Electron Trap Update

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On behalf of LNGS group

Introduction

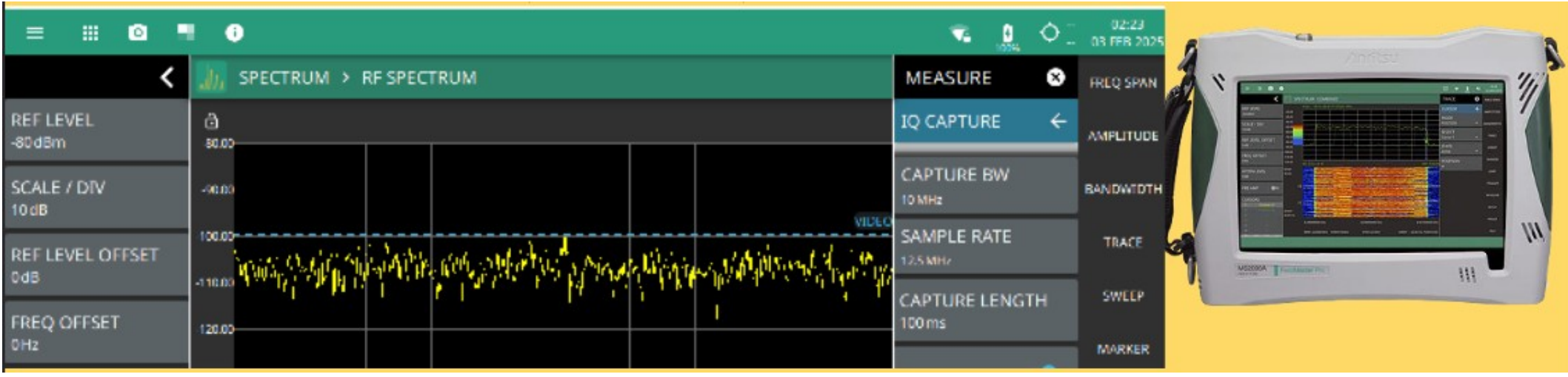
- Hardware update: trigger
- Software update: Montecarlo 2.0

Trigger options

A) RTO

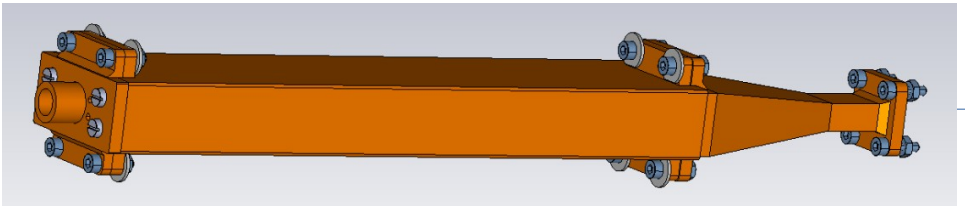
B) RTSA+RTO

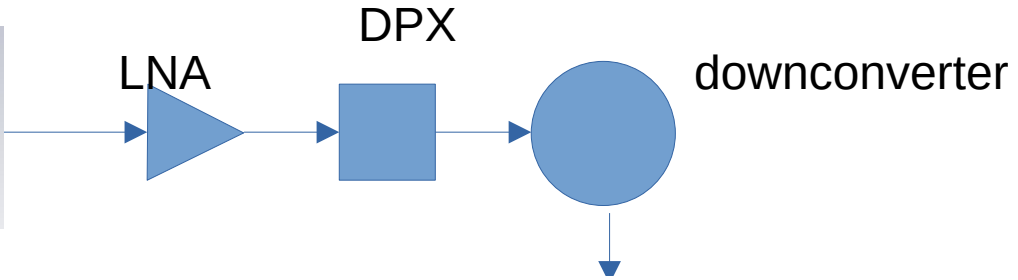
C) anritsu detector diode + RTO



Trigger option A

Electron trap



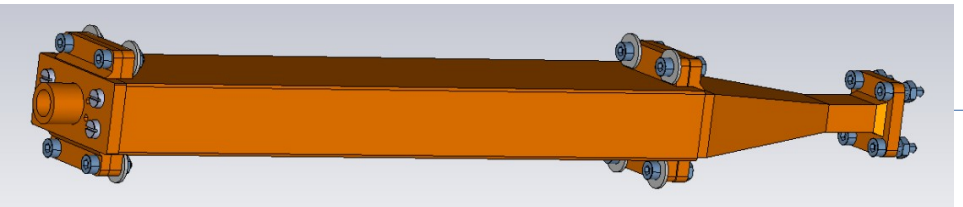


FFT trigger freq. mask+save time series(CH1)

Low efficiency, but possible to detect short signals (O(1us))

Trigger option B

Electron trap



LNA

DPX

downconverter

DAQ

Trigger in

Trigger out

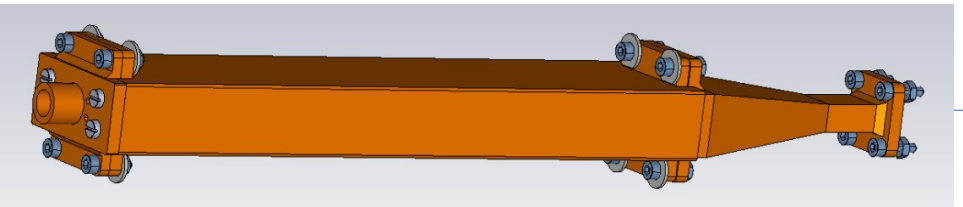
Trigger

Trigger option B

RTSA: 100% for signals>30 us, 30% for signals=20 us
High jitter (100 ms +- 30 ms)
RTO ch1 timeseries: 60 ms (heavy but not impossible)
(wrt 500 us of option A)

Trigger option C(WIP)

Electron trap



LNA

DPX

downconverter

DAQ

Trigger in

Trigger out

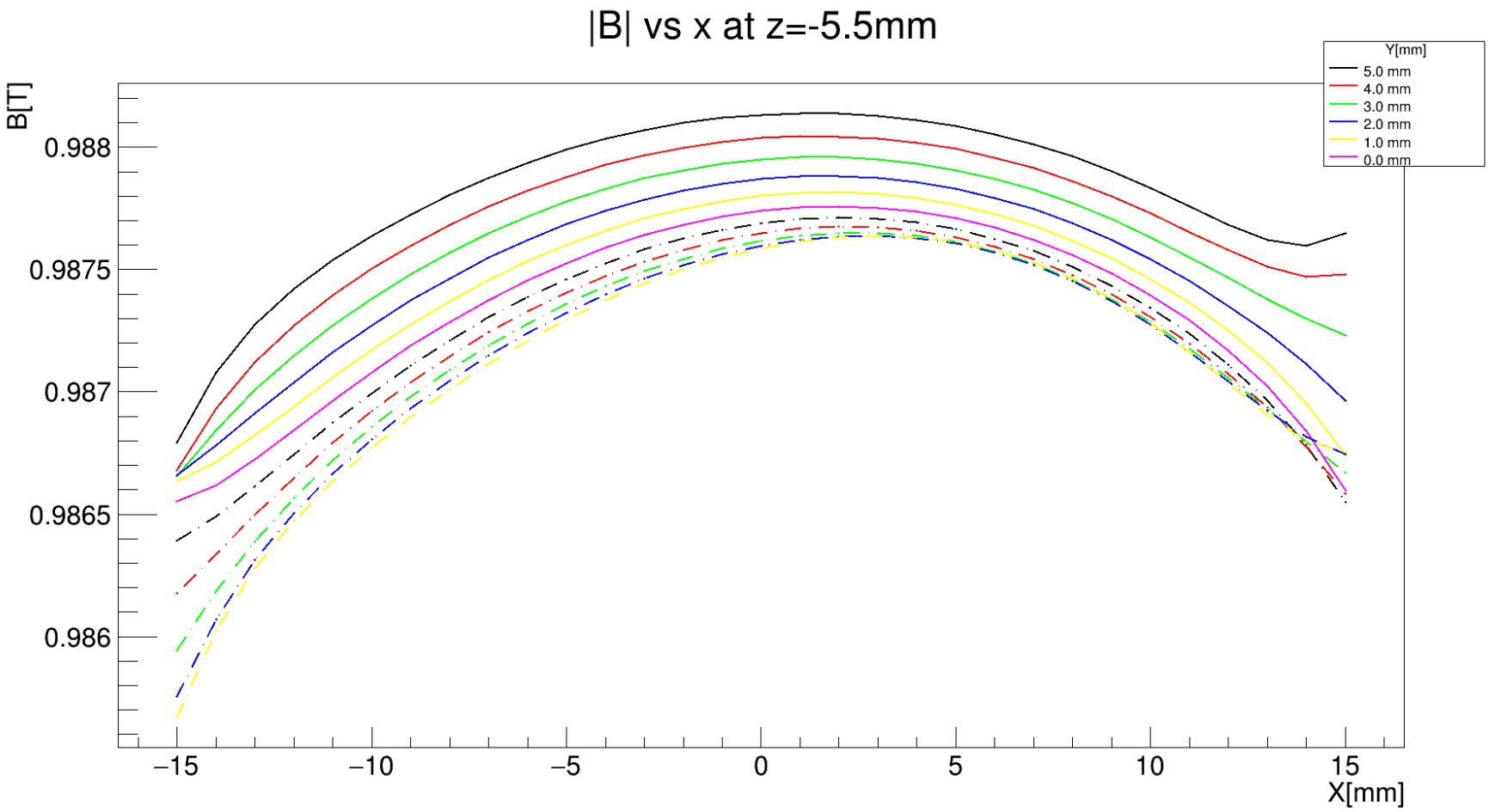
Trigger

This solution could solve the jitter of option B
...but don’t know the freq. Of triggered signal

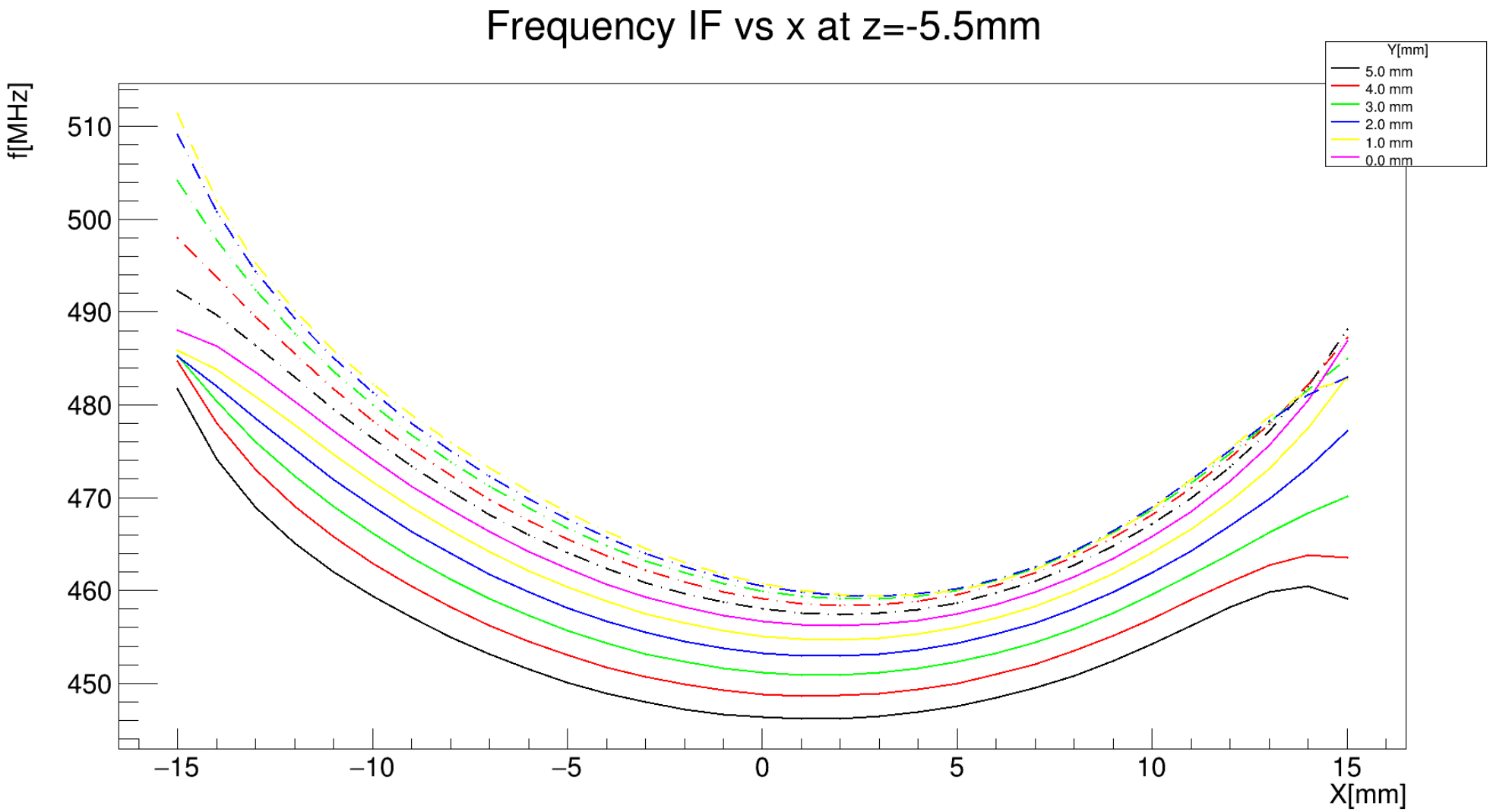
Electron Trap Magnet

- Measured Bx(z) at x=0,y=0
- Taken 2D average field map from CERN scaled in Z by the measured profile

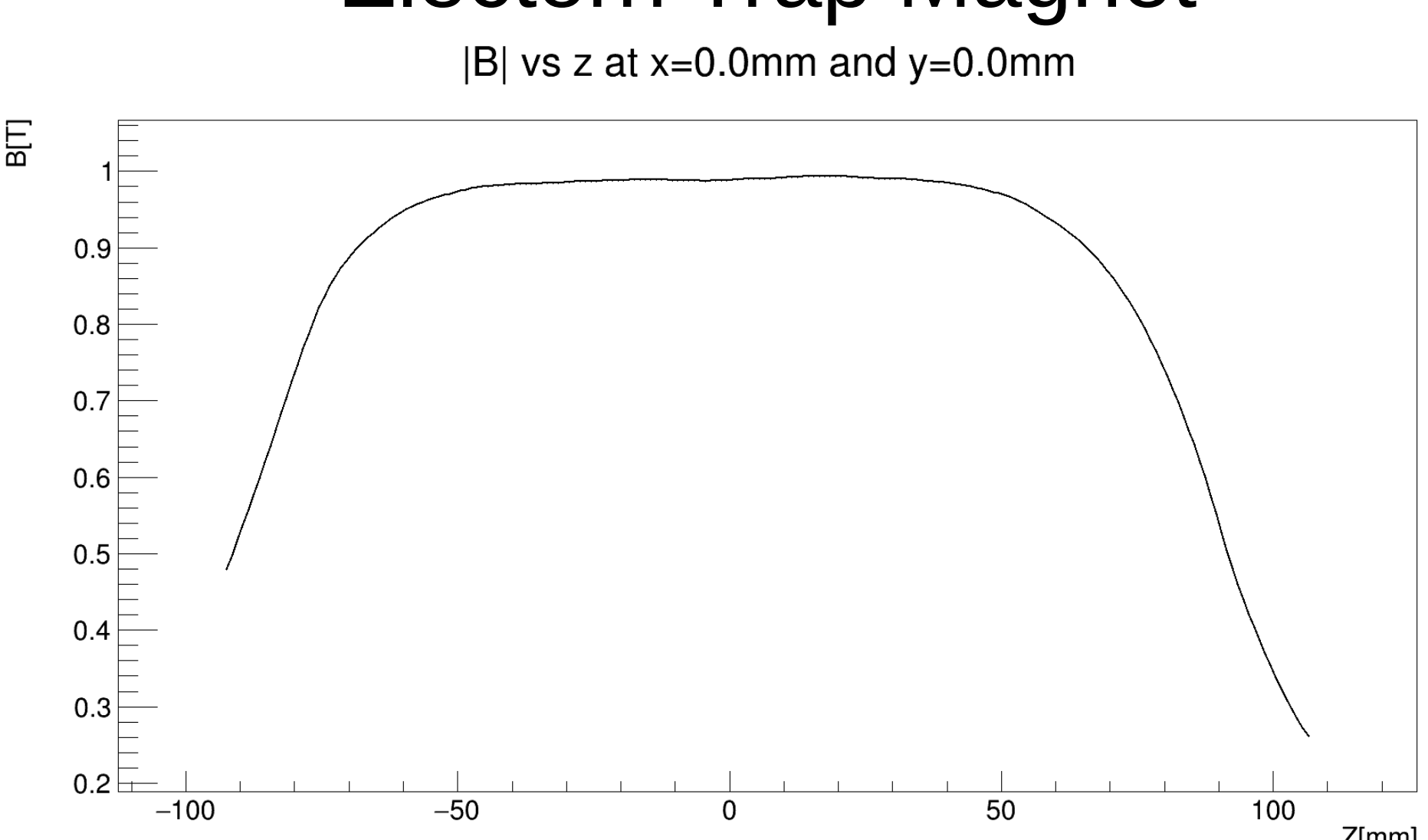
Electorn Trap Magnet



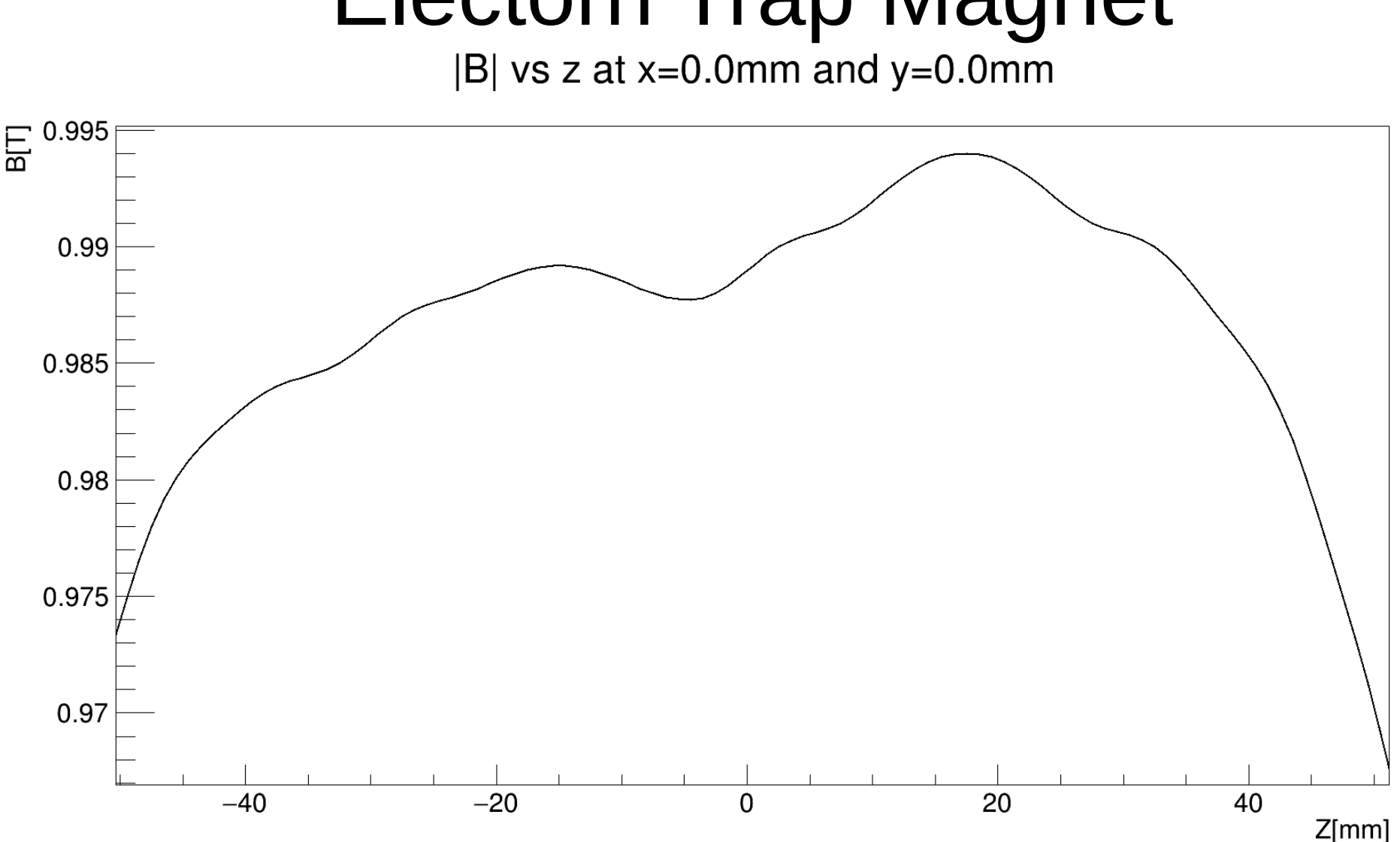
Electorn Trap Magnet



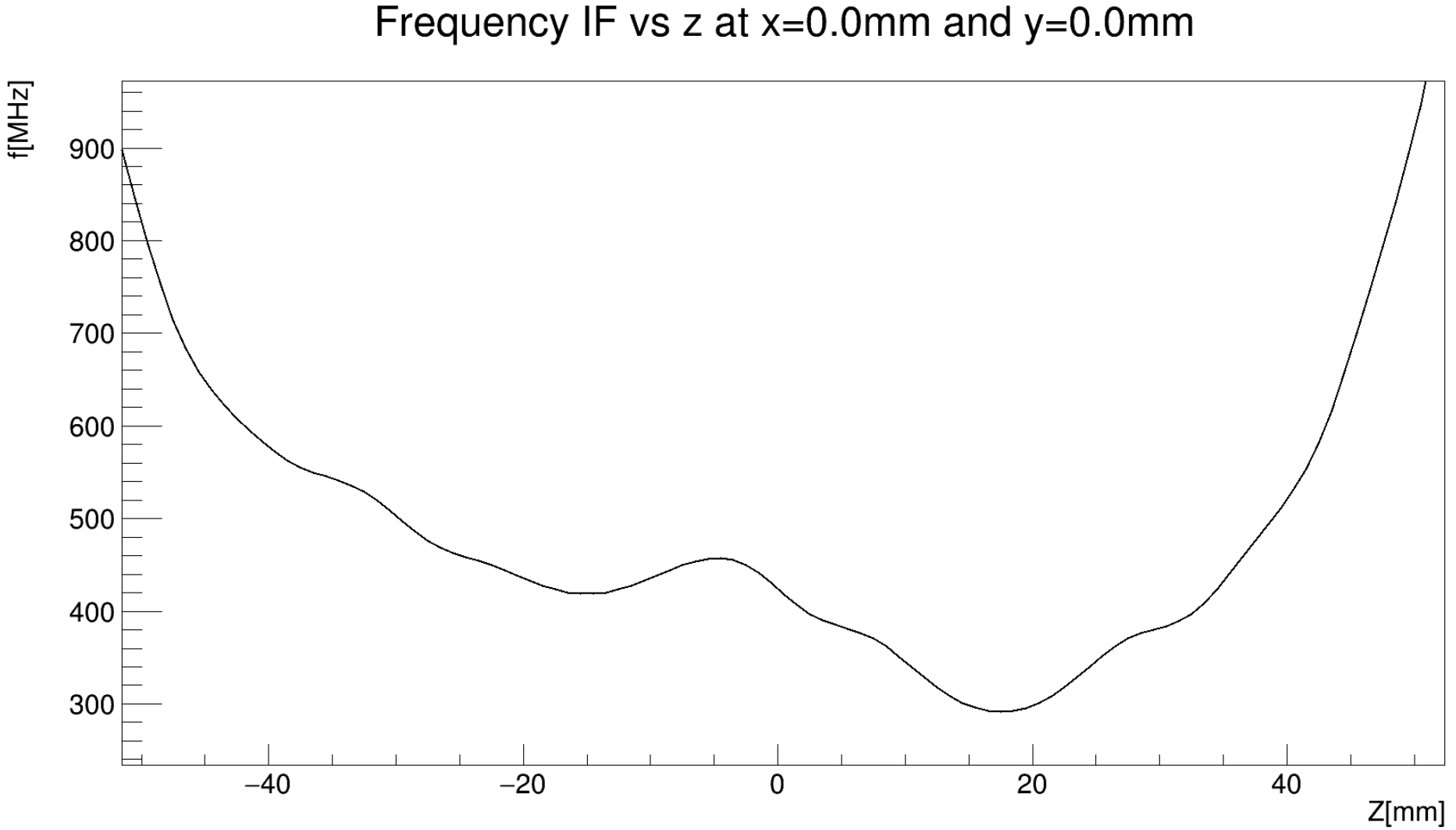
Electorn Trap Magnet



Electorn Trap Magnet



Electorn Trap Magnet

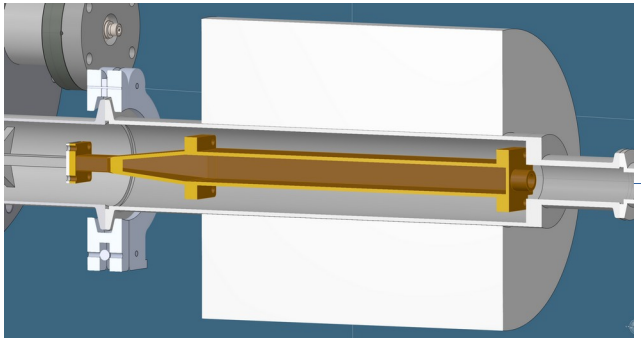


Electron trap Montecarlo v2.0

- Version 1.0: L.Pesce pollica meeting
  - Pros: high statistics
  - Pros: Good understanding about what we should expect
  - Cons: ideal B
  - Cons: rough estimate of Tb and drift Velocity
  - Cons: carrier and sidebands: script

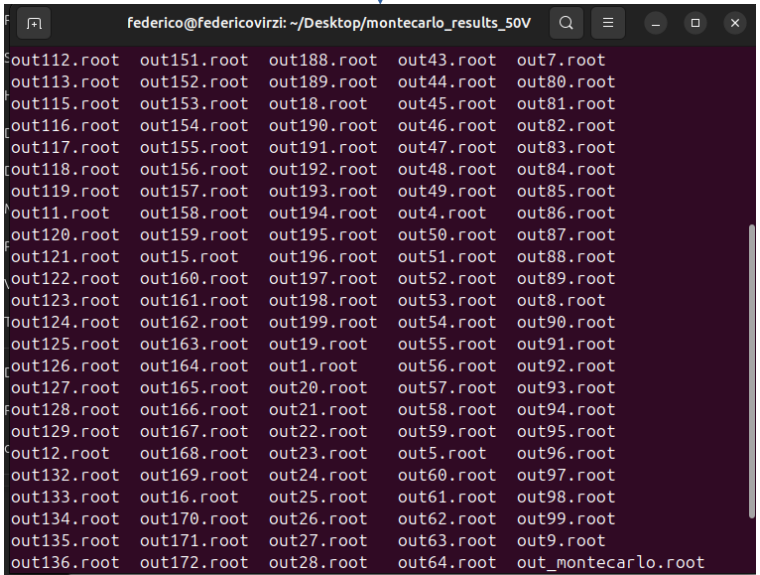
Electron Trap Montecarlo v2.0 (80%)

- Lorentz4: Baptism of fire



2:for(i=0;i<N;i++){ federico@federicovirzi:~$ ./lorentz4 }

3



1: CST simulation E field(different V bouncing)
Bfield map from CERN

cons: low statistics
Pros: Generic E, B
Pros: good estimate of Tb and drift Velocity
pros: carrier and sidebands: simulated by kinematic spectrum!

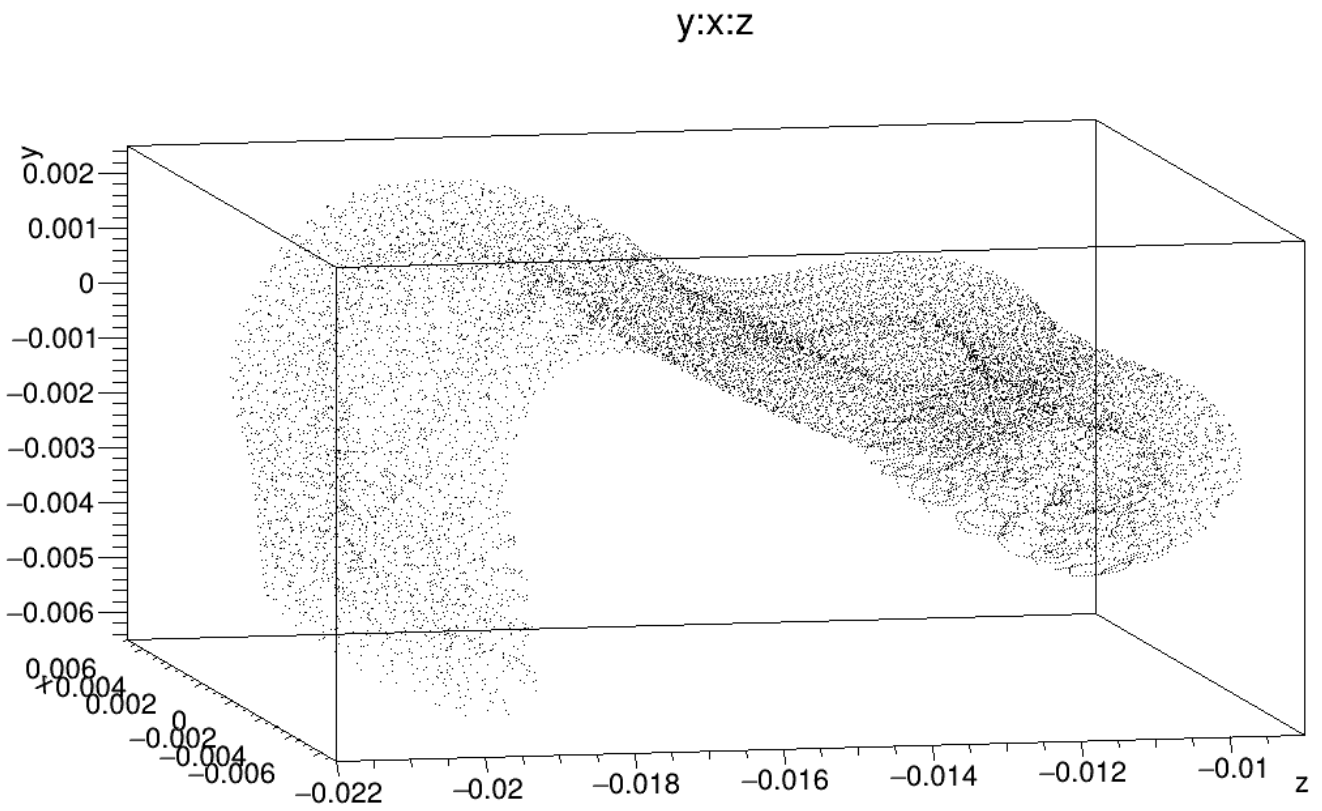
Browser File Edit View Options Tools

Files

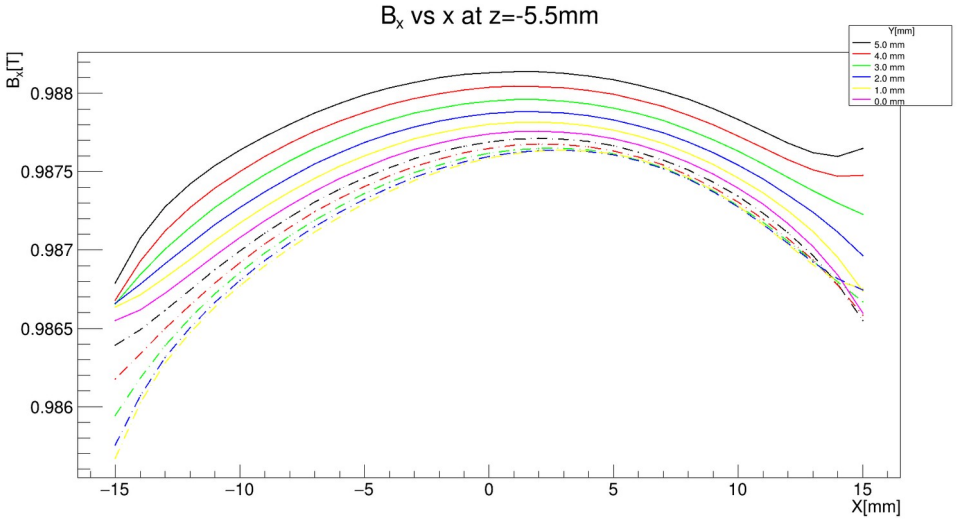
Draw Option:

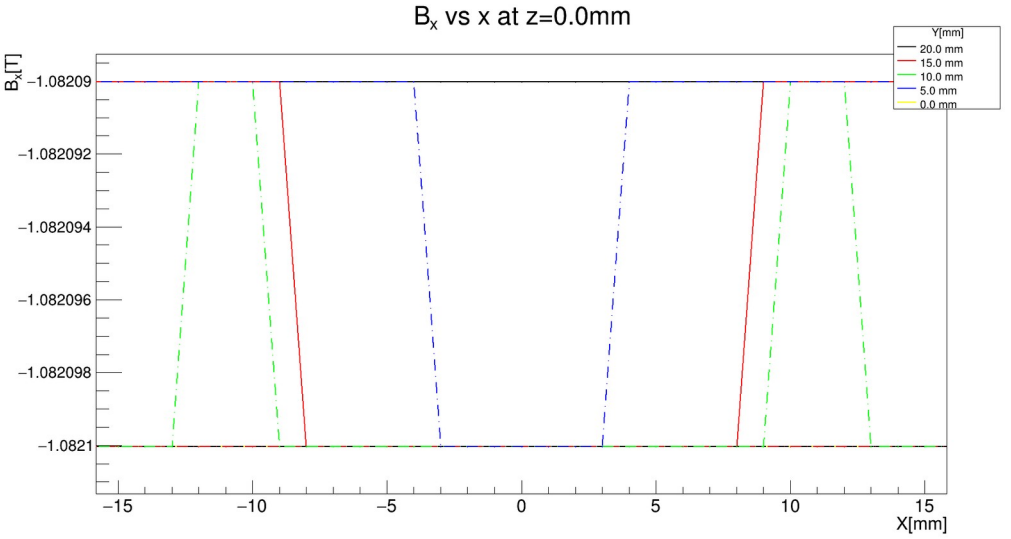
- out100.root
- out101.root
  - c_track;1
  - c_frenet;1
  - c_energy;1
  - c_projection;1
  - cFields;1
  - tree;1
    - E0
    - x0
    - y0
    - z0
    - theta0
    - phi0
    - t
    - x
    - y
    - z
    - K
    - U
    - E
    - Kpar
    - Kort
    - angle
    - mu
    - kappa
    - tau
    - omega
    - eps
    - ID
  - metatree;1

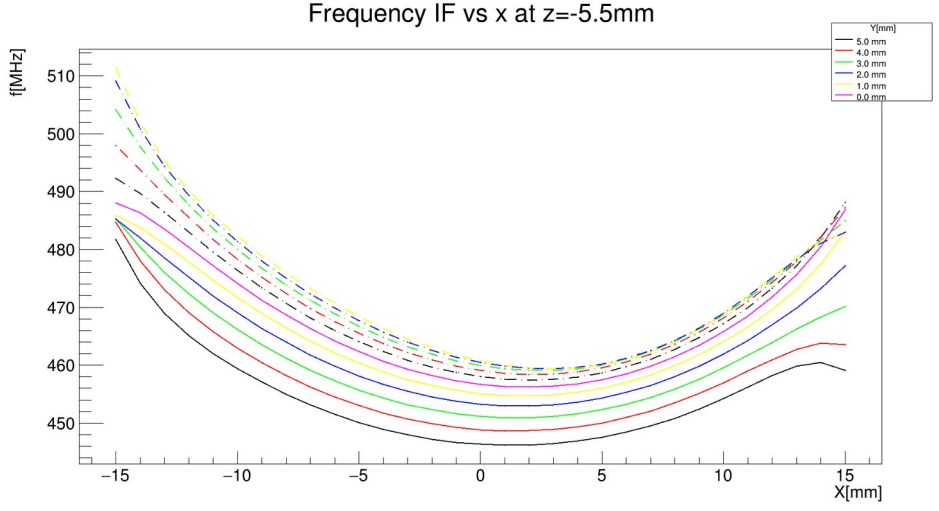
4

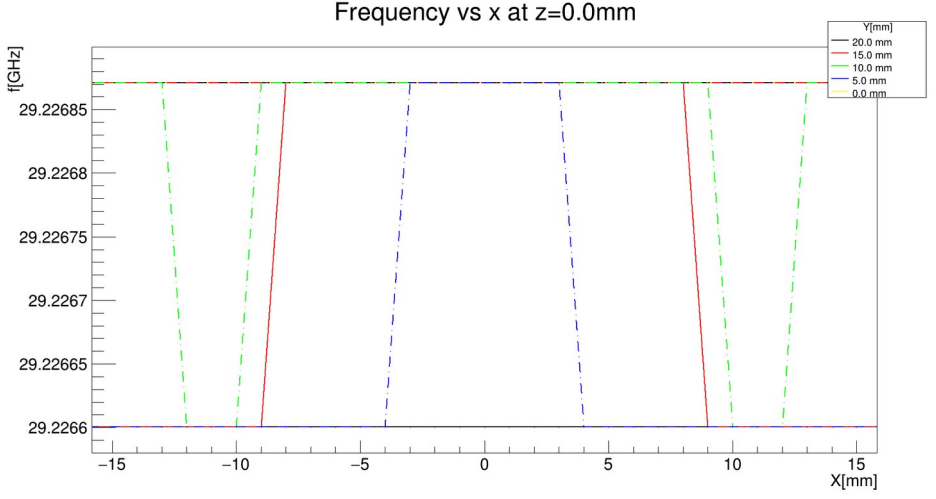


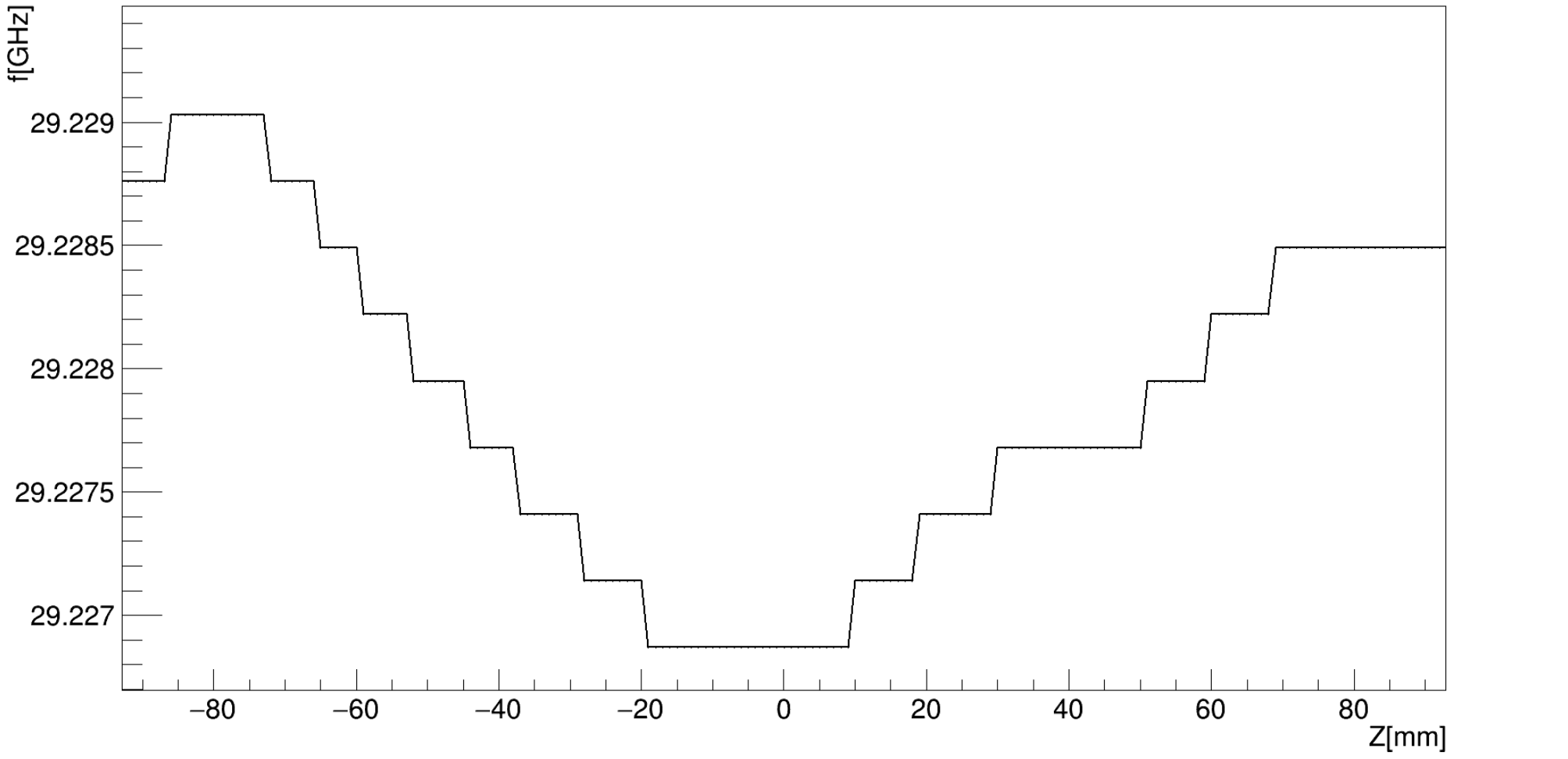
E trap magnet vs ptolemy magnet










Frequency vs z at x=0.0mm and y=0.0mm
PTOLEMY Magnet
f[GHz]
29.229
29.2285
29.228
29.2275
29.227
−80
−60
−40
−20
0
20
40
60
80
Z[mm]