D. STUDIES OF MUON-PROTON INELASTIC SCATTERING

As SLAC was being built, Fig. 1, we were preparing to study muon proton inelastic scattering

$$\mu^- + p \rightarrow \mu^- + \text{anything}$$

to compare it with

$$e^- + p \rightarrow e^- + \text{anything}$$

As you know, extensive studies of $e - p$ inelastic scattering were planned at SLAC. Indeed, some of those studies led to the Nobel Prize being awarded to J. Friedman, H. Kendall, and R. Taylor. My hope was that we would find a difference between the μ and e other than the differences of mass and lepton number. In particular, I hoped that we would find a difference at large momentum transfers. Some of our hopes, or at least my hopes, were naive by today's standards of knowledge of particle physics. For example, I speculated[17] that the muon might have a special interaction with hadrons not possessed by the electron.

Therefore, beginning in the late 1960's, we measured the differential cross sections for inelastic scattering of muons on protons, and then compared (Toner *et al.*[18], Braunstein *et al.*[19]) the $\mu - p$ cross sections with the corresponding $e - p$ cross sections.

Other experimenters studied the differential cross section for $\mu - p$ elastic scattering and compared it with $e - p$ elastic scattering (Ellsworth *et al.*[20], Camilleri *et al.*[21], Kostoulas *et al.*[22]). But statistically significant differences between $\mu - p$ and $e - p$ cross sections could not be found in either the elastic or inelastic case. Furthermore there were systematic errors of the order of 5 or 10% in comparing $\mu - p$ and $e - p$ cross sections because the techniques were so different.

Thus it became clear that this was not a fruitful direction and I turned to the third cast of our net, the use of e^+e^- colliding beams to search for heavy leptons.