

# Masterthesis

## Topic: Neutron Dose Determination with Gamma Ray Detectors

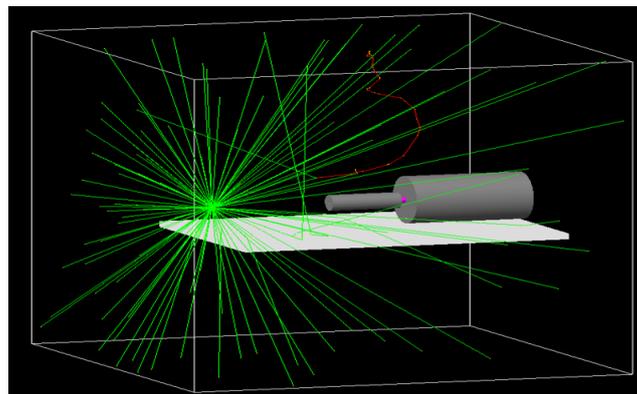
### Background

Radiation protection is one of the crucial issues concerning the disposal of spent fuel casks in dedicated repositories. Several devices such as neutron moderation spheres, H\*(10)-gamma balls, Albedo dosimeters, beta fingerring dosimeters and gamma dosimeters using thermoluminescence detectors (TLDs), as well as nuclear track dosimeter systems were developed experimentally and are introduced in dose monitoring. However, these devices show often large uncertainties. To improve the assessment of radiation fields and related dosimetry, Germanium (Ge) gamma ray detectors are considered. In comparison to TLD measurements, the Ge detectors offer high-resolution gamma spectrometry, i.e. the analysis of the pulse height spectra increases the accuracy determination of the gamma ray quantities.

### Task of the work

The aim of the proposed research project is to investigate the dose in mixed neutron-gamma-fields by employing Ge gamma ray detectors. Strictly speaking, a Ge gamma ray detector gathers the experimental radiation rays from a Cf-252 source and the pulse height spectra.

The following question is in focus: besides the gamma dose determination, how good is the “Ge gamma ray detector method” for neutron dose determination.



### Methods:

- Experimental work with a Ge gamma ray detector
- Measurements with a Cf-252 neutron source
- For theoretical estimations of the decays of Cf-252, dedicated programs will be provided.

### **Selected publications on the topic:**

- [1] Karelin Y.A. et al., Californium-252 Neutron Sources. Appl. Radiat. Isot. vol. 48, No. 10-12, pp. 1563-1566 (1997)
- [2] Martin, R.C., Knauer, J.B. and Balo, P.A., Production, distribution and applications of californium-252 neutron sources. Appl. Rad. Isot., vol. 53, pp. 785-792 (2000)
- [3] Gehrke R.J. et al., The  $\gamma$ -ray spectrum of  $^{252}\text{Cf}$  and the information contained within it. Nuclear Instruments and Methods in Physics Research B 213, pp. 10–21 (2004)

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