

Upgrade of Belle II ARICH detector

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Aerogel RICH currently identifies charged particles in the Belle II spectrometer. Cherenkov photons, emitted in the aerogel radiator are detected by single-photon Hybrid Avalanche Photon sensors working in a 1.5 T magnetic field and occupying an area of 4.5 m². By 2030 the Belle II will reach its design goal of 50 ab⁻¹ and the HAPD performance will degrade. The upgrade of the spectrometer to extend its operation will thus require replacement of the ARICH photo-sensors. Silicon photomultipliers are one of the candidates. Due to its sizeable dark count rates and their sensitivity to neutrons – we expect fluences of up to 5×10^{12} n/cm² - such a device requires to read out the signals in a narrow time window of several ns, requiring optimized SiPM design and high integration with the read-out electronics. In the presentation, we will present a SiPM module design, a study of single-photon detection capabilities of irradiated SiPMs and read-out FastIC chip.

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No, this is an entirely new submission.

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