Beta Decay Studies of Exotic Nuclei with the Total Absorption Technique

Research Project / Research Group Description:
The gamma and neutron spectroscopy group at IFIC (CSIC-UV) has three main research lines: study of the beta decay of exotic nuclei using total absorption spectroscopy, study of the beta decay of exotic nuclei using 3He counters and the participation in the nTOF experiment.

The present research project is related to total absorption spectroscopy studies of exotic nuclei, where the group has pioneered in recent years the development of new setups, the development of new analysis techniques and new fields of applications. The group is considered a world expert in the technique. The applications of the technique range from the shape determination of exotic nuclei in its ground state, to the study of beta decays that are relevant for the prediction of the decay heat in reactors and the prediction of the neutrino spectrum from reactors. This latter application has attracted significant attention in recent years due to the so-called reactor anomaly and because of the possibility of monitoring reactors for non-proliferation applications.

The main objective of this line of research is to provide beta decay data that is free from the so-called Pandemonium effect. The obtained results can serve as solid ground for testing nuclear models which is of relevance for nuclear structure and astrophysical applications and, as mentioned earlier, also for practical nuclear industry applications.

Job position description:
The candidate will take part in the preparation, realization and analysis of beta decay studies performed at Large Scale Facilities using the total absorption technique.
The group has several experiments approved and in preparation related to this technique. They aim at the study of nuclear structure in regions of utmost interest of the nuclide chart (A=100, A=132, A=190) and also at studying cases relevant for applications.

These experiments will be performed at installations like IPN Orsay (Orsay, France), IGISOL (Univ. of Jyväskylä, Finland), ISOLDE (CERN), GSI (Germany) or RIKEN (Japan). The experiments are mainly focused in the application of the total absorption technique, but may also require complementary experiments using conventional gamma and beta spectroscopy.

As a consequence of the research work, the candidate will learn the use of Monte Carlo techniques and to handle complex experimental data with tools such as ROOT. The work will also provide the candidate with a solid instrumental preparation in nuclear techniques

The candidate should have a medium/high level in English, computer skills, travel disposition and the interest to work in a dynamic experimental group.

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