



CASL Computational Science Seminar

Title: Cosmic ray current driven instabilities and particle transport properties in turbulent self excited magnetic fields.

Speaker: Brian Reville (UCD School of Mathematical Sciences)

Date: Tue 1st May 2007 at 2:00PM

Location: CASL Seminar Room - Belfield Office Park

Abstract: It has long been known theoretically that cosmic rays streaming along the mean magnetic field excite resonant hydromagnetic waves which scatter and isotropise the particles themselves. The resulting generated turbulence is believed to saturate at quasilinear levels. However, in recent years there has been an increase in the study of magnetic field amplification near collisionless shocks in astrophysics, the sites where cosmic rays are widely believed to be produced. Observational evidence suggests that magnetic fields well in excess of the compressed interstellar medium field are present in many nearby young supernova remnants, suggesting that there must be some nonlinear process amplifying the turbulence to values greater than the mean field. The so called Bell-type MHD instability is reviewed and extended to include a full plasma kinetic description including thermal effects. The results from numerical MHD simulations of the instability are presented, and the resulting particle transport properties in the amplified field is also shown.

<mailto:stephen.osullivan@ucd.ie>