

LABORATORI NAZIONALI DEL GRAN SASSO

**THEORETICAL SEMINAR
ANNOUNCEMENT**

On **April 3, 2009**, at **2:30 pm**, **Konstantin Manukovskiy** from **Institute for Theoretical and Experimental Physics, INR - RAS, Moscow, Russia**, will give a seminar entitled:

**“Three-dimensional explosion
dynamics of a critical-mass neutron
star (in a binary system)”**

Abstract

In a close binary system of neutron stars, the low-mass component undergoes explosive destruction at the final evolutionary stage of the binary system under consideration as a result of the collapse of the rotating iron core of a collapsing supernova. Numerical solution is obtained for the three-dimensional dynamics of 0.1 solar mass iron ejecta with energy release 4.7 MeV per nucleon in the gravitational field of a high-mass neutron star. The numerical solution has been obtained by the particle method. As a test problem, the suggested model is compared with the well-known asymptotic solution (for vanishing m/M), which we have also been able to slightly improve and extend. The separation of the ejecta into two categories of particles with hyperbolic and elliptical orbits is analyzed in detail. The kinetic energy of the ejecta is estimated as a function of the binary component mass ratio and the final pulsar velocity by applying the law of momentum conservation in the system of high-mass neutron star and ejecta. The simulations were carried out with time-dependent energy release and realistic profile of ejecta velocity distribution. For gravitationally bound part of the iron ejection, which is probably responsible for the additional emission of muon and electron neutrinos, the approximate estimation of total neutrino total was obtained.

(“B. Pontecorvo” room)