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Novel Approach for Measuring ISR Photons at BESIII

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Utilizing Initial State Radiation (ISR) events, the hadronic cross section in electron-positron (e^+e^-) production can be measured over a wide energy range at e^+e^- colliders. Due to the high luminosity at beam energies between 1.8 and 5.0 GeV, the BESIII experiment at the BEPCII collider is particularly well-suited for this purpose. Since ISR photons are predominantly emitted at small angles relative to the incoming particles, a large fraction escapes detection in the existing BESIII detector system.

For that reason, a novel detector, the crystal Zero Degree Detector (cZDD), is installed at BESIII to cover very small polar angles and detect ISR photons. Positioned between the beam pipes, it tags ISR photons emitted at small polar angles between 0.1° and 0.7° with respect to the beam axis.

An overview of the detector setup and the prospect of hadronic cross-section measurements using ISR events tagged with the new cZDD is presented. This is especially relevant in the context of data-driven determinations of the muon anomalous magnetic moment.

Collaboration

BESIII

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