

## Performance evaluation of HAPDs in the Belle II Aerogel RICH counter

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The Aerogel Ring Imaging Cherenkov (ARICH) counter is a particle identification device located in the endcap region of the Belle II detector. The main components of the ARICH counter are 248 silica aerogel tiles built into the Cherenkov radiator and 420 Hybrid Avalanche Photo Detectors (HAPDs) making up the photon detector. Angular distribution of Cherenkov photons emitted from silica aerogel and detected by HAPDs is used to identify charged particles. Therefore, HAPD performance is essential for the ARICH counter.

The HAPD is a vacuum tube made of ceramic body, quartz window with semitransparent photocathode and 4 segmented Avalanche Photo Diode (APD) chips. APD chips consist of 36 pixels covering  $4.9 \times 4.9 \text{ mm}^2$  each. Multiplication in an HAPD is a combination of impact ionization of a photo-electron accelerated by the high voltage applied between photocathode and APD, bombardment gain, and APD avalanche process, avalanche gain.

All the HAPDs were tested before the installation into ARICH detector. One of the issues of HAPDs is a very large signal observed when operated inside the magnetic field therefore each HAPD was also tested in the magnetic field.

Installation of HAPDs to the ARICH detector finished in July 2017, and the ARICH was installed in the Belle II detector at the end of 2017. Belle II beam commissioning is operated from February to July 2018. Evaluation of the HAPD performance during Belle II beam commissioning and the result of Belle II beam commissioning are reported.

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