1.8 GeV Electrons for Compton Posipol

Remarks

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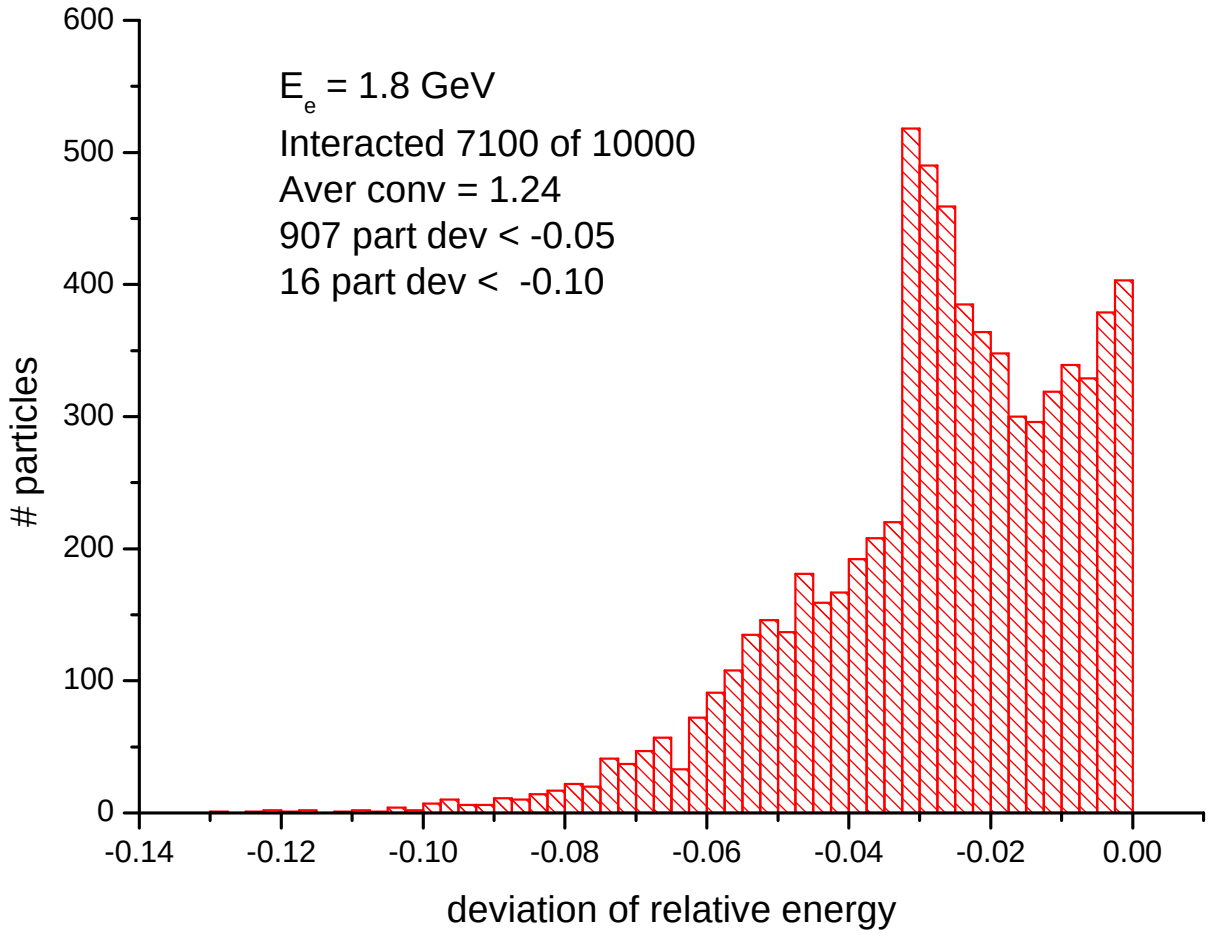
1.8 GeV Electrons for Compton Posipol vs 1.3 GeV

Max energy in Compton gammas 57.8 MeV comp. with 30 MeV

- Advantages
  - Higher ($\gamma \rightarrow e^+ + e^-$) cross section and thus the yield of positrons will increase
  - narrower the angular distribution of positrons and thus capture efficiency of positrons will increase
- Disadvantages. Recoil grows $\sim \gamma^2$.
  - Due to large Compton recoil electron bunches get large energy spread. Neither ERL no ring can reuse the bunches
  - Narrower the angular distribution of gammas $\sim 1/\gamma$ causes difficulty to collimate (preselect) gammas
- Advantages remained, electrons become reusable
  - CO2 laser: electrons with energy of 5.7 GeV produce the same spectrum of gammas
  - Recoil – $\Delta\gamma/\gamma \propto \sqrt{E_{\text{las}}}$ – reduced to one third: $\Delta\gamma/\gamma\,(E_e = 5.7) \approx \frac{1}{3}\Delta\gamma/\gamma\,(E_e = 1.8)$

Simulated Energy Spread in 1.8 GeV ERL



Energy spread in the bunch after a single crossing with YAG laser pulse spans $1.56\,\text{GeV} \leq E_{\text{after}} \leq 1.8\,\text{GeV}$