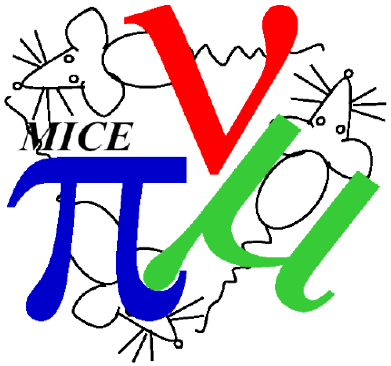
MICE Descope - Options



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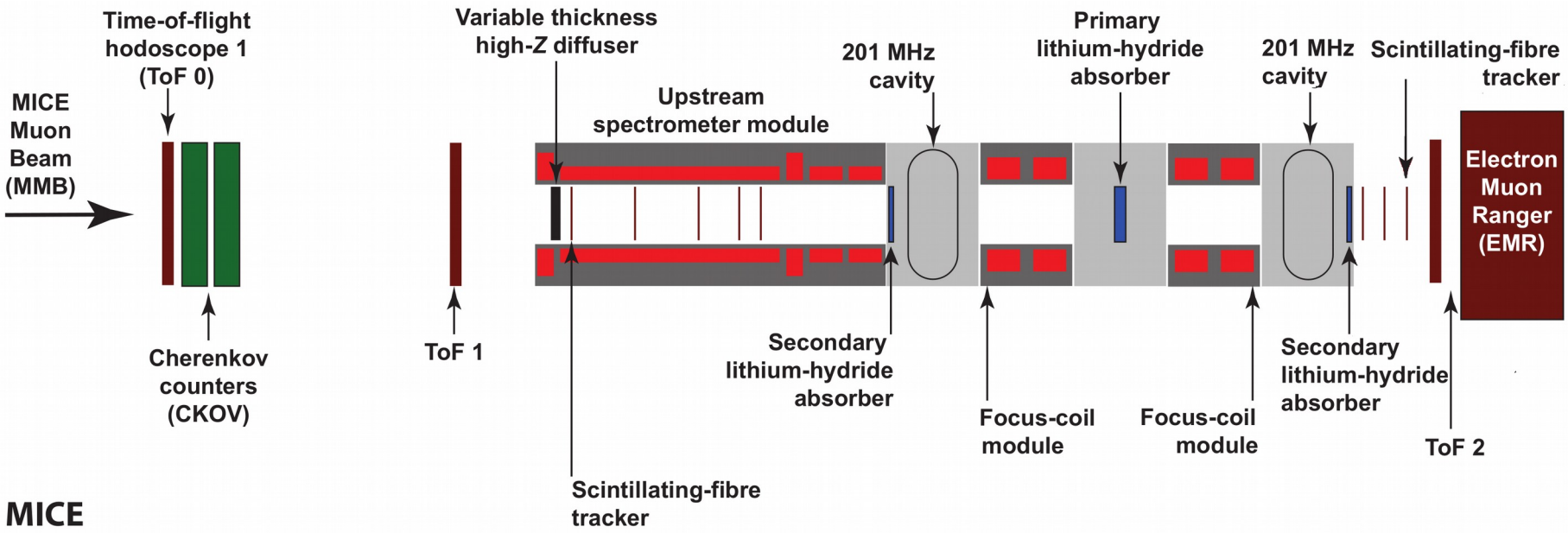
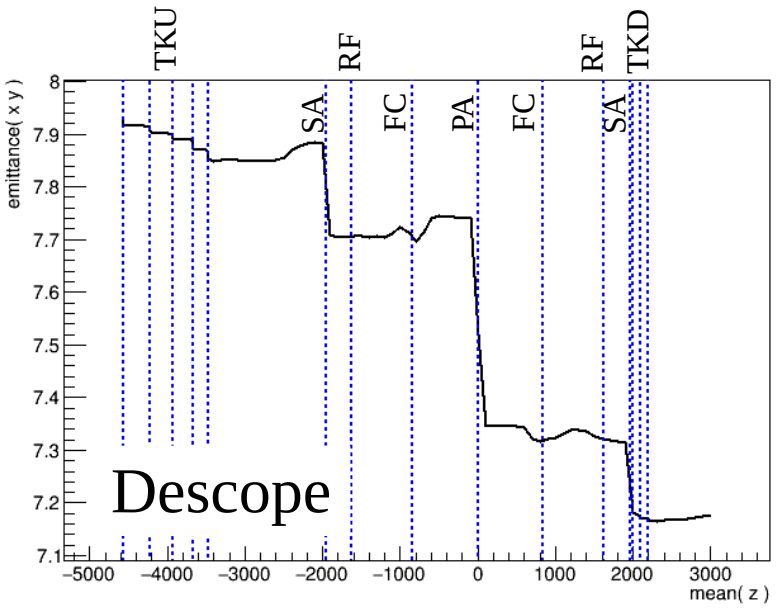
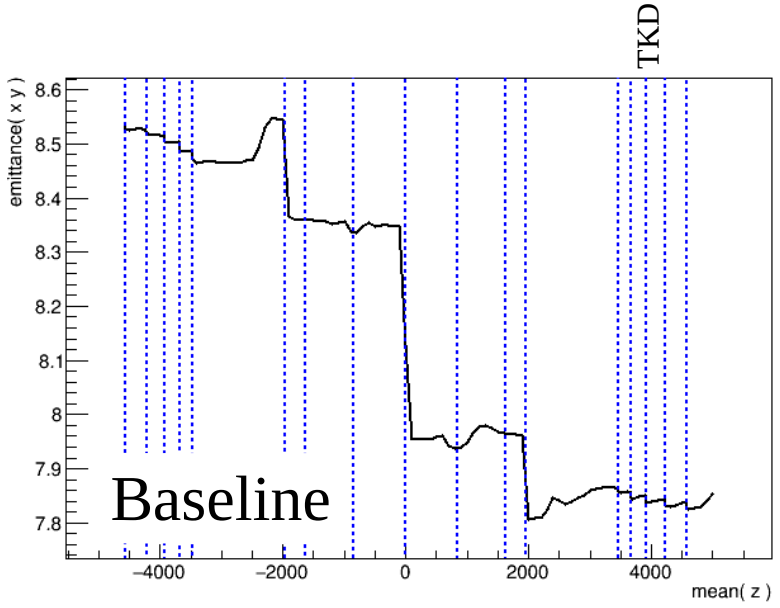
ASTeC Intense Beams Group
Rutherford Appleton Laboratory

SS2 in upstream position



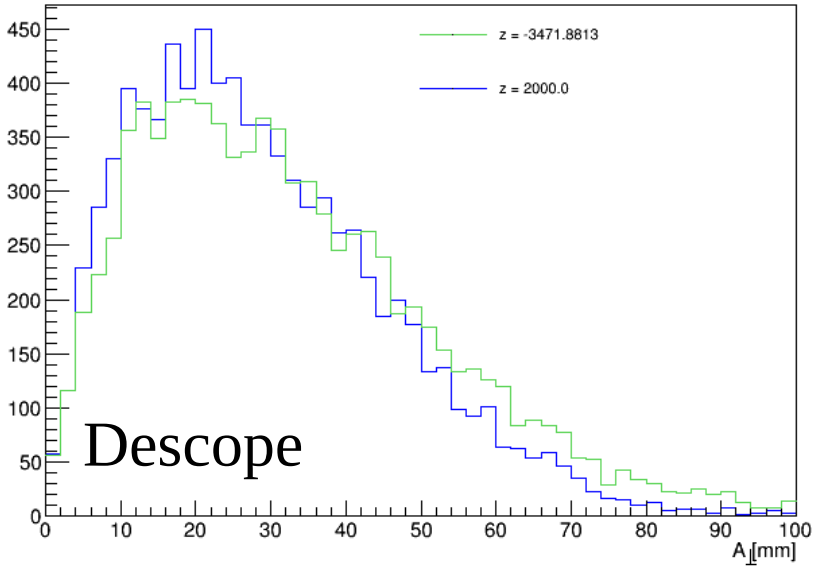
Emittance Reduction

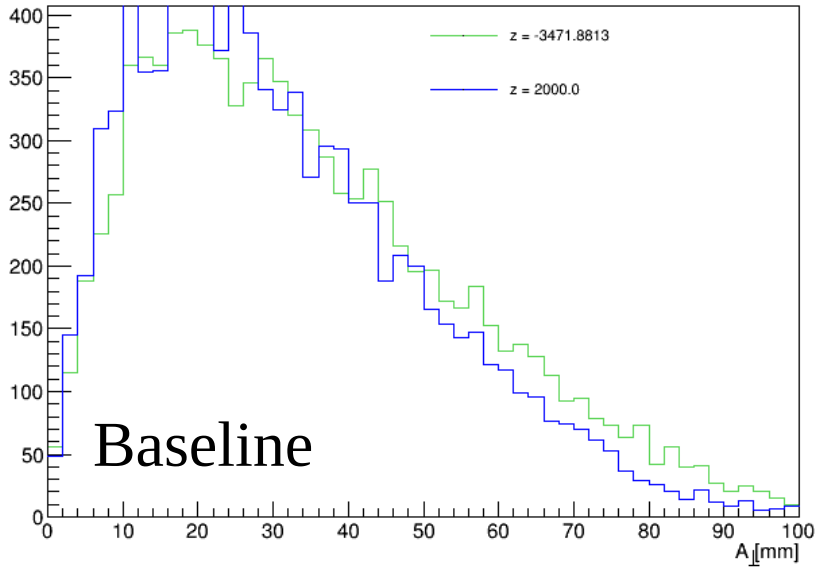




- Fixed geometry bug resulting in no D/S secondary absorber
- See expected good emittance reduction in upstream region, after scraping
- Transmission in descope – 85 %
- Transmission in baseline – 91 %
- Nb this is for initial beam emittance 10 mm nominal

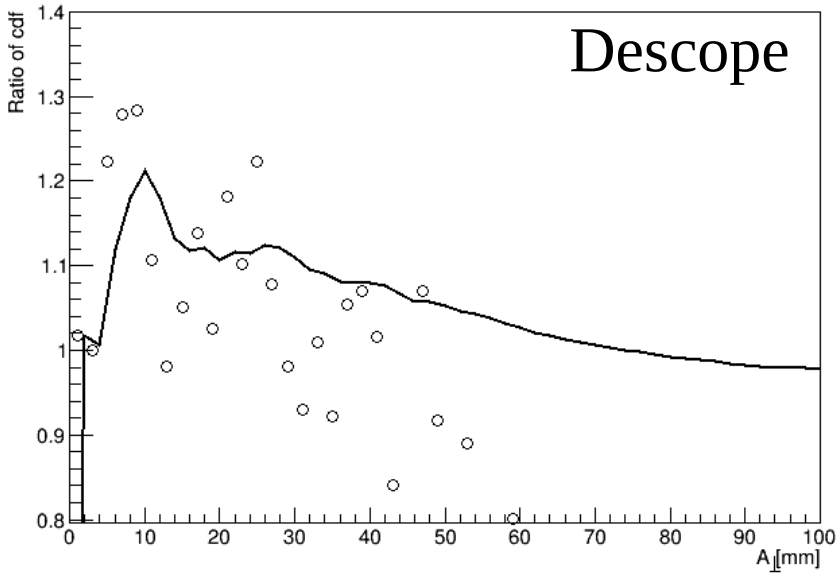
Amplitude change

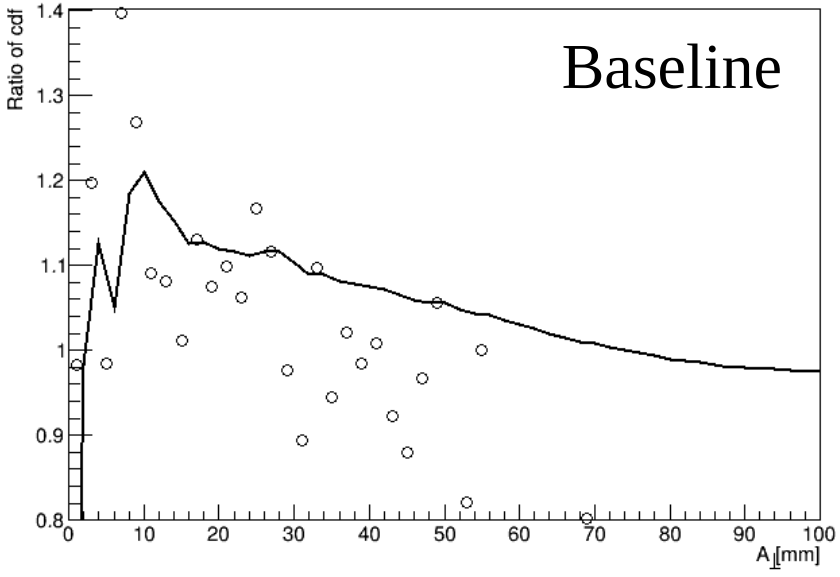




- Number of muons in each amplitude bin
  - Green – upstream
  - Blue - downstream

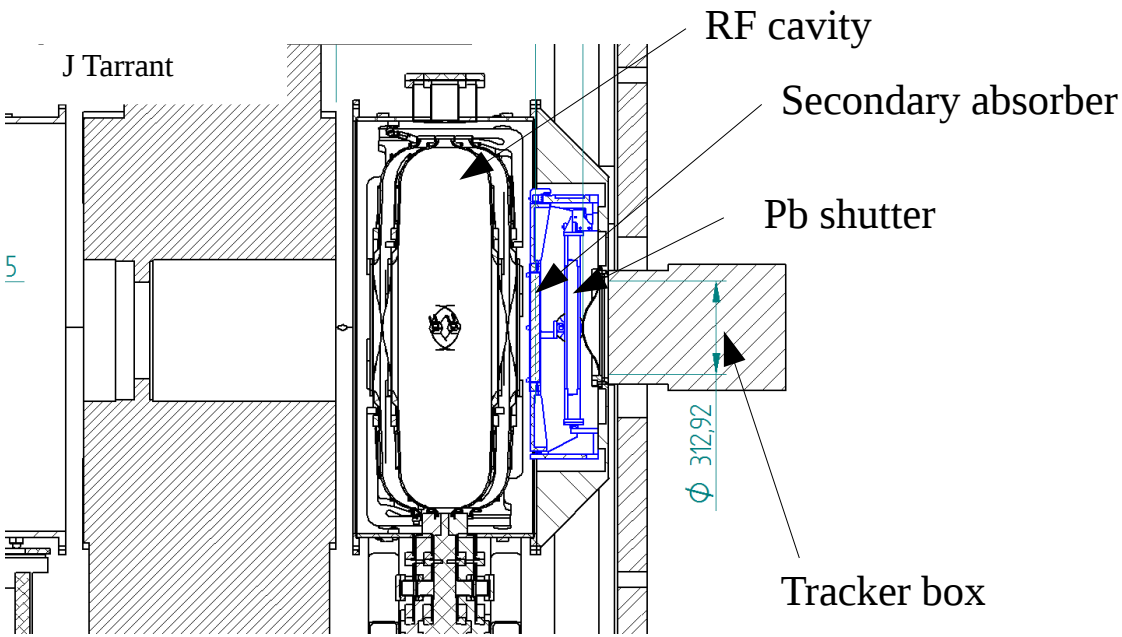
Ratio





- Histogram
  - Consider the number of muons in each amplitude bin, n
  - Histogram is n(downstream)/n(upstream)
- Line
  - Consider the number of muons with amplitude <= bin edge, N
  - Line is N(downstream)/N(upstream)

Combined fit - geometry

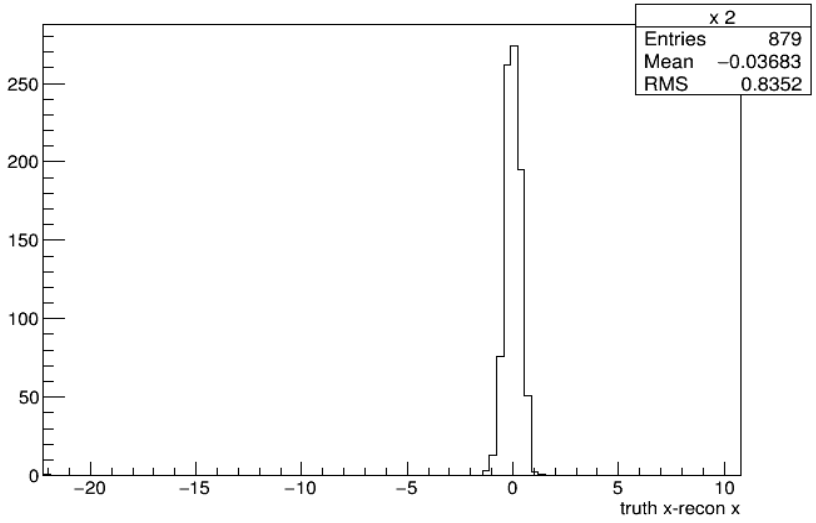


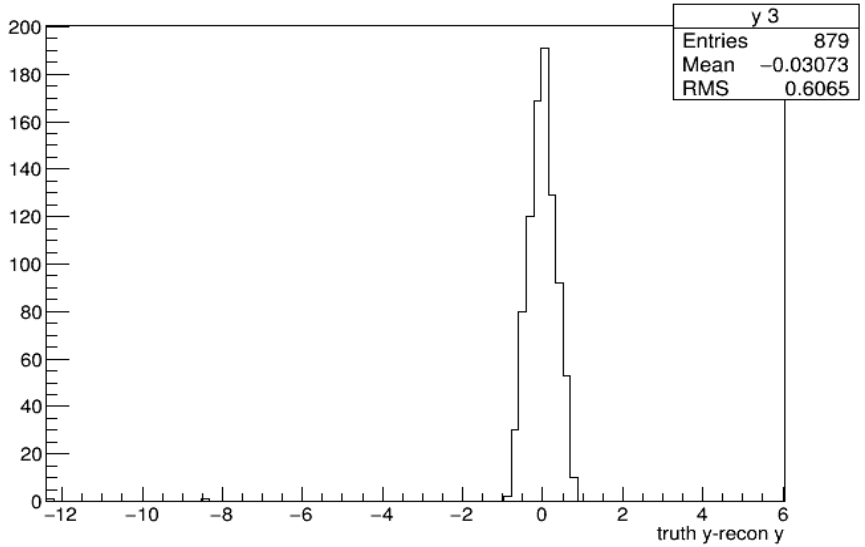
- Tracker is assumed to sit in air (not He)
  - No window simulated downstream of tracker
- Tracker stations at z = 2000, 2100, 2200 mm
- TOF2 at z = 2250 mm
  - Probably a bit too close to tracker, but it doesn't really matter
- EMR at z = 3000 mm

Combined fit - algorithm

- Use x, y from TKD station 1
- Use x', y' calculated from TKD station 1 and station 2
- Extrapolate EMR track (incl x', y', x, y at EMR) back to tracker
  - Use Bethe Bloch formula to “undo” energy loss in TOF, air
  - Step size 1 mm
  - Use extrapolated total momentum to scale x', y' and deduce pz
- KL is excluded for now
  - Very useful for measurements that do not require good pz
- Do not model: cross-talk in EMR, RF-induced backgrounds
  - Not sure about tracker efficiency model
- Plots that follow are for 10 mm emittance, 200 MeV/c beam shown in earlier slides
  - Nb: do not expect dependence on emittance/pt
  - Nb: do expect worse performance for low pz

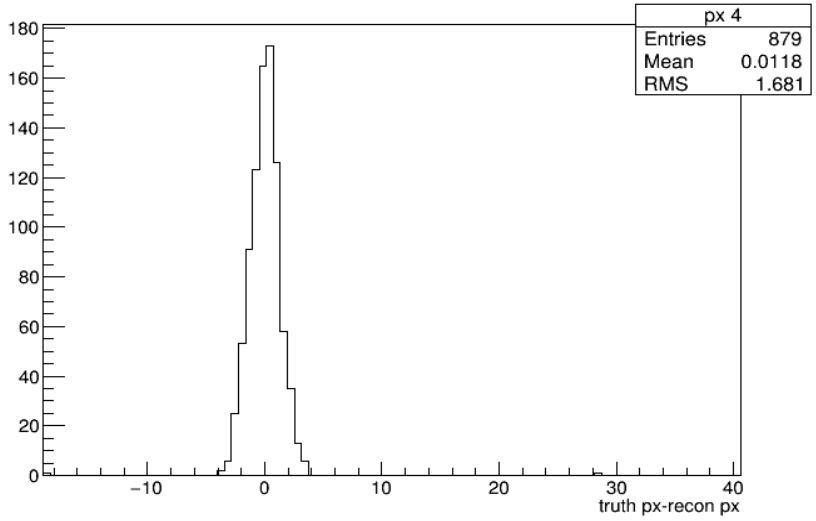
Combined fit - position

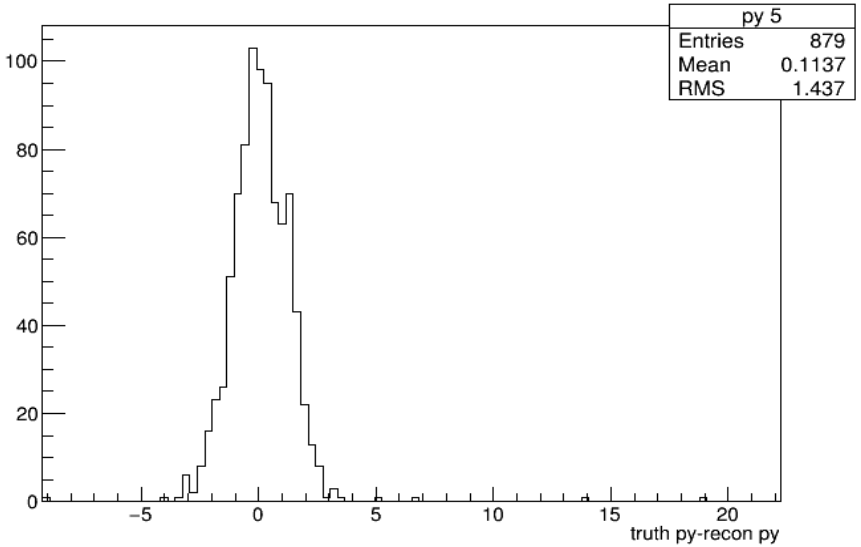




- Position width is ~ consistent with tracker fibre pitch
  - Where do tail events come from?

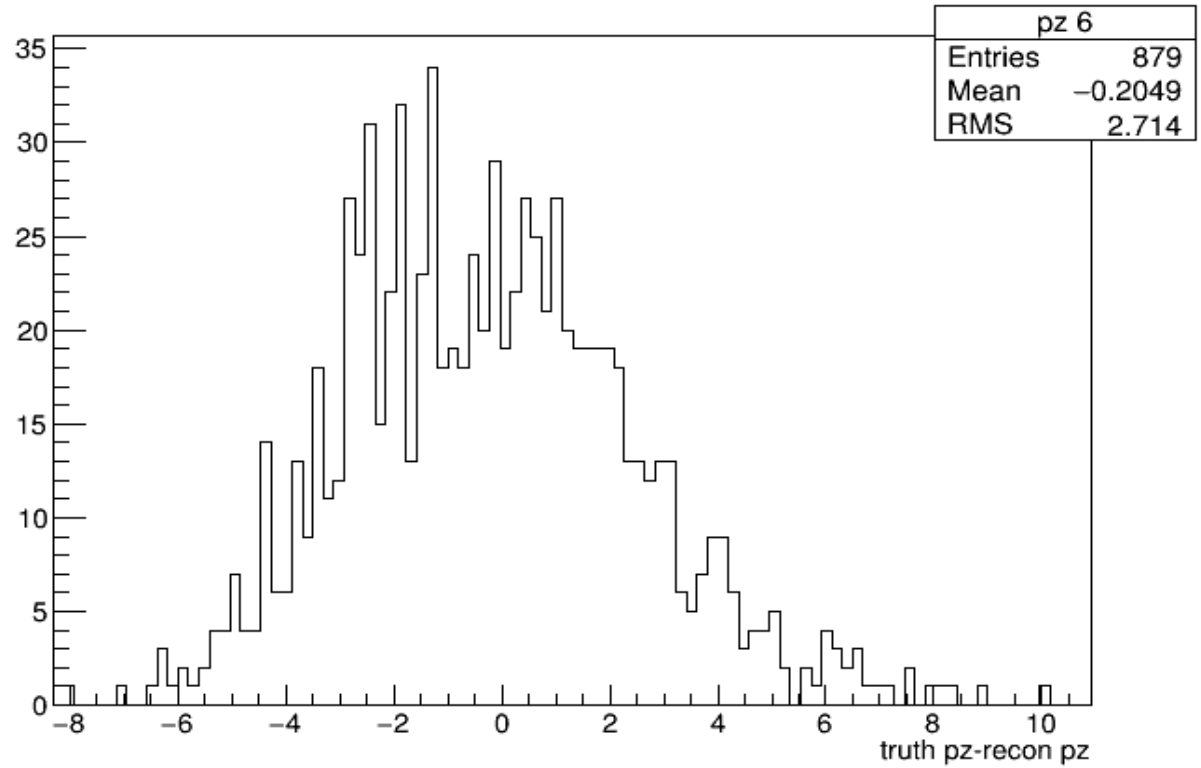
Combined fit - transverse p





- Px/Py fit looks good

Combined fit - pz

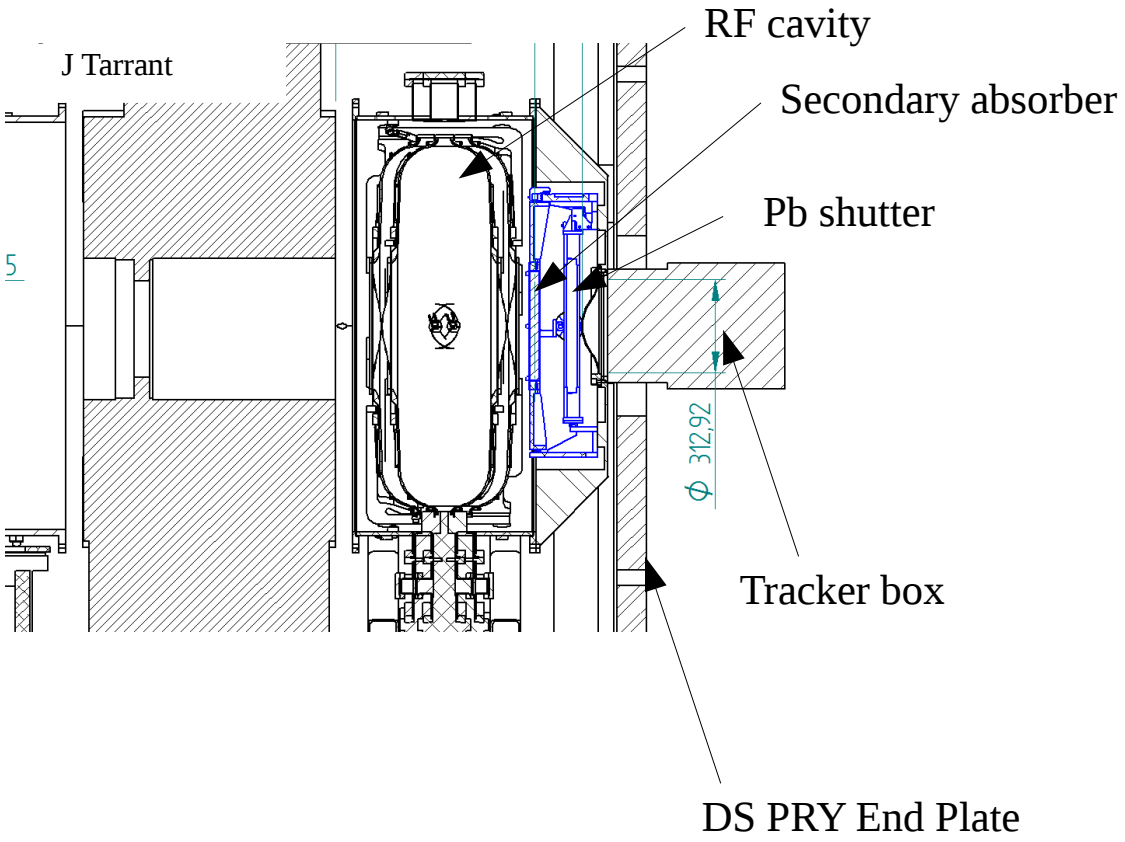


- Pz fit looks good
  - A bit better than expected!

Engineering and geometry

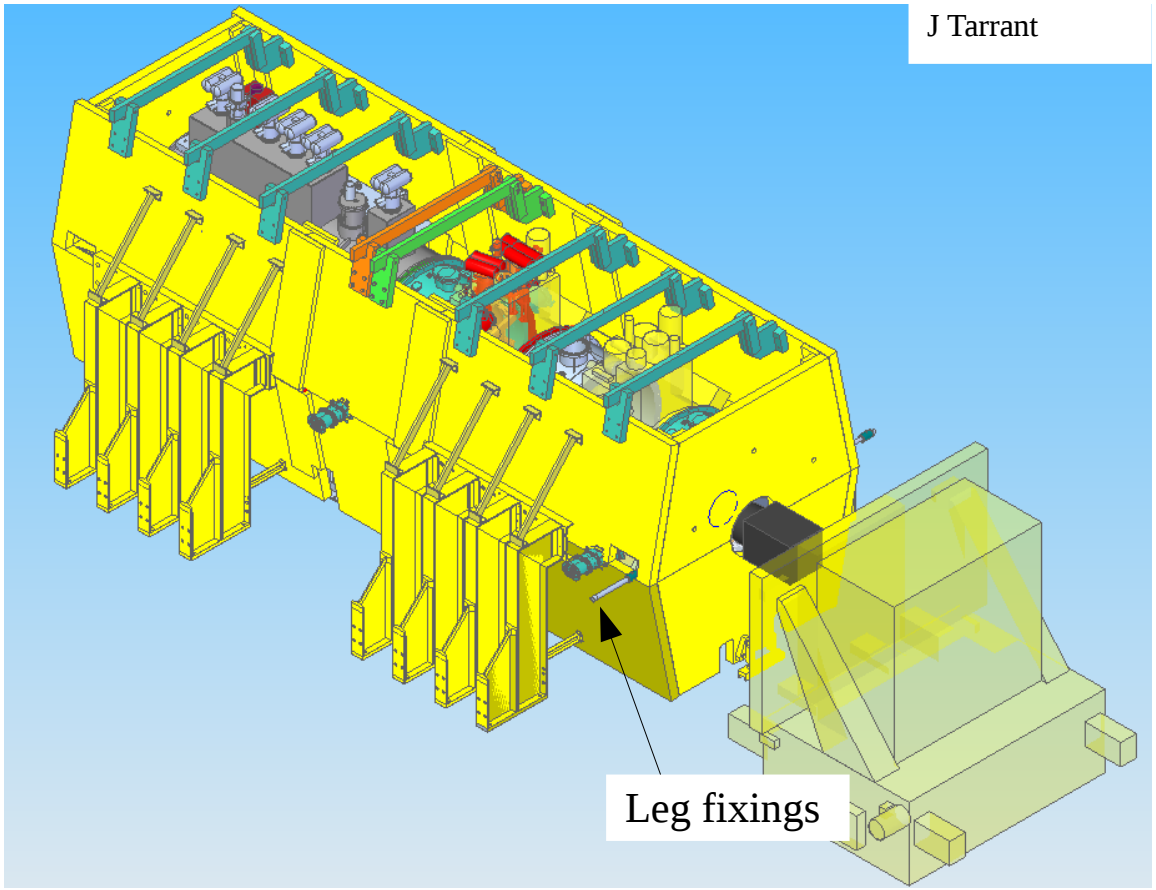
- Assume RF cavity requires tuners in downstream position
- Assume require lead radiation shutter
- Use lH2 window for vacuum seal
- Issues:
  - Need to move downstream PRY end plate d/s by 55 mm
  - Interference with leg fixings for PRY and feedthroughs
  - Vacuum window is > 2081.58 mm
    - I had tracker at 2000 mm, which must be downstream of this
  - Tracker stations like spacing significantly > 100 mm
    - Need to adjust fibre runs on the tracker stations – means “ungluing” fibres

Engineering and geometry



- Need to move downstream PRY end plate d/s by 55 mm

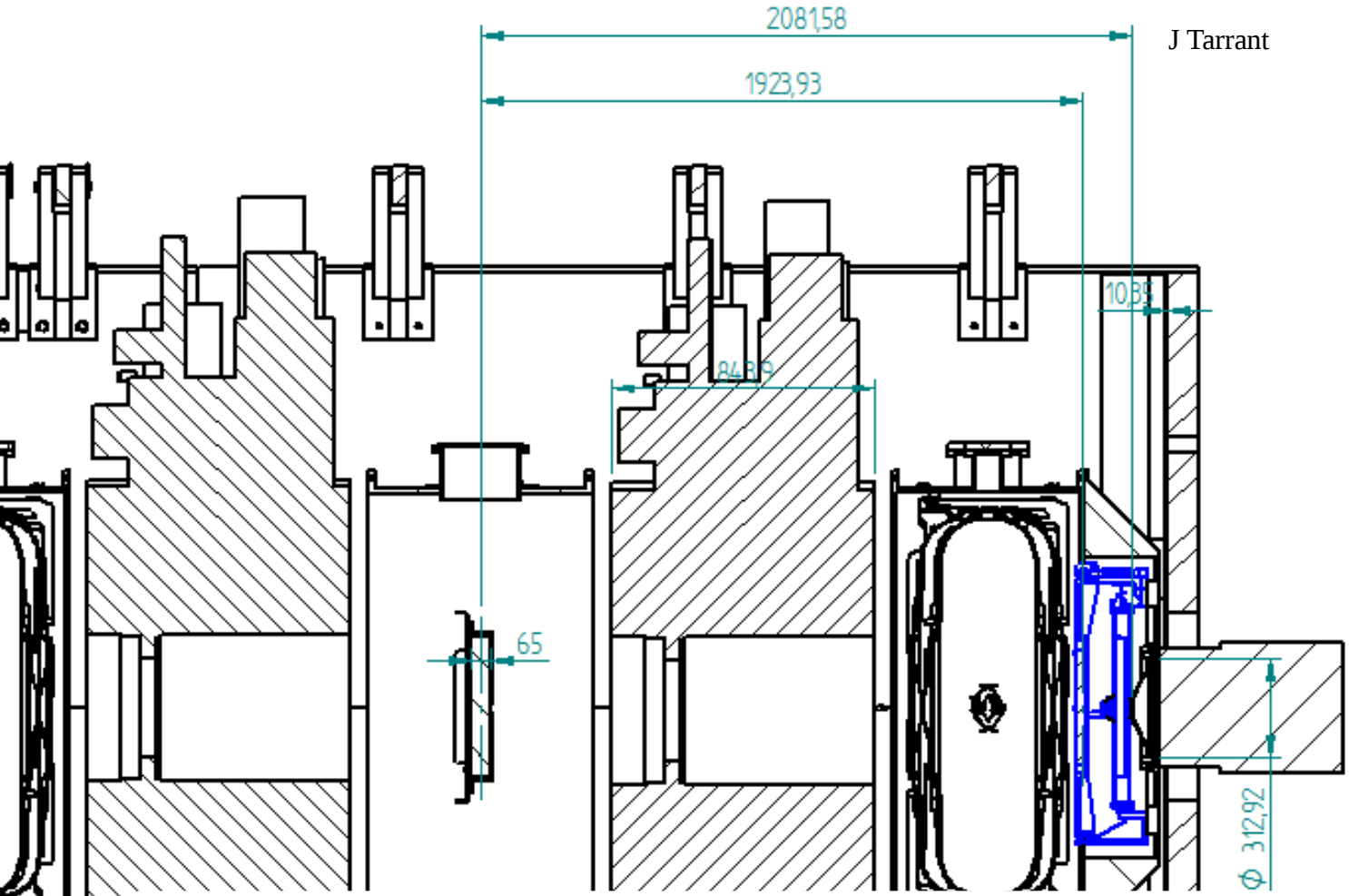
Engineering and geometry



- Interference with leg fixings

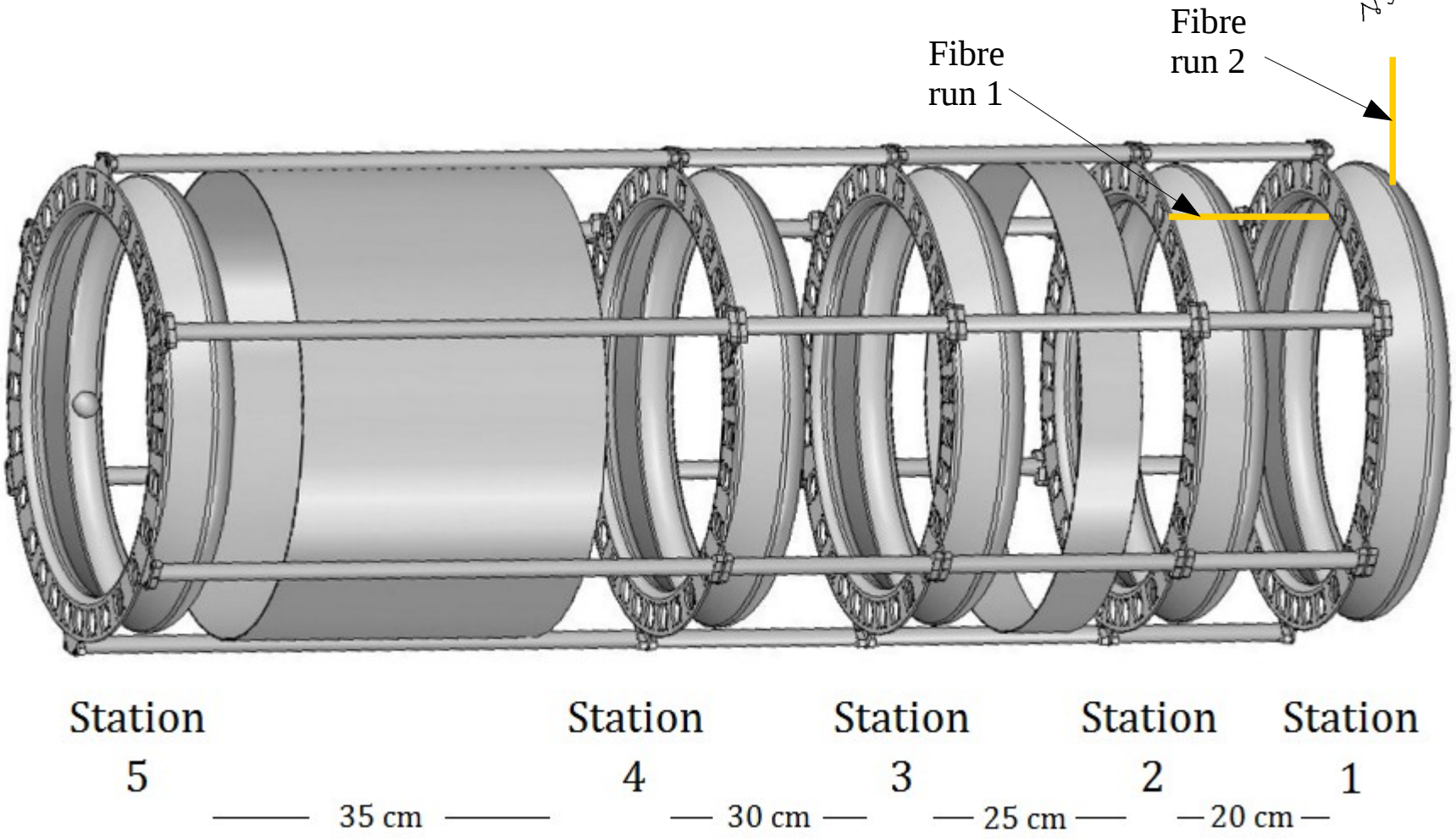
Engineering and geometry

J Tarrant



- Vacuum window intereferes with my tracker position

Engineering and geometry



- Fibre run 1 (as-built) not viable with small station spacing
- “Unglue”? And then implement fibre run 2

Engineering and geometry

- Check physics implications
  - Can we tolerate this?
  - Essential issue is excess scraping in downstream region
- Negotiatiable points:
  - Lead radiation shutters could get chucked
  - RF cavity could have tuners at upstream side of cavity
  - Unglue tracker station fibres and move plugs
  - Use BPM instead of a tracker station