Informal Seminar:
Tuesday, March 11, 2014, at 3:00 p.m.

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Magnonic Charge Pumping via Spin-Orbit Coupling

Abstract:
In ferromagnetic materials with broken spatial inversion symmetry, the relativistic coupling between spin and orbital momentum allows an electric current to reorient the magnetisation. Here, we report the experimental observation of charge pumping in which a precessing ferromagnet pumps a charge current, demonstrating direct conversion of magnons into high-frequency currents via the relativistic spin-orbit interaction.

To demonstrate charge pumping we choose (Ga,Mn)As. The generated electric current, differently from spin currents generated by spin-pumping, can be directly detected without the need of any additional spin to charge conversion mechanism and contains information about the relativistic current-driven magnetisation dynamics.

The charge-pumping phenomenon is generic and gives a deeper understanding of the recently observed spin-orbit torques, of which it is the reciprocal effect and which currently attract interest for their potential in manipulating magnetic information.