Session PS6 : Neutrinos

1- Franco Buccella, Universita di Napoli, Napoli, Italy.

Title: SO(10) and Neutrino Oscillations.

Abstract: The scale of the matrix elements of the Majorana mass-matrix of the right-handed neutrinos, which is related to the spontaneous symmetry breaking of B-L, may not be determined only from the experimental knowledge about neutrino oscillations. By assuming the vanishing of the 3x3 matrix elements of the right-handed Majorana neutrinos, we avoid too large fine tunings for other matrix elements in all the solutions to the neutrino solar problem.

2- Vo Van Thuan, Institute for Nuclear Science and Technique (INST), Hanoi, Vietnam.

Title: Reinterpretation of the two-component equation for neutrinos.

Abstract: The space-time symmetrical super-luminous Lorentz transformation (SLT) is developed for the lepton sector, particularly for neutrinos. Time-like leptons are predicted to have a pseudo-isospin and an electric dipole moment. They may have also an imaginary transcendent mass and magnetic charge which are pseudo-scalars due to their correlation with the space orientation, and may be seen in the parity non-conserving interference between the weak interaction and the electro-magnetic one. As a result, these pseudo-scalars should be suppressed by a factor proportional to the Fermi constant. Based on this assumption we modify the two-component equation and describe neutrinos as super-luminous leptons. The relationship between this equation and the traditional Majorana and Weyl equations is discussed.

3- Marek Zralek, Institute of Physics, University of Silesia Poland.

Title: Present Status of Search on Neutrino Nature.

Abstract: There are two main problems in neutrino physics. The first one is the problem of neutrino mass. According to present observations, this question seems to be solved. Neutrinos are massive particles. The second problem refers to neutrinos nature. Massive neutrinos can be either Dirac or Majorana particles. As their visible interactions are left-handed and known sources produce ultrarelativistic states, it is very difficult to distinguish experimentally each of them. Terrestrial experiments have not given the answer up to now. The experiments which directly should fill neutrino mass (e.g. neutrino oscillations, Tritium beta decay) do not distinguish their nature. The experiment which seems to be nearest to discover Majorana character of neutrinos – neutrinoless double beta decay of nuclei – is also inconclusive up to now. However if we combine all existing informations about neutrino

mixing, their masses (from Tritium beta decay and cosmology) together with the bound given by lack of neutrinoless double beta, we are able to say much more about their character. We can discriminate between accepted mass spectrum allowed still for Majorana or only for Dirac neutrinos. With the present experimental precision, the room for Majorana neutrinos is bounded but still is large. Future results neutrinoless double beta (Genius project), if still inconclusive, will limit the corner for Majorana neutrinos substantially. With assumption that neutrinos contribute to dark matter content, already the present neutrinoless double beta bound significantly restrict the possible neutrino mass schemes.

4- Verena Chazal, Institut de Physique de Neuchatel, Neuchatel, Switzerland.

Title: Status of the MUNU experiment.

Abstract:The MUNU experiment has been built to measure the neutrino magnetic moment at Bugey (France) with the studies of $\overline{\nu}_e e^-$ scattering. It consists on a low background detector based on a 1 m^3 TPC filled with 3 bars of CF4, and surrounded by an active anti-Compton shielding. The TCP served as neutrino target and detector. Data taking has started and the measured performance of this detector will be shown.

5- Javier Rico, ETH, Zurich, Switzerland.

Title: Long Base Line Experiments at Gran Sasso.

Abstract: The CERN Neutrino Beam to Gran Sasso has been approved by the CERN Council in December 1999. Two new and technologically challenging experiments (OPERA and ICANOE) have been proposed to be installed at the Gran Sasso Underground Laboratory. The combined project will help elucidate the atmospheric neutrino oscillation mechanism. The CNGS program will provide unique opportunities to look for $\nu_\mu \to \nu_\tau$ and $\nu_\mu \to \nu_e$ appearance.

6- Sylvain Turcotte, CEA/Dapnia/Astro, Saclay, France.

Title: Recent results on solar models.

Abstract: Helioseismology has put very strict constraints on the structure of the Sun. It has shown that the standard solar model reproduces very well the Sun as it is observed, thereby confirming the solar neutrino problem. Some processes not included in the standard solar models might change predicted neutrino fluxes without affecting the solar structure. The results for some possible processes investigated at Saclay will be briefly presented.

7- Roberto Petti, Cern, Switzerland.

Title: Current results from the short baseline experiments at CERN

Abstract: The short baseline program recently completed at CERN was design to address the $\nu_\mu \to \nu_\tau$ oscillation issue within the cosmologically-relevant region of the parameter space. In particular, two independent approaches are exploited for the τ appearance search: a direct kink detection through emulsions (CHORUS) and an indirect kinematic selection with an electronic detector (NOMAD). Both techniques have demonstrated to reach high sensitivity to the τ detection, down to $\sin^2 2\theta_{\mu\tau}\mathcal{O}(10^{-4})$.

8- Tran Minh Tam, University of Lausanne, Lausanne, Switzerland.

Title: Lambda Polarization in NOMAD.

Abstract: The Lambda polarization in nu(mu) charged currents interactions has been measured in the NOMAD experiment. The event sample (more than 8000 reconstructed Lambda) is 20 times larger than the one of any previous experiment. A negative polarization is observed along the W-boson direction which is enhanced in the target fragmentation region. In the current fragmentation region, our results do not allow to draw any conclusion, while in the target fragmentation region, they can provide a test of different models describing the nucleon spin composition. We also observe a transverse polarization (in the direction orthogonal to the production plane); this transverse polarization has qualitatively the same behaviour as the polarization in unpolarized hadron-hadron experiments.

9- Robert Plunkett, Fermilab, Batavia, Illinois, USA.

Title: MINOS and the Fermilab Long-Baseline Program.

Abstract: The MINOS experiment, currently under construction, will provide a powerful tool to investigate neutrino oscillation phenomena. Two identical detectors placed at Fermilab and at Soudan, Minnesota, a distance of 732 km. can be used with a variable-energy beam generated by the Fermilab Main Injector to study the region of parameter space indicated by atmospheric neutrino experiments. Firm evidence of oscillations, measurement of the oscillation parameters, and information on the mode of oscillation are goals of the experiment. This talk will describe the status and physics capabilities of MINOS, scheduled to begin data-taking in 2003.