

# Neutron Field Spectral Indices Investigation Using Activation Foils Modified by Ion Implantation and Vapor Deposition

Karel Katovsky<sup>1, a)</sup>, Jiří Burian<sup>1</sup>, Štefan Čerba<sup>2</sup>, Marko Erich<sup>3</sup>, Vendula Filová<sup>1,2</sup>, Marko Gloginjić<sup>3</sup>, Jakub Lüley<sup>2</sup>, Željko Mravik<sup>3</sup>, Srdjan Petrović<sup>3</sup>, Ondřej Šťastný<sup>1</sup> and Branislav Vrban<sup>2</sup>

<sup>1</sup>*Brno University of Technology, Faculty of Electrical Engineering and Communication, Department of Electrical Power Engineering, 3082/10 Technická, 616 00 Brno, Czech Republic*

<sup>2</sup>*Slovak University of Technology in Bratislava, Faculty of Electrical Engineering and Information Technology, Institute of Nuclear and Physical Engineering, 3 Ilkovicova, 812 19 Bratislava, Slovak Republic*

<sup>3</sup>*Vinča Institute of Nuclear Sciences, Laboratory of Physics, 12-14 Mike Petrovica Alasa, 113 51 Vinča, Belgrade, Republic of Serbia*

<sup>a)</sup> *Corresponding author: katovsky@vut.cz*

**Abstract.** Neutron activation measurement using set of thin foils from highly pure materials is a method known for decades. Using shielding materials like cadmium might add an extra information about neutron field which causes the activation. We very often use relation of activity of bare foil to the activity of the same foil covered by cadmium, and call it cadmium ratio or cadmium spectral index. We could use the same way to define another spectral indices like gadolinium ratio, hafnium ratio, boron ratio, etc. Manipulation with some specific materials like pure gadolinium, samarium, dysprosium or even boron is difficult, sometimes impossible. We introduce and tested method of ion implantation of neutron shielding material directly to the activation foil, and thus redefine spectral index as a ratio between activity of foil without implanted absorber to the activity with implanted absorber. For thicker layers of absorber another method, a vapor deposition, was used and tested. Activities are tested in systems with different neutron spectra, and compared with theoretical models and MCNP simulations.