RO & Particle Accelerators Dr. Dan Gabriel Ghiţă IFIN-HH

History

- 1956 1957 comissioning of the U120 cyclotron accelerator (2H⁺, D⁺, 4He²⁺ from 5 to 6,5 MeV/nucleon)
- Current status: modernized, still in use.
- 1972 1973 comissioning of the HVEC FN Tandem accelerator
- Current status: modernized, still in use.

The FN Tandem Accelerator

- Maximum terminal voltage (9 MV, upgraded from 7 MV)
- Accelerated ion species: from protons to gold.
- Tipical analized beam currents: tens to hundreds of nA.



Layout of the laboratory



The ion sources

Duoplasmatron with Li charge exchange

The selection of the

NEC SNICS II type for AMS

NEC SNICS II type

The pulsing systems

- "Fast" pulsing system (nanoseconds)
 - Chopper frequencies:
 5 MHz and subdivisions
 - Buncher: packing 25%, pulse duration 1-3 ns
- "Slow" pulsing system (>miliseconds)
 - home made
 - Chopper system, two plates at high voltage







Pelletron system and the titanium accelerating tubes



Earthquake protection system



7 experimental beamlines



Nuclear structure 7-8 55% HPGe detectors 5-8 LaBr₃: Ce detectors



Nuclear structure

XIA DGF system



LaBr₃:Ce detectors





- Best energy resolution achievable with scintillators
- Timing comparable with BaF₂: 100-300 ps depending on crystal size
- 3 2"x2", 3 1.5"x1.5", 2 conical shaped 1"x1.5"x1.5" (total 8 LaBr₃:Ce detectors)
- Might be used to measure lifetimes in the 50ps few ns range

Report of the last beam-time campaign

- February 15th to July 1st, 2010;
- 126 days meaning 3024 hours available for scheduled experiments
- From 3024 hours scheduled for the experiments we had 2887 hours of analyzed beam
- 49 days meaning 1176 hours, were used by foreign research groups

Future developments

Array of 25 HPGe 55% detectors with BGO anti-Compton shields

Absolute detection efficiency ~ 1%

Expected commissioning : mid 2011





Mechanical project of R. Dima (IFIN-HH)

Major investments on the way

- One 3 MV TANDEM accelerator and associated equipment for ion beam analysis (from HVEC)
- One 1 MV TANDEM accelerator and associated equipment dedicated for AMS detection technique of ¹⁴C (from HVEC)
- One ACSI TR19 cyclotron for research and production of medical radioisotopes

Summary

- The old equipment on the accelerators was replaced with new, more reliable one.
- New associated detection and aquisition systems were build.
- New accelerators dedicated to applied research are on the way.