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CERN/SPSC/I 73-15 Rev

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Addendum

to

LETTER OF INTENT

to carry out a programme of physics at the S.P.S. to study the electromagnetic interactions using muons of energy up to 250 GeV.

by

The British, French and German and CERN Muon Collaboration.

## I. INTRODUCTION

The Muon collaboration submitted a letter of intent (CERN/SPSC/I 73-15) to the S.P.S. committee earlier this year setting out a programme of physics which could be carried out at the S.P.S. using a high quality muon beam and the experimental facilities required to meet that programme. Since that time the N.A.L. programme of physics has started and in discussions within the collaboration and with members of the S.P.S.C. it became clear that a very large part of the physics programme could be carried out with a simpler facility. This would enable the collaboration to start productive experiments immediately a muon beam becomes available. It is proposed therefore to amend the previous letter of intent. This amended letter of intent will form the basis of proposals to the S.P.S. committee.

## II. PHYSICS INTEREST

The programme of physics which will be used as a basis for proposals is similar to that of the letter of intent with more emphasis on large momentum transfer; up to  $200 \text{ GeV}^2$  for hydrogen and beyond for complex nuclei. The possibility of doing experiments to look for weak interactions effects using polarized muons is also under investigation. The study of exclusive channels ( $2 \cdot 1 \text{ d}$ ) is deleted from the initial programme but it is anticipated that subsequent investigations will be required in this field.

## III. BEAM REQUIREMENTS

The momentum resolution required is now only  $\sim 1\%$  FWHM. Muons of energy up to 300 GeV should be available.

## IV. EXPERIMENTAL FACILITIES

The apparatus has an acceptance for the scattered muon and produced

hadrons similar to that stated in the letter of intent but the momentum resolution of the forward spectrometer is relaxed to  $\sim 1\%$  at 100 GeV/c giving  $\Delta\omega \sim 1$  GeV, compared with the previous requirement of  $\Delta\omega \ll m_\pi$ .

The forward spectrometer consists of a magnet section of 4Tm ( $\geq 2$ m width x 1m gap) which preferably should be of 2 units for flexibility and triggering requirements. This removes the 2 and 8Tm sections from the apparatus described in the initial letter of intent but the 8Tm section would be necessary to study exclusive channels which require a resolution  $\ll m_\pi$ .

The dipole magnet requirements at the vertex remain essentially unchanged. The collaboration would like to have the magnet at the earliest possible date although some physics in the forthcoming proposals could be done without it.

A drawing of the basic apparatus is included.

#### V. CONCLUSIONS

The conclusions are similar to those of the letter of intent with the exception of the forward spectrometer production.

#### VI. EQUIPMENT REQUIRED FROM CERN

The collaboration requests from CERN :

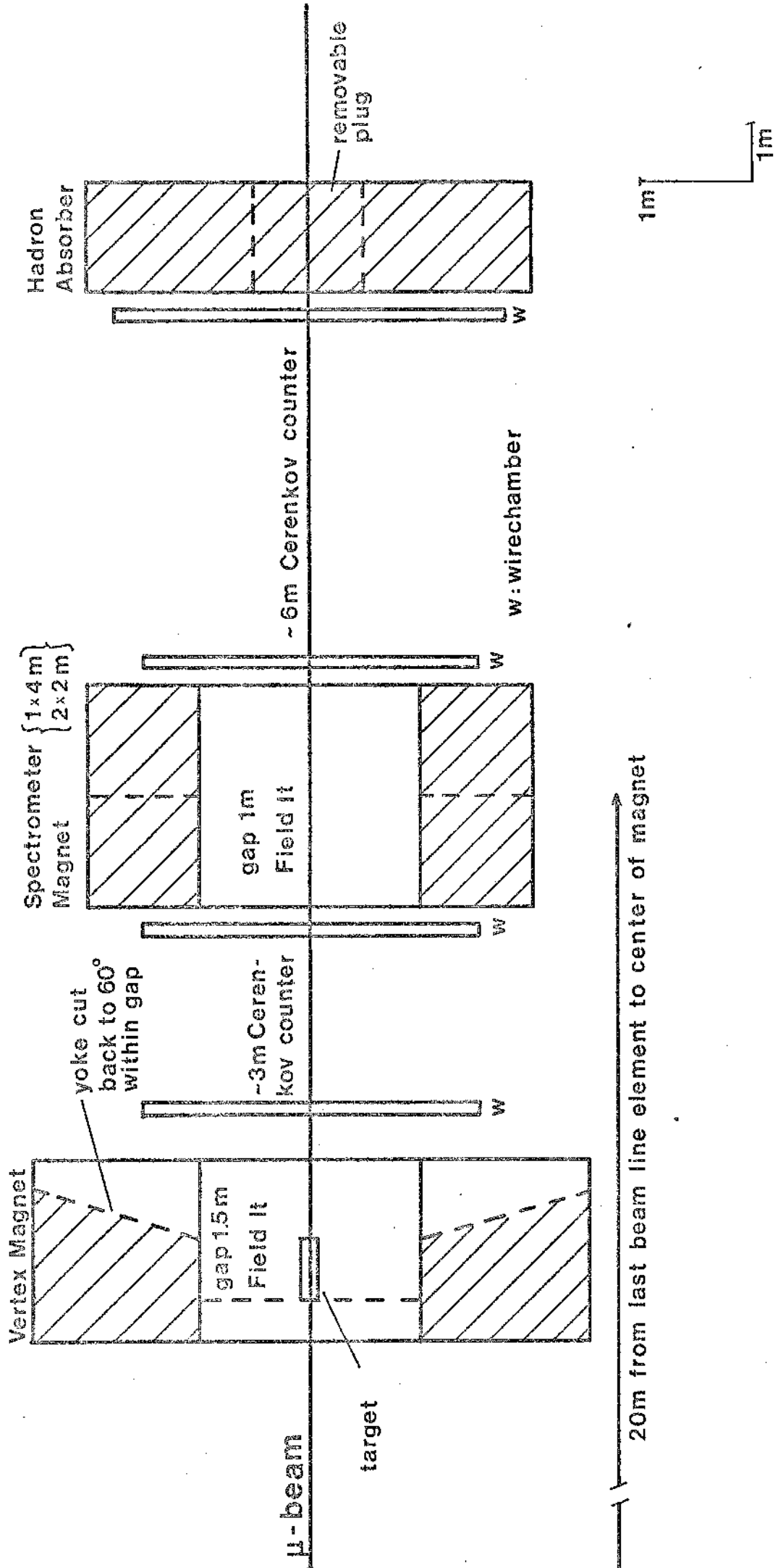
- a) The muon beam
- b) A spectrometer magnet of aperture 2m width x 1m gap and of length 4Tm, preferably in 2 sections
- c) A vertex (dipole) magnet of aperture 2.5m length x 2m width x 1m gap with a field of 1T.
- d) Steel for the hadron absorber (~200 tons)
- e) Participation in the development of a large volume polarized target.

The collaboration will provide the remainder of the equipment. This includes the entire detection system, electronics, computers etc. Discussions are underway to organize the sharing of responsibility for this equipment.

The collaboration requests that sufficient space is provided along the beam to allow installation of a full spectrometer should that become desirable.

# Basic apparatus for muon experiments.

## Plan view



20m from last beam line element to center of magnet