FEASIBILITY OF USING HIGH-FLUX MUON BEAMS

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The SLAC μ-p experiment runs with an instantaneous muon flux of 10^8/sec. In the experiment, the beam[1] passes through "holes" in spark-chamber plates of ~ 3-in. radius. A large bank of counters 3 ft $\times$ 7 ft forms one element of the trigger system. The beam passes within about a foot of the edge of this bank. Large 4 ft $\times$ 8 ft thick plate chambers are set up within a foot or so of the edge of the beam. The triggering and scanning are quite feasible at this rate.

The experiment is designed to cover elastic and inelastic scattering at low and high momentum transfers, simultaneously. This is the reason for having chambers very close to the beam and for a very loose trigger requirement (essentially one scattered muon). This is also the reason why we cannot use the 4×10^8 instantaneous μ/sec presently available (10^5 μ/sec average in 180 pps each of 1.4 μsec). We get more physics this way per unit time than we would if we were to design separate experiments.

From our experience, there is no reason why it should not be possible to design an experiment of a less all-embracing type (for example, large four-momentum transfer elastic scattering) which would use a significantly higher instantaneous flux in a beam of similar quality. The most crucial part is the absence of "halo." The hardest

part of the design seems likely to be the design of a trigger system sufficiently precise to keep the trigger rate low.

REFERENCE

[1] J. Cox, F. Martin, M. L. Perl, T. H. Tan, W. T. Toner, T. F. Zipf, and W. L. Lakin, A High-Energy, Small Phase-Space Volume Muon Beam, SLAC Pub. 434.