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B-MESON LIFETIME FROM THE MAC DETECTOR*

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The MAC detector has been run at PEP at $\sqrt{s} = 29$ GeV enough to collect 108 pb^{-1} integrated luminosity of e^+e^- collisions, and a sample of about 50,000 multihadron events was isolated. By the "flavor–tagging" procedure (described in detail elsewhere[1]), direct leptons associated with these events were identified: muons by their lack of interaction in the iron of the hadron calorimeter and appearance as clear tracks in a system of drift tubes surrounding the calorimeter. Electrons are identified in a lead-proportional shower chamber immediately surrounding the central drift chamber (of 1 m diameter and with first layer $\sim$ 12 cm from the beam: the wire resolution is 200 μ and the average error in projection to the beam is $\sim$ 650 μ.) The b–enriched sample is selected from these as having a lepton over 2 GeV/c with momentum transverse to the event thrust axis over 1.5 GeV/c. This procedure gives 155 muon and 113 electron events, estimated by Monte Carlo technique to be respectively 72% and 63% pure b–quark associated.

The impact parameter δ of the lepton track with respect to the average beam position, as determined from Bhabha scattering events from the same exposure, was then plotted. A positive $\langle\delta\rangle$ resulted for both muons and electrons separately: 158 ± 81 and 174 ± 75 μ respectively. Allowing for contributions from c–quark and background events, the combined data gives

$$\tau_b = (1.8 \pm 0.6 \pm 0.4) \times 10^{-12}\,\text{sec}$$

where the last error is the estimated systematic error.

We have made the following checks of the method: (1) Selected nonmuon events from the parent sample, using the same cuts and analysis as above. For those, $\langle\delta\rangle = 17 \pm 20$ μ for 963 tracks. (2) Used the tau–lepton sample in the same way and found $\tau_T = (3.9 \pm 1.4) \times 10^{-13}$ sec, consistent with many other measurements.

REFERENCES

1. E. Fernandez, *et al.*, Phys. Rev. Lett. *50*, 2054 (1983).

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