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#08-16 The Gamma and Neutron Monitor Counters for the MICADO Project

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In the framework of the MICADO EU project, aimed at the full digitization of the low and intermediate level radioactive waste management, we have produced and characterized a full set of radiation counters suitable for monitoring gamma rays and neutrons. In particular the goal of the Work Package 7 is to set up a granular radwaste monitoring system to be used during the final demonstration. The proposed system for the online real-time monitoring consists of an array of many radiation sensors to be deployed all around a number of radioactive waste drums, in order to collect counting-rate data in real time and to make them available to a software platform named DigiWaste. In order to be suitable for mass deployment these detectors have to be small, reasonably inexpensive, robust, easy-to-use and reliable. The sensors developed possess all of these features.

Continuous radiological monitoring of radwaste has to be based on the measurement of gamma and neutron radiation, since these are the penetrating types of radiation more easily detectable out of the drums. This is the reason why the focus was placed on the development of detectors for gamma rays and neutrons. In view of a possible mass deployment the foreseen sensors have to be reasonably low-cost. The overall system must be modular, so that one can easily modify number and placement of the sensors around the drums, and it has to be scalable in order to make it possible to tailor it to small, medium and large scale storage configurations without conceptual limitations.

The proposed system is based on detectors which can be easily installed and/or reassembled in different geometrical configurations, as they are mechanically very simple and are based on commercial electronics (see the attached file with figures). The detection efficiency the SiLiF thermal neutron counter is 4%, whereas the SciFi gamma counter has a $\approx 2.5\%$ efficiency. Moreover, these detectors do not need special calibration procedures, and their ease of use and installation makes them suitable for short, medium and long term (as long as possible) monitoring.

A continuous automatic monitoring of the radwaste drums after their characterization represents an added value in terms of safety and security, and the availability of continuous streams of counting-rate data around each drum is a comfortable tool toward the transparency, which now more than ever is a hot topic of the nuclear industry with respect to the common people environment-aware.

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