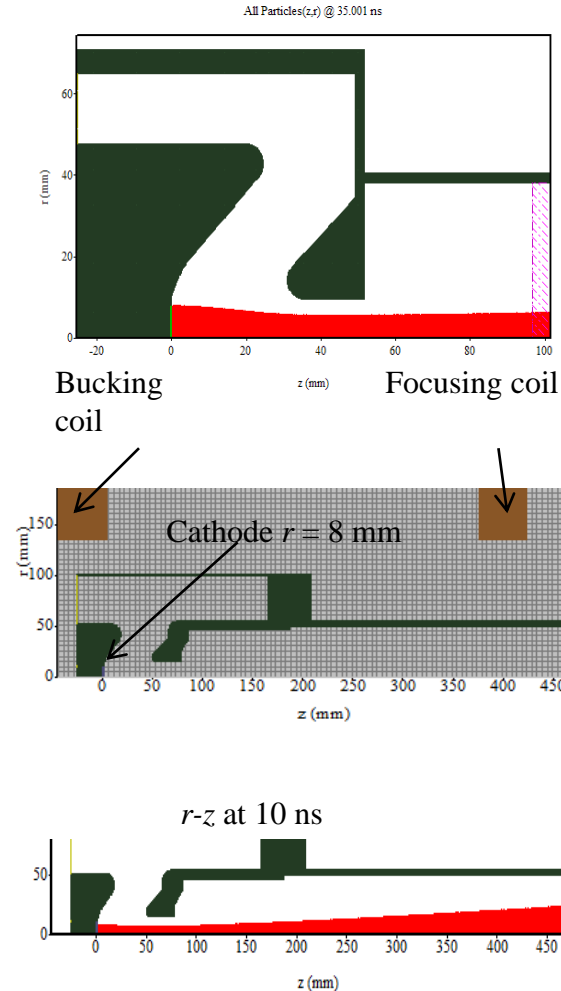
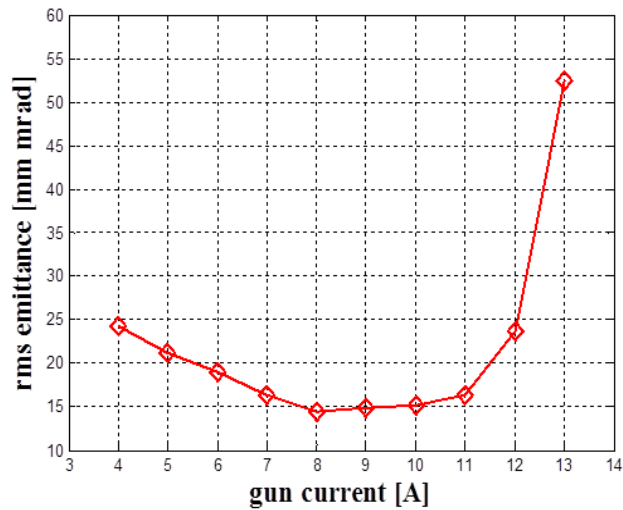
3D thermal analysis (ANSYS)

Northstar VD-150
230 kV, 20 MHz
OTR with silicon carbide target
50 mm diameter

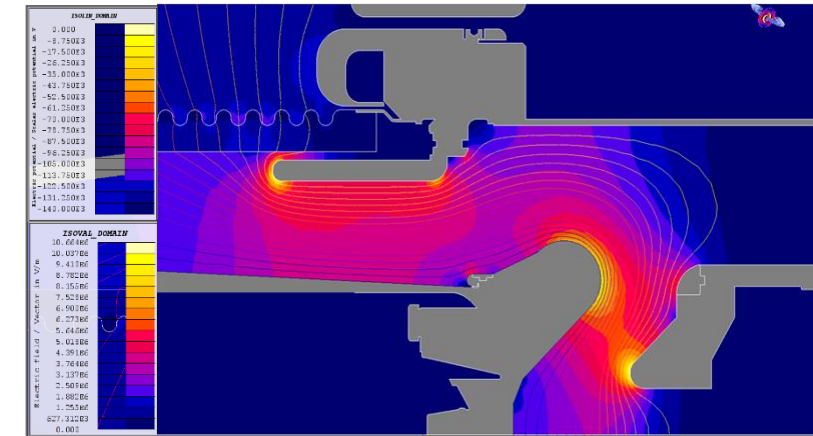


MAGIC simulation example of the electron gun

Current dependence of the emittance for the 8 mm cathode (EGUN)



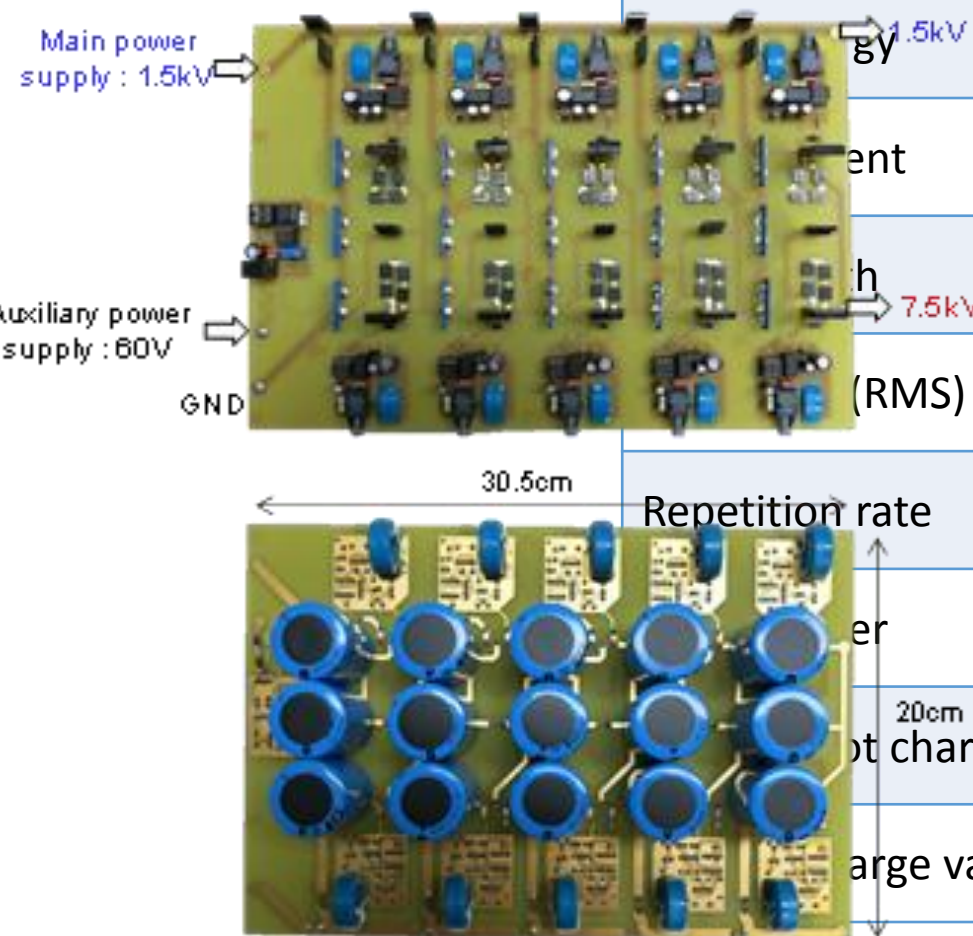
Electrical field simulations in the cathode region to check possible breakdown locations (Flux2D).
Maximum surface field 14 kV/cm



Jacques Gardelle, CEA
Bruno Cassany, CEA
Romain Pecquois, CEA
Steffen Doebert

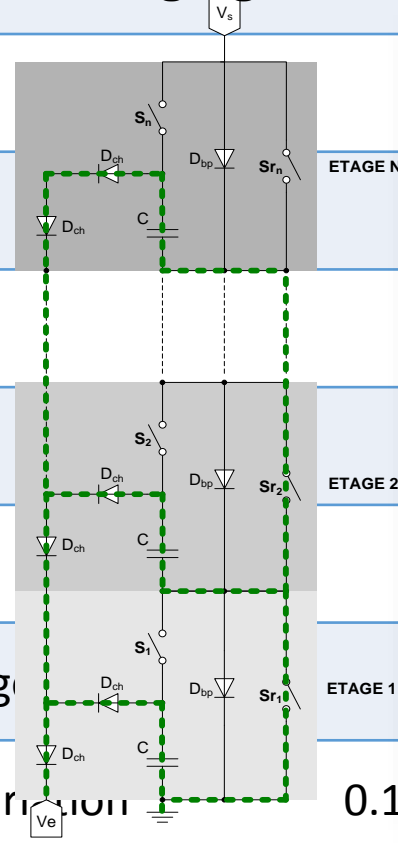
Perspectives

Modular 7.5 kV board



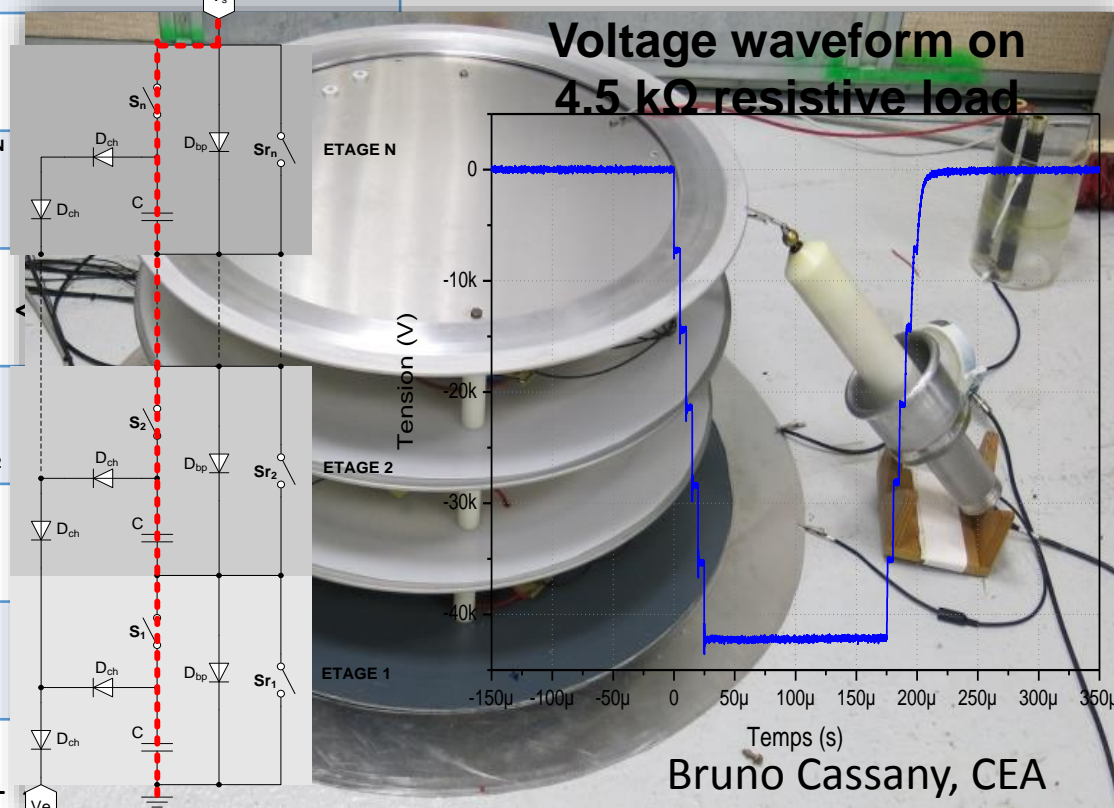
Parameters

Schematic of the modulator during charging and discharging



Baseline

prototype of the modulator during HV tests



Bruno Cassany, CEA
 Baptiste Cadilhon, CEA
 Romain Pecquois, CEA

Conclusions

- Integration and installation of the gun in the area are completed
- Vacuum is good
- New components are expected:
 - ❖ Optical diagnostic
 - ❖ Dump
 - ❖ Connector
- The first tests with short pulses beams will be performed in 2016
- The tests with long pulses at 50 Hz should be performed in 2016



Thank you for your attention