

MEASUREMENT OF THE Ξ^0 AND Ξ^- MAGNETIC MOMENTS

R. Handler, R. Grobel, R. March, L. Pondrom,
M. Sheaff, C. Wilkinson, B. Lundberg
University of Wisconsin, Madison, Wisconsin 53706

P.T. Cox, J. Dworkin, O.E. Overseth, C. Dukes
University of Michigan, Ann Arbor, Michigan 48109

L. Deck, T. Devlin, B. Luk, G. Ramięka, P. Skubic
Rutgers University, Piscataway, New Jersey 08902

G. Bunce
Brookhaven National Laboratory, Upton, L.I. New York 11973

K. Heller
University of Minnesota, Minneapolis, Minnesota 55455

Experiments were performed in the M2 line of FNAL to determine if Ξ^0 and Ξ^- particles inclusively produced by 400 GeV protons off a Be target were polarized in the parity allowed direction for production angles greater than four millirads. If so a precise measurement of their magnetic dipole moments was possible.

The decay chains studied were $\Xi^0 \rightarrow \pi^0 + \Lambda$, $\Lambda \rightarrow p + \pi^-$, $\pi^0 \rightarrow \gamma + \gamma$ and $\Xi^- \rightarrow \pi^- + \Lambda$, $\Lambda \rightarrow p + \pi^-$. Multi wire proportional chambers in conjunction with a spectrometer magnet were used to measure final state charged particle momenta. A lead glass array gave γ ray energy and position coordinates. The polarization of the parent particles was found by measuring the difference in the decay asymmetry of the daughter Λ for cascades produced at opposite production angles. Equipment biases cancelled out of this difference and the accuracy of the measurement was limited only by statistics.

The observed magnitude of the polarization of the cascades was similar to that previously measured for lambdas.^{1,2} The values found for the magnetic moments, expressed in proton nuclear magnetons were

$$\mu_{\Xi^0} = -1.253 \pm 0.014$$

$$\mu_{\Xi^-} = -0.75 \pm 0.06$$

¹K. Heller, et al., Phys. Rev. Lett. 41, 607 (1978).

²L. Schachinger, et al., Phys. Rev. Lett. 41, 1348 (1978).