STRANGE PARTICLE PRODUCTION IN SULPHUR-SULPHUR INTERACTIONS AT 200 GeV/c PER NUCLEON

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Synopsis

The aim of the WA94 experiment is to study the production of strange and multistrange particles and antiparticles, in the central rapidity and medium p_T region, in ultra relativistic heavy ion collisions. Strange particle production is expected to be a useful probe of the dynamics of hadronic matter at extreme conditions of temperature and energy density.

In this thesis, the 100 million triggers obtained by WA94 in 1991 using sulphur-sulphur interactions at 200 GeV/c per nucleon are analysed. The techniques used to reconstruct the strange particles are discussed, giving raw particle yields of 56140 Λs, 18014 $\overline{\Lambda}$s, 547 Ξ^-s, 278 $\overline{\Xi^-}$s, 430 K^+s and 202 K^-s. The data are corrected for reconstruction efficiency and acceptance and the Λ ($\overline{\Lambda}$) sample is corrected for feed-down from Ξ ($\overline{\Xi}$) decays, an effect of about 20% for Λs and 35% for $\overline{\Lambda}$s.

The corrected particle ratios in the central rapidity region are found to be;

$$\Xi^-/\Lambda = 0.08 \pm 0.01,$$

$$\overline{\Xi^-}/\overline{\Lambda} = 0.20 \pm 0.02,$$

$$K^-/\Lambda = 1.3 \pm 0.2,$$

$$K^+/\Lambda = 2.5 \pm 0.3.$$

These ratios are consistent with other heavy ion data, and in particular the $\overline{\Xi^-}/\overline{\Lambda}$ value of 0.20 ± 0.02 is significantly higher than that obtained in non-heavy ion data. The transverse mass distributions are also plotted giving inverse slopes corresponding to temperatures of the order of 200 MeV for a thermal source.