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Development of dosimetry and monitoring applications with CLYC detectors for nuclear technology

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Nuclear physics research and applications require continuous research and development (R&D) in detection and data acquisition (DAQ) systems. The Nuclear Innovation Unit at CIEMAT covers a broad scientific program on neutron-induced reaction cross-section measurements (capture, fission, and charged particle production), β-delayed neutron emission, (α,n) reaction studies, and is also involved in applications such as the characterization of nuclear waste and neutron dosimetry.

CLYC based detection systems are being developed for neutron measurements in various environments, such as underground laboratories, proton therapy facilities, and nuclear waste repositories. Moreover, the combined sensitivity of CLYC scintillators to both γ-rays and neutrons with excellent discrimination properties, has been explored to simultaneously perform combined γ-ray and neutron dosimetry.

In this talk we report on the development of CLYC-based dosimetry. Monte Carlo simulations have been used to design Wendi-II and Lupin-II based dosimeters, using a 1-inch cubic CLYC crystal as the sensitive element. Simulations show that the responses are comparable to the original detectors. The dosimeters have been constructed and calibration measurements with a ^{252}Cf high intensity source were carried out at the Neutronic Standards Laboratory (LPN) of CIEMAT.

Primary author(s) : ALCAYNE AICUA, Victor (CIEMAT (Spain)); BALLESTEROS, Carlos (CIEMAT); CANO OTT, Daniel (CIEMAT); LLANES, José (CIEMAT); MARTÍNEZ, Trino (CIEMAT); MENDOZA, Emilio (CIEMAT); PÉREZ DE RADA FIOL, Alberto (CIEMAT); PLAZA, Julio (CIEMAT); SANCHEZ-CABALLERO, Adrián (CIEMAT); VILLAMARÍN, David (CIEMAT)

Presenter(s) : PÉREZ DE RADA FIOL, Alberto (CIEMAT)

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