

CHARGED PARTICLES IN NEUTRON RADIOTHERAPY - CHARGED
PARTICLES SPECTRA FROM THE INTERACTION OF 14 MeV
NEUTRONS WITH AIR

K. Kadija, D. Rendić, B. Eman and I. Šlaus
Ruder Bošković Institute, Zagreb

Using photodiodes to measure fluences of neutrons¹⁾ it was found that a radiotherapeutic neutron flux contains also charged particles²⁾. These charged particles are produced through the interaction of neutrons with air and with the material used in the construction of the neutron source and the collimator.

This work is a part of a systematic study³⁾ to determine the contribution of charged particles to the neutron radiotherapeutic dose. Charged particles spectra, from the interaction of 14.8 MeV neutrons, are measured using the photodiode at 0.1 and 0.3 m source-detector distances. Measuring with and without collimators and placing gold foils at appropriate positions it was possible to determine separately charged particles spectra from the air, from the source and from the collimator. Neutron fluences are determined by associated alpha particles and using photodiodes as recoil particle detectors. Measured proton, deuteron and alpha particle spectra (due to negative Q values and low (n, trion) cross sections the contribution of tritons and ³He can be neglected) are compared with the predictions of the Monte Carlo calculation based on (n, charged particles) differential cross sections.

References:

- 1) K. Kovačević, N. Stipčić, G. Paić, I. Šlaus, B. Eman, V. Pečar and M. Antić, Nucl. Instr. Methods 148 (1978) 291.
- 2) I. Šlaus, P.A. Treado and J.M. Lambert, unpublished, 1978.
- 3) For the complementary study using continuous neutron spectra from d + ⁹Be at 16 MeV and 35 MeV deuteron energy see P.A. Treado, J.M. Lambert, I. Šlaus, R.G. Allas, and B. Eman, IEEE Transactions on Nuclear Science NS-28 (1981) 1570.