

MACISTE: A FORWARD DETECTOR FOR MASS AND CHARGE SPECTROMETRY AT LNS-CATANIA

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Heavy ion beams of 20+100 MeV/A energy are planned in 1995 at LNS. A few multidetectors have been developed in order to study the heavy-ion collisions in such an energy range. In particular the MEDEA¹⁾ and MULTICS²⁾ detectors, respectively for backward gamma rays and light particles, and for forward fragments, are going to be coupled in order to cover a $\approx 4\pi$ solid angle with a high efficiency to all charged particles and photons.

The forward hole left by the apparatus is about $\pm 3^\circ$: 2 meters further we have placed a superconducting solenoid³⁾, acting as a charged particle collector, with an angular acceptance of $\pm 6^\circ$ and an energy one of $\pm 20\%$. This solenoid allows to convey a class of particles, according to their magnetic rigidity, onto the collection plane at 15 m from the target.

The collection plane detector, now under construction and named MACISTE, will be constituted by four telescopes arranged on a 60x60 cm² area like a photographic diaphragm, to leave a central hole for the beam. Each telescope has four layers: a gas chamber for ΔE measurement, followed by two wire chambers for XY position and by a 3 cm thick plastic scintillator, read by means of the new Hybrid Photomultiplier Diode, for energy measurement.

Such a detection system, still remaining quite compact, will allow to resolve a single mass unit up to $A=70$ and the single charge unit up to $Z=45$, when detecting fragments around the ^{60}Ni at ≈ 50 MeV/A; in these conditions the energy resolution expected is $< 1\%$. The apparatus will also be capable of reconstructing the polar emission angle of the particle from the target. The precision of such a reconstruction is strongly bound to the tuning of the magnetic field of the solenoid around a class of fragments of interest.

The experiments planned with this detector are focused around two main directions: those detecting a quasi-fusion product (e.g. studies on giant resonances) and those detecting the projectile-like fragment (e.g. peripheral reactions).

References

- 1) E.Migneco et al., Nucl. Instr. & Meth. A314(1992)31
- 2) I.Iori et al., Nucl. Instr. & Meth. A325(1993)458
- 3) C.Agodi et al., LNS Report 91/3, 24-09-91

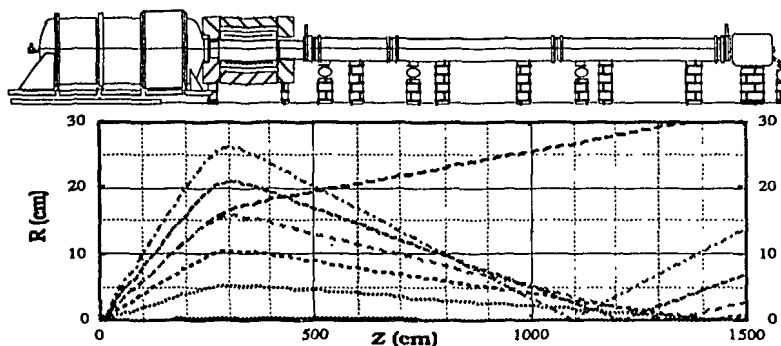


Fig.1: the MEDEA + MULTICS detector system, followed by the solenoid, the beam line and finally the MACISTE detector. Also shown is an example of the radial profile for fragments on the collection plane.