



Departamento de  
Física de la  
Materia Condensada  
**Universidad Zaragoza**

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## Quantum trapping based on the Casimir force

The Casimir-Lifshitz force originates from the quantum vacuum fluctuations of the electromagnetic field. This force is especially intense between interacting objects at nanoscale distances, and it can be attractive or repulsive depending on the optical properties of the materials involved (amongst other parameters). This fundamental phenomenon is at the heart of the malfunctioning of nano- and micro-electromechanical devices (NEMS and MEMS) that integrate many of the gadgets we use in our daily lives. Absolute control over these forces would make it possible to suppress adhesion and friction in these NEMs and MEMs.

During this talk, I will show the possibility of controlling the Casimir-Lifshitz force by tuning the optical properties of the interacting objects. Specifically, I will present diverse examples of quantum levitation of self-standing thin films comprising multilayer structures or films with spatial inhomogeneities, based on the Casimir-Lifshitz force.

*Sol Carretero obtained her PhD in 2011 (Universidad de Zaragoza) working on the theoretical analysis of the Extraordinary Optical Transmission in metallic nano-holes. Granted by a Humboldt Fellowship, in 2012 she moved to Ludwig-Maximilians-Universität München (LMU) where she worked on the control and manipulation of nano- and micro-objects with optical tweezers. In 2014, she focused on the optical design of highly efficient solution processed solar cells at the Institute of Materials Science of Seville (ICMS) with a Juan de la Cierva Incorporación contract. There, she also triggered a new research line on the manipulation of Casimir-Lifshitz forces by tuning the optical properties of the interacting materials. Since 2018, she works at Universidad Autónoma de Madrid (UAM) as Prof. Ayudante Doctor designing highly efficient opto-electronic devices (nano-lasers, perovskite LEDs, etc) with additional functionalities.*

Con la colaboración de:



**11 Marzo (viernes)**

**HORA: 12:30**

**SALA DE GRADOS  
FACULTAD DE CIENCIAS**