

Ref:

Date: 30 March 2004

# MEMORANDUM

**From/De** : J. Panman /PH, for the HARP collaboration  
**To/à** : Prof. J. Dainton, chairman SPSC  
**Subject/Sujet** : Villars meeting - hadron production measurements  
**Copies** : Prof. J. Engelen, CSO

---

HARP is presently performing an analysis to measure hadron production yields by proton beams in the momentum range from 1.5 to 15 GeV/c. The primary aim of the experiment is to measure pion production for a neutrino factory and to predict precise atmospheric neutrino fluxes. In the PS proton momentum range important additional measurements have been done to determine the properties of the neutrino beams for the MiniBooNe and K2K experiments at 8 and 11.9 GeV/c respectively. A formal collaboration with these groups has been set up.

Similarly, future neutrino experiments will need precise measurements of pion and kaon production cross-sections at higher energies. In particular, the T2K experiment at JPARC will use a neutrino beam produced by 50 GeV/c protons. For this experiment it is crucial to know the pion and kaon production cross-sections with high precision. A similar measurement would be important for the FNAL neutrino programme with 120 GeV/c protons.

The HARP collaboration is contemplating to study how to perform such measurements at the CERN SPS. These studies will include the possibilities to re-use existing apparatus and a comparison with the possibilities at other facilities.

The energy range 20–100 GeV is also important for a better determination of the hadron production cross-sections needed to calculate atmospheric neutrino fluxes. This opportunity had already been pointed out to the SPSC in 2001-017/P322

The collaboration would like to request the SPSC to consider this option as part of the future physics programme of the SPS.