

# Fission studies using quasi-free scattering reactions in inverse kinematics

Jose Benlliure<sup>1</sup>

<sup>1</sup>Instituto De Física Corpuscular (CSIC - Universitat De València), Spain

Fission reactions induced by relativistic heavy nuclei, in combination with an advanced detection setup, have recently allowed, for the first time, the complete identification of both fission fragments in atomic and mass number. In addition, these kinematic conditions allow the study of a wide variety of unstable fissile nuclei. The first experiments made it possible to address the role of shell effects in fission and the dynamics of fission at high excitation energies.

More recently, these experiments have been upgraded. The R3B target area detectors (silicon tracker and Califa calorimeter) allow the determination of the missing energy in quasi-free scattering (p,2p) reactions using a liquid hydrogen target. In the case of (p,2p)-induced fission reactions the missing energy corresponds to the excitation energy of the fissioning nuclei, which was not accessible in previous measurements. In addition, the new setup is able to measure gamma rays and neutrons emitted during the fission process. This provides, for the first time, complete kinematic measurements of fission reactions. In this contribution we present the first results obtained in the study of the fission of  $^{238}\text{U}$  induced by quasi-free (p,2p) reactions. In particular we will show how the complete identification of both fission fragments and the measurement of the excitation energy of the fissioning nucleus allowed us to study the disappearance of shell effects in the fission yields with temperature and the sharing of the excitation energy between the two fission fragments.