

# **BTOF Overview**

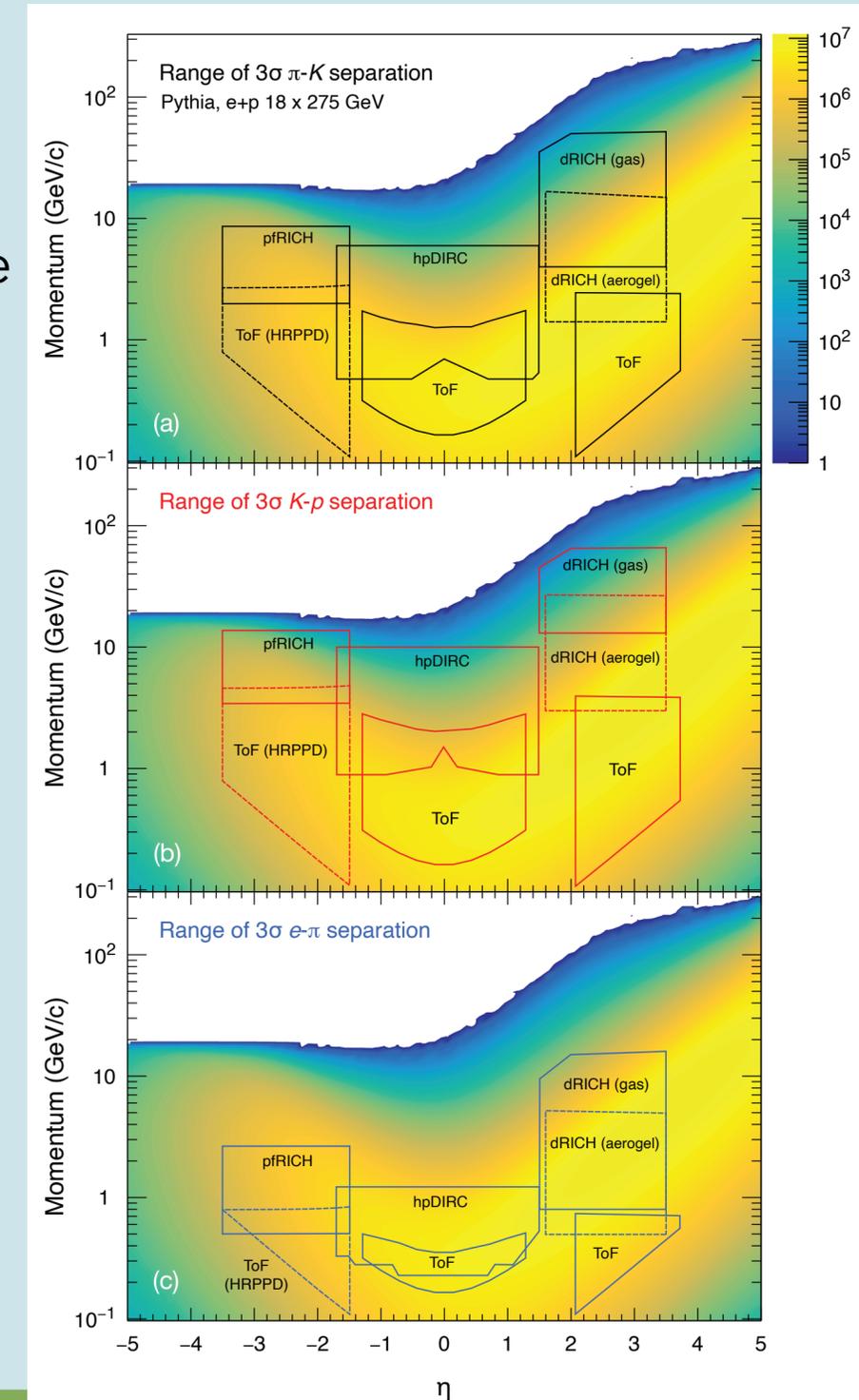
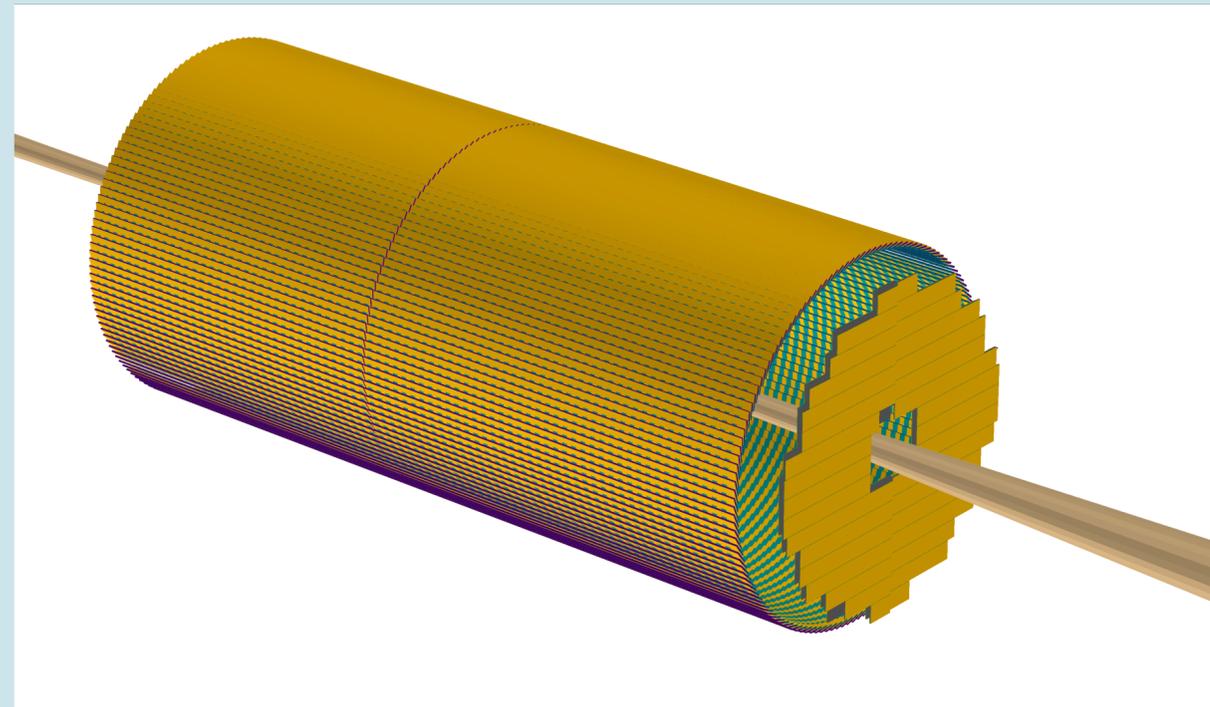
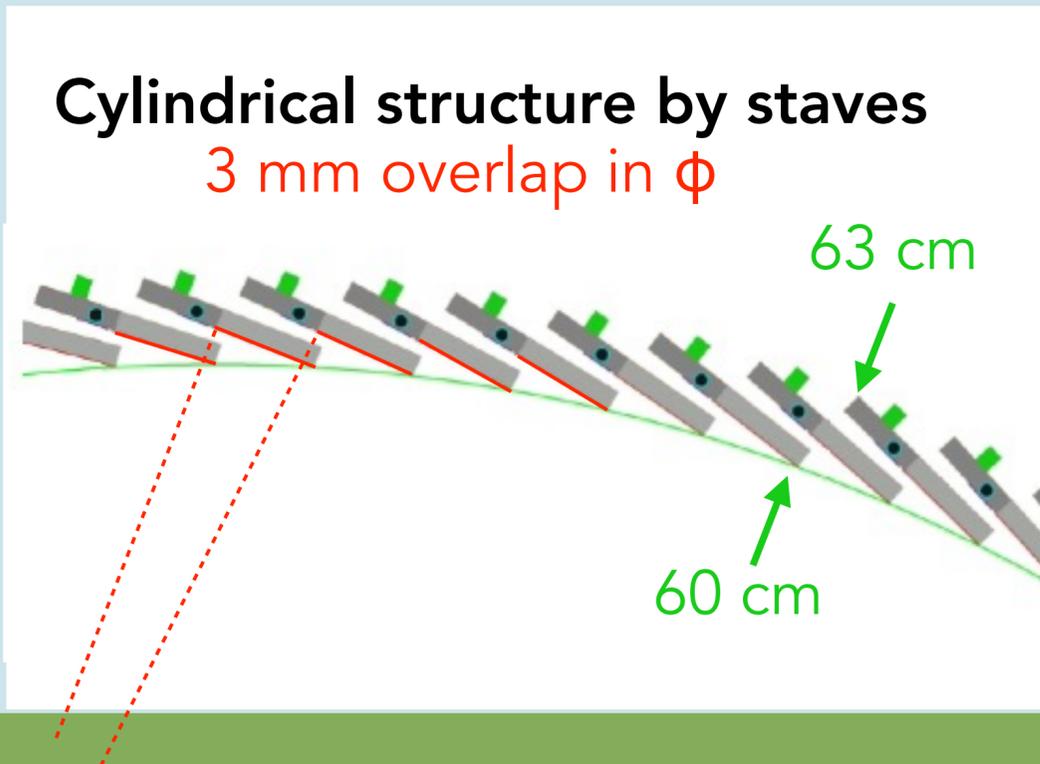
*Satoshi Yano (Hiroshima University)*

*The ePIC Collaboration meeting @ Villa Mondragone*

*21/01/2025*

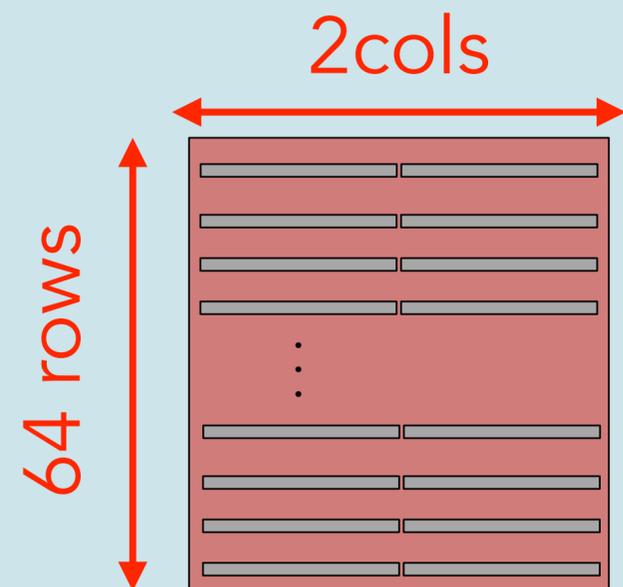
# Recap of the BTOF

- BTOF is composed of 144 staves (288 half staves) to form a cylindrical shape
- 64 AC-LGAD **strip-type** sensors readout by 64 ASICs are attached to one half stave
- The radius is 63 - 66 cm from the beam pipe
- Required performance is **35ps** timing resolution and **30 $\mu$ m** with 2-3%  $X/X_0$
- BTOF plays a role in the low momentum PID at midrapidity
  - The performance of  $\pi/K$  3-sigma separation below  **$\sim 1.5$  GeV/c** is baseline



# Items that have changed since the last workfest

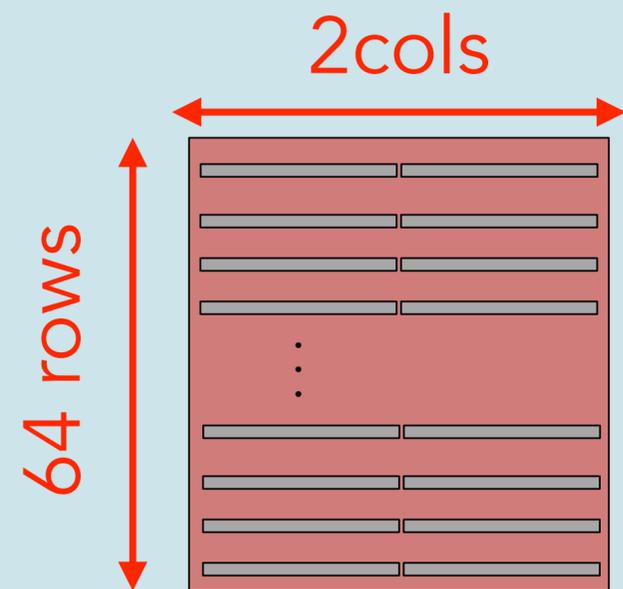
- The sensor design has been changed due to the readout geometry and production yield
  - $64 \times 4 = 256$  channels  $\rightarrow$   $64 \times 2 = 128$  channels ( $3.2 \times 4 \text{ cm}^2 \rightarrow 3.2 \times 2 \text{ cm}^2$ )
  - The number of sensors becomes double



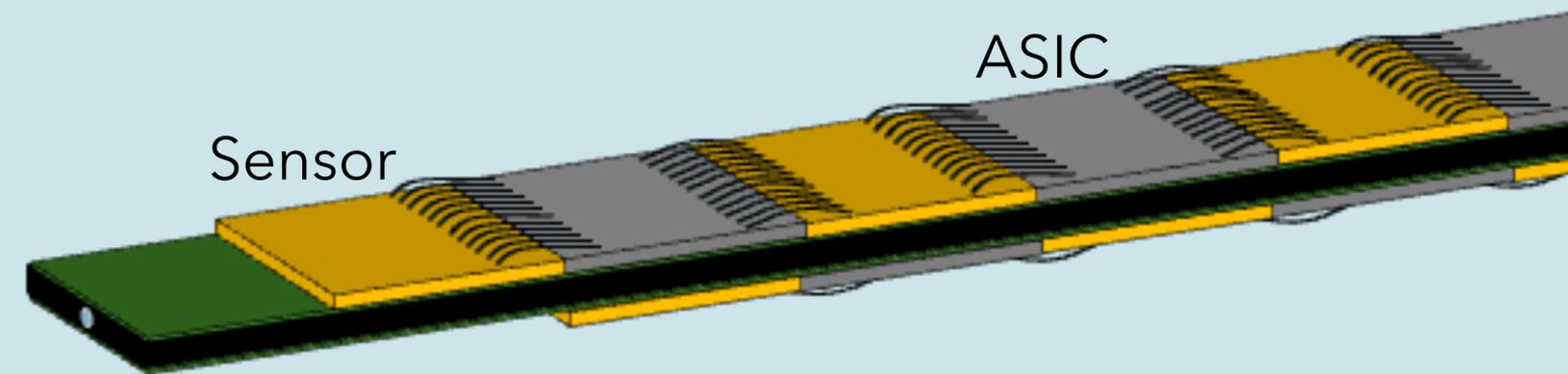
- BTOF strip sensor
  - **18432 sensors**
  - $12 \text{ m}^2$
  - 2.4 M readout channels

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  - The number of sensors becomes double
- The double-side stave becomes the baseline of the design
  - Effective cooling of ASIC and removing acceptance gap between sensors



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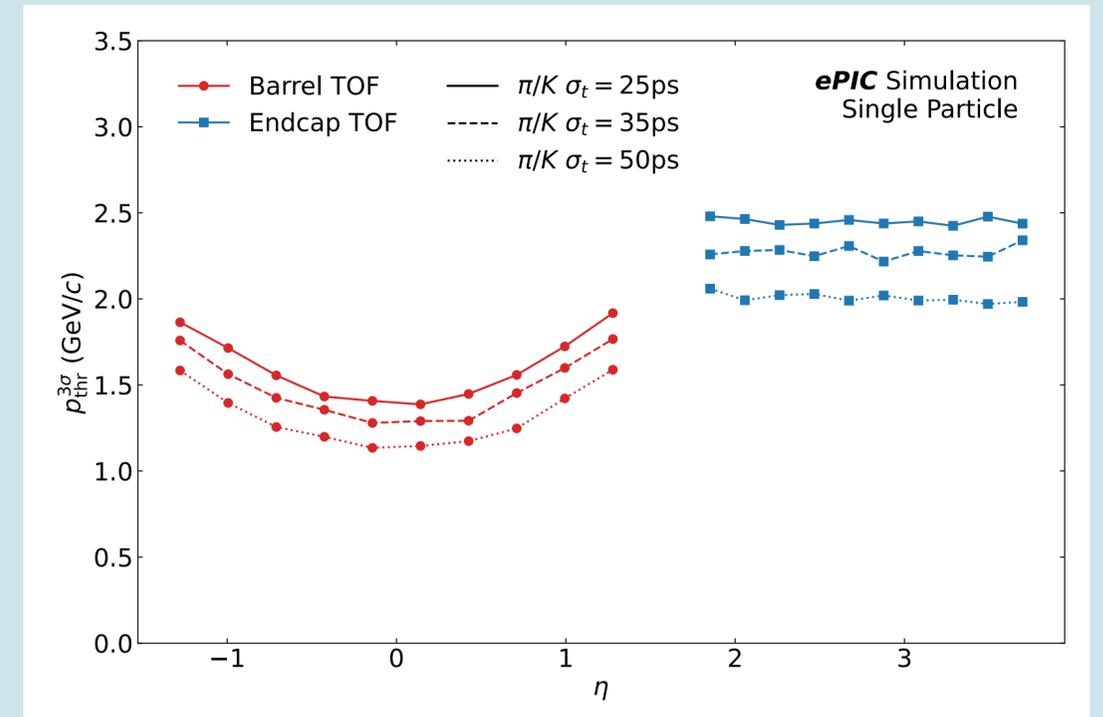


# What must be discussed in this meeting

- **What amount of BTOF material budget is allowed?**
  - Effect on the angle resolution on the hpDIRC surface
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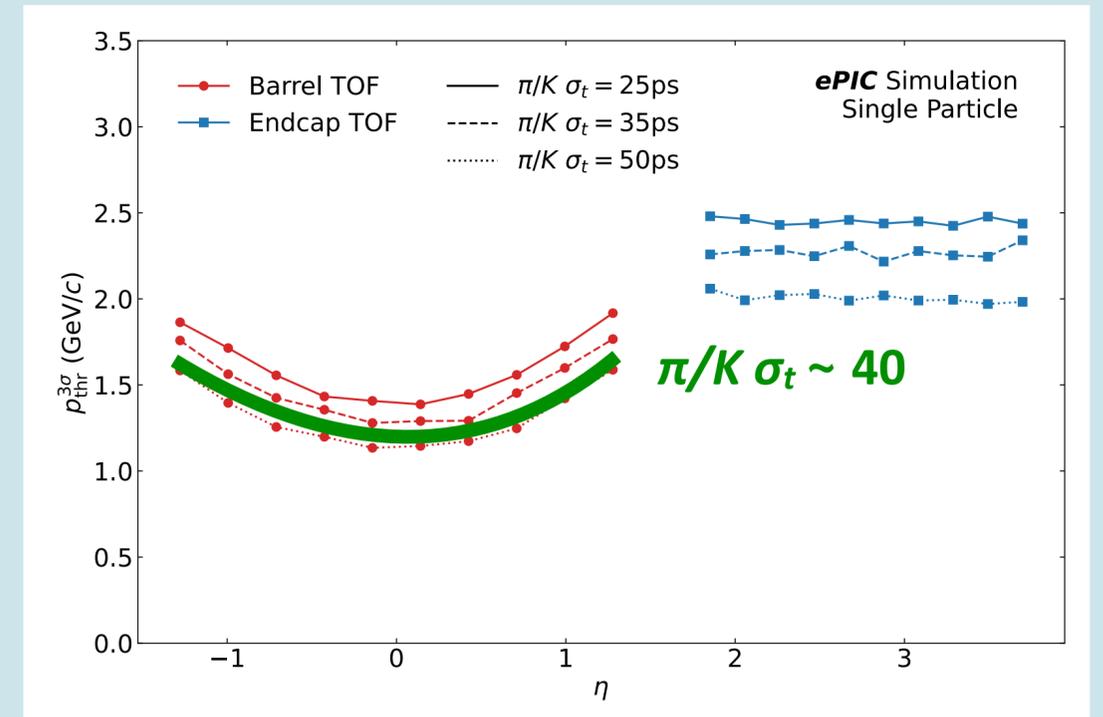
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  - Best timing performance is  $\Delta t_{\text{Sensor}} = 35 \text{ ps} \rightarrow \Delta t_{\text{BTOF}} = 43 \text{ ps}$  with  $\Delta t_{\text{ASIC}} = 20 \text{ ps}$ , and  $\Delta t_{\text{T0}} = 15 \text{ ps}$



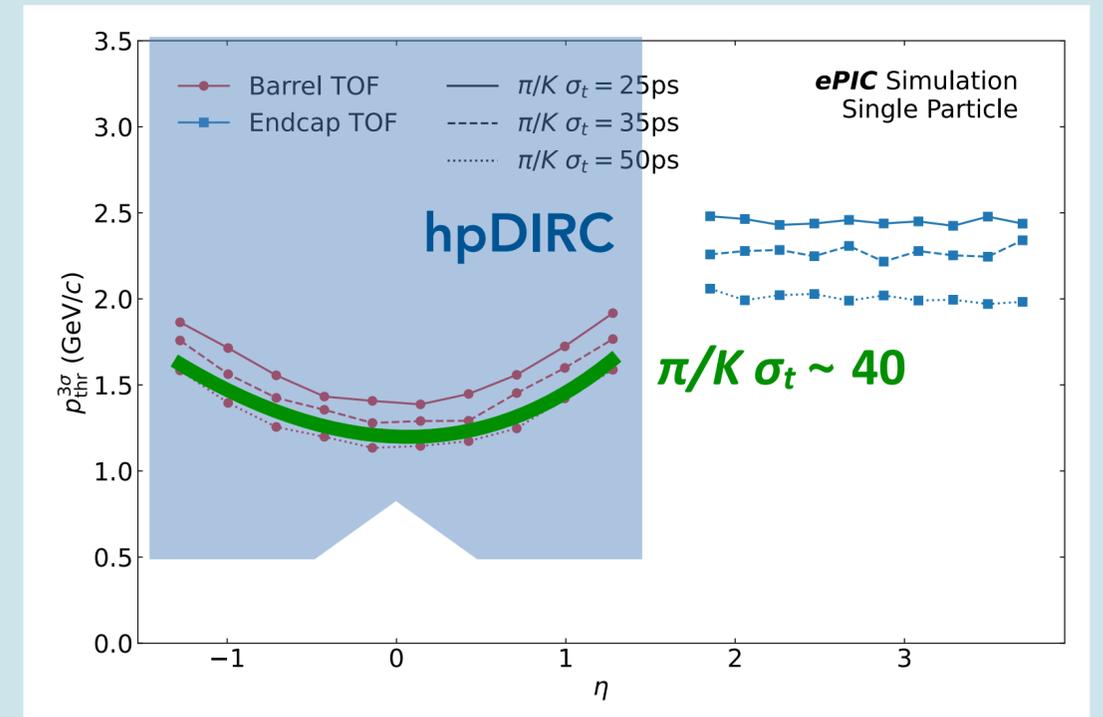
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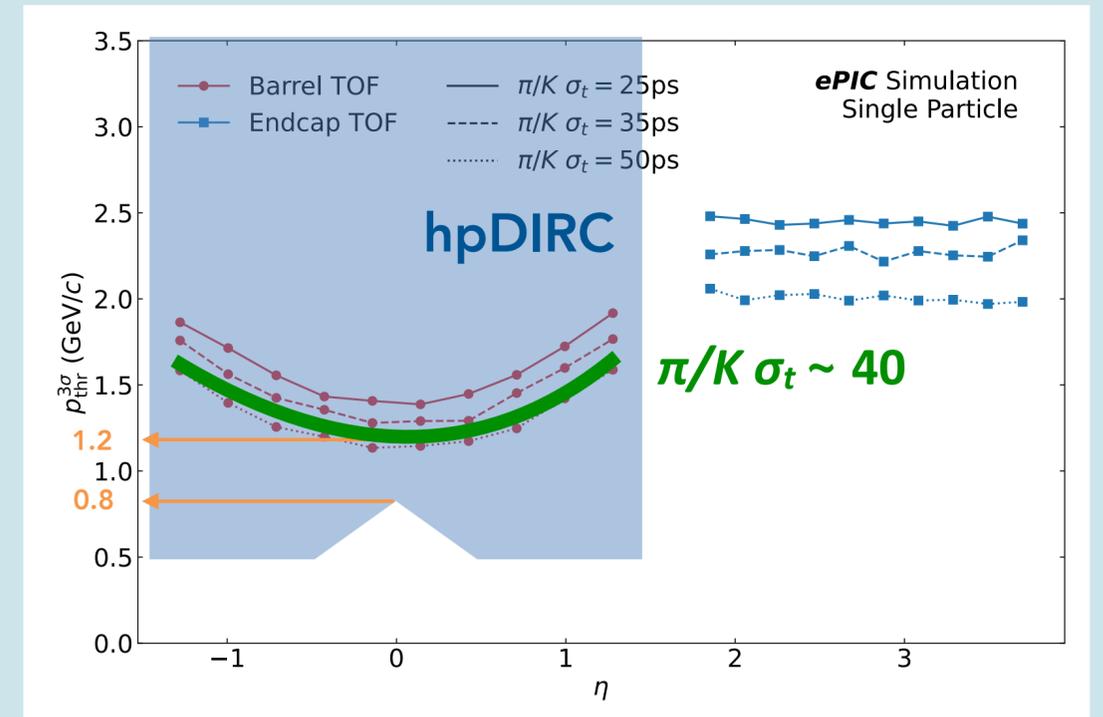
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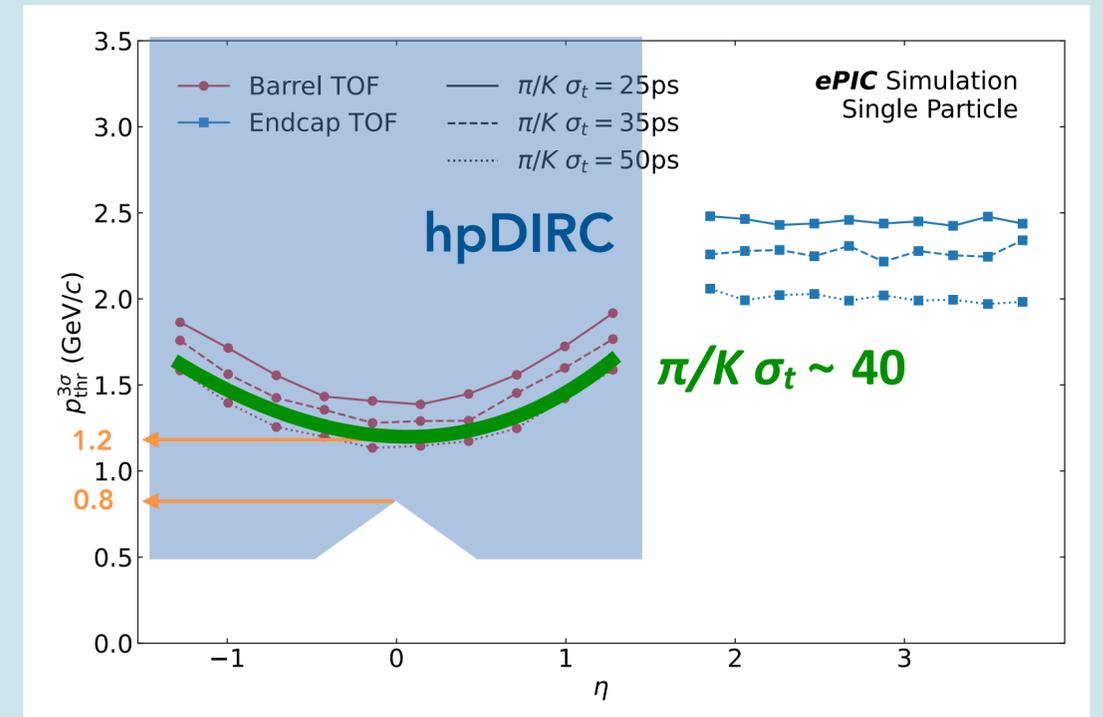
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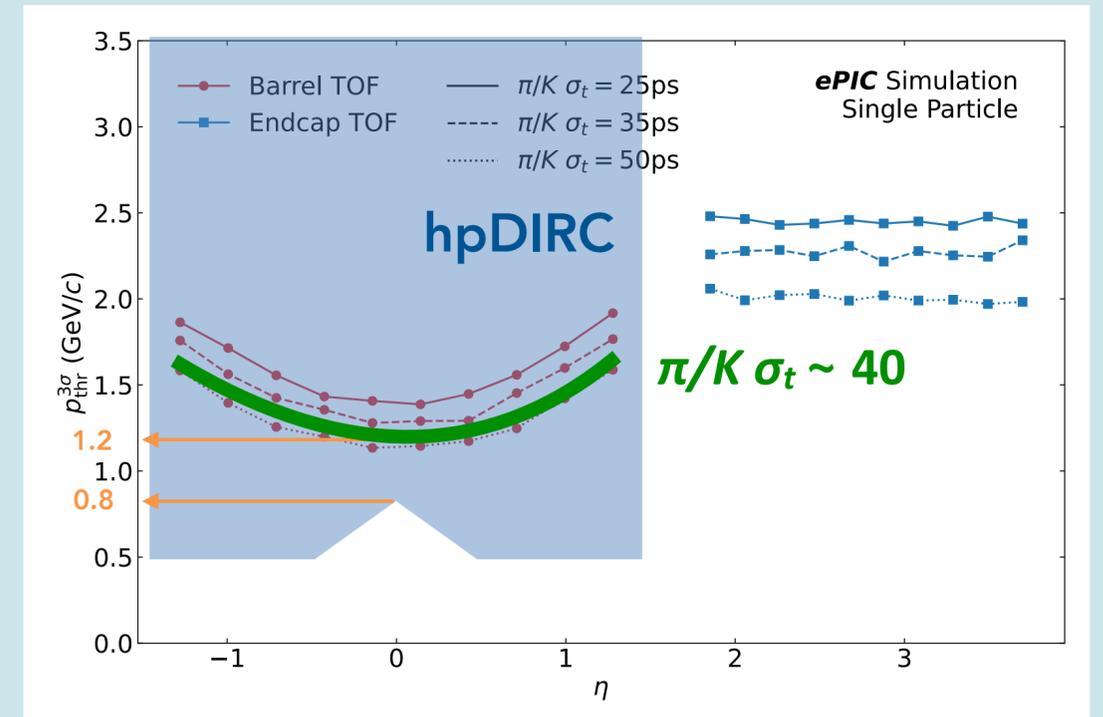
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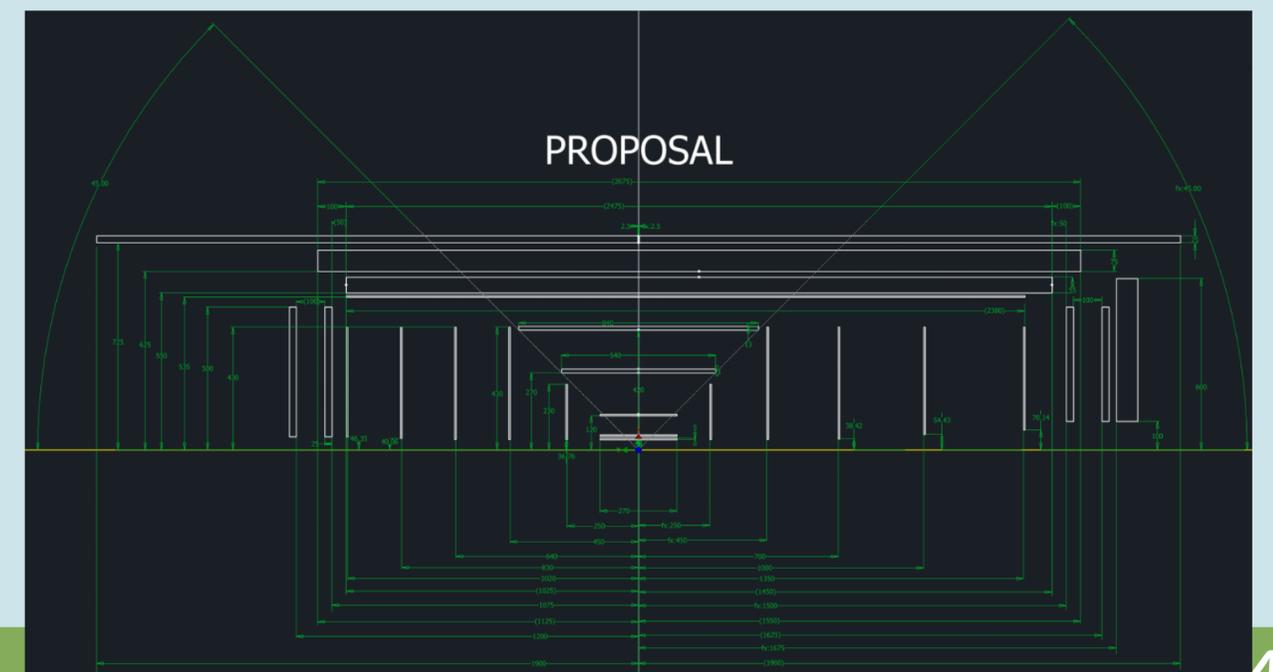
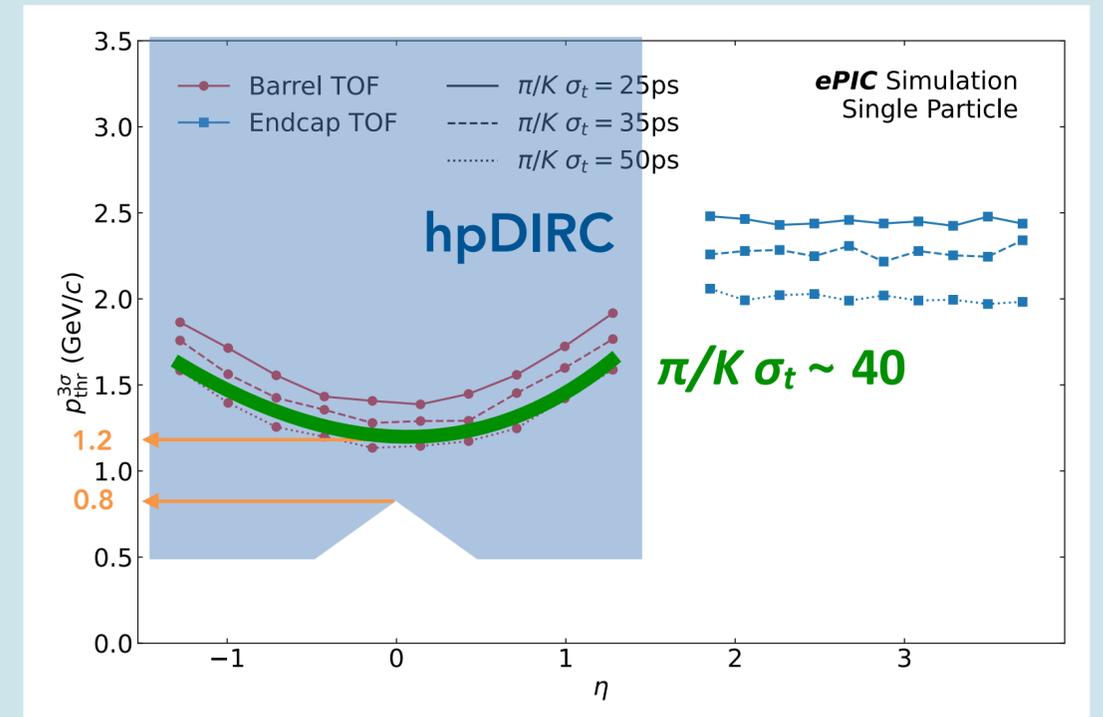
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- **What is the impact of the plan to shorten the BTOF by 21cm?**
- **How does the Japanese fund work with eRD109+eRD112?**
  - The Japanese government (MEXT) has decided to support BTOF (in FY25 ~\$2M)

