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A Proposal for the measurement of space properties of π^+_τ mesons (π - mesons coming from τ^+ - decay)

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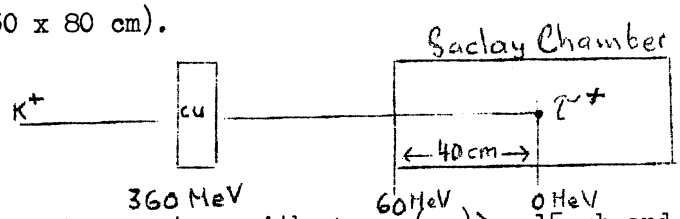
Using the nuclear emulsion technique we have made measurements on 256 π μ decay events in search for a backward-to-forward asymmetry of μ decay relative to π momentum. The technique used and the results of these measurements are given in a preliminary report which is available. Although the results are marginal, there is a general trend in measurements which would indicate the existence of such an asymmetry. This would mean that π^+_τ - mesons carry a memory of their space-orientation. A similar result has been obtained by the Columbia University Group (Garwin et al[1]) as a byproduct of their measurements on space properties of π mesons produced in Nevis cyclotron. We are continuing the measurements on τ^+ in emulsions (about 700 events), but in order to determine the type of space memory they are carrying, we propose to do the same measurements on τ^+ mesons stopped in a hydrogen bubble chamber exposed to the k_4 beam and with the magnetic field off as well as with the field on.

Proposed method

All measurements should be made on K^+ at rest. In order to have most of events entirely within the bubble chamber it is imperative to use the Saclay chamber (30 x 30 x 80 cm).



Using the above set-up with $\langle \sigma_{K^+}(np) \rangle \sim 15$ mb and a copper stopper we have calculated that 11 K^+/per 10" circulating protons could be obtained. Assuming 6 o/o of τ^+ from above K^+ at rest we arrive at the conclusion that in order to obtain 1800 K^+ (with a loss of 60 o/o due to the geometry of decay and the chamber) we would need approximately 20'000 photographs for each exposure, i.e. for exposures with and without magnetic field.

(1) Garwin et al. Phys. Rev. 108, 1589 (1957)

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