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Finding the optimum value for number of events in NPE simulation study

Rohit Singh Bhadauriya, Tapasi Ghosh

Ramaiah University of Applied Sciences, Bengaluru

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Outline

- The primary objective is to determine the optimal number of events required to get appropriate simulation study without compromising the accuracy of the NPE results.
- Additionally, to analyze the behavior of NPE across the range of pseudorapidity.

Particle kinematics for π^-

- Momentum is 10 GeV
- Pseudorapidity is 2.6
- Aerogel radiator(refractive index 1.019)
- k = 5
- Safety factor 0.7

Distribution of σ_{npe} vs number of events

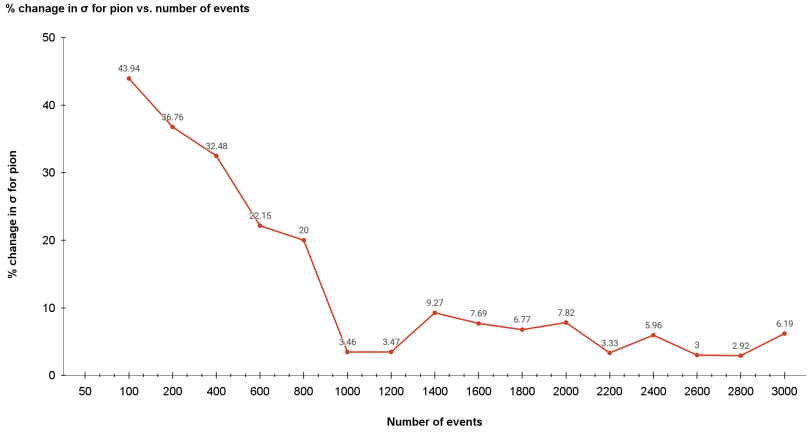

Figure 1: Variation in σ_{npe}(in percent) vs number of events

Comparison study of π^-, k^+ and proton

- Pseudorapidity is 2.6
- Aerogel radiator (refractive index 1.019)
- k = 5
- Safety factor 0.7
- Momentum
  - For π^- - 10 GeV.
  - For k^+ and proton - 30 GeV.

Comparison study of π^-, k^+ and proton

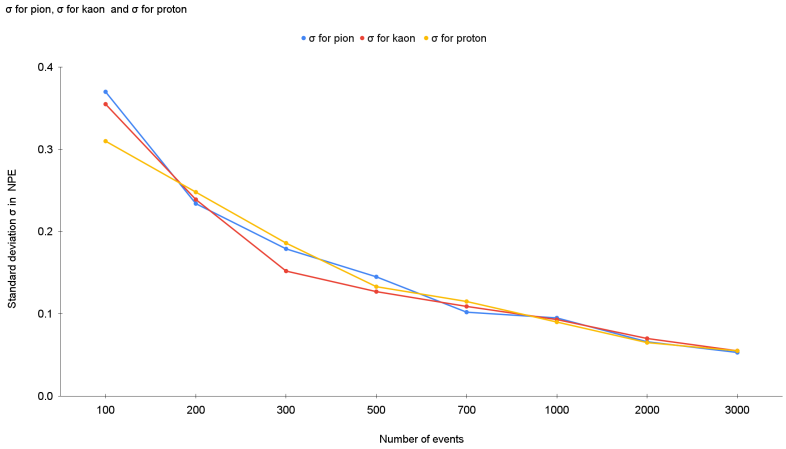

Figure 2: Change in σ_{npe} with the variation of number of events for π^-, k^+ and proton

NPE distribution with Pseudorapidity for π^-

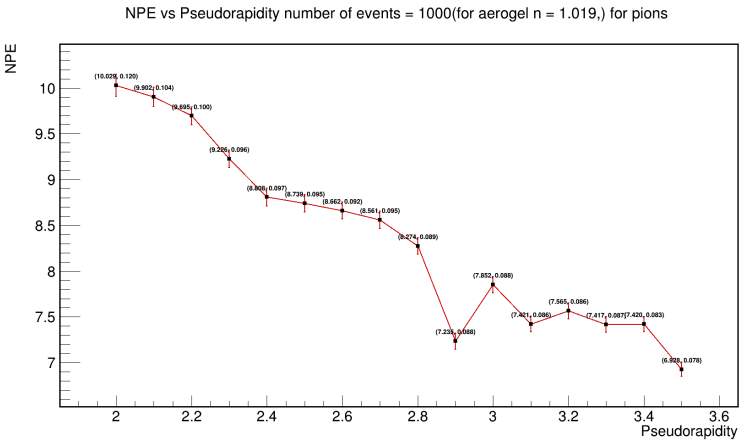

Figure 3: NPE vs Pseudorapidity(for aerogel radiator)

At 2.9, there is a sharp dip, indicating a deviation from the expected trend.

NPE distribution with Pseudorapidity for π^-

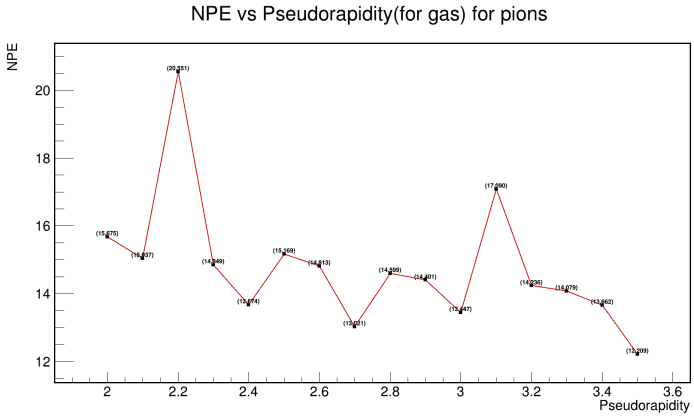

Figure 4: NPE vs Pseudorapidity(for gas radiator)

Conclusions

- It is observed that up to (n = 1000), there is a steep decline in the (σ_{npe}) percentage. Beyond this point, the decline becomes less significant, stabilizing within a specific range. Therefore, it can be reasonably concluded that (n = 1000) serves as an optimal value.
- It is observed that the observed trend is consistent across all three simulated particles, confirming the validity of the above analysis.