**Department Seminar:**

**Monday, June 1, 2015, at 11:00 a.m.;**
— all are invited to meet at around 10:40 for a chat and coffee —

**Dr. Phil King**
School of Physics & Astronomy,
University of St. Andrews, Scotland.

**Imaging spin-valley-layer locking in centrosymmetric bulk transition-metal dichalcogenides**

Richard-Willstätter-Haus, Faradayweg 10

**Abstract:**

Methods to generate spin-polarized electronic states in non-magnetic solids are strongly desired to enable all-electrical manipulation of electron spins for new quantum devices. This is generally accepted to require breaking global structural inversion symmetry. In contrast, I will discuss our observation from spin- and angle-resolved photoemission spectroscopy of spin-polarized bulk states in the centrosymmetric transition-metal dichalcogenide $2H$-WSe$_2$ [1]. Mediated by a lack of inversion symmetry in constituent Se-W-Se monolayers of the bulk crystal where the electronic states are localized, we show how enormous spin splittings up to $\sim 0.5$ eV result, with a spin texture that is strongly modulated in both real and momentum space. Through this, our study provides direct experimental evidence for a putative locking of the spin with the layer and valley pseudospins in transition-metal dichalcogenides, of key importance for using these compounds in proposed valleytronic devices.

**Reference:**