NEUTRON CAPTURE MEASUREMENTS AT N_TOF WITH THE TOTAL ABSOROPTION CALORIMETER

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The measurement of accurate neutron induced cross sections is fundamental for the development of innovative nuclear reactors such as Accelerator Driven Systems (ADS) and Gen-IV. Both types of reactors are characterized by the use of a fast neutron spectrum and a fuel composition with a high content in Plutonium and Minor Actinides, to be compared to the thermal neutron spectrum and uranium based fuel of today's commercial reactors. Due to this differences in the neutron spectra and fuel composition, the neutron cross section database existing nowadays is well suited for the design and operation of commercial reactors but not for ADS or Gen-IV.

In this context, the combination of the n_TOF facility at CERN and the 4pi Total Absorption Calorimeter (TAC) provide the means for measuring the capture cross sections of small mass radioactive samples in a wide neutron energy rang.

The contribution will give an overview of the activities of the Nuclear Innovation Unit from CIEMAT regarding the measurements with the TAC at n_TOF. The measurements carried out in the last few years will be summarized and the main conclusions will be drawn. The results concern not only capture cross sections but also nuclear structure studies regarding g-ray strength functions.

The measurements foreseen for 2010 and 2011 will be performed using an improved set-up that pushes the limits of the detection system towards lower background conditions, higher energy limits and versatility. The improved set-up and the test measurements will be presented as well as the latest data from the ongoing measurement of ^{241}Am(n,g). The versatility of the new set-up allows one to combine a transparent fission detector with the TAC in such a way that fissile isotopes can be measured keeping under control the fission induced background. The first results from this type of measurements will be presented and its use for future measurements discussed.

Overall, this contribution is an overview of the past, present and future measurements with the BaF_2 Total Absorption Calorimeter at the CERN n_TOF facility.