

LABORATORI NAZIONALI DEL GRAN SASSO

**THEORETICAL SEMINAR
ANNOUNCEMENT**

On March 29, 2007 at 14:30, Alexander Vikman from Ludwig-Maximilians-Universität and Arnold Sommerfeld Center for Theoretical Physics, Munich, Germany, will give a seminar entitled:

**“Superluminal” Scalar Fields, Cosmology
and Black Holes**

Abstract:

It is well known that in manifestly Lorentz invariant theories with nontrivial kinetic terms, perturbations around some classical backgrounds can travel faster than light. The nontrivial scalar field backgrounds serve as a "new ether" and break spontaneously Lorentz invariance despite a manifestly Lorentz invariant action of the theory. These exotic "superluminal" models may have interesting consequences for cosmology and astrophysics. In particular, one can show that in such theories the contribution of the gravitational waves to the CMB fluctuations can be substantially larger than that in standard inflationary models. This increase of the tensor-to-scalar perturbations ratio leads to a larger B-component of the CMB polarization, thus making the prospects for its future detection much more promising. Moreover in such theories one can send information from inside a black hole. This information is encoded in perturbations propagating in the "scalar field ether". We found the stationary solution for background, which describes the accretion of the scalar field onto a black hole. Examining the propagation of small perturbations around this solution we show that the signals emitted inside the horizon can reach an observer located outside the black hole. Thus the accreting field forms a hydrodynamical analog of a black hole whose horizon is inside of the gravitational black hole drawing in the scalar field. In particular I will discuss causality and stability issues in these models.

(“B. Pontecorvo” room)