

Design and Testing of an accelerator based 14-MeV neutron Generator

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An accelerator based 14-MeV neutron generator has been developed to study radiation effect, material damages and fusion related studies. It has been assembled and tested at Fusion Neutronics Laboratory, (IPR Gandhinagar, India). The key component of the 14-MeV neutron generator is Electron Cyclotron Resonance (ECR) ion source, einzel lens, electrostatic accelerator, beam profile monitor, faraday cup, beam steerer, tritium target and high voltage power supplies. The accelerator which was modelled using SIMION, is composed of a set of electrodes that create an electric field to accelerate ionized deuterium on to a tritium/ titanium target. The 14-MeV neutrons are produced from the $T(d,n)He$ reaction, which has an extremely high cross section of 5b at the relatively low beam energy of 110 KeV. The neutron generator has been tested with different experimental conditions and the neutron fluxes measured at the different position of the system by activation technique. Experimental results on the activation of pure Au, Al, Cu, Zr and In foils are presented and compared with calculations.

Keyword: 14-MeV Neutron Generator, Accelerator, ECR Ion source, SIMION