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## Development of Hybrid Avalanche Photo Detector and its Readout Electronics for the Belle II Aerogel RICH counter

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For the Belle II experiment at the superKEKB accelerator, we have been developing a proximity focusing ring imaging Cherenkov detector using a silica aerogel as a radiator (A-RICH). This 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. 144-channel Hybrid Avalanche Photo-Detector (HAPD) modules developed with Hamamatsu Photonics K.K. have been adopted as the photon detectors for the A-RICH. A total of 420 HAPD will be used in Belle II detector.

We started the mass production of the HAPD. Quality of the manufactured HAPD is checked by a system that we developed. We report the status of the quality check that consists of the leakage current measurement, channel-by-channel noise level measurement, the 2-dimensional scan for photon detection, and the quantum efficiency measurement for the photo cathode.

As for the readout of about 60,000 channels from the A-RICH, we developed an ASIC for the amplification and digitization of the signal from HAPDs.

We started the mass production of the ASIC last year. Then we plan to test all the ASIC chips before mounting them on the front-end boards attached to HAPDs.

The data from several front-end boards will be merged into one board, and are sent to the Belle II central DAQ system by an optical link called Belle2Link. For this purpose, modules called "merger board" located inside the detector are under development. Each merger board is connected to 6 front-end boards, and has an FPGA for the data merging and transmission. We are developing the firmware for the FPGA and testing it.

In this presentation, status of the mass production of HAPDs and ASICs, and the development and test results for the merger board will be reported.

### Summary

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