Elastic scattering of ^{28}Si on ^{13}C

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Elastic scattering is a basic process of all nuclear interactions since it accompanies any reactions, and the analysis of elastic scattering by means of optical model provides for basic information about the properties of nuclear interactions as well as the distorted waves which in turn may be used as ingredients in theoretical description of non-elastic reactions. One of the great strengths of the optical model is also that it is possible to obtain global potential fitting the elastic scattering by many nuclei over a range of energies with very similar parameters, and use them to generate distorted waves for energies and target nuclei for which no elastic scattering measurements are available.[1,2]

In present work we aim to study elastic scattering ^{28}Si on ^{13}C to determine optical potential parameters which may be used to yield distorted waves for nuclei in same region for which no elastic scattering measurements are available. In an experiment carried out at Texas A&M Cyclotron Institute, a beam of 336 MeV ^{28}Si ions from K150 cyclotron bombarded self-supporting ^{13}C target foil in the chamber of the multipole-dipole-multipole (MDM) spectrometer. Reaction products were separated using the MDM spectrometer and were observed by means of the Oxford detector. Elastic scattering of ^{28}Si on ^{13}C was measured from 2° up to 15° in the lab frame (corresponded to 6° – 49° in the center-of-mass frame). As shown on Fig.1, for example, the elastic scattering of ^{28}Si on ^{13}C measured at 4° was plotted onto $\Delta E1\text{-}E_{RESIDUAL}$ histogram

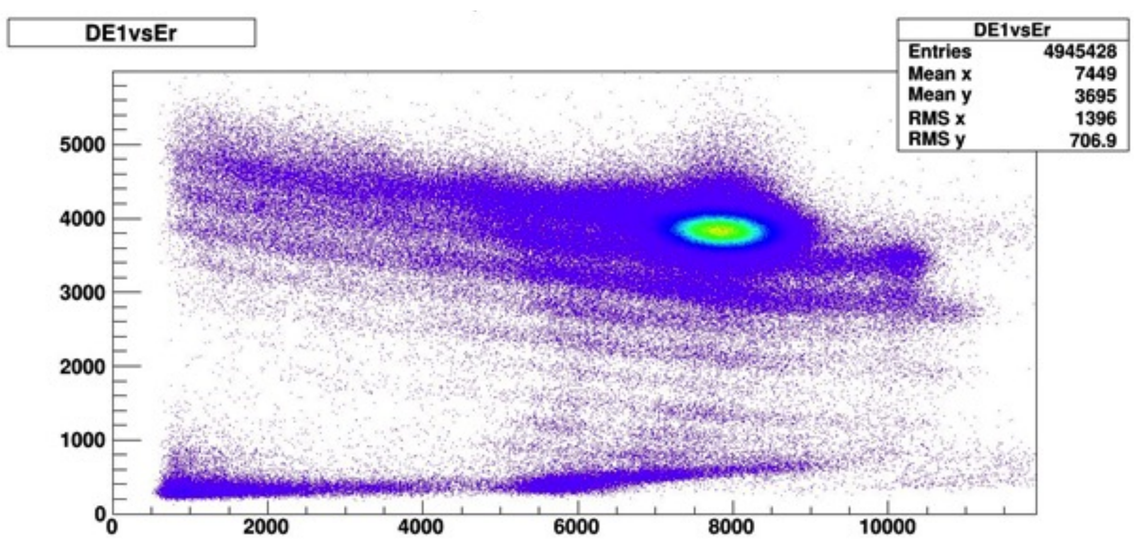

FIG. 1. $\Delta E1\text{-}E_{RESIDUAL}$ measured with the Oxford detector centered at 4 deg.

using the energy loss measured by the first two plates (named as ΔE1) and the residual energy left in the scintillator, respectively. As an alternative way for the detection of the reaction products using Micromegas [3], the same data set, as shown Fig.2, was also plotted onto $E_{MICROMEGAS}$-

$E_{RESIDUAL}$ histogram using the energy loss measured by Micromegas and the residual energy left in the scintillator, respectively. An analysis of elastic scattering at 13° is currently proceeding, and the experiment will be repeated in near future due to lack of data at 10°.

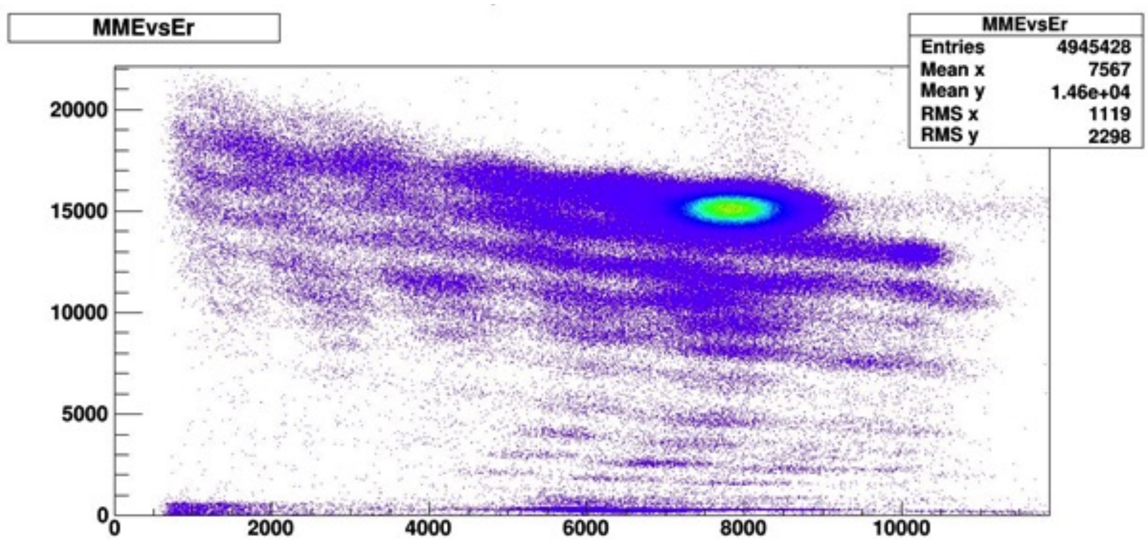

FIG. 2. $E_{MICROMEGAS}$-$E_{RESIDUAL}$ measured with the Oxford detector centered at 4 deg.

[1] P.E. Hodgson, *The Nuclear Optical Model Introductory Overview*, Nuclear Physics Lab., Dept. Of Physics, University of Oxford, Oxford, United Kingdom.

[2] P.E. Hodgson, *Nuclear Heavy-Ion Reactions*, Oxford University Press (1978).

[3] Y. Giomataris *et al.*, Nucl. Instrum. Methods Phys. Res. **A376**, 29 (1996).