# SEMINARIO
# Departamentos de Física Teórica I y II
# Universidad Complutense de Madrid

**CONFERENCIANTE:** Daniel Arovas

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**TITULO: Topological Order and Absence of Band Insulators at Integer Filling in Non-Symmorphic Crystals**

**LUGAR**: FACULTAD DE CIENCIAS FÍSICAS UCM
**DÍA**: 10 de octubre, 2014 (Viernes)
**HORA**: 14:30
**AULA**: Seminario Depto. Física Teórica I, Planta 3ª

**ABSTRACT:**

Band insulators appear in a crystalline system only when the filling – the number of electrons per unit cell and spin projection – is an integer. At fractional filling, an insulating phase that preserves all symmetries is a Mott insulator, i.e. it is either gapless or, if gapped, displays fractionalized excitations and topological order. We raise the inverse question – at an integer filling is a band insulator always possible? Here we show that lattice symmetries may forbid a band insulator even at certain integer fillings, if the crystal is non-symmorphic – a property shared by a majority of three-dimensional crystal structures. In these cases, one may infer the existence of topological order if the ground state is gapped and fully symmetric. This is demonstrated using a non-perturbative flux threading argument, which has immediate applications to quantum spin systems and bosonic insulators in addition to electronic band structures in the absence of spin-orbit interaction.

Reference: Nature Physics 9, 299 (2013)