Abstract

The ALICE experiment consists of a central barrel and a forward muon spectrometer [1]. Additional smaller detectors for global event characterization and triggering are located at small angles outside of the central barrel. Such a geometry allows the investigation of many properties of diffractive reactions at hadron colliders for example the measurement of single and double diffractive dissociation cross-sections and the study of central exclusive production (CEP). Central diffractive events are defined experimentally by hits in the central barrel and no activity outside of it creating an activity gap in the rapidity observable [2].

Studying *Pythia-8* simulations of these processes shows a drastic reduction of non-diffractive events (background) by enforcing the rapidity gap condition. The remaining background is largely composed of partially reconstructed CEP events, so called feed down events. Often feed down events are accompanied by neutral particles which are not detected. This missing mass and momentum leads to a shift of the invariant mass spectrum to lower masses. This work aims at applying machine learning methods for background suppression of CEP events.

The measured variables *e.g.* the four-momentum of particles, energy loss in the detectors, deduced kinematic quantities, and global event characteristics are in general correlated. To obtain a maximal separation of signal and background it is necessary to treat these observables in a fully multivariate way.

In this talk I will give an introduction to the concepts of machine learning and discuss its application to the analysis of central exclusive production events with ALICE.

References

[1] K. Aamodt et al. The ALICE experiment at the CERN LHC. *JINST*, 3:S08002, 2008.

[2] R. Schicker. Central exclusive production in the ALICE experiment at the LHC. *Int. J. Mod. Phys.*, A29:1446015, 2014.