Rate and PID in the MVD

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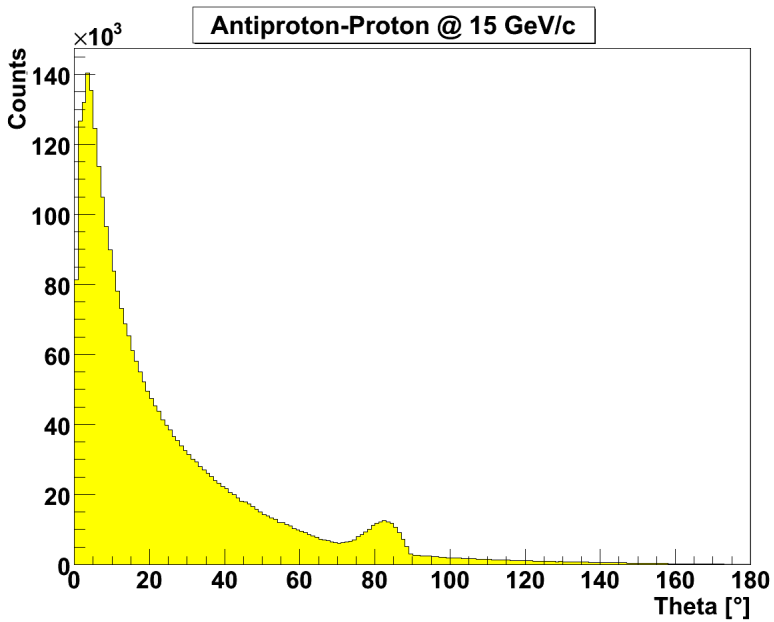
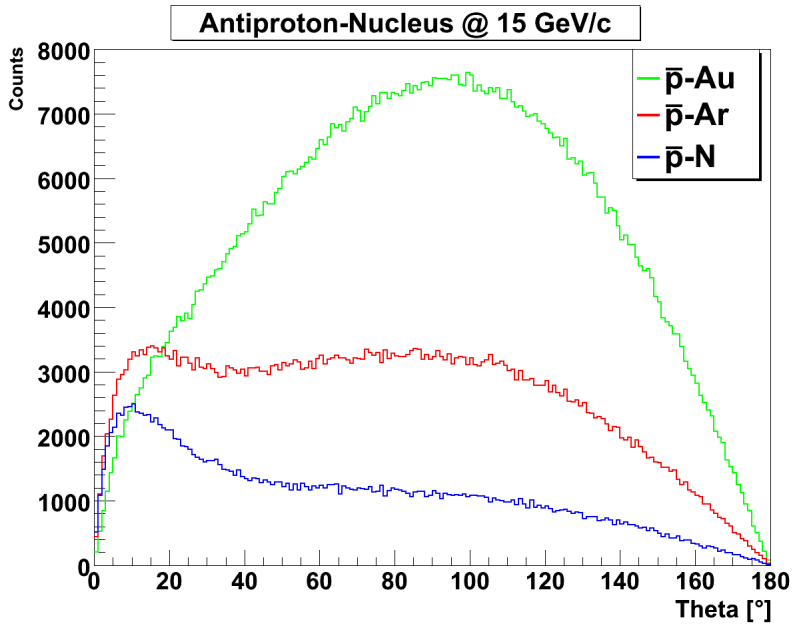
XXXI PANDA Collaboration Meeting - 8-12th March 2010

Overview

- Rate Study
- PID by Energy Loss

Angular Distribution

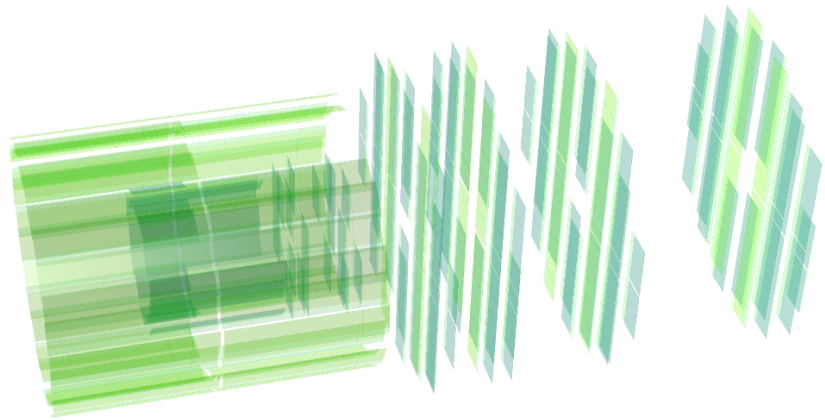




Rate Estimation

Achtung Bitte!!

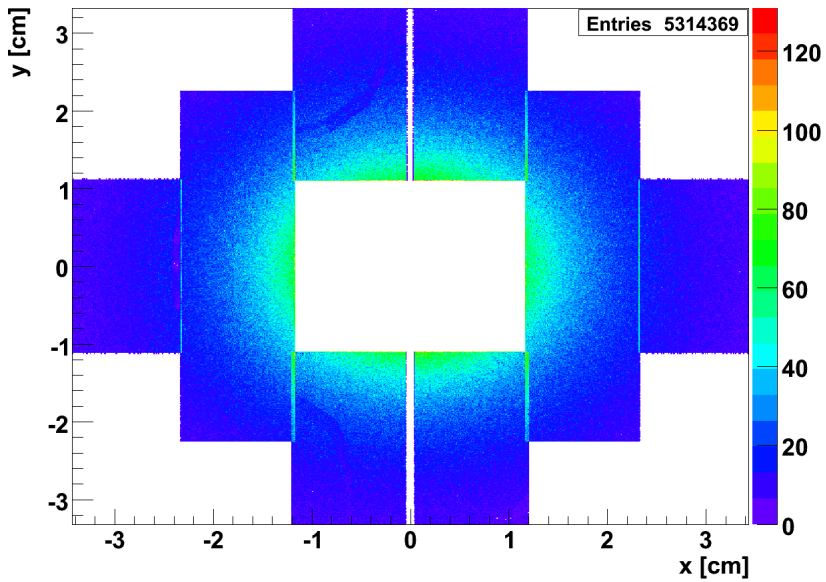
- Almost Complete Geometry
- No Digitalization
- No Time Distribution
- 2 10^7 annihilations

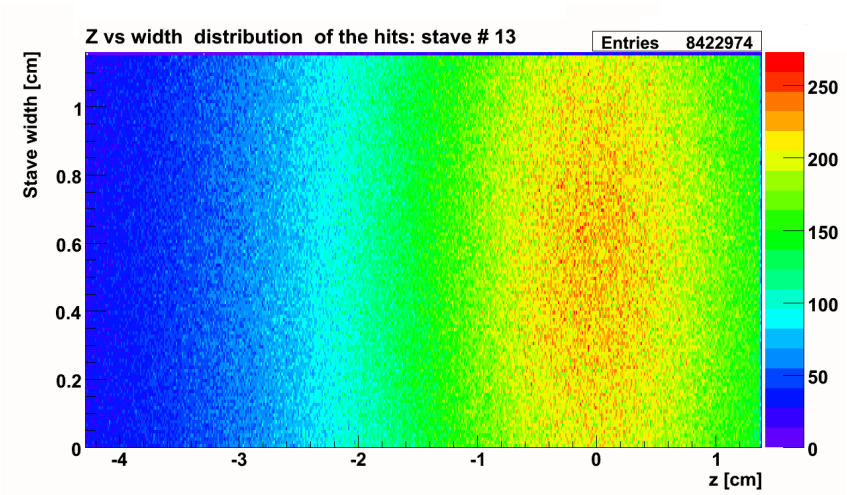


Annihilations	Simulated Events	Average Rate [$cm^2\ s^{-1}$]	Maximum Rate [$cm^2\ s^{-1}$]	Where?
$\bar{p} - p$	8.5 10^6	8.24 10^5	6.10 10^6	Disk Part
$\bar{p} - N$	2.5 10^6	1.85 10^6	3.70 10^6	Disk Part
$\bar{p} - Ar$	2.5 10^6	3.30 10^6	6.80 10^6	Disk Part
$\bar{p} - Au$	2.5 10^6	1.03 10^7	1.60 10^7	Barrel Part

Rate Estimation

Spatial Distribution





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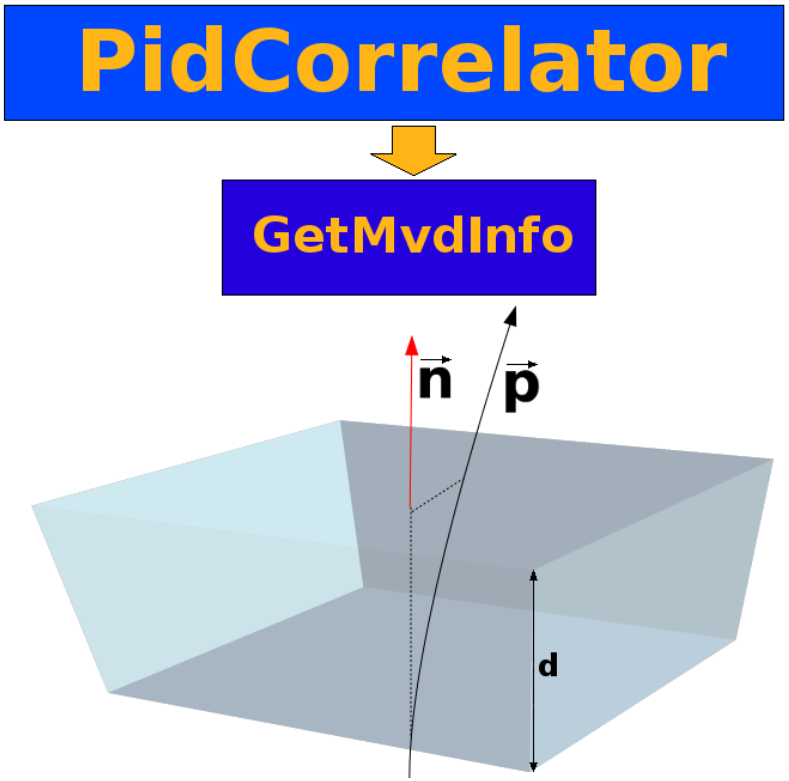
PID by Energy Loss

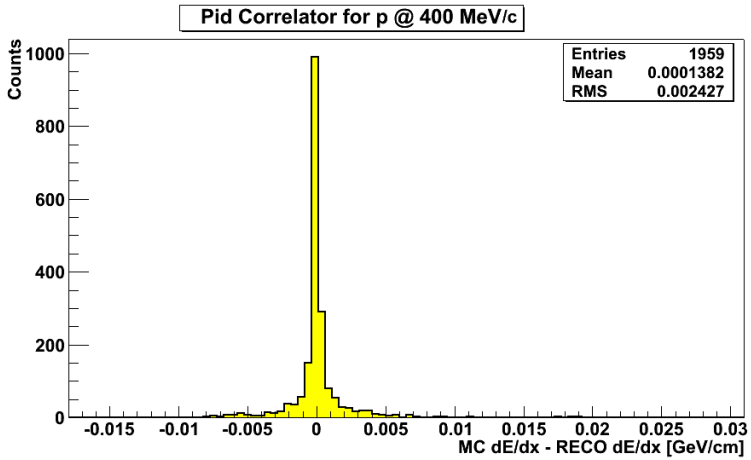
Steps

- Fix dE/dx in the PidCorrelator
- Parametrize the dE/dx
- Calculate the PDF

PID by Energy Loss

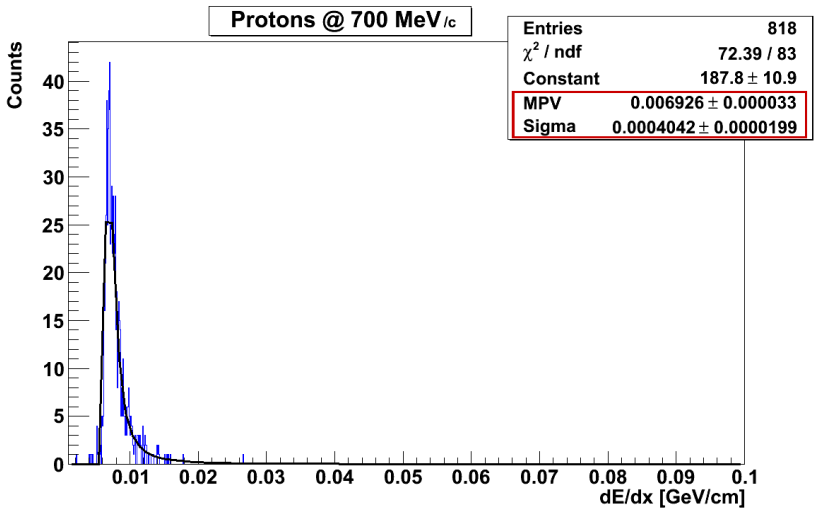
Fix dE/dx in the Pid Correlator

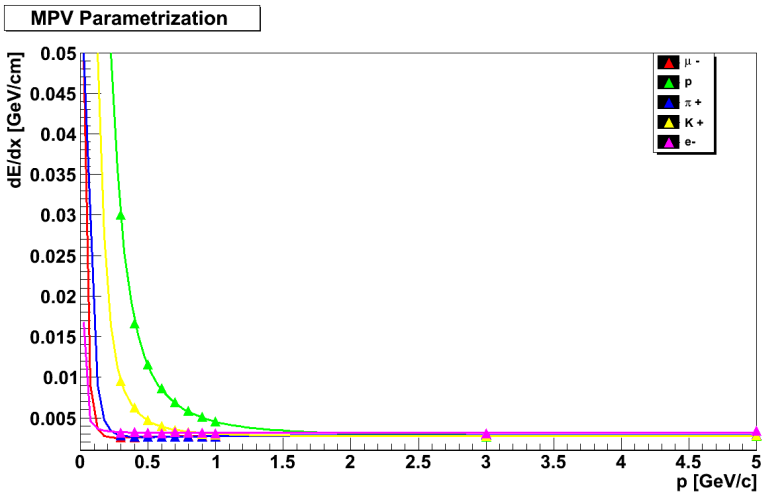




$$dx = \frac{d}{\cos\theta}$$

PID by Energy Loss
Parametrization





$$\frac{dE}{dx} = \frac{[0]}{p^2}\left[[1] * Ln(p^2) - p^2 - [2]\right]$$

PID by Energy Loss

Calculate the PDF with the Bayesian Approach

- $r(s|i) \rightarrow$ conditional probability density function to observe a PID signal s if a particle of i-type is detected;
- $w(i|s) \rightarrow$ probability to be a particle of i-type if the signal s is observed;
- $C_i \rightarrow$ a priory probability to find this kind of particle.

Bayes' Formula

$$w(i|s) = \frac{r(s|i)C_i}{\sum_{k=e,\mu,\pi} r(s|k)C_k}$$

PID by Energy Loss
Classes Implementation

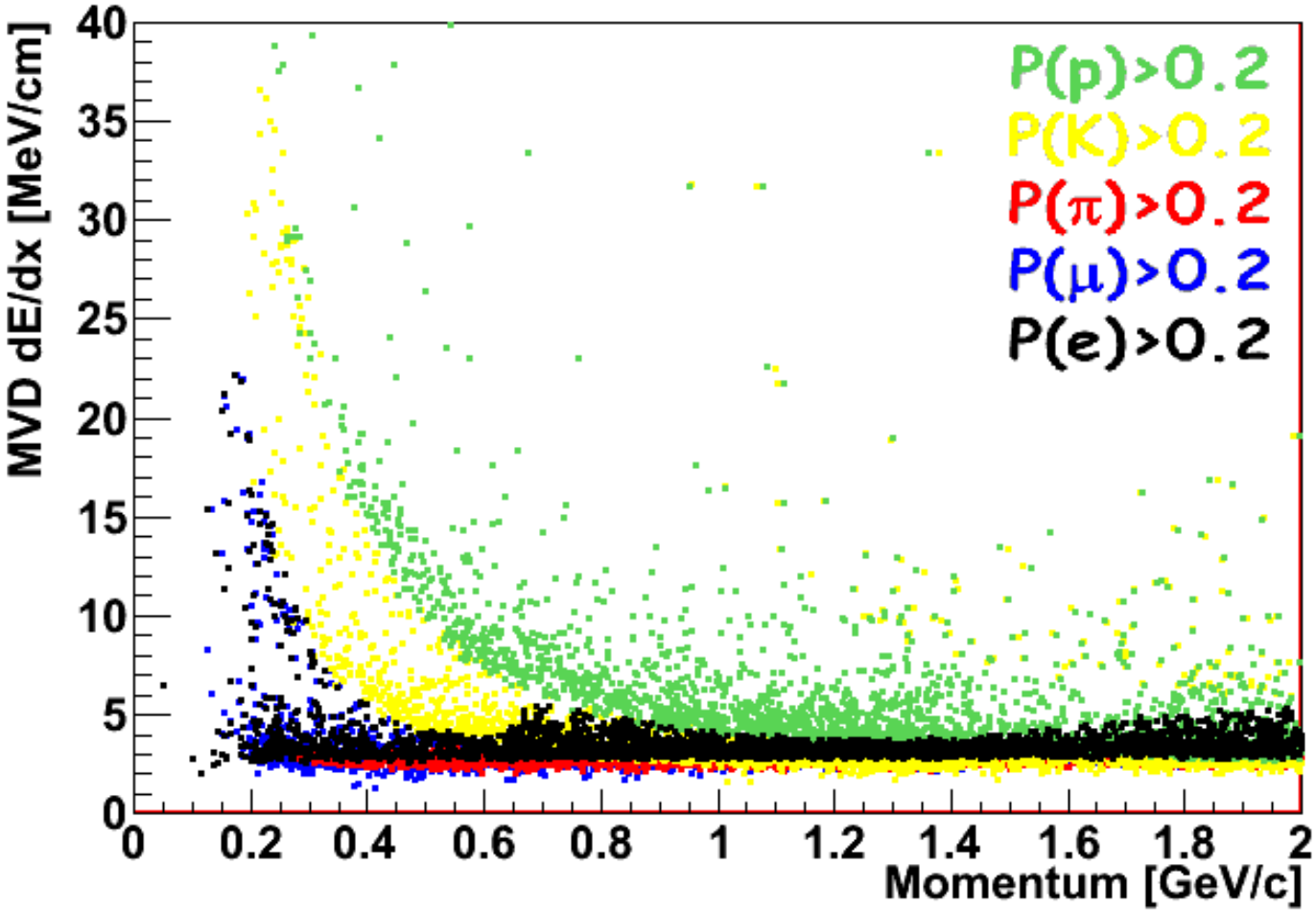
PndPidMvdPar

- Contains Particles (e^-, π, μ, p, k) Parameter
- GetParticleMpv
- GetParticleSigma

PndPidMvdAssociatorTask

- Take Momentum and Energy Loss of PndPidChargedCand
- Calls PndPidMvdPar to have Mpv and Sigma
- Calculate the PDF

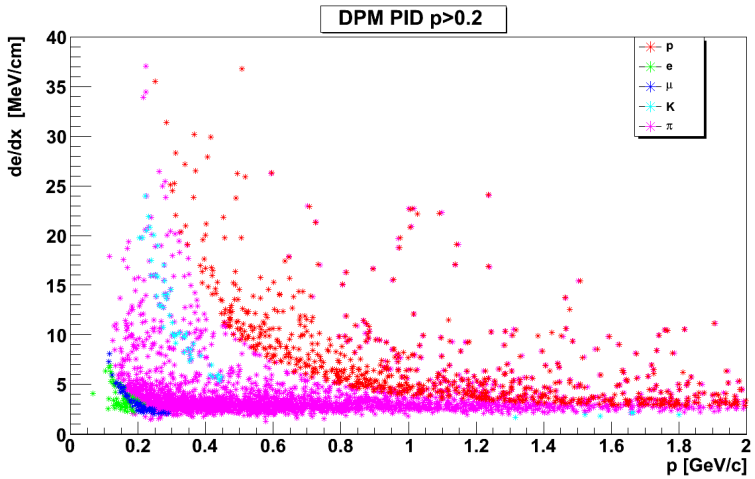
PID Results for Costant Flux

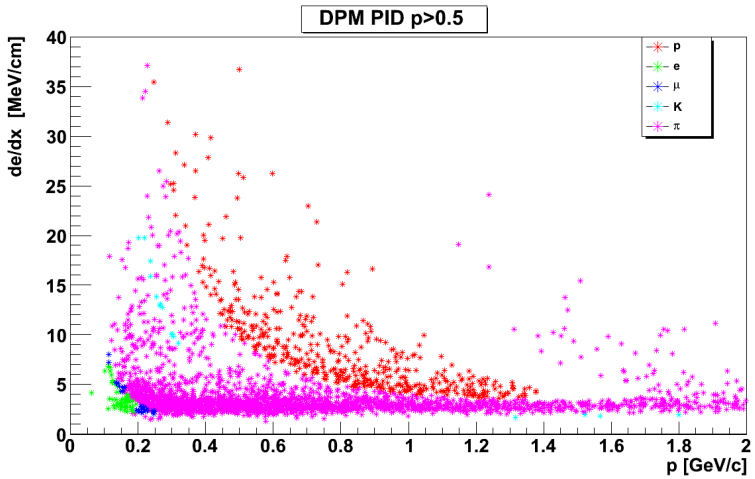


PID Results for DPM Events

DPM 2000 events @ 6 GeV/c no elastic

PndPidProbability * flux = new PndPidProbability(239+237,114+101,2282+2375,35+42,517+1052)





Thanks for the attention!