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P R O P O S A L

To : E.E.C. and T.C.C.

From : Gargamelle Neutrino Collaboration (Spokesman : H. Wachsmuth)

Re : Proposal to measure π^{+}_{-} and K^{+}_{-} spectra with the spectrometer of the S 92 Experiment (Allaby et al.).

Summary : It is proposed to measure π^{+}_{-} and K^{+}_{-} production by protons of the highest possible Momentum (26 GeV/c ?) in a B_4C target. These data are necessary to determine the neutrino spectrum above 6 GeV neutrino energy.

We ask for two weeks of machine time in the S 5 beam after the completion of the experiment of Allaby et al. to enable the Gargamelle-Neutrino collaboration to measure positive and negative pion and kaon production spectra in a B_4C target at 26 GeV/c proton momentum over the range of momenta and angles accepted by their apparatus.

These data are of vital importance in order to obtain the neutrino spectrum, particularly at high energy. Above 6 GeV the neutrino spectrum determination depends completely on the knowledge of the kaon/pion ratio [1].

The aim of the next neutrino experiment is to study the highly inelastic production processes [2], and test scale invariance. Scale invariance implies that the total neutrino cross section should be linear with energy. We expect that the statistical accuracy of the neutrino cross-section at 10 GeV will be of the order of 5 %. It is therefore of prime importance to determine the ν flux to at least 5 %.

We consider that this can be achieved with the experience gained in the last determination of the ν flux, plus accurate data on the K/π ratio. Obviously this information will be of great value for all future neutrino experiments.

From discussions with Allaby et al. and from past experience of a similar experiment at 19.2 GeV/c proton momentum [3], we conclude that a period of two weeks will be sufficient for the necessary change-overs and data taking.

References

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D. Bloess, J.B.M. Pattison, G. Plass, D. Rusch, W. Venus and H.W. Wachsmuth - in prep.

2) I. Budagov, D.C. Cundy, C. Franzinetti, W.B. Fretter, H.W.K. Hopkins, C. Manfredotti, G. Myatt, F.A. Nezrick, M. Nikolic, T.B. Novey, R.B. Palmer, J.B.M. Pattison, D.H. Perkins, C.A. Ramm, B. Roe, R. Stump, W. Venus, H.W. Wachsmuth, H Yoshiki - Phys. Lett. 30 b, 364 (1969)

3) J.V. Allaby, F. Binon, A.N. Diddens, P. Duteil, A. Klovning, R. Meunier, J.P. Peigneux, E.J. Sacharidis, K. Schlüpmann, M. Spighel, J.P. Stroot, A.M. Thorndike and A.M. Wetherell, Experiment S 61, 1968 and Physics Letters 28 B, 67 (1968).