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Study of exotic nuclei of interest for applied and fundamental nuclear physics with Total Absorption Gamma Spectroscopy (TAGS)

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The study of beta decay of neutron rich nuclei is particularly important for many fields in fundamental and applied physics[1]. In nuclear reactors, fission products, through their decays, produce an additional power called decay heat[5]. The assesment of this energy is essential for nuclear safety since it represents around 7% of the power in an operating reactor and these decays continue after reactor shutdown. Beta decay leads to antineutrino emmission and is thus a good tool for fundamental neutrino research[6] but it can also be used for non-proliferation purposes since the antineutrino flux reflects the reactor power and the fuel content. In nuclear astrophysics, the r-process is a nucleo-synthesis process[3] at the origin of half of the nuclei heavier than iron. It takes place in hot (T~10^9K) and highly neutron-dense environments. This process is based on the competition between neutron capture (n,γ), photo-dissociation (γ,n) reactions and beta decays. A precise knowledge of the beta properties can constrain the theoretical models used to understand this nucleo-synthesis process. Some of the nuclei involved in these fields of nuclear physics are affected by the pandemonium effect[4]: due to the low efficiency of high-resolution detectors, such as germanium (HPGe), at high gamma energies, some gamma-rays and the corresponding high energy levels can be missed in the decay data leading to a distortion of the beta decay feeding.

`New measurements of relevant nuclei for the above mentioned topics have been performed at the IGISOL facil`

`The topic of the presentation will be the introduction of Pandemonium effect and the solution our groups c`

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