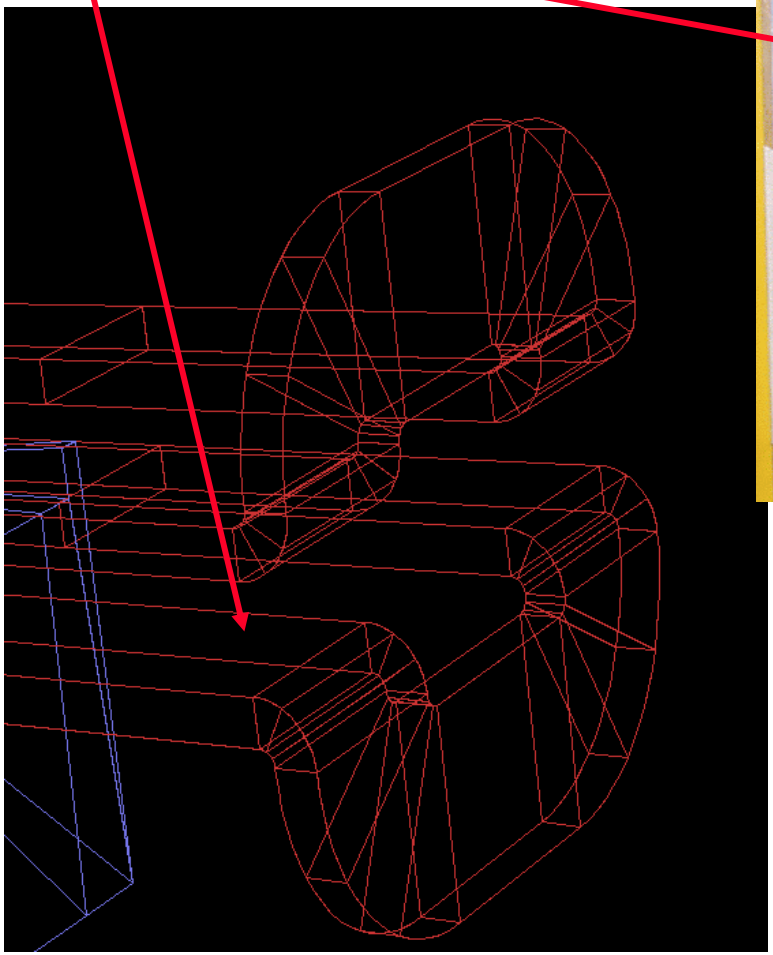
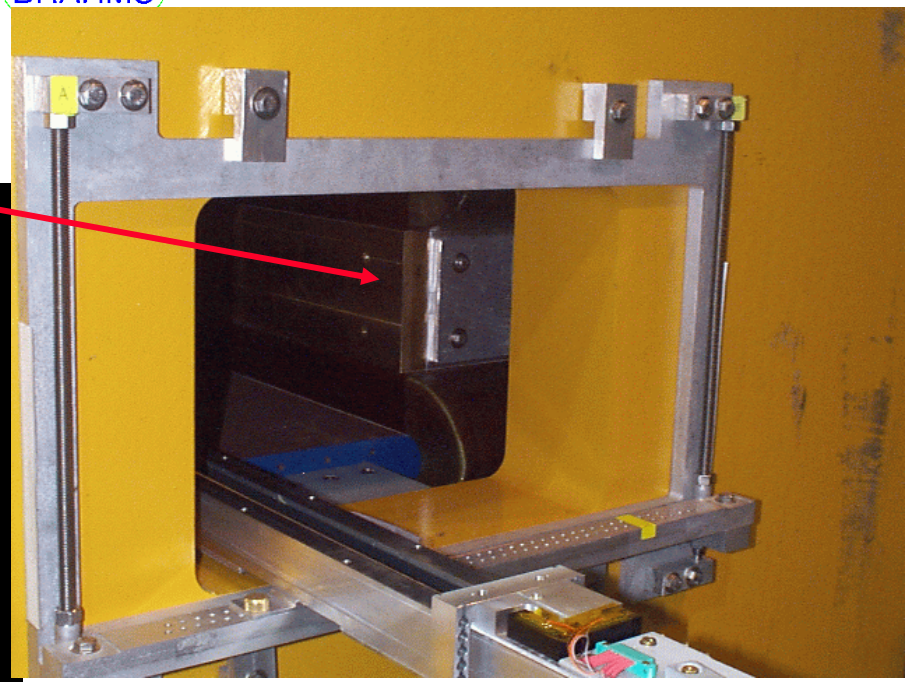
Magnetic Field

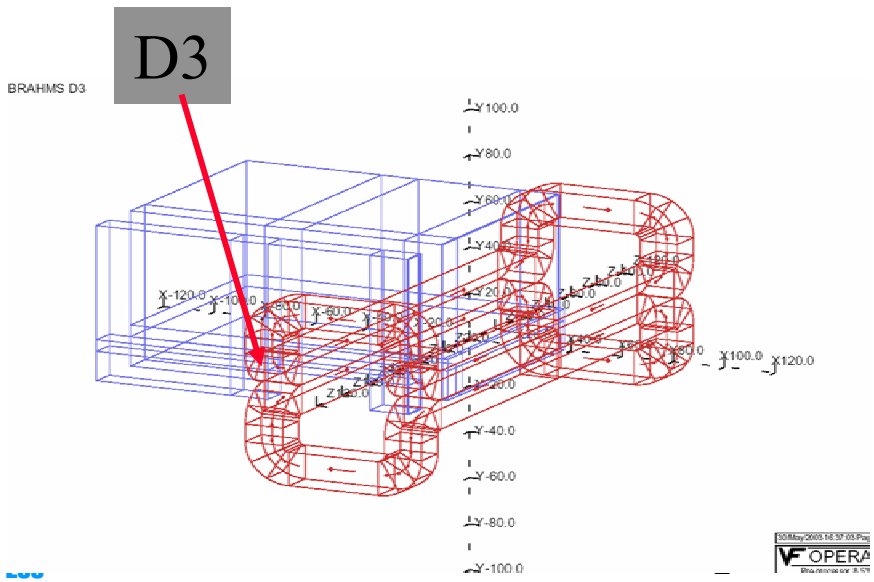
- What's the issue?
  - Field responsible for momentum mismatch in FS?
  - Effective edge approximation: Good enough? Especially for D4?
- What to do?
  Using Hall Probe read-out
  + Transfer Matrix
  (+ Full Field Map)
- TOSCA
- Field Map: Status

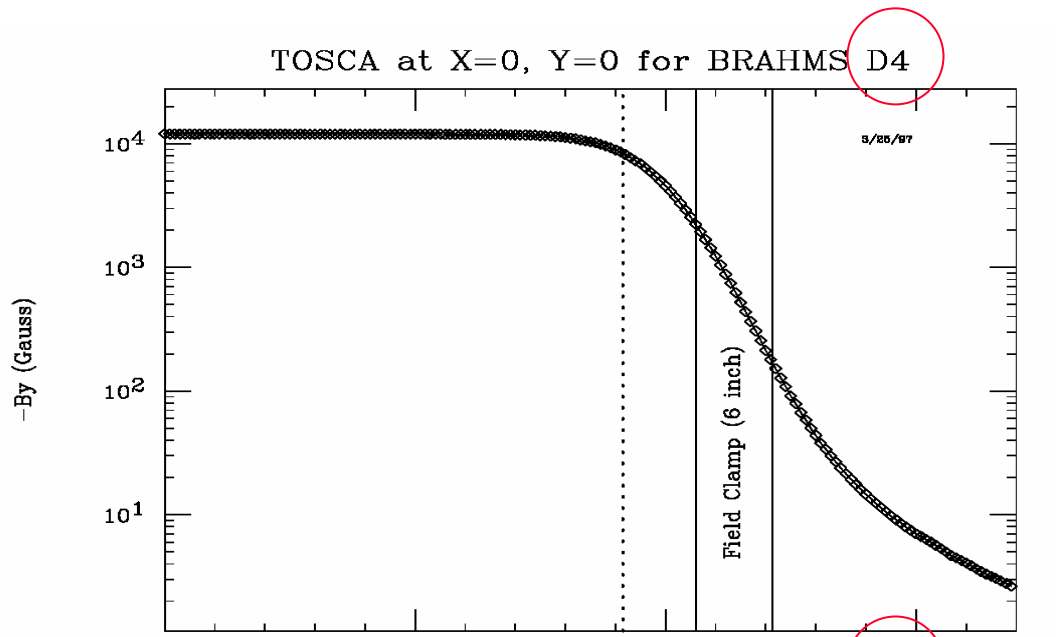
D4

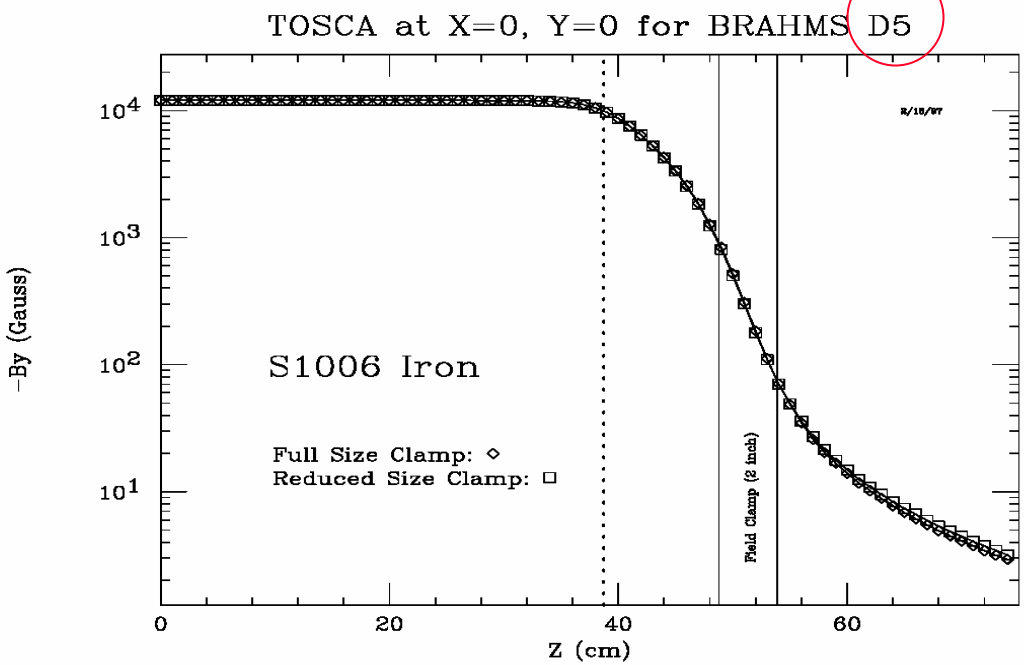




D3


BRAHMS D3
Y 100.0
Y 80.0
Y 60.0
Y 40.0
Y 20.0
Y -40.0
Y -60.0
Y -80.0
Y -100.0
X -120.0
X 100.0
X 120.0

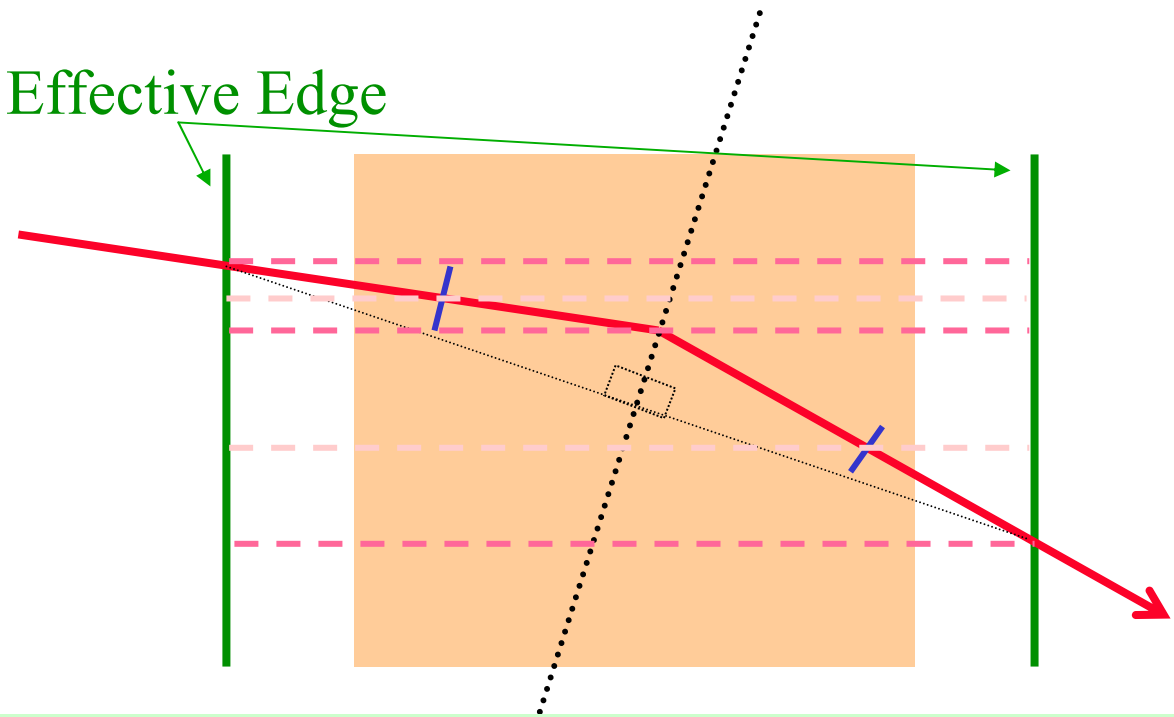




D4 has

- More fringe field
- Non negligible off-component: Vertical focusing effect

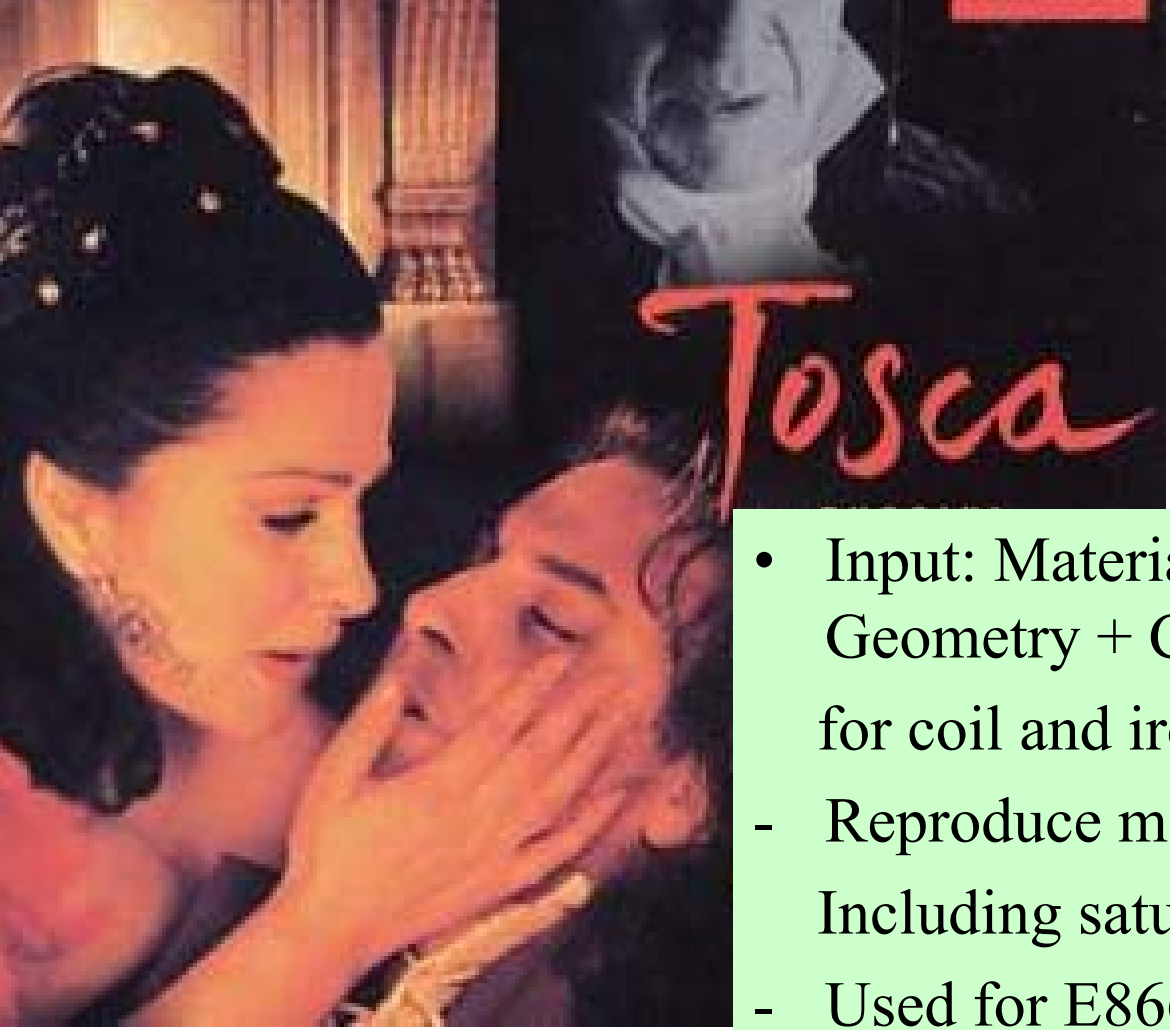
Effective Edge, Transfer Matrix



- Effective Edge: Good approximation for D1-3, D5
- D5: | z (effective edge)-z (Half field calculated by TOSCA) | < 1-2mm
- Transfer Matrix: More accurate information x,y dependence of By is taken into account
- Average of $\int B_y d\ell$ at entrance, exit, matching,+

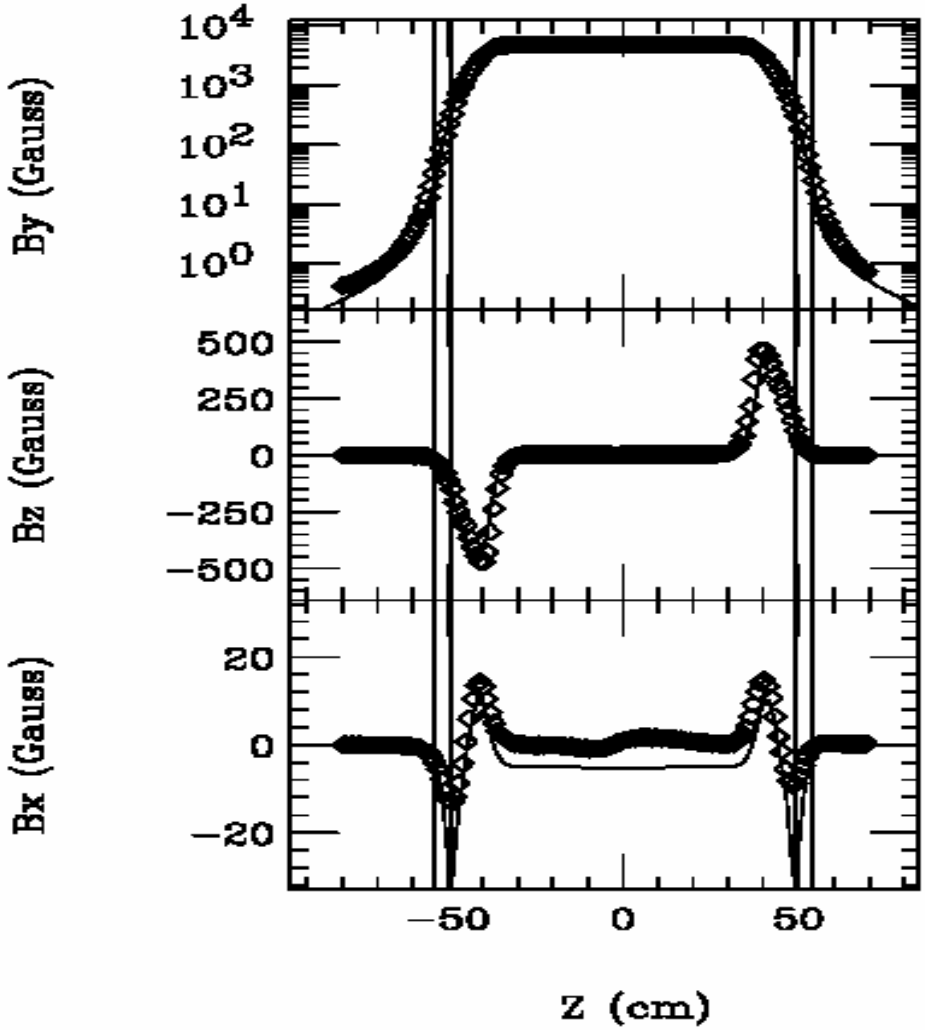
How to do

- Prepare a Map from (Interpolated) Measurements or TOSCA output (*ex*.: 1cm×1cm×1cm)
- Read Field Map
- Make transfer matrix 1cm×1cm (or whatever)
- Get 3 points (or can be any number) of at entrance, exit, matching in x,y using interpolation of 4 points in the grid
- $\int B_y d\ell$ used in momentum calculation: average of the points: $1/n\Sigma\int B_y(x,y)d\ell$



- Input: Material (B-H curve) + Geometry + Current for coil and iron
- Reproduce measurement well Including saturation
- Used for E866
- Easy to make map at any format
- Simulation

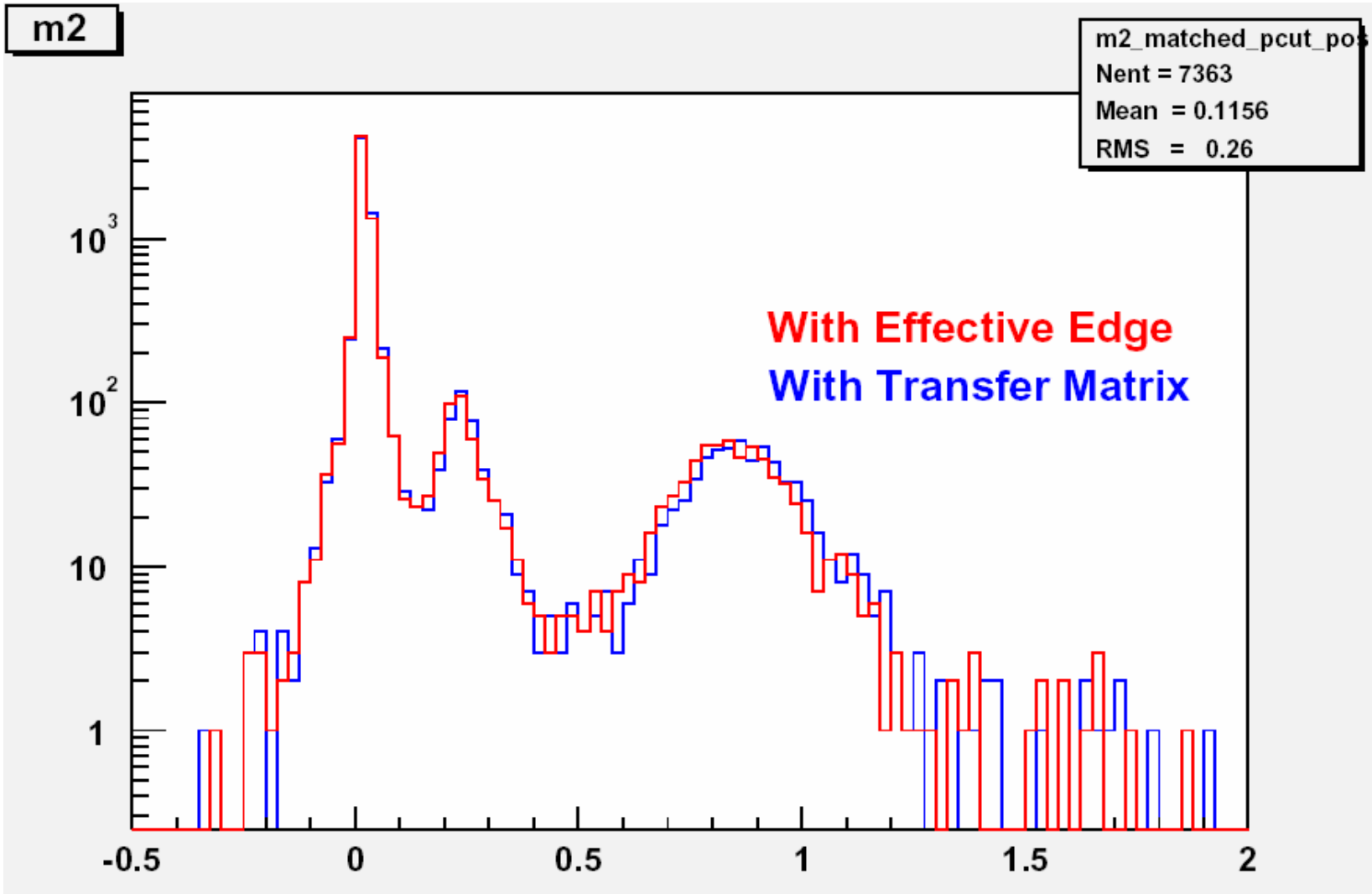
TOSCA Reproduces Measurements



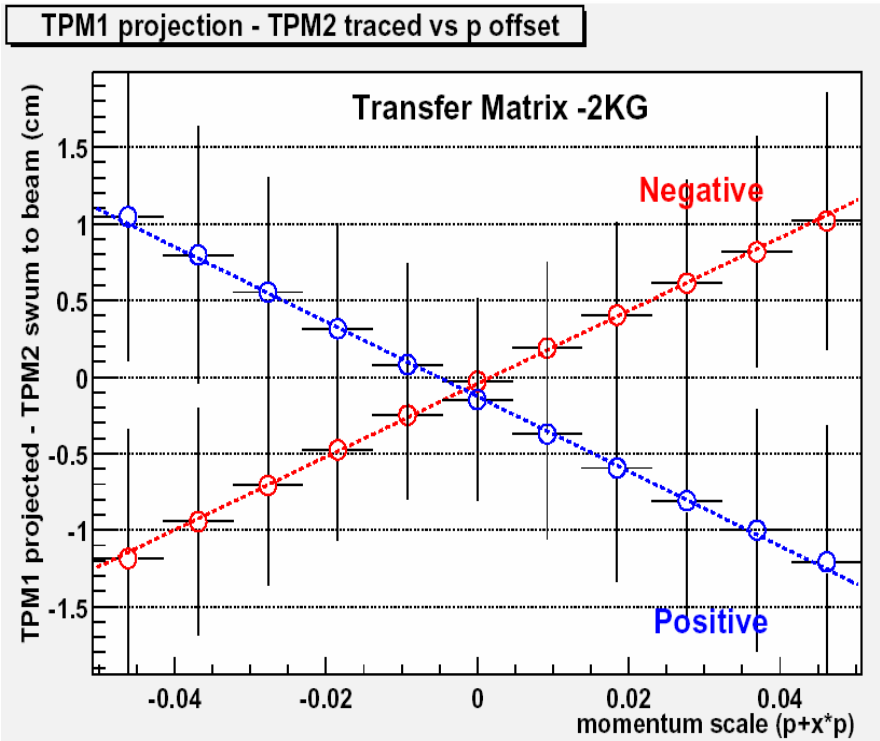
D5

- Points: Measurements
- Lines: TOSCA
- Reproduce measurement for all component

Effective Edge vs Transfer Matrix from TOSCA for D5



Full field map can be used to get best momentum: Not practical, but useful check



- Calculate momentum Using eff. edge or transfer Matrix
- Swim track backward (forward) with the momentum through the full field map
- Compare distance at TPM1 with TPM1 track and minimize the distance

Slide From Ramiro

The latest excitation curve measurements

- Work started on 26 Feb-2002 with D1 .Three axes probe placed at y=0 and at least 3 magnet gaps into the magnet. Excitations for both polarities.

- Then I did D4, but I disturbed the position of the permanent Hall probe, I think that can be fixed.

- Did same work on D3, and later went back to D4 with a new position for the permanent Hall probe.

- Finished with D2 and then D5

- Each magnet has data measured with two probes; the permanent Hall probes and a second one measuring the field in the middle of the gap. One can parameterize the correlation of both measurements and have a continuous monitoring (every minute) of the field in the middle of the magnet.

I gave the data to several people. I will place it in a public place in a root macro form.

We mapped the field for all magnets in a single polarity and two

field values: ~half field and full field.

D5 map is done (1cm^3 grid size)

I will work on D4 and place results on the magnet section of the detector BRAHMS page.