E883 - Fragmentation of Au-Projectiles at AGS Energies

University of Siegen, Physics Department,
D-57068 Siegen, Germany

Spokesperson: Wolfgang Heinrich
E-Mail: heinrich@hrz.uni-siegen.d400.de (ean)   FAX: (49)271-740-2330

Physics Goals:	Spallation Reactions, Multifragmentation, Search for non integer charged fragments
Beam:	Au at 10.6 A GeV
Targets:	CH_2, C, Al, Cu, Ag, Pb

Physics Summary

This experiment investigating nuclear fragmentation for Au projectiles is a continuation of earlier experiments WA87 and E806 (see QM-93 booklet). It is based on two types of nuclear track detectors: the plastic material CR-39 (registration threshold $Z \geq 6$ for relativistic fragments) and the glass BP-1 (registration threshold $Z \geq 73$ for relativistic fragments). Stacks of these detectors are combined with different targets. Experiments with good statistics are possible due to the completely computerized analysis of the track detectors. Total and partial charge changing fragmentation cross sections are measured. Vertices of intermediate mass fragments which are produced in multifragmentation interactions are reconstructed. The excellent charge resolution of CR-39 allows to search for fragments with fractional charge.

Status of Analysis

Spallation and Electromagnetic Dissociation

Total and elemental charge changing cross sections for reactions $\Delta Z = +1, -1, -2, -3$ were measured for ^{197}Au ions colliding with different targets. Our results confirm the data of Waddington et al. (E869) and disagree with the data of He and Price (E882). We determined electromagnetic dissociation cross sections which are in good agreement with calculated values.

Non Integer Charged Fragments

11830 tracks of fragments with charges $6 \leq Z \leq 12$ were analyzed in detail. No candidate for fractional charge was detected, i.e. the production probability of fractional charged fragments is less than $2.5 \cdot 10^{-4}$ at a confidence level of 95%.

Multifragmentation

The results of our multifragmentation experiment at AGS energies significantly differ from those of a comparable experiment performed at 1 A GeV at LBL BEVALAC. As predicted by the statistical Berlin model fission is suppressed at higher excitation energies, whereas the contribution by multifragmentation events increases. Furthermore, the charge of intermediate mass fragments produced by multifragmentation decreases with increasing excitation energies.

Selected Publications

"Multifragmentation experiments using plastic nuclear track detectors", W. Heinrich, E. Winkel, G. Rusch, J. Dreute, and B. Wiegel, Proc. Int. Workshop XXII, Hirschegg, p.30 (1994).

" Response of BP-1 to ^{197}Au heavy ions at 11.3 GeV/nucleon", S.E. Hirzebruch, G. Rusch, E. Winkel, and W. Heinrich, Nucl. Instr. Meth. **B74** (1993) 519–522.

"Charge changing interactions of ^{197}Au at 10 GeV/nucleon in collisions with targets from H to Pb", S.E. Hirzebruch, E. Becker, G. Huentrup, T. Streibel, E. Winkel, and W. Heinrich, to be submitted to Phys. Rev. C.

Related Experiments

WA87, E806, E882, e896