PHYSICS AND ASTRONOMY
COLLOQUIUM

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"Tritium in Air: Electrons in Gases"

Abstract

Tritium (3H) is a radioactive isotope of Hydrogen. Present in the natural environment and a by-product in nuclear reactors, the monitoring and measurement of tritium is regulated by the Canadian Nuclear Safety Commission (CNSC). The presence of heavy water (D2O) as a coolant and moderator in CANDU nuclear reactors results in a large fraction of the annual occupational exposure to nuclear energy workers from tritium. Due to tritium's unique radioactive properties and its rapid oxidation, its detection and accurate activity measurement in air and in real time, is challenging. In gaseous detectors the energy deposited by radiation generates free electrons by ionizing the neutral gas molecules. These electrons are the key to the signal generated within the detector. Understanding the behaviour of these electrons in different gases and operating conditions, such as voltage and pressure, will provide insight on the ability to measure tritium in air. Using an Electron Attachment Spectrometer (EAS), investigations on electron transit time and gain in different counting gases and the presence of oxygen have provided an insight in the capability to use proportional counters to detect and measure tritium in air. The results of these investigations will be presented and a new detection system under development using a THick Gas Electron Multiplier (THGEM) will be introduced.

Friday, February 07, 2014
2:30 p.m.
Engineering & Computer Science Building
Room 116