

LABORATORI NAZIONALI DEL GRAN SASSO

SEMINAR ANNOUNCEMENT

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**“A *FIELD-THEORETICAL*
APPROACH TO NEUTRINO
OSCILLATIONS - Part I:
Relativistic Wave Packets”**

The Fock vectors used in the quantum field theory (QFT) for description of the asymptotically free in out states with definite momenta are inapplicable for the description of the states localized in space-time such as, e.g., the states of unstable particles. However just the states of such kind are needed in the QFT approach to the problem of neutrino flavor transitions. In this approach, the sequential processes of neutrino production and detection are treated as a single process described, in the perturbation theory, by a sum of the macroscopic Feynman diagrams, external lines of which correspond to the wave packets and the neutrino mass eigenfields are described by the propagators linked to the macroscopically separated vertices. A relativistically covariant theory of wave packets is proposed, which can be used for description of the asymptotically free localized states in the S-matrix formalism of QFT. The general properties of such packets and their integrals of motion are investigated. As a simple working model of the relativistic wave packet, satisfying all requirements of the formalism, we study relativistic Gaussian packet (RGP). The regime is studied in which one can neglect the natural dispersion of RGP with time.

APRIL 5, 2011 – 11:00 AM
LNGS - “B. PONTECORVO” ROOM