

# ABSOLUTE CALIBRATION OF THE ANTIPROTON DETECTION EFFICIENCY FOR BESS BELOW 1 GeV WITH AN ACCELERATOR BEAM TEST AT KEK-PS

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To investigate the origin of low energy antiprotons with the BESS spectrometer, it is important to reduce systematic errors of the resultant spectrum due to uncertainties in the antiproton interaction losses. For this purpose, absolute calibration of the antiproton detection efficiency for the BESS detector is inevitably important to validate Monte Carlo simulations. Accordingly an accelerator-beam experiment was performed by using low energy antiproton beam below 1 GeV at KEK-PS K2 beam line. The detection efficiencies were measured as a function of incident energy at three different incident beam positions into the BESS detector. The measured efficiencies showed good agreement with the calculated ones derived from the simulation based on GEANT/GHEISHA irrespective of the incident position and energy into BESS. Since incident positions are selected to represent the trajectories of cosmic-ray particles in terms of the amount of material and penetrated region, a total test of the BESS Monte Carlo has been performed by combining all data for each energy. As a result, it is demonstrated that the relative systematic error of the detection efficiency derived from the BESS Monte Carlo is kept within  $\pm 5\%$  in the energy range 0.16 to 1 GeV, while it was previously estimated to be  $\pm 15\%$  as a dominant uncertainty for measurements of cosmic-ray antiproton flux.