Spectrometer energies revisited

- Re-analysis of 2000 fills, with full BPM span
- Ways to distinguish the more reliable BPMs
- Preliminary results with proposed prescription

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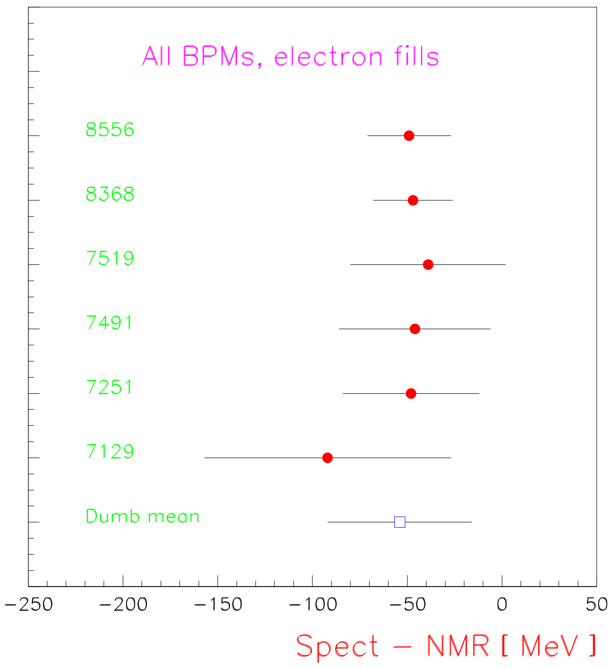
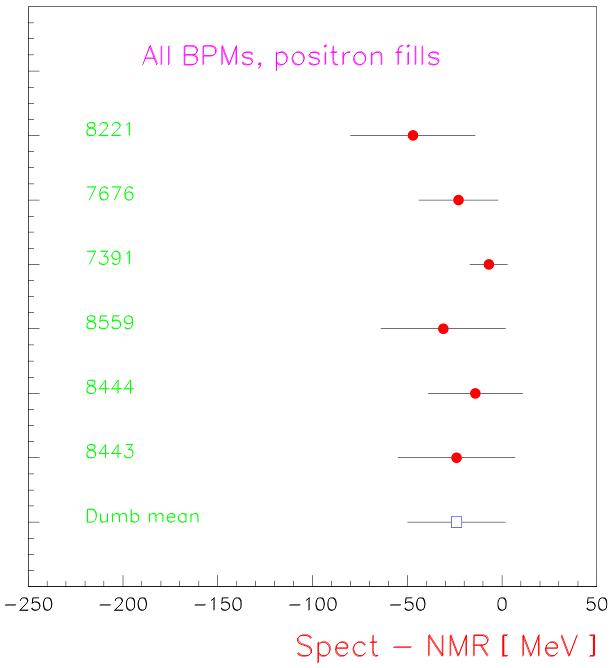
2000 results, using BPMs 1 & 3, 4 & 6

Spect-NMR for 50 $\longrightarrow$ 90 GeV, with cross-talk & ambient field corrections. Look at e^- & e^+ separately (sawtooth!)





(All fills included apart from: 7380 – very badly recentred; 8224 – anomalous behaviour; 7835, 7931, 8566 – lack of time)

Biased estimators: but which is more trustworth?

Now for ALL these fills the uppermost energy estimate comes from using inner BPMs, and the lowermost estimate from the outer BPMs. Which combination has least bias w.r.t. $\mathrm{E_b}$?

- Spectrometer - NMR comparison at low energy
  Compare results from outers and inners with NMRs at low energy (fills 7129, 7251, 8368, 8443, 8444).
- Determine sign of bias
  See how bias evolves towards inners or outers (fills 8368, 8443, 8444, 8556).
- Magnet constrained fits
  Spot bad BPM(s) fill by fill.

Clear result from first 2 methods, ambiguous from 3rd

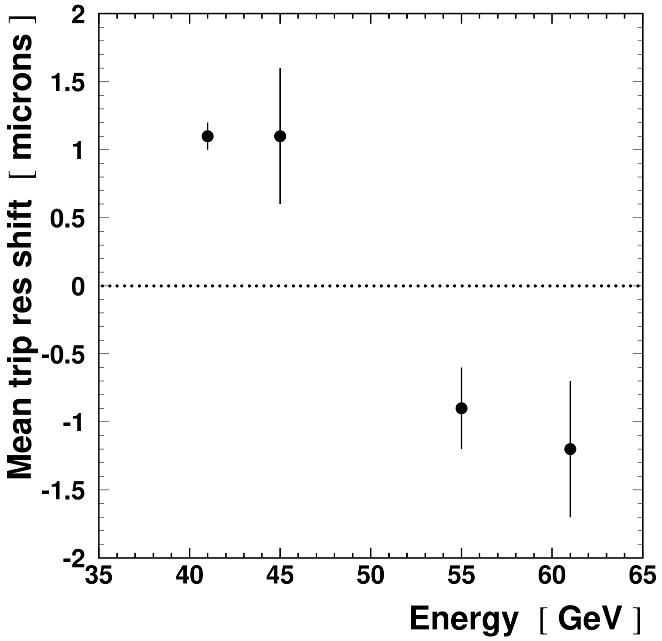
$\longrightarrow$ inner BPMs are better estimators of E_b !

Possible way to proceed:

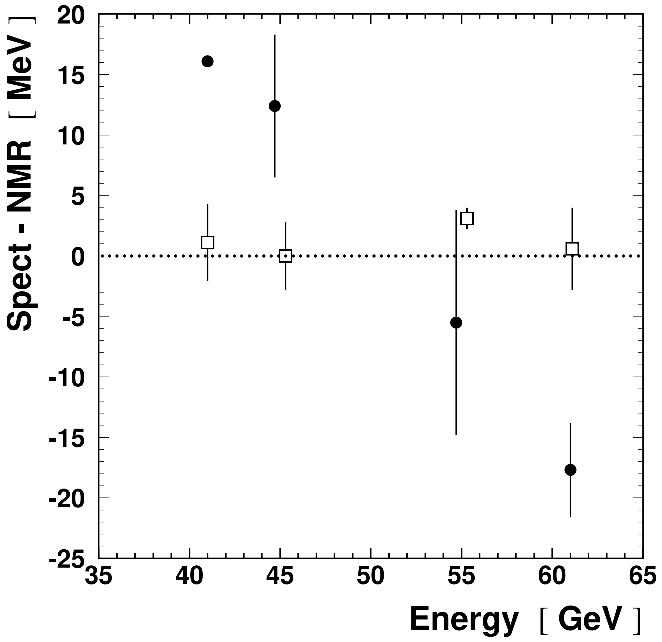
Use estimate from inners, & reduce BPM error by half, since energies spanned by lower half of old error bar now excluded

Spectrometer - NMR agreement at low energy

In fills with measurements at 41 $\longrightarrow$ 61 GeV, there are significant triplet residual shifts...



Compare inner BPMs (open squares) and outer BPMs (closed circles) estimate of energy change w.r.t. 50 GeV



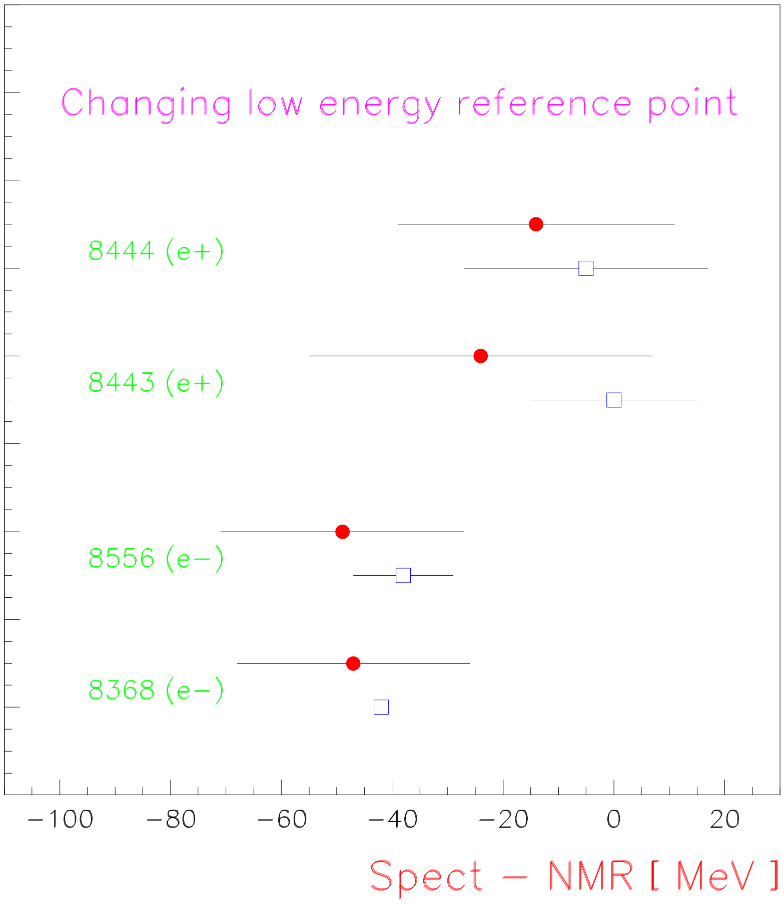
Clear result $\longrightarrow$ inner BPMs compatible; outer BPMs are biased

Raising reference point to reduce bias

4 fills have measurement at 60 or 55 GeV, aswell as 50 GeV:

- In all cases triplet shifts $55/60 \longrightarrow 90$ GeV are less than $50 \longrightarrow 90$ GeV
- Thus normalising to $55/60$ GeV will give less biased result

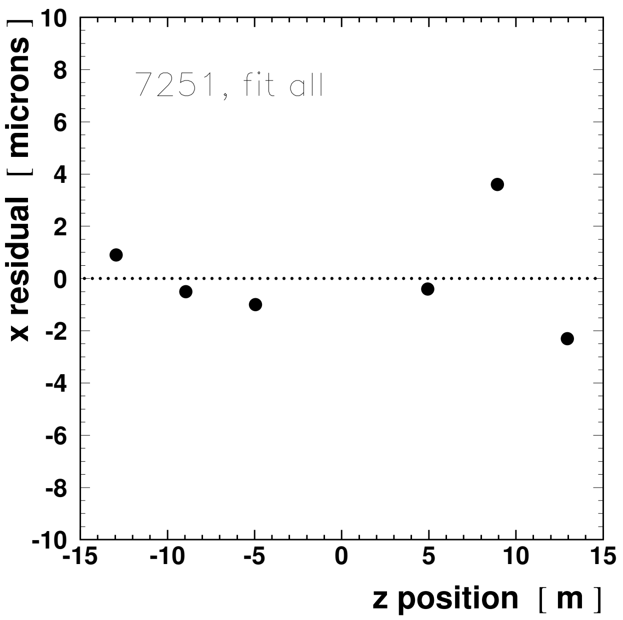
Study change in result from 50 GeV (closed circles) to 55/60 GeV (open squares) reference:

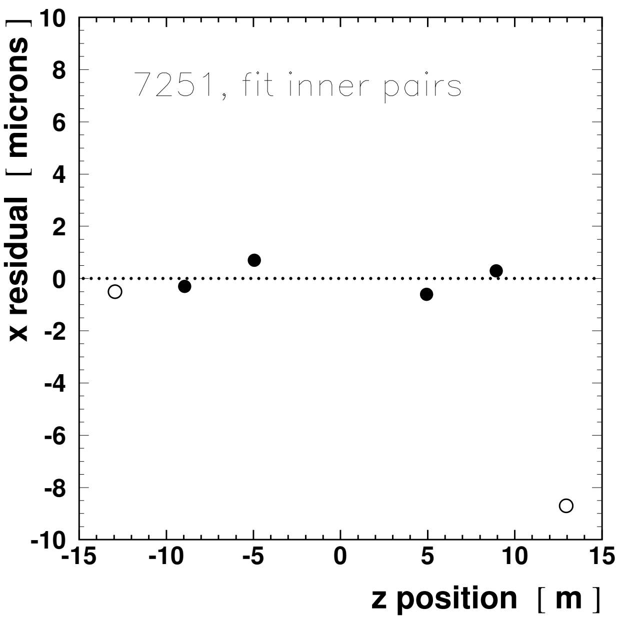


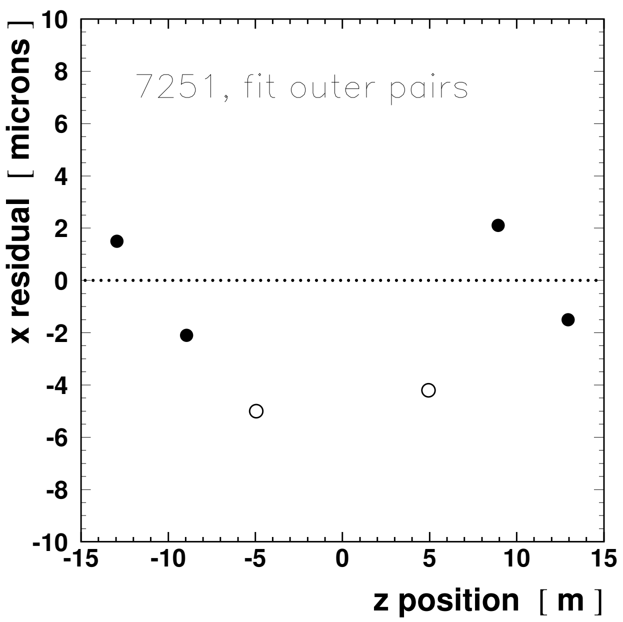
From changes in results conclude inner BPMs are more reliable

Inconsistency in magnet centre constrained fits

Some fills indicate very plainly that inners are more reliable:



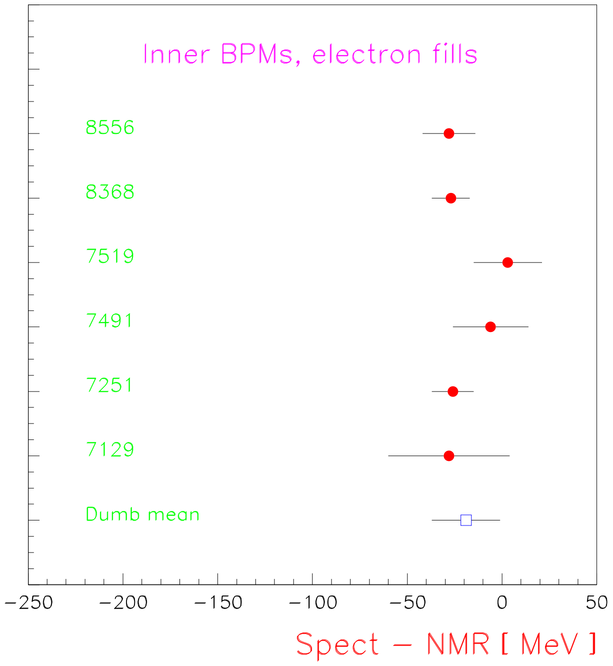


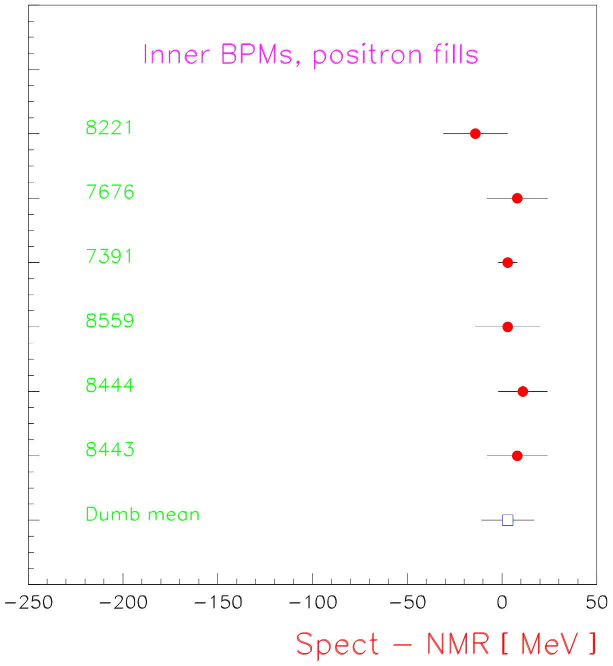


But other fills inconclusive, and still others suggest contrary result! As all fills have identical behaviour in other respects, we know that this cannot be... Needs more work

2000 results, using inner BPMs

Re-evaluate energies with new prescription:





Result lies around -10 MeV, with $\sim$ 15 MeV BPM error bar

Electron/positron splitting $<$ 25 MeV. This is not incompatible with 2×10 MeV error on sawtooth model.