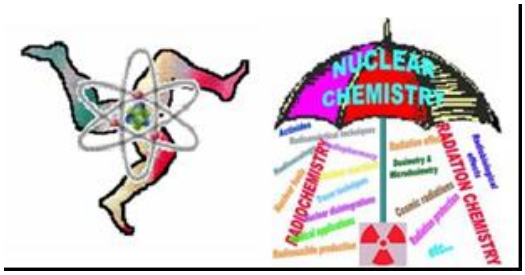

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A system for radwaste storage real-time monitoring: lab and real tests

Tuesday 20 September 2011 10:10 (15 minutes)

A prototype array of modular sensors for online monitoring of radioactive waste was developed at INFN-LNS. With the main purpose of counting gamma radiation, we implemented a new kind of mini-sensor, based on Silicon PhotoMultipliers and scintillating fibres, that behaves like a cheap scintillating Geiger-Muller counter. It can be replicated, for instance, in shape of a fine grid around each single waste drum in a repository.
After simulating the counting response of thin scintillating fibers to gamma radiation, we verified our simulation results with precision measurements on the bench with laboratory sources.
Front-end electronics and an FPGA-based counting system was developed, in order to handle the data flow coming from the field sensors. Such a system also deals with the redundant data transmission toward a console with a graphical user interface and a data storage system. The redundant transmission is done on differential cables and also foreseen wireless using low-power ZigBee units. The log data are foreseen to be stored onto a database system navigable by means of a web browser interface.
A robotic arm demonstrator was developed and is being finalized for remote ad-hoc inspection and operations around the waste drums, and for this purpose we also designed and constructed a 1:1 prototype platform holding 4 phantom drums and equipped with sensors.
Test results with radioactive sources showed very encouraging performance in terms of sensitivity, therefore we are planning to install a small demonstrator system around real radioactive waste drums quite soon.
A possible final system will be distributed, fine-grained, robust, reliable, and based on low-cost components.
An overview of the prototype system, along with the test procedures and results of real tests, will be shown at the conference.

Authors: Dr PAPPALARDO, Alfio (INFN); Dr SCIRÈ, Carlotta (INFN); Dr COSENTINO, Luigi (INFN); Dr FINOCCHIARO, Paolo (INFN); Dr SCIRÈ, Sergio (INFN)

Co-authors: Mr CALÌ, Claudio (INFN); Mr LI PUMA, Fabio (INFN - Università Catania); Mr DE LUCA, Giovanni (INFN); Mr PISCOPO, Massimo (INFN); Mr LITRICO, Pietro (INFN); Mrs FINOCCHIARO, Valentina (INFN - Università Catania)

Presenter: Dr FINOCCHIARO, Paolo (INFN)

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