

Abstract

This research aims to study the possibility of utilizing the Gas Electron Multiplier (GEM) detector for neutron detection by using both solid and gaseous neutron converters. In this research, 2 types of solid neutron converters are used: Boron-10 (thickness 1 μm) and natural Boron (thickness 2.5 and μm) and 2 types of gaseous neutron converters are used: gas mixtures of Ar/CO₂ (70:30) and He/CO₂ (80:20). Properties that are investigated are the ability to detect both fast neutrons and thermal neutrons by investigating on count rates and signal amplitudes. Results have shown that all combinations of solid neutron converters and gaseous neutron converters are able to detect thermal neutrons, while only combination of He/CO₂ with solid neutron converters are able to detect fast neutrons. Furthermore, results have shown that GEM detectors with 1- μm Boron-10 and all gaseous neutron converters have better thermal neutron detection ability than 2.5- μm natural Boron, while GEM detectors with Ar/CO₂ have better thermal neutron detection ability than He/CO₂ for all solid neutron converters. Results have also shown that backgrounds from GEM detectors with He/CO₂ are higher than while GEM detectors with Ar/CO₂.

Key words: GEM detector, neutrons, gaseous neutron converters, solid neutron converters