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Partecipazione Italiana al 300 GeV

Letter of Intent to participate to the high energy neutrino program with bubble chambers at CERN

The Milano Heavy Liquid Bubble Chamber Group would like to express with this letter its firm intent to participate to the bubble chamber neutrino physics at the CERN SPS. The importance and the interest of the problems to be studied with high energy neutrino beams are well known and have been emphasized by the recent results obtained by the Gargamelle Collaboration. Without discussing them in details, which seem not to be appropriate to the aim of the present letter, we would like only to mention here:

a) the study of the ν and $\bar{\nu}$ differential and total cross sections as a function of energy;
b) the production of new particles (W mesons, heavy leptons, etc.)
c) tests on CVC, PCAC, T reversal invariance etc.;
d) existence of lepton and hadron neutral currents;
e) structure of the current at the hadron vertex;
f) [illegible] the multiplicative and [illegible] neutrino etc.

We would like to participate to the experiments on neutrino interactions in Gargamelle placed behind BEBC. In our opinion this displacement should be favoured for the following reasons:

a) neutrino physics to be studied in Gargamelle can be studied also in BEBC filled with hydrogen-neon mixtures. Apart any question of time and cost, neutrino experiments in neon would obviously decrease the time available to the equally interesting neutrino experiments in hydrogen and deuterium.

b) the shielding could not prevent some muons to enter BEBC. This muon background will be certainly lower in Gargamelle due to the fringing field of BEBC.

c) the advantage to use at the same time two giant bubble chambers is obvious, expecially if one takes into account that Gargamelle already works in an excellent way in neutrino physics and that the cost to displace Gargamelle is small in comparison with the cost of the neutrino beam and negligible with respect to the "cost of protons" for the neutrino experiment.

We believe that a possible participation by our group to the Gargamelle neutrino physics at 300 GeV would be made easier by the following reasons:

a) our group works in the high energy neutrino physics since 1967 : at the beginning with the CERN NPA Heavy Liquid Bubble Chamber and presently with Gargamelle. Between 6 and 10 physicists, two programmers and 8 technicians would participate to the Gargamelle neutrino experiment at the CERN SPS.

b) we already own the instrumentation needed for the analysis of Gargamelle pictures. We have already in operation two simple projectors for Gargamelle films plus two projectors Argo of our design and a third is going to be installed in a few months. These projectors are already linked to an "on-line" PDP 9 computer to which a PDP 11 will be added soon.

c) the group has participated to the studies at CERN on neutrino beams and on the use of Gargamelle at the 300

Members of the group have participated to reports already published on dicromatic neutrino beams with quadrupoles (M. Rollier), "non conventional" lenses for dicromatic neutrino beams (M. Brini, C. Conta, E. Fiorini and A. Pullia), muon shielding with magnetized iron (M. Rollier and G. Sacerdoti) and on the possibility to distinguish at very high energy between events on hydrogen and on complex nuclei (E. Bellotti and M. Rollier).

We would like to stress that our interest is on neutrino physics in Gargamelle. If however this chamber would not operate at the CERN SPS we would obviously be interested in the similar heavy liquid bubble chamber physics to be done with BEBC. Due to the buge amount of work required by an high energy neutrino experiment, we are not considering the possibility to analyze at the same time pictures from Gargamelle and from BEBC.

(Ettore Fiorini)
on behalf of Milano
Heavy Liquid Bubble
Chamber Group