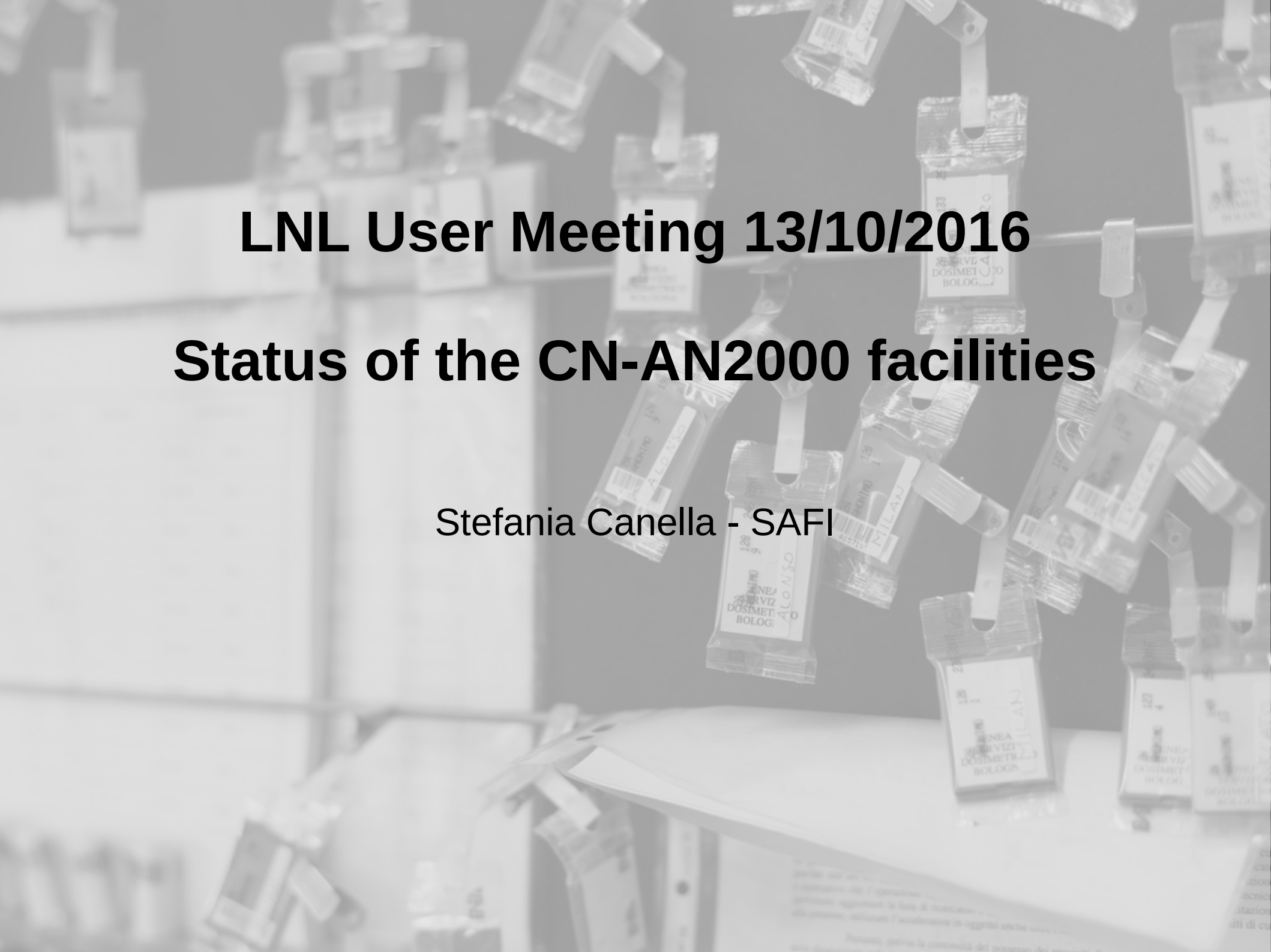


LNL User Meeting 13/10/2016

Status of the CN-AN2000 facilities

Stefania Canella - SAFI

Contents

1. Staff
2. Accelerators
3. Beams
4. Accelerators Performances in 2015 and 2016
5. Shift Organization

Staff - SAFI

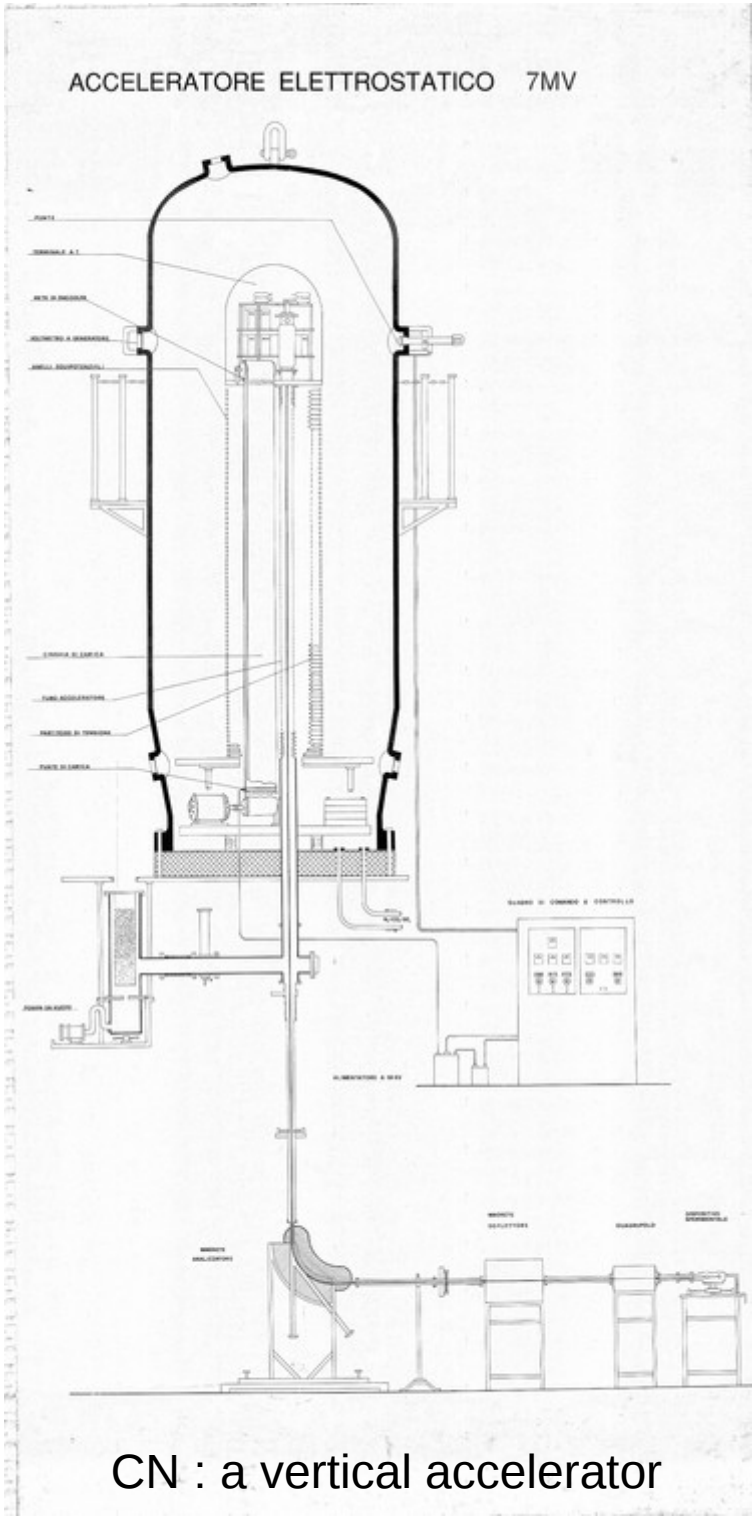
SAFI (Servizio Acceleratori Fisica Interdisciplinare)

- Enrico Munaron (University of Padova)
- Luca Maran (University of Padova)
- Leonardo La Torre (INFN – LNL)
- Davide Carlucci (INFN – LNL)
- Stefania Canella (INFN – LNL)

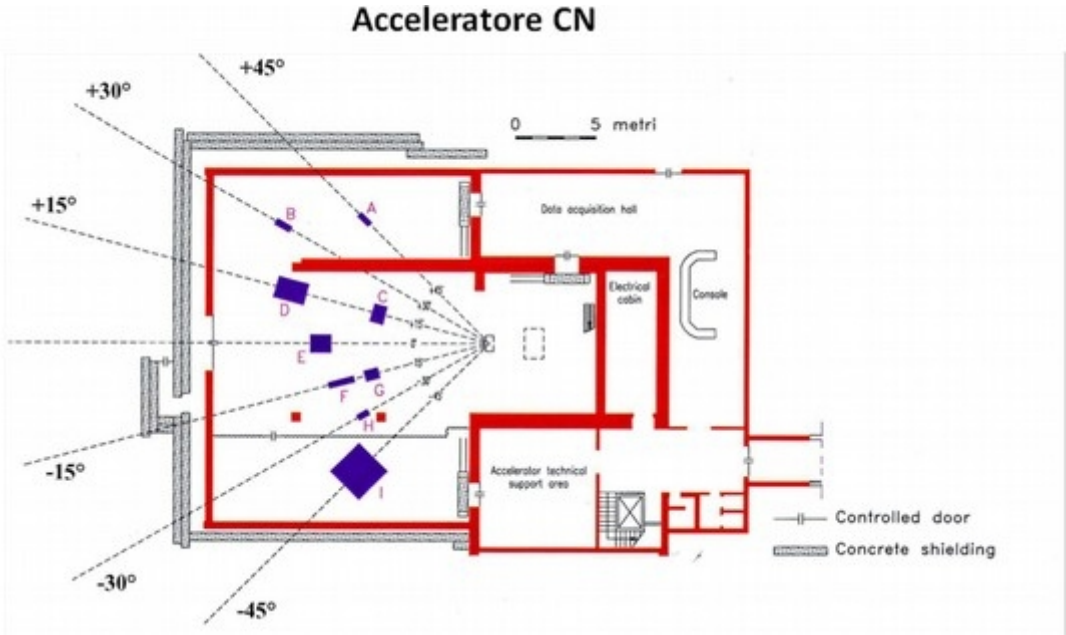
Accelerators - CN

The CN "Van de Graaff" electrostatic machine was the first accelerator at LNL, in 1961. Its vertical structure is housed in a tower at the north-east border of the laboratory.
This was on of the first LNL building and it is now one of the main symbols of the laboratory.
The whole accelerator structure is inside a metal tank, filled in with a high pressure Insulating gas: N_2 and SF_6.

The positive RF ion source (using light gases, H and He) is inside the machine, in the HV terminal, installed together with the necessary devices to extract and focus the ion beam in the acceleratig pipe.

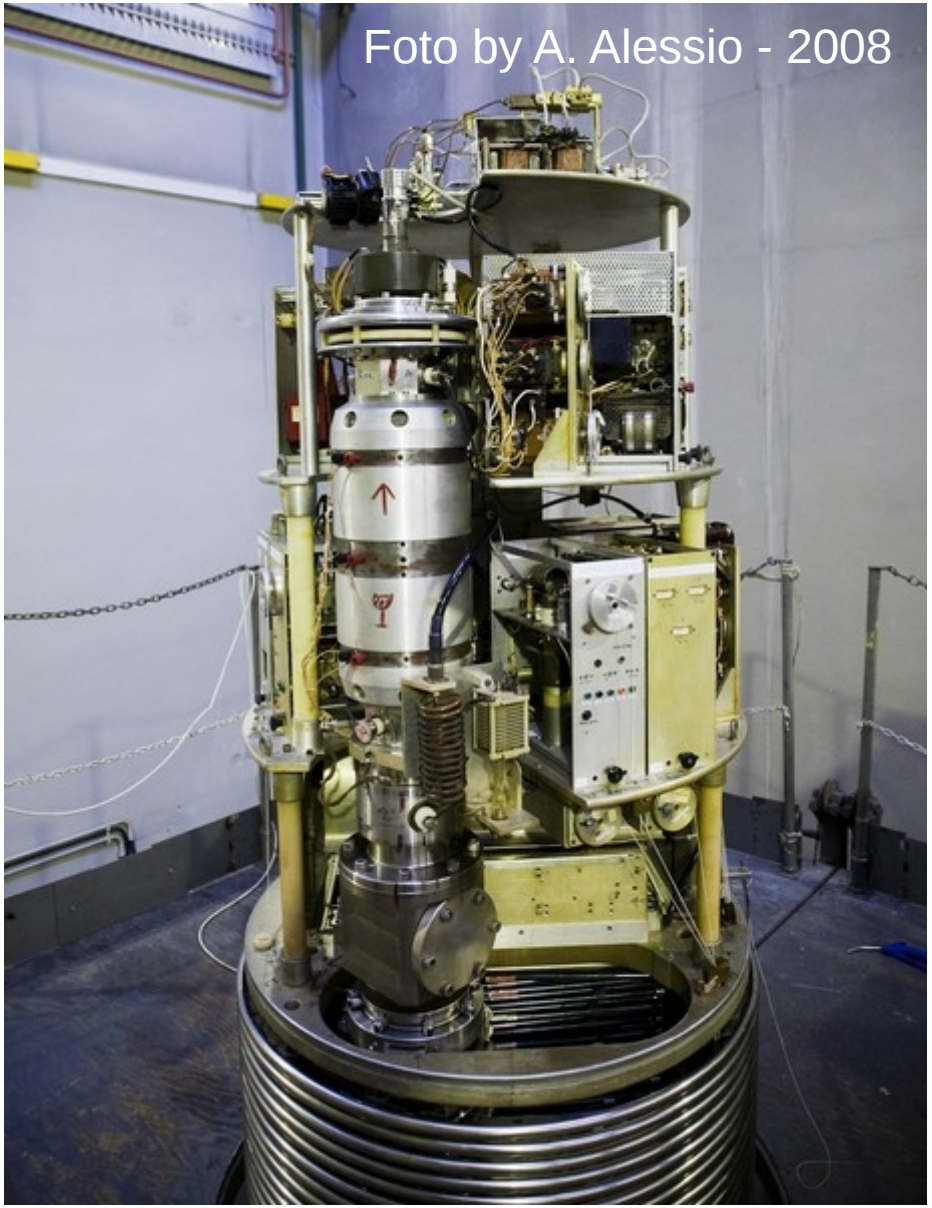


CN : a vertical accelerator



CN : the map of the experimental room with 7 beam lines

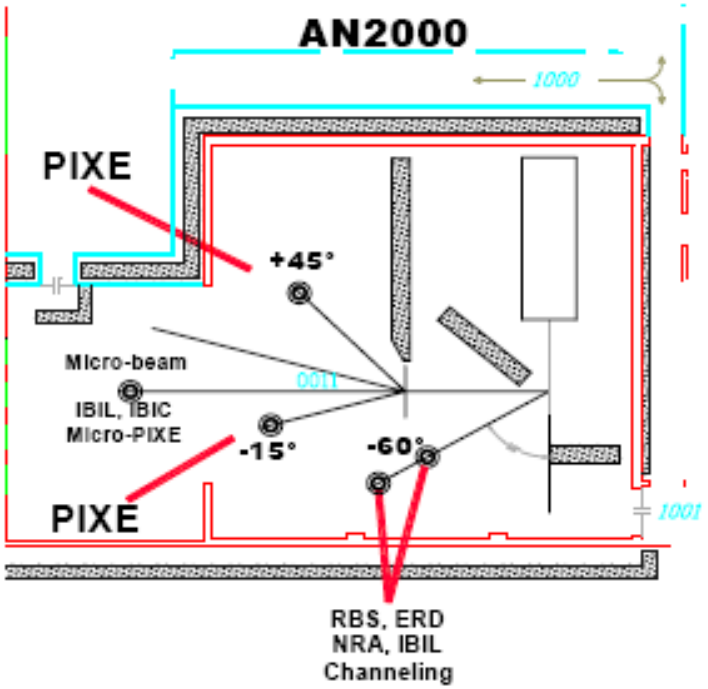
CN : open for maintenance

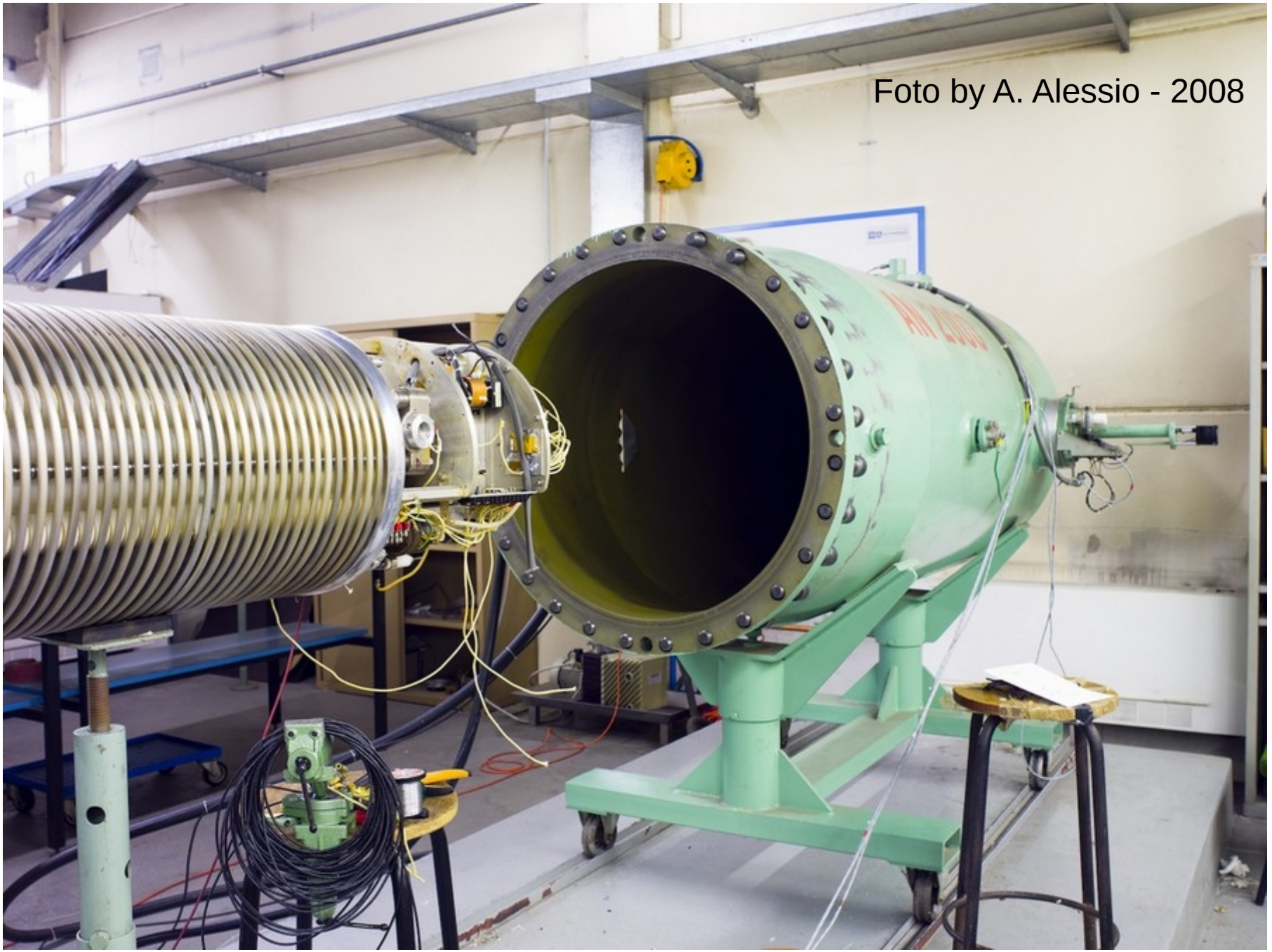


CN : the HV terminal

Accelerators - AN2000

AN2000 was installed at LNL in 1971.
This compact machine has an horizontal structure 2 m long, so the whole accelerator facility (the accelerator with its internal ion source, the beam lines and all measurements points) is housed in a single experimental room.

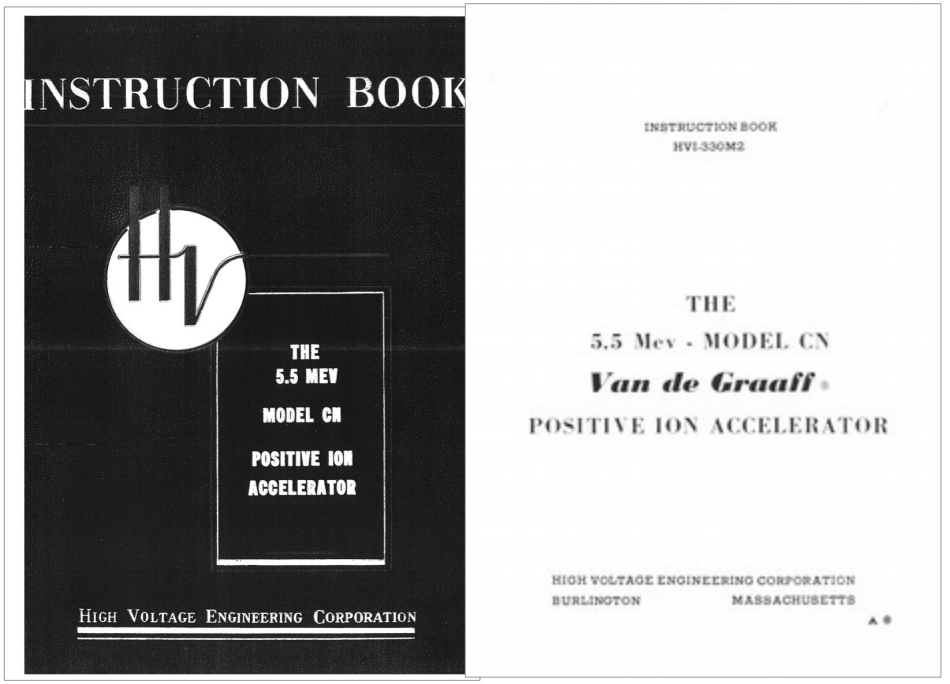


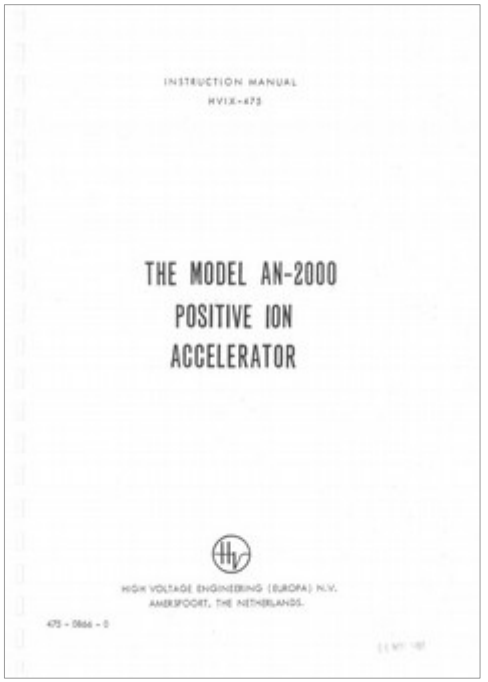


AN2000 : The accelerator open for maintenance

HV

Both CN and AN2000 accelerator were manufactured by HV





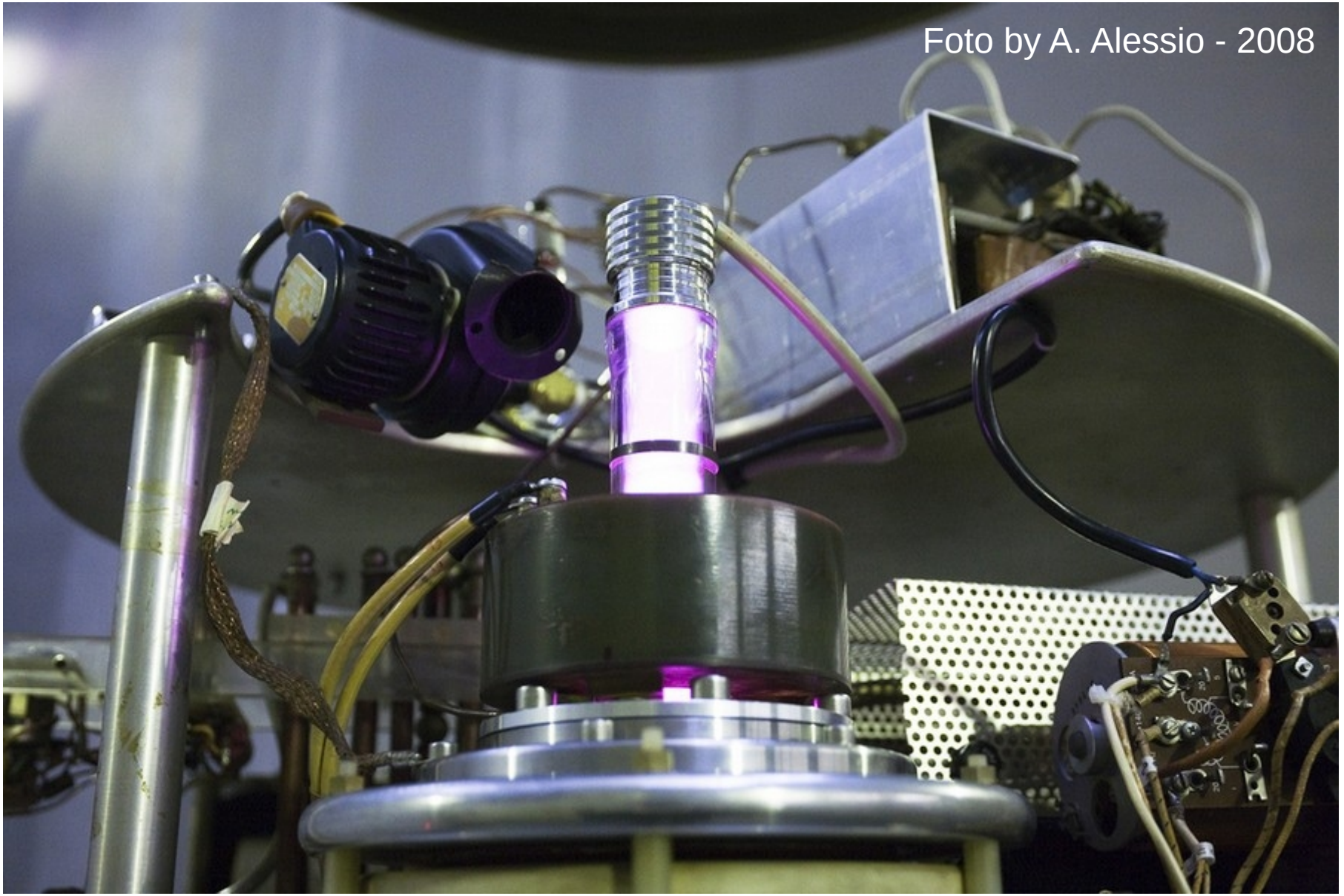
Beams

CN : $^{1}H+$, $^{2}H+$, $^{3}He+$, $^{4}He+$, $^{4}He++$; all in DC current mode (^{3}He must be supplied by the user);
$^{4}He++ \leq 20nA$ with two days beam preparation;

CN : pulsed beam is available on the 0° beam line at 3.3 MHz - should be properly planned, as a high current has to be extracted from the ion source;

AN2000 : $^{1}H+$, $^{4}He+$ in DC current mode;

AN2000 : the micro-beam facility is available on the 0° beam line



The CN ion souce on the HV terminal, switched on during a maintenance test

AN2000 : the micro-beam channel

Accelerators Performances (2015)

In 2015 the AN2000 and CN accelerators delivered beam according to users' requests.
For CN, 3 standard maintenance periods were necessary.
AN2000 had several short maintenance periods and the frequent change of insulation gas helped in the recovery of better performances after the substitution of the accelerating tube in 2014.

Year 2015 – CN	Number	Unit
Accelerator ON	1520	h
Conditioning	350	h
Time provided for user-op	1081	h

Year 2015 – AN2000	Number	Unit
Accelerator ON	1165	h
Conditioning & Maintenance	190	h
Time provided for user-op	975	h

Accelerators Performances (Oct. 2016)

For CN, the first maintenance period in 2016, started in mid April and originally planned to last 4 weeks, had a long delay, until mid-June, for a failure in the pumping system of the insulating gas, now almost completely fixed. An other minor failure in the voltage stabilization system of the accelerator (repaired) partially affected the last experimental shifts in the second part of last July.

A different failure happened on the same section on the 6th of October, now fixed.
Now the machine is again in operation up to the beginning of November

In 2016, up to last September the AN2000 accelerator delivered beam according to users' requests.
At AN2000 the renewal of the control system on the micro-beam line is almost completed.

Shift modes in 2015 – CN and AN2000

All SAFI personnel work in daily hours,
usually from 8:30 to 17:00.
Working days are from Monday to Friday.

Both the accelerators, **CN** and **AN2000,**
must be started and the beams set by SAFI personnel.

On Friday afternoon both the accelerators **must** be stopped by SAFI personnel.

Shift modes in 2015 – CN and AN2000

Up to October 2015 CN has been operated only by the staff (start, tuning, stop), while for the whole 2015 AN2000 has experienced a partially self-service operation mode

Since November 2015 a partially self-service operation mode is allowed also at CN and now both the accelerators and the requested beam are started and tuned by the staff, but the machine may be left in charge to the users from Monday to Thursday for :
- stable operation (no changes in beam or energy)
- beam stop/restart and machine stop

This kind of operation is available to trained users (currently they are 12 at AN2000 and 20 at CN), who need stable beams for more than 8 hours per day.


Thanks for the attention.