To : FS Co-ordinator  
From : G. von Dardel  
Re : Secondary Particle Production Measurements in the Scattered Proton Beam  

I want to request machine time in the East Area scattered proton beam during Period I for the carrying out of a measurement of the production spectra and angular distributions for secondary particles, in particular pions and kaons, in heavy target material of interest to the neutrino experiment. The general interest of other groups would make it useful to extend the study to antiprotons as well, and to lighter materials, beryllium, and perhaps hydrogen.

The information required for the neutrino experiment is characterized as follows:

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<tr>
<th>Energy (GeV)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>15</th>
<th>Gev/c</th>
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<td>24</td>
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<td>26</td>
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</table>

(x) are measured for both pions and kaons of both signs, other values only for pions.

An accuracy of 10% from statistical and systematic errors should be aimed at.
Time Estimate

An estimate of the counting rates assuming a proton beam of $10^7$ protons per burst, and experimental layout as given in Figure 1, with a solid angle of $10^{-2}$ ster, and a momentum resolution of $1\%$ indicates that the sufficient required accuracy of most points is achieved in a small fraction of one hour. On the assumption that, on the average, each measurement requires half an hour, including the setting of the momentum and the pressure in the gas Cerenkov counter, one arrives at 10 shifts for the measurements on a heavy material target. With 10 shifts for similar measurements on beryllium, 10 shifts for setting up purposes, the total required machine time is about 30 shifts. Measurements at the three angles, 0, 2.5, and 5° could be done in a single run if the system of three 2 m magnets is used to change the incident direction of the incoming proton beam, without changing at all the analyzing equipment.

Experimenters

The Mermod group has kindly offered to assist in these measurements with their staff and equipment, and we can also count on help from the PAP2P group, who are interested in the best conditions for antiproton production.

G. von Dardel

Distribution:--
Director-General
E.E.C.
Professor G. Bernardini
Mermod Group
Neutrino Groups
PAP2P Group
Taylor Group
Scintillator 6x15 cm

Gas Cerenkov Counter

Scintillator 4x10 cm

Schematic beam and detector for N5