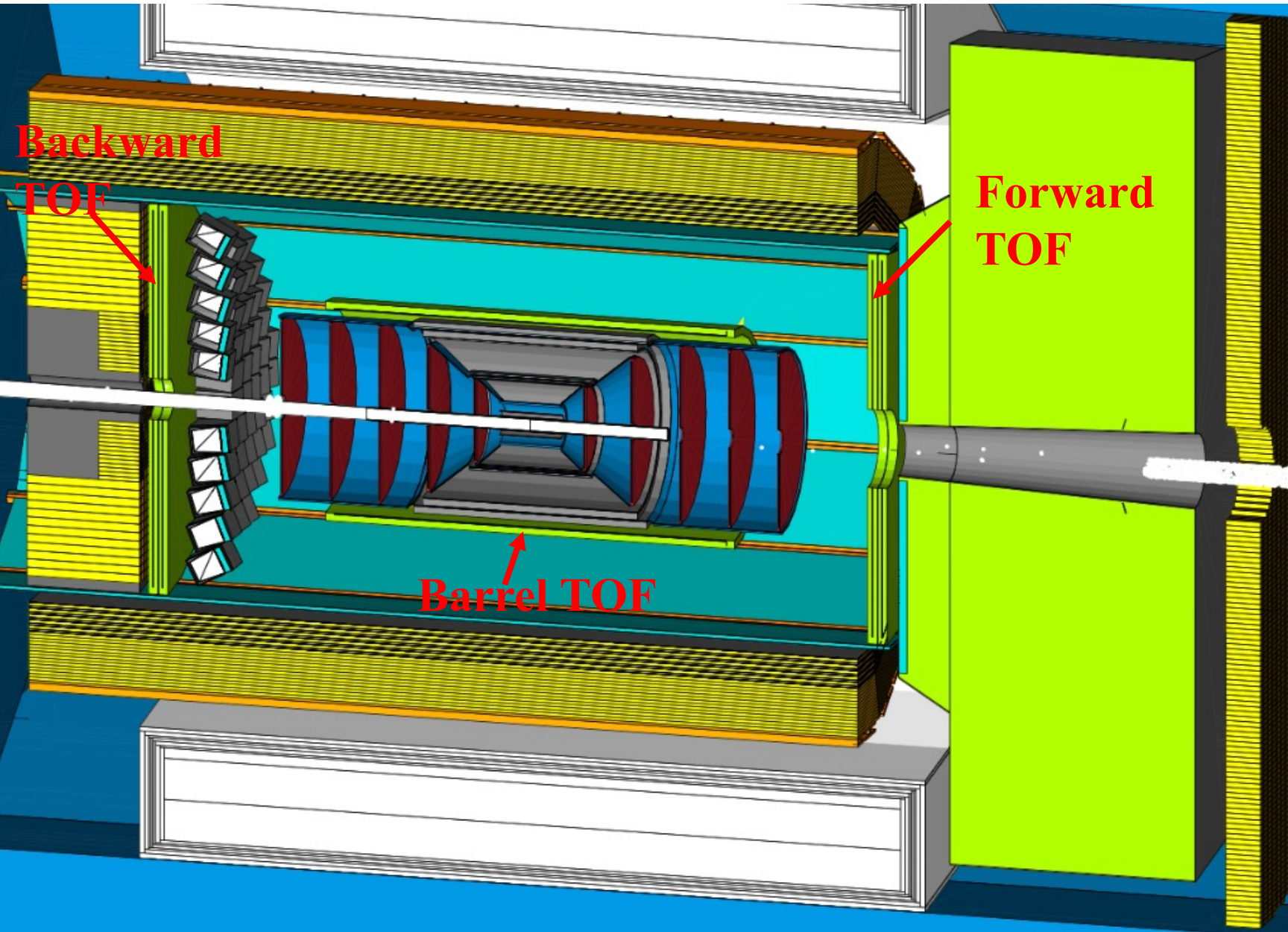


# AC-LGAD TOF Detectors in ATHENA DD4HEP



**Barrel TOF** (Area=6.28m<sup>2</sup>)

Z=[-1m, 1m], R=0.5m,

Eta=[-1.44, 1.44]

Single layer with 30 ps resolution and  
2%X<sub>0</sub> material budget per layer

**Forward TOF** (Area=5.44m<sup>2</sup>)

Double layer with 25 ps resolution and  
5%X<sub>0</sub> material budget per layer

Z=1.73m, R<sub>in</sub>=0.19m, R<sub>out</sub>=0.95m

Eta=[1.36, 2.91]

**Backward TOF** (Area=5.44m<sup>2</sup>)

Double layer with 25 ps resolution and  
5%X<sub>0</sub> material budget per layer

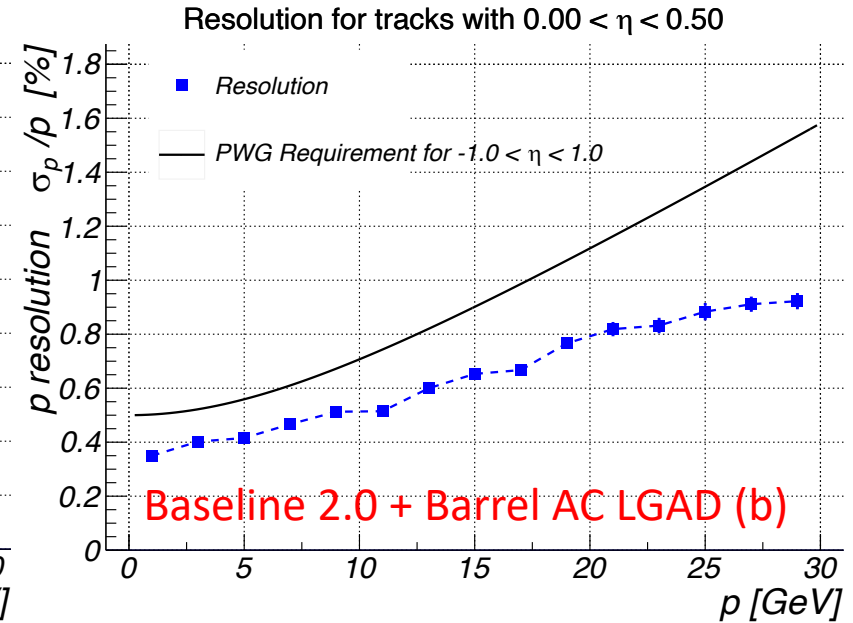
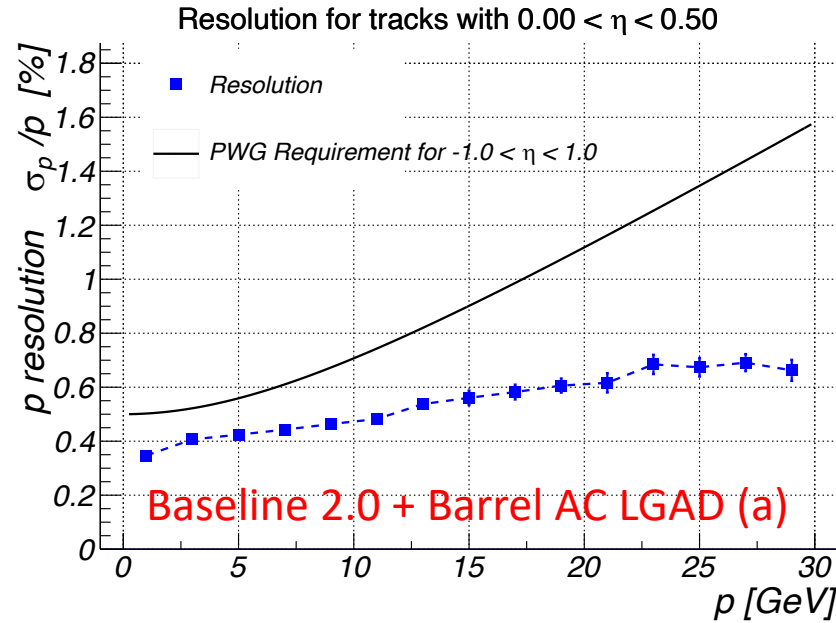
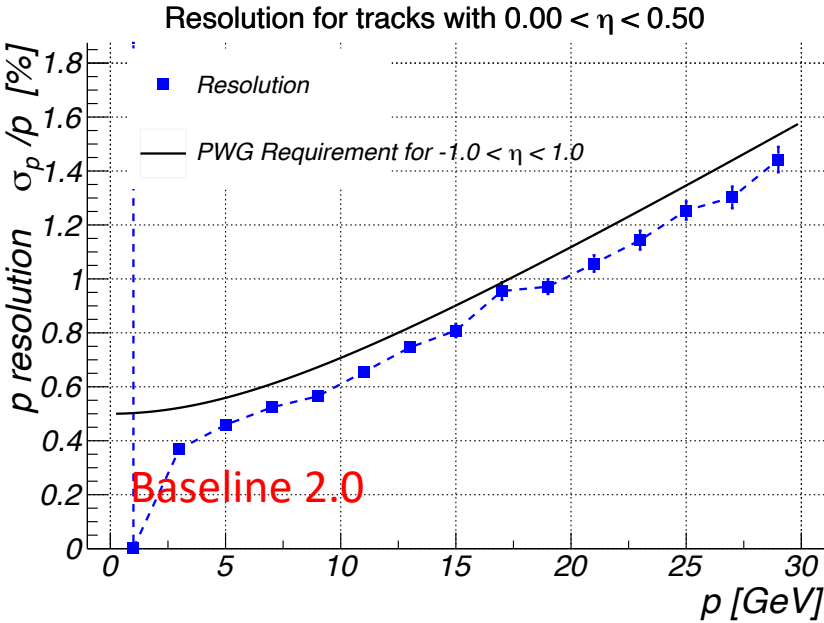
Z=-1.85m, R<sub>in</sub>=0.19cm, R<sub>out</sub>=0.95m,

Eta=[-2.97,-1.42]

**START Time**

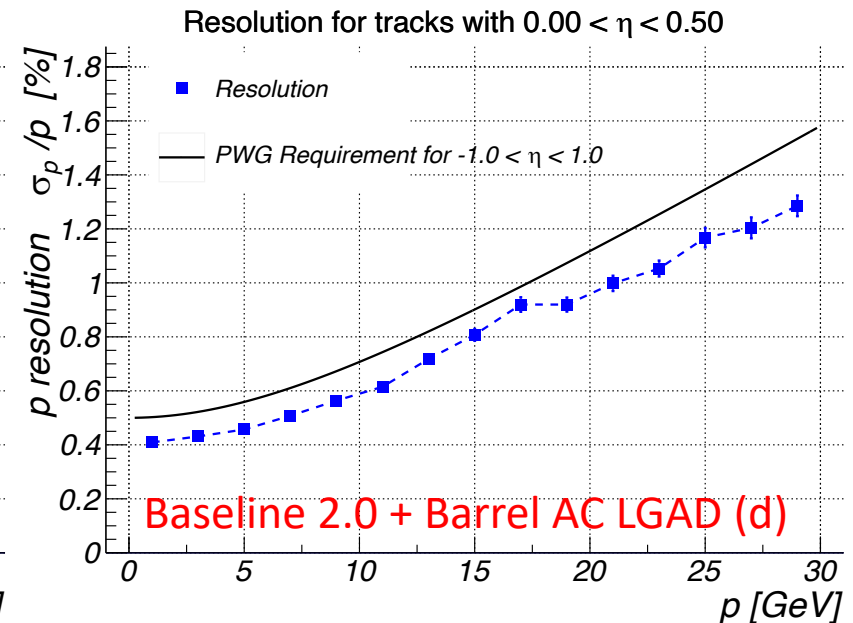
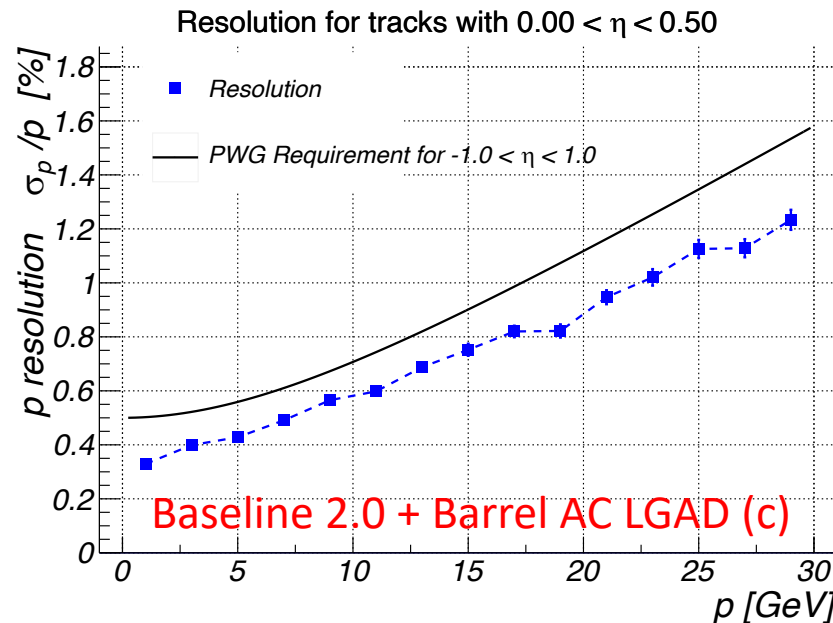
20 ps resolution

# AC-LGAD TOF Detectors in ATHENA DD4HEP

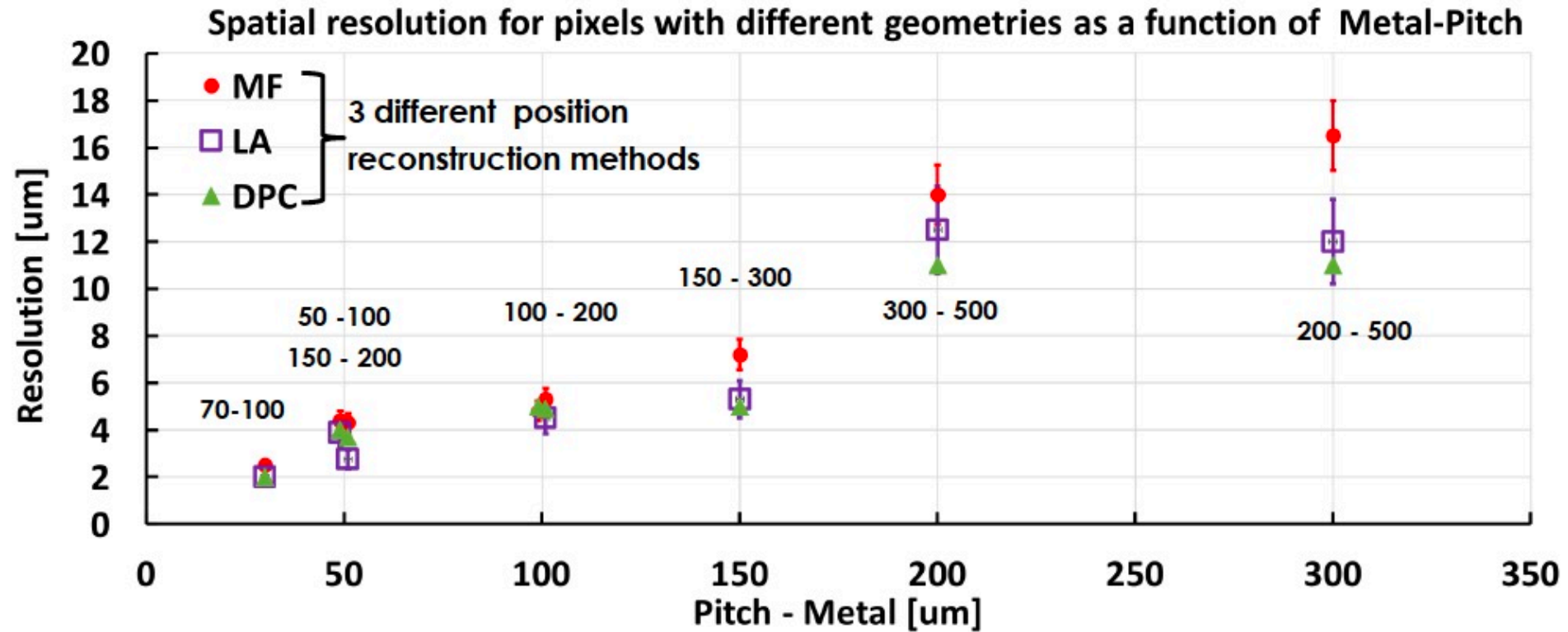


Barrel AC-LGAD at  $r=52$  cm, with 2.5 cm long strips along beam direction and the following spatial resolutions perpendicular to the strips

- (a)  $r\delta\phi = 15 \mu m$
- (b)  $r\delta\phi = 30 \mu m$
- (c)  $r\delta\phi = 60 \mu m$
- (d)  $r\delta\phi = 90 \mu m$



# Laser study: position resolution as a function of pixel geometry



**RSDs reach a spatial resolution that is about 5% of the inter-pad distance**

**→ ~ 5  $\mu\text{m}$  resolution with 150  $\mu\text{m}$  pitch**

**RSDs have the “usual” UFSD temporal resolution of 30-40 ps**