

Intermediate silicon tracker for sPHENIX experiment at RHIC

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The INTermediate Tracker (INTT) is the one of three major tracking detectors to be implemented in sPHENIX experiment¹⁾ which is to be launched in 2023 at RHIC. It is consisted of two layers of silicon strip sensors assembled into the barrel structure covering the central region of sPHENIX collision point. Silicon sensors and FPHX readout chips²⁾ are implemented on high density interconnect (HDI) cables which are glued on top of a 50 cm long cooling stave. The stave as shown in Fig. 1 is made of the carbon fiber reinforced plastics and fabricated in Asuka co.

The mass production of silicon sensors, FPHX chips, and HDI cables have been completed. The stave production is to be completed by the end of February, 2021. A bus extender cable (BEC) and a conversion cable (CC) form series of INTT readout chain together with the HDI cable. The development of the BEC and CC are almost completed³⁾ and the mass production of these cables are scheduled in JFY2021. Several preproduction INTT ladders (Fig. 2) have been assembled in National Taiwan University and BNL. Once the final tune for the optimization of assembly procedure is over, the mass production of the ladder assembly will be started and expected to be finished in Spring, 2021.

The preparation for testing production ladders has been ongoing at Nara Women's University in both hardware and software. There 3 major items listed below are

under development.

- (1) **Source test fixture:** The motor driven radiation source scanner of the ladder (Fig. 3)
- (2) **FPHX readbacker:** The software application to read back the registers of FPHX chips.
- (3) **Interception board:** The compact circuit board to be inserted between the readout cables which branches out signal traffic without disturbing the data taking. To be used for debugging of any mis-communications between ladder and readout control board.²⁾



Fig. 2. Fully assembled INTT preproduction ladders.

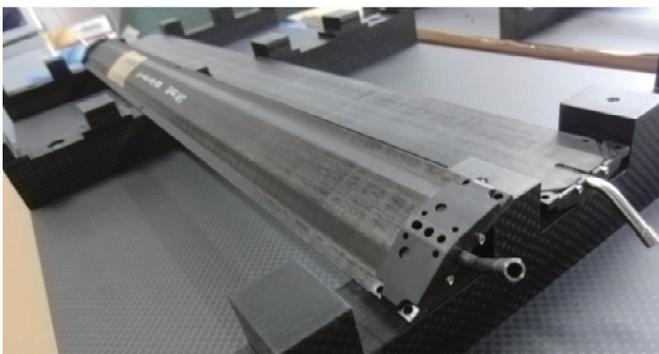


Fig. 1. The CFRP staves for INTT ladder.

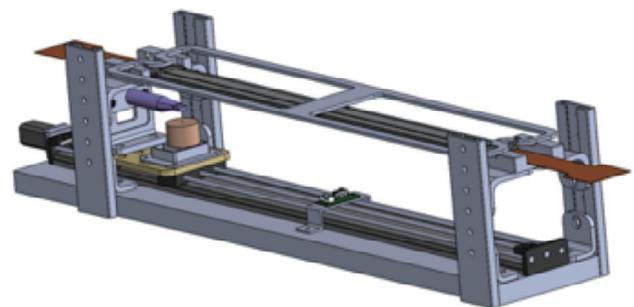


Fig. 3. The fixture for radiation source test of a ladder.

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