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**BOOK OF ABSTRACTS
AND PROGRAM**



COLLERONI
FRUTTA DI SICILIA

EQUIVALENT DETECTOR MODELS FOR THE SIMULATION OF EFFICIENCY RESPONSE OF AN HPGe DETECTOR WITH PENELOPE CODE

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Monte Carlo simulation of response of an HPGe detector is a widely used technique to evaluate counting efficiencies. It is particularly useful when calibration standards with the same shape and composition of the sample under examination are not available. The result of the simulation depends on the more or less detailed knowledge of the characteristics of the detector, able to define a "model" of the same detector. To highlight parts not well defined in the manufacturer's certification, a detector X-ray analysis is usually performed, except in cases when it is not possible to dismantle the shielding structure with the loss of previous calibration data.

In this work, in absence of some data on the detector and a being unworkable to perform a X-ray graph, some "equivalent" models have been studied and adopted. The main feature was to attribute the uncertainties of the model to only one of the parameters, in this case the dead layer of the detector, keeping the other data provided by the manufacturer unchanged. With this technique, using the Monte Carlo PENELOPE code in the 2011 version, the efficiency response of a spectrometric chain based on an ORTEC GEM-50195S detector, installed inside a "low-background" bunker in the Engineering Department of the University of Palermo, was evaluated. Simulation results were compared with previous ones performed with MCNP5 code.

The experimental validation of the "equivalent" model is carried out by comparing the simulation results with those of spectrometric measurements of calibrated point sources supplied by CEA or previously characterized measurement geometries such as the "packet-sample" geometry and a Marinelli beaker.

It has been verified that, as is known, the characteristics of the detector change over time and the "equivalent" models to be used in the simulations must be continuously redetermined, as well as the experimental measurements of efficiency must be periodically repeated also for the same measurement geometry.

Finally, the use of "equivalent models" makes easier and faster the evaluation with a Monte Carlo code of efficiency curves, for which a few experimental values are sufficient for validation.