about R-Hadrons & how to find them

A (nearly) published analysis.
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What are R-hadrons

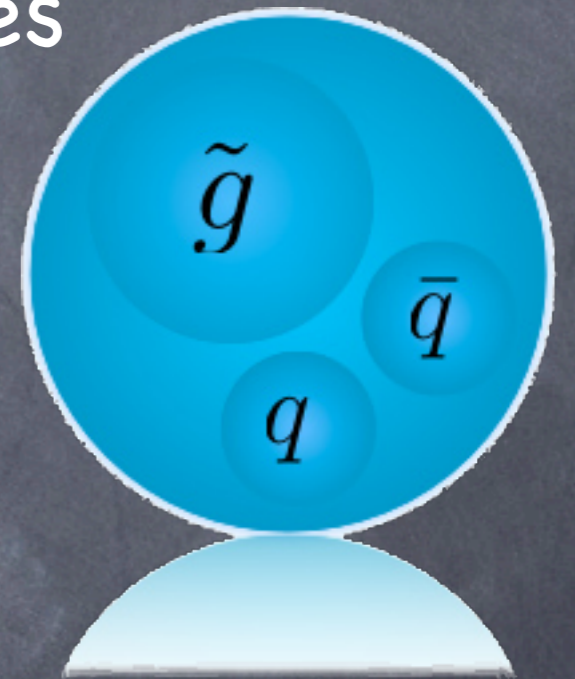- collective name for heavy stable long lived particles hadronized with SM particles

  - e.g. gluionos, sqarks,

- many SUSY models predict them

- long lifetime!

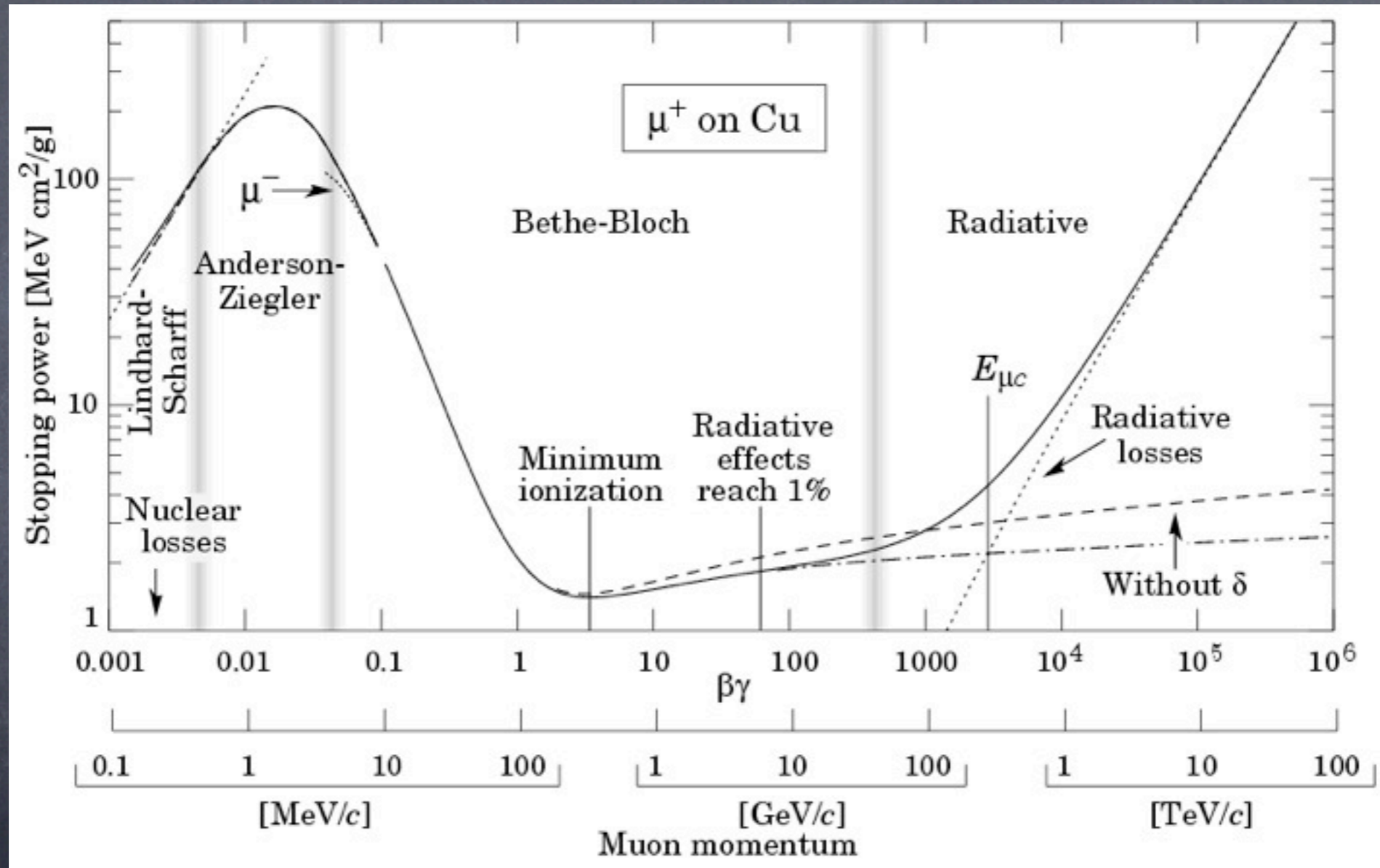 - results from small mass difference to LSP

  - necessary for hadronization

How are they observed

- Long lifetime -> direct observation

- Very high mass (TeV scale) -> slow (β < 1)

  - time of flight measurements

  - specific ionization (dE/dx) relates to $\beta\gamma$ via Bethe-Bloch equation.

How are they observed

How are they observed

- ToF measured by:
  - calorimeters
  - muon spectrometer
- dE/dx measured by:
  - Pixel detector (ADC readout)
  - TRT (Time over threshold, high threshold)
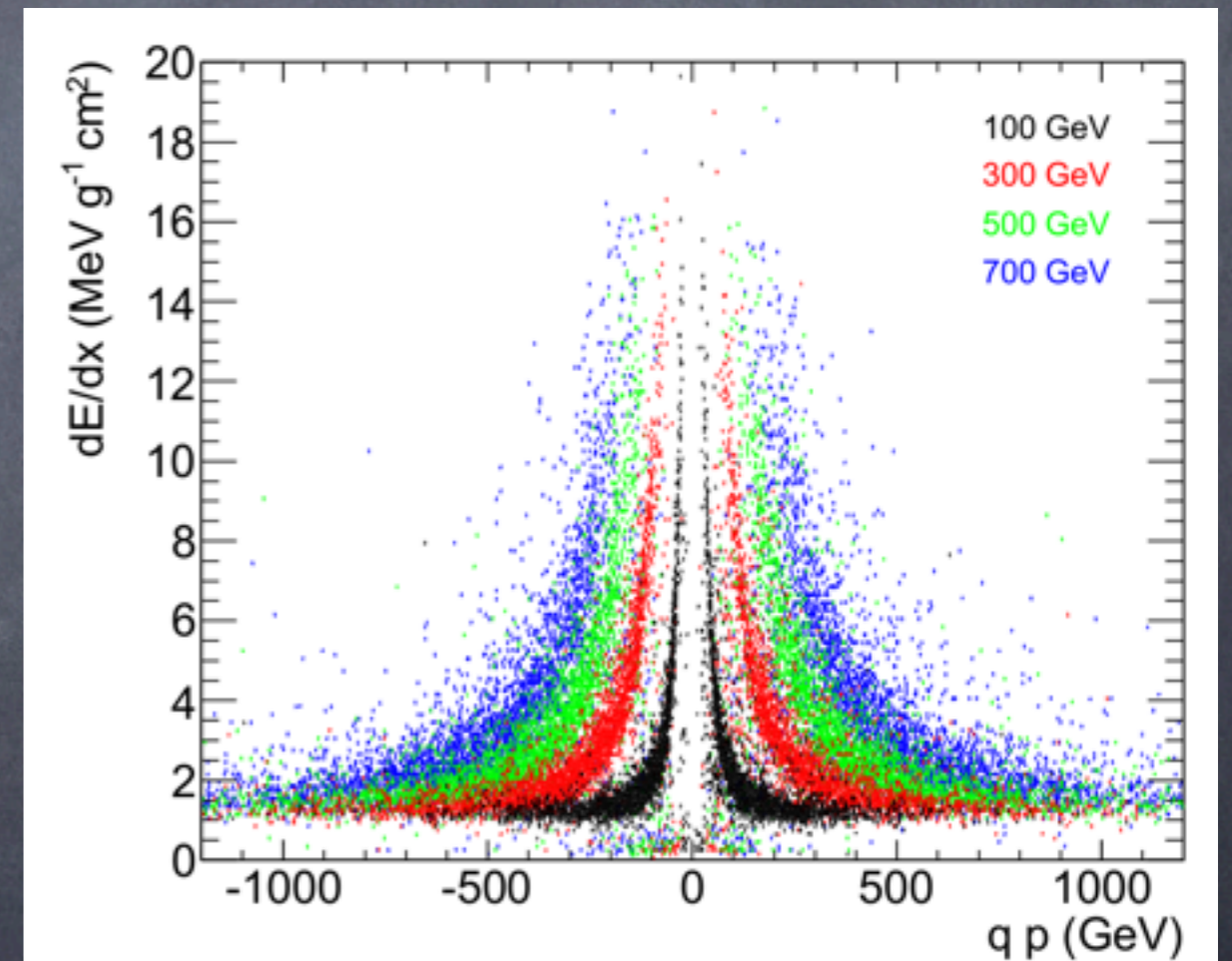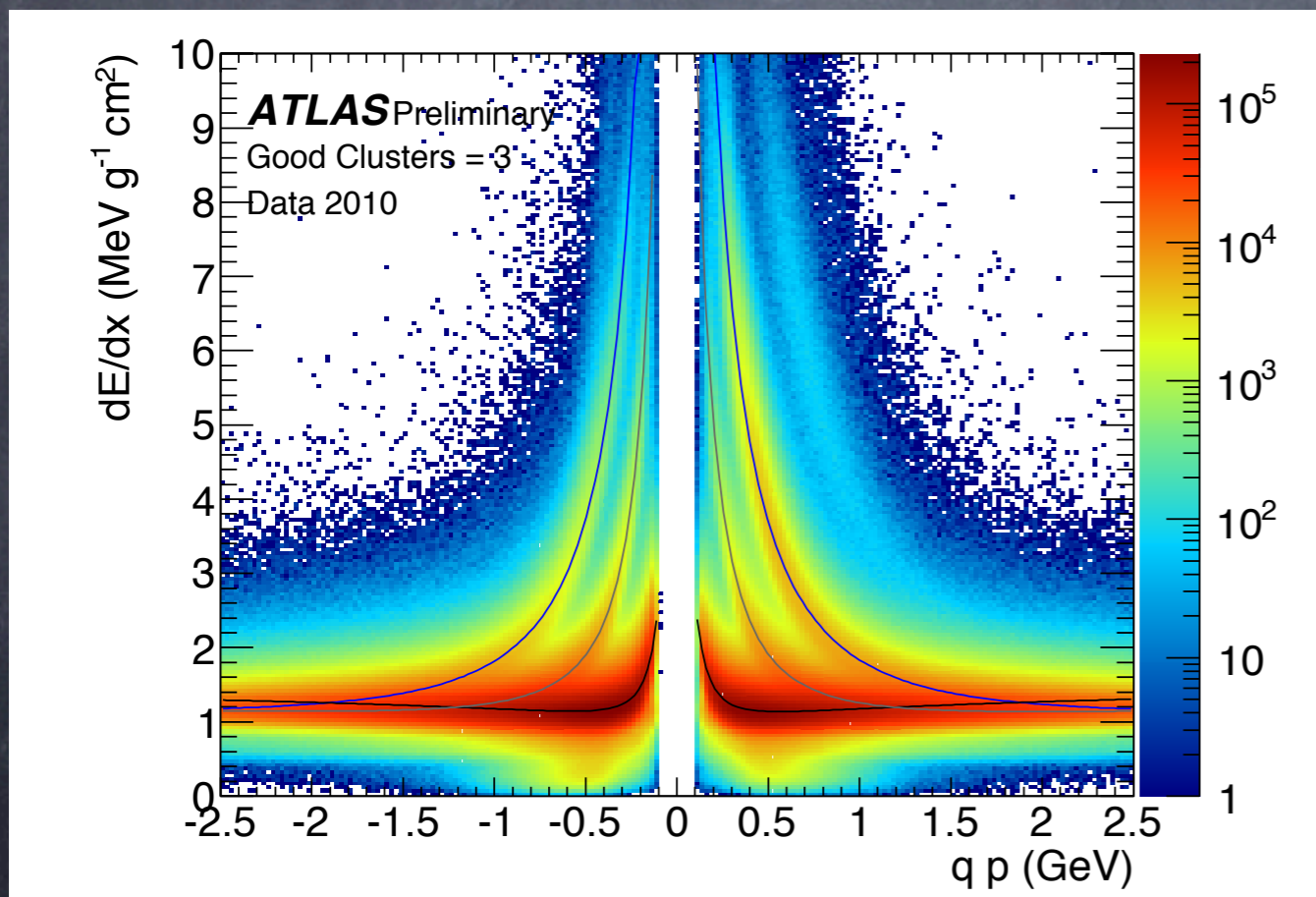 - Calorimeters

Phenomenology

- various quark systems possible:
  - R-mesons & -baryons
  - charges -2,-1,0,1,2
- Interaction model:
  - Stable & massive: Direct cross-section is tiny.
  - Associated light quark system interacts like a hadron with a big momentum reservoir
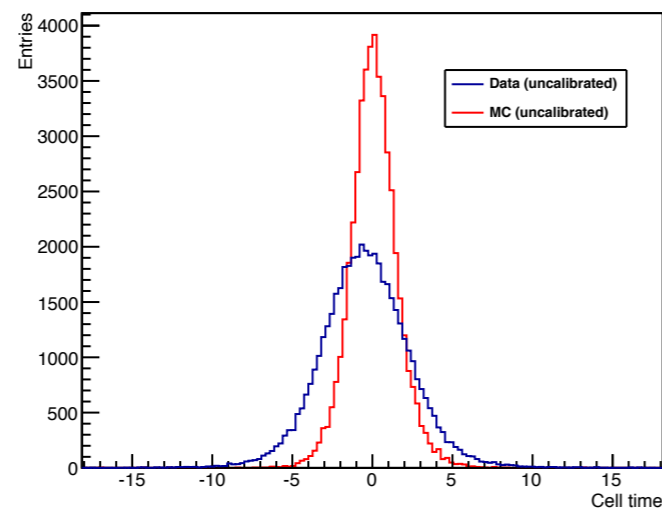
Independent of SUSY model

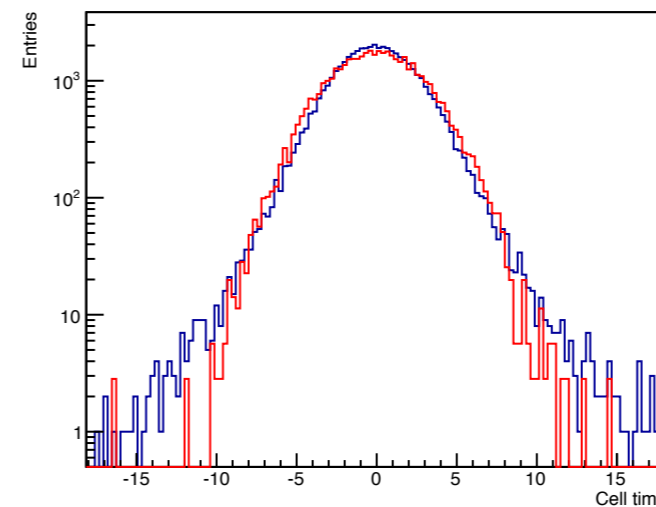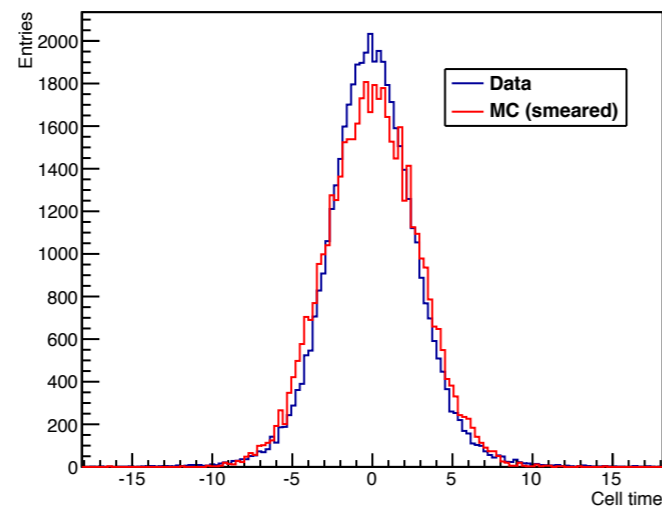# Performance

Pixel performance
-calibrate with protons
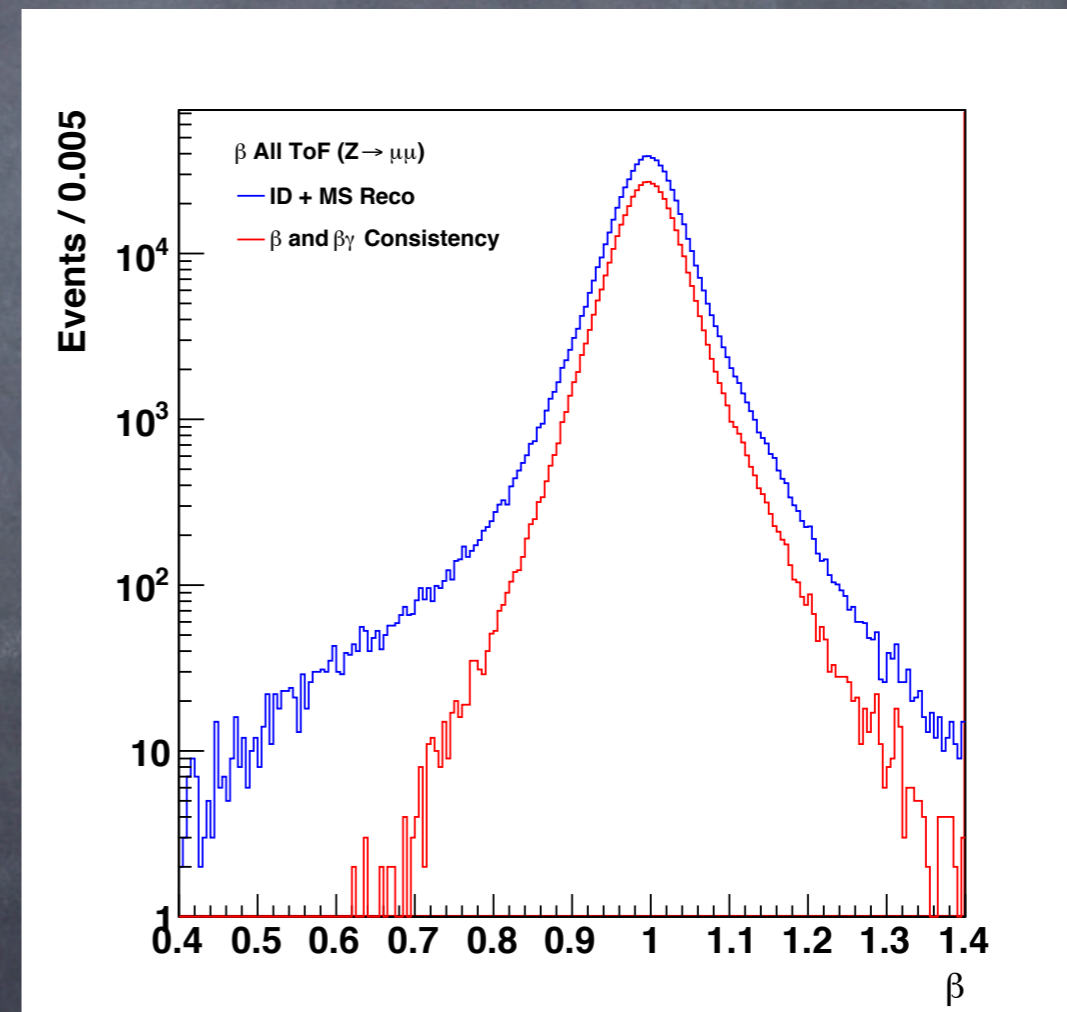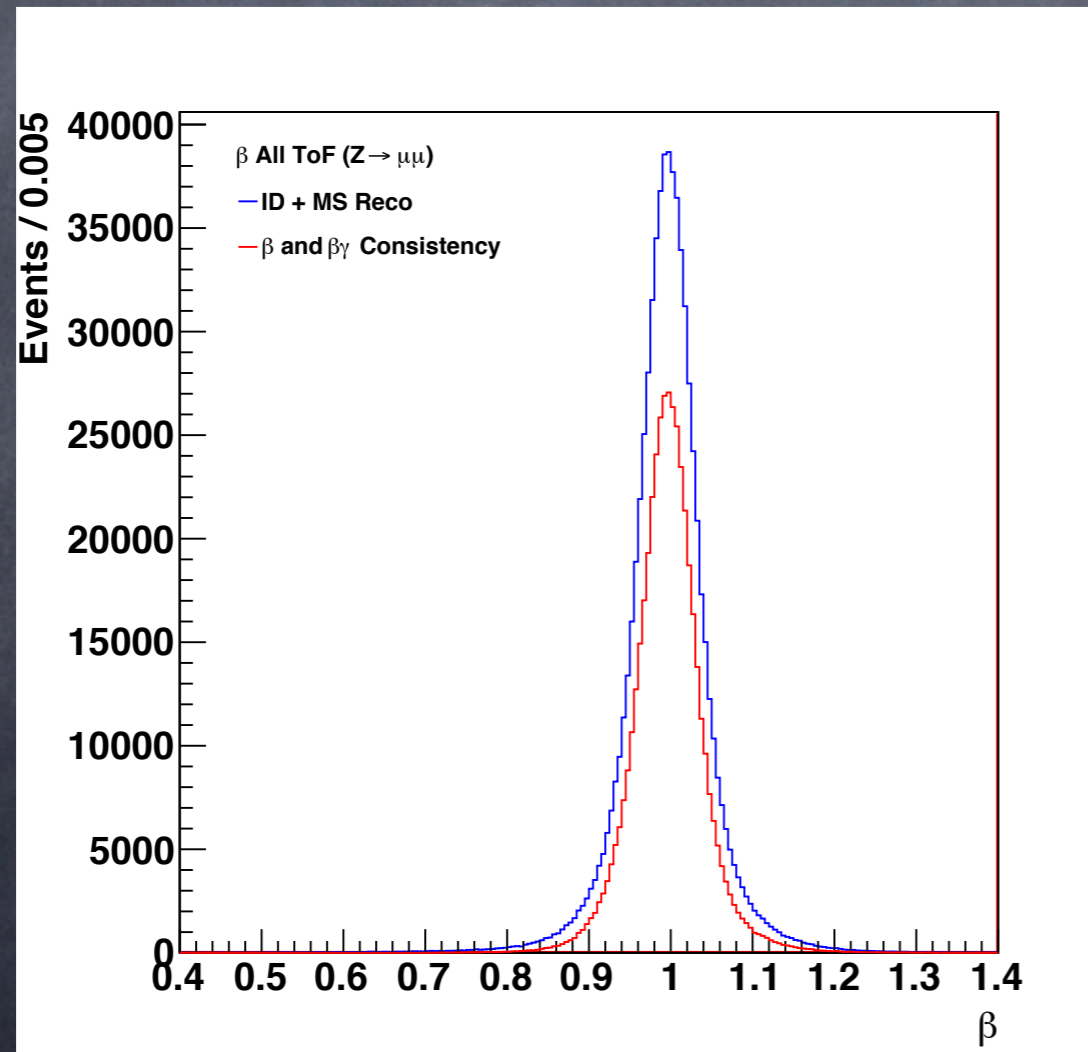
Performance

Calorimeter performance

MC agreement
is terrible
-> calibration

Performance

MS performance

Limits