

# Status of Silicon & Scintillator Ecal implementation in Mokka

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# Silicon & Scintillator Ecal: driver SEcal04

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- Absorber: W or Pb
- Sensitive: Si wafers and Scintillator strips
  - User can also request an "all silicon" or "all scintillator" detector
- Si layers – implementation unchanged
- Scintillator strips can be oriented along the larger (longitudinal strips) or the smaller (transverse strips) dimension of the slab
- Users can mix couples of Scintillator or Si layers (not individual layers), by specifying the value of a global parameter: "Ecal\_Sc\_Si\_mix"

# "Ecal\_Sc\_Si\_mix" – digit values

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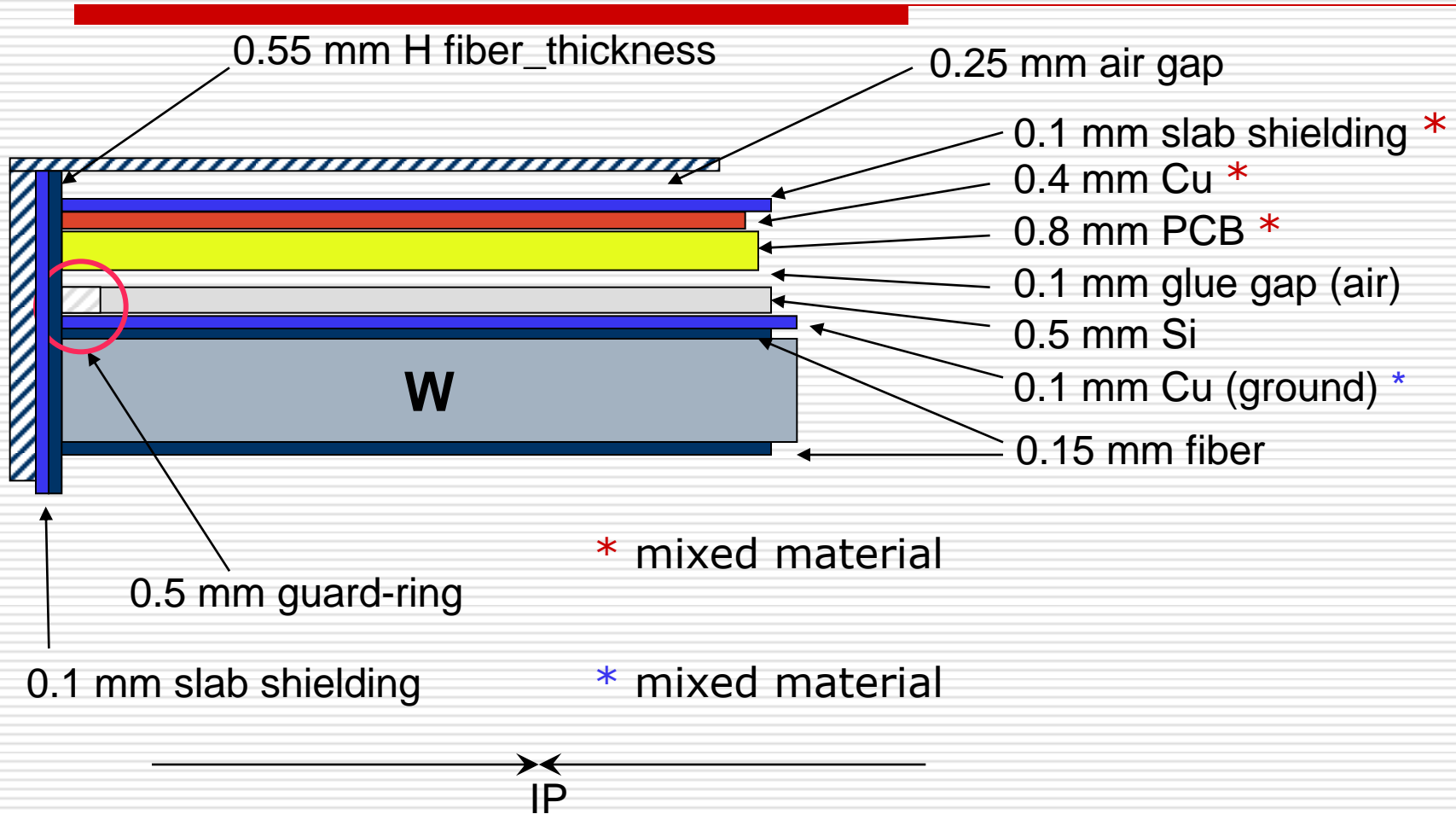
- ❑ 0 - both layers are made of silicon (default DB value)
- ❑ 1 - both layers have scintillator strips oriented longitudinally in the slab
- ❑ 2 - both layers have scintillator strips oriented transverse to the slab
- ❑ 3 - the first layer has scintillator strips oriented longitudinally in the slab
  - the second layer has scintillator strips oriented transverse to the slab
- ❑ 4 - the first layer has scintillator strips oriented transverse to the slab
  - the second layer has scintillator strips oriented longitudinally in the slab

# Global Geometry remarks

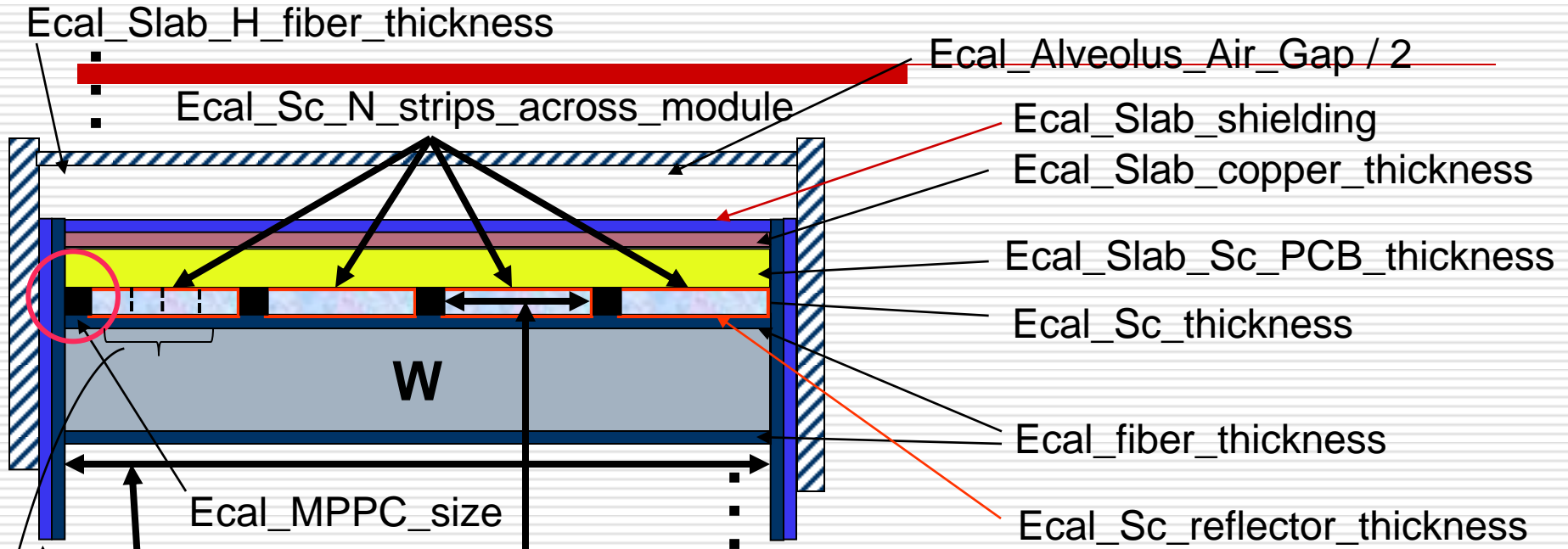
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- the same geometry as the 'all silicon' version:
  - the same shapes and dimensions of barrel and endcap modules, towers
  - only the 'H structures' are filled with different sensitive materials and related ingredients

# Si layers: Alveoli & “H” slab structure



# Parameters for Alveoli & “H” slab structure for Sc strips, Z direction (parallel to beam)



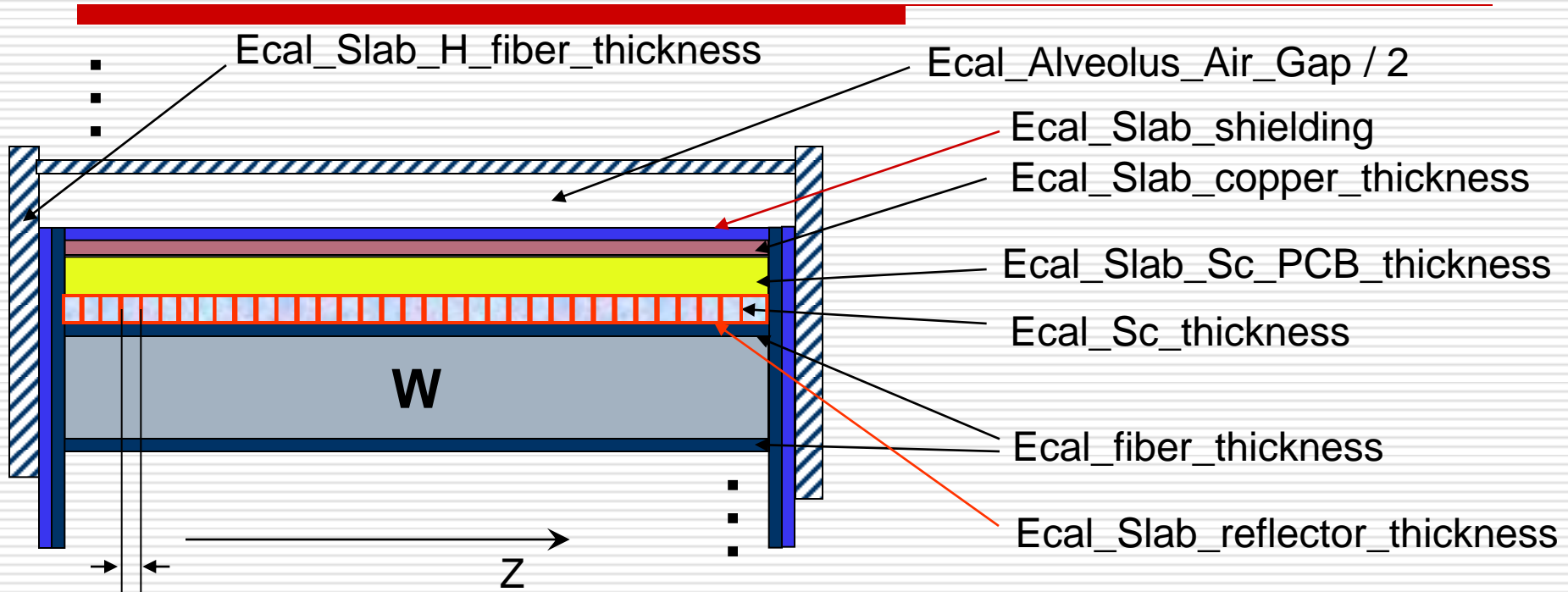
Strip size parallel to beam (calculated) =  
 $(\text{Inner "H" size} / \text{Ecal\_Sc\_N\_strips\_across\_module}) - \text{Ecal\_MPPC\_size}$

Inner “H” size = the same value calculated for the Si “H”

Ecal\_Slab\_shielding (here implemented as fiber in vertical)

Cells in Z = Ecal\_Sc\_number\_of\_virtual\_cells (for every strip)

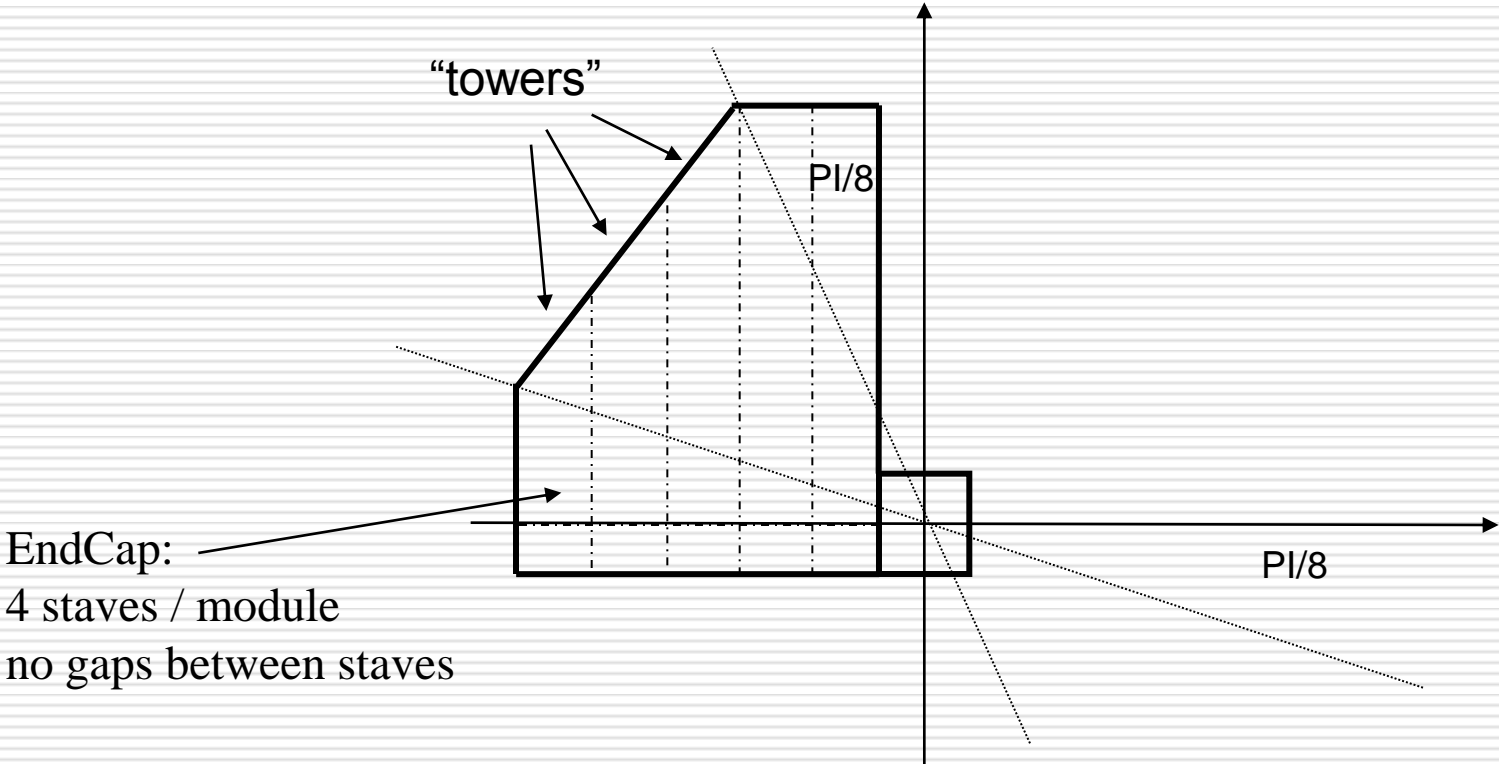
# Parameters for Alveoli & “H” slab structure with Sc strips, X direction (orthogonal to beam)



- Strip size = (Inner “H” size ) / 2 X (Number of cells in a Si wafer)  
 (the cell size is slightly different from the Si ones as the Sc doesn’t have guard rings)

# Ecal EndCap Module

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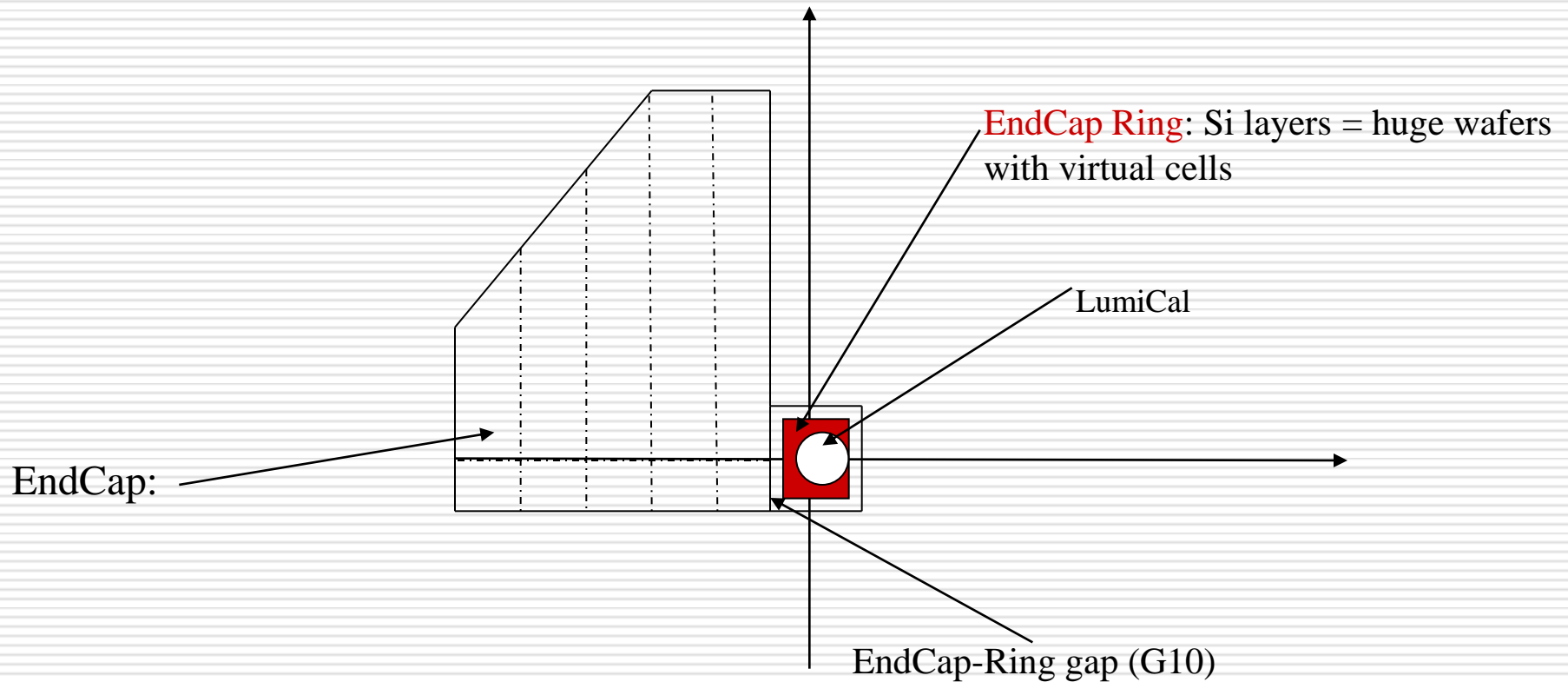


EndCap:  
4 staves / module  
no gaps between staves



# Ecal EndCap Ring – only Silicon

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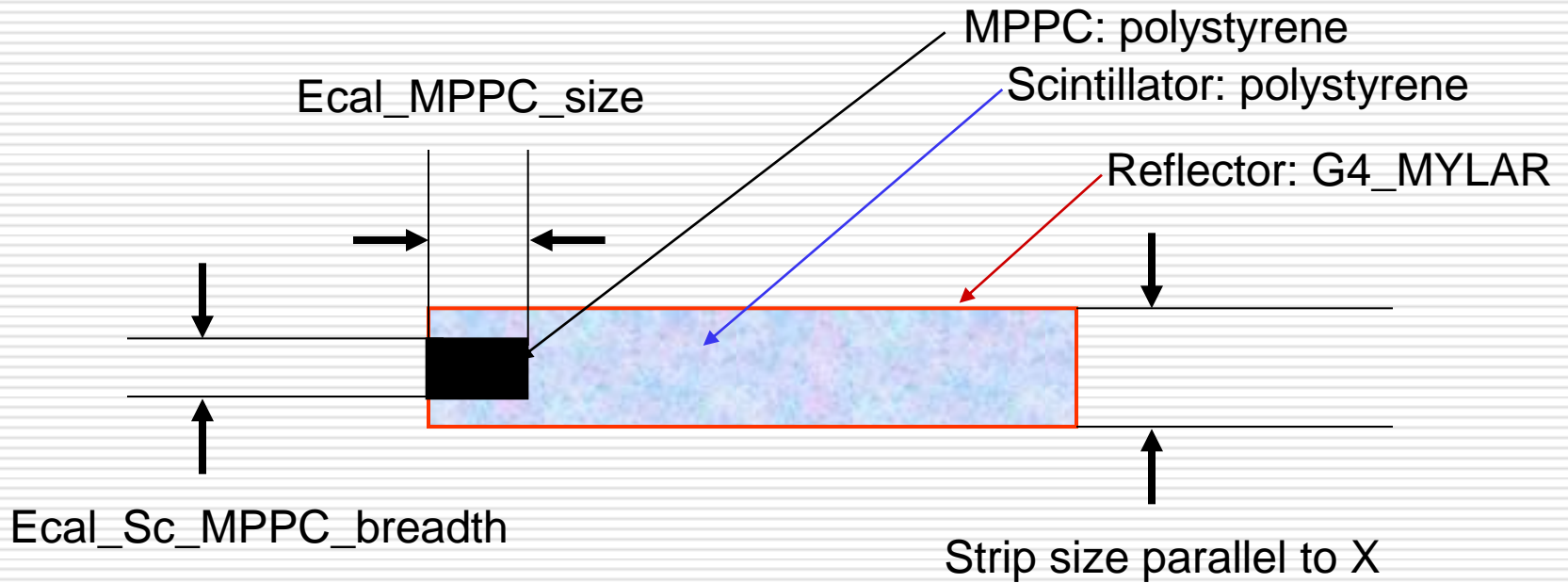


# Silicon – Scintillator combination

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- ❑ the Barrel and EndCaps use the same 'Ecal\_Sc\_Si\_mix' parameter
- ❑ Separate hit collections are created for silicon and scintillator
- ❑ scintillator - two hit collections: for longitudinal and for transverse strips

# Scintillator strip details



MPPC thickness =  $Ecal\_Sc\_thickness$

# Scintillator parameters - default values

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- ❑ Ecal\_Sc\_thickness = 2.0
- ❑ Ecal\_Sc\_reflector\_thickness = 0.057
- ❑ Ecal\_Slab\_Sc\_PCB\_thickness = 0.8
- ❑ Ecal\_Sc\_MPPC\_breadth = 2.5
- ❑ Ecal\_MPPC\_size = 0.91
- ❑ Ecal\_Sc\_N\_strips\_across\_module = 4
- ❑ Ecal\_Sc\_number\_of\_virtual\_cells = 9
- ❑
- ❑ Ecal\_Sc\_Si\_mix = 0000000000000000

# Using the Hybrid Ecal

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- Change the Ecal sub-detector in the steering file:
  - /Mokka/init/detectorModel ILD\_00
  - /Mokka/init/EditGeometry/rmSubDetector SEcal03
  - /Mokka/init/EditGeometry/addSubDetector \  
SEcal03p01 90
- Specify the Silicon or Scintillator layers:
  - /Mokka/init/globalModelParameter Ecal\_Sc\_Si\_mix \  
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