

Università degli Studi di Pavia
DOTTORATO DI RICERCA IN FISICA

CORSO DI SEMINARI DI INDIRIZZO TEORICO

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Sala Riunioni INFN

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Università dell'Insubria a Como

**L'accoppiamento Aharonov-Bohm
nei sistemi amorfi**

**ovvero, perché i vetri da finestra sono sensibili
a deboli campi magnetici alle basse temperature**

Abstract

Recent experiments on the thermal, dielectric, and acoustic properties of multicomponent silicate glasses at low temperatures ($T < 1$ K) have revealed an unusual response in some thick-film glass sensors to a weak applied magnetic field. The heat capacity, which should be linear with temperature T , has a non-monotonic response in the field; the dielectric constant, which should be linear in $\ln(T)$, has both an enhancement peaking around 1000 Gauss and a suppression beginning around 2000 Gauss, changing various time curvature. This and other puzzling behaviours have been observed.

A statistical-mechanics theory will be presented to explain quantitatively these puzzling experimental findings. The theory is based on an extension of the standard tunneling model for structural low-temperature glasses in which the tunneling particles are assumed to move in a multi-welled local potential. The coupling of the orbital motion of the tunneling particle to the magnetic field is a manifestation of the Aharonov-Bohm effect in cold condensed matter. The theory explains the thermomagnetic enhancement as well as both the magnetocapacitance enhancement and subsequent decrease. It turns out that a small cluster of coherently tunneling charged particles is involved, a success for the tunneling approach to the universal physical properties of complex forms of matter.

Gli studenti di Dottorato e tutti gli interessati sono cordialmente invitati

Annalisa Marzuoli

Titolare del Corso