

The Belle II flavor tagger

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Measurements of time-dependent CP violation and of B -meson mixing at B-factories require a determination of the flavor of one of the two exclusively produced B^0 mesons. The predecessors of Belle II, the Belle and BaBar experiments, developed so-called flavor tagging algorithms for this task. However, due to the novel high-luminosity conditions and the increased beam-backgrounds at Belle II, a new flavor tagging algorithm had to be developed with a specific and dedicated optimization in order to be applied in precision measurements while coping with the harsher experimental conditions.

The new Belle II flavor tagging algorithm, the so-called Belle II flavor tagger, bases on inclusive methods that exploit the flavor specific signatures of B^0 decays, considering more signatures than in the previous algorithms and employing novel multivariate approaches. It proceeds in two steps: the event level, where candidate particles providing flavor specific signatures are selected; and the combiner, where all the possible signatures are combined into the final output. The framework is now complete and ready for use in data analysis, reaching an effective tagging efficiency of ca. 37% on Belle II Monte Carlo (MC).

A major test consists in applying the Belle II flavor tagger algorithm in analysis with Belle data. For this, the Belle II flavor tagger was trained with Belle MC and tested with Belle data reaching an effective efficiency of 34% (Belle reached 30%). Additionally, the shape of the Belle II flavor tagger output shows good agreement between Belle data and Belle MC, meeting also the requirements to be used for analysis of Belle data.

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