ID de Contribution: **31** Type: **Non spécifié**

Gamma Spectroscopy in a Laser-perturbed Environment

When high power lasers interact with matter, ions, electrons and their associated bremsstrahlung photons are the products. The protons can reach hundreds of MeVs and intensities of some kA within a few ns. Such high-intensity opens up new realms of nuclear physics like the study of shot-lived nuclei states in a plasma by gamma spectroscopy [1].
It is common to use a LaBr3 scintillator coupled to a Photomultiplier Tube (PMT) for gamma spectroscopy. However, high-energy depositions in the detector due to huge amount of soft X-rays from the laser interaction trigger delayed emissions in the form of afterglows within the scintillator making the PMT blind for a few ms after the laser shot. Fortunately, with a LaBr3 and a Hybrid Photo Diode (HPD) the duration of the afterglow signal can decrease to some tens of µs [1]. Nonetheless, the amplitudes of signals near the region of the afterglow remain altered due to variations in the gain of the photodetector.
It is imperative to implement signal treatment procedures that take into account the role of the afterglow and the amplitude variations of signals in a laser-perturbed environment. In this work, I have done offline signal processing on experimental data acquired from a HPD coupled to a LaBr3. The experiment involved the use of laser-accelerated protons to induce nuclear excitations on a zirconium target. The outcome was the production of 90mNb nucleus, which emits several gamma rays including 122 keV and 257 keV with lifetimes of 63 µs and 6.19 ms, respectively. I will thus present the steps taken for the signal treatments and the obtained results.

[1] Scintillators in high-power laser-driven experiments; M.Tarisien, et al. ; IEEE Transactions on Nuclear Science, Vol 65, issue 8, p.2216-2219 (2018)

Auteur principal: ATUKPOR, Emmanuel (CENBG)

Co-auteurs: Dr DOMANGE, Jocelyn (CENBG); Dr HANNACHI, Fazia (CENBG); Dr TARISIEN, Medhi (CENBG)

Orateur: ATUKPOR, Emmanuel (CENBG)