Hyperon Production in Proton-Sulphur Interactions at 200 GeV/c at the CERN OMEGA Spectrometer

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Thesis submitted for the degree of
Doctor of Philosophy

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August 1997.

Synopsis

The production of strange and anti–strange hyperons is an important probe in the study of the hot, dense environment of ultra-relativistic heavy ion collisions. The aim of the WA94 experiment is to investigate ultra-relativistic heavy ion collisions at the CERN OMEGA Spectrometer, following the attempts of the WA85 collaboration to produce an exotic state of matter known as a Quark Gluon Plasma.

The WA94 experiment used a sulphur ion beam from the CERN Super Proton Synchrotron and a sulphur target, data was taken in 1991. As a control, in the autumn of 1993, the beam was changed to protons. Particles were detected in the region of central rapidity and transverse momentum greater than 0.6 GeV/c. The analysis and results from the proton beam data form the basis of this thesis.

By detecting the weak decays of Λ, $\overline{\Lambda}$, $\Xi^-$and $\overline{\Xi}^+$ particles, the relative production yields and transverse mass can be determined. These results are compared not only with the results from the sulphur beam run, but with the results from the WA85 experiment. The anti–particle to particle ratios are consistent when comparing proton beam data to sulphur beam data. There is an increase of about 30% in the $\overline{\Xi}^+$ to $\overline{\Lambda}$ ratio when going from proton–nucleus to sulphur–nucleus interactions. The inverse slope parameters from the transverse mass distributions give information about the temperature inside the collision region. In the proton–sulphur data, these parameters are lower than those for sulphur–sulphur interactions.

The production of charged kaons and negative particles has also been studied. The ratio of K$^-$/K$^+$has been measured in both proton–sulphur and sulphur–sulphur inter-

actions. The negative particles have been interpreted as being π^-s, giving an inverse slope parameter of 171 ± 1 MeV. The negative particle yield is also used to give absolute enhancements of strange particles.