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5.17 Study of the Polarization for A's Produced in Nucleus-Nucleus Interactions

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Using the 2 m streamer spectrometer SCM-200, the polarization P was studied for 82 Λ 's produced in inelastic HeLi interactions at 3.7 GeV/A and for 336 Λ 's produced at the same energy in central collisions of various nuclear pairs (CC, CNe, ONe, CCu, CZr, CPb, OPb)¹⁾.

The value of αP has been defined in the usual way as the ratio $P = \langle \cos \theta \rangle / \langle \cos^2 \theta \rangle$, where $\alpha = 0.642$ is the decay asymmetry parameter and θ is the angle (in Λ CM-system) between the vector normal to the production plane ($n_{\text{beam}} \times n_{\Lambda}$) and the direction of the decay proton. All αP -values obtained are consistent, within the errors, with zero polarization, as well as with the value of αP equal to 0.06±0.03 derived from the analysis²) of 70 Λ 's produced in central (Ar + KCl) collisions at 1.8 GeV/A (Fig. 1).

It should be taken into account that the polarization of Λ 's observed experimentally, P(Λ_{tot}), is expected to be smaller than that for Λ 's directly produced, P(prompt), because of the admixture of Λ 's from Σ° decays.

The factor of diminution can be estimated from the formula³⁾

 $P(\Lambda_{tot}) = P(\Lambda_{prompt}) \frac{\sigma(\Lambda_{prompt})}{\sigma(\Lambda_{tot})} - \frac{1}{3} P(\Sigma^{\circ}) \frac{\sigma(\Sigma^{\circ})}{\sigma(\Lambda_{tot})}$

and appears to be $P(\Lambda_{tot}) \simeq 0.7 P(\Lambda_{prompt})$ for our energy $(\sigma(\Sigma^{\circ})/\sigma(\Lambda_{tot}) \simeq 1/4)$ assuming that $P(\Sigma^{\circ}) \simeq P(\Lambda^{\circ})$.

Looking for a possible dependence of the polarization on transverse momentum (P_t), we have calculated αP -values for Λ 's subdivided into some groups corresponding to Λ 's within different P_t -intervals. The results shown in Fig. 1 do not reveal any significant dependence.

A considerable increase of statistics for Λ 's produced in nucleus-nucleus collisions would be required to obtain a reliable solution of the problem of Λ -polarization which may be due to quark degrees of freedom.

Fig. 1. Polarization of Λ 's (α P) as a functin of transverse momentum (Pt) $\frac{1}{2}$ - for inelastic

- HeLi-interaction (82A)
- interactions (336A)

 for central (Ar + KCl) interactions (~70A)





1) M. Anikina et al.: Z. Phys. C 25 (1984) 1.

2) J. Harris et al.: Phys. Rev. Lett. 47 (1981) 229.

(In our opinion, the error of αP value is underestimated in this paper.) 3) R. Gatto: Phys. Rev. <u>109</u> (1958) 610.