Update: Total Absorption Cross Sections

PrimExII Weekly Meeting
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Ursula Salamonowicz
North Carolina A&T University

- Status of Monte Carlo Simulations
- Extraction of Efficiencies
- Estimation of Systematic Errors

Definitions of Efficiencies

- In this analysis, I will keep Lingling/Ilya's notation

  - Two efficiencies for extraction of total cross sections

    - **(1-α)**

      - TAC detection efficiency of photons at given energies (T-counters)
      - For reconstruction of $N_{incident}$ and N_{TAC}

    - **ε**

      - TAC detection efficiency for interacted photons at given energies (T-counters)
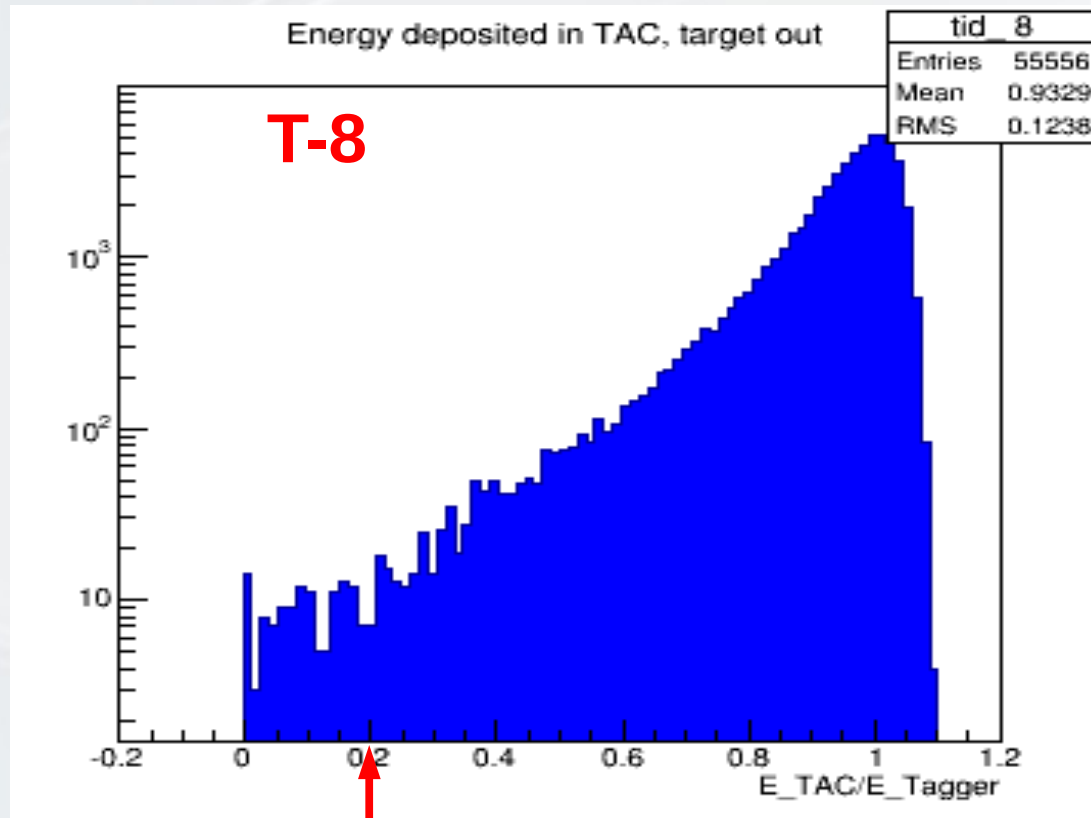   - Estimating the amount of scattered photons in TAC

Energy Ratio VS. Time Difference
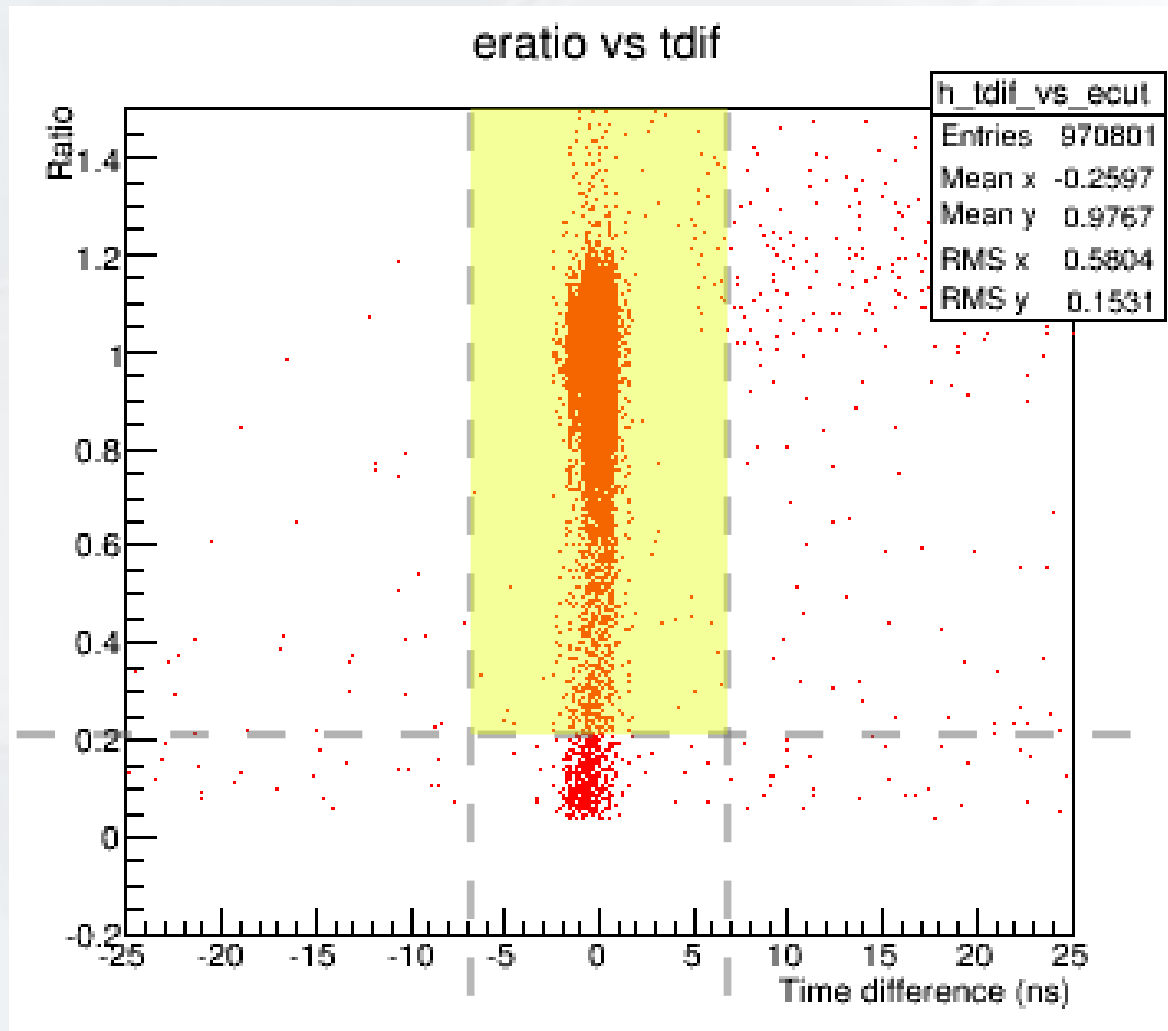
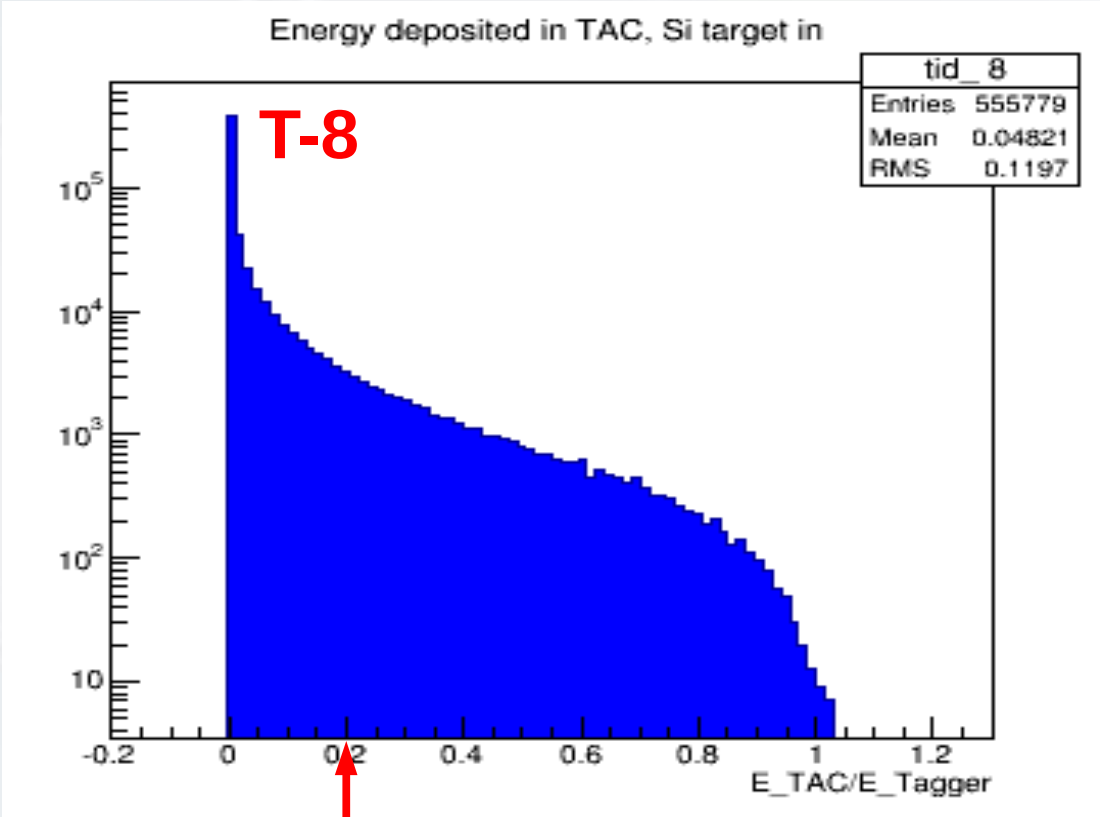
Shown for TAC run #065063, Si target

Extraction of (1-α)

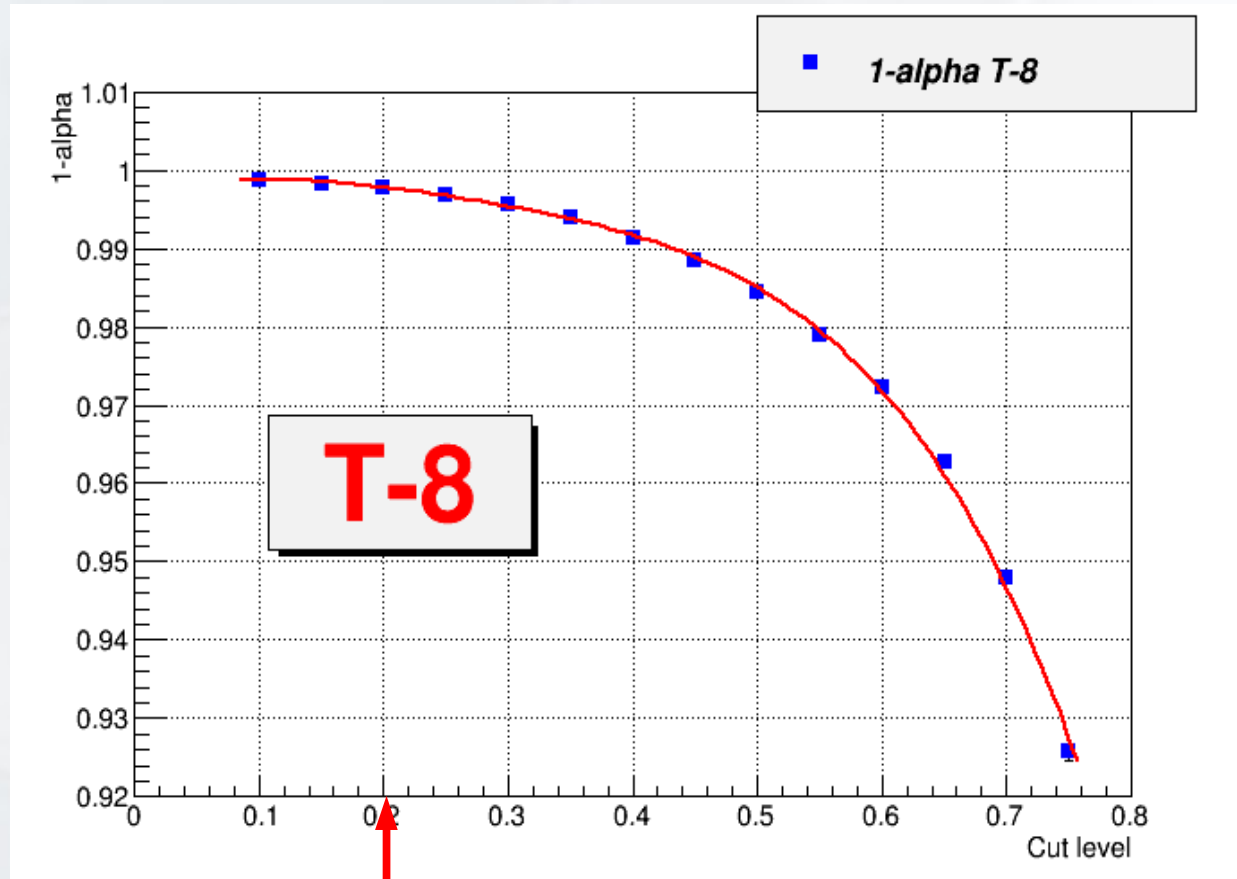MC result for empty target, T-counter #8

Extraction of ε

MC result for Si target, T-counter #8
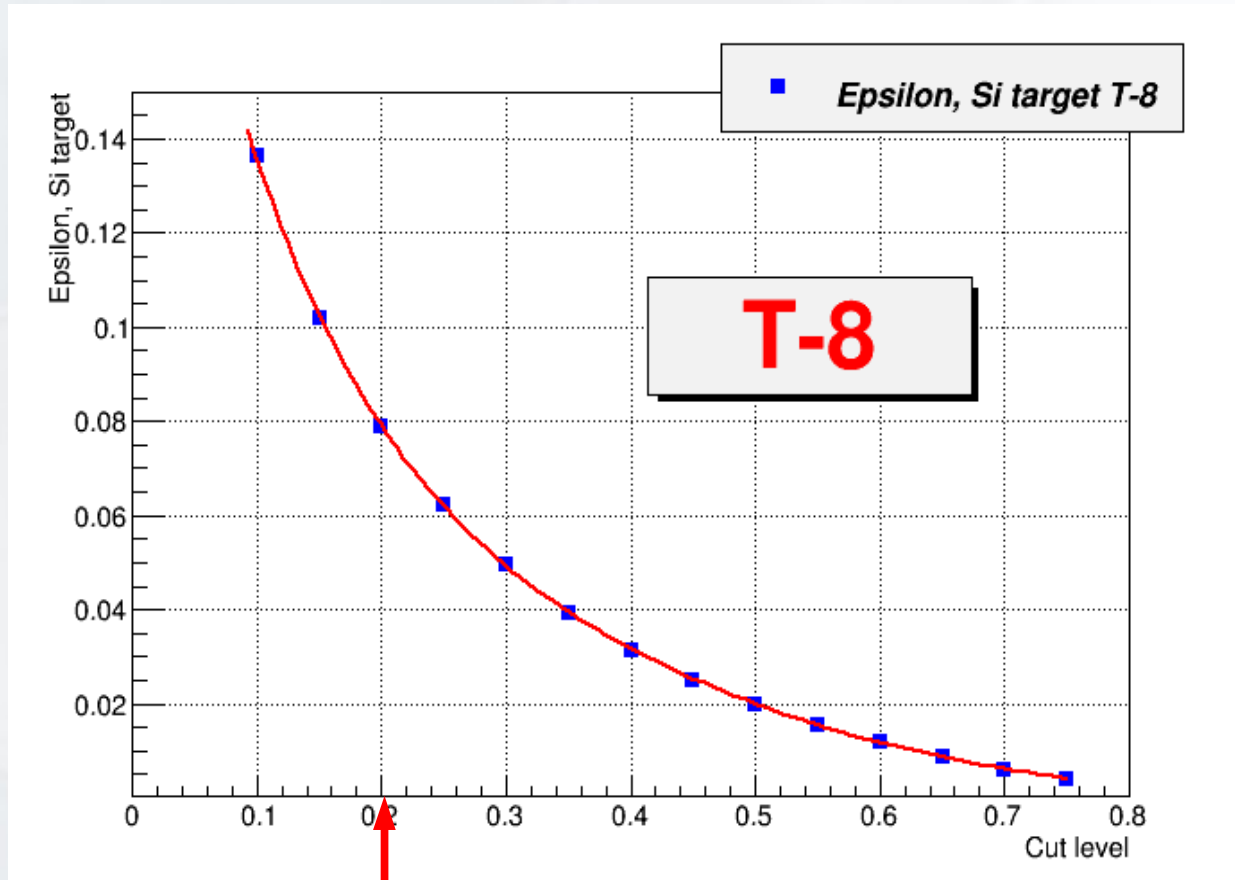
Systematic Error:
Sensitivity of Cut Level

- Estimate systematic error on $(1-\alpha)$ and ε

  - Need error estimation on cut level

  - Definition of cut level $\mu = E_{TAC}/E_{inc}$

    - Resolution of TAC

      $\Delta E/E = 0.06/\sqrt{E}$

    - Resolution of T-counters in Tagging system

      $\Delta E/E = 0.01$

- $\sigma_\mu = 0.012$

- $\mu = 0.20 \mp 0.012$

(1-α) vs. cut level (μ)

- Fitted with 4th order polynomial

ε(Si target) vs. cut level (μ)

- Fitted with 5th order polynomial

Estimated Systematic Error (results)

(1-α)

T-counter	(1-α)	Statistical error	Systematic error
8	0.99878∓0.0002	0.02%	0.02%

ε(Si target)

T-counter	ε	Statistical error	Systematic error
8	0.07896∓0.00486	0.04%	6%

Outlook

- Estimate systematic errors for all T-counters

- Extract efficiencies and estimate systematic error for Carbon target

- Finalize errors for total absorption cross sections

- Compare with Lingling/Ilya's results

- Report at workshops