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## Development of the ARICH monitor system for the Belle II experiment

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The Aerogel Ring Imaging Cherenkov (ARICH) counter takes the role in particle identification at the endcap region of the Belle II detector. ARICH discriminates charged pions from kaons using the difference in radiation angle of Cherenkov light. ARICH is composed of aerogel tiles and Hybrid Avalanche Photo-Detectors (HAPDs). To keep high photon detection efficiency of HAPDs, periodical check of the efficiency and in-situ calibration of HAPDs are necessary. We are developing the monitor system that checks performance of each channels.

The monitor system is required to be installed in limited space inside ARICH. Pulse light is injected into ARICH using the optical fiber and emitted at the end of the fiber towards aerogel tiles. Some of emitted photons are reflected by Rayleigh scattering in aerogel tiles. Using scattered photons that enter a HAPD window, the performance of HAPD checked. At early stage of the Belle II experiment, it is difficult to detect the possible change of the performance of HAPDs using the beam data, so the monitor system is useful to ensure the healthiness of HAPDs. In stable stage of the Belle II experiment, the system can be used as the in-situ calibration source for HAPDs and their front-end electronics.

We constructed prototype monitor system consisting of an HAPD, a pair of aerogel tiles and an optical fiber. To check how pulse light is scattered by aerogel tiles, scattered photons are detected with moving the HAPD. As a result, We find the photons are scattered about 30 cm away from the optical fiber. Using a scattered photon, We confirm that the monitor system can be used to judge if a channel is dead or alive. We also find that noise level and gain of each channels can be measured at the same time. We have tested the system for around 500 hours, and have confirmed the stability for long term operation. In this poster, a test using the partially constructed Belle II ARICH counter, will also be presented.

### Registered

Yes

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