WA101 – Study of Various Processes with 160 A GeV Pb Beam

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Physics Goals:	Cross Sections for Nuclear Fragmentation, Electromagnetic Dissociation, Charge Pickup, and Electron Capture and Stripping
Beams:	Pb at 160 A GeV
Targets:	CH_2, C, Al, Cu, Ag, Sn, Au, Pb, and U

Experiment Description

In this series of experiments we will use BP-1 phosphate glass track-etch detectors, which measure ionic charges with remarkable resolution ($\sim$ 0.15 charge unit per surface) in a very small sampling distance ($\sim 20\mu$m). We plan to expose 10 stacks composed of BP-1 and several targets to the anticipated $\sim$ 160 A GeV ^{208}Pb beam at CERN when it first becomes available. After exposure, scanning and measurements will be made with an automated scanning microscope system.

Physics Summary

With this simple setup, we will measure cross sections for several interesting interactions in heavy ion collisions of $\sim$ 160 A GeV ^{208}Pb ions:

- nuclear charge pickup;
- nuclear and electromagnetic spallation;
- fragmentation of secondary beams produced in upstream targets;
- electron capture and stripping.

Measurements of the cross sections for these processes at Lorentz factor of 160 and with an ion beam as heavy as Pb will be fascinating.

New data of charge pickup will be useful for us to explore its underlying mechanism.

A measurement of the electromagnetic dissociation cross section will enable us to establish a clear picture for electromagnetic dissociation by heavy projectile nuclei.

It is of particular interest for us to study the charge-changing cross section for secondary beams, especially for Bi nuclei formed in charge pickup by 160 A GeV ^{208}Pb.

At higher Lorentz factor the capture cross section is dominated by vacuum capture. A measurement of cross section for electron capture with the $\sim$ 160 A GeV ^{208}Pb beam is crucial for resolving the question of the lifetime of colliding beams at RHIC. It is also interesting to measure cross sections for electron stripping, in order to predict lifetimes of stored beams of partially ionized ions. Our measurement will remove some of the uncertainties in the current calculation. The information our experiment will provide should thus be of great interest for RHIC.

Selected Publications

no paper has been submitted yet.

Related Experiments

EMU02