

# SEMINARIO DEPARTAMENTO DE QUÍMICA FÍSICA

Universidad Complutense de Madrid



**Miércoles 18 de enero de 2023 – 12:30 h**

**Aula QC22**

## **RELATIVISTIC AND NON-RELATIVISTIC ATOMIC PHOTOIONIZATION**

**Felipe Zapata Abellán**

*Departamento de Química, Universidad Autónoma de Madrid*

*felipe.zapata@uam.es*

Atomic photoionization time-delays (PTDs) are very sensitive observables that strongly depend on the electronic environment from where the electrons are emitted. In this sense, ultrafast modifications of the electronic environment, induced by processes such as light scattering, collisions or redistribution of the electron density due to chemical reactions, may be probed in real time by measuring PTDs. This fascinating discovery consolidated the field of attophysics and opened the door to the emerging field of attochemistry which aims at visualizing and steering chemical reactions by using ultrafast laser pulses [1].

Although a complete characterization of the photoionization process has been recently accomplished for neon atoms [2], the investigation of complex systems becomes a true challenge. From a theoretical perspective, the description of photoionization processes requires the correct representation of bound and continuum states of the target system, as well as the introduction of correlation effects due to electron-electron interactions.

In this seminar we will present recent (relativistic and non-relativistic) methods that are able to take into account important correlation effects by keeping a correct mathematical representation of the outgoing part of the wave function [3-6]. Applications to different atomic systems will be shown. As an outlook, the implementation to molecular systems will be commented.

[1] M. Nisoli *et al.* Chem. Rev. 117, 10760 (2014)

[2] J. Peschel *et al.* Nat. Commun. 13, 5205 (2022)

[3] F. Zapata *et al.* Phys. Rev. A 105, 012802 (2022)

[4] F. Zapata *et al.* J. Chem. Phys. 150, 234104 (2019)

[5] K. Schwinn *et al.* J. Chem. Phys. 156, 224106 (2022)

[6] J. Toulouse *et al.* J. Chem. Phys. 157, 244104 (2022)

Se ruega enviar un correo a [ncaselli@ucm.es](mailto:ncaselli@ucm.es) si se está interesado en acceder vía telemática.