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Observation of Branching Fraction and Time-dependent CP Violation in B0 $\rightarrow \omega \gamma$ Decay at Belle II

The decay $B^0 \rightarrow \omega \gamma$ provides a unique probe into flavor-changing neutral current processes, where the *b*-quark transitions to a *d*-quark via a one-loop radiative process. This rare channel, sensitive to potential new physics contributions, enables the search for virtual particles that could influence the branching fractions and polarization observables. Standard Model predicts the branching fraction to be $\mathcal{O}(10^{-6})$, while prior searches by the Belle and BaBar collaborations have set upper limits with 90% confidence levels at 0.4×10^{-6} and 0.9×10^{-6} respectively.

We present preliminary results from the analysis of this rare radiative decay using simulated data from the Belle II detector at the SuperKEKB collider, with an accumulated dataset exceeding 427.8 fb⁻¹. This study aims for the first observation of $B^0 \rightarrow \omega \gamma$, with a projected statistical significance above 3σ . The findings will contribute valuable insights into quark flavor dynamics, CKM matrix elements, and potential New Physics effects, advancing our understanding of such rare decay processes.

Field of contribution

Experiment

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