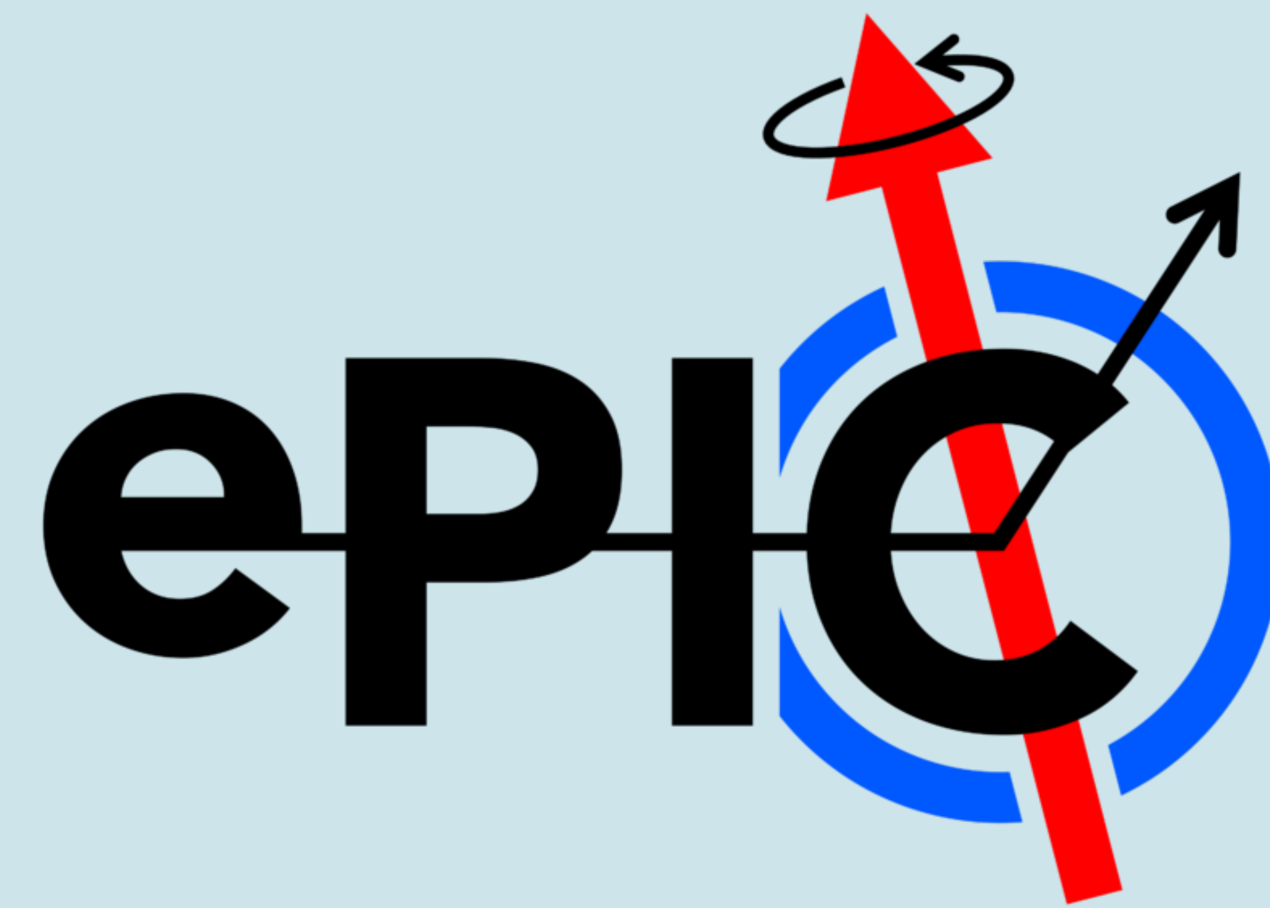


TOF-J meeting

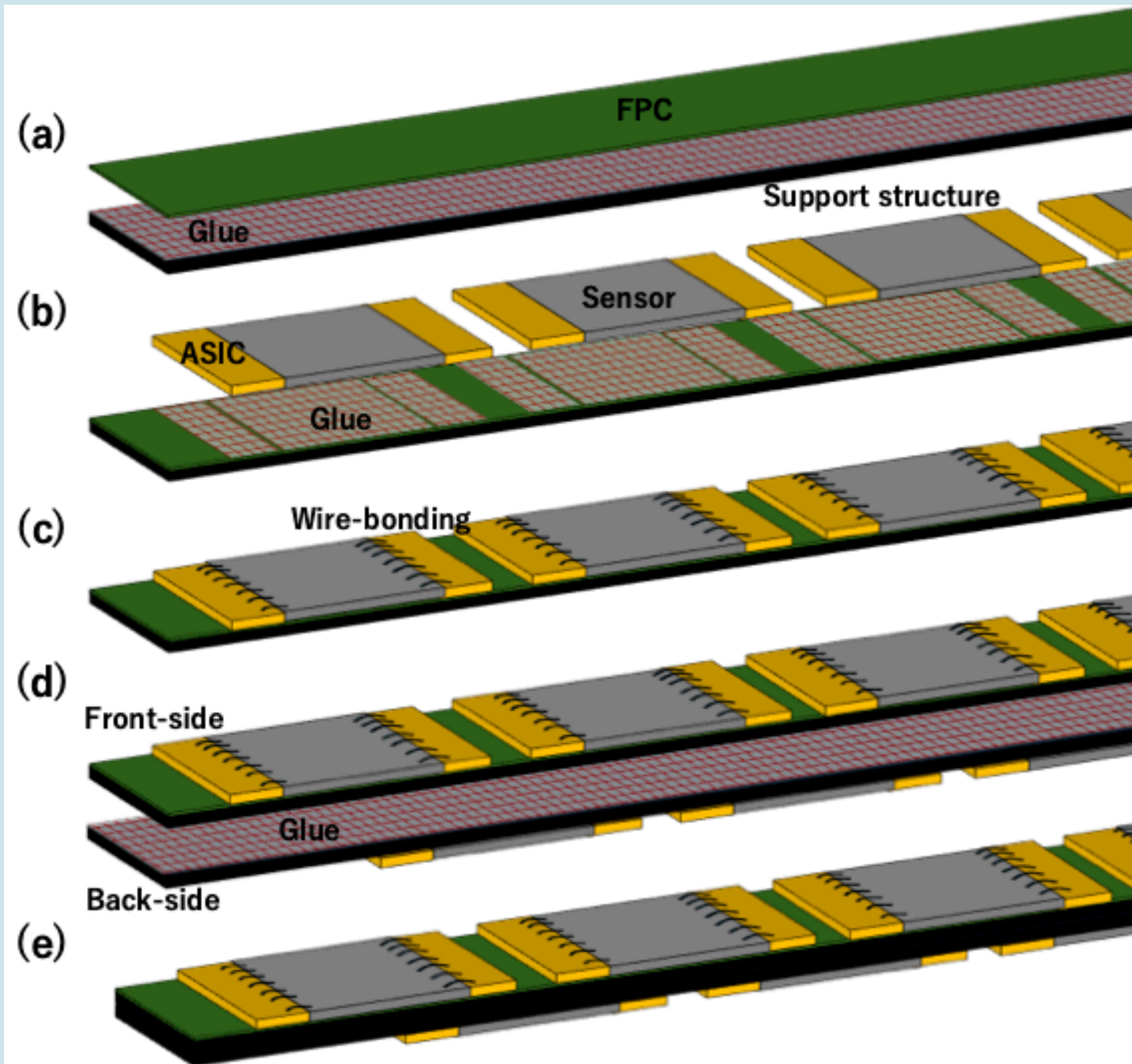
Satoshi Yano

Hiroshima University

2024/10/02

General information to share

- Pre-TDR v0 has been submitted to the ePIC collaboration
  - "Service" and "Assembling & construction" parts have been written by SY
- It became clear that it is doubtful that the strict limit of 1% is an appropriate value
  - The ePIC collaboration is looking forward to seeing Muraoka-kun's result about the effects from the BTOF material on the hpDIRC and BEMC
- Using ETROC for BTOF R&D has been proposed by Fernando, who is the chair of the electronics of ePIC
  - The digital block design will be adapted to FCFD's one
  - ETROC has been designed for low-capacitance sensors, so it shouldn't be considered for the characterization of the BTOF performance study
- Double-side stave is the version explained in Pre-TDR
  - For the moment, this is the best design for cooling the stave efficiently and has no acceptance gaps



Construction and assembly planning: The BTOF detector has a cylindrical shape, consisting of 144 tilted staves. These staves are assembled at designated sites within class-7 or higher clean rooms before being transported to BNL for final construction. Each stave is approximately 270 cm long and is divided into two half-staves of 135 cm. A half-stave includes a support structure with an integrated cooling pipe, a flexible printed circuit (FPC), sensors, and ASICs. The sensors and ASICs are mounted on both sides of the half-stave, with 64 sensors and 128 ASICs on each side. Wire-bonding is used to connect the ASICs to the sensors and electronics. Only components that pass various quality inspections—such as visual checks, metrology, and electrical tests—proceed to the assembly stage. During the half-stave assembly, one FPC is glued onto the support structure (Fig.8.15 (a)). To ensure precise alignment, a specialized tool is used, featuring pins and holes that guide the placement of the FPC and the correct application of glue. After assembly, the staves undergo both electrical and mechanical tests. Subsequently, sensors and ASICs are installed on the FPC surface using alignment tools similar to those used during the FPC mounting process (Fig.8.15 (b)). These tools help position the components and apply adhesive. Electrical connections are verified, and the ASICs are bonded to the sensors using wire-bonding, followed by wire encapsulation (Fig.8.15 (c)). 2 support structure with wire-bonded sensor, ASIC, FPC which is corresponding to front and back side, are attached to each other (Fig.8.15 (d)). Upon completing the installation on both sides (Fig.8.15 (e)), the final round of testing is conducted. Fully tested staves are then shipped to BNL for integration into the global support structure of the ePIC detector, which contains 144 slots for precise alignment of the staves within the global coordinate system.

- Wire bonding machine must have a function to treat 135 cm long stave