Double bang fit

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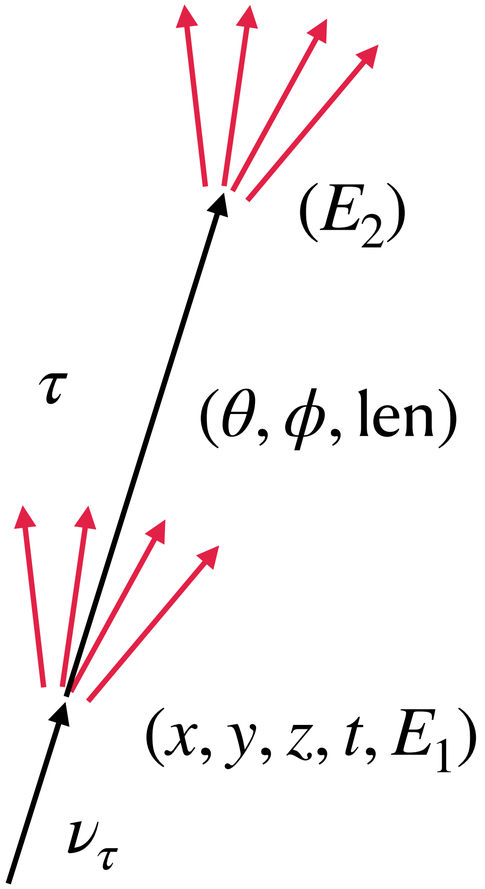
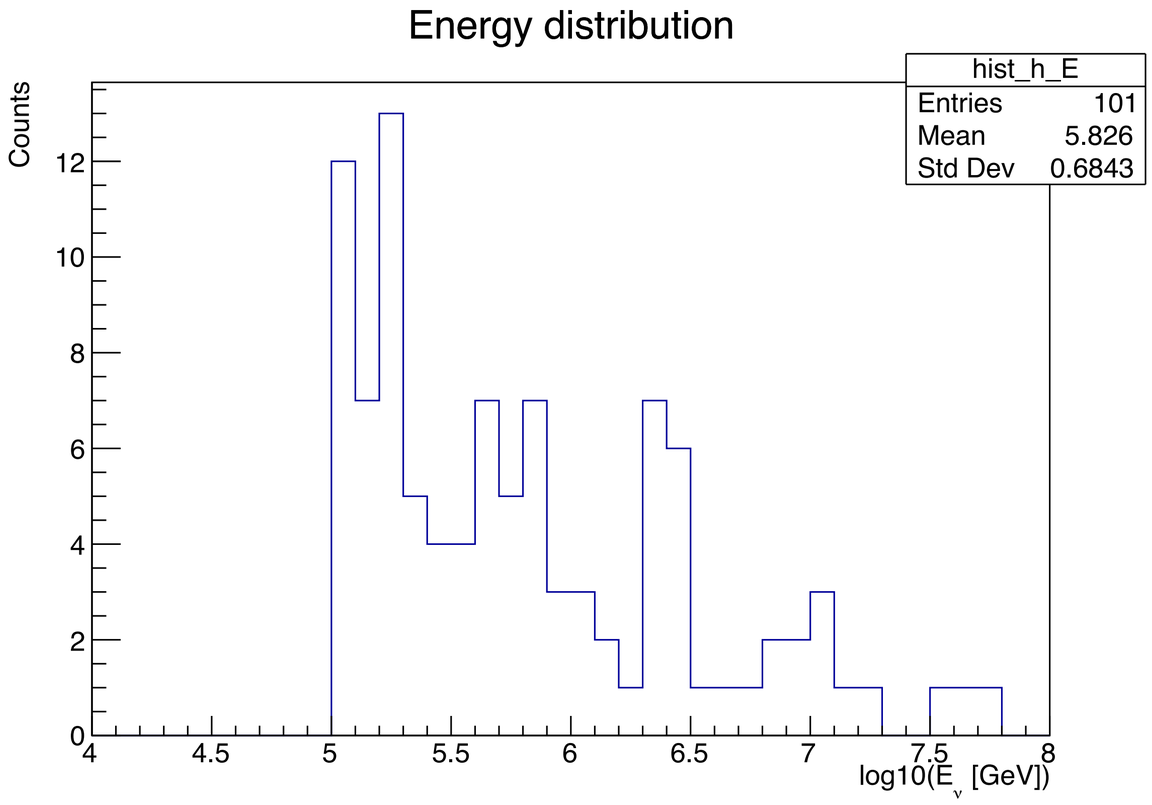
Double bang fit

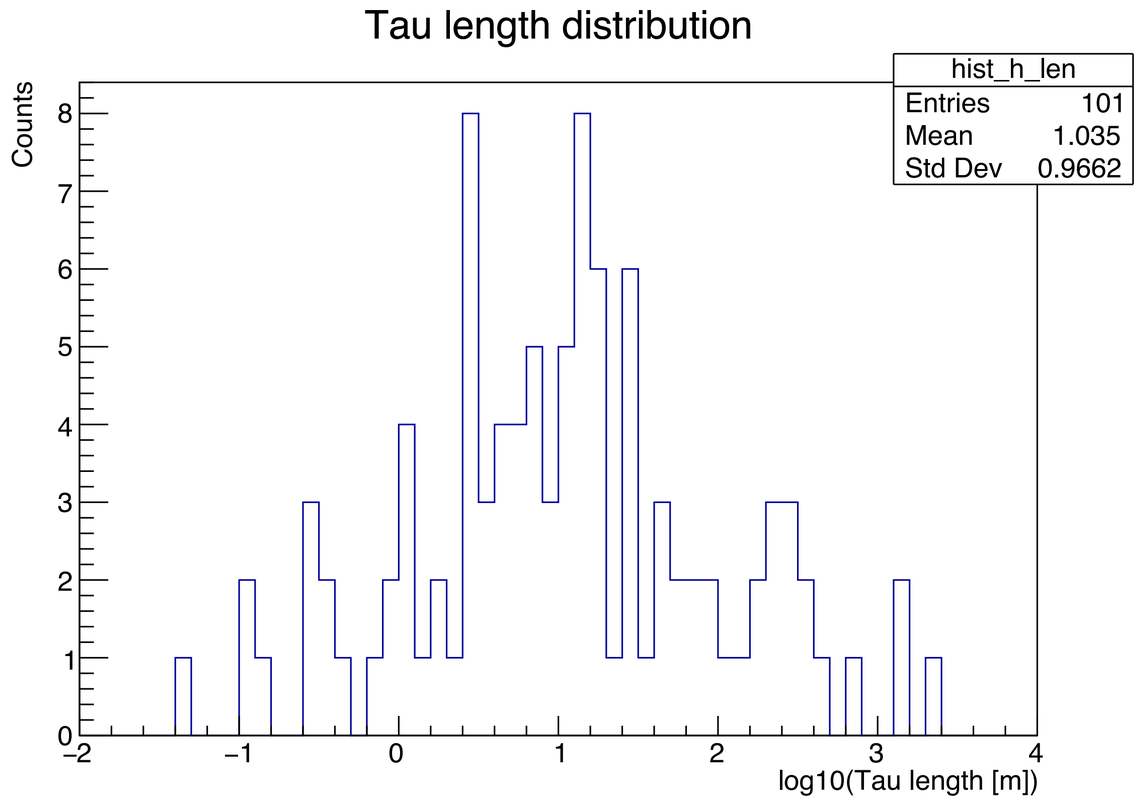
- First MC hits
- 8 fit parameters: $(x, y, z, t, \theta, \phi, \text{len}, E_1, E_2)$
- Start fit at true values
- 100 contained events (E > 100 TeV)

Minimize: $-\text{Log Likelihood} = -\sum_{\text{hits}} \text{Log P}_{\text{1st}}$

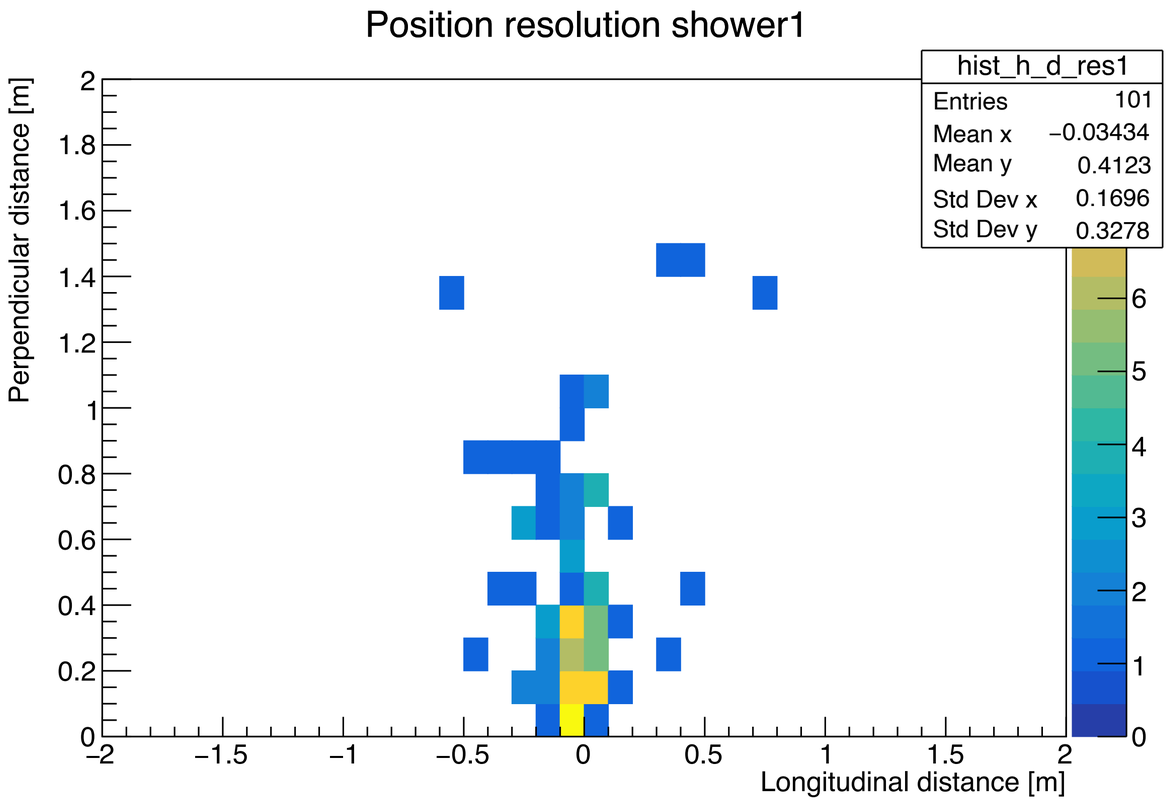


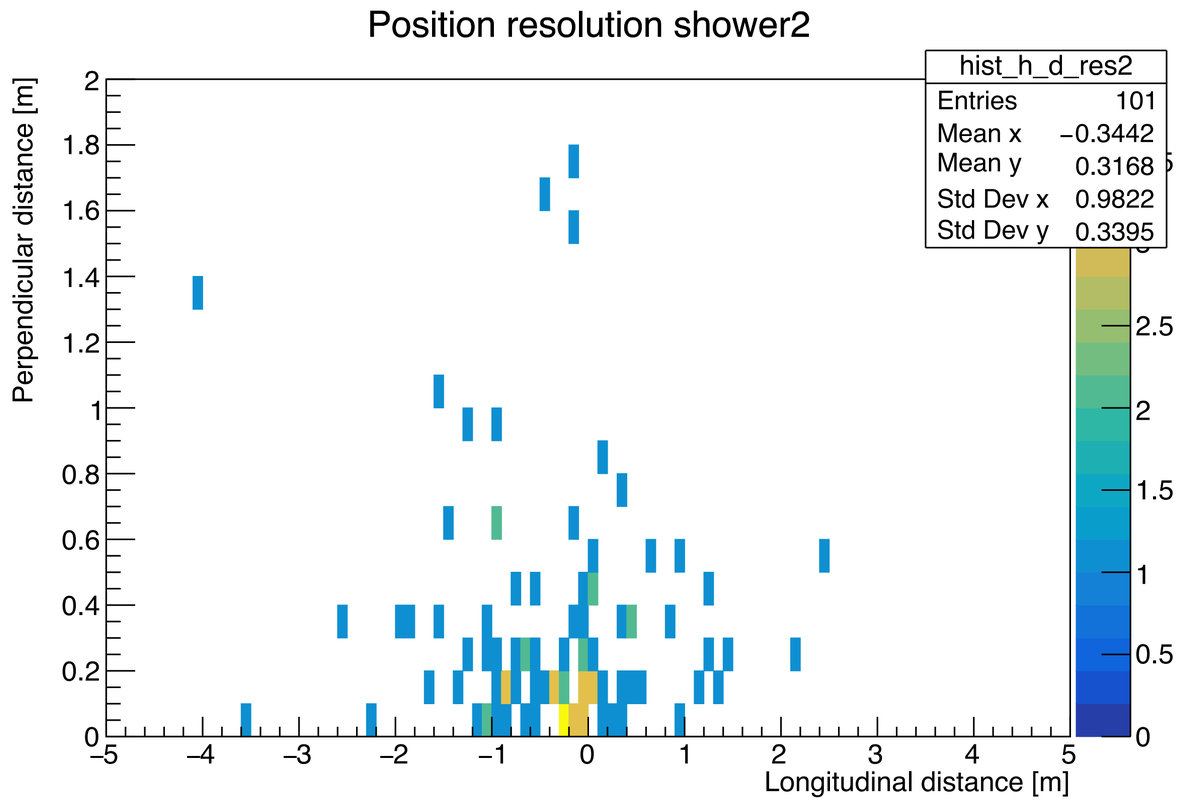
Sample distribution



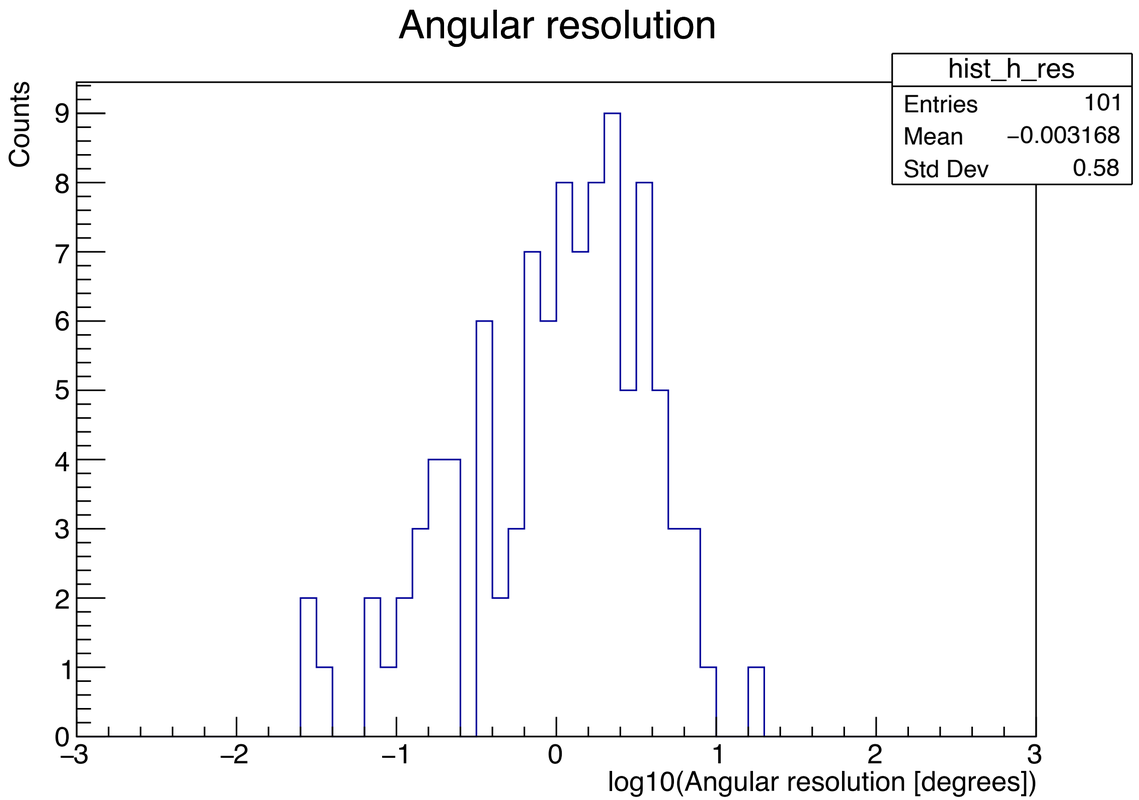


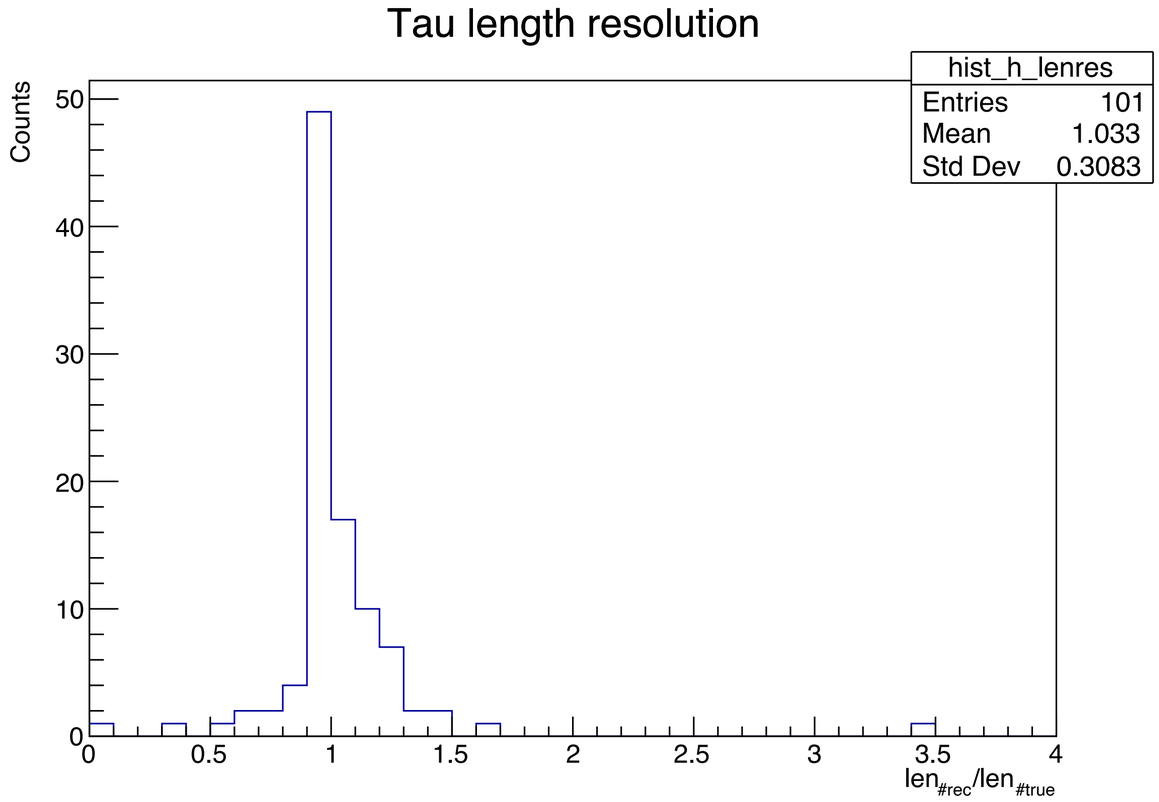
Position resolution



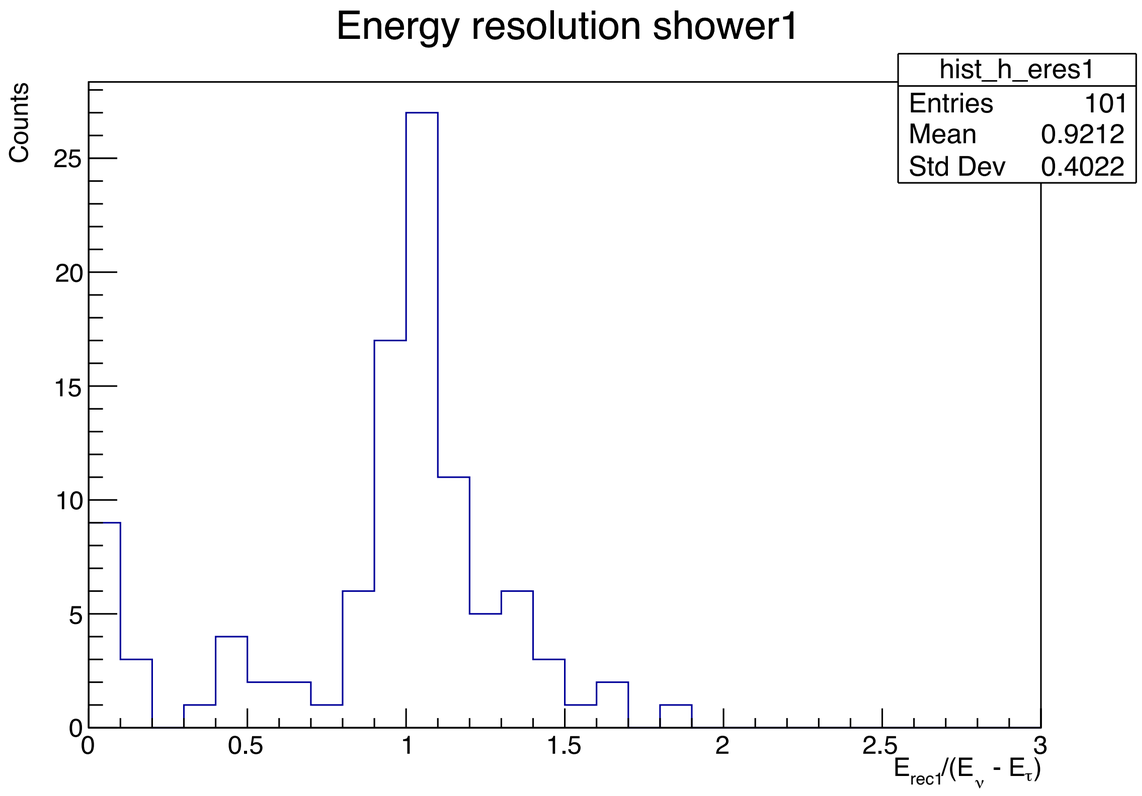


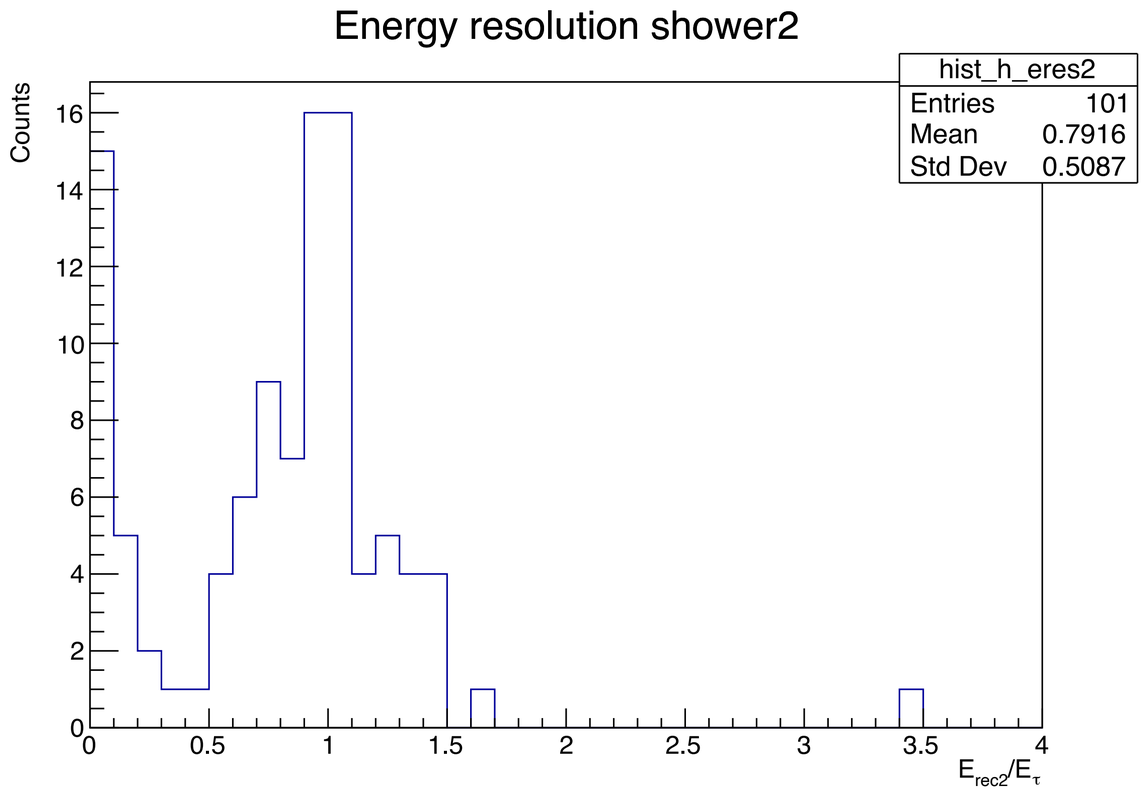
Angular and length resolution



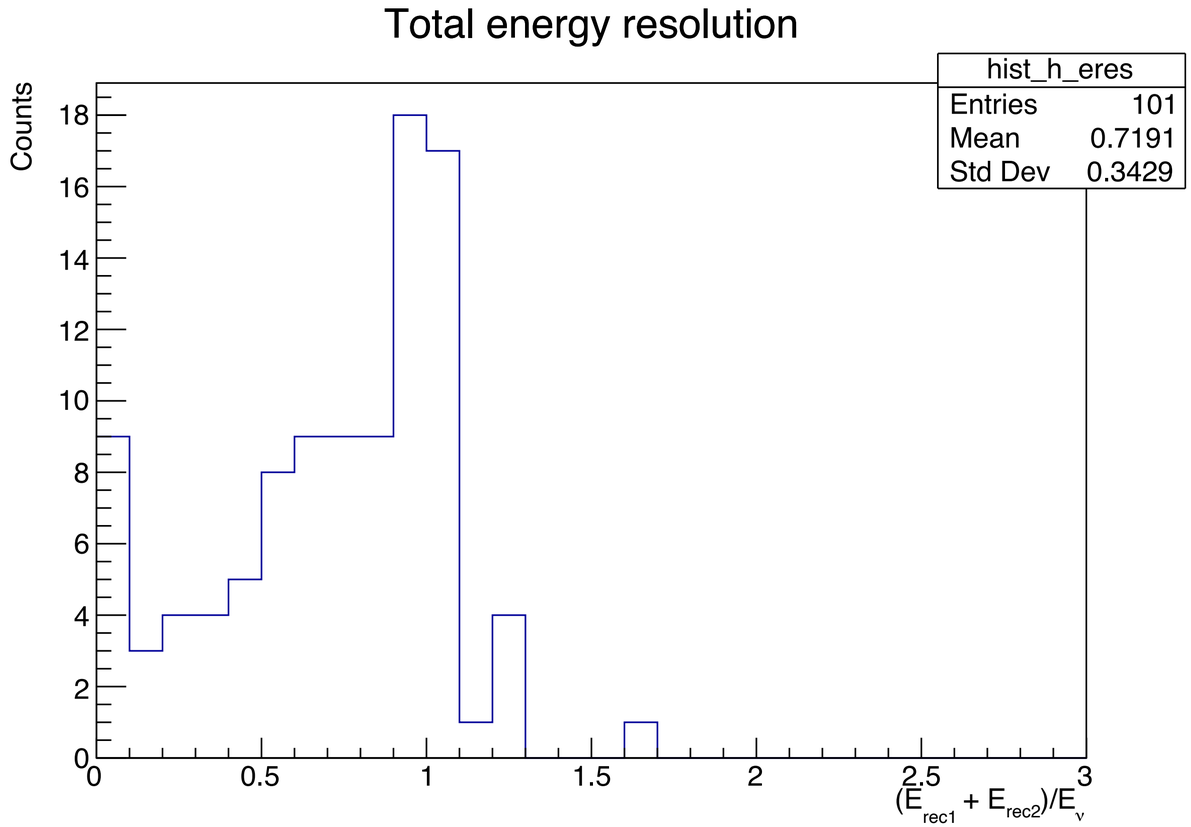


Energy resolution





Total energy resolution



Conclusions

- Fit converges: good news
- Takes about 15 minutes/event
- No hit/nohit information used yet: no hit information makes it SLOW
- Energy resolution does not yet entail *invisible energy* (neutrinos)

Outlook

- Include background, PMT/CLB simulation
- Move to more realistic starting points for the fit

Likelihood

$$-\text{Log Likelihood} = -\sum_{\text{hits}} \text{Log P}_{\text{1st}}$$

$$P^{1st}_{\text{no bg}}(t) = \frac{1}{e^{-N(T_{start})} - e^{-N(T_{end})}} n(t) e^{-N(t)}$$

$$P^{1st}_{\text{with bg}}(t) = \frac{1}{1 - e^{-N(T_1) - R_{bg}(T_1 - T_0)}} (n(t) + R_{bg}) e^{-N(t) - R_{bg}(t - T_0)}$$

$$P^{1st}_{\text{2 shower}}(t) = \frac{1}{1 - e^{-N_1(T_1) - N_2(T_1) - R_{bg}(T_1 - T_0)}} (n_1(t) + n_2(t) + R_{bg}) e^{-N_1(t) - N_2(t) - R_{bg}(t - T_0)}$$