assumption that they come only from this source, we measure the branching ratios $B(\tau \to e\nu_e\nu_\tau) = (22.4 \pm 5.5)\%$ and $B(\tau \to h + \text{neutrals}) = (45 \pm 19)\%$."

L. SEMILEPTONIC DECAY MODES AND THE SEARCH FOR $\tau^- \to \nu_\tau\pi^-$ AND $\tau^- \to \nu_\tau\rho^-$

By the time of the 1977 Photon Lepton Conference at Hamburg, I was able to report[45] in a "Review of Heavy Lepton Production in e^+e^- Annihilation" that

"*a.* All data on anomalous $e\mu$, ex, ee and $\mu\mu$ events produced in e^+e^- annihilation is consistent with the existence of a mass 1.9 ± 0.1 GeV/c^2 charged lepton, the τ.

b. This data cannot be explained as coming from charmed particle decays.

c. Many of the expected decay modes of the τ have been seen. A very important problem is the existence of the $\tau^- \to \nu_\tau\pi^-$ decay mode."

The anomalous muon and anomalous electron events had shown that the total decay rate of the τ into hadrons, that is the total semileptonic decay rate, was about the right size. And, as pointed out as early as 1976 by De Rújula and Georgi[46], the measured total e^+e^- annihilation cross section required the τ to have the expected total semileptonic decay rate. But, if the τ was indeed a sequential heavy lepton, two substantial semileptonic decay modes had to exist: $\tau^- \to \nu_\tau\pi^-$ and $\tau^- \to \nu_\tau\rho^-$.

First, the branching fraction for

$$\tau^- \to \nu_\tau + \pi^- \tag{9a}$$

could be calculated from the decay rate for

$$\pi^- \to \mu^- + \bar{\nu}_\mu \tag{9b}$$

and was found to be

$$B(\tau^- \to \nu_\tau\pi^-) \approx 10\% \tag{9c}$$