# MEASUREMENT OF THE $^{197}$Au(n,g) STELLAR CROSS SECTION AT kT=30 keV BY ACTIVATION

Pablo Jimenez-Bonilla[1], Javier Praena[1,2]

[1] *Atomic, Molecular and Nuclear Physics Department, University of Seville, Spain.*
[2] *Centro Nacional de Aceleradores (US-JA-CSIC), Seville, Spain.*

Neutron capture processes (s-process and r-process) are responsible for the nucleosynthesis of the main part of the heavy elements above iron. The Stellar Cross Section or Maxwellian Averaged Cross Section (MACS) of the involved isotopes is a key parameter for modeling the stellar nucleosynthesis processes. The MACS can be calculated analytically from the neutron-capture cross-section measured as a function of the energy. Moreover, as shown by Beer & Käppeler [1], MACS at kT≈25 keV can be measured almost directly using activation technique (whenever possible), since a quasi-maxwellian neutron spectrum (MNS) can be generated by means of $^{7}$Li(p,n) near the reaction threshold.

Most neutron cross sections are measured relative to standards. For activation measurements, the MACS of $^{197}$Au(n,γ) at kT=30 keV is used as reference [2]. The value traditionally adopted for the MACS of Au(n,γ) was obtained by Ratynski & Käppeler, in a very accurate activation measurement using a spherical segment gold sample [3]. They reported a value equal to 582±9 mb. Recently, new measurements of the $^{197}$Au(n,γ) with TOF technique at n-TOF facility at CERN [4] reported similar values (611±22 mb).

In this work, we have measured the MACS of $^{197}$Au(n,γ) at kT=30 keV by activation at 3 MV Tandem Pelletron accelerator at CNA (Seville). A gold flat sample was used. We report a value equal to 619±30 mb. We will discuss the analysis and results; in particular we will examine the planar correction proposed in this work.

*[1] H. Beer, F.Käppeler. "Neutron capture cross sections on $^{138}$Ba, $^{140;142}$Ce,$^{175;176}$Lu, and $^{181}$Ta at 30 keV: Prerequisite for investigation of the $^{176}$Lu cosmic clock". Phys. Rev. C, vol. 21, nº 2, p. 534–544, 1980.*

*[2] KADoNiS v0.3 - The third update of the "Karlsruhe Astrophysical Database of Nucleosynthesis in Stars" I. Dillmann, R. Plag, F. Käppeler, T. Rauscher.* www.kadonis.org.

*[3] W.Ratynski, F.Käppeler. "Neutron capture cross section of $^{197}$Au: A standard for stellar nucleosynthesis" Phys. Rev. C, vol. 37, nº 2, p. 595–604, 1988.*

*[4] C. Lederer et al. (n_TOF collaboration). "$^{197}$Au(n,γ) cross section in the unresolved resonance region". Phys. Rev. C, vol. 83, nº 034608, 2011.*