



**AMS GROUP:**

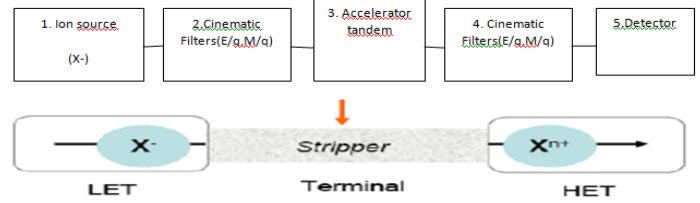
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# ACCELERATOR MASS SPECTROMETRY, AMS

## TANDETRON ACCELERATOR

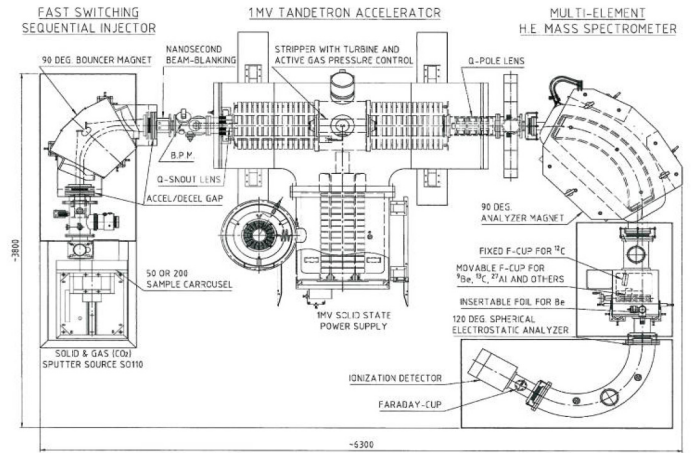
- Mass Spectrometry with tandem accelerator.
- 1 MV maximum Voltage (Low Energy AMS).
- Cinematic Filters.
- Detection of particles by mass and not to be radioactive.



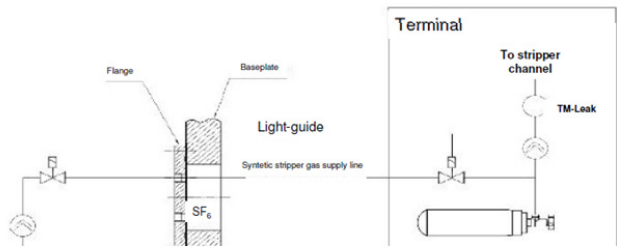
## PRINCIPLES AND ADVANTAGES

- Charged particles have different trajectories when they pass through areas with magnetic and electric fields. The trajectory depends on its mass, charge and energy of the particle. Using these fields, we separate the radioactive and stable isotopes of an ion beam.
- The charged particles reach high speed.
- **Higher sensitivity** than the mass spectrometry systems without accelerator.
- The **STRIPPING process** is the interaction of the analysis beam with an low-pressure gaseous medium at the terminal, removing the molecular component and accelerate particles to high energies. These effects allow to overcome the limitations with present techniques conventional mass spectrometry to measure of some radionuclides such as <sup>10</sup>Be, <sup>14</sup>C, <sup>129</sup>I and actinides .

Basic diagram of AMS system.



## NEW STRIPPER THAT ALLOWS THE USE OF DIFFERENT GASES. REPLACE Ar BY HELIUM GAS STRIPPER



2. External gas bottle

1. He bottle ( before Ar bottle)

(Ar, Xe, N2)

Diagram of the new stripper Helium for AMS system

## OBJECTIVES

- 1) Improving the measurement conditions for radionuclides, <sup>41</sup>Ca, <sup>129</sup>I and actinides: transmission through the accelerator will increase significantly with the **He gas stripper**. Also increase the counting rates of radionuclide in the detector, thus significantly improve the counting statistics and the uncertainty of the results.
- 2) Study of the physical phenomena of stripping with **He, N<sub>2</sub> and Xe** from 500 keV to 1 MeV energy.
- 3) Increase the number of users and improved results. **Stripper will be more versatile** and will increase competitiveness.

## WORK SCHEDULE

- 1) **Technical Block I:** Making necessary parts for the implementation of external gas stripper, and replace the current one of Ar by He.
- 2) **Technical Block II:** Installation and tuning of the new stripper on the accelerator system of 1 MV.
- 3) **Experimental Block I:** AMS Group will optimize the operating parameters for the demanded radionuclides using He as a stripper.
- 4) **Block experimental II:** Experiments with different gases will be made.

## EXPECTED RESULTS

- Experimental results with better experimental uncertainty and less analysis time. Consequently, the CNA installation will become **more competitive**, both for the services offered as for research in basic physics.
- The installation will be **multidisciplinary**, increasing the number and type of applications in Archaeology, Hydrology, Nuclear Waste and Environmental Sciences.
- As **transmission system grows**, the measurement time is reduced significantly, and energy of the team.



Radionuclide	AMS-CNA (Ar)		AMS-CNA (He)	
	T	Background	T	Background
Ca41	7%	5 e-12	>50%	?
I129	4-10%	10e-13	>40%	
U236	11%	2e-11	>35%	

Comparison of measurement conditions using Ar and He (as research publications)