Spettrometro PlasmonX

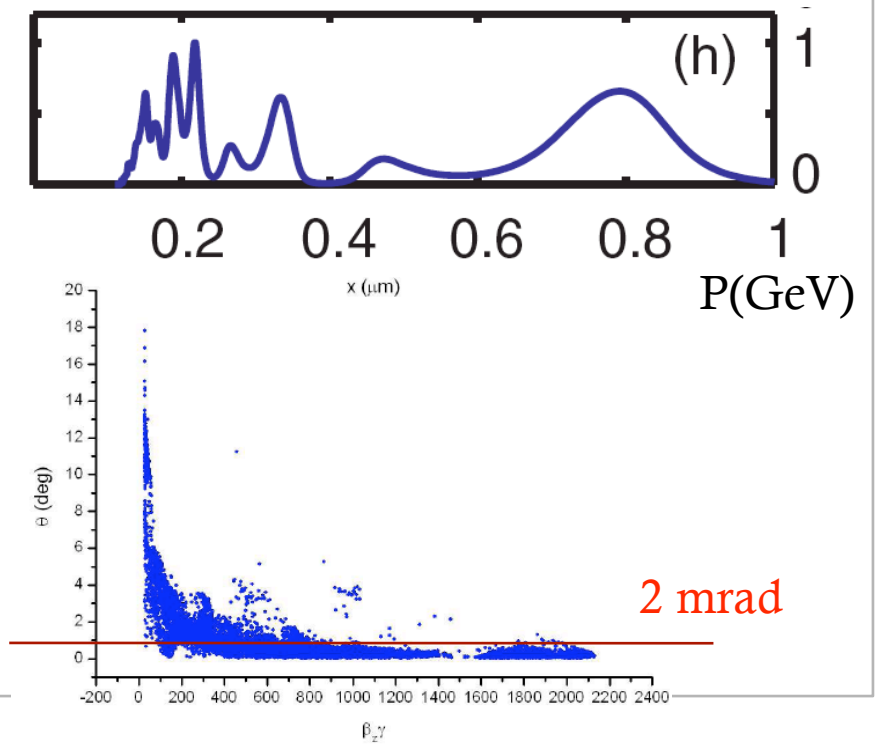
Stato e piani futuri

N. Drenska, **R. Faccini**, S. Martellotti, F. Tani,P. Valente
"Sapienza" Universita' and INFN Roma

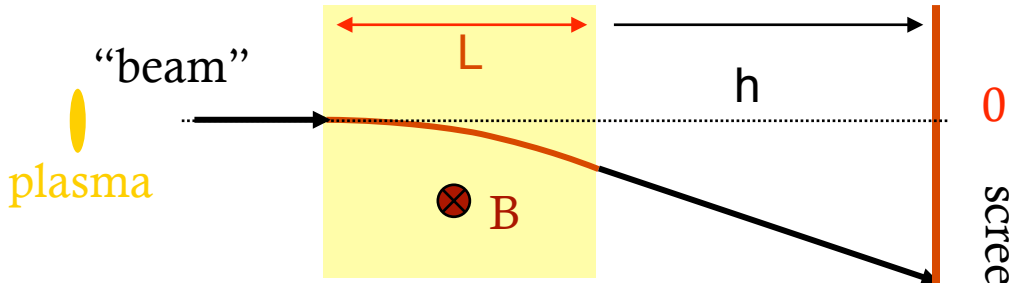
Requirements

- Max energy
  - Expect to start at p~100MeV but achieve results as high as 10 GeV
  - In case of ion acceleration one expects to generate protons with T>~10 MeV [p>~140 Mev]
- Resolution
  - ~1% in most of the range
- Beam shape
  - Point-like source
  - >~2mrad angular dispersion

Challenge: 10^8 electrons over 3 o.o.m



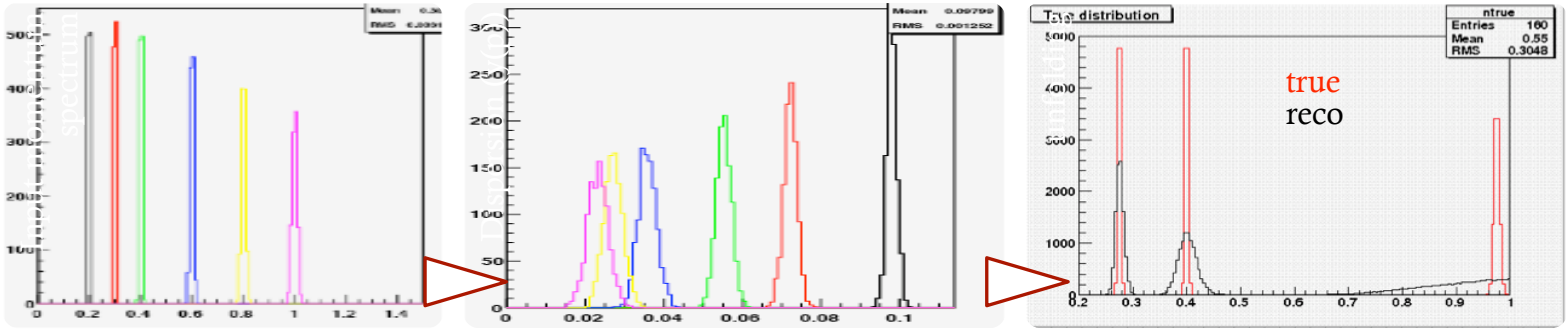
Generic layout



Momentum spectrum

Position measurement

Unfolding



P(GeV)

Y(m)

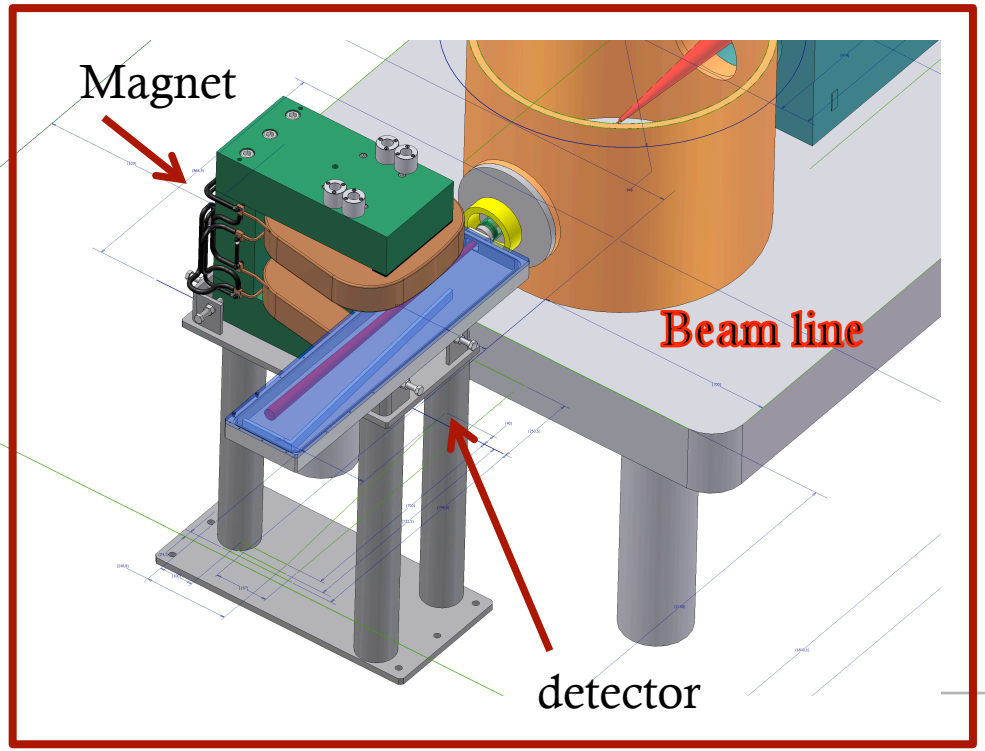
P(GeV)

Critical Aspects

- Design of magnetic field (intensity and length) and detector positioning
  - Beam divergence
  - Dispersion (space resolution)
- Choice of detector technology
  - Space resolution
  - Charge resolution
  - Cost and encumbrance constraints
- Data analysis

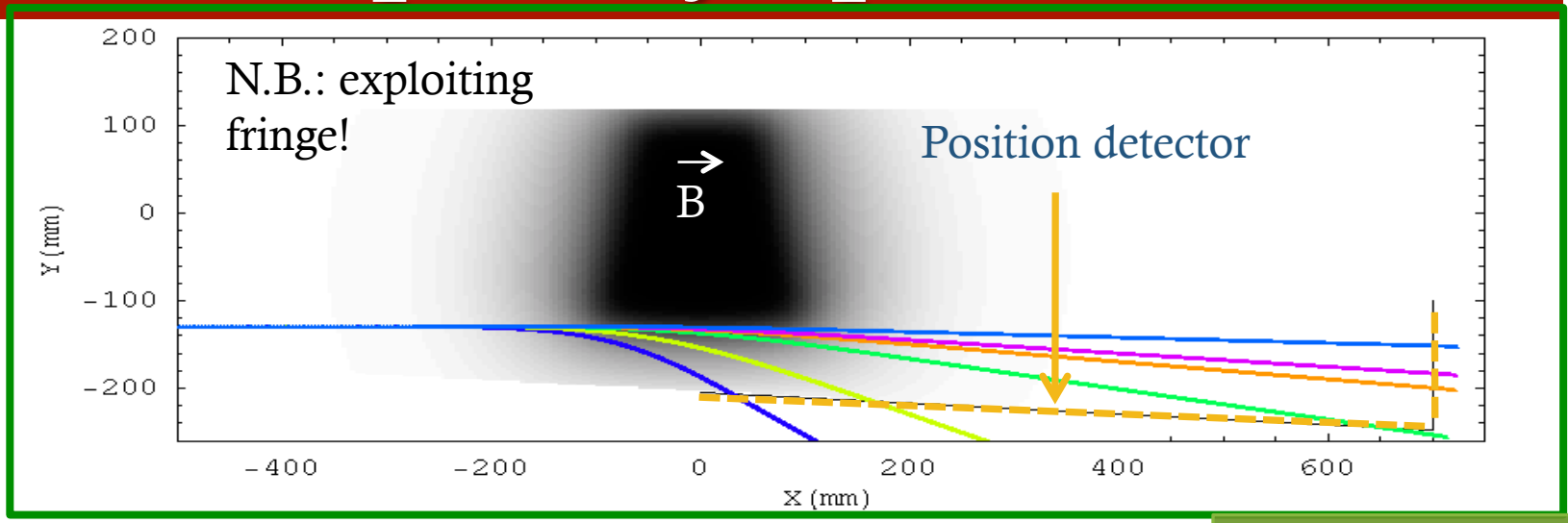
Temporary Spectrometer (2010)

Will discuss these points, showing studies for the 2010 preliminary spectrometer for PlasmonX
➔ Dedicated detector under design

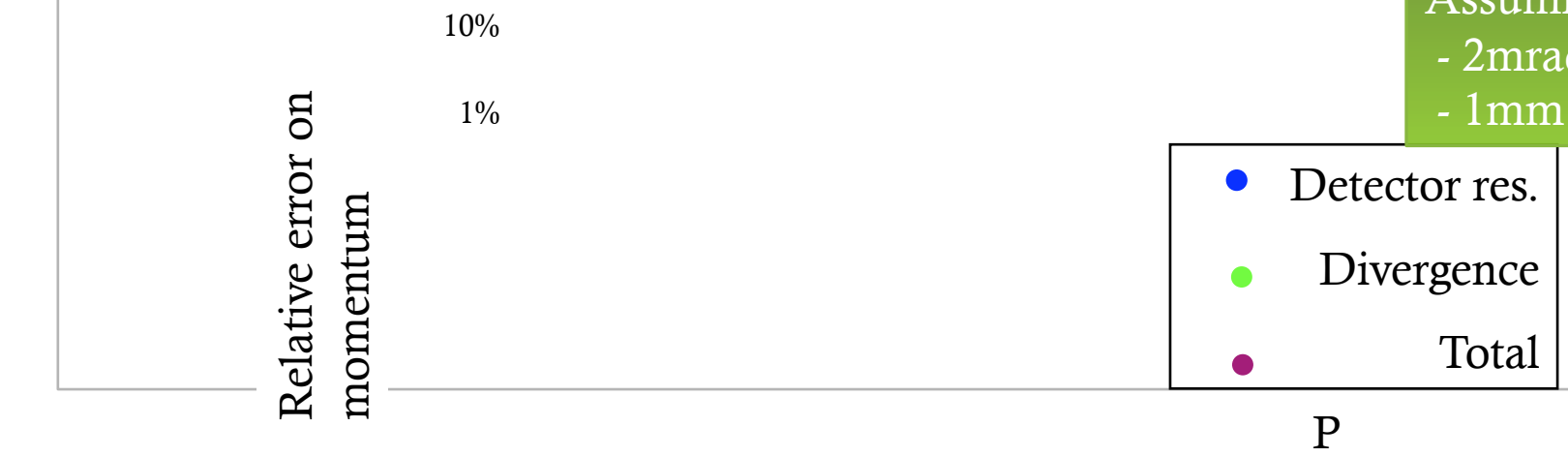


Mostly recycled material:
- Magnet spare of SPARC
- Scintillating fibers from NA62
- electronic board borrowed from ISS

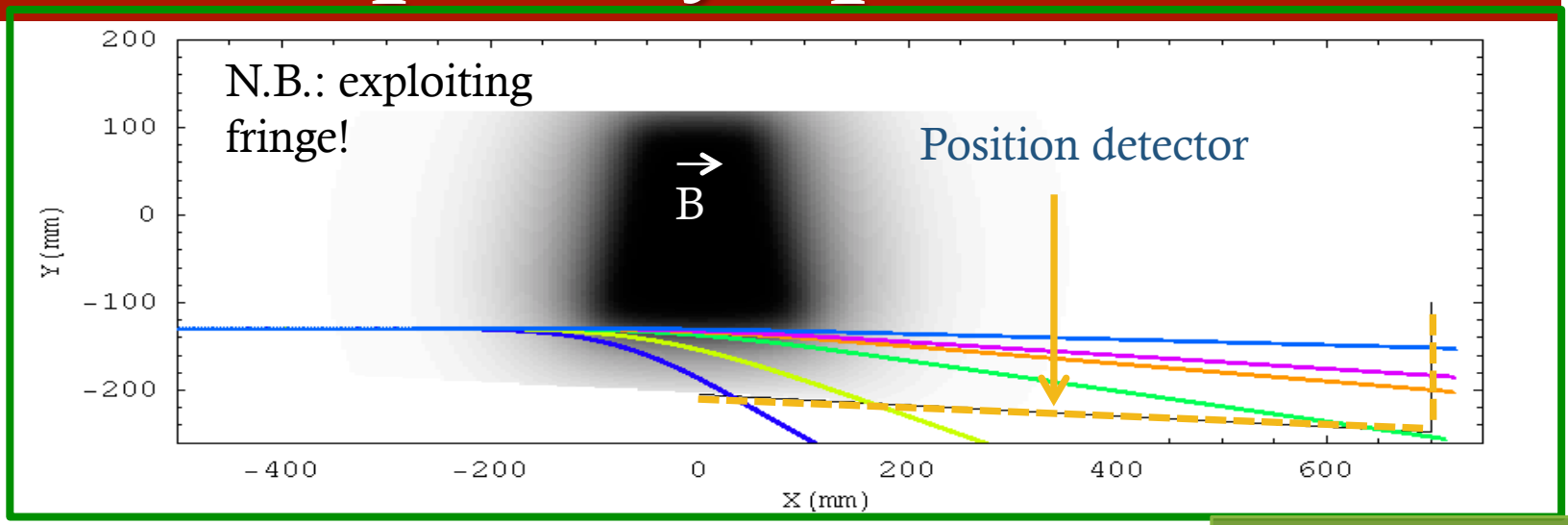
Optimal configuration for temporary spectrometer

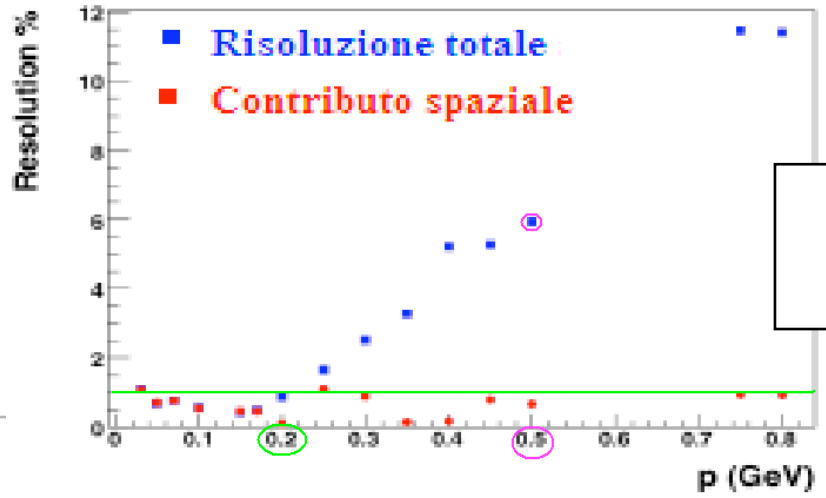


Assuming:
- 2mrad divergence
- 1mm resolution



Optimal configuration for temporary spectrometer



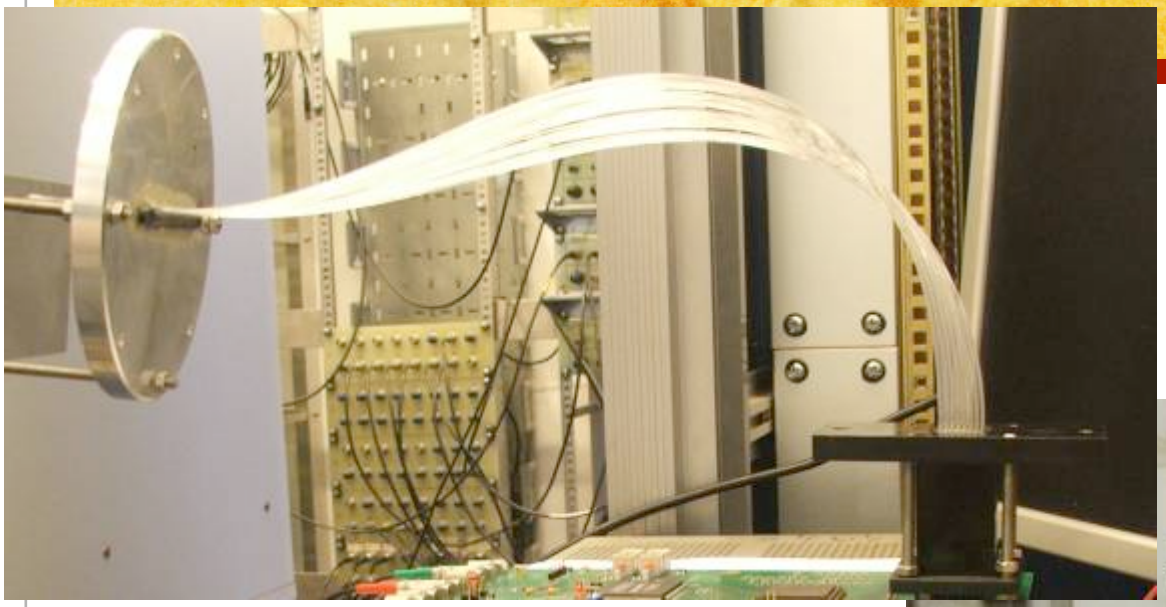


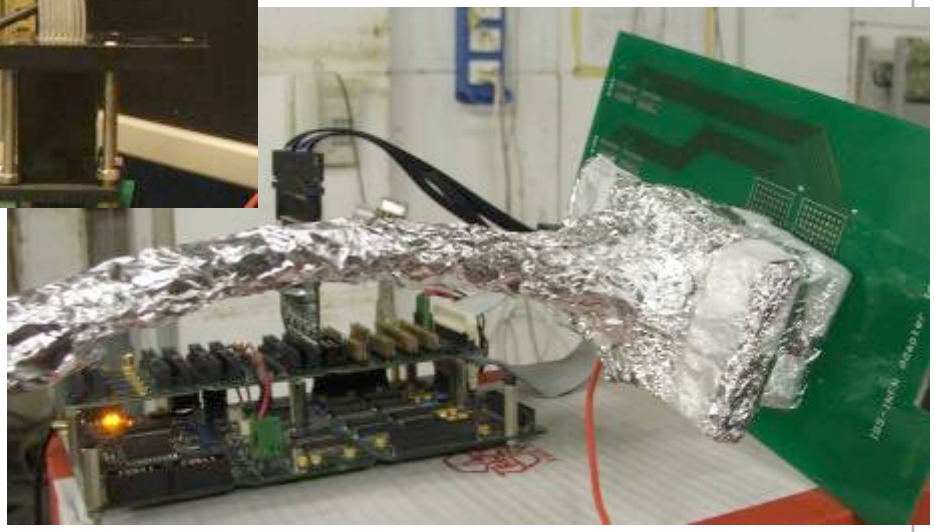
Assuming:
- 2mrad divergence
- 1mm resolution

Total.

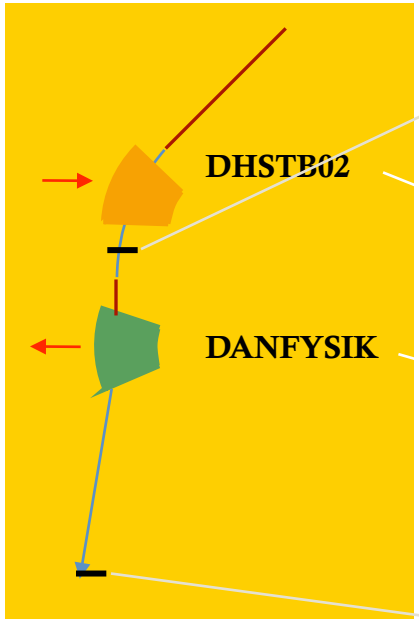
Detector Res.

64 channels Prototype





Test Beam @ Frascati BTF

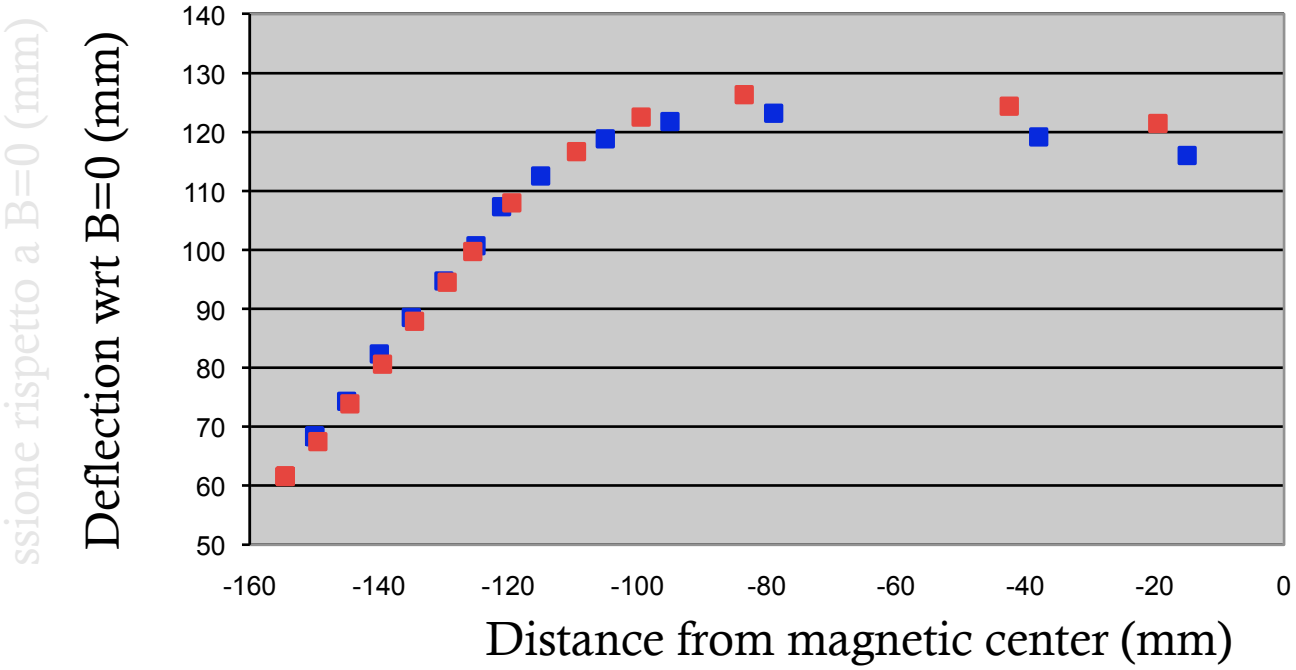


UPSTREAM position monitor

DOWNSTREAM
Position monitor
(or prototype)

Tests of Fringe Layout

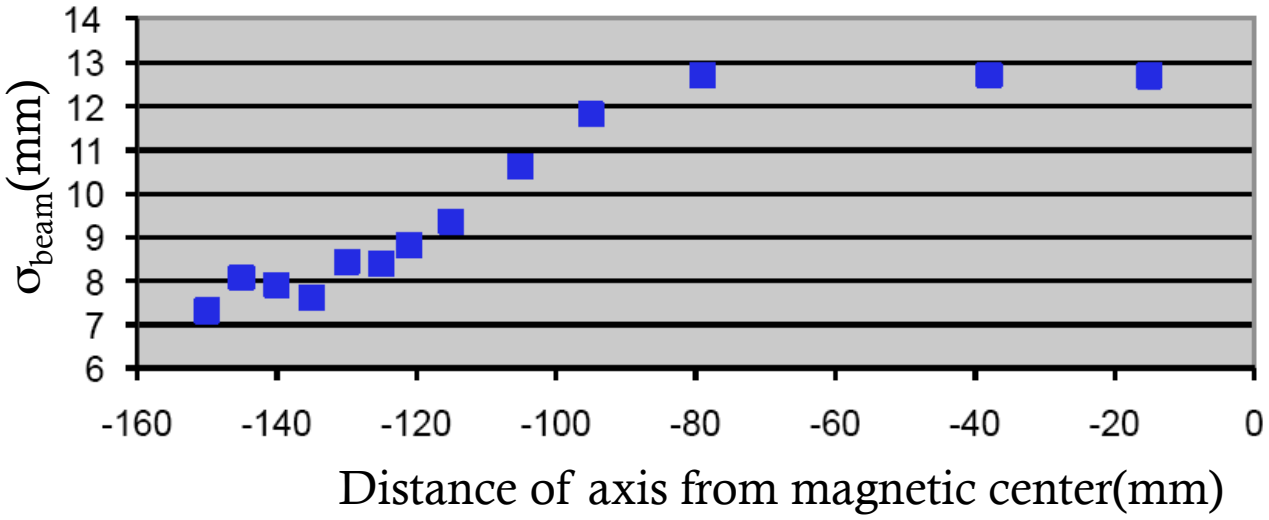
- Tests at the Frascati BTF have verified that the deflection is well reproduced with the magnetic map also for particles impacting the fringe



Note that alignment at the mm level is critical

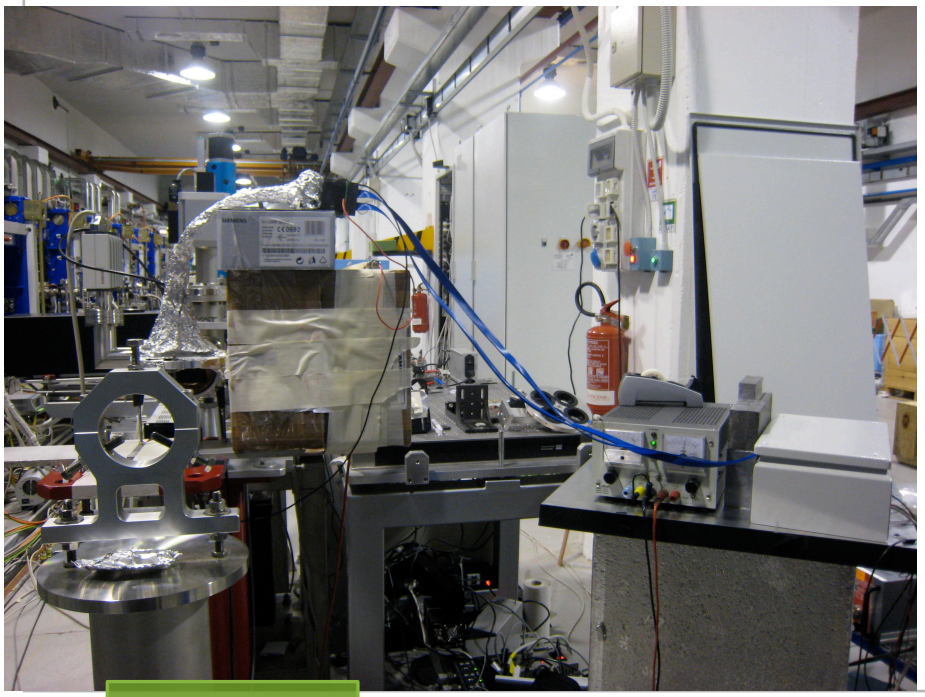
Focii

- Existence of points of convergence of the beams proven in TB

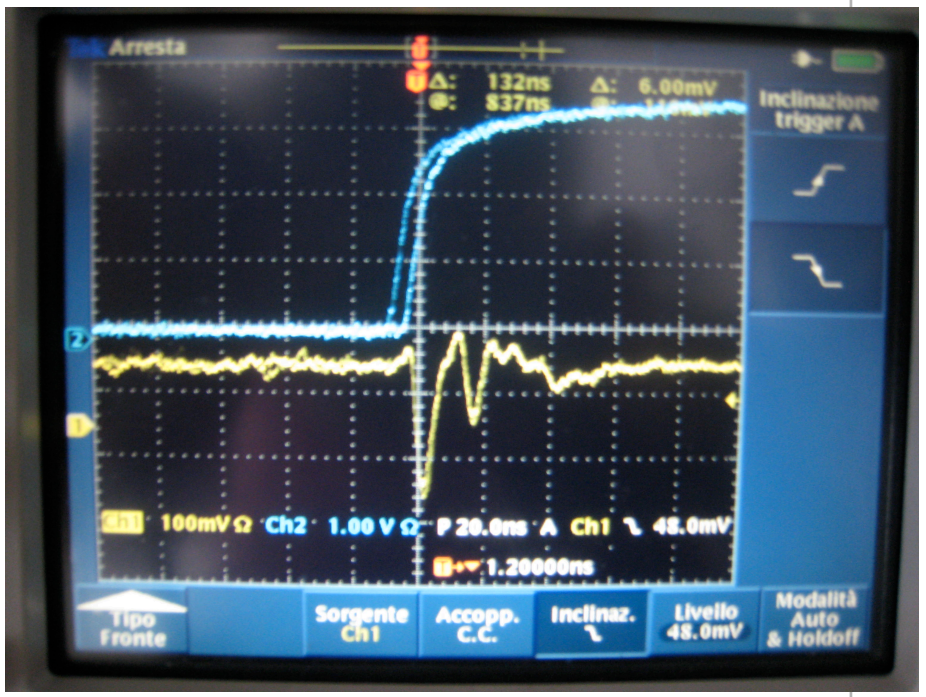


Test a SPARC

- Abbiamo avuto del tempo di fascio di SPARC → Difficolta' di sincronizzazione



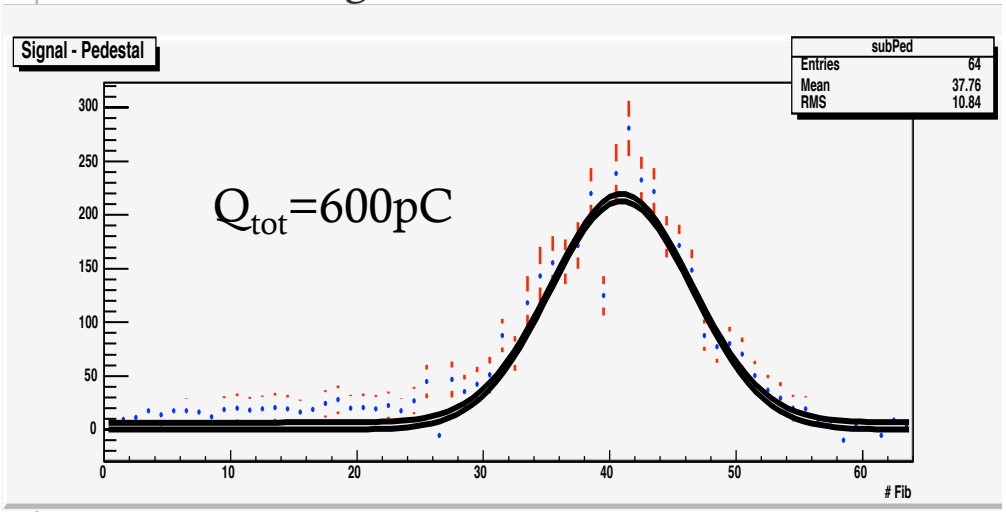
March '10

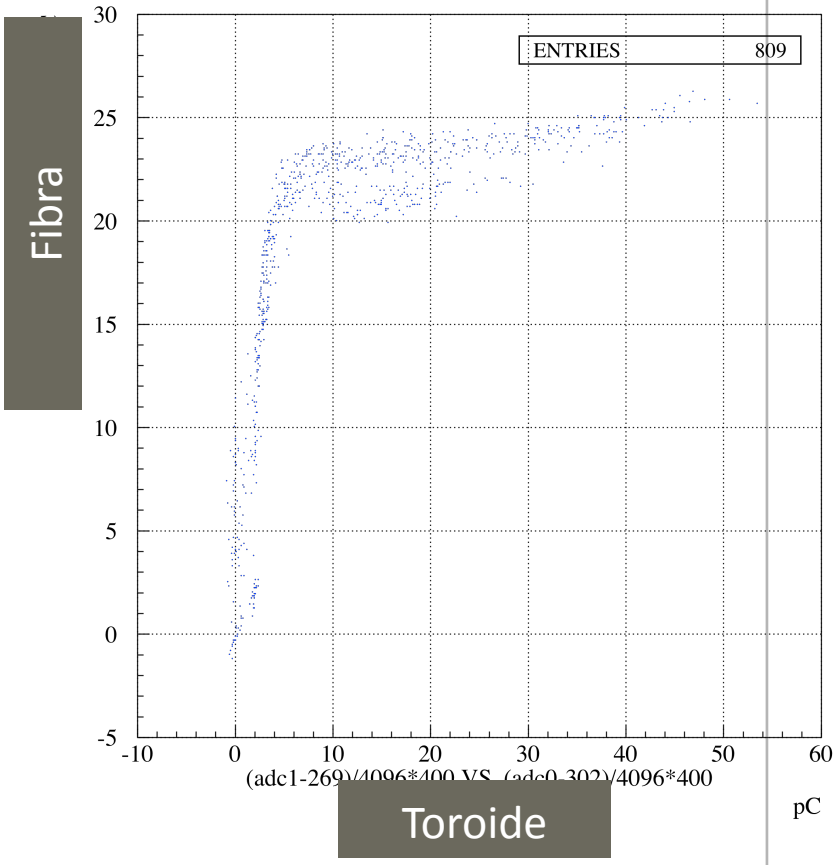


Test sincronizzazione su FLAME questa settimana

Test @ BTF

- Primo segnale da fascio





- Problema: area segnale indipendente da Q_{tot}!! Saturazione fibre a ~0.8pC/fibra
- Calibrazione e linearita' sotto studio. Preliminarmente C~300ADC/pC @HV=500V

April '10

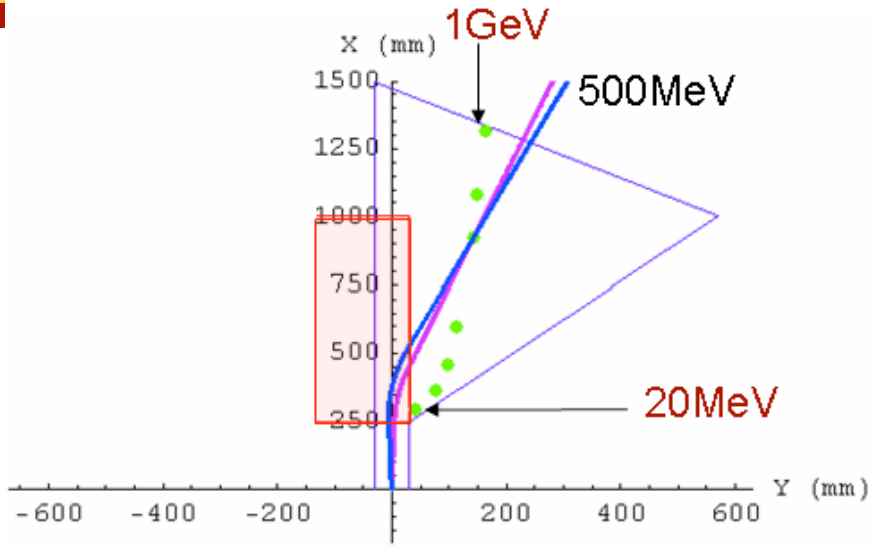
Costruzione camera e rivelatore

- 20/3 disegno camera consegnato a ditta ✔
- 3/4 disegno rivelatore pronto ✔
- 13/4 cameretta consegnata da ditta ✔
- 19-24/4 allineamento e posizionamento cameretta → installazione dentro FLAME in corso

  inizio produzione rivelatore in attesa decisione su fibre
- 19/4 rivelatore consegnato da ditta
- 19-23/4 montaggio PMT ed elettronica
- Se c'e' tempo organizziamo calibrazione alla BTF (fibra per fibra contro quella media con BCM)

Next generation (SITE → Ext. Ini.)

- Spettrometro + lungo (1.5m)
- magnete piu' intenso
  - B=1.5T?
  - Basta "sottile"? Focheggiamento di dipolo
  - Qualche componente speciale per facilitare focheggiamento?
- Rivelatore:
  - Stessa tecnologia (se funziona_ per le code
  - Misure di precisione in avanti per eserre utilizzabile per fasci collimati
  - Qualcosa puo' facilitare il suo comportamento come emittanzometro?



With B=1.8T, L=75cm
There are focusses up to 1GeV

Critical point: being able to exit a face orthogonal to the entrance one

Futuro e richieste

- Abbiamo gia' 30K sj per il magnete nel 2010
  - Bisogno urgente di fare un disegno plausibile: HELP!
    - Componenti non dipolari?
    - Preventivo
- Proposta per PRIN
  - C'e' modo di accoppiarlo con emittanzometro?