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MEASUREMENTS OF PULSE SHAPE DISCRIMINATION WITH EJ 299-33 PLASTIC SCINTILLATOR USING HEAVY ION REACTION

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Abstract:

The motivation of the present paper is to study the performance of EJ 299-33 scintillator in online and off-line analysis in high rate scattering for nuclear reaction experiments performed with heavy ions. An experiment was carried out inside the CHIMERA chamber using ^{24}Mg beams at 71.5 MeV and 81 MeV impinging on $^{92}ZrO_2$ target. The plastic scintillator was backed by a photomultiplier tube and the anode pulses were digitized through 100 MHz GET electronics for the purpose of pulse shape discrimination (PSD) studies. Performances of the plastic scintillator have been tested with respect to PSD capabilities and energy spectra analysis under beam irradiations in a high background environment.

1. Introduction

In a recent paper we tested EJ 299-33 produced by Eljen Technology [1] with respect to the irradiation of Gamma-rays, neutrons and alpha particles emitted by radioactive sources [2] with the purpose to develop prototypes to be integrated under vacuum in experiments with complex multi-detector arrays, like CHIMERA [3]. Detection of neutrons and charged particles produced in nuclear reactions is needed to understand the underlying reaction