Double Bang Reconstruction

Double M-estimator

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Initial approach

- Use M-estimate minimizer that minimizes: using a reconstructed shower position:

$$M = \sum_{\text{hits}} \sqrt{1 + r_i^2}.$$

$$r_i = \text{hit.t} - \text{shower.t} - \text{d}(\text{shower}, \text{hit})/v_{light}$$

- Two showers in a double bang: Can we fit both?

First: using MC information

Split the L1 hits in

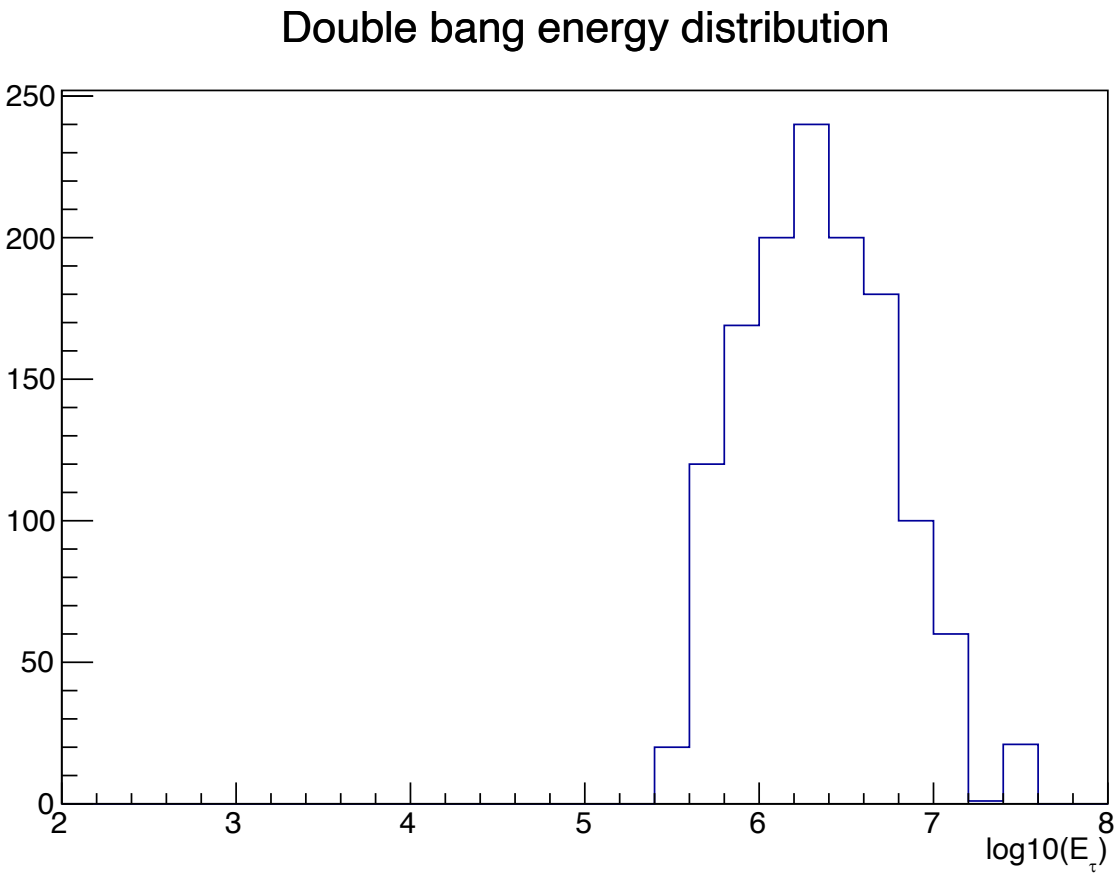
- Hits from shower 1
- Hits from shower 2

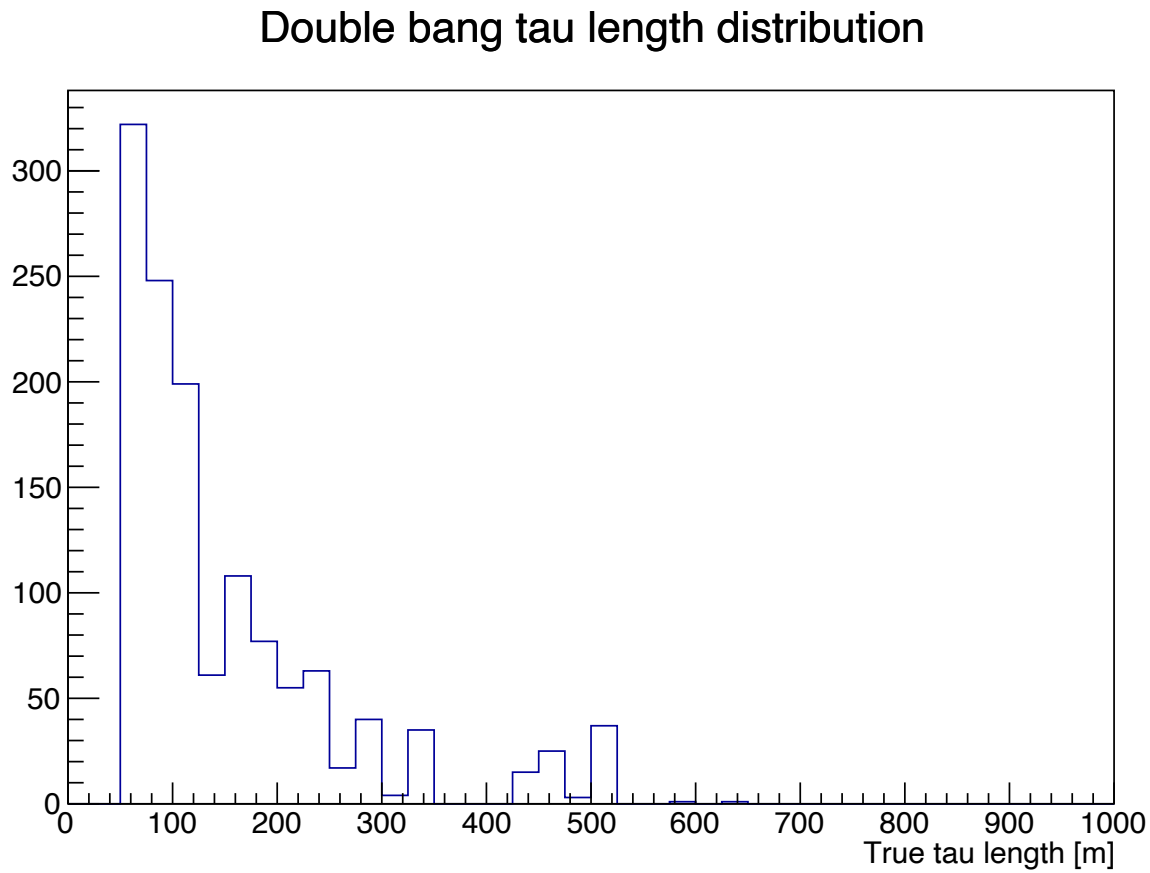
Fit positions of both showers

Obtain direction by vector between both positions

Double bang event sample

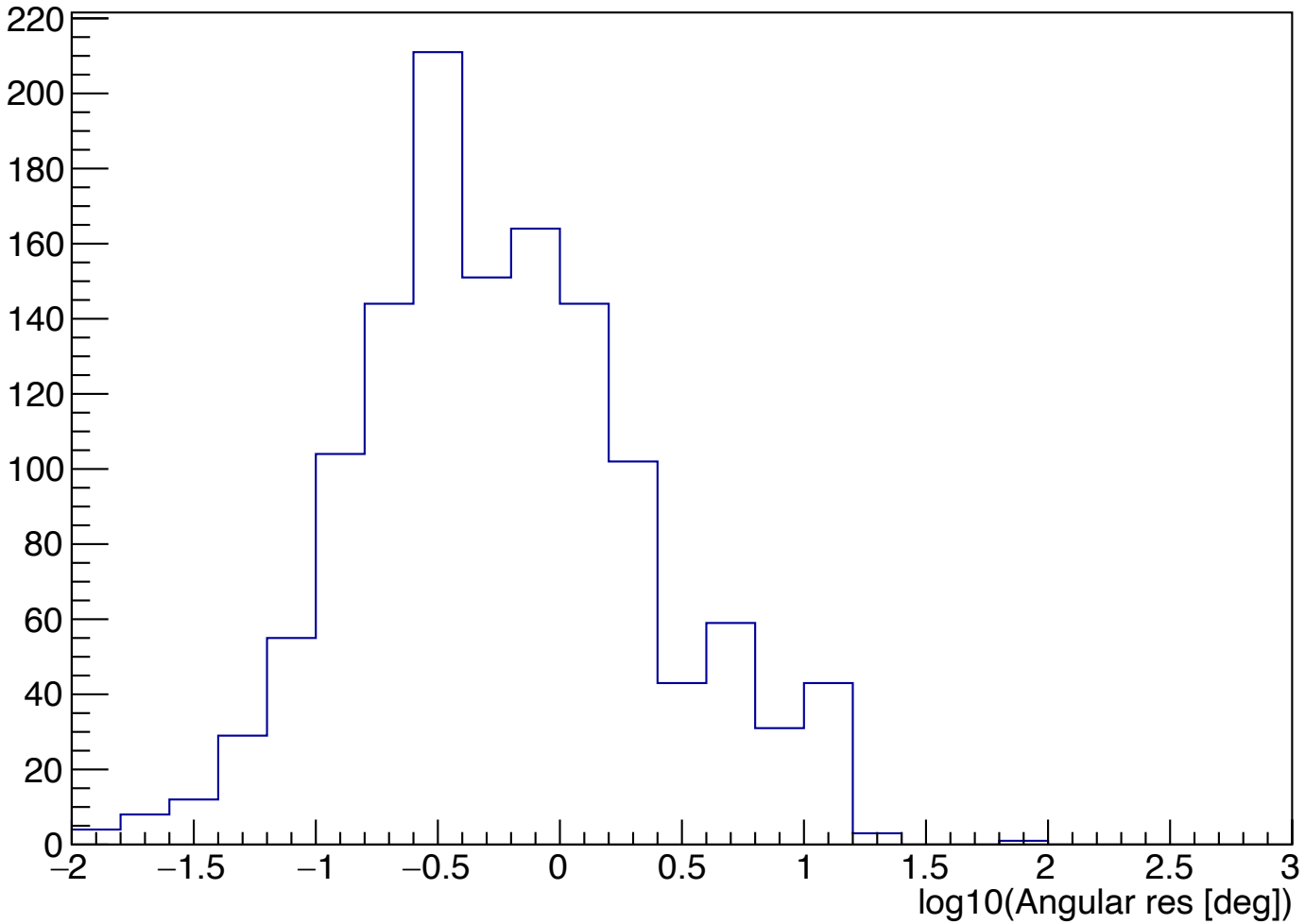
1400 events with τ_{length} > 50 m



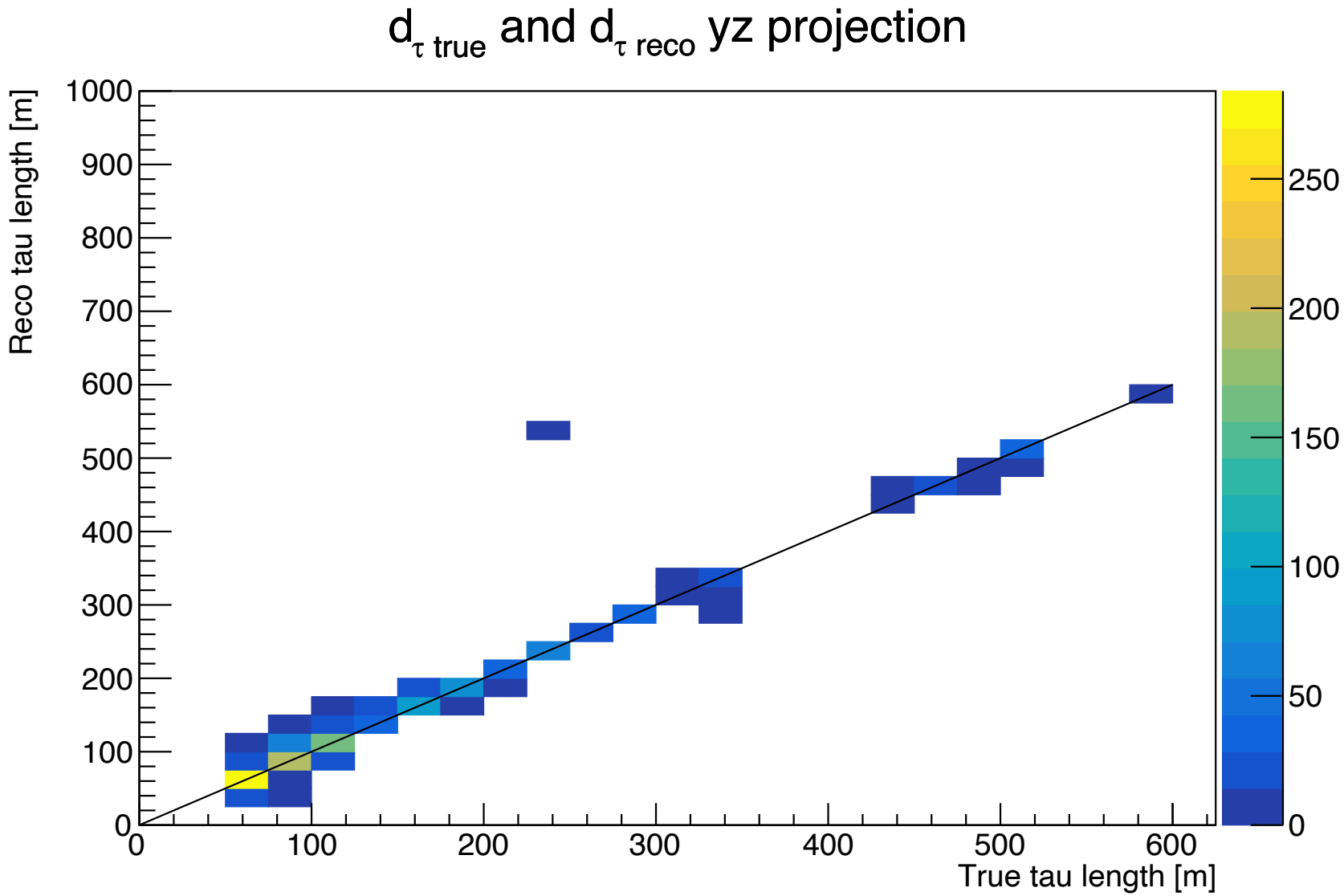


Angular resolution

- Mean: -0.24 (0.58 degrees)
- Median: -0.28 (0.52 degrees)



Reconstructed tau length



Next

- Try this method without using MC information

- Initial guess of both shower positions is important for the next step
  → full likelihood fit for 2 showers