C. ATHENE: HIGH ENERGY NEUTRINO PHYSICS

From our knowledge of the cosmic ray muon spectrum, we can predict with fair accuracy the neutrino flux due to interactions of cosmic rays with the atmosphere. The energy spectrum extends to very high values; but the flux falls off very rapidly with increasing energy.[23]

The advent of the Fermilab 500-GeV accelerator has given us accelerator based neutrino data to over 200 GeV. The accuracy and detail of accelerator measurements, whenever they are possible, far exceed that obtainable with any conceivable cosmic ray experiment. In planning a cosmic-ray measurement on neutrinos, one would do well to consider only energies which appear to be inaccessible to accelerators.

In the immediate future the Fermilab accelerator can be raised to about 1000 GeV, or 1 TeV, by the use of superconducting magnets. The following stage at Fermilab is undoubtedly some application of the accelerator to the production and use of colliding beams; but colliding beams, though they raise the center-of-mass energy of a collision, do not produce neutrinos of higher energy in the laboratory than the colliding particles. To get neutrinos above 1 TeV, a still larger accelerator will have to be built. Fermilab Director, R. R. Wilson, has proposed an internationally sponsored 10 TeV accelerator; "it will cost a billion dollars, ten trillion volts 'twill give." If past history is a guide, the gestation period of such a suggestion