

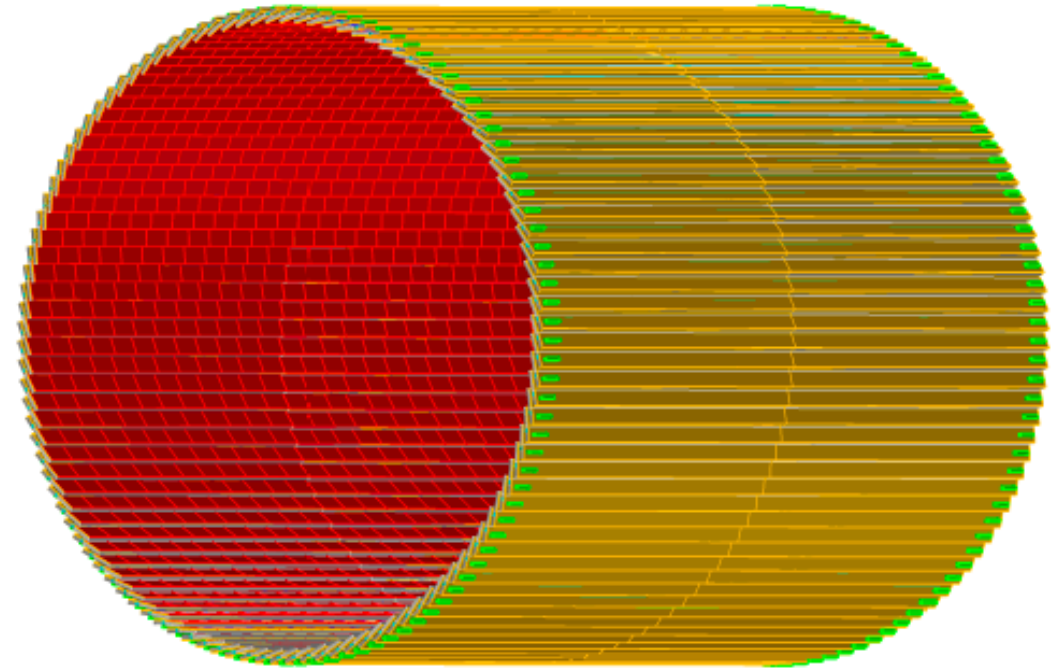
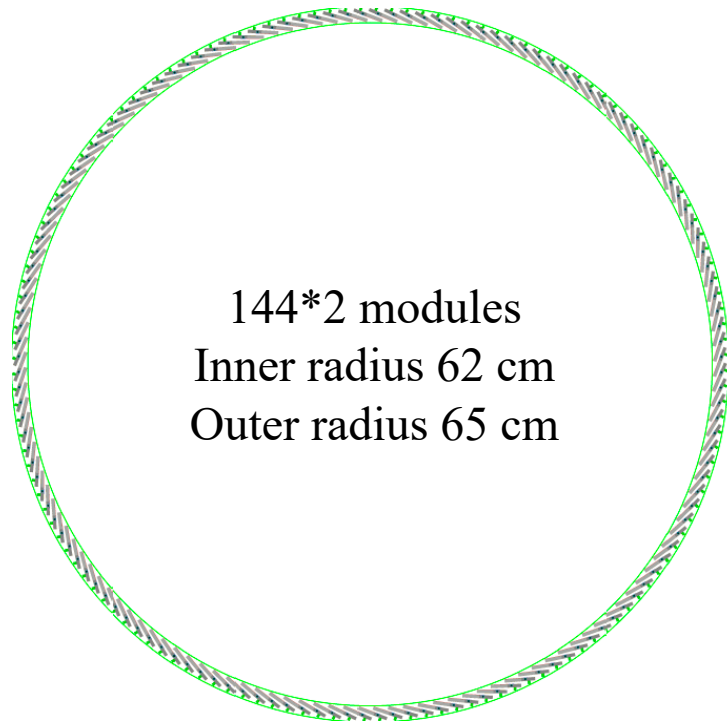
EPIC TOF (v0) in DD4HEP

Zhenyu Ye

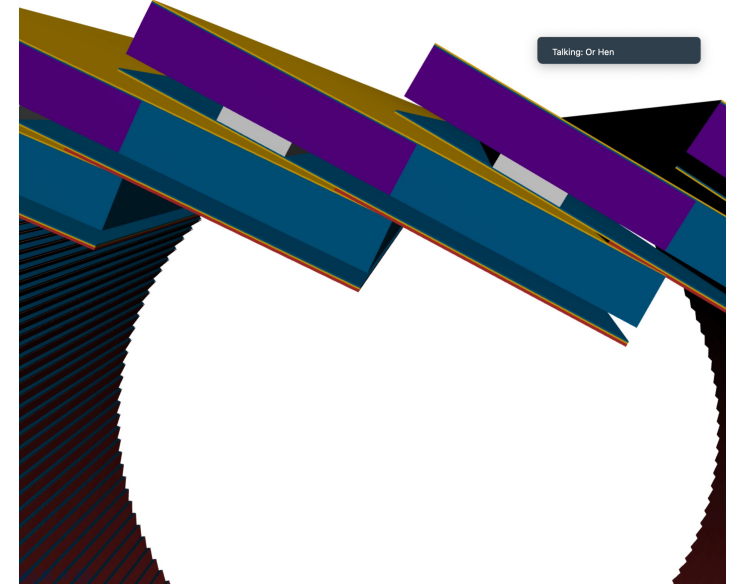
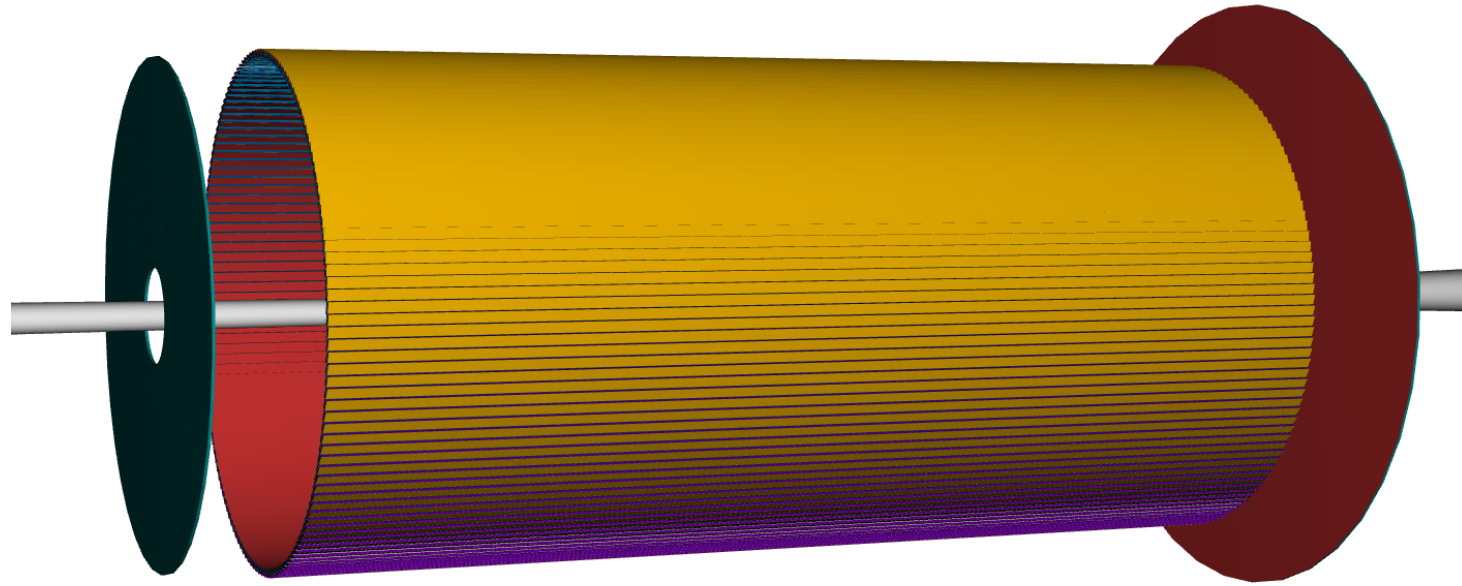
University of Illinois at Chicago

Barrel TOF Layout and Specification

- **Single layer of strip AC-LGAD sensors**
 - $62 < R < 65$ cm, 2.7 m long, ~ 11 m² area
 - **Strip metal electrodes, with $500 \mu\text{m}$ pitch in $r\phi$ and 1 cm^* in z**
 - Minimal material budget and power consumption compared to pixels
- * Will look into longer strips with sensor R&D

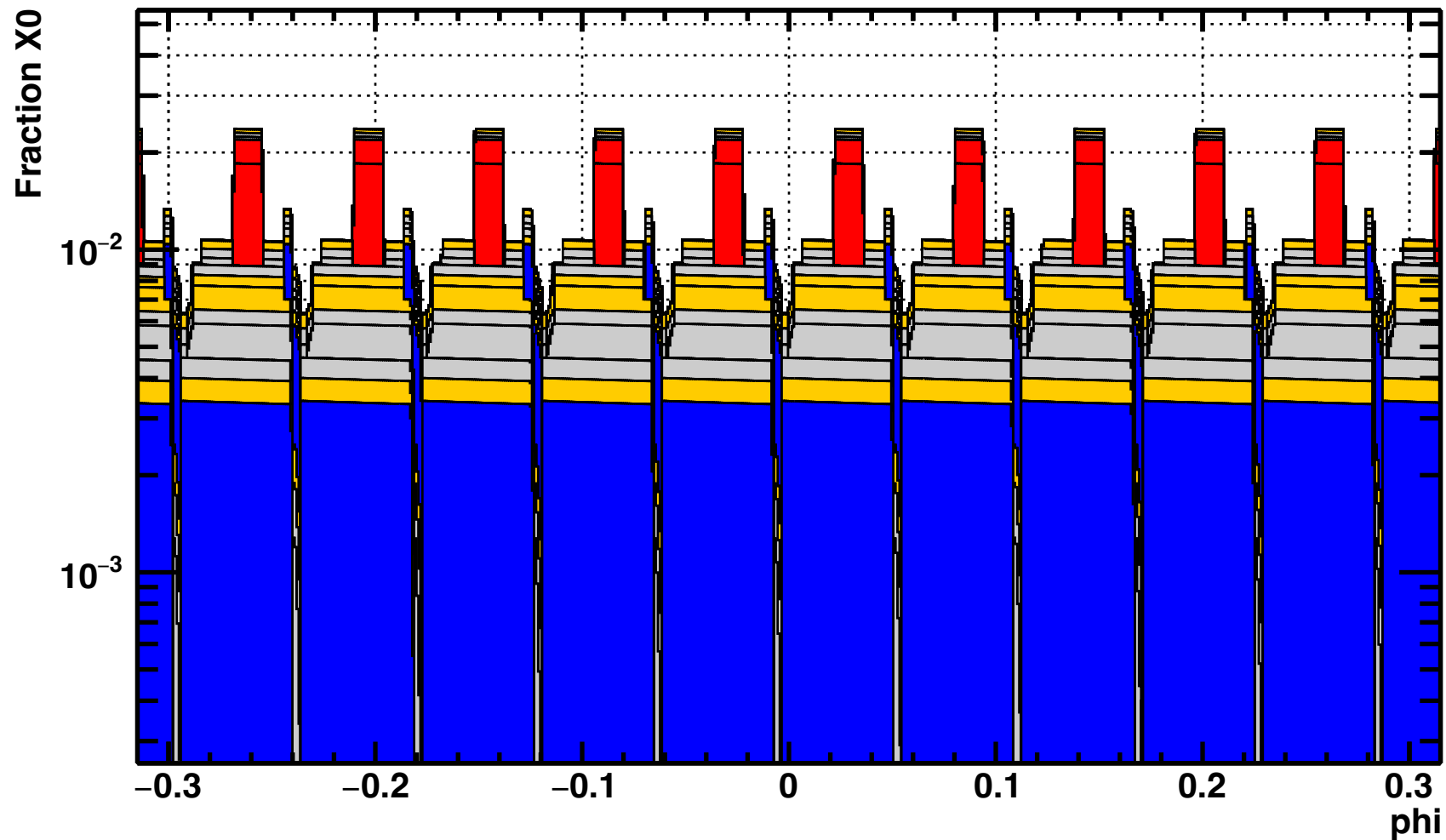


EPIC TOF in DD4HEP



- CTTL
 - 144*2 tilted detector modules including CF structures, Kapton hybrid, Si sensor, cooling tube material contribution (simplified by an Al block)
 - To be done: gaps between sensors, ASICs, connectors, services (need to work with engineer to define how the cooling and cables will be routed)
- E/FTTL
 - 2 disks of 8%X0 with Si
 - To be done: detailed modeling of the detector modules and services.

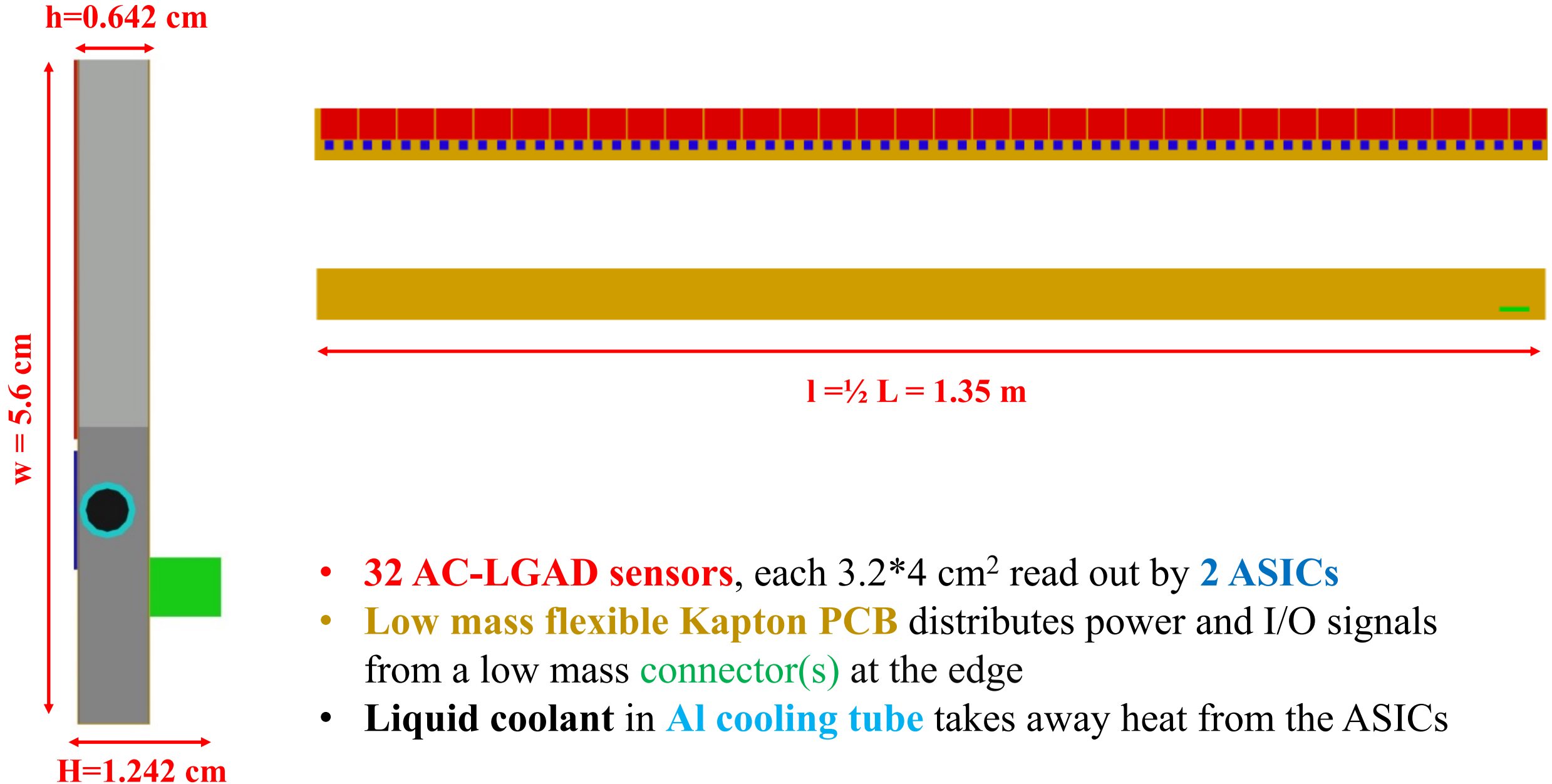
Barrel TOF Material Budget



Average material budget $\sim 1\% X_0$

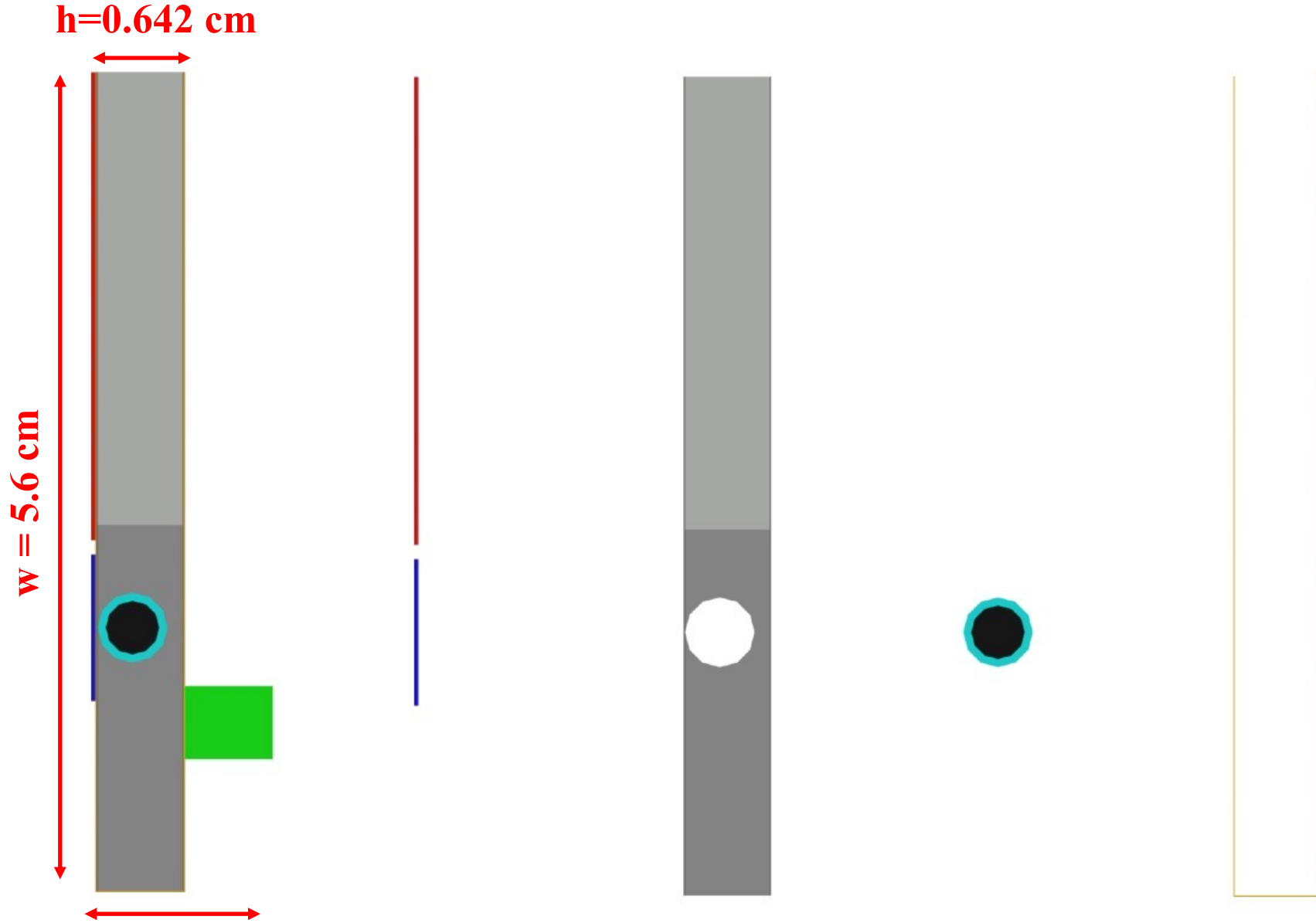
EPIC Barrel TOF Module

>95% coverage in Z



- **32 AC-LGAD sensors**, each $3.2 \times 4 \text{ cm}^2$ read out by **2 ASICs**
- **Low mass flexible Kapton PCB** distributes power and I/O signals from a low mass **connector(s)** at the edge
- **Liquid coolant** in **Al cooling tube** takes away heat from the ASICs

EPIC Barrel TOF Module

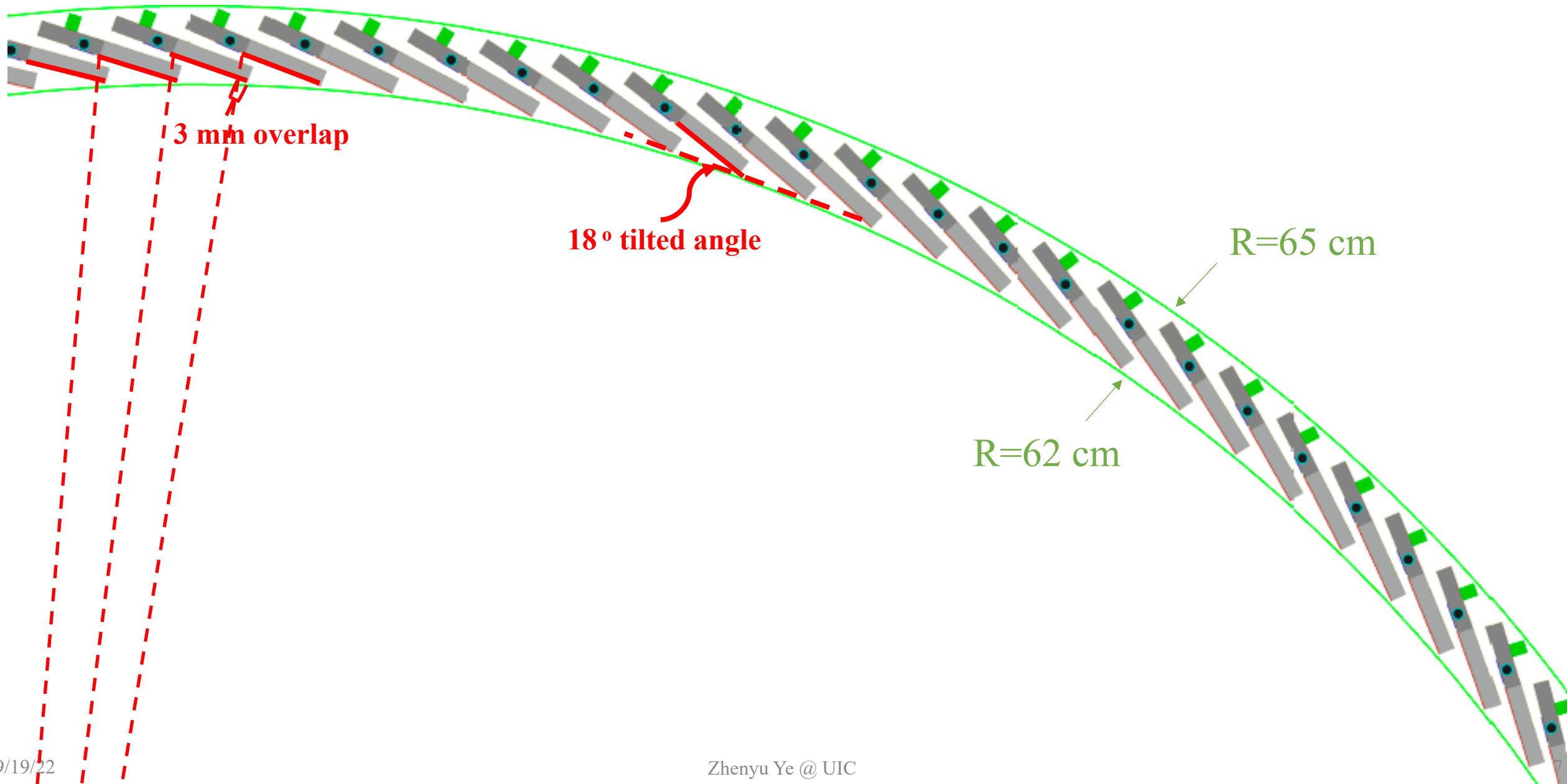


- **AC-LGAD sensor**
- **Frontend ASICs**
- **Carbon foam+**
Carbon honeycomb+
CF skins
- **Al cooling tube**
- **Liquid coolant**
- **Kapton PCB**
- **Connector**



EPIC Barrel TOF Detector Layout

Full azimuthal coverage



Services

- In total 288 modules,
 - 9216 sensors, 18,432 ASICs, 2.4 M channels
 - 70 kG, ~4 (6) kW
- On each module:
 - 32 sensors, 64 frontend ASIC
 - Powered and read out by 1 service board
 - 1 fiber to DAQ
 - 1 LV+HV cable
 - 1 liquid cooling line