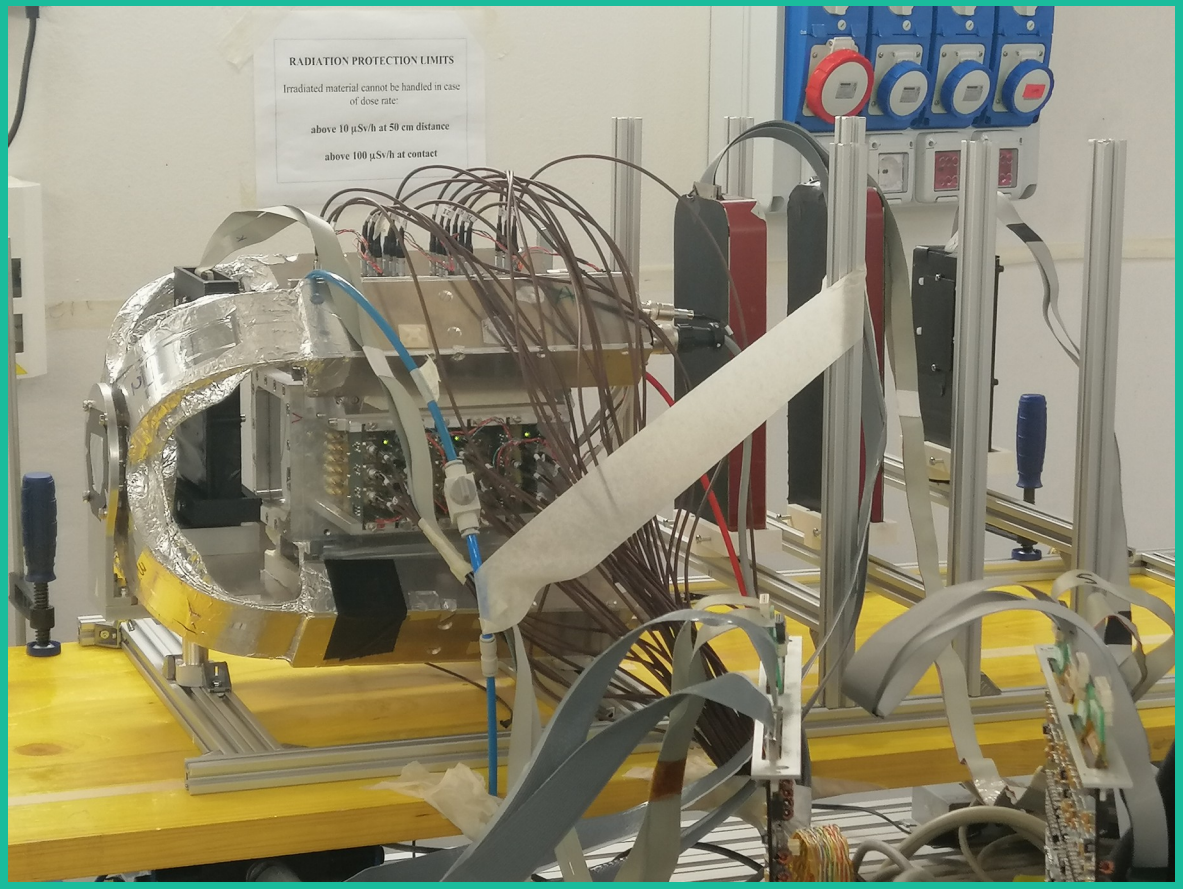
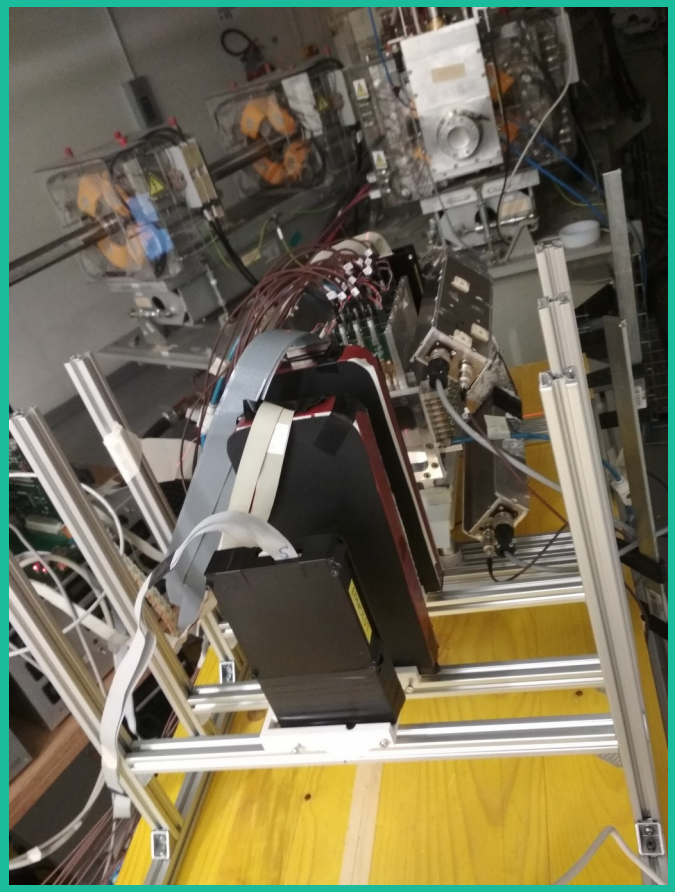




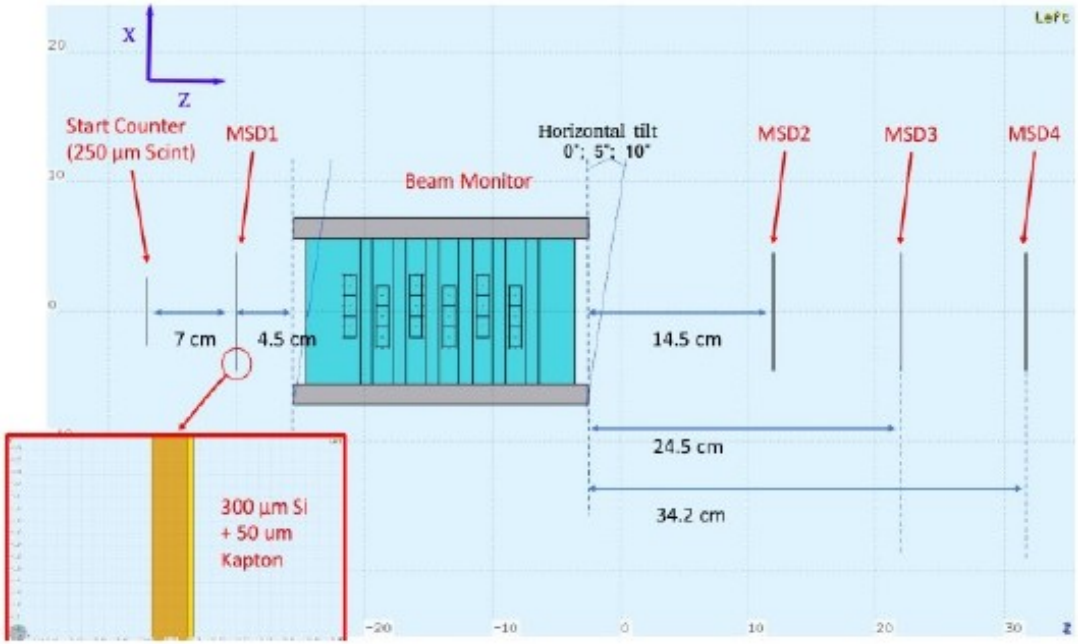
Update on BM Analysis

Milano + Perugia + Trento

FOOT Physics meeting

01 April 2020

BM–MSD calibration with P @ Trento



BM calibration performed with Margherita and 4 layers of Microstrip Silicon detectors (MSD), together with the Perugia Team.

- Space-time relation
- Efficiency
- **Resolution**
- Technical paper in preparation (NIM)

Resolution evaluation methods

Method BM
Resolution as the residual between the **BM** fitted track and the hit distance measurements

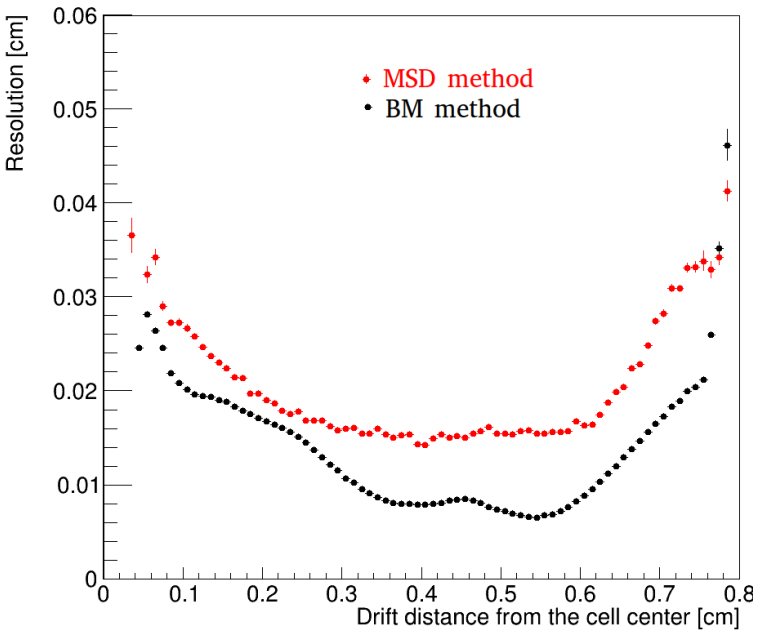
- Use only the BM hits and tracks
- Depends on the space time relations
- Depends on the BM reconstruction algorithm and selection criteria.
- Adopted in the FIRST experiment

Method MSD
Resolution as the residual between the **MSD** fitted track and the BM distance measurements.

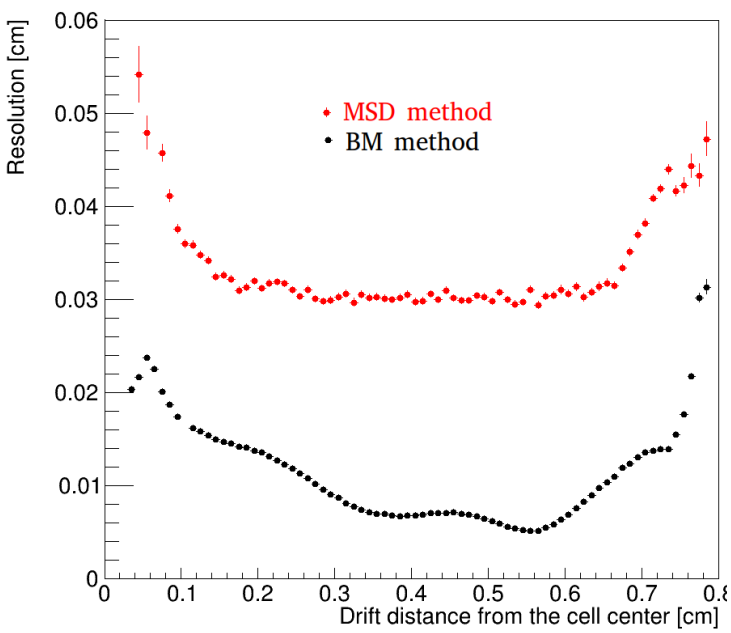
- Use an external independent detector
- Depends on the space time relations
- No dependence on BM reconstruction algorithm

Data of P @ 228 and 80 meV

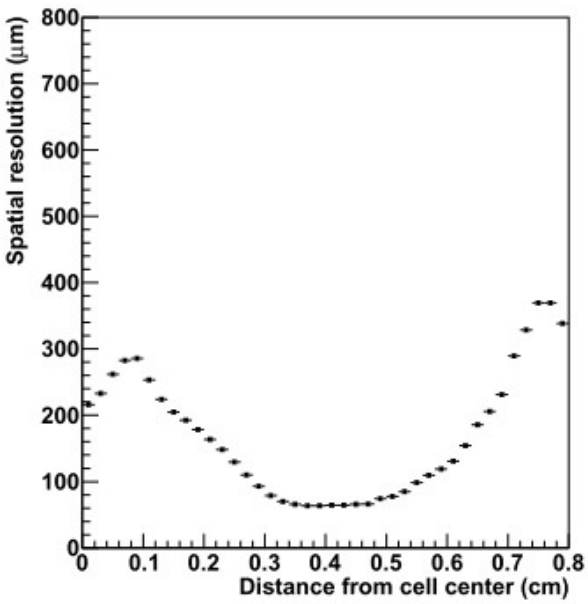
FOOT 228 MeV



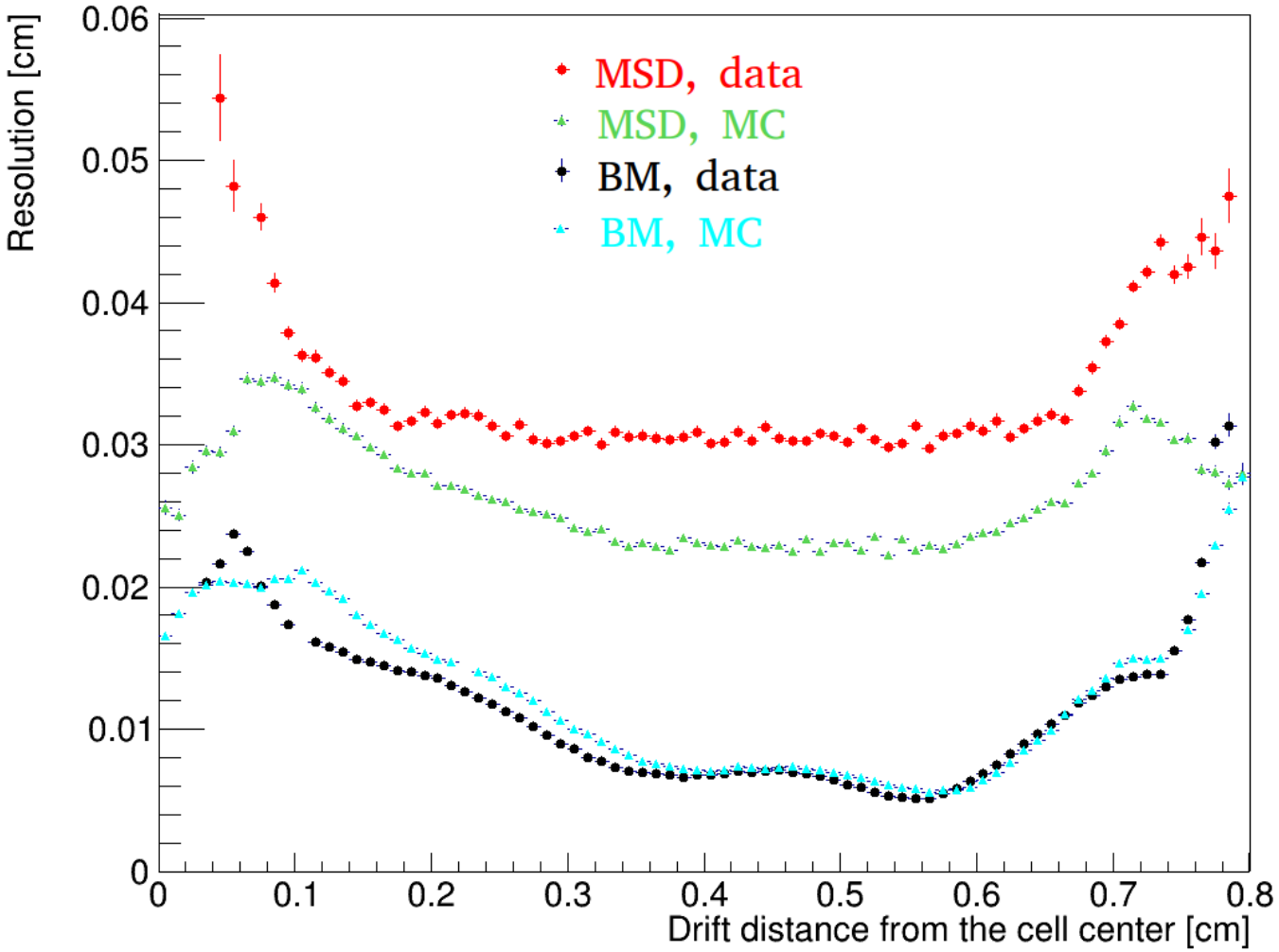
FOOT 80 MeV



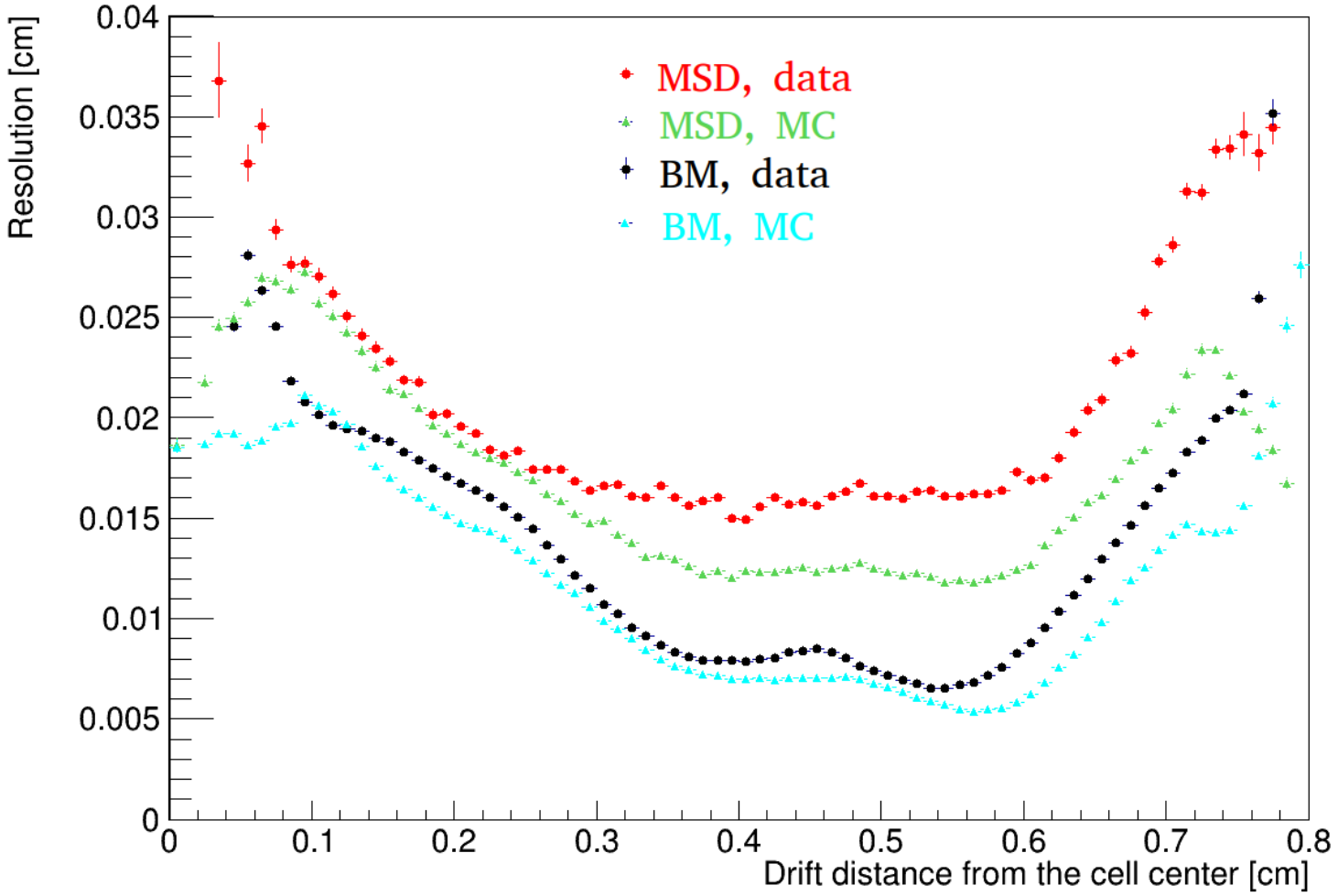
FIRST 80 MeV



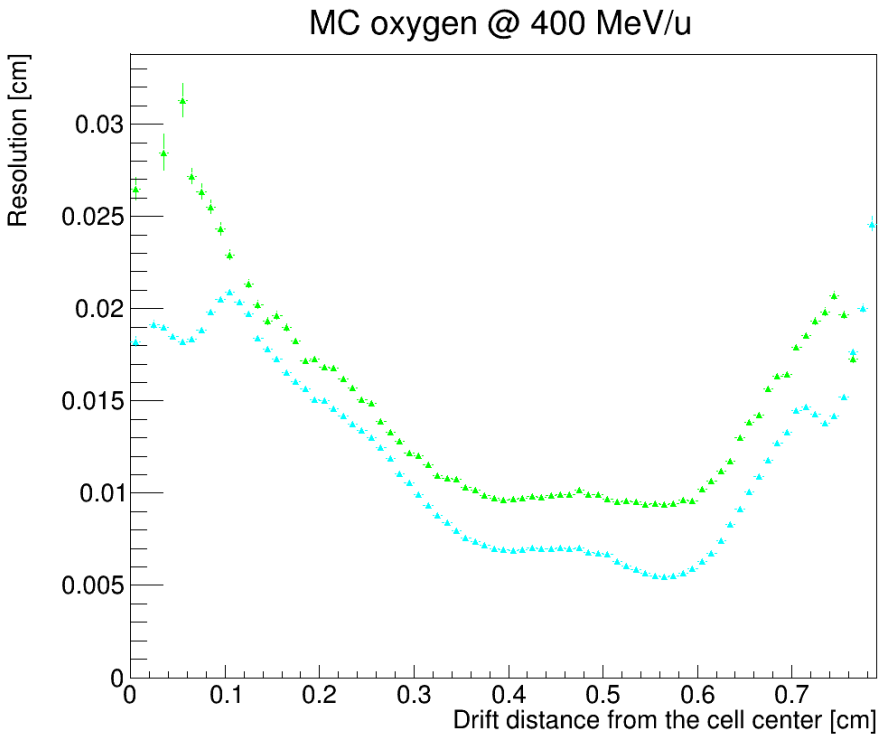
P @ 80 MeV: data and MC

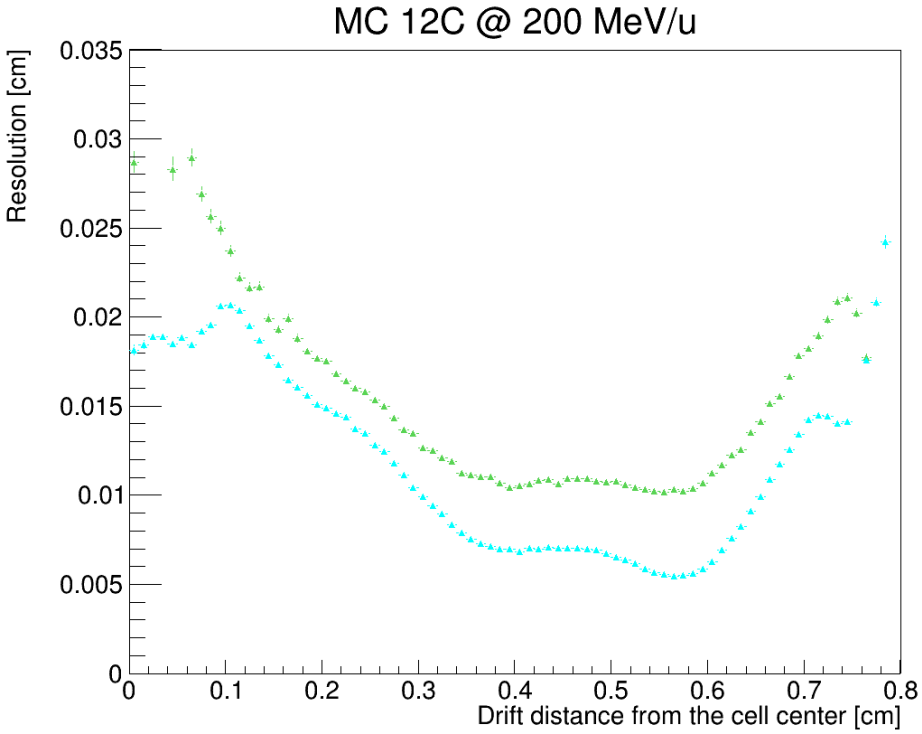


P @ 228 MeV: data and MC

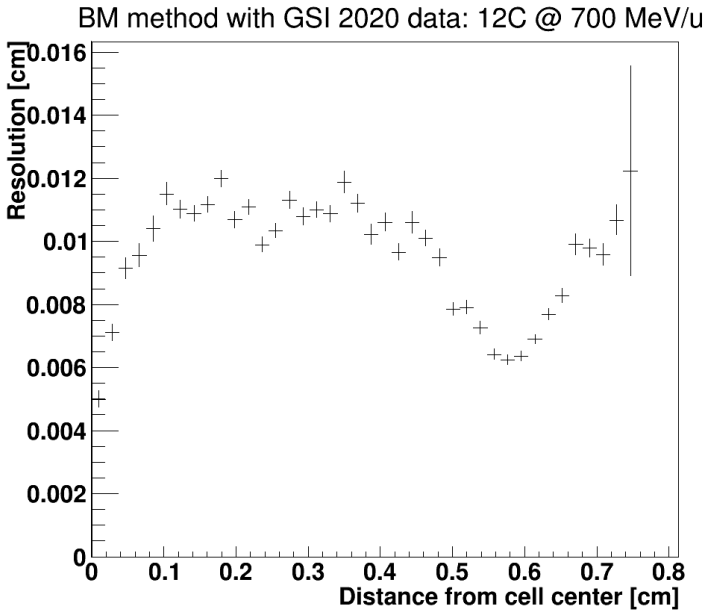


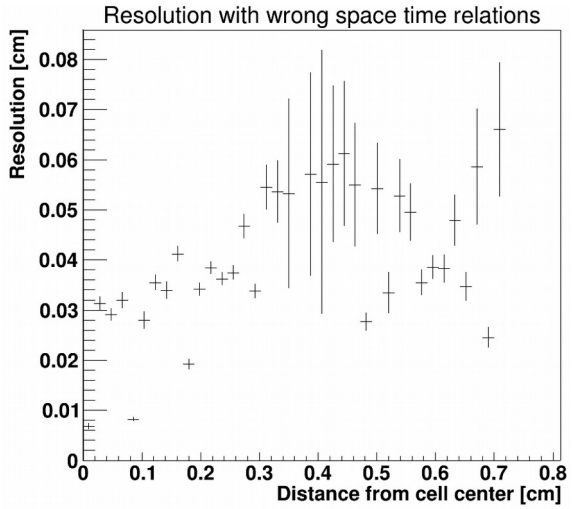
MC studies


MC oxygen @ 400 MeV/u
Resolution [cm]
0.03
0.025
0.02
0.015
0.01
0.005
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Drift distance from the cell center [cm]


MC 12C @ 200 MeV/u
Resolution [cm]
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Drift distance from the cell center [cm]

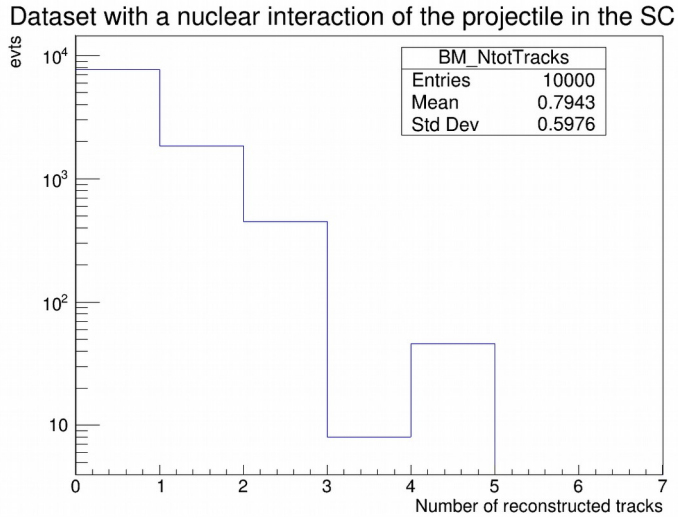
Resolution conclusions

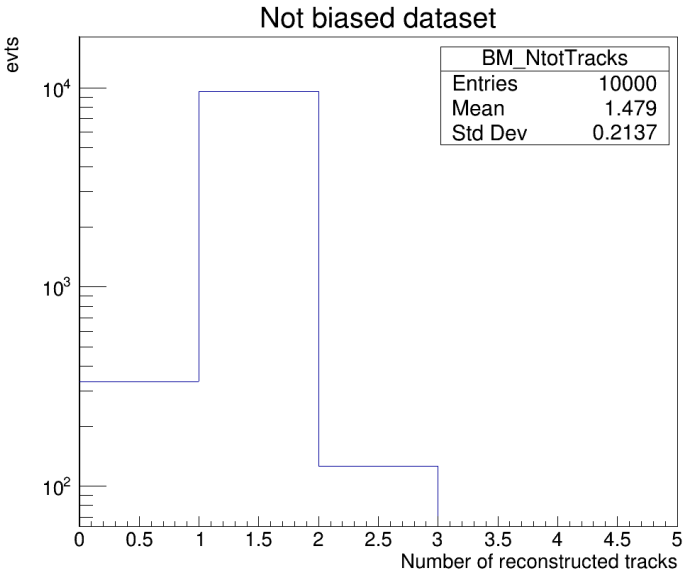




- Both methods depends on the accuracy of the space time relation
- The BM method does not depends on the Multiple Coulomb Scattering.
  It is the best method to estimate the BM resolution.
- The resolution with the BM method is consistent with the FIRST exp. results
- The MSD method take into account the MCS effect.
  It is useful to evaluate the impact of the MCS on the BM tracks

BM Multitrack capability





- The BM multitrack capability has been added in the reconstruction algorithm
- It can help to identify the events with a fragmentation of the projectile on the SC or BM itself
- About 20% of the events with an interaction of the primary in the SC is reconstructed with only 1 BM track
- Very preliminary study

FOOT internal note

Characterization of the ^{12}C beam at 700 MeV/u at GSI using the FOOT Beam Monitor

FOOT internal note number: 1

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Abstract

The emulsion setup of the FOOT experiment has been exposed at GSI with a beam of ^{12}C ions at 700 MeV/u, with both C and C_2H_4 targets. A plastic scintillator and a drift chamber have been adopted to characterize the beam properties. In particular it was possible to verify that the beam had a Gaussian shape with standard deviation of 0.2 cm and an angular spread of 0.2°. Since we asked for a beam with low intensity, a stable beam with a mean rate of 2.4 kHz has been provided. About 30200 particles distributed on an area of $2.5 \times 2.5 cm^2$ have been delivered on the FOOT emulsion setup, as requested by a specific irradiation pattern.

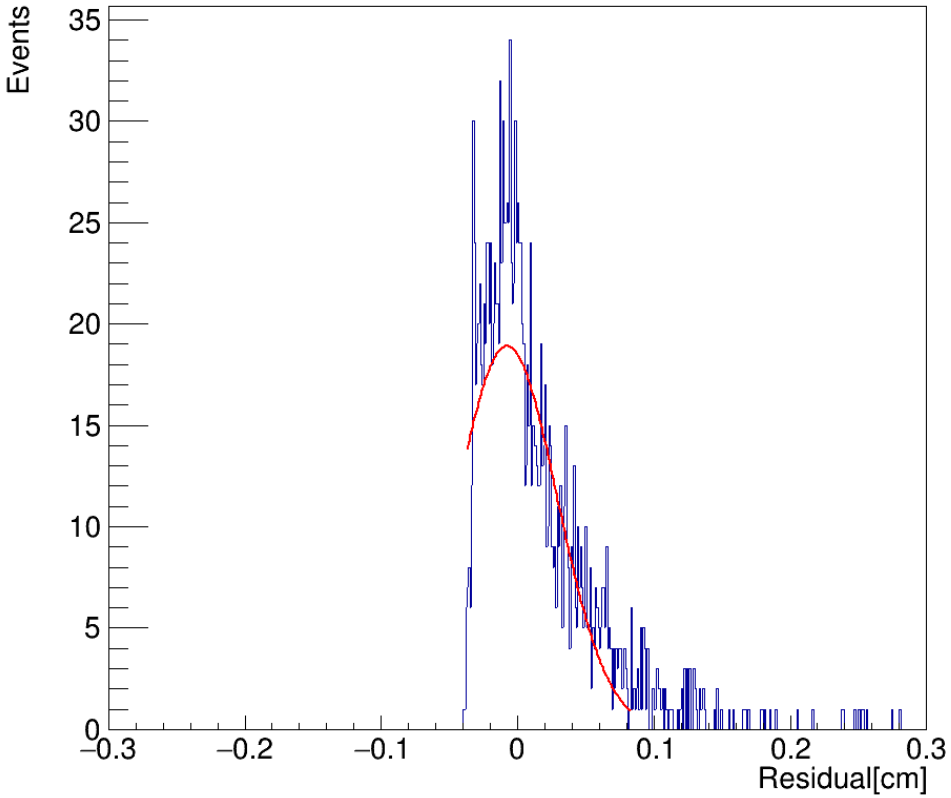
A FOOT internal note for the GSI ^{12}C beam @ 700 MeV/u characterization performed with the BM has been written:

https://www.overleaf.com/read/kmbgydbrbsyn

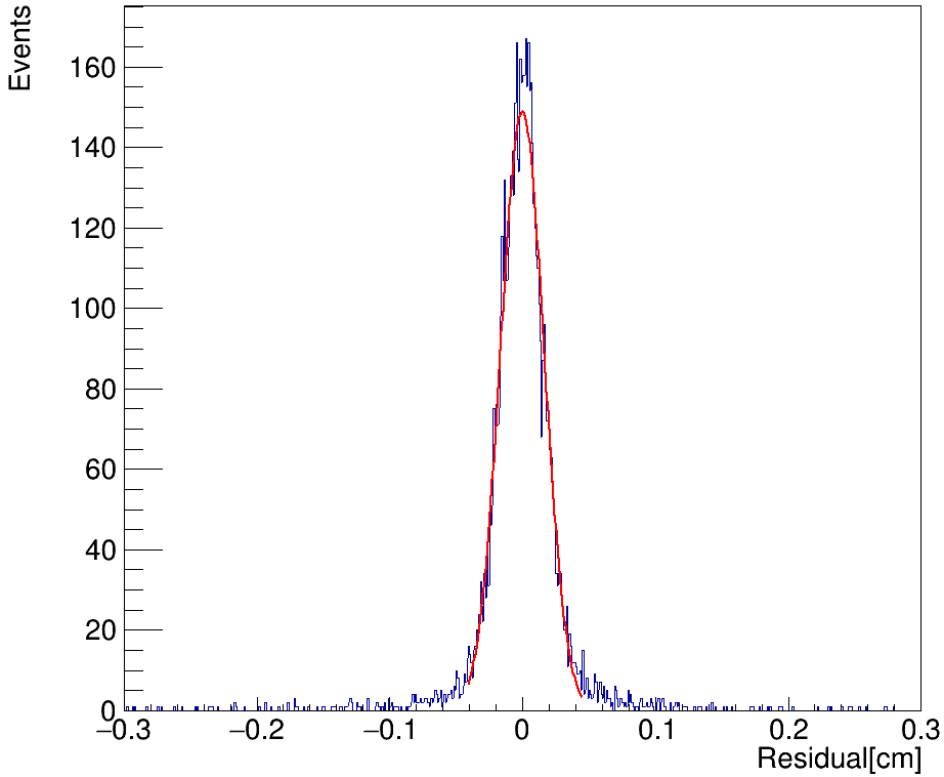
- Please let me know your comments/request etc.

Back up

Resolution fitting



BM cell border



BM center