EVOLUTION OF FRAGMENTATION MOMENTUM DISTRIBUTIONS WITH MASS AND A NEW CsI(Na) HODOSCOPE ARRAY

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Parallel momentum distributions of fragmentation products as a function of fragment mass have been used extensively to understand the fragmentation mechanism [1, 2]. However, relatively few measurements have been made of the perpendicular component of the momentum distribution and only a basic picture is available. The widths of the perpendicular momentum distributions are predicted to be equal to the widths of the parallel distribution plus a similarly sized contribution from Coulomb deflection [3]. In order to test this prediction, both momentum distributions have been measured for nuclei produced by reactions of a 130 MeV/u ^{76}Ge primary beam on beryllium and gold targets at the National Superconducting Cyclotron Laboratory at Michigan State University. Parallel distributions of all fragments follow established mass systematics, regardless of target species. However, the perpendicular distributions of fragments produced with the ^{197}Au target that are near the projectile mass contain a clear peak near the grazing momentum that diminishes in significance as fragment mass decreases, a deviation from predictions. The origin of this peak and its systematic variation will be discussed in the context of fragmentation reaction mechanisms.

This work was carried out with a new CsI(Na) hodoscope detector in the focal plane of the S800 spectrograph needed to completely identify heavy fragments by measuring the total kinetic energy of incoming fragments to the spectrograph [4]. This measurement is necessary to provide independent charge-state and mass number identification of heavy ions at the focal plane. The properties of the array were characterized with the above mentioned primary beam and projectile fragments. Results of these tests will also be presented.

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2. D. J. Morrissey, Phys. Rev. C **39**, 460 (1989).
3. K. Van Bibber *et al.*, Phys. Rev. Lett. **43**, 840 (1979).
4. K. Meierbachtol *et al.*. Nucl. Instrum. Methods Phys. Res., Sect. A **652**, 668 (2011).