



Departamento de
Física de la
Materia Condensada
Universidad Zaragoza

SEMINARIOS 2020

Matthias Bode

Universität Würzburg

“Indirect Chiral Magnetic Exchange through Dzyaloshinskii-Moriya–Enhanced RKKY Interactions”

Localized electron spins can couple magnetically via the Ruderman-Kittel-Kasuya-Yosida interaction even if their wave functions lack direct overlap. Theory predicts that spin-orbit scattering leads to a Dzyaloshinskii-Moriya type enhancement of this indirect exchange interaction, giving rise to chiral exchange terms. Recently, we performed a spin-polarized scanning tunneling microscopy study of transition metal oxide chains on the (001) surfaces of Ir and Pt. Our STM results confirm that the deposition of Co, Fe, Mn, and Cr on the (2×1) oxygen-reconstructed Ir(001) surface leads to the formation of quasi-one-dimensional chains with a (3×1) unit cell. In contrast, preparation on Pt(001) required deposition onto the cold substrate with subsequent annealing in an oxygen atmosphere. In particular, for MnO₂ chains we observed highly complex spin structures. Whereas we find an almost antiferromagnetic Mn–Mn coupling along the chains, the inter-chain coupling across the non-magnetic substrates turns out to be chiral. These magnetic structures observed for MnO₂ can be viewed as highly anisotropic Skyrmions.

Prof. Matthias Bode holds the Chair of Experimental Physics II department at the University of Würzburg since 2010. After getting his PhD in Physics, he led between 1997 and 2006 the ‘Nanomagnetism’ research sub-group in the University of Hamburg, where he contributed decisively to the development of spin resolved imaging techniques with atomic resolution. His studies paved the way to understand exotic magnetic ground states in low dimensional systems. He has received the Philip-Morris Research Award and is Distinguished Lecturer of the IEEE Magnetic Society. His current research interests are topological, magnetic and transport properties of surfaces investigated by Scanning Tunnelling Microscopy.

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11th of February (Tuesday)

**PLACE: SALA DE GRADOS DE LA
FACULTAD DE CIENCIAS**

TIME: 12:30