

Abstract

For this thesis, minimum bias data taken during December 2002 with the HERA –B detector at the Deutsches Elektronen-Synchrotron (DESY) in Hamburg were analysed. The decays of Λ - and $\bar{\Lambda}$ -hyperons which were produced in pA collisions at a centre-of-mass energy of $\sqrt{s} = 41.57$ GeV were analysed, and the polarisation of Λ - and $\bar{\Lambda}$ -hyperons was measured for different target materials. A specialised, fast Monte Carlo simulation which increased the number of the Λ - and $\bar{\Lambda}$ -hyperons in the Monte Carlo data sample was used for acceptance determination. The measurement of the transversal Λ -polarisation led to the following results:

$$P(\Lambda, \text{Carbon}) = 0.066 \pm 0.029(\text{stat.}) \pm 0.010(\text{syst.})$$

$$P(\bar{\Lambda}, \text{Carbon}) = 0.015 \pm 0.045(\text{stat.}) \pm 0.038(\text{syst.})$$

$$P(\Lambda, \text{Tungsten}) = 0.063 \pm 0.024(\text{stat.}) \pm 0.014(\text{syst.})$$

$$P(\bar{\Lambda}, \text{Tungsten}) = 0.086 \pm 0.037(\text{stat.}) \pm 0.048(\text{syst.})$$

$$P(\Lambda, \text{Titanium}) = 0.188 \pm 0.039(\text{stat.}) \pm 0.015(\text{syst.})$$

$$P(\bar{\Lambda}, \text{Titanium}) = 0.131 \pm 0.065(\text{stat.}) \pm 0.047(\text{syst.})$$

The measurement yields a non-zero polarisation with a significance of 2σ for the Λ -hyperon, and for the $\bar{\Lambda}$, the polarisation is consistent with zero. These results are in good agreement with earlier measurement and with theoretical expectations.