

Charm physics performance studies for $\overline{\text{P}}\text{ANDA}$

Aleksandra Biegun^(a) for the $\overline{\text{P}}\text{ANDA}$ Collaboration

^(a) KVI, University of Groningen, Groningen, The Netherlands

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 $\overline{\text{P}}\text{ANDA}$ 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 $\overline{\text{P}}\text{ANDA}$ is the charmonium spectroscopy [1].

In preparation of the $\overline{\text{P}}\text{ANDA}$ 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 h_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.

This research was supported by Veni-grant 680-47-120 from the Netherlands Organisation for Scientific Research (NWO), the University of Groningen and the Gesellschaft für Schwerionenforschung mbH (GSI), Darmstadt.

[1] Physics Performance Report for: $\overline{\text{P}}\text{ANDA}$, Strong Interaction Studies with Antiprotons (2009), [arXiv:0903.3905v1](https://arxiv.org/abs/0903.3905v1) [hep-ex].

[2] <http://www-panda.gsi.de>.

[3] <http://root.cern.ch>.

[4] <http://fairroot.gsi.de>.

E-mail: a.k.biegun@rug.nl