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Search for the decay $B \rightarrow \tau^+ \tau^-$ at BELLE and BELLE II

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Processes involving Flavor Changing Neutral Currents (FCNC), where a B meson undergoes decay into a pair of oppositely charged leptons, serve as potent avenues in the exploration of physics beyond the Standard Model (SM). Notably, the decay $B \rightarrow \mu^+ \mu^-$ has been observed by LHC experiments, and its measured branching fraction (BF) aligns with the SM prediction, thereby imposing rigorous constraints on theories extending beyond the SM.

Investigations into the tauonic modes $B \rightarrow \tau^+ \tau^-$, where B can be either a B^0 or B_s^0 meson, become particularly compelling due to indications of lepton flavor nonuniversality hinted from several experiments in $b \rightarrow sll$ and $b \rightarrow cl\nu$ processes. Models elucidating these anomalies propose that the BF of $B \rightarrow \tau^+ \tau^-$ modes could exhibit significant enhancements compared to SM predictions, potentially by several orders of magnitude. Only few measurements have been performed on those modes so far, Belle II is expected to improve them significantly.

The Belle II experiment, located at KEK in Japan, began data collection in 2019 with the goal of accumulating the largest statistics of B mesons ever recorded at an $e^+ e^-$ collider.

In this talk I will present the status of the analysis performed with both Belle and BelleII dataset.

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