# MPGD Layers in ePIC Detector

* This presentation takes from the work done by the previous tracking conveners: F. Bassu, L. Gonella, L. Gnanvo, and L. Xuan (see their WG presentation)

❑ MPGD layers will **not** contribute to momentum or pointing resolution performance

- Pattern recognition to aid in track fitting

- Compliment Si with fast timing hits (order mag. of 10 ns) to aid in background/single discrimination

  ➢ MPGD layers needed in backward, forward, and endcap regions
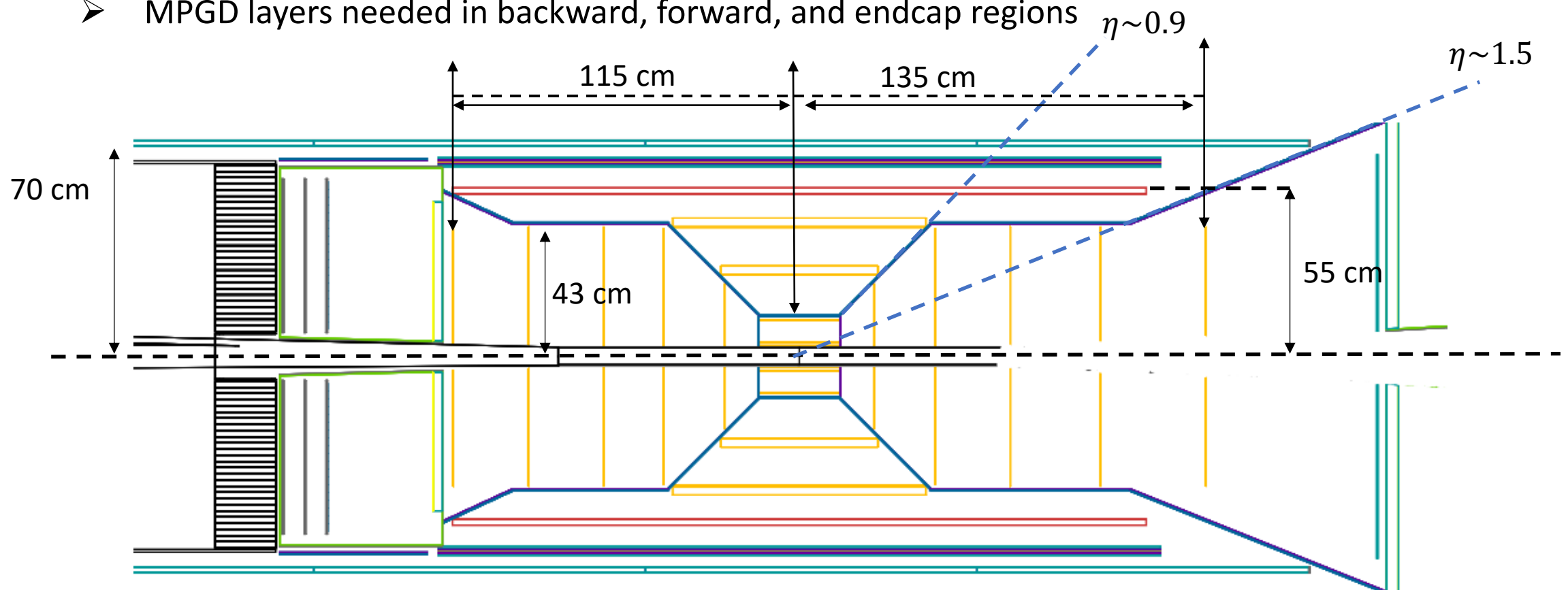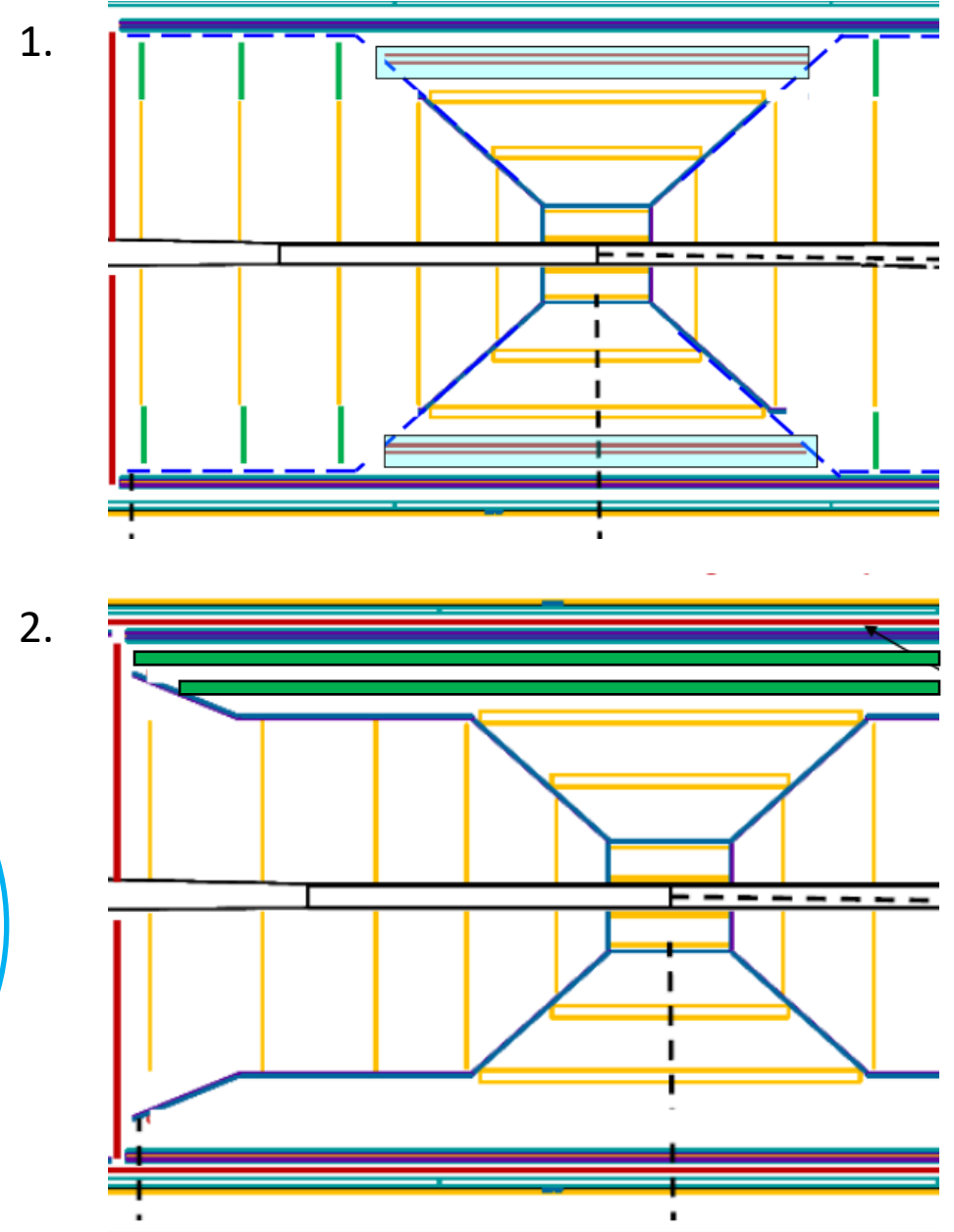
Current ePIC Tracking Layout
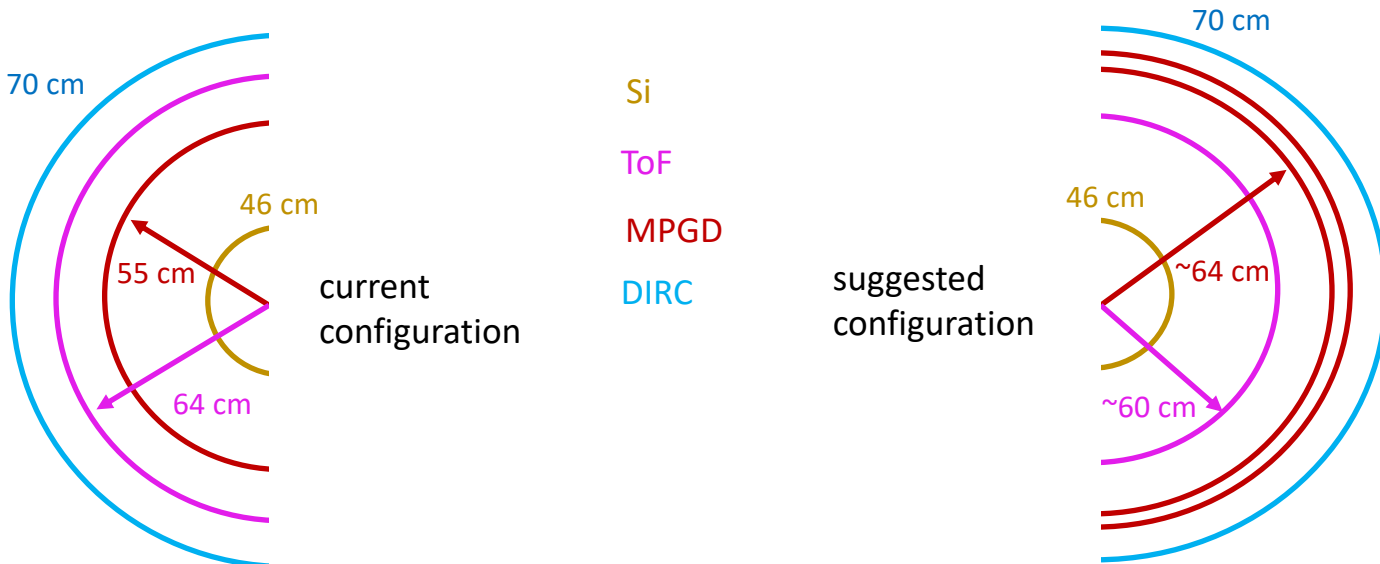
- [ ] Use MPGDs to increase number of hits in barrel and backward/forward region

  - Transition region ($\sim 0.9 \leq |\eta| \leq 1.5$)

Si hits only

Ernst's fast simulation

$\eta \sim 0.9$
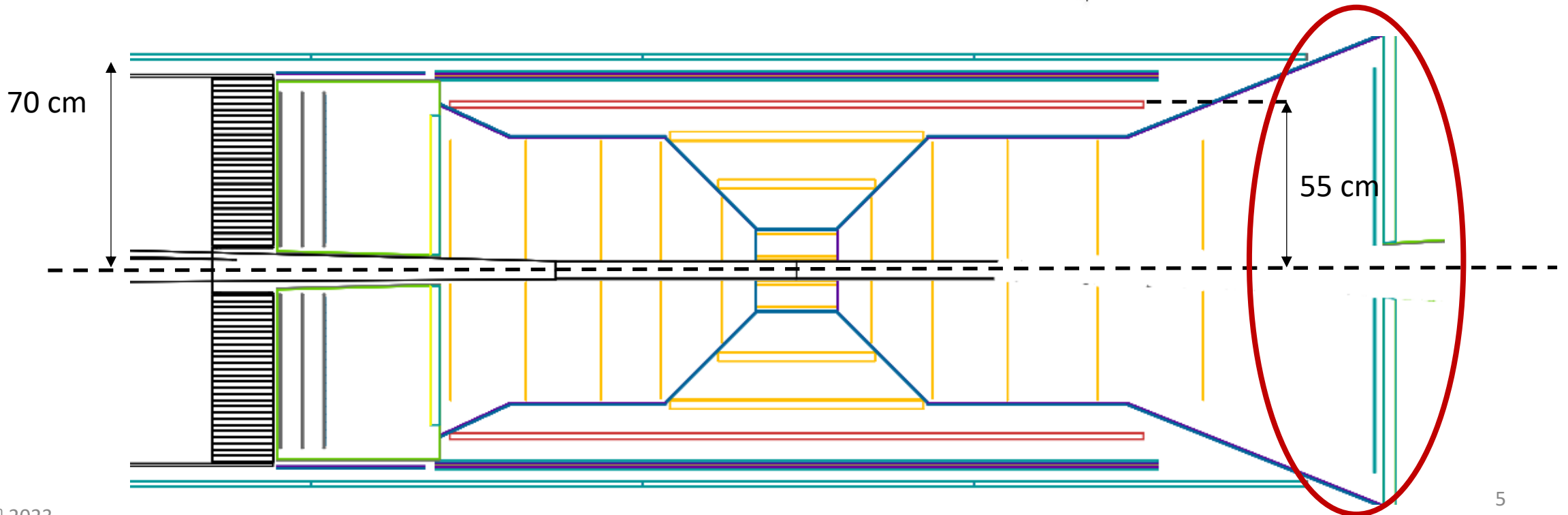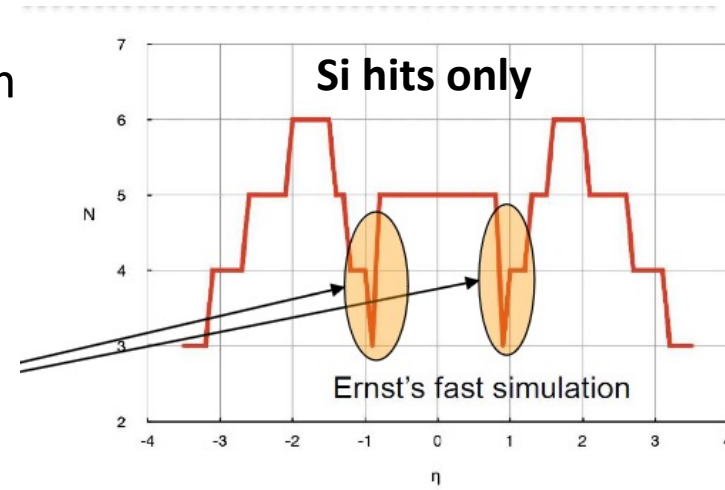
$\eta \sim 1.5$

70 cm

55 cm
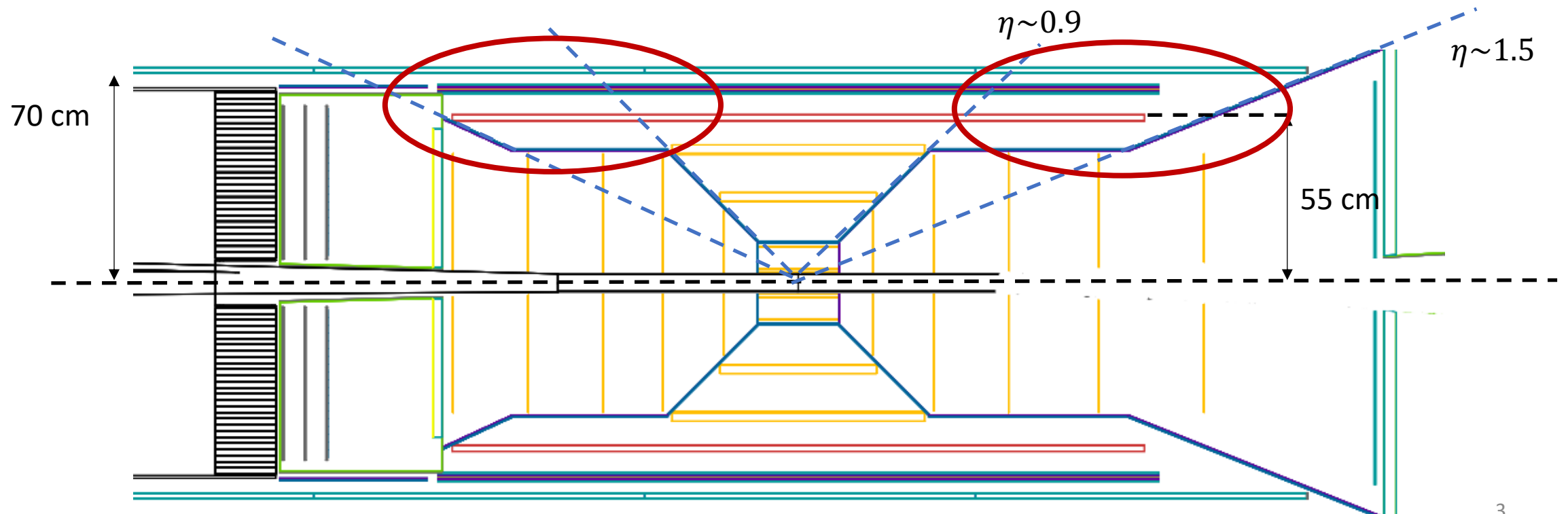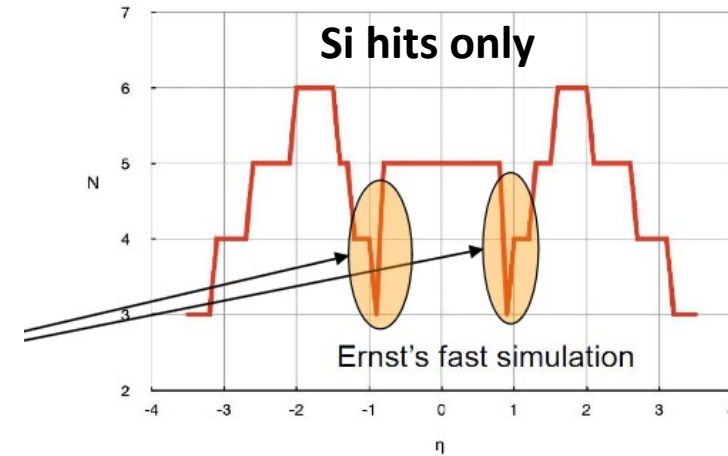
Current ePIC Tracking Layout Options

□ Transition region ($0.9 \leq |\eta| \leq 1.5$):

1. Extend disk endcap trackers (dr ~ 15-20 cm)

   - Barrel layers follow one projective cone at $|\eta|{\sim}1$

   - Extension of Si ideal, but is it possible?

   - If MPGD ring how de we support/integrate them?

2. Extend MPGDs to follow outer cone projection

   - MPGD location depends on flexibility of ToF layer

   - Alternative: MPGD-ToF-MPGD sandwich

1.

2.

70 cm

70 cm

46 cm

46 cm

55 cm

~64 cm

64 cm

~60 cm

Si

ToF

MPGD

DIRC

current configuration

suggested configuration

Current ePIC Tracking Layout

❑ Use MPGDs to increase number of hits in forward arm

Si hits only

Ernst's fast simulation

70 cm

55 cm

Tracking Layout
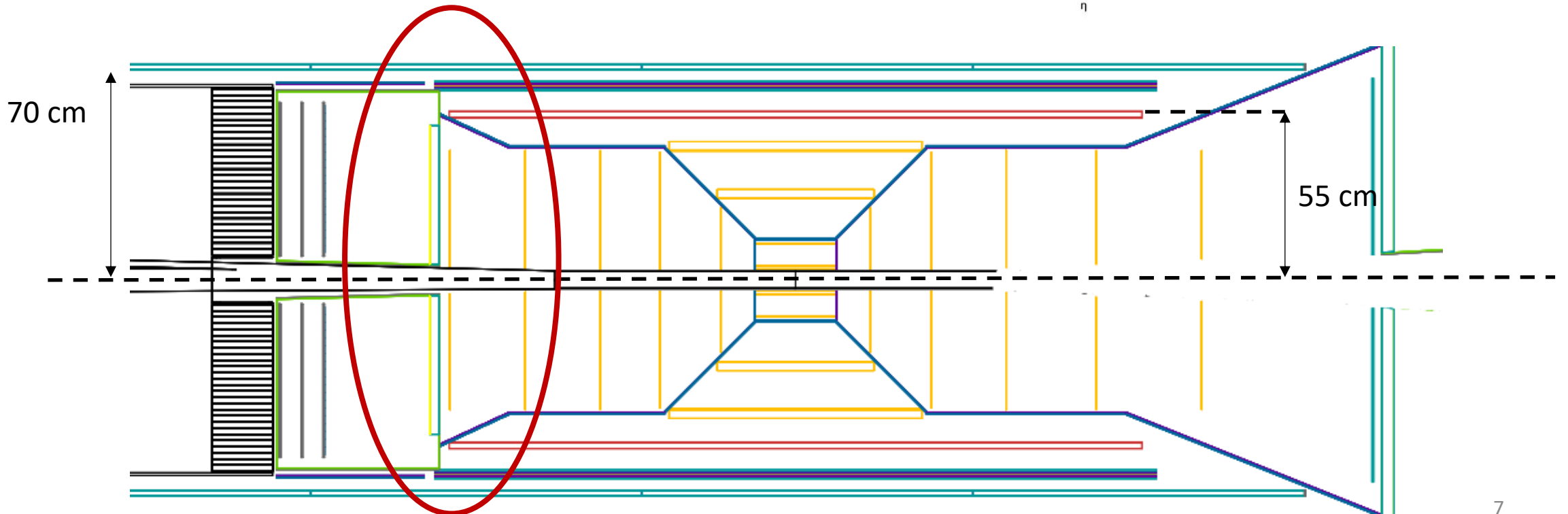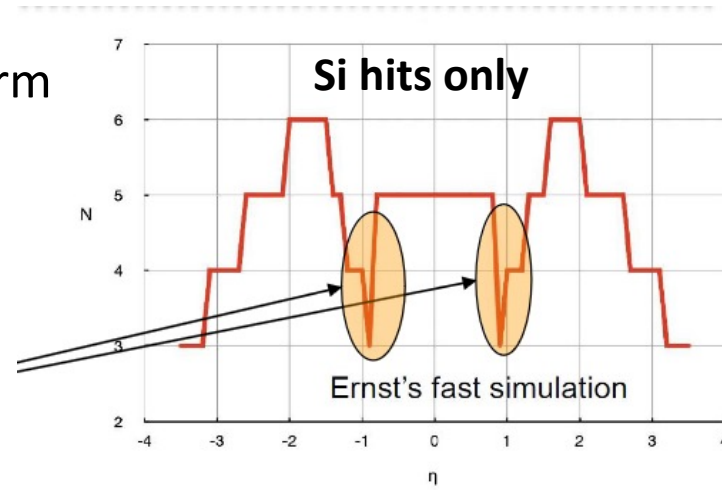
- ❑ Forward Endcap

  - A lot of space in forward direction

  - ATHENA proposal showed benefit of additional Si disk (Si+)

  - Additional MPGD layers for additional timing and pattern recognition

    - ➢ Number of layers depends on number of points wanted (2 min.)

    - ➢ Arrangement depends on ToF position flexibility
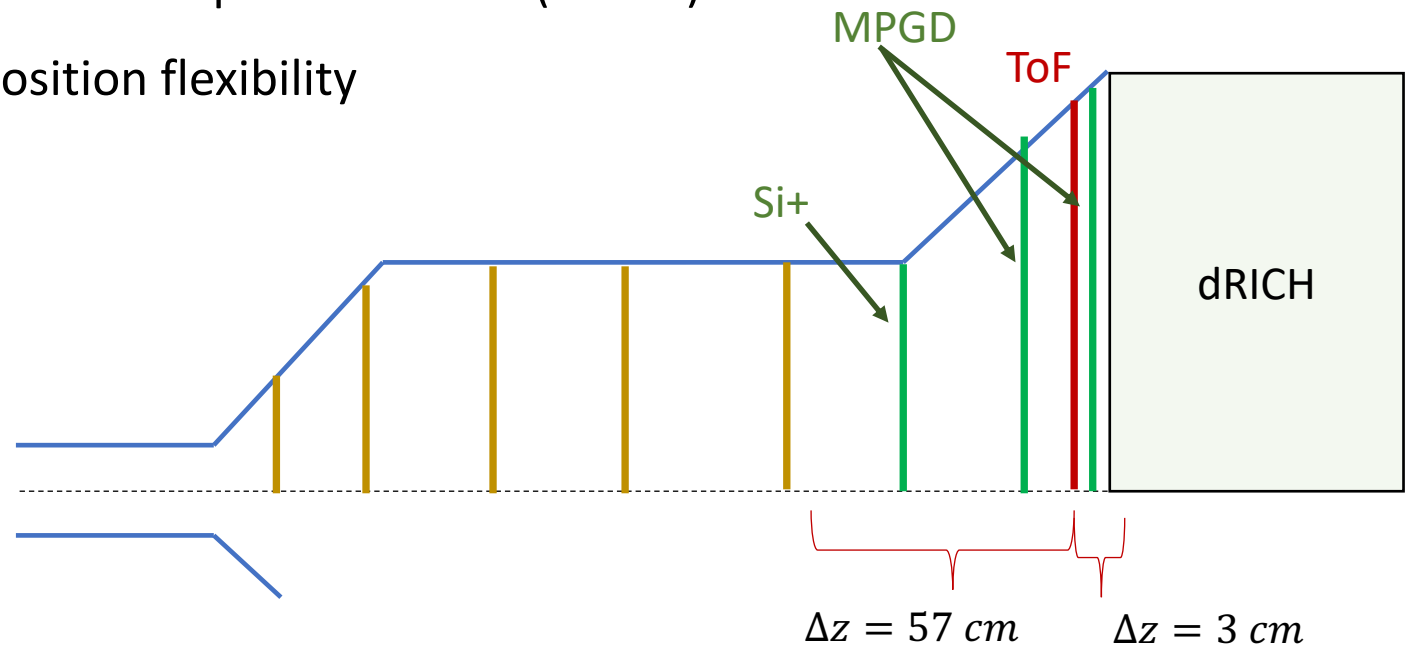
Current ePIC Tracking Layout

❑ Use MPGDs to increase number of hits in backward arm

Si hits only

Ernst's fast simulation

70 cm

55 cm

Tracking Layout

- ❑ Backward Endcap

  - ➤ Space is tight, constrained by EM cal and pfRICH

  - ➤ Placing an MPGD just before bECal to provide precision space point to help with angular resolution → improve lower Q^2 resolution

    - • No space for MPGD layer in front of EM cal. Would need ~ 2 cm of space

MPGD layers

EM Cal   pfRICH

$\Delta z = 1.3\ cm$ $\Delta z = 3.6\ cm$