

# MUON TARGET STUDIES: TAPERED CAPTURE SOLENOID

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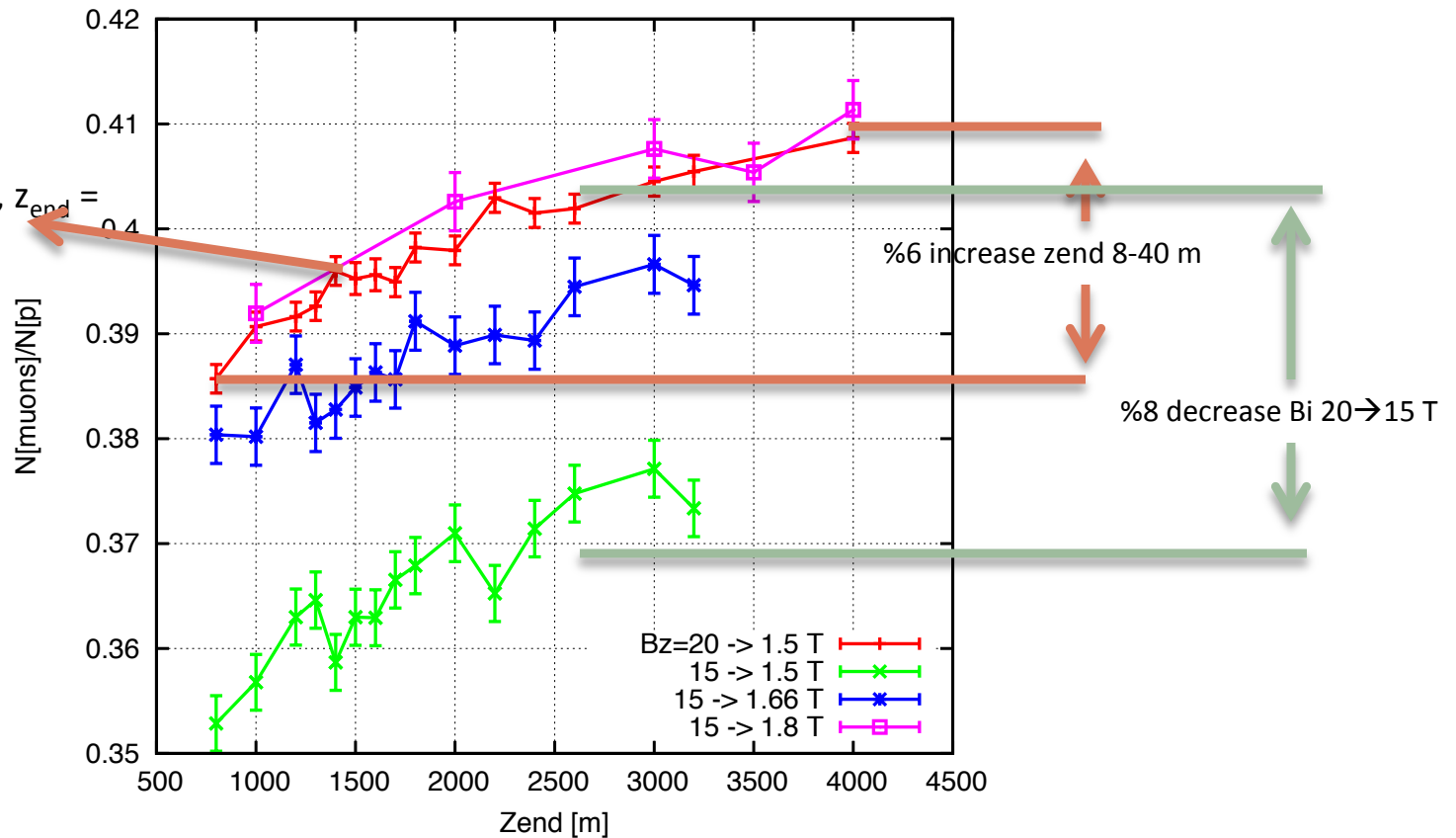
Sept 20, 2012

# MARS SIMULATION RESULTS

Muons+Pions count at  $z=50$  m with K.E. 80-140 MeV

Present baseline:

$B_i = 20$  T,  $B_f = 1.5$  T,  $z_{end} = 15$  m.



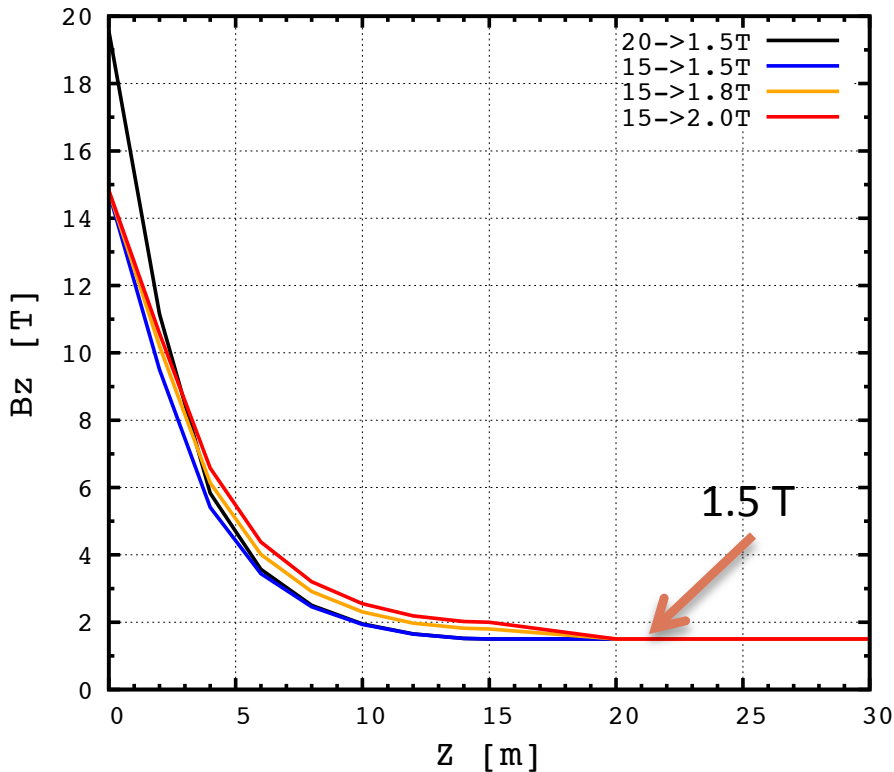
Tapered field using inverse-cubic field ( $P = 1$ )

# MUON COUNT AT END OF "FRONTEND"

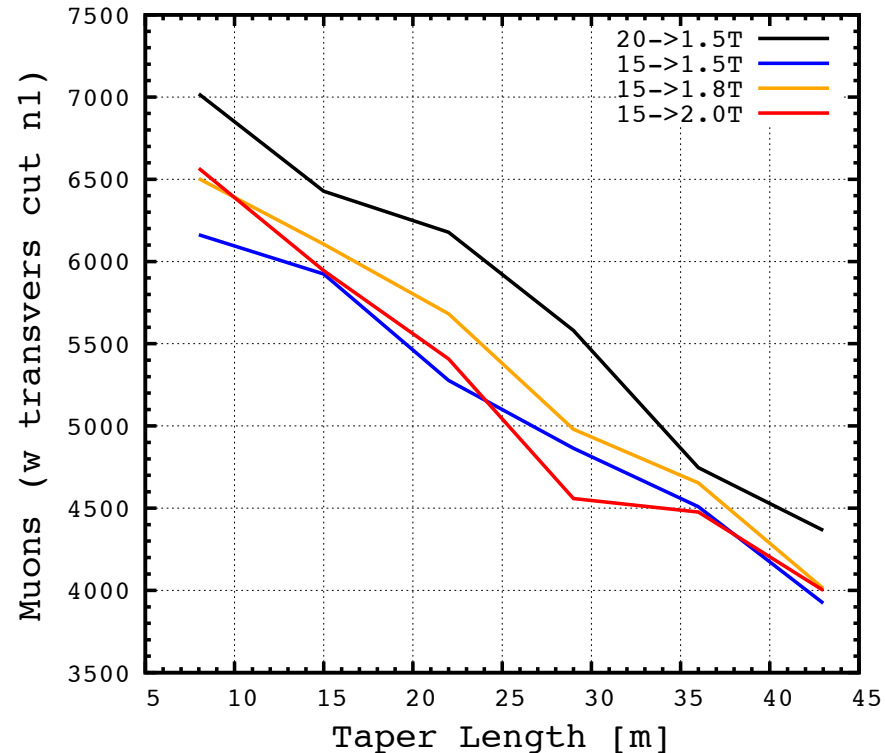
Muons within required acceleration acceptance cuts

- $0.1 < P_z < 0.3$  GeV
- Transverse cut  $R < 0.3$  m
- Longitudinal cut 0.15 m

### Solenoid Field along z-axis

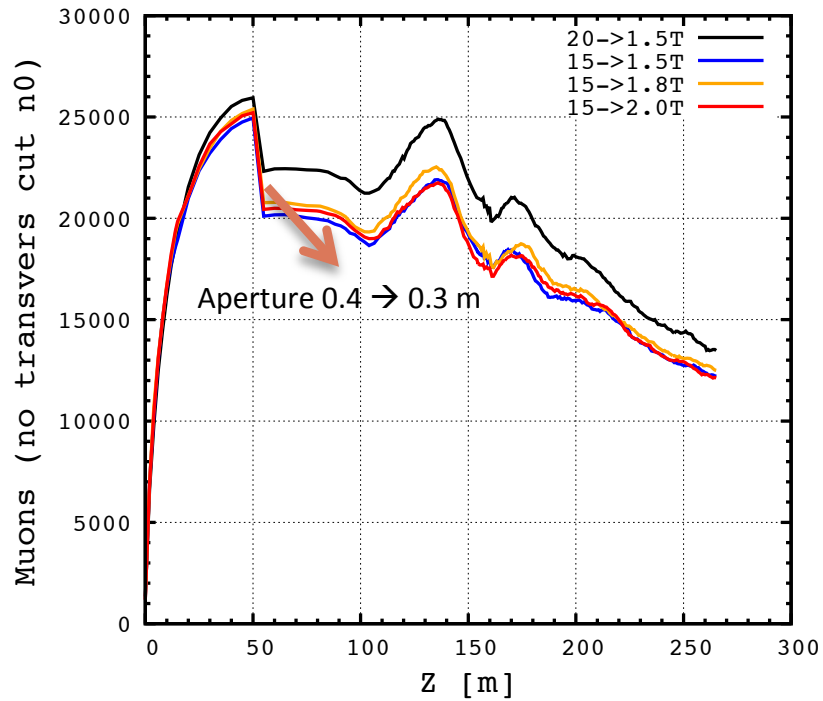


### Shorter taper better survive the phase rotator & cooling

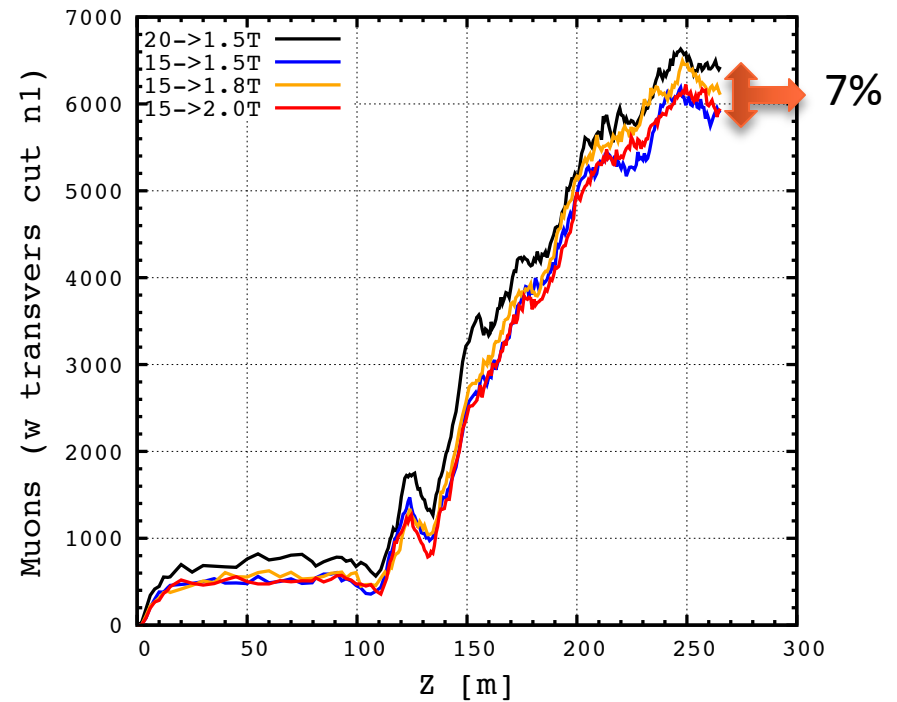


# TRANSMISSION THROUGH FRONT END

## Pz & $\Sigma$ cut



## Trans, Pz, & $\Sigma$ cut

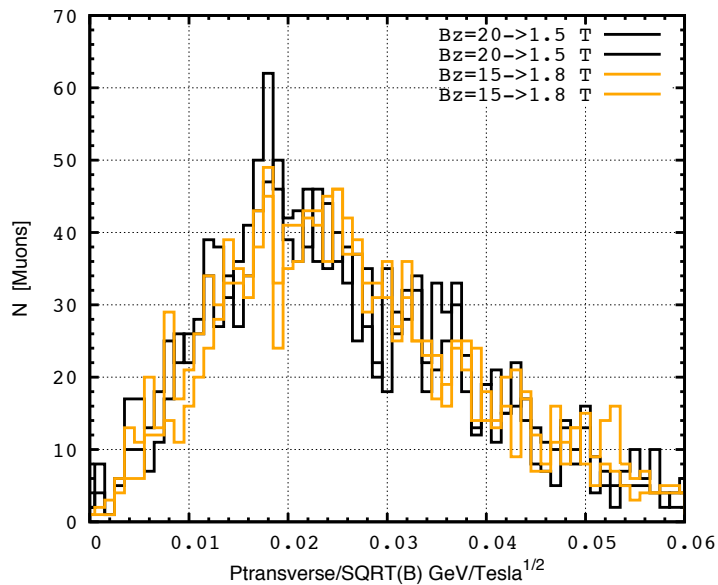
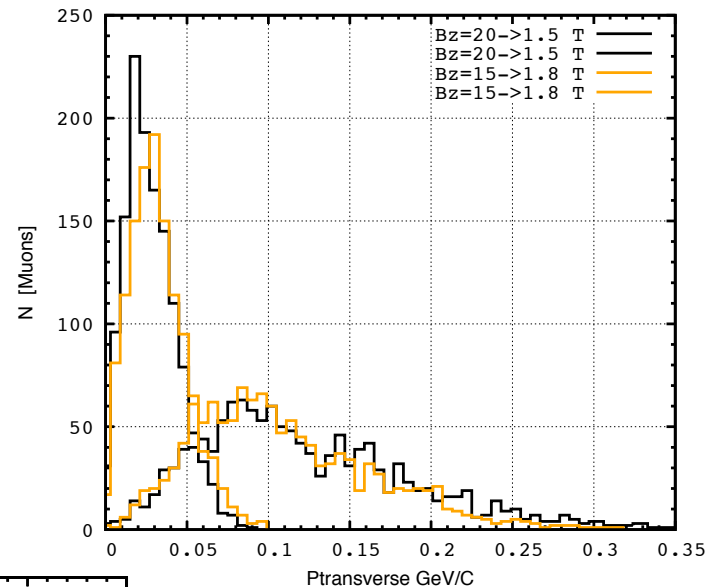
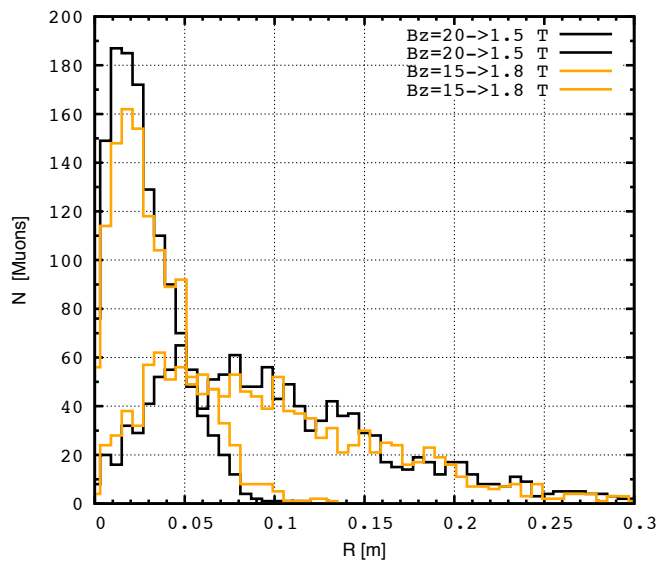


# DISTRIBUTIONS OF PARTICLES SURVIVED THE FRONT END AND ACCELERATION CUTS

- 1- Taper solenoid field: 20 --> 1.5 T over 15 m
- 2- ICOOL applied aperture for decay region  $R_{\text{aperture}} = 0.4 \text{ m}$  & 0.3 afterwards
- 3- Good particles are those who satisfy the following conditions/cuts
  - 1- Survived the phase rotator and cooling sections
  - 2- Fall within required acceleration acceptance cuts
    - $0.1 < P_z < 0.3 \text{ GeV}$
    - Transverse cut  $R < 0.3 \text{ m}$
    - Longitudinal cut 0.15 m

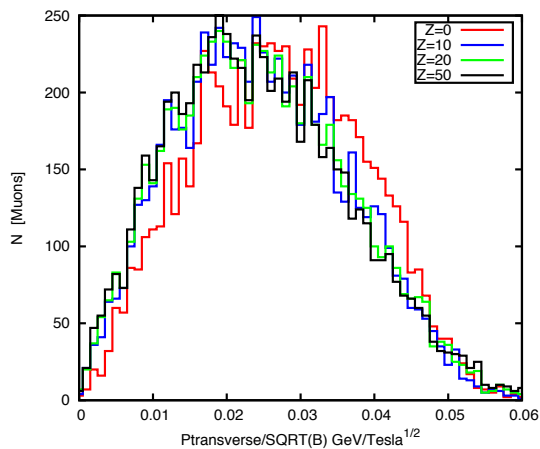
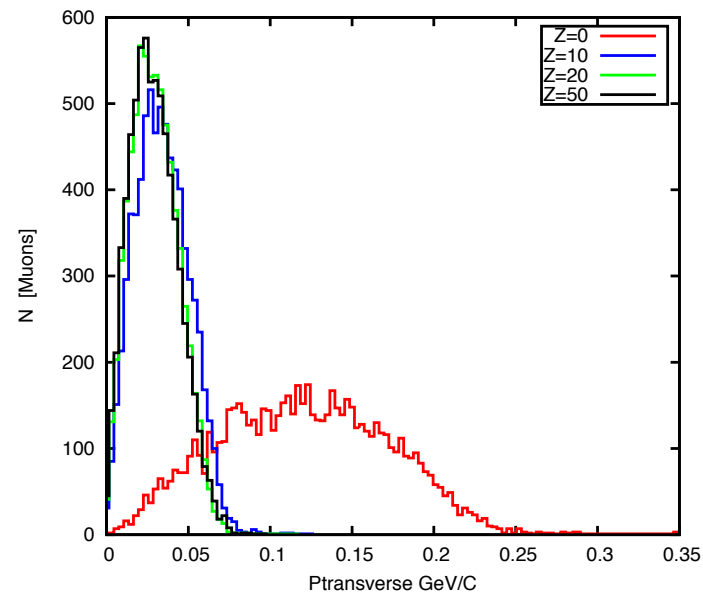
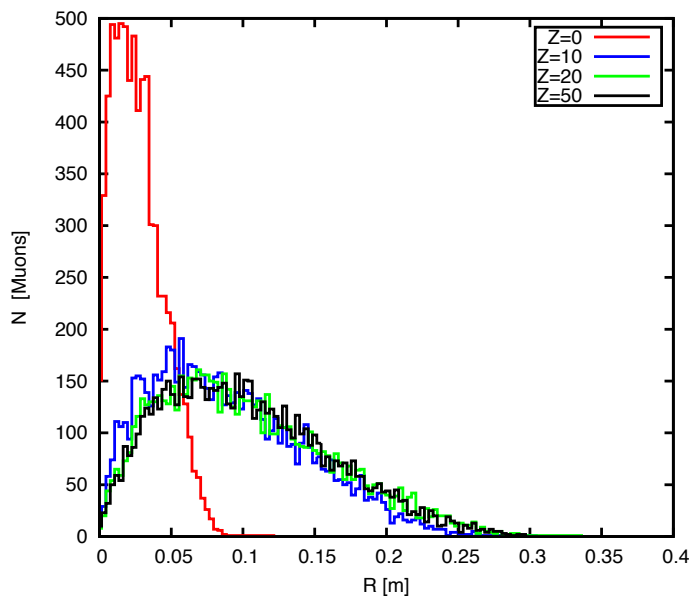
# DISTRIBUTIONS OF PARTICLES SURVIVED THE FRONT END AND ACCELERATION CUTS

## Particle radii distribution $L_{\text{taper}}=15$



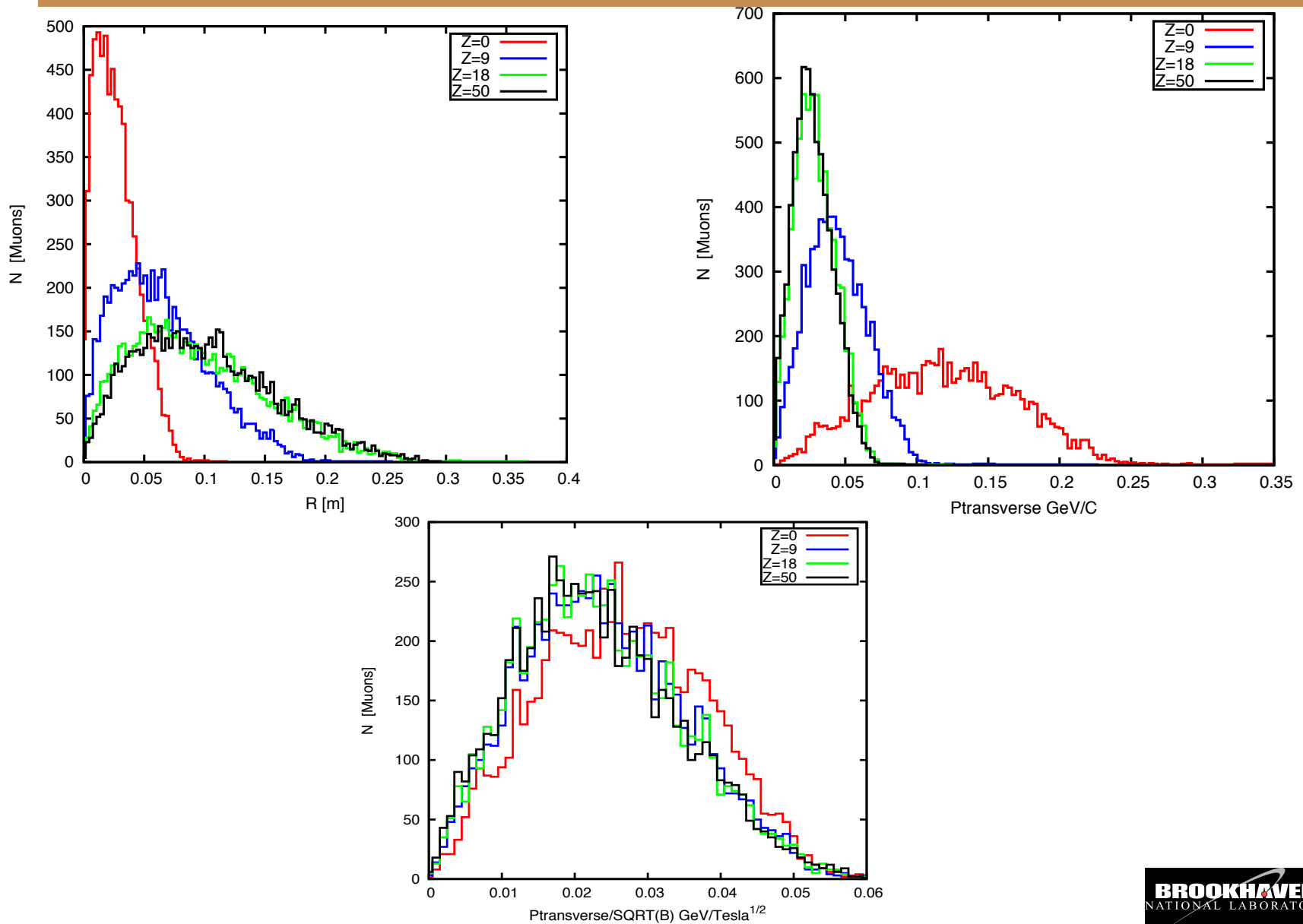
# DISTRIBUTIONS OF PARTICLES SURVIVED THE FRONT END AND ACCELERATION CUTS

## Particle radii distribution $L_{\text{taper}}=15$



# DISTRIBUTIONS OF PARTICLES SURVIVED THE FRONT END AND ACCELERATION CUTS

Particle radii distribution Ltaper=22 m





# DISTRIBUTIONS OF PARTICLES SURVIVED THE FRONT END AND ACCELERATION CUTS

## Particle radii distribution Ltaper=36

