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Simulation of the PANDA Lambda disks

The main physics motivation of PANDA is to explore the non-perturbative regime of QCD and to study hadronic states. In this context, here is a possibility to include hyperon studies in the PANDA physics program. Hyperons travel a large distance before they decay into other particles. In order to increase the acceptance to measure these particles, there is a concept to include an additional “Lambda Disk” detector. The Micro Vertex Detector (MVD) is the innermost tracking detector of PANDA. It consists of four barrel layers and six forward disk layers. It is made up of two types of silicon sensors – silicon hybrid pixels and double sided silicon strips. The last layer of the MVD forward disk is situated at 23 cm downstream of the interaction point and the first layer of GEM tracking station is located 110 cm downstream from the interaction point. Hence, there is a large region, close to the beam pipe, without tracking information. Therefore, it is proposed to place two additional disks known as the Lambda disks in this region. The detector will enhance the reconstruction probability for hyperons. As a starting geometry, the Lambda disks have been proposed to contain only double sided silicon sensors elements and not any pixel sensors. At present, we are involved in simulation studies of the Lambda disks detector with the reaction $p\bar{p} \rightarrow \Lambda \bar{\Lambda}$ to calculate the reconstruction efficiency and resolution for this channel. This channel provides essential input in understanding the vertex reconstruction of hyperon pairs. We have also started to study with the reactions $p\bar{p} \rightarrow D^+ D^-$ and $p\bar{p} \rightarrow J/\psi \pi^+ \pi^-$ to see how the reconstruction performance of these channels is affected with and without the Lambda disks. In this presentation we will report about the reconstruction efficiency of lambda and lambda bar particles with and without the Lambda disks. In addition, a simulation study of detector coverage and material budget with the Lambda disks essential for the development of the detector will be presented.

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