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## Development of Ring Imaging Cherenkov counter for Belle II experiment at super KEKB

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For the Belle II experiment at the super KEKB, we have been developing a proximity focusing ring imaging Cherenkov (RICH) detector using a silica aerogel as a radiator. This Aerogel RICH counter is designed to be used at the forward endcap region and to have pion/kaon separation with more than 4-sigma deviations at momenta up to 4 GeV/c.

A 144-channel Hybrid Avalanche Photo-Detector (HAPD) which is developed with Hamamatsu Photonics K.K. was adopted as the photon detector for the Aerogel RICH counter, since the HAPD has an excellent single photon detection capability. The pixel size of the HAPD is  $5 \times 5 \text{ mm}^2$ , which enables photon detection with a sufficient resolution. We have conducted beam tests in order to evaluate the PID performance for the Aerogel RICH system and confirmed that more than 4-sigma pion/kaon separation is possible.

One of our current worry for the system is a radiation tolerance of the HAPD. Since the Aerogel RICH counter is placed at the endcap region in the Belle II detector, where a neutron dose rate of  $10^{11} \text{ /cm}^2\text{/year}$  is expected, a leakage current of APDs in the HAPD may increase according to the neutron irradiation level. Therefore noise from HAPDs is expected to be increased and may deteriorate the PID performance. In order to realize the signal to noise be more than 7 even for  $10^{12} \text{ neutrons/cm}^2$  (It is equivalent to 10 years operation of Belle II experiment), we have tried to modify the APD's structure and made APDs with a thinner P-layer which is expected to help in reducing the leakage current. Tests of this scheme were made by using the Yayoi nuclear reactor at Tokai, Japan last year. As a result, we actually confirmed effects of thinner P-layer APD.

In this talk, HAPD performance including beam test results will be presented. In addition, our neutron irradiation test using the new sample will be also reported.

**Author:** Mr IWATA, Shuichi (Tokyo Metropolitan University)

**Presenter:** Mr IWATA, Shuichi (Tokyo Metropolitan University)

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