Status of TPC tracking in non-uniform magnetic field

Bo Li

Center for High Energy Physics,
Tsinghua University

ILD Analysis/Software Meeting
Oct. 26, 2014

Introduction

- The algorithm (KalTest) was updated for tracking in non-uniform magnetic field already. (The code is in my branch of KalTest on ILCSoft repository.)

- It is now meaningful to study the performance of new KalTest in the ILCSoft (such as Clupatra and MarlinTPC)

- Simulation in Mokka: a non-uniform magnetic field is hard-coded in the class Field00.
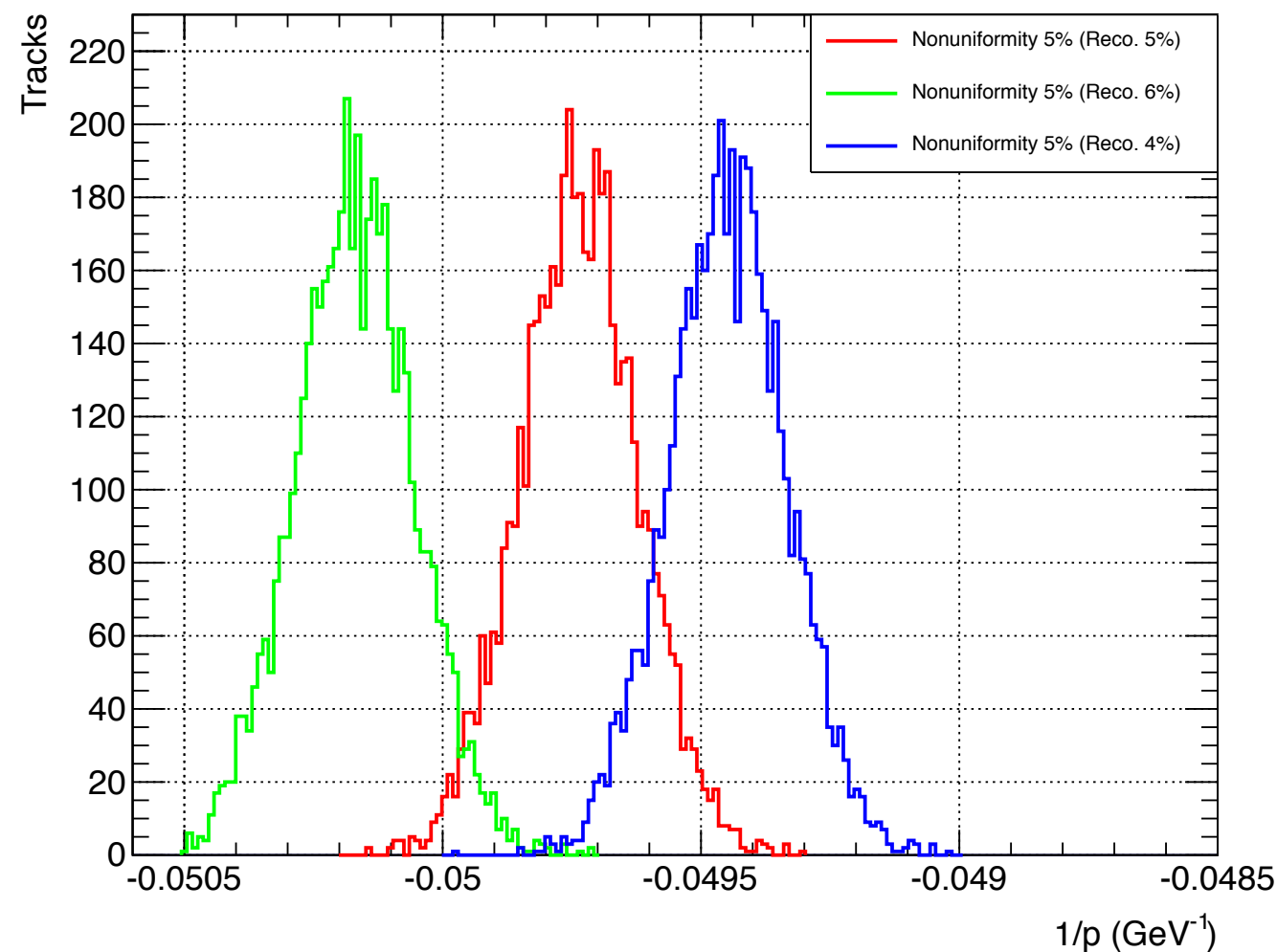
Track momentum

- The track momentum fitting results by new KalTest in the non-uniform magnetic field are consistent with that of original KalTest in uniform magnetic field 😄
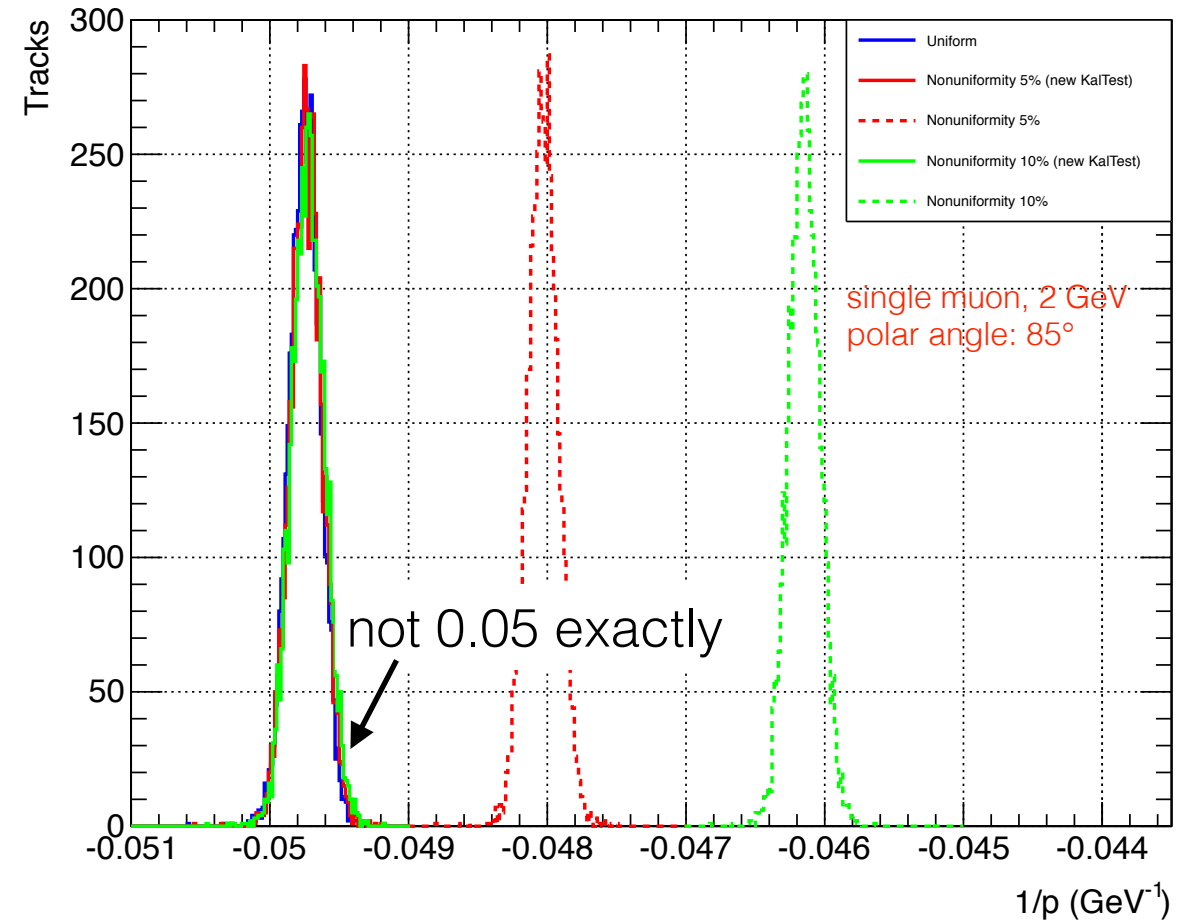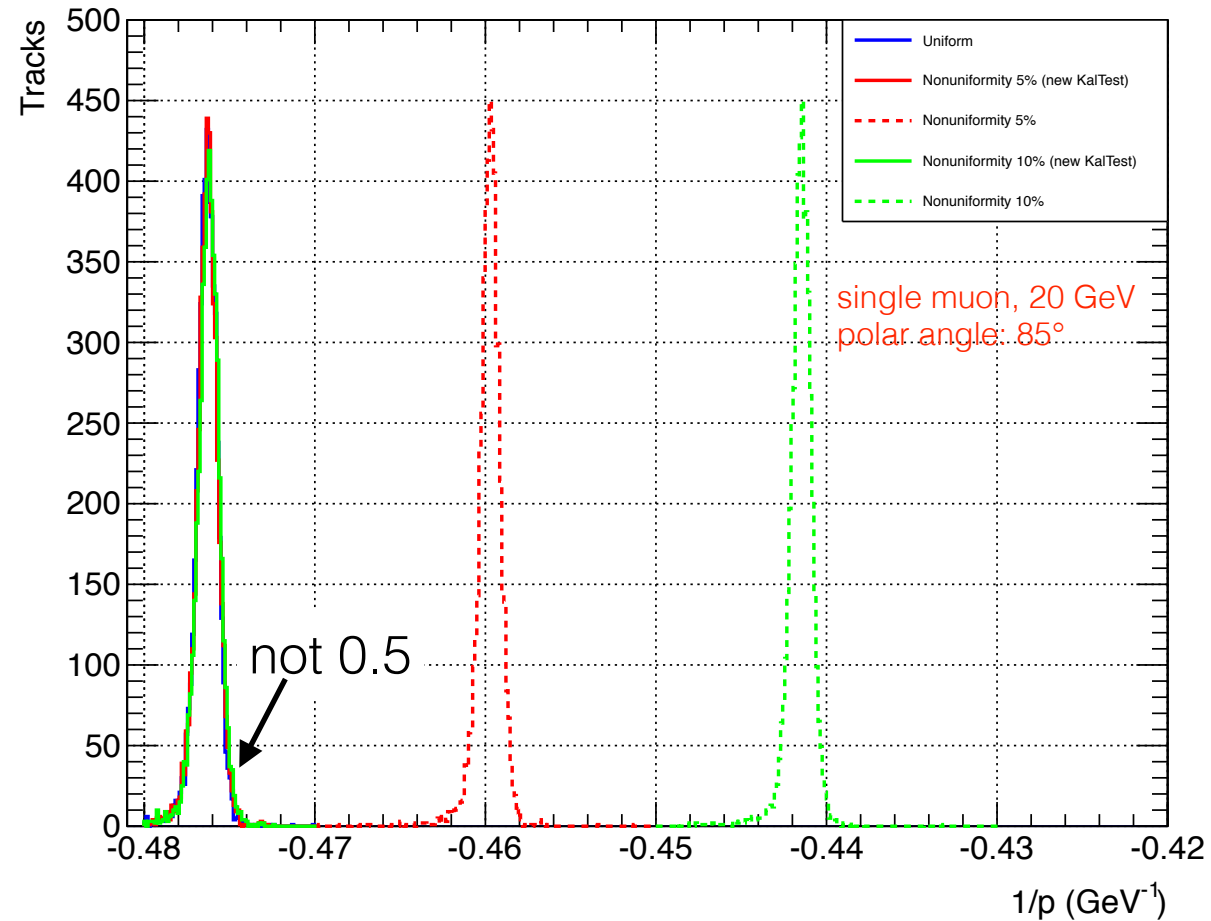
- A difference between expected value and the reconstruction 😒
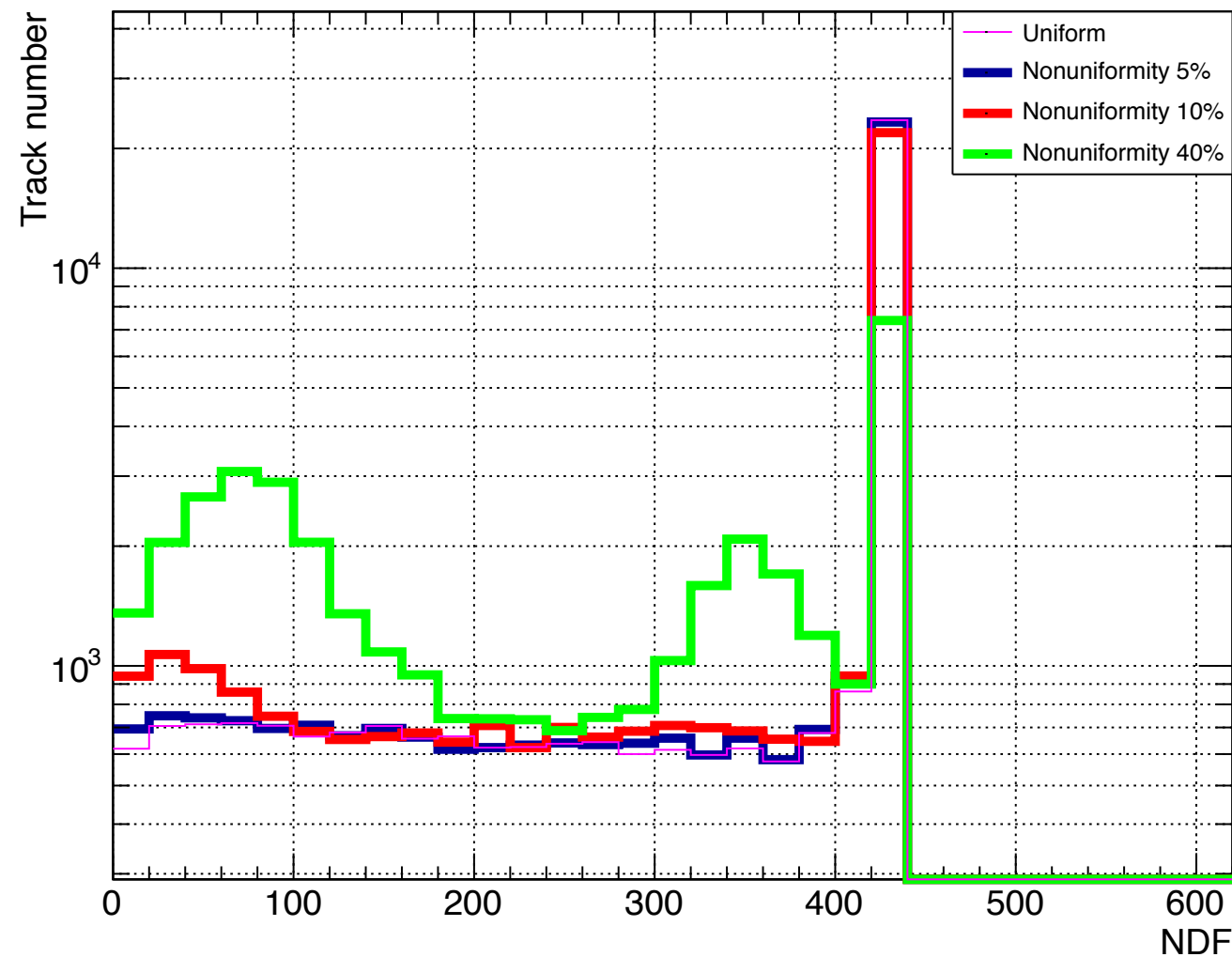
Field precision

- If the measured field map is not precise enough, we may wonder its influence on momentum.

- At 20 GeV, the momentum bias introduced by the error (20%) of measured field map is about 0.1 GeV.
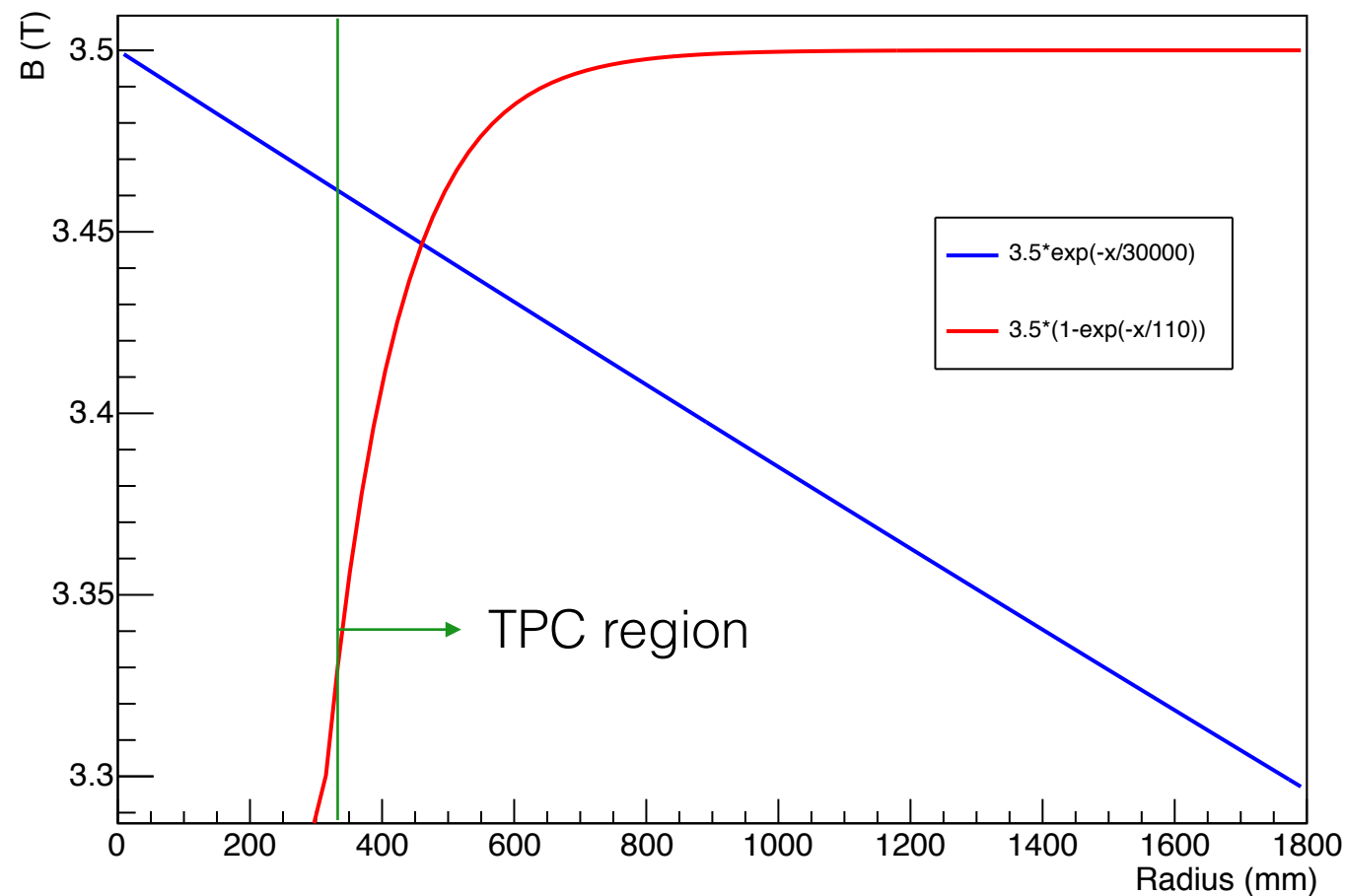
Tracking performance

- Tracking efficiency: 99%
- The degree of freedom per track:

- When the non-uniformity is less than 10%, its affect on track finding can be neglected.
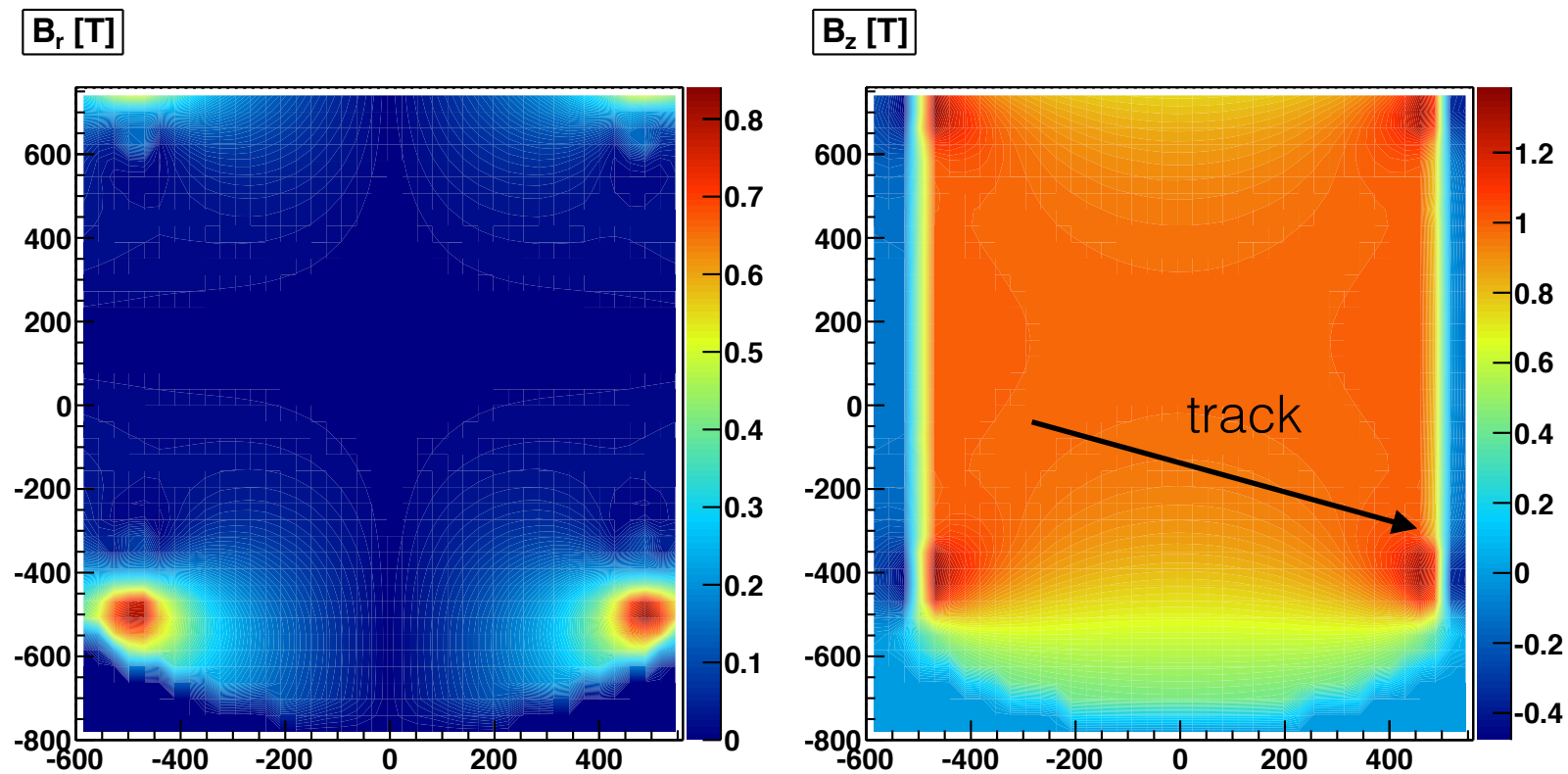
Magnetic field

- For the previous studies, a field map having a form the blue curve is hypothesized.

- It seems that reconstruction result by the current ILCSoft is good enough. (However, I will check this further.)
- A map field close to the real case is very useful.

Reconstruction in MarlinTPC

- The field map of PCMAG:

- Reconstructed momenta of 5 GeV tracks (polar angle: 0.5 rad):