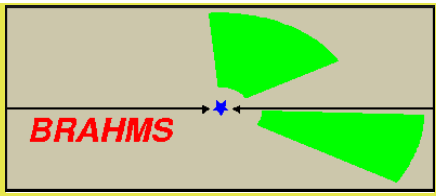
BRAHMS Collaboration Meeting
January 2002, BNL



Oslo Tales

1. TPC efficiencies

2. The search for Λs at
   η = 1

3. dN/dη from TPM1

−Bjørn H. Samset

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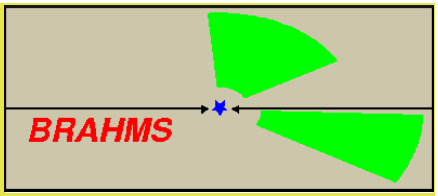
Status of TPC tracking efficiency:

TPC tracking efficiencies



Algorithm:

- Add geant tracks (at sequence level) to data events
- Reconstruct before and after
- Check if the track was found or not...
- Do this as a function of
  - particle species
  - momentum
  - track angle
  - position in the TPC
  - centrality
  - etc...
- Find efficiency as a function of the number of clusters or the number of tracks
- Make efficiency maps

What's there:

- BrEffPackage is in brat, has all the basic functionality but is somewhat lacking in comments...
- An example script can be found here:

  ~trine/brat_test/effpackage_test

  on rcf.
- The code has been run for a large number of settings, giving us a good feeling for the average tracking efficiency. A typical number for TPM1 would be

  $\varepsilon = 1 - 0.000133 * N_{clusters}$

  The other TPCs show similar numbers − the value seems more a feature of the tracking software than of the hardware. (1−0 to Dana...)

What's coming:

- A nice gui (by the designer of **badtrip**, "The only brahms program that *does* something"–Hiro) that will allow anyone to easily estimate the efficiency for any tpc, any setting etc...
- A polished set of efficiencies, ready to be used.

Timescale:

Well, Truls plans to graduate this spring and this is part of his thesis so he'd better get off the mountain.

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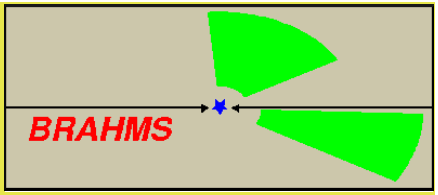
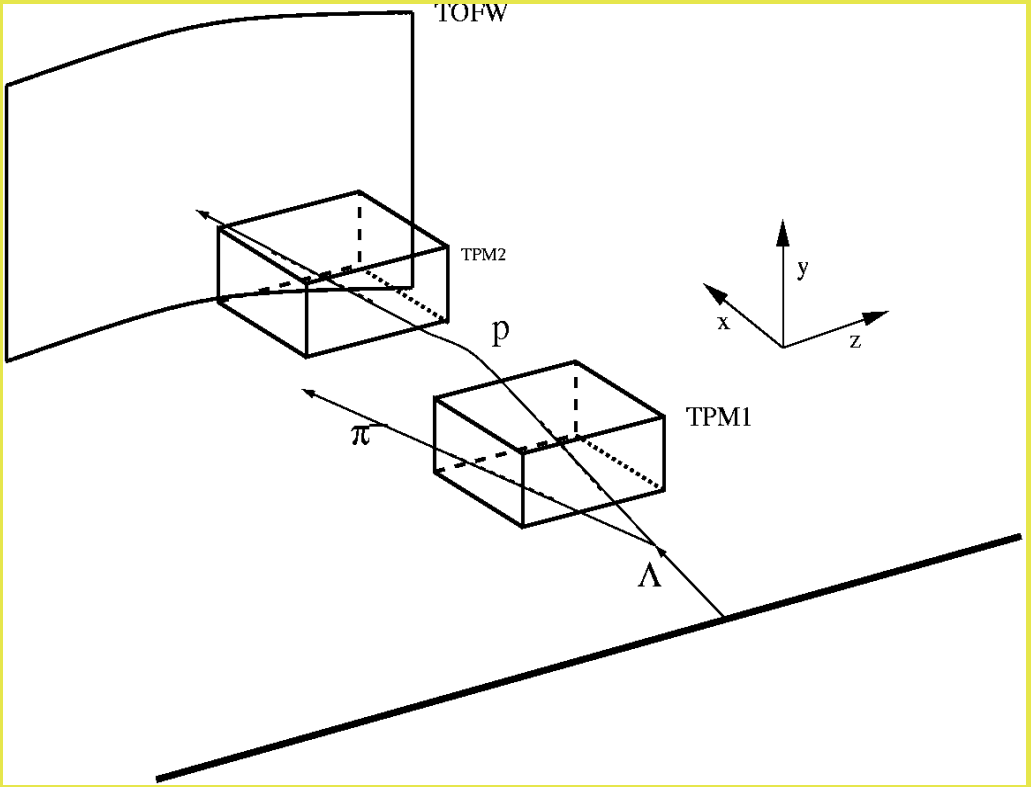
V0s in the MRS



Algorithm:

- Identify a proton using TOFW PID (m^2 cut)
- Assume all other tracks in TPM1 are pions
- Get vertex from BB
- For each pair of MRS and TPM1 tracks:
    1. Check if they cross in a "reasonable" place
    2. Use this point as a decay point
    3. Check if vertex, decay point and tracks are all in a plane
    4. Check that if one track goes right, the other one goes left...
    5. Using momentum conservation, calculate p_Π and m^2 for the V0



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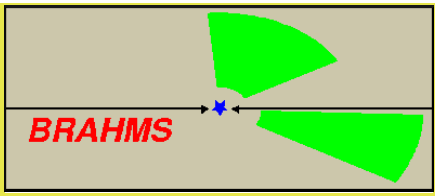
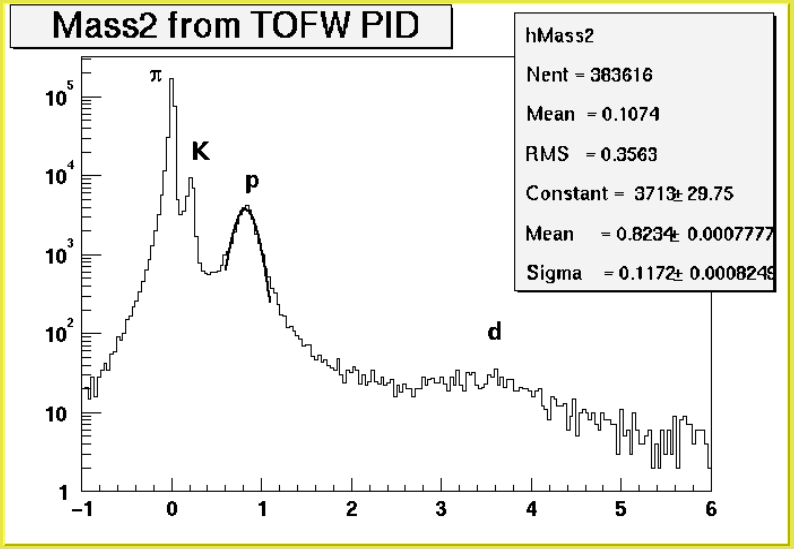
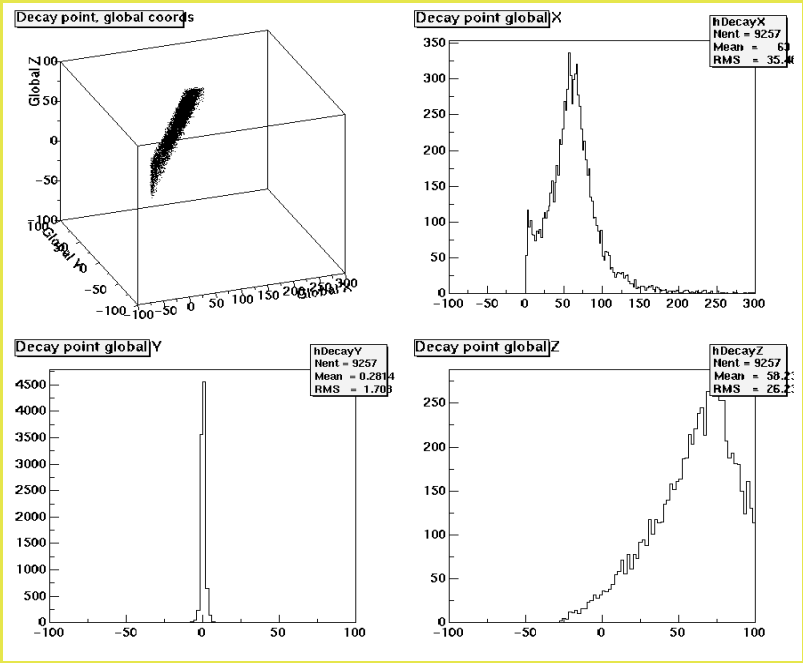
V0s in the MRS





TOFW particle identification, MRS at 40 degrees.

−Is this a deuteron that I see before me?



Calculated decay points, after all cuts are applied...

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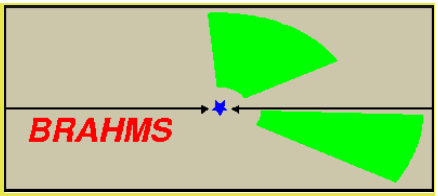
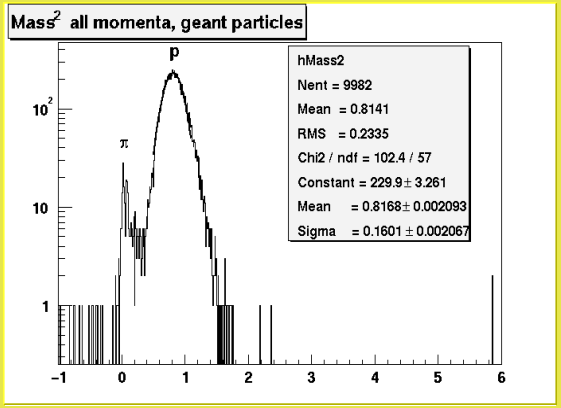
V0s in the MRS

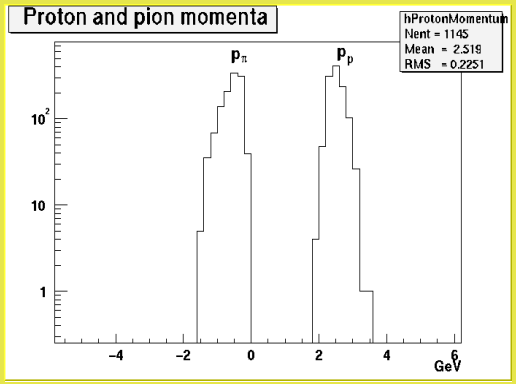


To tune my cuts, I threw 50k 3GeV Λs through the MRS:

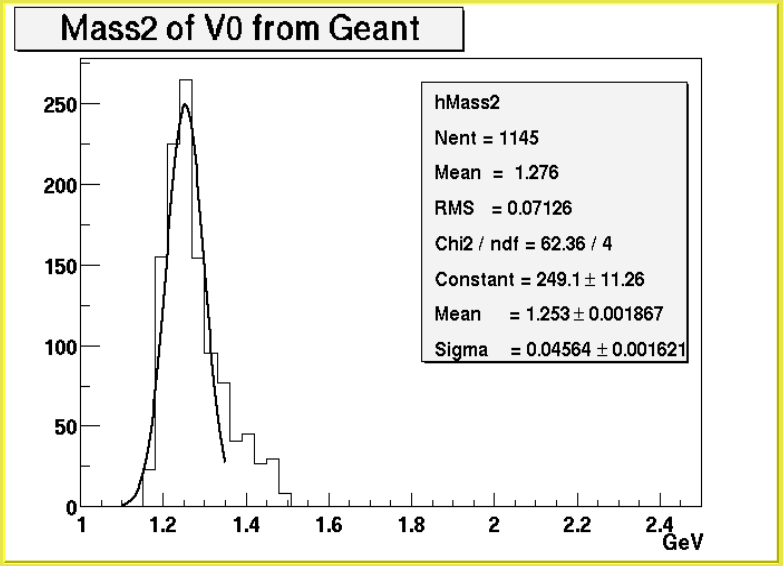


1) I find the decay products...

2) ...with more or less reasonable momenta...



3) ...and it's a hit!



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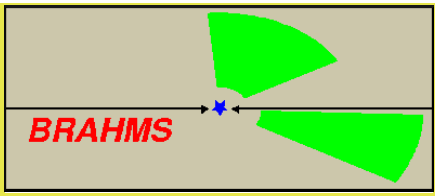
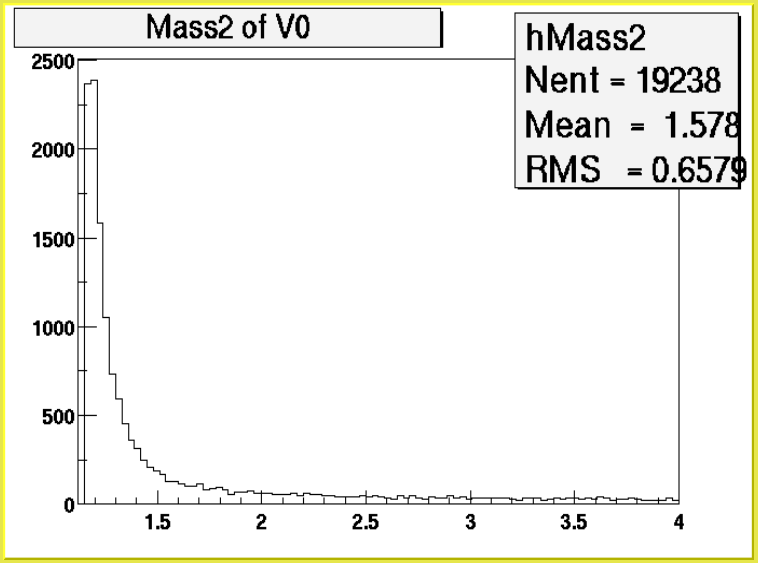
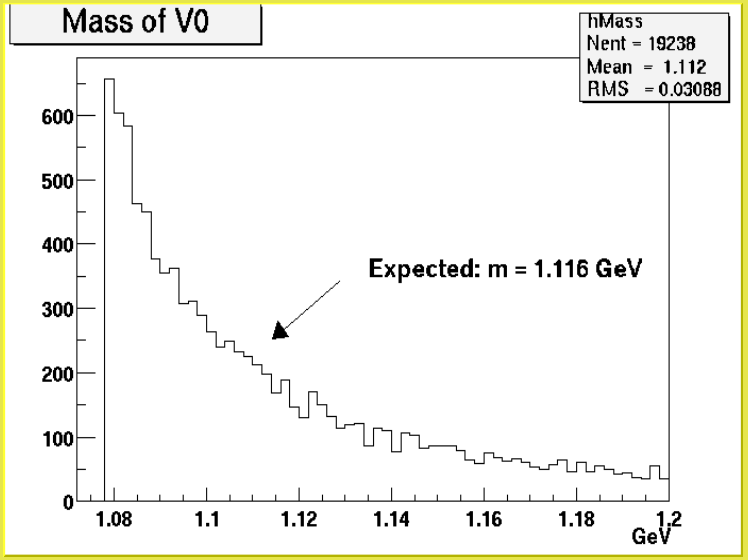
V0s in the MRS







...but no luck yet for real data.

Coming:

- m^2 spectrum from mixed events
- more and better tuned cuts
- more statistics

...so stay tuned!

–Elin and Bjørn

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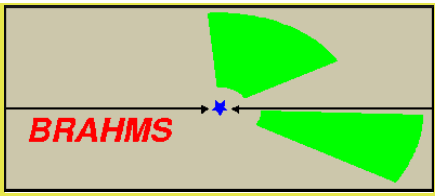
dN/dη from TPM1



Results:

1. 130 GeV (from last year...)
2. 200 GeV: η = 0, η = 1
3. 19 GeV: η = 0

Algorithm:

- Local tracking in TPM1
- Driftvelocity: 1.7 − this may be wrong!
- Find vertex from Bb
- Set acceptance cut in ϕ and η, where the η cut is made as a function of z keeping Δη constant
- Project tracks back to the beamline and see how much they miss the vertex
- Use this spectrum to find background correction − includes scatterings, secondaries etc.
- Correct for tracking efficiency as a function of the number of clusters in TPM1

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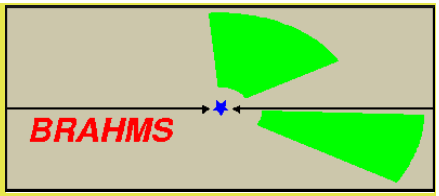
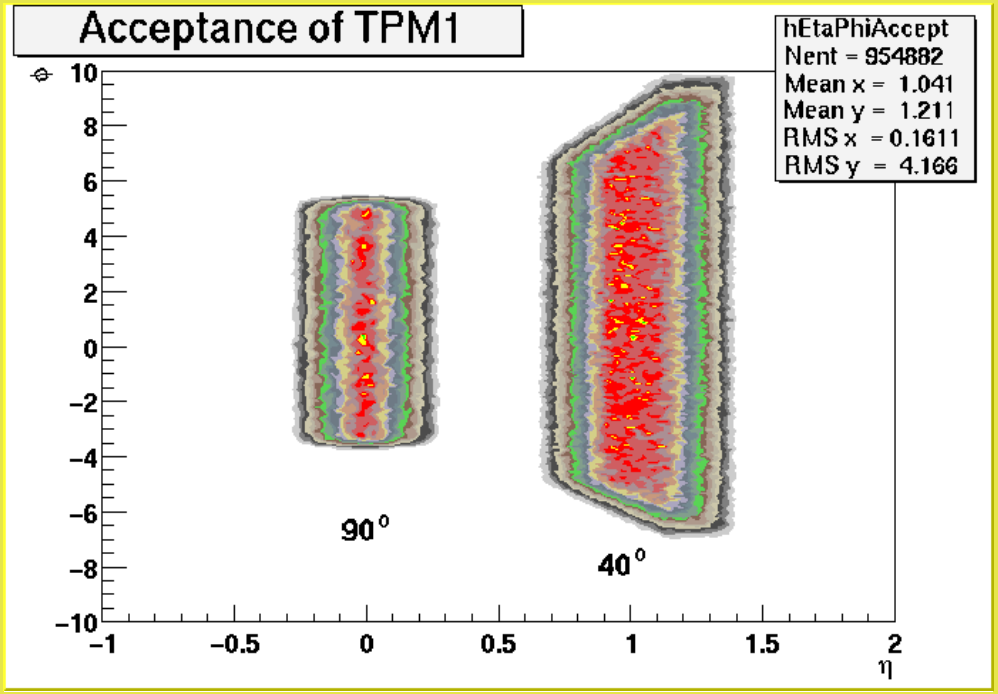
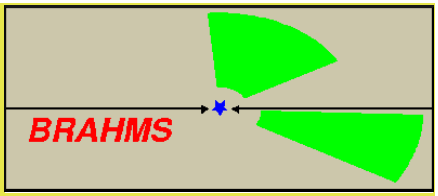
dN/dη from TPM1



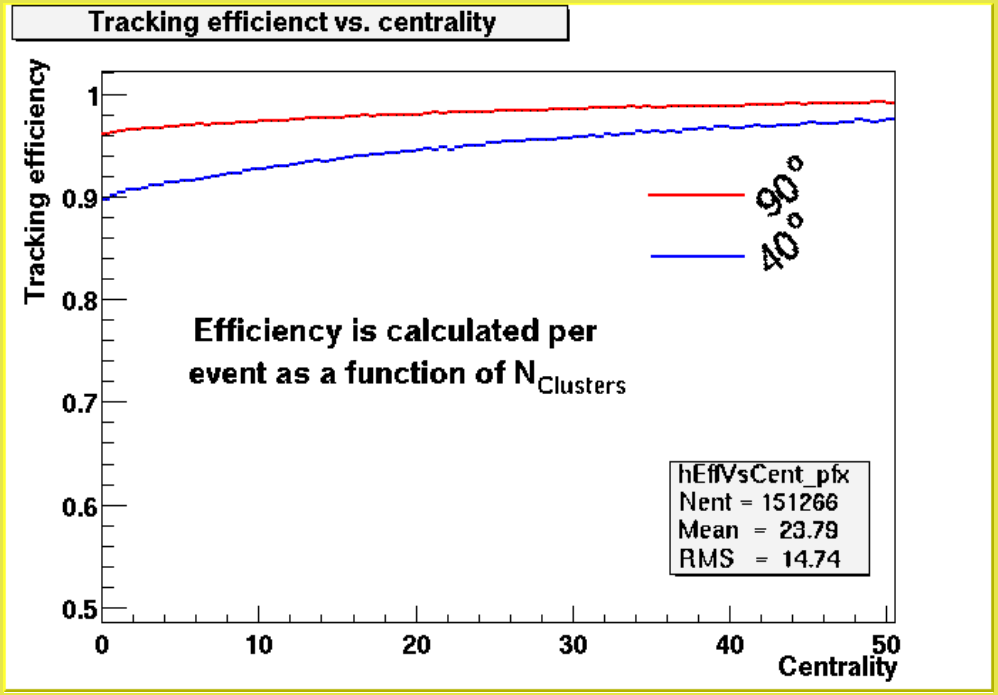
Geometrical acceptance:



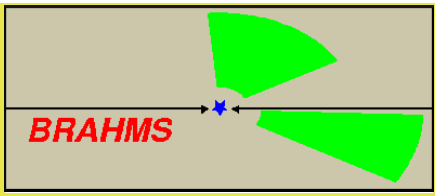
dN/dη from TPM1



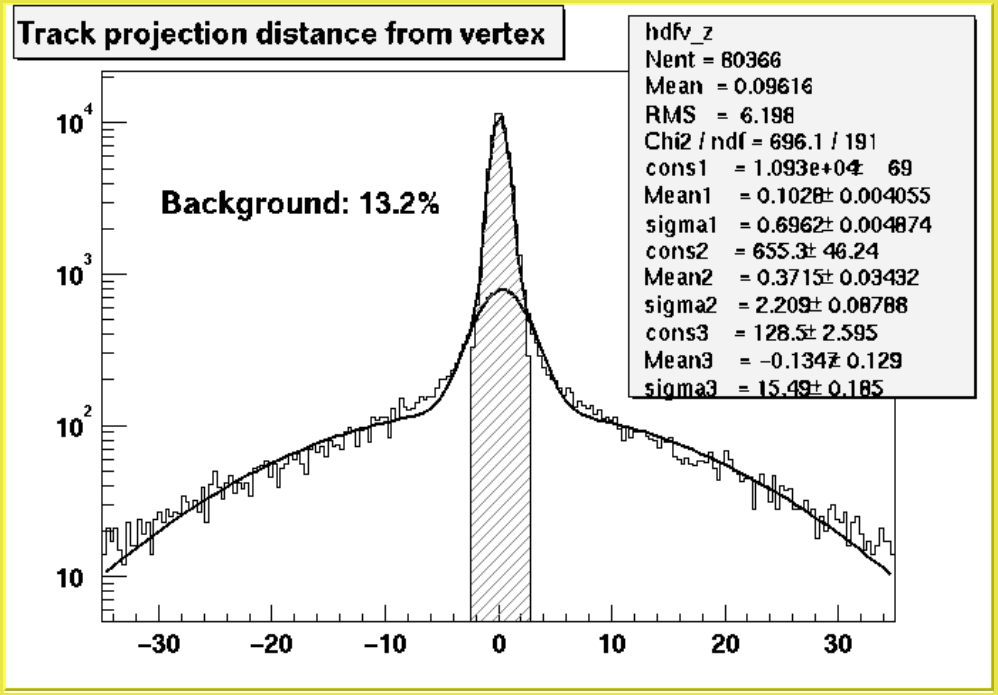
Tracking efficiency:



dN/dη from TPM1



Background correction: (90 deg)



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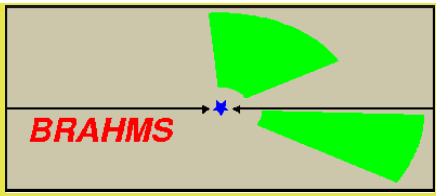
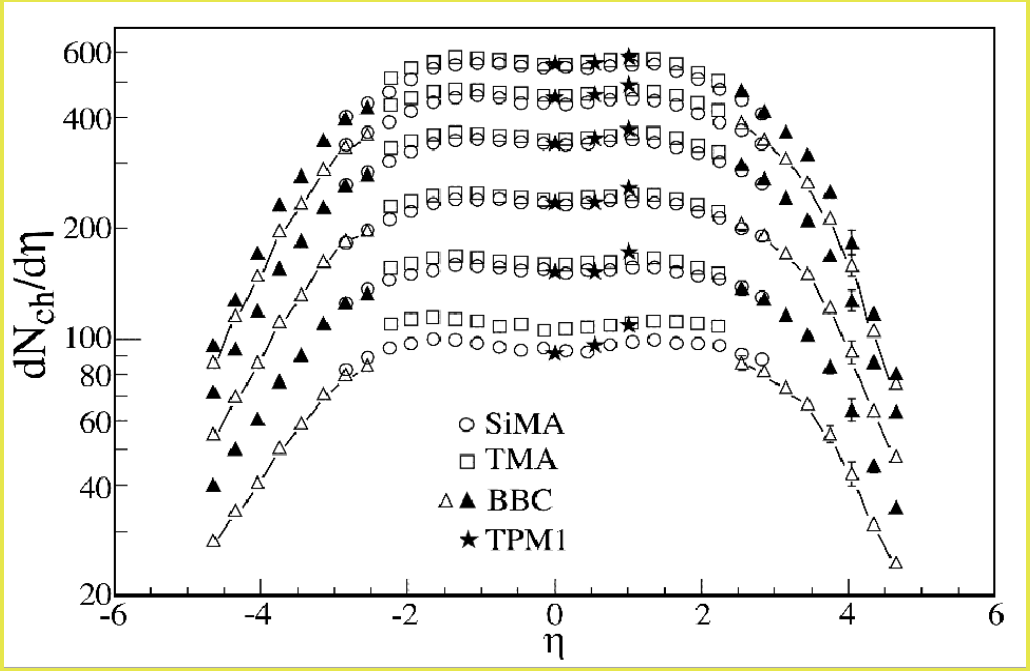
dN/dη from TPM1



130 GeV analysis:



Phys. Lett. B 2001, 523:227–233

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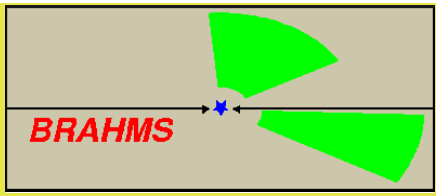
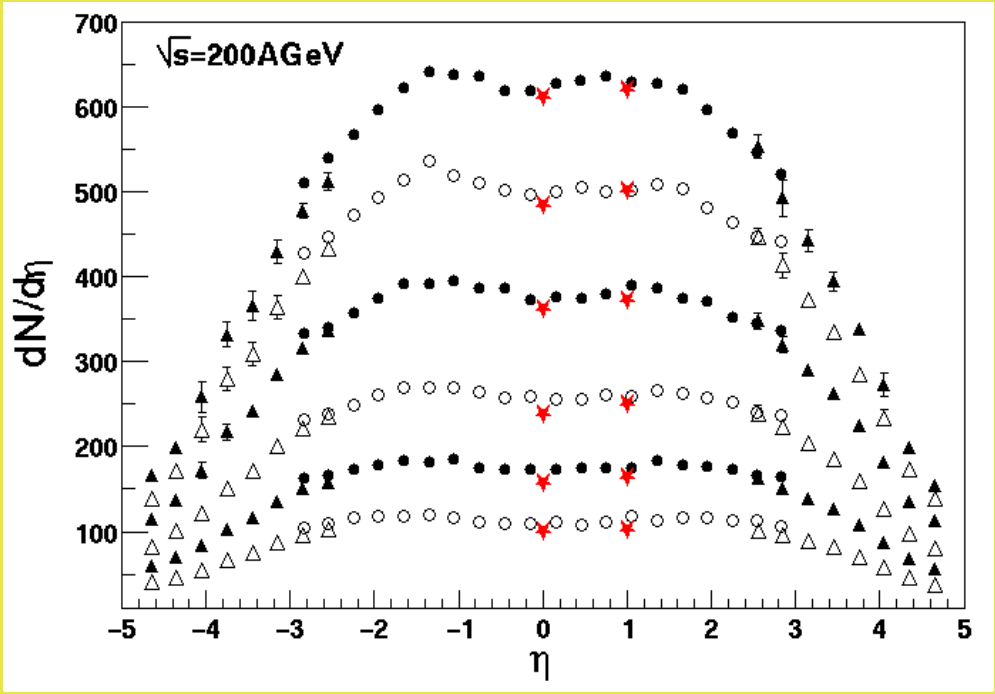
dN/dη from TPM1



200 GeV analysis:



PRELIMINARY

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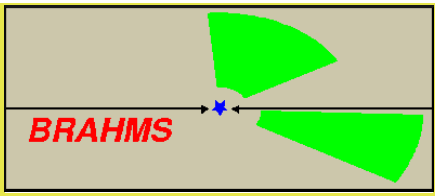
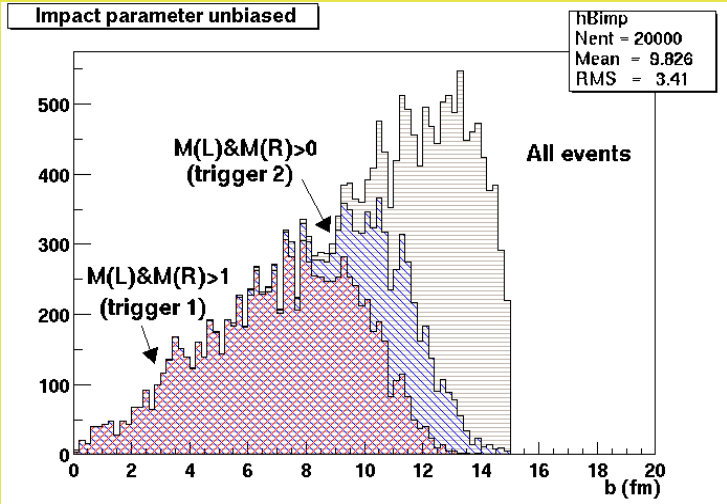
dN/dη from TPM1



19 GeV analysis − here I have a few problems...

1. I need a good vertex, but neither BB nor ZDC are efficient at this energy. BB is "not too bad" though, so I'll use that and try to understand its behaviour:



This is from geant...

So, if I demand a hit in both left and right BB arrays (= trigger 2, incidentally) I see 63% of the crossection AND I can assume that BB is 100% efficient for 0−5% central events.

2. I need something that picks out the 0−5% most central events, and this turns out to be harder.

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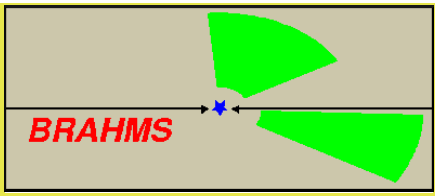
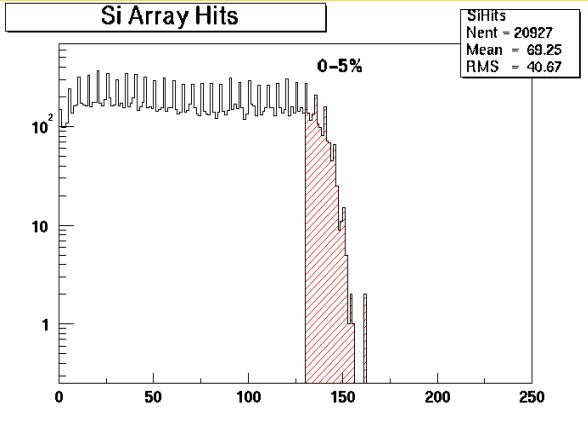
dN/dη from TPM1



After much ado and discussions with Steve, I select events by cutting on SiHits. This is the only response that looks "nice" (has a knee, no slope on the "Min"Bias) and also the one that gives the largest dN/dη.

Top 5%:

N_{events} = 20927 / 0.63 * 0.05 = 1660



dN/dη = 265±7(stat)

Top 100 events:

dN/dη = 293±34(stat)

For comparison:

For 5% central PbPb data at 17GeV:

dN/dη = 344

(Nucl.Phys.A661:45−54, 1999)

...so I'm open to suggestions.

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