

Performance estimation of the Belle II Aerogel RICH counter in the first beam collision

Thursday, 29 November 2018 15:00 (20 minutes)

The Belle II experiment at the SuperKEKB facility started observation of beam collisions in 2018 to search for the New Physics beyond the Standard Model using 50 times higher statistics of electron-positron collisions of the Belle experiment. The Aerogel Ring Imaging Cherenkov (ARICH) counter is a newly developed particle identification device in the forward endcap of the Belle II spectrometer to secure 4σ separation of charged kaons and pions up to momenta of 3.5 GeV. Several techniques were developed to maximize the pion-kaon separation performance in 1.5 T of high magnetic field and 30 cm depth of narrow space in the endcap region. The ARICH counter is a proximity-focusing RICH counter. Photons are emitted in two layers of the Sirica Aerogel radiators with different reflective indices to be detected by the Hybrid Avalanche Photo Detector (HAPD) as 2-dimensional Cherenkov ring images. Types of the particles is identified based on the difference of radiation angles of the emitted photons. Construction and installation of the ARICH counter is finished in 2017. Commissioning of the SuperKEKB accelerator and the Belle II spectrometer using beam collisions has been finished in July of 2018. We have collected ring images by particles from the collisions passing the ARICH and studies for the PID performance estimation is carried out. Results of the PID performance study using the collision data and prospects for full operation of the SuperKEKB/Belle II for the BSM search in 2019 will be discussed in this presentation.

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Session Classification: Thursday afternoon