

# The Heavy-Ion Magnetic Spectrometer

## **PRISMA**

PRISMA is a magnetic spectrometer for heavy ions installed at Legnaro (LNL), with very large solid angle (80 msr), wide momentum acceptance ( $\pm 10\%$ ) and good mass and energy resolution via TOF measurement

PRISMA will be ready for the first experiment at the end of this year

### **Prisma Collaboration**

**A.M.Stefanini, L.Corradi, A. Gadea, S.Szilner, M.Trotta, A.Latina**

**M. Gulmini, G.Maron, A.Pisent, N.Toniolo**

INFN - Laboratori Nazionali di Legnaro (Padova, Italy)

**S.Beghini, G.Montagnoli, F.Scarlassara, D.Bazzacco**

Università di Padova and INFN - Sezione di Padova

**A.De Rosa, G.Inglima, M.LaCommara, D.Pierrotsakou,**

**M.Romoli, M.Sandoli**

Università di Napoli and INFN - Sezione di Napoli

**G.Pollarolo**

Università di Torino and INFN - Sezione di Torino

## Main Features of the PRISMA Spectrometer

**Solid angle**

$$\Omega \cong 80 \text{ msr}$$

**Angular acceptance**

$$\Delta\theta \cong 12^\circ \quad \Delta\phi \cong 22^\circ$$

**Target - Focal Plane distance**

$$7 \text{ m}$$

**Energy acceptance**

$$\pm 20\%$$

**Max. rigidity**

$$70 \text{ MeVamu} \quad (1.2 \text{ Tm})$$

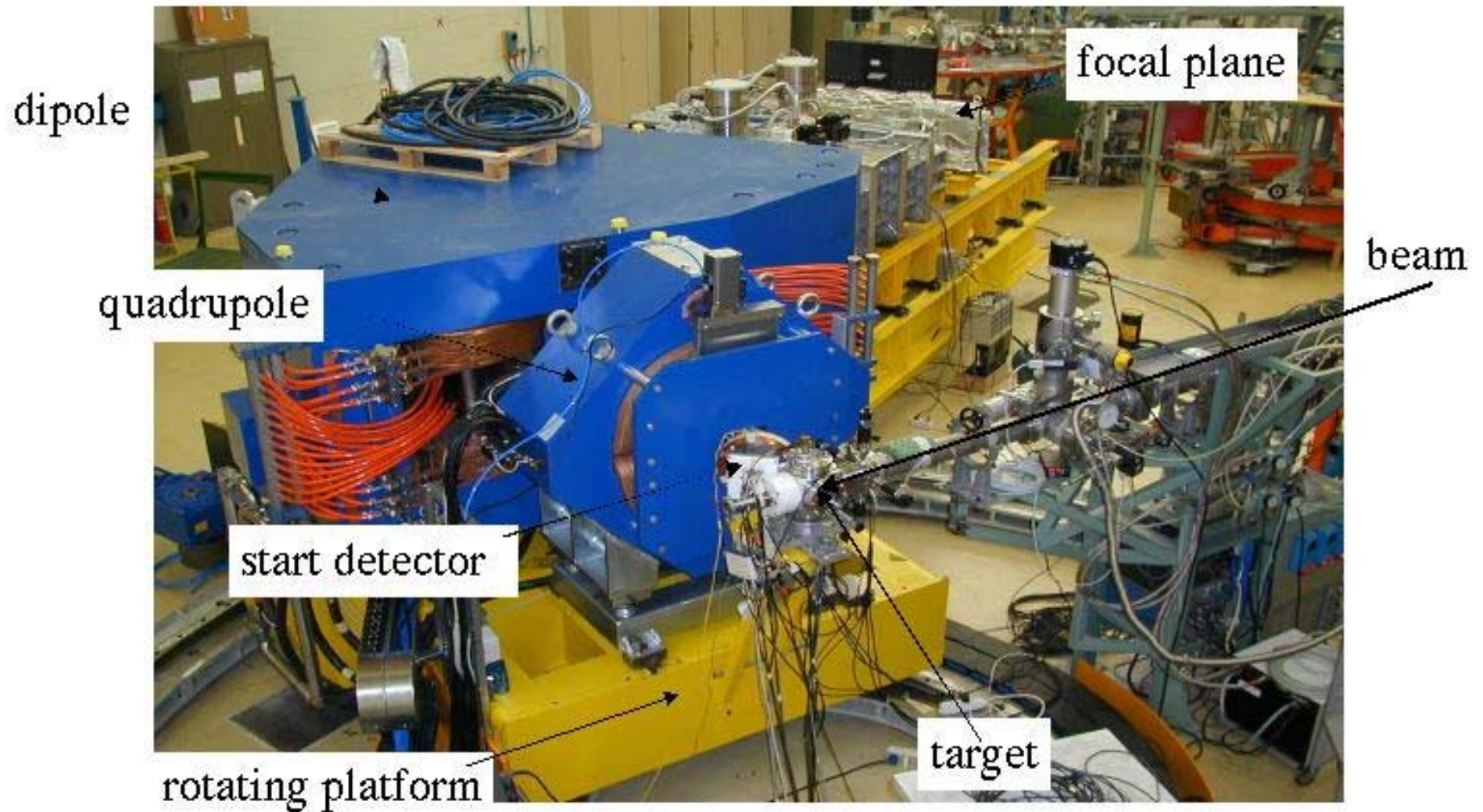
**Dispersion**

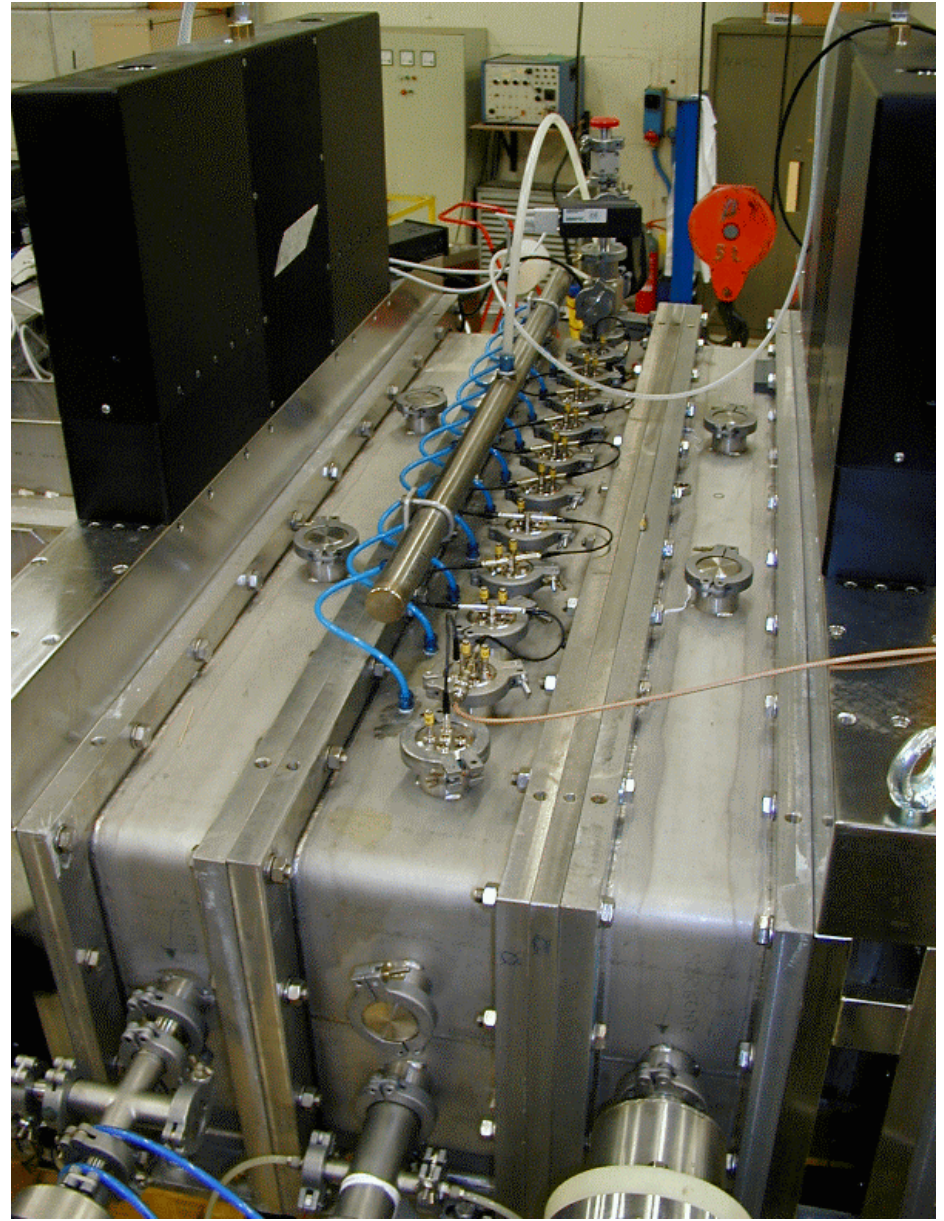
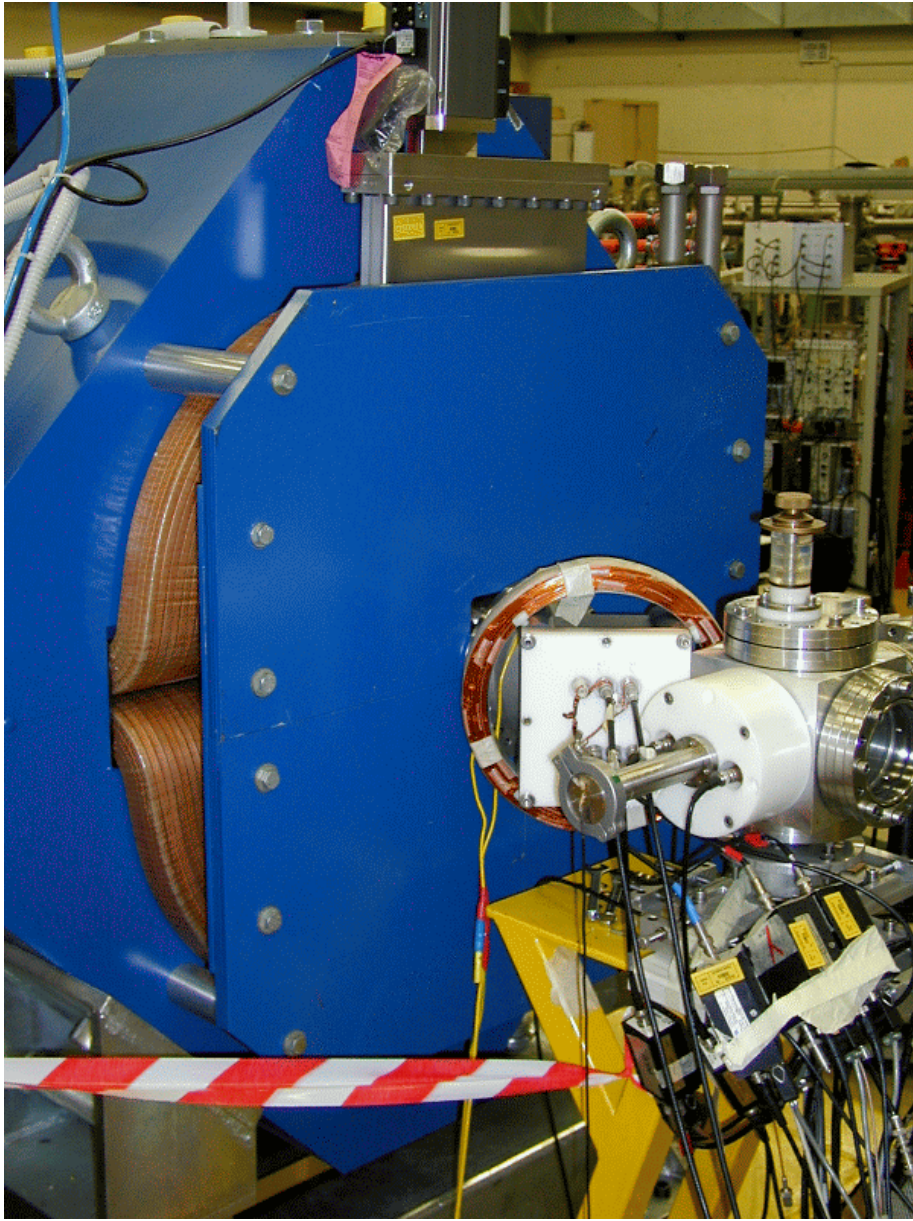
$$3.3 \text{ cm/\%}$$

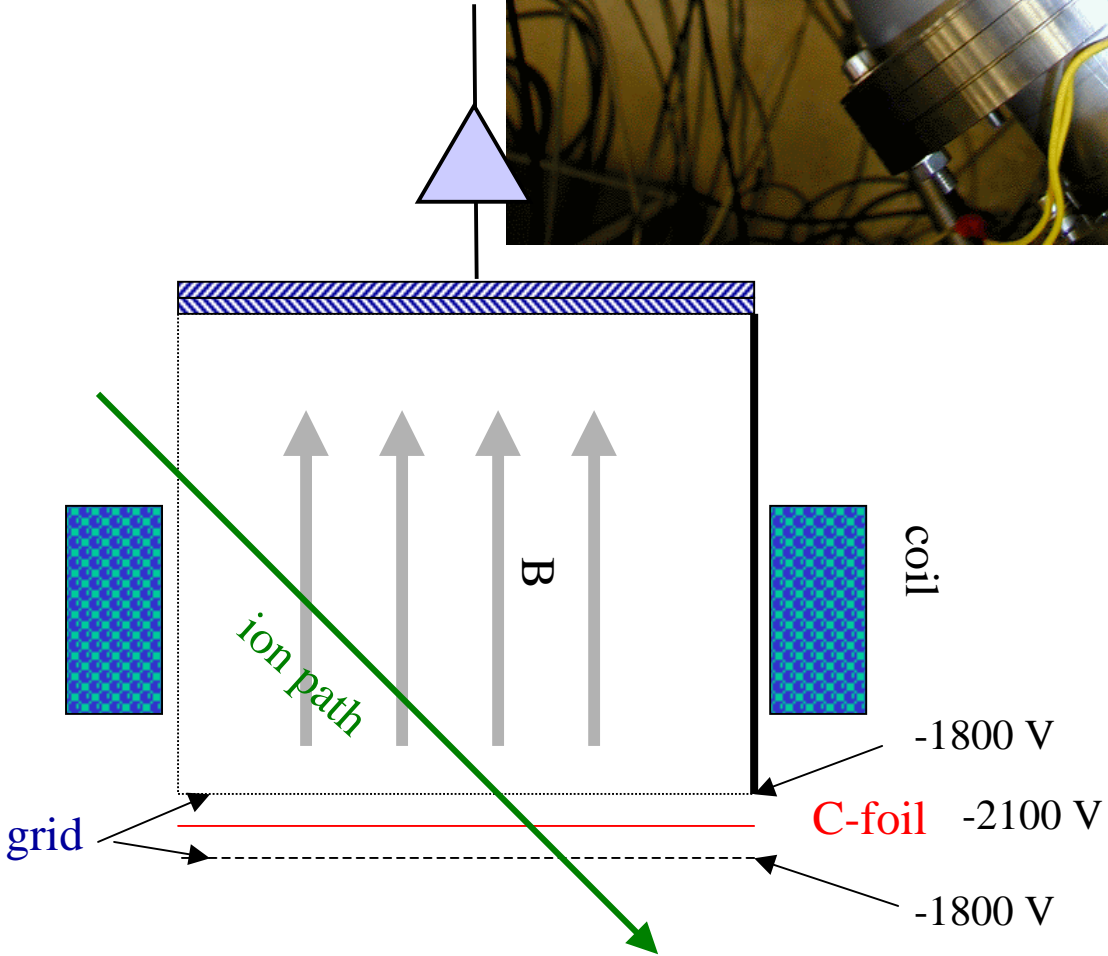
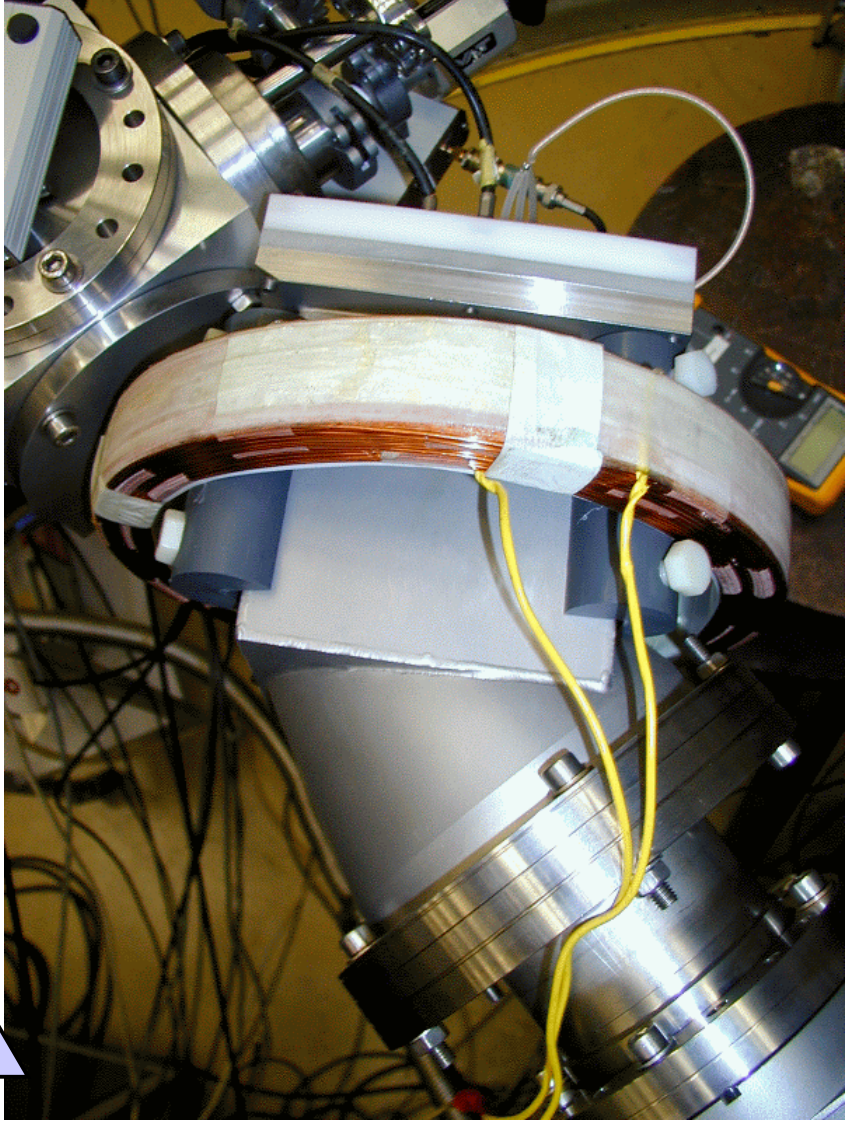
**Mass resolution**

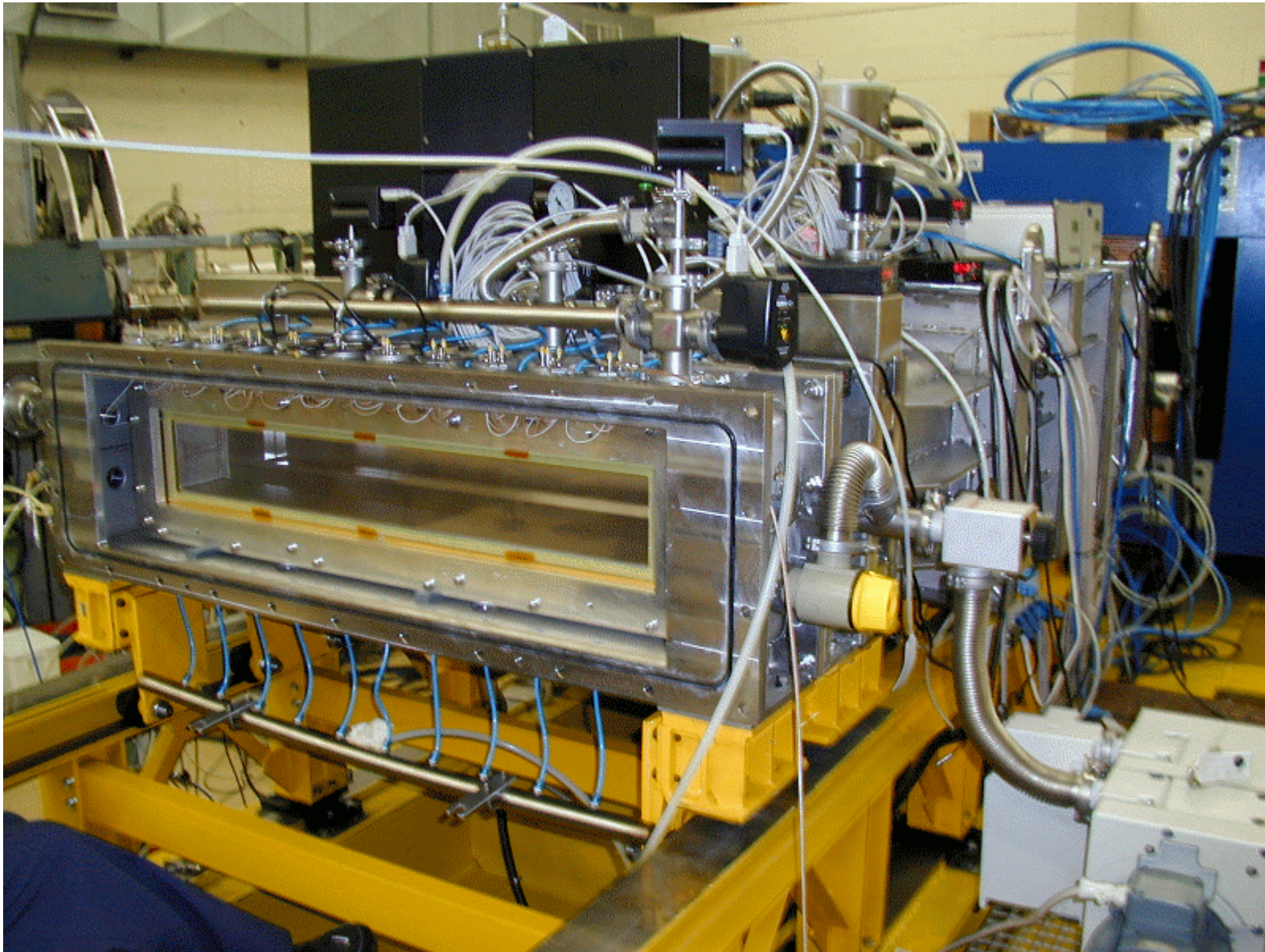
$$\approx 1/300 \text{ fwhm}$$

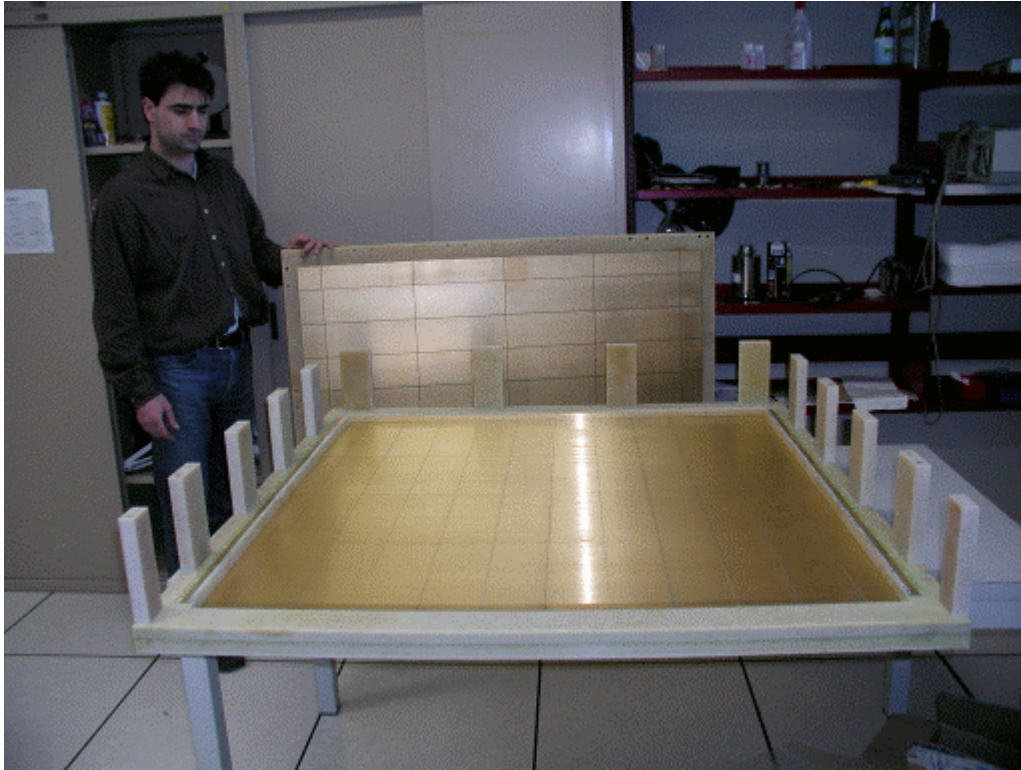
## The magnetic spectrometer PRISMA installed at LNL









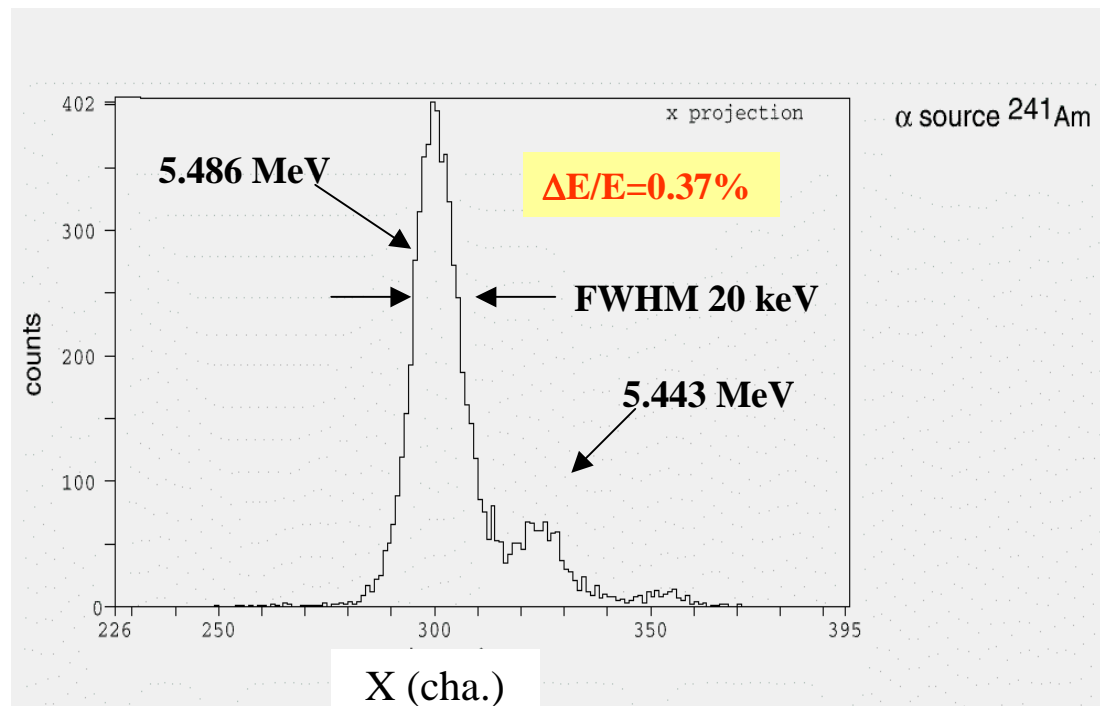


## The Ionization Chamber



## Alpha source calibration: energy resolution

Determination of the momentum (energy) resolution with a MCP ( $8 \times 10 \text{ cm}^2$ ) placed in the center of the focal plane, on which  $\alpha$  particles from a  $^{241}\text{Am}$  source were implanted.





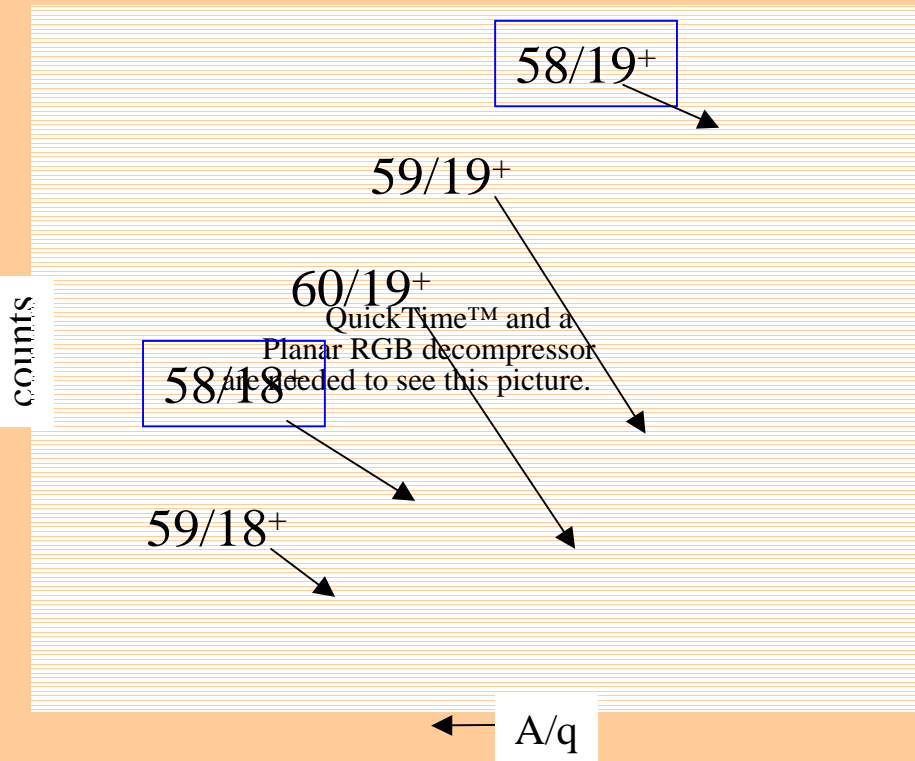
In-beam test: first mass spectrum measured in a nuclear reaction

240 MeV  $^{58}\text{Ni} + ^{124}\text{Sn}$

$\theta_{\text{lab}} = 90^\circ$

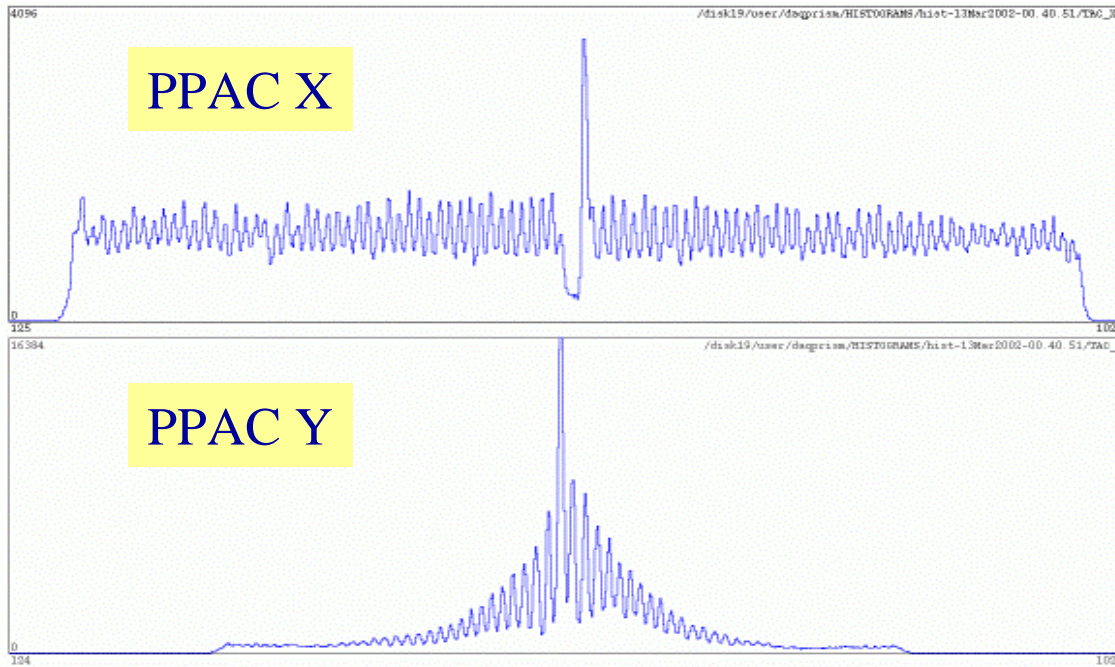
TOF (cha)

QuickTime™ and a Planar RGB decompressor are needed to see this picture.



X(cha)

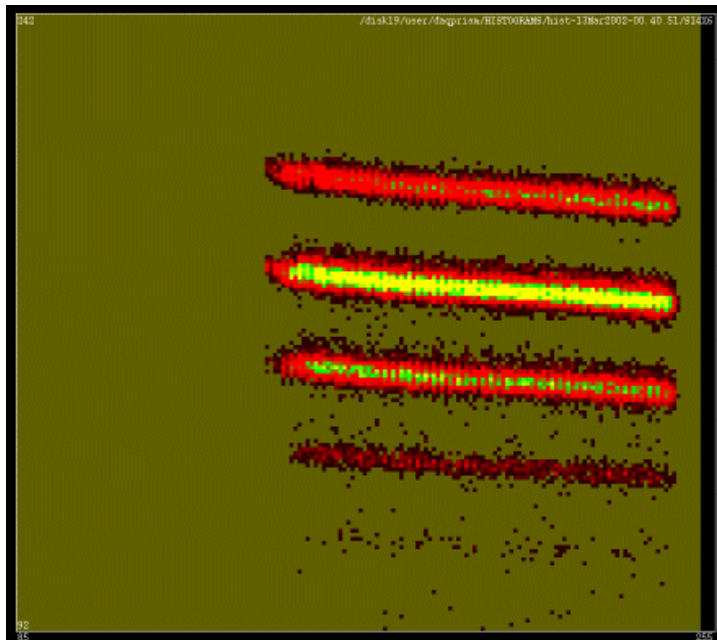
A MWPPAC (10x8cm<sup>2</sup>) followed by a Si detector was placed on the focal plane.



$^{58}\text{Ni} + ^{197}\text{Au}$   
185 MeV

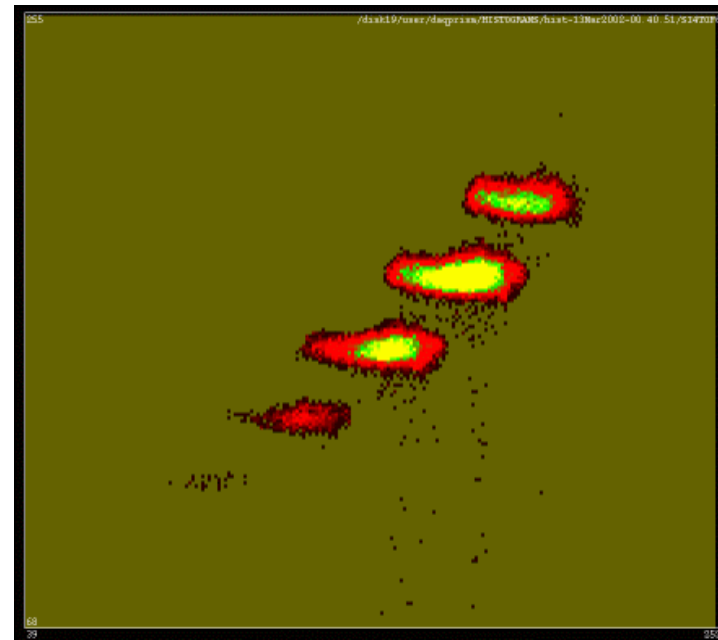
1.5 mg/cm<sup>2</sup>

E



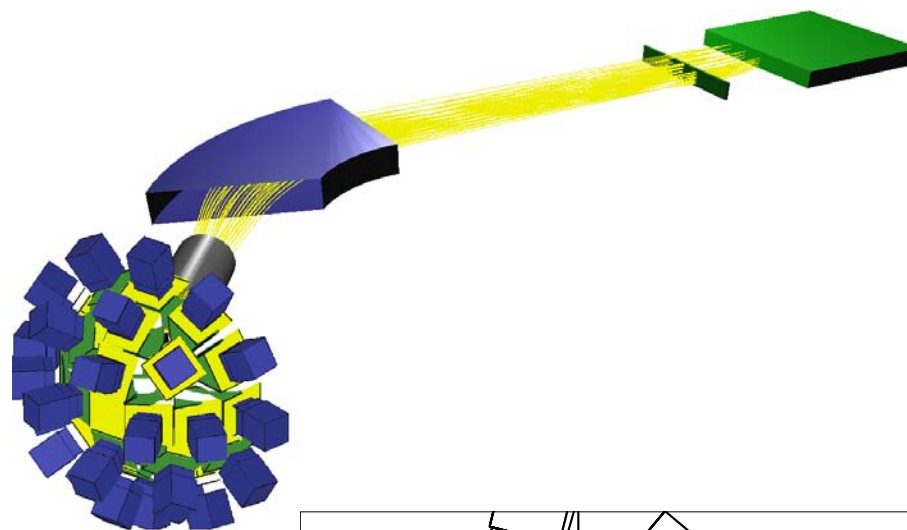
X

E

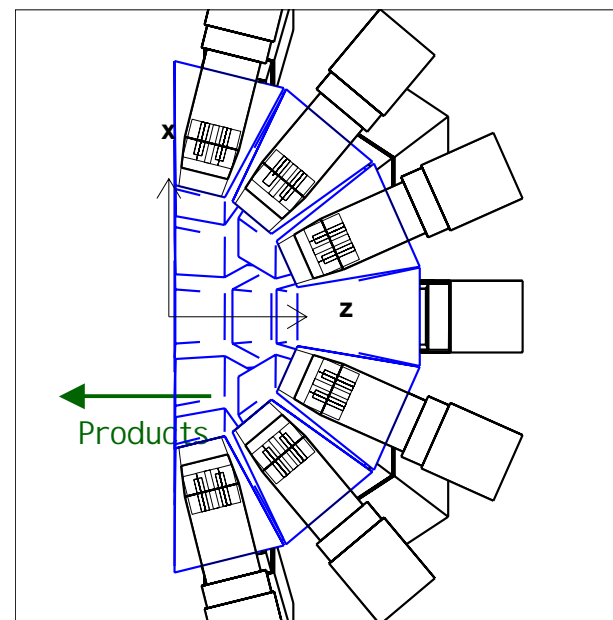


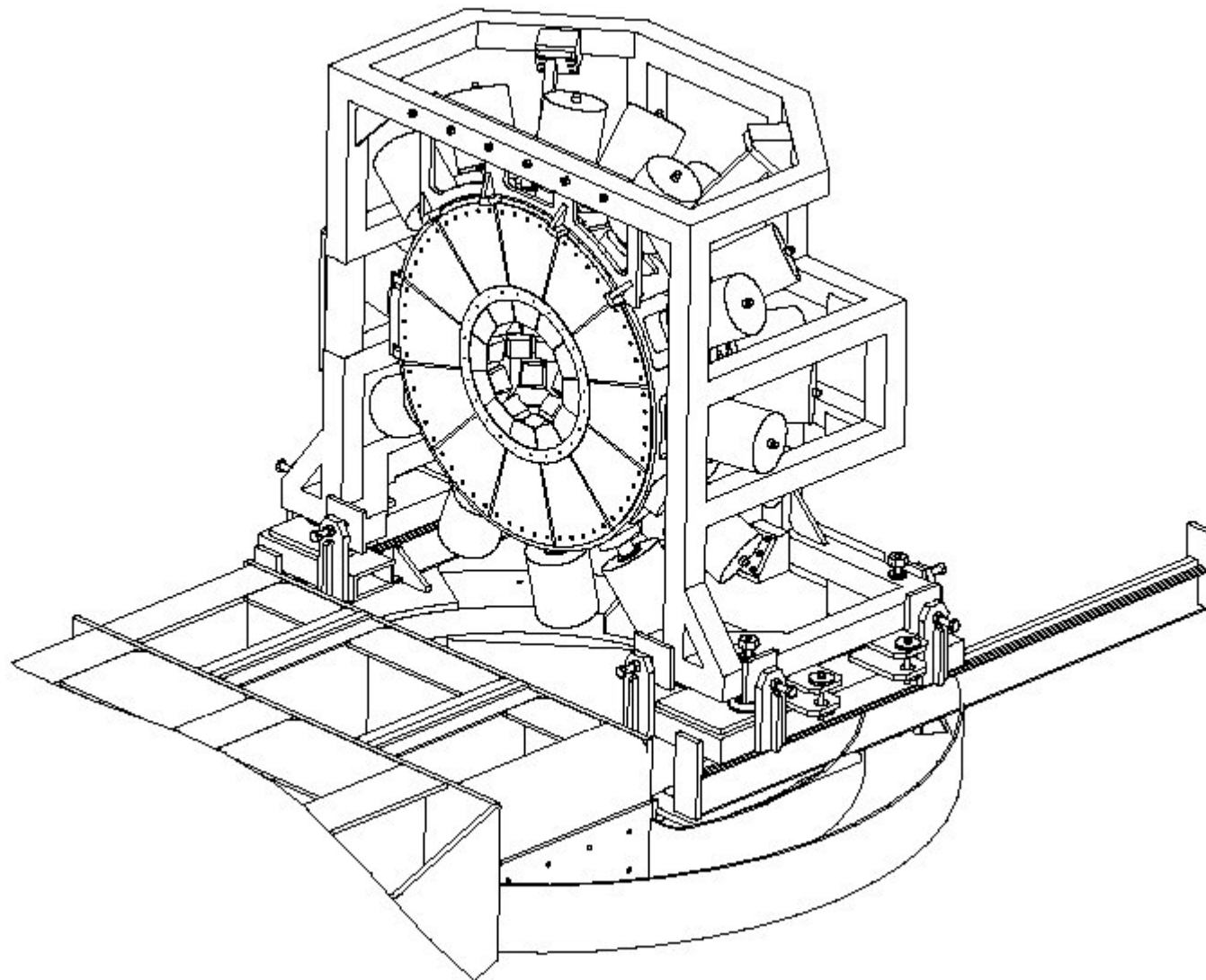
TOF

# The Prisma - Clover array setup



- 24 to 25 Clovers setup
- Efficiency  $\sim 3\%$
- Peak/Total  $\sim 50\%$
- Position  $\theta = 104^\circ - 156^\circ$
- FWHM  $\sim 10$  keV for  $E_\gamma = 1.3$  MeV  
at  $v/c = 10\%$





In the design phase. Campaign to start in June 2003