



Departamento de  
Física de la  
Materia Condensada  
Universidad Zaragoza

**SEMINARIOS 2022**

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## Thermoelectric conversion mediated by spin currents

Magnetic insulators can be used to generate and propagate spin currents (i.e. a flow of angular momentum) without the presence of charge carriers and their associated Joule heating losses, offering alternative mechanisms for spin current generation and manipulation, with the potential to realize more efficient spin-based applications, such as spin-driven thermoelectric conversion.

During this talk I will review basic aspects of interconversion between heat and electricity mediated by the spin of the electron in magnetic materials, particularly, the spin Seebeck effect (SSE) and related phenomena. I will also present experimental results obtained in oxide/metal-heterojunction systems, demonstrating different mechanisms that enhance the spin currents in magnetic materials, offering alternatives to improve the efficiency of spin-based thermoelectric conversion.

*Rafael Ramos obtained his PhD in 2010 (Trinity College Dublin, Ireland), focused on magnetotransport properties of thin films of electrically conductive systems. In 2012 he joined the group of Prof. M. R. Ibarra at Institute of Nanoscience of Aragón where he investigated the spin Seebeck effect (SSE) in magnetic systems working on a Japanese-Spanish collaboration that further continued in 2015 when he joined the group of Prof. E. Saitoh in Japan, obtaining record enhancements of the SSE efficiency in multilayer systems and by magnon-phonon resonances. In 2020, awarded with a Marie S. Curie Fellowship, he joined the group of Prof. F. Rivadulla at Centro Singular de Investigación en Química Biológica y Materiales Moleculares in the University of Santiago de Compostela, and since 2021 he is a Ramón y Cajal fellow at the same institute. He studies electron, heat and spin transport in solid state systems, and their mutual interaction as potential routes for heat energy scavenging and heat flow control.*

Con la colaboración de:



Facultad de Ciencias  
Universidad Zaragoza



**25 Febrero (viernes)**

**HORA: 12:30**

**SALA DE GRADOS  
FACULTAD DE CIENCIAS**