Abstract:

Phenomena that create intriguing traces of activity that can be observed by direct visual methods are among the most fascinating events in nature. Penetration of magnetic flux in type-II superconductors seen by magneto-optical imaging (MOI) is one example, where especially the spectacular dendritic flux patterns occurring abruptly in superconducting films are currently attracting much attention.

In this talk I will first explain the basic principles for using MOI as a powerful experimental technique for superconductor research, and demonstrate its ability to resolve detailed magnetic flux behavior down to the smallest scales, i.e., the motion of individual Abrikosov vortices (flux quanta). Then, an overview of the recent work done on abrupt flux avalanches involving ~1 million vortices is presented. Focus is put on avalanches forming dendritic flux patterns in films of MgB2* and NbN, where this instability is most pronounced. The experimental findings are compared with a theoretical model based on a thermomagnetic underlying mechanism responsible for the instability, and it is shown that the model gives an excellent quantitative description of main features of the phenomenon.

Date: Monday, 15 Jan 2007
Time: 10.30am to 11.30am
Venue: PAP Meeting Room (SBS B3n-19)