

Electron Trap Update

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On behalf of LNGS group

Introduction

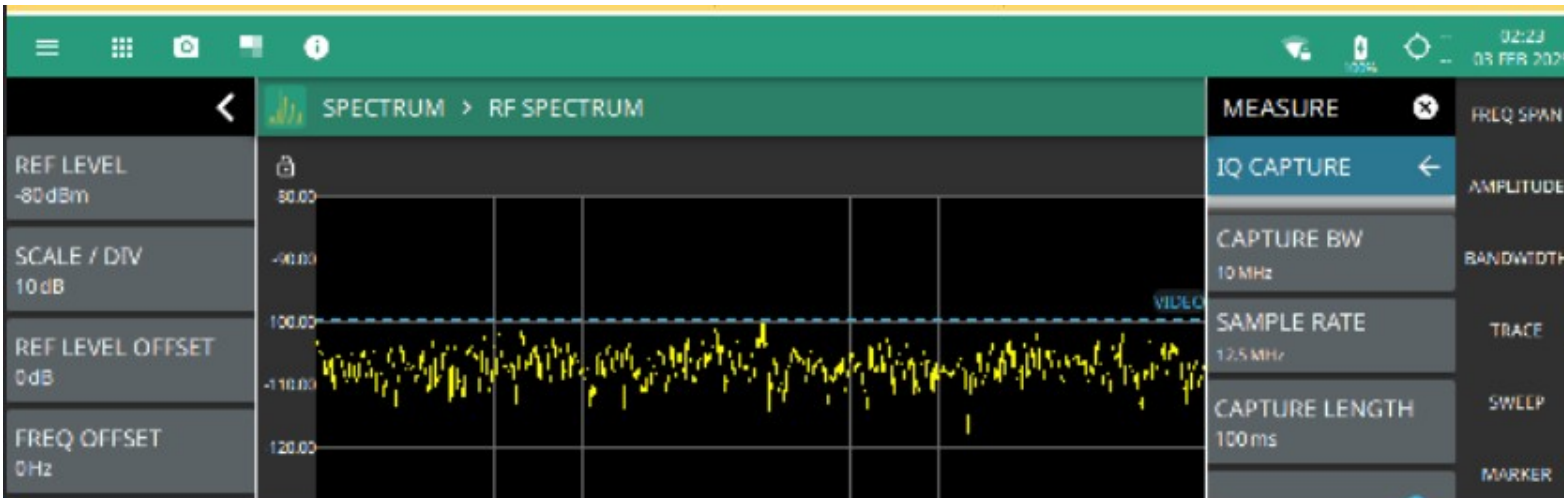
- Hardware update: trigger
- Software update: Montecarlo 2.0

Trigger options

A) RTO

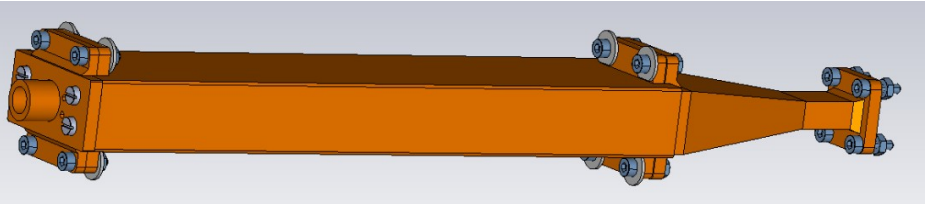
B) RTSA+RTO

C) anritsu detector diode + RTO

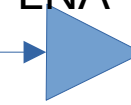


Trigger option A

Electron trap



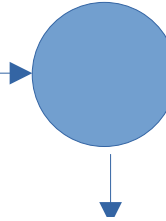
LNA



DPX



downconverter



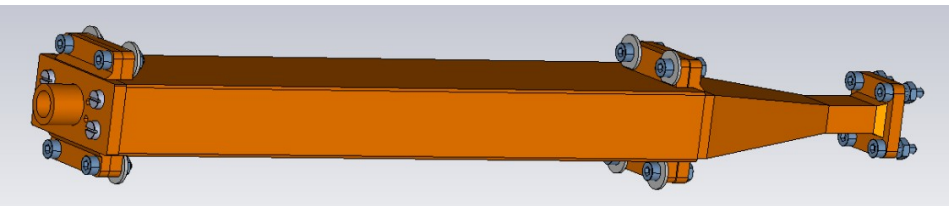
FFT trigger freq. mask+save time series(CH1)

Low efficiency, but possible to detect short signals
($O(1\mu s)$)



Trigger option B

Electron trap



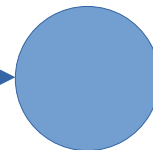
LNA



DPX



downconverter



DAQ



Trigger in

Trigger out

Trigger



Trigger option B

RTSA: 100% for signals > 30 us, 30% for signals $= 20$ us

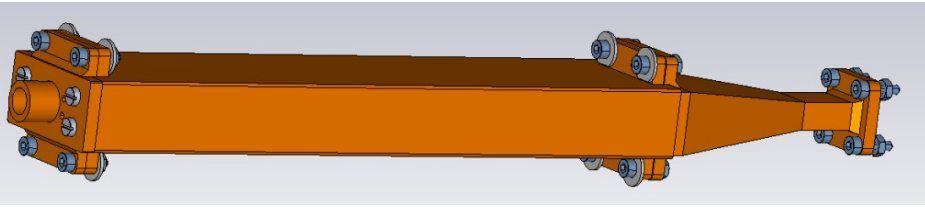
High jitter (100 ms $\pm$ 30 ms)

RTO ch1 timeseries: 60 ms (heavy but not impossible)
(wrt 500 us of option A)

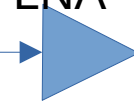


Trigger option C(WIP)

Electron trap



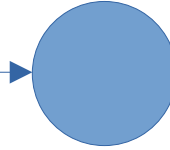
LNA



DPX



downconverter



DAQ



Trigger
in

Trigger
out

Trigger



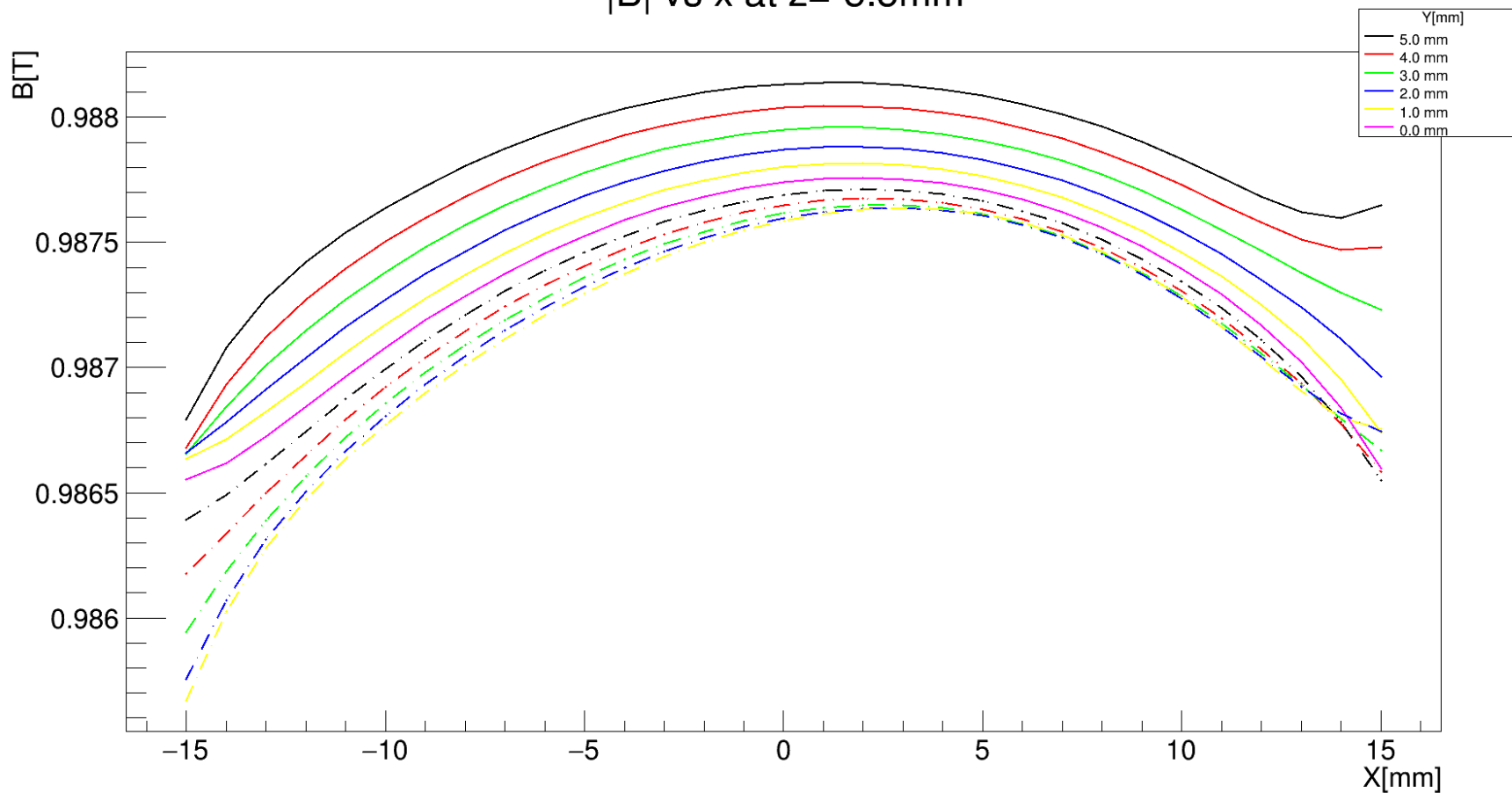
This solution could solve the jitter of option B
...but don't know the freq. Of triggered signal

Electron Trap Magnet

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

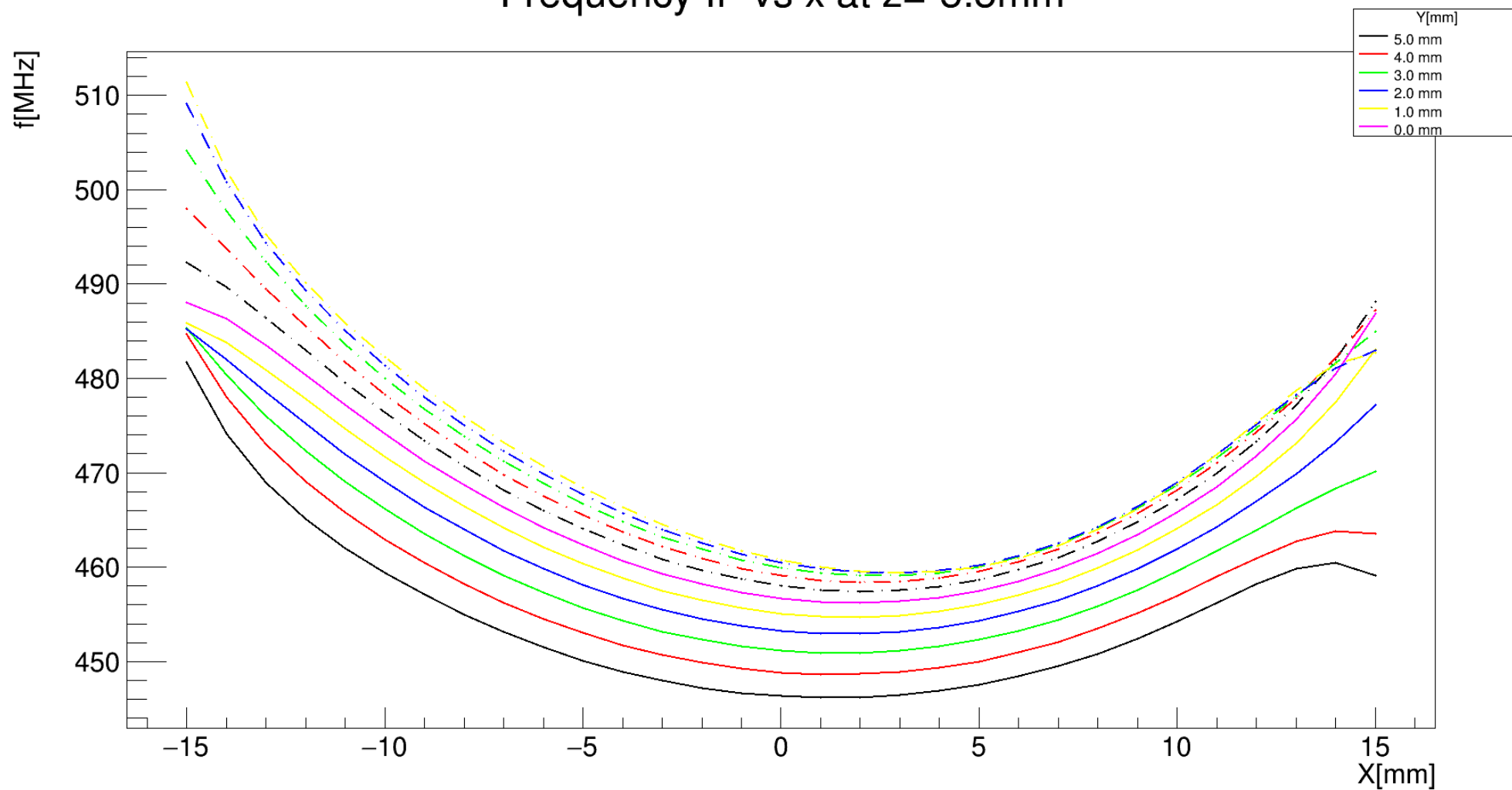
Electron Trap Magnet

$|B|$ vs x at $z=-5.5\text{mm}$



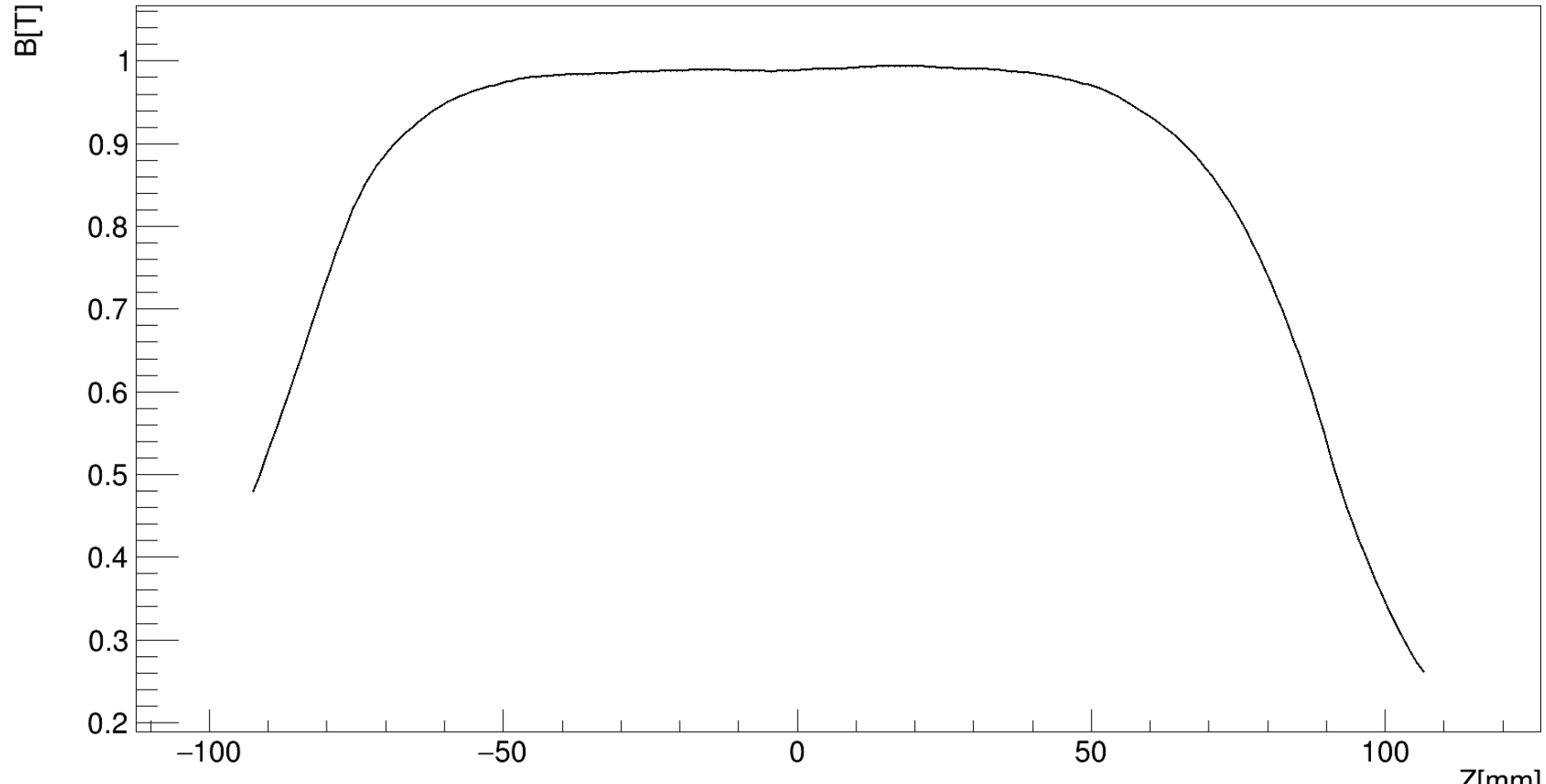
Electron Trap Magnet

Frequency IF vs x at z=-5.5mm



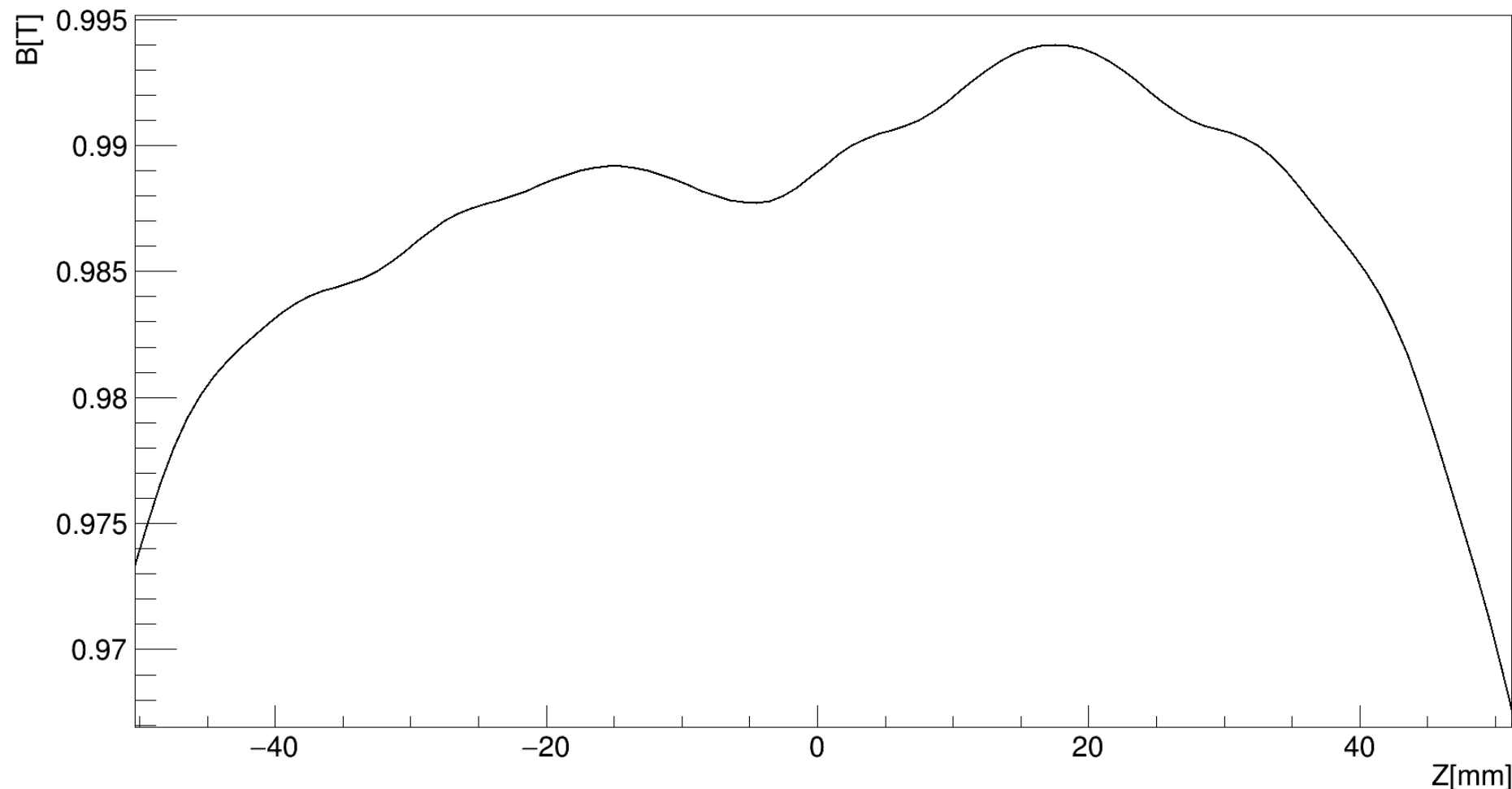
Electron Trap Magnet

$|B|$ vs z at $x=0.0\text{mm}$ and $y=0.0\text{mm}$



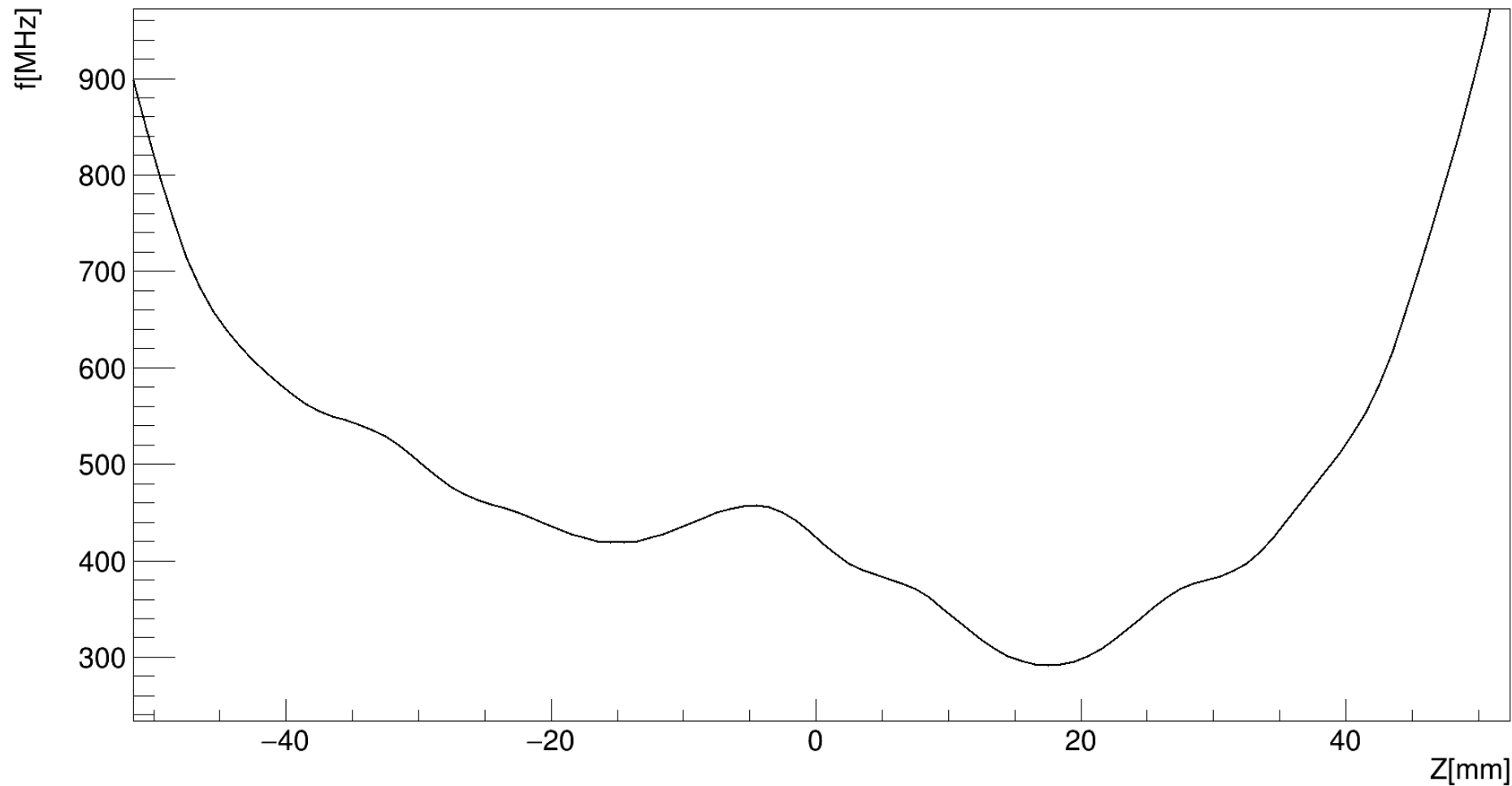
Electron Trap Magnet

$|B|$ vs z at $x=0.0\text{mm}$ and $y=0.0\text{mm}$



Electron Trap Magnet

Frequency f vs z at $x=0.0\text{mm}$ and $y=0.0\text{mm}$

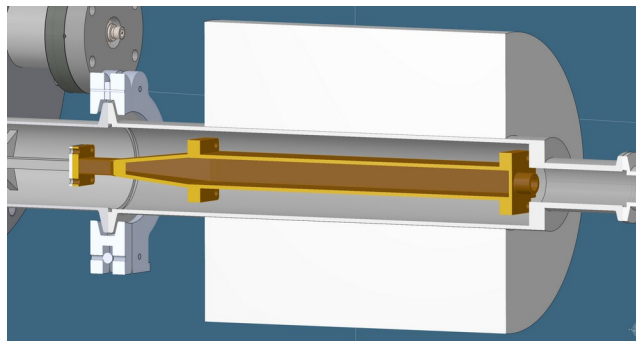


Electron trap Montecarlo v2.0

- 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 T_b 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
```

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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!

```
federico@federicovirzi: ~/Desktop/montecarlo_results_50V
out112.root out151.root out188.root out43.root out7.root
out113.root out152.root out189.root out44.root out80.root
out115.root out153.root out18.root out45.root out81.root
out116.root out154.root out190.root out46.root out82.root
out117.root out155.root out191.root out47.root out83.root
out118.root out156.root out192.root out48.root out84.root
out119.root out157.root out193.root out49.root out85.root
out11.root out158.root out194.root out4.root out86.root
out120.root out159.root out195.root out50.root out87.root
out121.root out15.root out196.root out51.root out88.root
out122.root out160.root out197.root out52.root out89.root
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out124.root out162.root out199.root out54.root out90.root
out125.root out163.root out19.root out55.root out91.root
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out127.root out165.root out20.root out57.root out93.root
out128.root out166.root out21.root out58.root out94.root
out129.root out167.root out22.root out59.root out95.root
out12.root out168.root out23.root out5.root out96.root
out132.root out169.root out24.root out60.root out97.root
out133.root out16.root out25.root out61.root out98.root
out134.root out170.root out26.root out62.root out99.root
out135.root out171.root out27.root out63.root out9.root
out136.root out172.root out28.root out64.root out_montecarlo.root
```

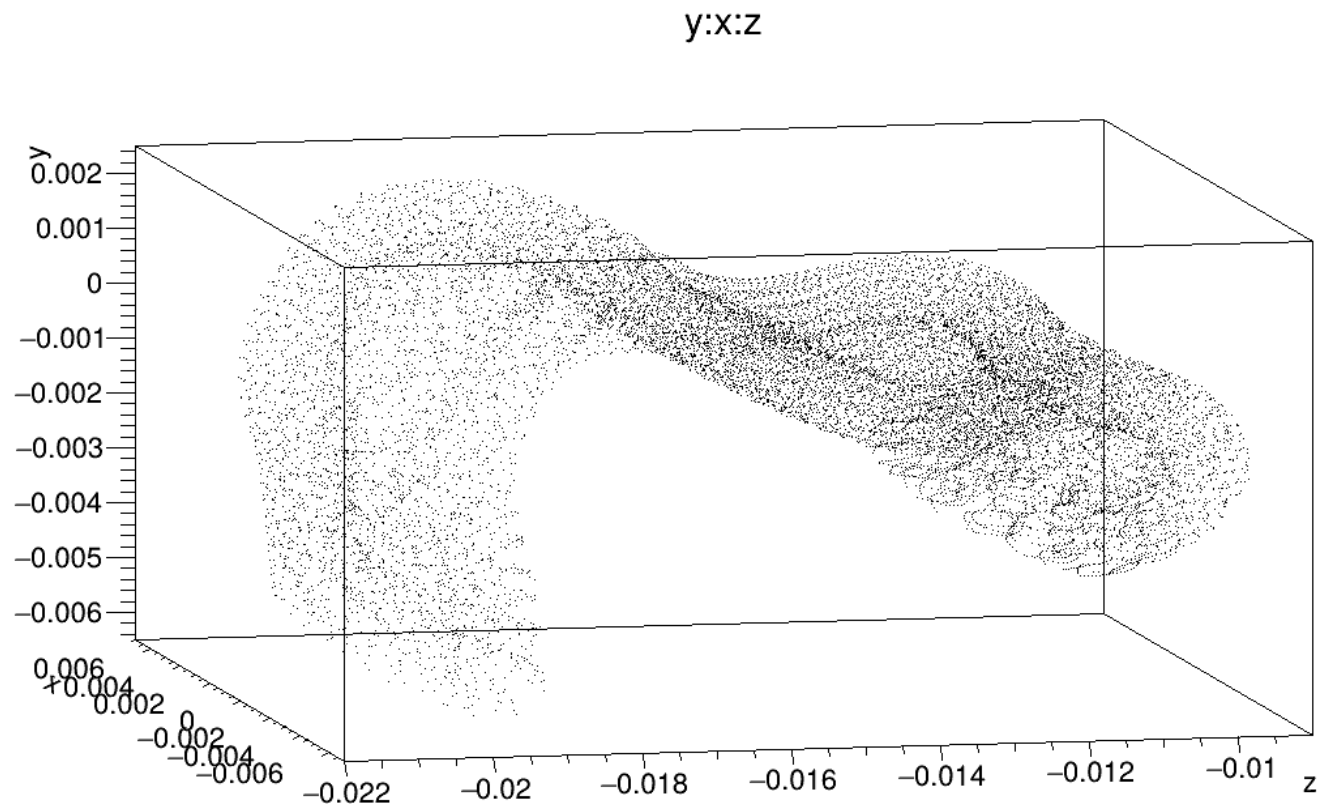
Browser File Edit View Options Tools

Files

Draw Option:

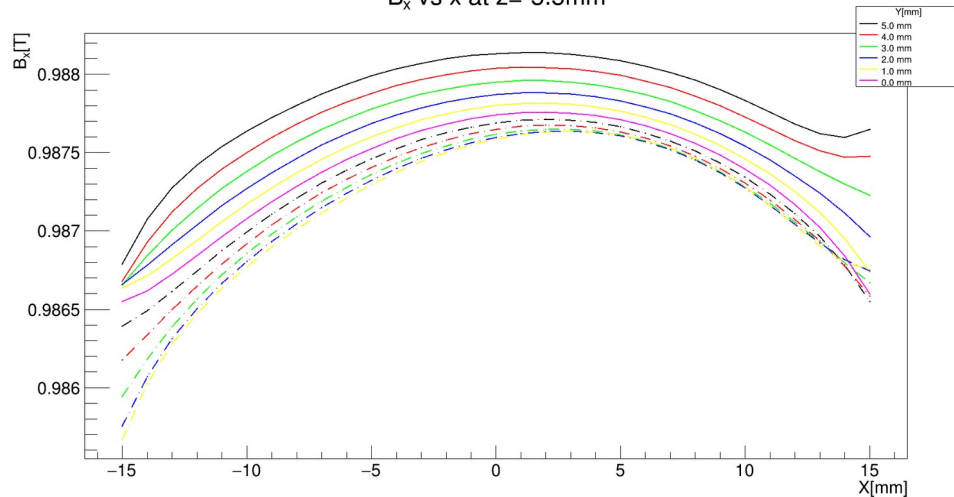
- out100.root
 - out101.root
 - c_track;1
 - c_frenet;1
 - c_energy;1
 - c_projection;1
 - cFields;1
 - tree;1
 - E0
 - x0
 - y0
 - z0
 - theta0
 - phi0
 - t
 - x
 - y
 - z
 - K
 - U
 - E
 - Kpar
 - Kort
 - angle
 - mu
 - kappa
 - tau
 - omega
 - eps
 - ID
 - metatree;1

4

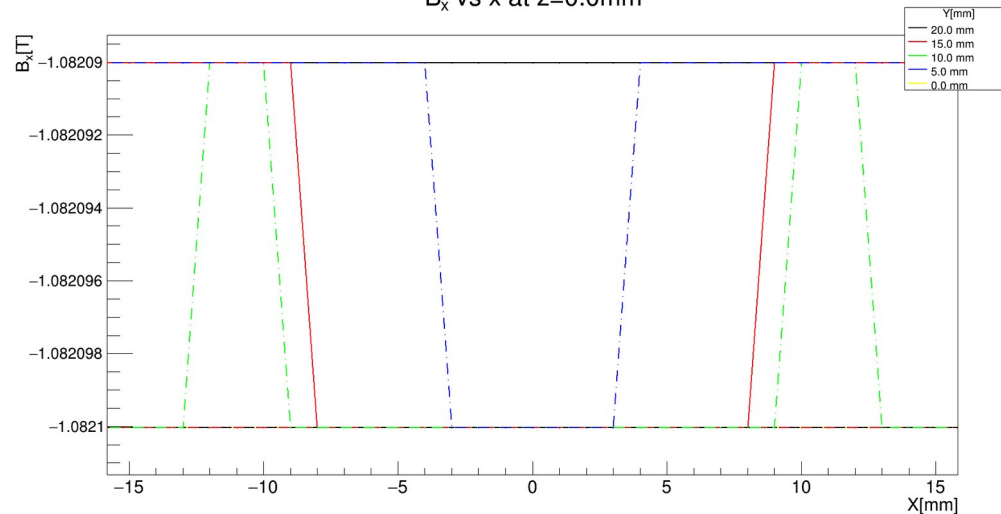


E trap magnet vs ptolemy magnet

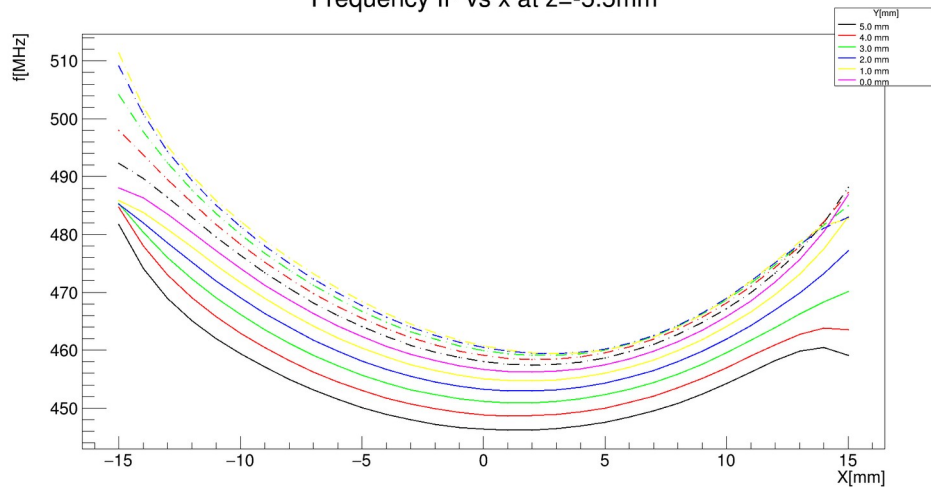
B_x vs x at $z=-5.5\text{mm}$



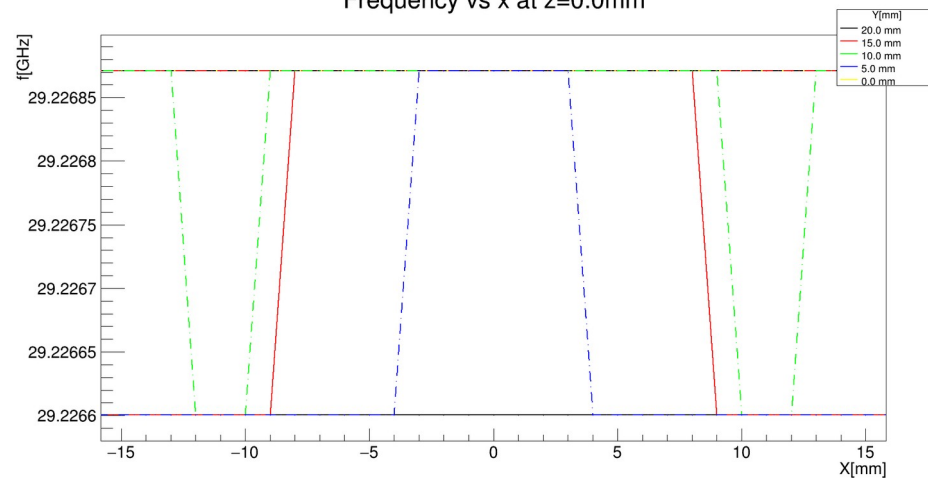
B_x vs x at $z=0.0\text{mm}$



Frequency IF vs x at $z=-5.5\text{mm}$



Frequency vs x at $z=0.0\text{mm}$



Frequency vs z at x=0.0mm and y=0.0mm

PTOLEMY Magnet

