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Neutron Energy Spectrum Measurements of Neutrons Sources With NE-213 Spectrometer

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The neutron energy spectrum of the following sources: Cf-252, Am-Be and T(d,n) ^{4}He from a Vander GRAAFF accelerator (400 KeV) were measured using a fast neutron spectrometer with NE-213 liquid scintillator.

The spectrometer consist of a NE-213 scintillator (2" Diameter x 1 1/2" High) with an associated electronic for pulse shape discrimination method to resolve neutron and gamma-ray pulse-height data. The measured pulse height spectrum of recoil protons, from neutron interactions with scintillator material, was unfolded using the FANTI code to obtain the neutron energy spectrum. The spectrometer gives neutron spectrum in the range of 2 MeV to 16 MeV, with 6% intrinsic efficiency and a resolution between 11 and 4%.

The ^{252}Cf neutron energy spectrum was measured and the results obtained show good agreement with the spectrum usually published in the literature, which can be fitted by the expression: $N(E) = \sqrt{E}\, EXP\ (-E/T)$ with the constant T=1,42 MeV. The neutron energy spectrum of Am-Be and T-D neutron sources also are presented in this work.

The fast neutron spectrometer has been utilized in shielding benchmark experiments, as well as in characterization of reactor sources. Finally, the spectra obtained can be usefull for application in radiation dosimetry, since the biological damage is function of neutron energy.