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SPSC/M 157
2nd March 1979

MEMORANDUM

To : Members of the SPS Committee

From : P 123 Collaboration

Re : Wide Band Running

The 450 GeV hardened wide band beam using horn position "B" that will be used this summer produces an event energy distribution that is substantially wider and harder than that from the 350 GeV beam that has been used until now and, while some 20% softer, is otherwise very similar to that produced by the bare target running we proposed. We expect the precision of flux determination and hence of total cross section measurements to be considerably worse than for bare target running, particularly if North Area production measurements of the kind we proposed but over an appropriately wider angular range are not carried out. But total cross section data obtained meanwhile by other experiments using the narrow beand beam at various energies will hopefully be sufficiently precise that they can be used to prevent this affecting the quality of the remaining and major part of our intended physics programme.

Thus wide band running in such a beam, while inferior to bare target running, is sufficiently similar that in the event of the SPSC deciding that no bare target running can be scheduled before the long 1980 shutdown we would wish to request running in this beam. Since the event rate per proton should then be about 4 times higher for neutrinos of given sign, a total of 1.2×10^{17} protons on target with antineutrino focussing plus 0.6×10^{17} with neutrino focussing would suffice to provide half the statistics originally requested. This would correspond for example to a 10 day run at an average proton intensity of $(3 - 4) \times 10^{12}$ per pulse on target. The extent to which higher intensity operation would have too deleterious an effect on the quality of the EMI data can be checked this summer.

The feature of this beam that makes it reasonably well suited to our purpose, namely its hard wide energy spectrum, clearly makes it less suited to P 121 which aims primarily at collecting low energy (10 - 30 GeV) events. Our collaboration would have little interest in running in the conditions P 121 proposes (i.e. 350 GeV low energy beam) since the resulting energy and Q^2 range is too narrow. However the P 121 collaboration may be interested in also taking data in the conditions we propose here. In any case we would be happy to work together with them in whatever way seems most reasonable and efficient for extracting the physics. We consider this physics to be of the most fundamental importance and BEBC, because of its intrinsically superior resolution, to be in principle the best available detector for doing it.

However, because of the slowness and laboriousness of the measurement process, large measurement effort is required in toto if this potential of BEBC is to be fully exploited. In addition the fact that the structure function moments published by the ABCLOS and CDHS collaborations differ systematically by about a factor 2 at corresponding values of Q^2 for reasons that are apparently not yet understood underlines the desirability of parallel independent experiments to establish the true uncertainties in the experiments and their interpretation.