SCTau: Parametric Simulation: PID

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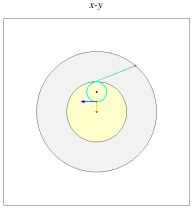
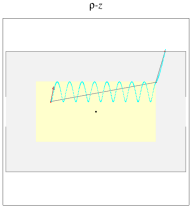
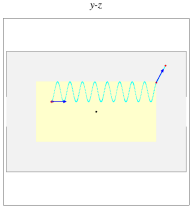
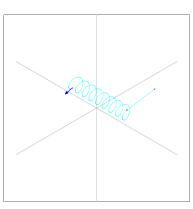
1st February, 2019

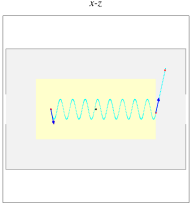
ToF







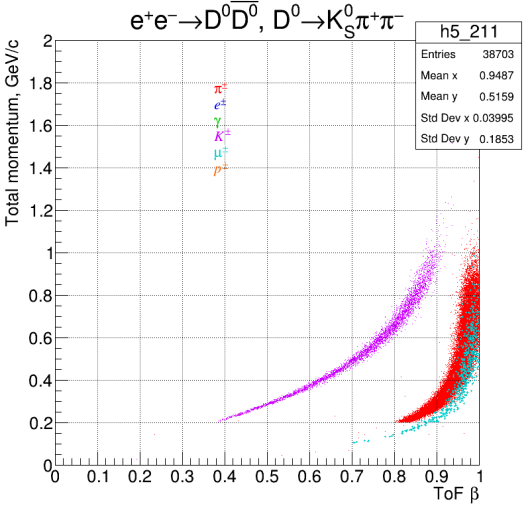




t_0 = 8.572e-08 sec
t_1 = 7.448e-09 sec
charge = -1.0
mass = 0.10566 GeV/c^2

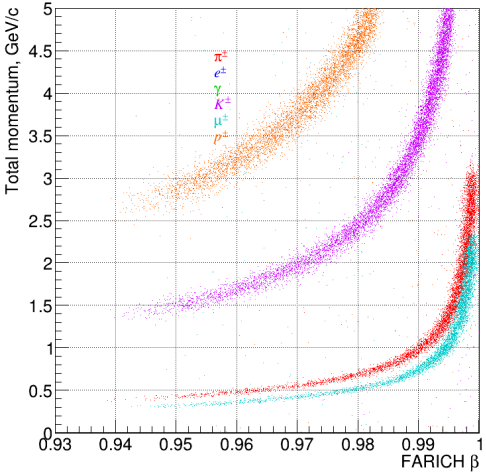
The ToF conception is implemented: propagation in the axial magnetic field and hitting the cylinder with holes in endcaps. No $\mathrm{d}E/\mathrm{d}x$, no scattering.

ToF



Interaction point smearing 20 ps (the same across an event). ToF time measurement smearing 35 ps.

FARICH


Total momentum, GeV/c
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$e^{\pm}$
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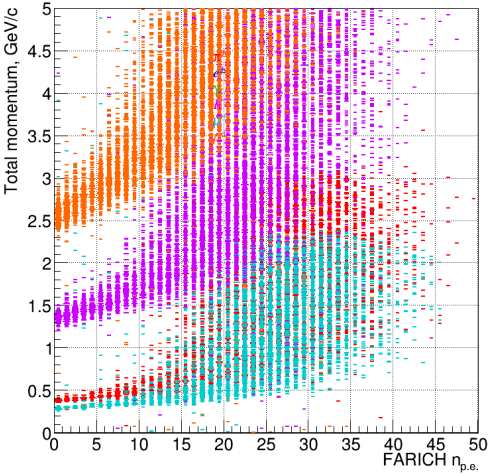
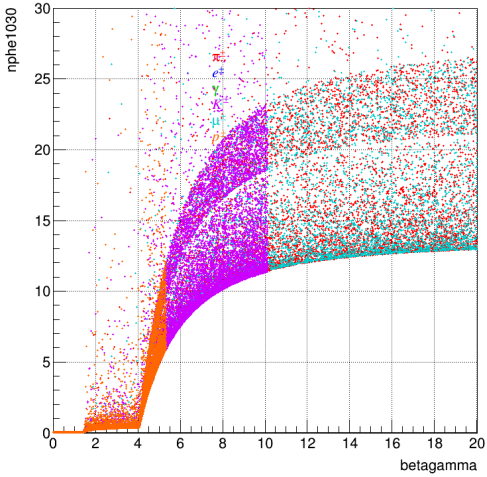
$\mu^{\pm}$
$p^{\pm}$


Total momentum, GeV/c
FARICH $n_{p.e.}$

AShiPh


nphe1030
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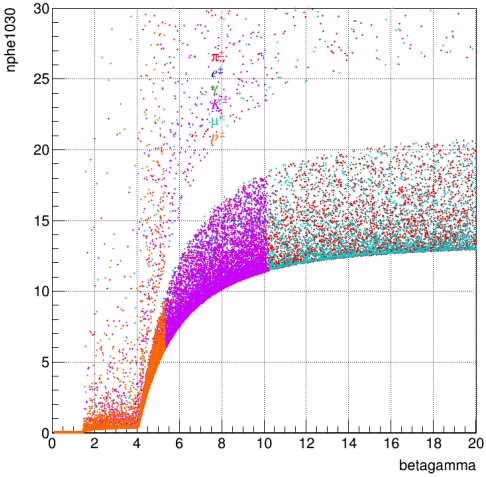
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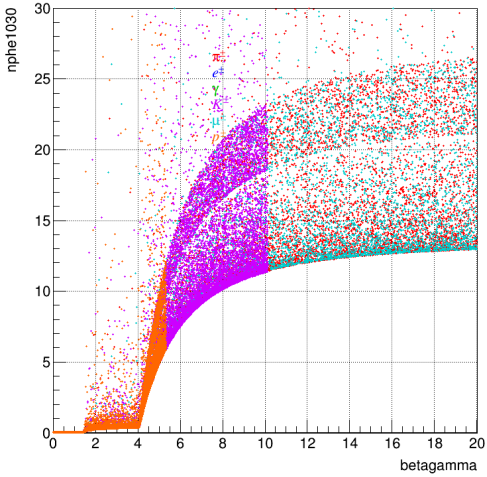
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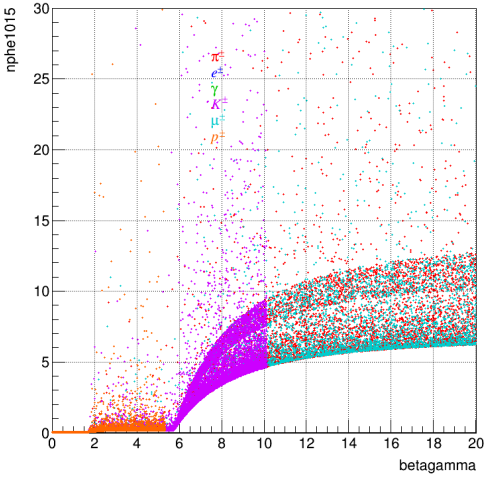
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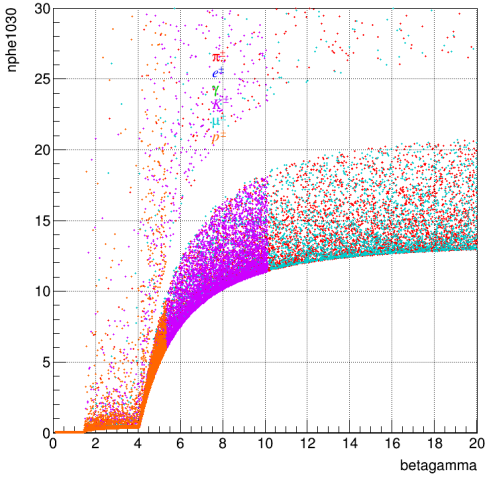
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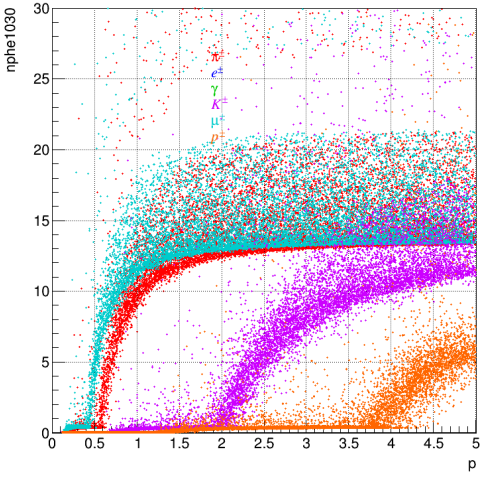
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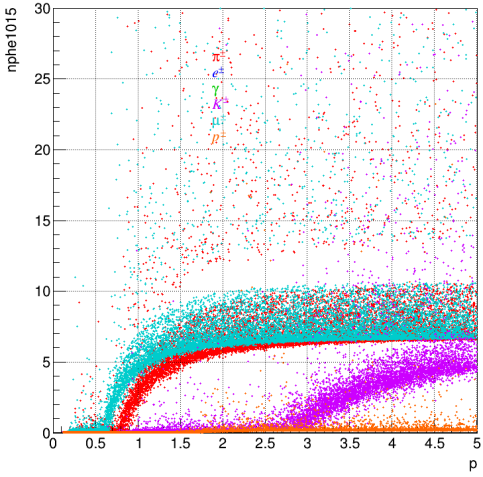
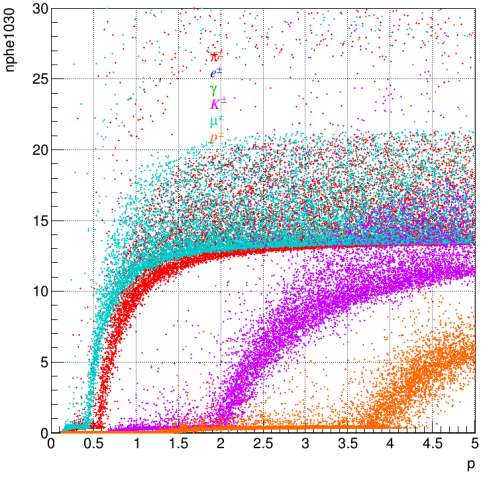
AShiPh





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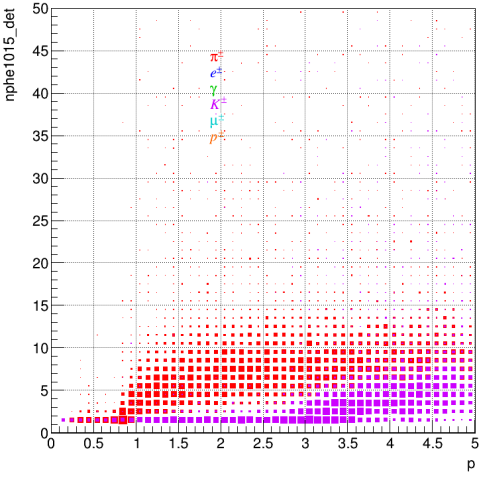
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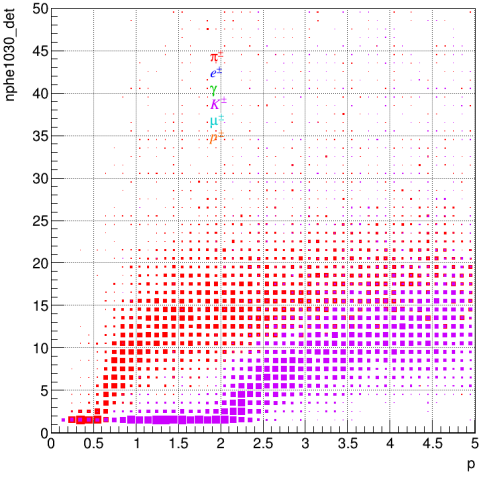
nphe1030_det
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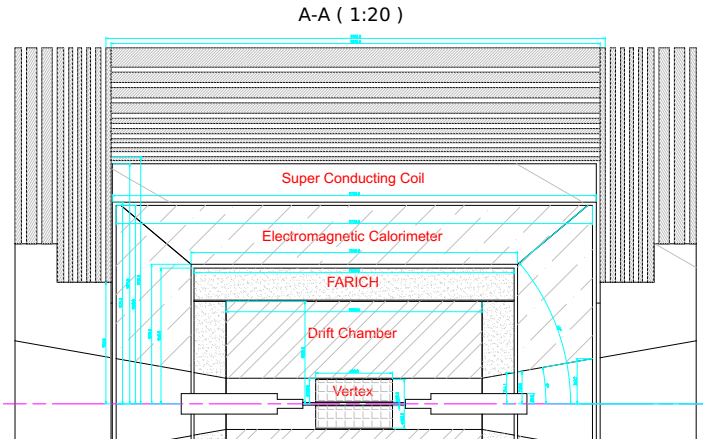
Fin

Data formation

- Generator data
- Papas
  - Tracker, calorimeter, solenoid
  - Detector response
  - Reconstructed particles
- PID systems
- Background and fake particles
- User tree maker



Detector subsystems

Tracker

Papas has only one build-in tracker. The complex response represented DC + IT should be implemented:

```
if pt < 0.1:
    return False
elif pt < 0.3:
    return rnd < 0.9
elif pt < 1.:
    return rnd < 0.95
else:
    return rnd < 0.99
```

The BaBar DC resolution model has been used.

$$\frac{\sigma}{p_T} = 0.13\,\% \times p_T + 0.45\,\%$$

Detector subsystems

Calorimeter

A hadron calorimeter is suppressed.

The electromagnetic calorimeter parameters are taken from D. A. Epifanov's CHARM-18 satellite presentation (pure CsI).

$$\frac{\sigma_E}{E} = \frac{0.82\,\%}{\sqrt[4]{E}} \oplus \frac{0.066\,\%}{E} \oplus 1.34\,\%$$

Different calorimeter options are possible, but paramitrization is required.