

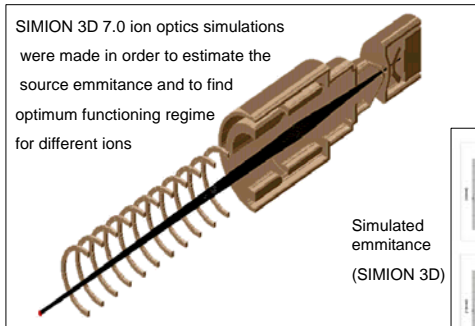
Improvements of Ion Beam Quality at Bucharest FN Tandem

Tiberiu Bogdan Sava, Daniel Vasile Mosu

*Horia Hulubei National Institute for Physics and Nuclear Engineering, Bucharest, Romania
Department of Nuclear Physics*

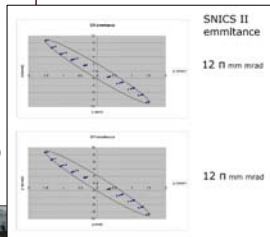
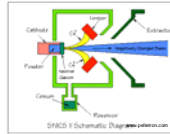
• New sputtering negative ion source (Source of Negative Ions by Cesium Sputtering)

The old inverse geometry sputtering ion source was replaced by a SNICS-II ion source, produced by NEC-USA



What brings new the SNICS-II

- reliability; quicker probe exchange; intense beam currents; computer controlled interface.



Typical values for our source parameters :

Cs oven heater: 5A, 100 V;
Line heater: 75A, 7.5V;
Ionizer : 25A, 8V,
Temperature on Cs oven: 130° - 160°;

Cathode: 6 kV, (water cooled);
Extractor: 15kV;
Focus (Einzel Lens): 2 kV;
Pre-acceleration tube: 50kV;

3 voltage blocks with different parameters:

- Ground potential**
- pre-acceleration voltage/current
 - deflectors voltage
 - vacuum read
 - network plug-in
- 55 kV potential**
- extractor voltage/current
 - cooling water presence
- 70 kV potential**
- cathode voltage/current
 - focus voltage/current
 - Cs oven heater current
 - Cs line heater current
 - ionizer current
 - Cs oven thermocouple read

Some species of ions and currents obtained from SNICS-II

Particle	Current (µA)	Compound
⁷ Li	10.0	LiH
⁷ Li	1.00	LiF
⁹ Be	0.30	Be
¹² C	15.0	graphite
¹⁶ O	5.0	THH
⁶³ Cu	7.5	Cu



SNICS-II

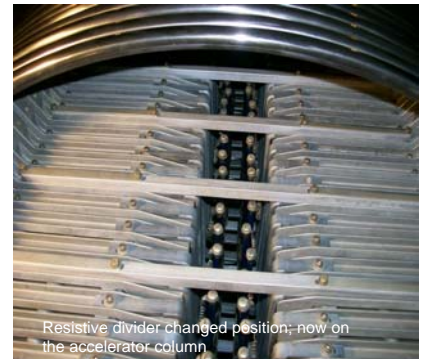
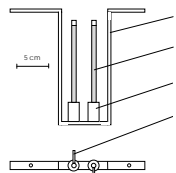
LabView computer read/control interface



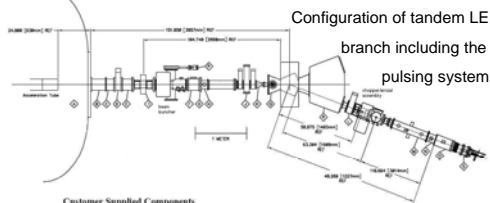
• The "pelletron" charging system of Bucharest FN Tandem: Two metal pellet chains linked with nylon junctions were mounted on low and high energy sectors, replacing the old HVEC rubber charging belt.



The chains were set on the left outer side of the tandem accelerator column. The resistive divider formed by 384 resistors was relocated between the two sections of the column on the upper side

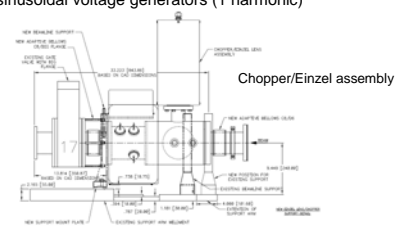


• Bucharest FN tandem nano-second pulsing system A nano-second beam pulsing system produced by NEC-USA has arrived in our laboratory in order to be mounted on the tandem accelerator



Pulsing system components:

- 2.5 MHz beam chopper
- count down system with adjustable frequencies (5 MHz, 2.5 MHz, 1.25MHz, 625kHz, 312 kHz, 156 kHz, 78 kHz, 39 kHz, 19.5kHz)
- (63-50) Einzel lens
- 5 MHz beam buncher
- 2 sinusoidal voltage generators (1 harmonic)



Some pulsed beam future applications: nuclear life times measurements, nuclear electric/magnetic moments analysis, gamma off-beam spectrometry

Short review of other improvements on **Bucharest FN Tandem Accelerator**:

- Alpha particle ion source (Li charge exchange) / Dec. 2006
- New GVM (Generator Volt Meter) on high voltage stabilization chain / Feb. 2008
- New generation turbo-molecular vacuum pumps / May 2008
- New power and high voltage supplies / Jun. 2007
- New titan accelerator tubes / sep. 2008

References:

<http://www.pelletron.com/> (NEC-USA)

Modernization and development of the Bucharest FN Tandem Accelerator" – S. Dobrescu e.a./ IFIN-HH Days – Dec. 2008