

Gamma-ray spectroscopy with large volume scintillator detectors

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In the last 10 years a large number of new high light-yield scintillator crystals have been discovered. The most famous among them are LaBr₃:Ce crystals. Even though large volume LaBr₃:Ce detectors are available since only 2008-2009 some newly arrays with large volume crystals are already in operation as for example HECTOR+ which consists of ten 9 x 20 cm LaBr₃:Ce detectors and eight 14.5 x 17.5 BaF₂ detectors. The arrays has been coupled to the AGATA demonstrator in both the LNL campaign with stable beams and in the GSI PRESPEC campaign with radioactive beams.

The properties of large volume cylindrical 3.5" x 8" LaBr₃:Ce scintillation detectors cannot be easily derived from those of small and medium sized detectors. In fact, self absorption, possible crystal in-homogeneities (both of which are more likely to appear with scaled up dimensions), plus the much longer mean free path of the scintillation light towards the photo-cathode and photo-multiplier tube (PMT) non-idealities, can all variously affect the detector performance. Therefore the properties of these large volume detectors in terms of signal lineshape, linearity, energy and time resolution will be discussed.

In addition the very preliminary results concerning the analysis of the data in the GARFIELD-LNL, AGATA-LNL and PRESPEC-GSI campaign, where large volume scintillator detectors, had been used will be presented. In particular the topics of Isospin Mixing, Pygmy Dipole Resonance, Dynamical Dipole and low lying collective states will be discussed

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