

BELLE II: Analysis project

At the Belle II experiment, B meson decays can be studied with highest precision and in particular so called semi-leptonic decays where the B meson decays to a hadron, a lepton and a neutrino. In this context, when the hadron contains an up quark ($B \rightarrow Xu \ell \nu$), important Standard Model parameters can be measured. However, this process is overwhelmed by the much more likely decay to a hadron containing a charm quark ($B \rightarrow Xc \ell \nu$). Nowadays, most high energy physics analyses make use of Machine Learning (ML) in order to improve the separation between signal and background. ML has already been used to distinguish $B \rightarrow Xu \ell \nu$ events from $B \rightarrow Xc \ell \nu$ events at Belle II. Various algorithms can be compared in order to choose the most performant one. We propose the student to develop a ML classifier (typically a Neural Network) for the $B \rightarrow Xu \ell \nu$ analysis and compare its performance with other classifiers already used. Prior knowledge of ML is not required (but could obviously help).

Field

B1: Particle physics analysis (software-oriented)

DESY Place

Hamburg

DESY Division

FH

DESY Group

Belle II

Special Qualifications:

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