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LETTER OF INTENT FOR AN EXPERIMENT USING THE E.H.S.

Investigation of High Energy π -meson Interactions in Hydrogen with
Particle Identification

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1. INTRODUCTION

We wish to propose an experiment to be performed in the first phase of operation of the E.H.S. The principal objective will be a global investigation of multi-particle production by high energy π^- mesons with neutral and charged particle identification.

(*) On leave of absence at CERN.

2. OUTLINE PHYSICS AIMS

We propose to exploit the principal advantages of the E.H.S., that is 4π acceptance with multi particle capability for particle identification and γ -detection. We will study high multiplicity processes ranging from forward diffraction to central region production without using on-line triggers which would restrict the physics. In particular we shall study correlations involving strangeness. We expect to get clear charged kaon identification up to 55 GeV/c allowing us to explore kaon production up to $x = +0.2$. Existing data show that more than 90% of kaon production lies in this range⁽¹⁾. We will analyse the data looking for local conservation of strangeness, charge and transverse momentum. Information of this kind is currently lacking and can be provided by E.H.S. with charged particle identification and π^0 detection.

It appears that a substantial fraction ($\sim 100\mu\text{b}$) of the high multiplicity cross section involves the production of jets with transverse momentum greater than 3 GeV/c⁽²⁾. We hope to understand such processes using the almost complete and bias free information that E.H.S. system provides -acting rather like a fine grain calorimeter.

(1) J. Whitmore, Physics Reports 27C (1976), Fig. 43.

(2) C. Bromberg et al., CALT-68-590.

3. REQUIREMENTS

(i) Beam

We wish to use a negative beam at the highest energy, 350 GeV/c and also possibly at 150 GeV/c.

(ii) E.H.S.

Our experiment requires the main components of the E.H.S. including charged particle identification and gamma detection. We require a simple interaction trigger, but should use a fiducial volume interaction trigger if available.

(iii) Setting-up Time

The E.H.S. system must be given substantial setting-up time, typical of that needed for any other complex electronic spectrometer array, over a 3 to 4 months period.

(iv) Number of Events

For this experiment we request 10 ev/ μ b (\sim 200,000 events) in the (50 cm long) fiducial volume -this corresponds to 600,000 pictures assuming only a simple interaction trigger.

4. CONTRIBUTION TO E.H.S. AND RESOURCES OF GROUPS

The groups proposing this experiment are making the following contribution to the E.H.S.:

Oxford:	ISIS
Padua and Trieste:	FGD (together with others)
Rutherford Laboratory:	RCBC construction

The measuring resources available to the groups for this experiment include 3 PEPRs and 1 HPD and several "on-line" manual measuring machines. Measurement of the number of events needed for this experiment can be completed within one year.