Vertexing tridents

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SLAC

Inputs

- Data: golden runs, pass3 (484551 nC, 77.51 nb^{-1})
  - pairs1 trigger, filtered on all SVT flags (bias, position, burst-mode noise, header)
- MC: tritrig-beam-tri, pass2, 4962 files (24.73 nb^{-1})
- Normalize to total run luminosity (1240 nb^{-1}, very rough estimate)
- GBL tracks, unconstrained vertices
- Data-MC comparisons: black data, red MC

Cuts

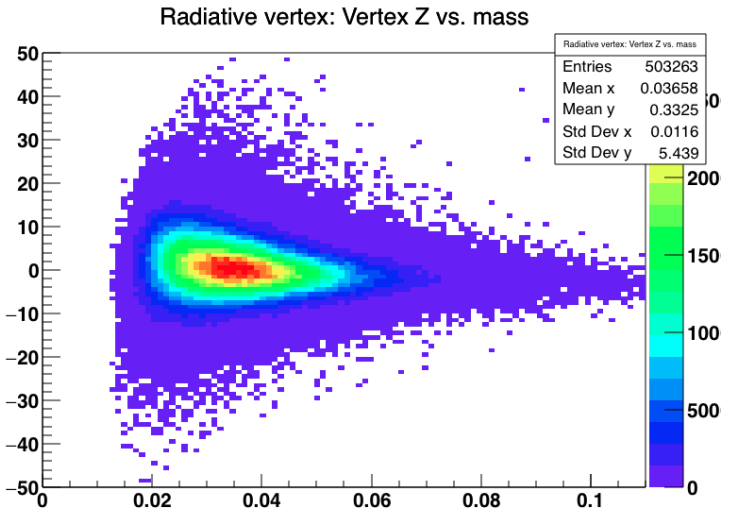
- All cuts applied in org.hps.analysis.dataquality.TridentMonitoring
- Listing only significant cuts that aren't redundant with other cuts:
  - Quality: track chi2, vertex chi2
  - Track cuts: require top-bottom, $p(e^-), p(e^+) < 0.85$ GeV
  - Radiative cut: $p(V0) > 0.8 * E_{beam}$
  - Event cut: $<=$ 5 tracks, exactly 1 positron track in event
  - Front layers: require L1 and L2 hits
  - L1 isolation: require $>$ 1 mm to nearest strip
- Haven't optimized cuts; some cuts may be unnecessary (cluster match, event cut), other cuts may be useful (GBL kinks)
- No cluster information used
- Beamspot constraint (or equivalent) will eventually be useful

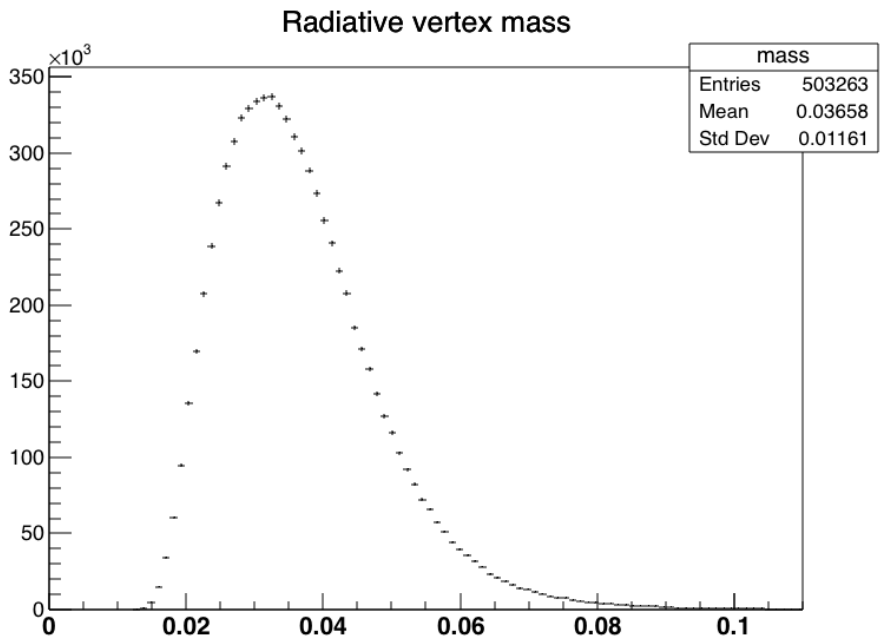
Cuts

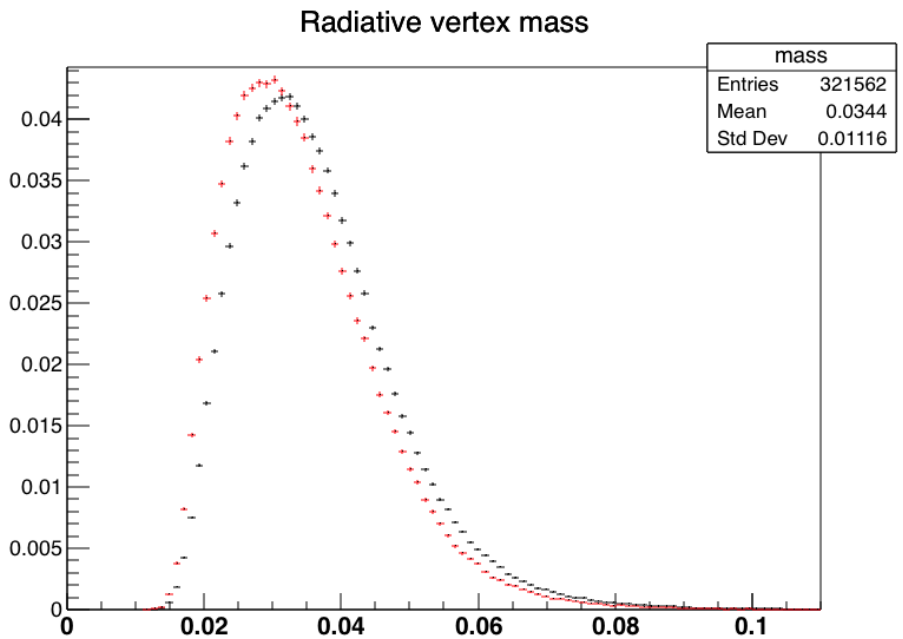
- In MC, cuts are 22% efficient; starting with triggered tritrig-beam-tri
  - 65% have a V0
  - 54% pass trident cuts
  - 66% pass vertex cuts
- In data, 59% pass vertex cuts

Vertex distributions

- I see the same data-MC differences Matt does (lower mass peak in MC, more low-energy tridents)

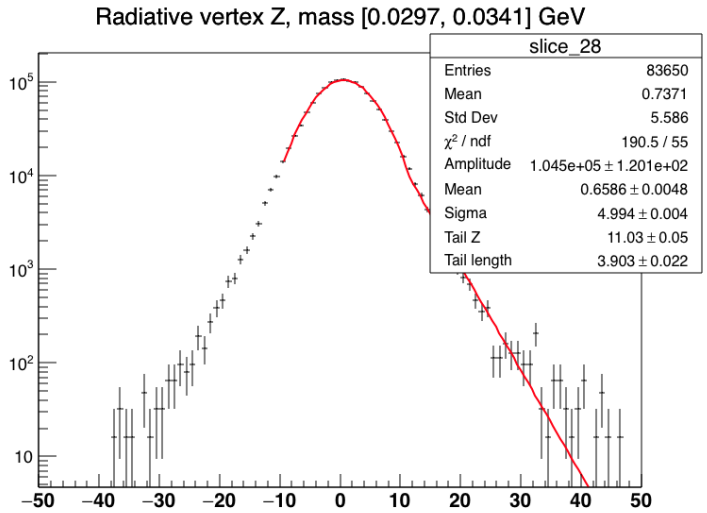


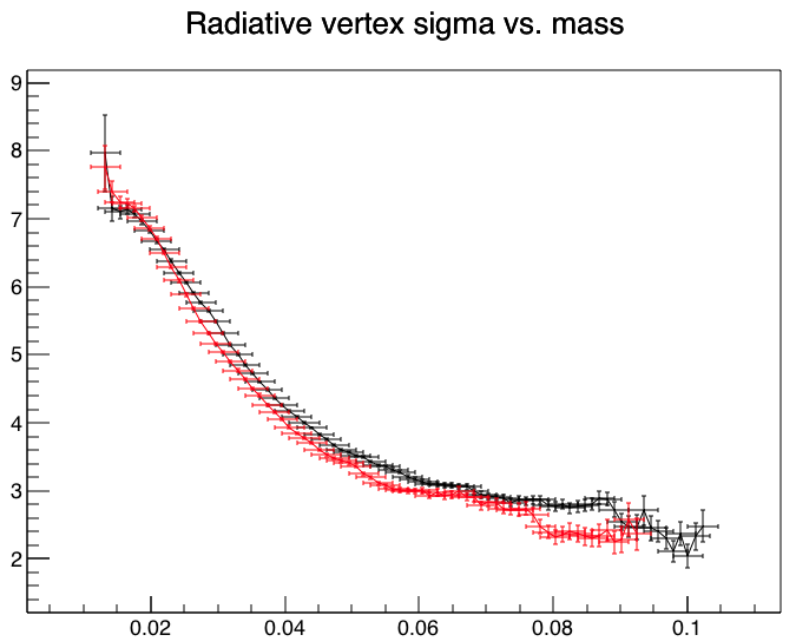


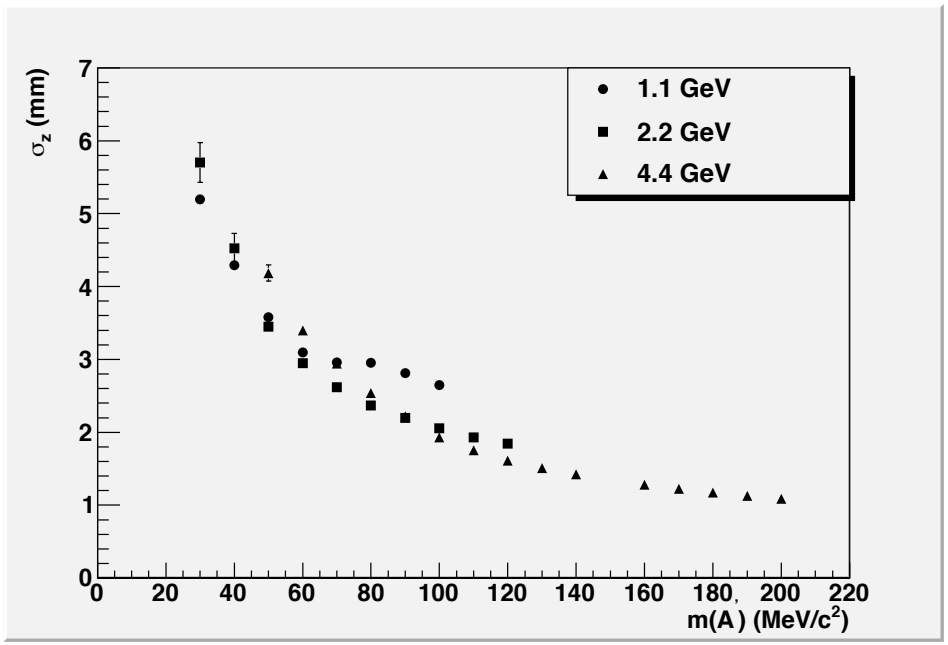


Vertex resolution

- Fit the Gaussian core of the vertex distribution, and exponential tail
- Good data-MC agreement

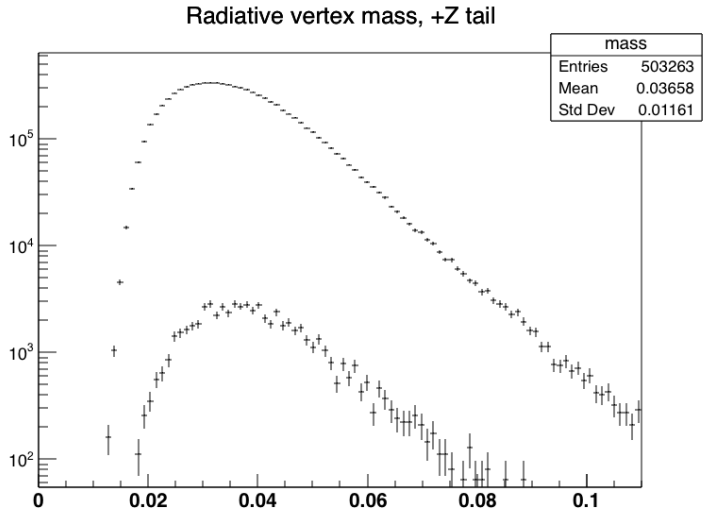


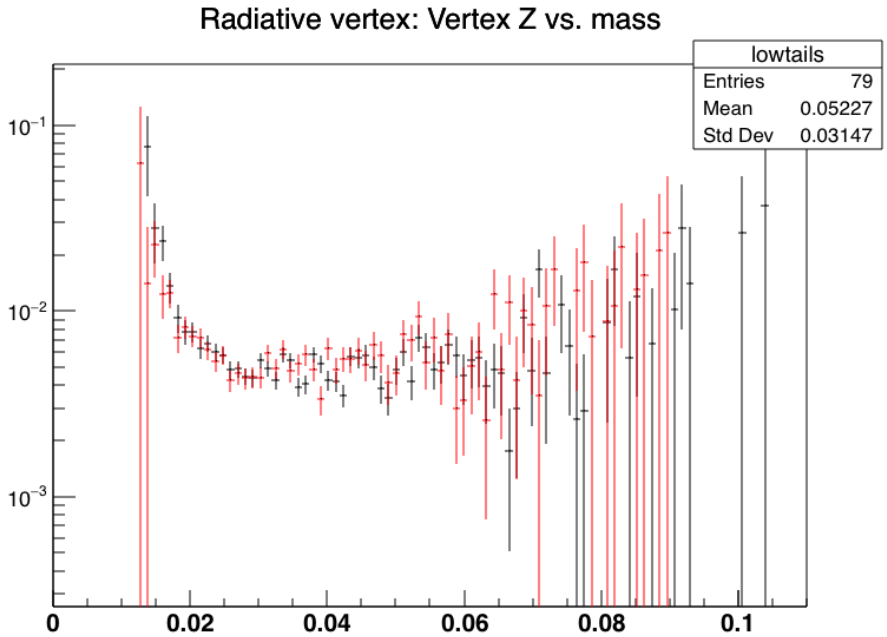


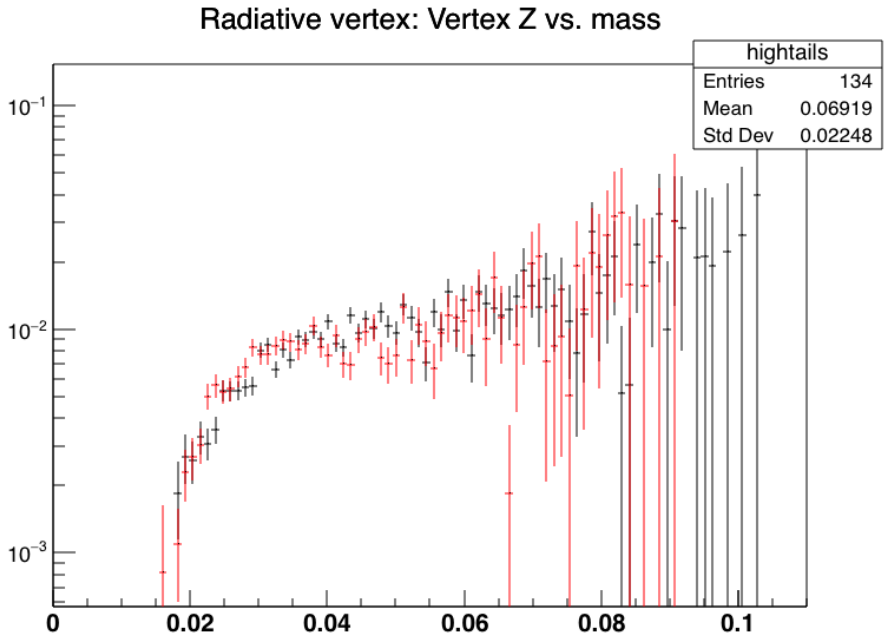


Vertex tails

- Count vertices outside of 3σ: tails are roughly 10^{-2} of total
- Tails asymmetric as expected
- Good data-MC agreement







Vertex Z-cut

- Z cut: E(events with z>zcut)=0.5
  - Blue curve on right (2.2 GeV, from proposal)
- Fit vertex tail to exponential
- Normalize to total run luminosity