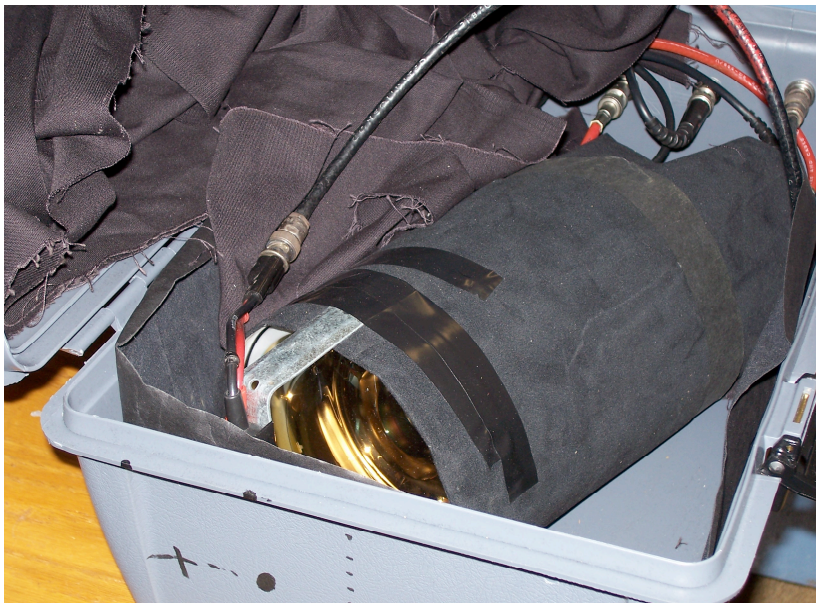


# Magnetic Field Effects on 5" PMT

David Flay

# Setup (1)



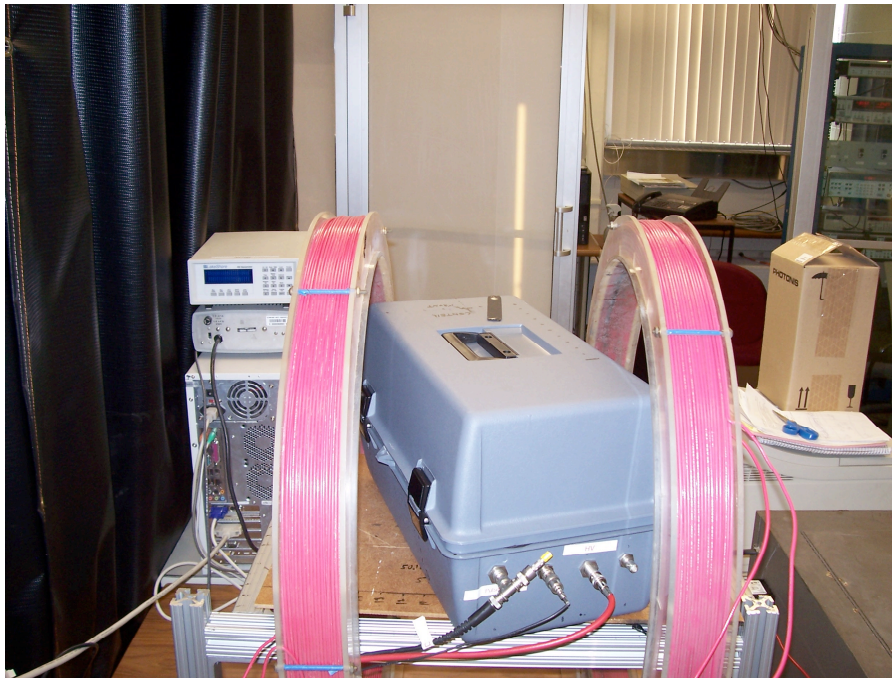
**No shield setup -- PMT wrapped in blackout paper**



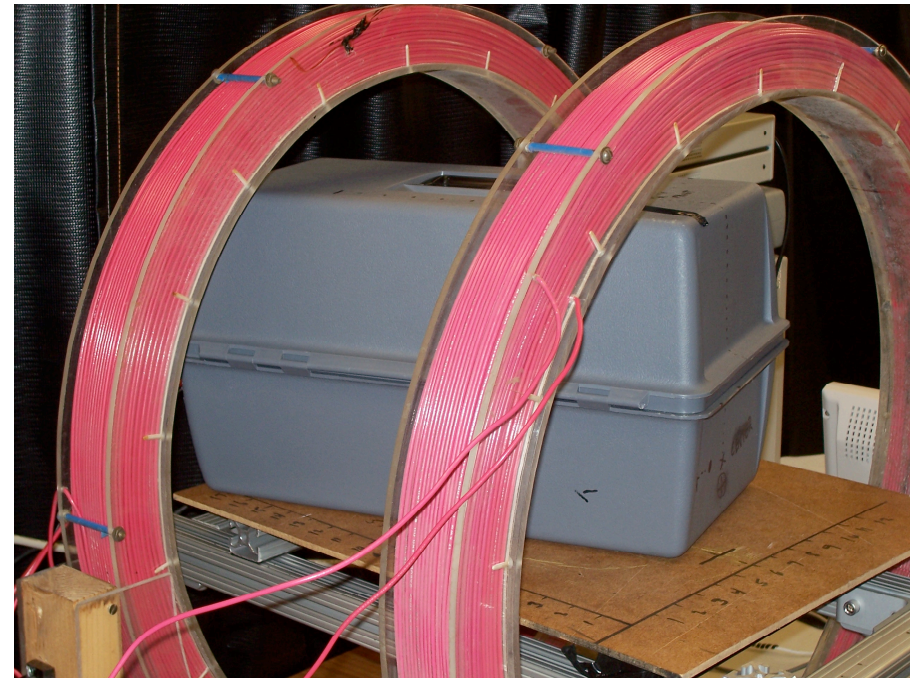
**PMT wrapped in blackout paper, placed in iron shield**

## Setup (2)

- PMT is placed in a darkbox, to block out any unwanted light
- The black tape on top of the box indicates positioning of PMT inside the box
- In the photo on the right, the markings on the box indicate the central axis of the PMT. The front face of the PMT is located on the box on the right, while the back is seen on the left.



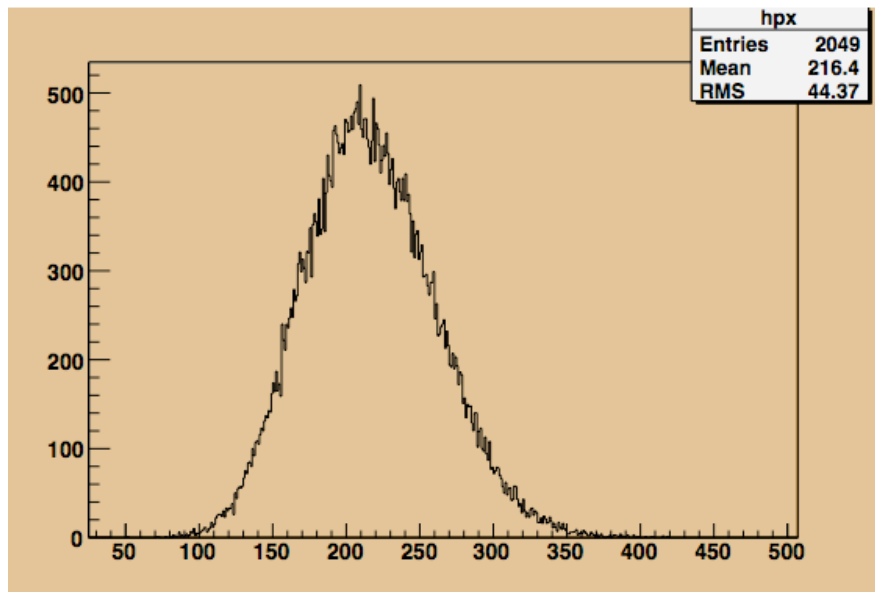
Orientation for transverse field



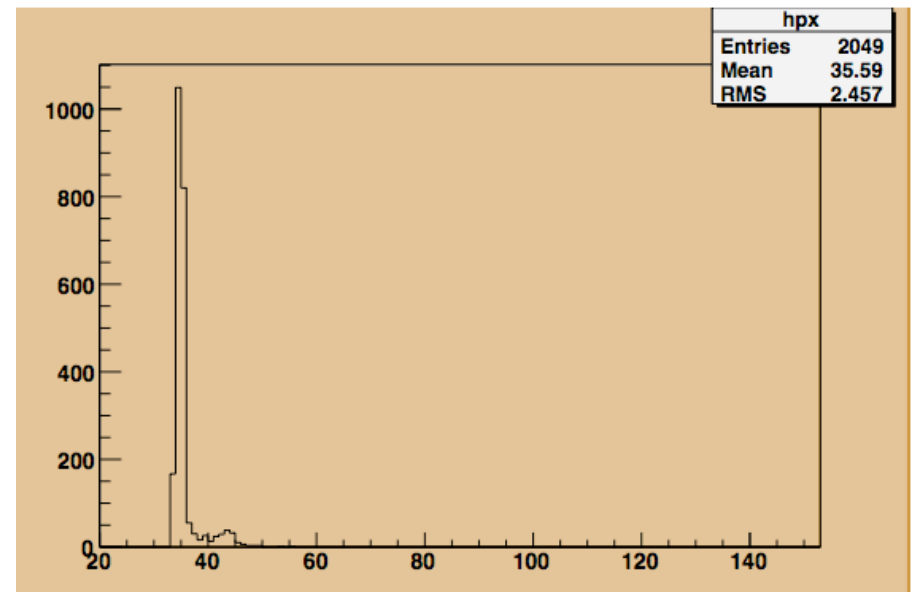
Orientation for longitudinal field

# No Shield (1)

- For the transverse component, with no shield:



16 photoelectron peak, field turned off

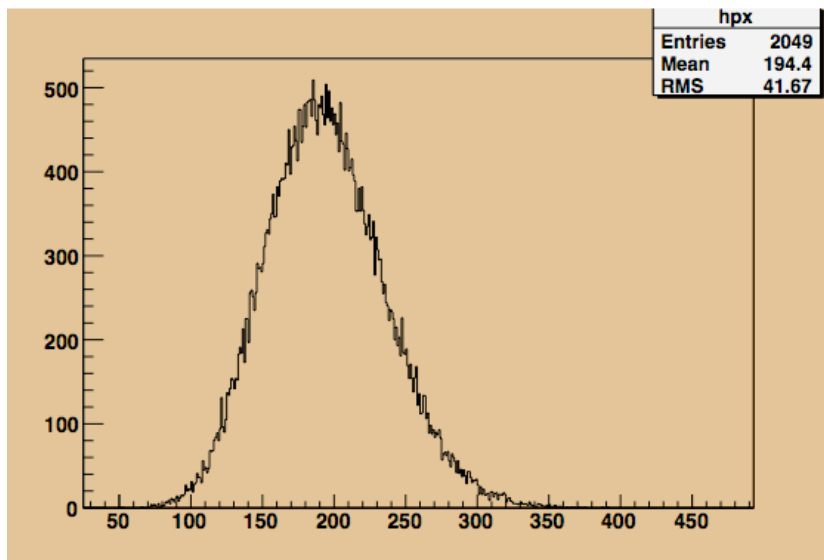


0 photoelectrons,  $B = 2.68$  G

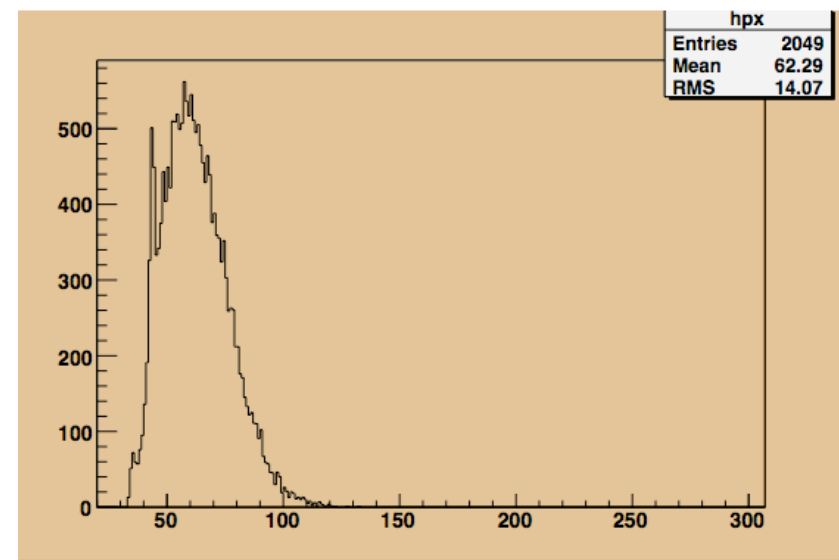
*All field values indicated are field values measured at the face of the PMT*

# No Shield (2)

- The effect due to the longitudinal component:



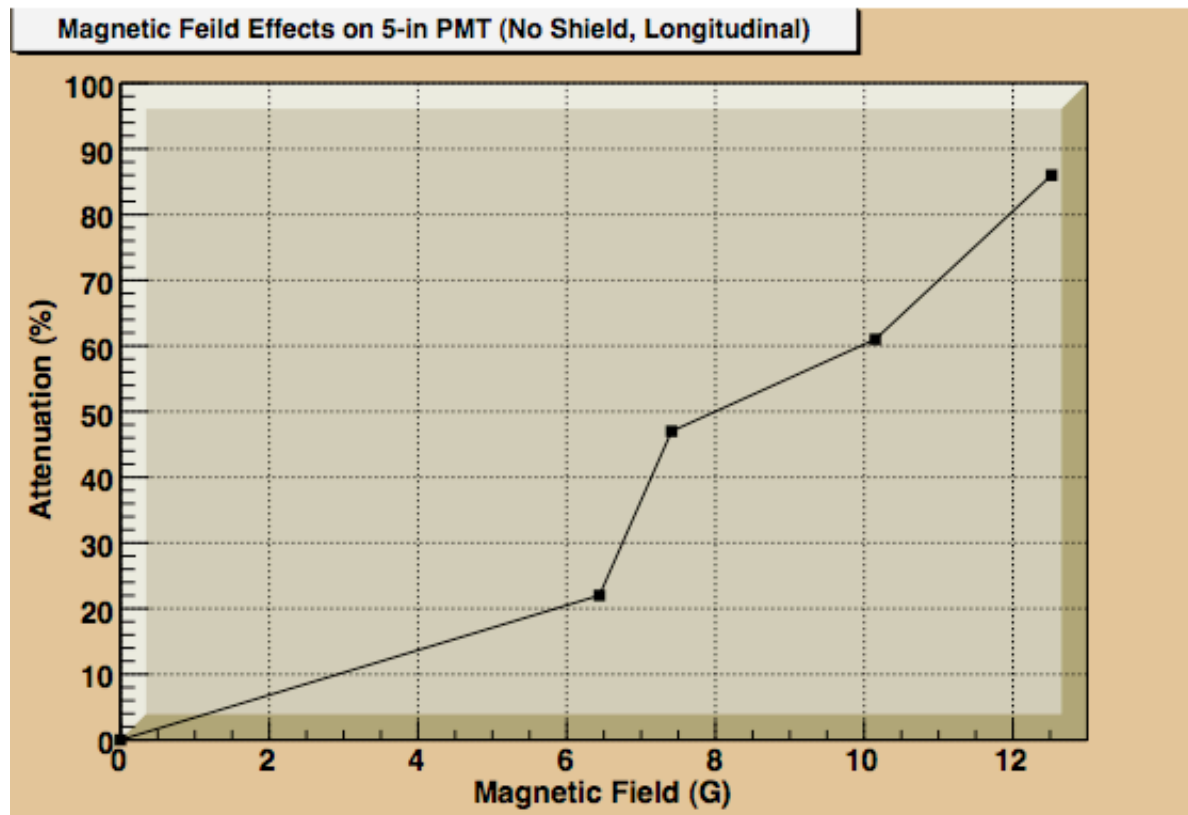
14 photoelectron peak, field turned off



1 & 2 photoelectron peak,  $B = 12.52$  G

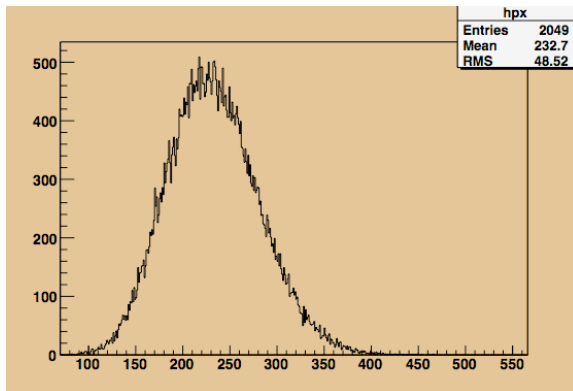
## No Shield (3)

- For the effect of the longitudinal component of the magnetic field, attenuation of 60% for a field of 10 G, and ~85% for a field of 12.52 G

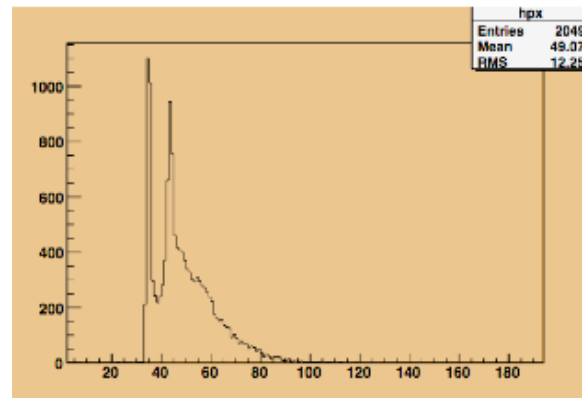


# With Shield (1)

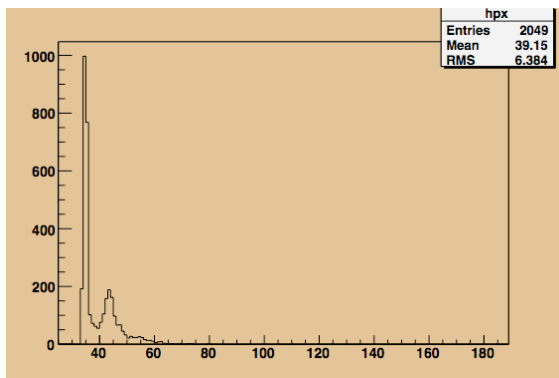
- For the effects due to the transverse component:



16 photoelectron peak, field turned off



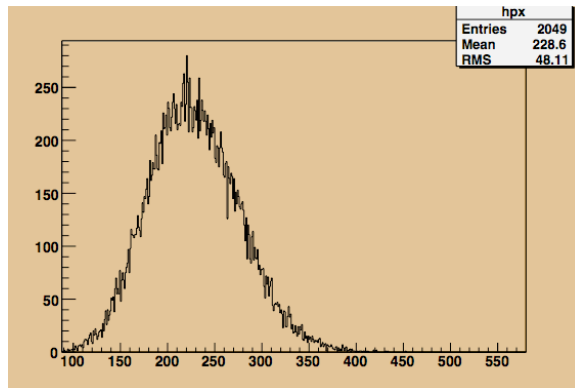
1 photoelectron peak,  $B = 8.19$  G



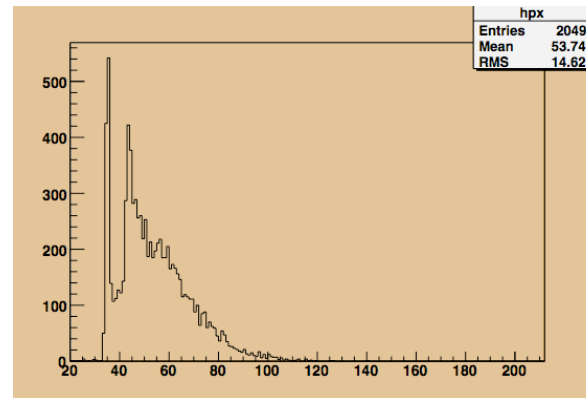
0 photoelectrons,  $B = 9.54$  G

# With Shield (2)

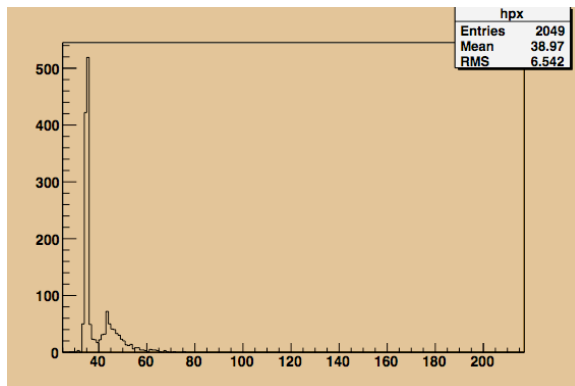
- For the longitudinal component:



14 photoelectron peak, field turned off



1 & 2 photoelectron peak, B = 7.41 G

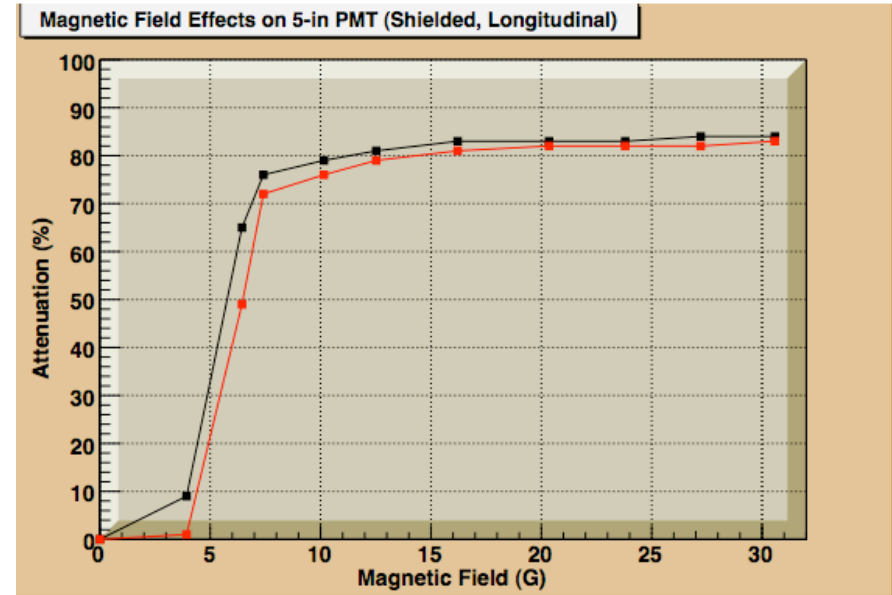
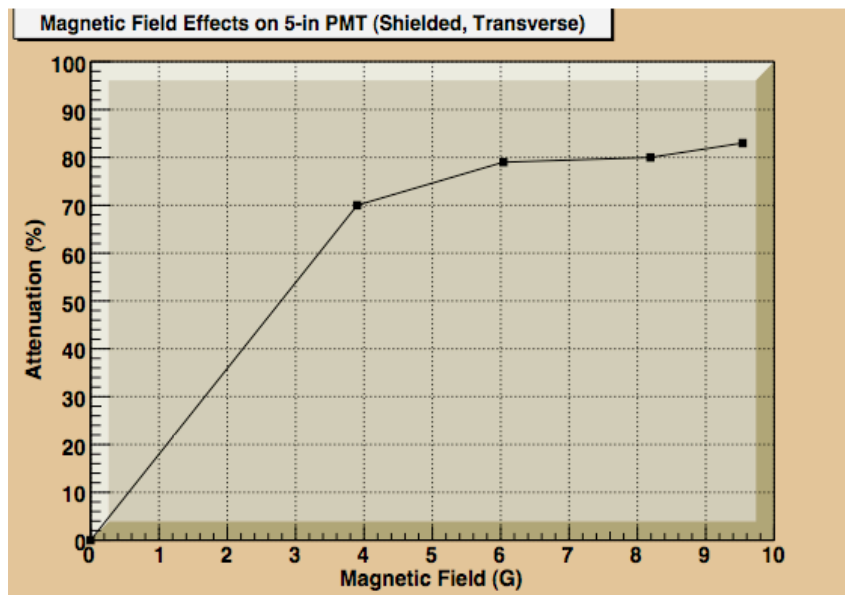


0 photoelectron peak, B = 16.21 G



# With Shield (3)

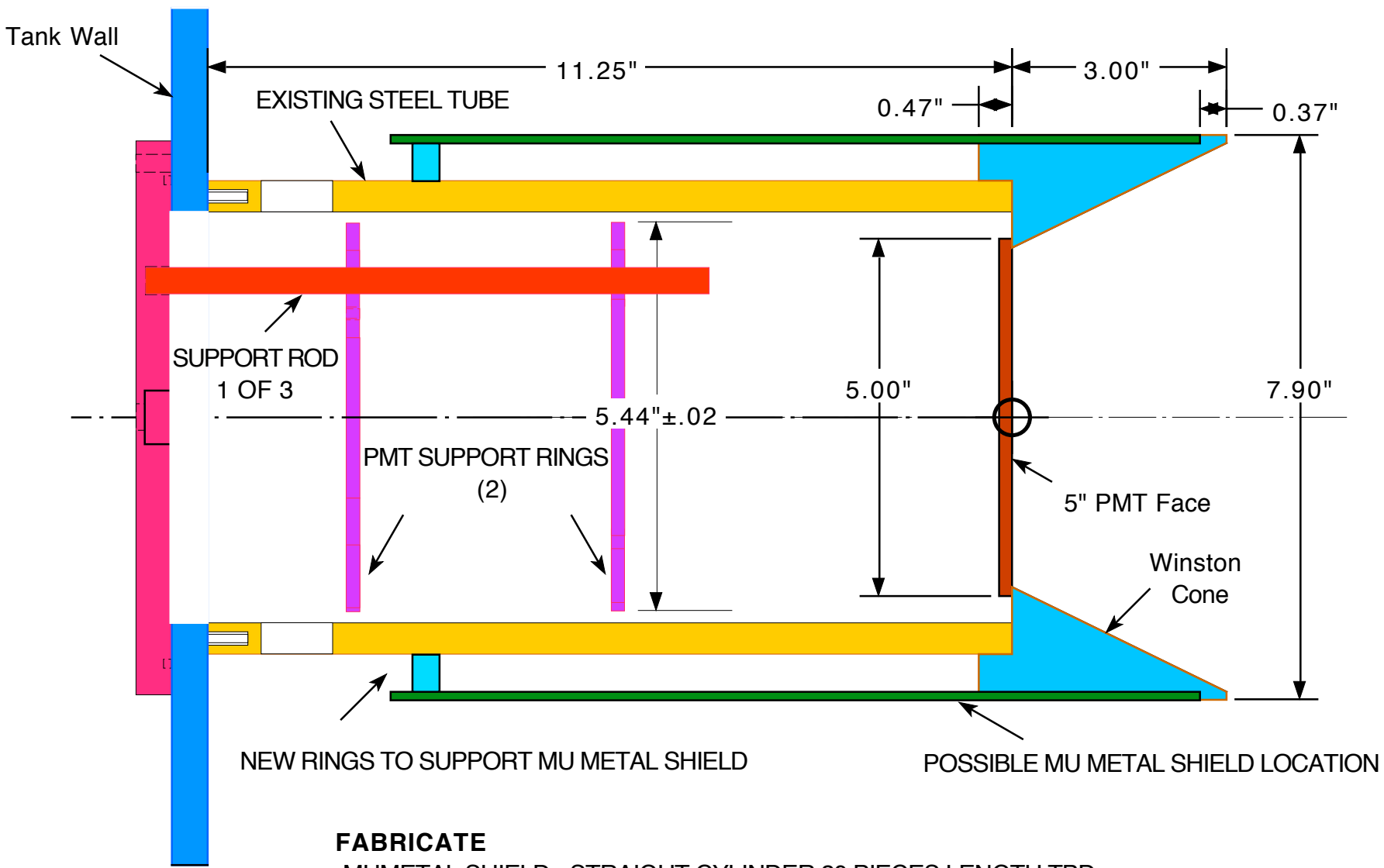
- Results for transverse and longitudinal effects:



- For the longitudinal case, the data was taken twice to check for polarization effects of the iron shield

# Conclusion

- **Iron shield is ineffective for both longitudinal and transverse components of the magnetic field**
- **With the shield on, higher attenuation seen for the transverse component with smaller field values than seen for the longitudinal component**
- **Can be improved by use of mu-metal cans**



**FABRICATE**

- MUMETAL SHIELD - STRAIGHT CYLINDER 20 PIECES LENGTH TBD
- ALUMINUM BACK SUPPORT RING 20 PIECES

**RETAIN**

- STEEL CYLINDER **OR** FABRICATE FROM ALUMINUM
- SCHEDULE 80 STOCK OD AND ID - MACHINE TO LENGTH ADD BOLT CIRCLE ONE END

**MODIFY**

- WINSTON CONE OD FOR SLIP OVER FIT