# Fast simulation about PID for p, K ,pi with TOF

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Effect of different radius (length)of TOF(only barrel) on the PID p 0-1GeV/c

L : 2900mm /1000 mm L : 1000/2000/2900mm R: 1800mm/555mm (itk & otk comparison) R: 555mm (itk barrel length)

# Performance of OTK with different position of endcap in z direction

p 0-1GeV/c

L : 1500/2350/2900mm R : 1800mm Endcap's geometry is constant (inner radius 400mm, outer radius 1800mm)



### **Key Parameter**

Separation power:

$$S_{AB} = \frac{|T_A - T_B|}{\sigma}$$
, T is ToF of particle,  $\sigma$ 

is the TOF resolution.

#### Effect of different radius(length) of ToF(only barrel) on the PID







#### Performance of OTK with different position of endcap in z direction

# **Conclusion and plan**

#### Conclusion :

L=2900mm , R=1800mm : p>800MeV ,  $\cos\theta < 0.8$ ; L=1000mm , R=555mm : p>250MeV ,  $\cos\theta < 0.8$ ; ITK can improve the PID on 0~1GeV with ac-lgad.

#### Plan :

Make fast simulation with TPC on 0~1GeV (Better resolution model required)

Bombine ITk ToF and TPC

# **BACK UP**



$$\frac{\sigma_I}{I} = \frac{13.5}{n^{0.5} \cdot (h\rho)^{0.3}} [2.05 + 0.8(\beta\gamma)^{-0.3}] \times [2.5 - 1.5(\cos\theta)^4 + 3.9(\cos\theta)^{10}],$$