

Physics Cases and Instrumentation for the EURISOL-DF, next step towards Eurisol



Contribution ID: 2

Type: **Innovative Instrumentation for EURISOL-DF**

Instrumentation Physics Cases and for EURISOL- DF, the next step towards EURISOL

Starting from the commercialization of LaBr₃:Ce scintillators, approximately 10 years ago, a new generation of high performing scintillator detectors began to be available (CeBr₃, CLYC, CLLC, CLLBC, Co-Doped LaBr₃, ...). These new scintillators provide good energy resolution, much better than that provided by NaI, an excellent time response, large volumes (and therefore good detection and full energy peak efficiencies), particle identification, neutron spectroscopy in particular conditions and, potentially, they provide good position sensitivity which could be used to reduce the Doppler Broadening effect when used in reaction studies.

For example the CLYC scintillator (now available in 3"x3" volume) provides a much better energy resolution than NaI and an excellent timing. In addition Pulse Shape Discrimination (PSD) gives a very clean neutron identification. When the CLYC is enriched with ⁶Li it has very high efficiency for thermal neutron detection while if enriched with ⁷Li it permits the direct measurement of the neutron kinetic energy from the energy pulse signal.

These types of detectors, however, cannot compete with HPGe excellent high resolution and tracking performances (as for example AGATA) but, because of the much lower price, the simplicity of maintenance, the large volumes, the excellent time and PSD performances can be used in several physics case where HPGe are not optimal or more in general together with HPGe arrays. In particular, they can be used, for example, to measure i) high energy gamma rays (large volumes are important, ii) gamma rays in an extremely noisy background and thus the time resolution can be exploited for its reduction, iii) where the level density is low or where iv) neutron identification and spectroscopy is needed. In terms of physics cases scintillator can be used to measure collective properties of nuclei and first excited levels in extremely exotic nuclei where efficiency and time determination or PSD cleanliness are more important than energy resolution.

Primary author: Prof. CAMERA, Franco (Università di Milano and INFN section of Milano)

Presenter: Prof. CAMERA, Franco (Università di Milano and INFN section of Milano)