Charm physics performance studies for PANDA

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Antiproton-proton annihilations at the future international research facility FAIR in Darmstadt (Germany) will allow sensitive tests of QCD in the regime of non-perturbative QCD. The intense high-resolution beam of antiprotons together with a multi-purpose and compact PANDA detector will provide an excellent tool to answer fundamental questions about quark confinement and the generation of hadron masses. One of the main items in the experimental program of PANDA is the charmonium spectroscopy [1].

In preparation of the PANDA experiment, large-scale simulation studies are carried out using the simulation and analysis framework PandaROOT [2], based on ROOT [3], which is an extension of the FairROOT [4] framework developed at GSI.

The results of the Monte Carlo simulation, using a realistic description of the detector response and advanced data analysis techniques, will be presented. The analysis of reaction channels, such as the charmonium $\chi_c$ decaying into 7 photons, demonstrates the feasibility to identify specific final states of the charm-quark spectrum, and to determine precise values of mass, width and branching fractions.

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[4] \url{http://fairroot.gsi.de}.

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