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Event reconstruction and simulation in PandaRoot for the PANDA experiment

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The $\bar{\text{P}}\text{ANDA}$ experiment, currently under construction at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany, addresses fundamental questions in hadron and nuclear physics via interactions of antiprotons with a proton or nuclei, e.g. light and charm exotics, multi-strange baryons and hadrons in nuclei. It will be installed at the High Energy Storage Ring (HESR), which will provide an antiproton beam with a momentum range of 1.5 - 15 GeV/c and enables an high average interaction rate on the fixed target of 2×10^7 events/s.

The $\bar{\text{P}}\text{ANDA}$ experiment adopts a triggerless, continuous data acquisition. The data rate without any suppression will be in the order of 200 GB/s. With an online software-based data selection system a data reduction of a factor 100 - 1000 has to be achieved. This demands a highly advanced online analysis due to the high interaction rate which has to deal also with overlapping event data. Scalability and parallelization of the reconstruction algorithms are therefore a particular focus in the development process. A simulation framework called PandaRoot is used to develop and evaluate different reconstruction algorithms for event building, tracking and particle identification as well as further optimization of the detector performance. In a novel approach PandaRoot is able to run time-based simulations which allows to simulate the continuous data stream and the mixing of events in addition to the standard event-based simulation. It utilizes the common software framework for the future FAIR experiments, FairRoot, which is based on ROOT and Virtual MonteCarlo with Geant3 and Geant4.

This contribution will give an overview about PandaRoot, the requirements on the event reconstruction algorithms and present the status of a reconstruction and tracking algorithm currently under development.

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