Contribution ID: **53** Type: **not specified**

Uncovering rare B meson decays with photons at Belle II

B meson decays to final states that include a photon offer a unique probe into the quark-level transition b⟶s. In the Standard Model (SM), this transition occurs through a loop-induced process, making it very rare and sensitive to contributions beyond the SM. Additionally, measuring the photon energy spectrum is sensitive to the mass of the b-quark as well as non-perturbative parameters.
Between 2019 and 2022, the Belle II experiment, at the SuperKEKB accelerator, collected a dataset containing close to 400 million B meson pairs. Using this dataset, the B⟶Xs branching fraction is measured as a function of the photon energy using the hadronic tagging technique. The reconstructed mass of the tag-side B meson is used in the final fit to data.
One of the key challenges of this analysis is to separate signal events from the abundant background of quark-pair production with an additional photon, whose cross-section increases exponentially for lower values of the photon energy. Recently, this has been done using boosted decision trees (BDTs). In this project, alternative multivariate methods will be explored, with the goal of enhancing continuum background suppression, while avoiding sculpting the reconstructed mass of the tag-side B meson.

Group

FH - BELLE

Project Category

B1. Physics Data Analysis and Performance (software-oriented)

Special Qualifications

Basic python programming knowledge would be useful

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