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Accelerator Development and Detection Techniques at Necsca

Graham Clinton Daniels, Chris Franklyn

Necsca (South African Nuclear Energy Corporation Limited), P. O.Box 582, Pretoria, 0001,
South Africa

Graham.Daniels@necsca.co.za

Abstract

The accelerator facility at Necsca is involved in the development and operation of a Van de Graaff accelerator, capable of going up to a terminal potential 4 MV and a Radio Frequency Quadrupole (RFQ) accelerator, capable of accelerating deuterons up to energies between 3.7 MeV and 5.1 MeV or protons between 1.8 and 2.5 MeV. Depending on the user requirements, a variety of targets can be used, such as ^9Be , ^{11}B on a tungsten backing, or a windowless high pressure (up to 3 bar) deuterium gas cell. The major thrust of recent investigations have been performed using the $^{11}\text{B}(\text{d},\text{n})^{12}\text{C}$ reaction, as it produces a range of fast neutron energies and two distinct gamma rays.

These radiation products are used to conduct time-of-flight studies, fast neutron radiography of special nuclear materials and dual discrete energy gamma radiography, with some results presented here.