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EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

INTERSECTION STORAGE RINGS COMMITTEE

Addendum 2

to

PROPOSAL

MEASUREMENT OF HIGH TRANSVERSE MOMENTUM CHARGED PARTICLES

M. Banner, J.C. Chèze, J.L. Hamel, J.P. Pansart,
A.V. Stirling, J. Teiger, H. Zaccone
Centre d'Etudes Nucléraires de Saclay

F.W. Büsser, L. Camilleri, R.L. Cool, L. Di Lella,
L.M. Lederman, L. Litt, B.G. Pope, S. Segler,
A.M. Smith, J,K. Yoh

CERN-Columbia-Rockefeller Collaboration

It is proposed to add to the spectrometer arm 2 of experiment R 105 the lead glass counters which have been used in experiment R 103 for the detection of electrons and gamma rays. With this addition, the apparatus shown in Fig. 1 will allow :

1) The detection of electrons in arm 2

The charged particle momentum is measured by the magnetic spectrometer. The discrimination between hadrons and electrons will be achieved by the use of lead glass. The energy resolution of the lead glass system is $10\ \%/\sqrt{P}$. The agreement between the energy measured in the lead glass detector and the momentum determined by the magnetic spectrometer is the electron signature. This method allows a rejection against pions of about 10^{-3}. The rejection against electrons originating from converted gamma rays in the vacuum pipe will be done by pulse height measurement in hodoscope H'. Both of the arms of the spectrometer would now be equipped for electron detection. It is possible to continue search for electron pairs production especially for lower effective masses. With an ISR luminosity of 2×10^{30} cm^{-2} sec^{-1}. In a 100 hours run it is possible to reach a cross section in the 10^{-35} cm^2 range.

2. Correlations between high transverse momentum particles.

The results obtained by experiments R 102 and R 103 have shown that the production cross section of high transverse momentum pions is much larger than expected and therefore the correlations between these high transverse momenta becomes an important physics information.

High transverse momenta π^o can be selected by pulse height requirement in the lead glass system. It is then

possible to set up electronic triggers that select high transverse momentum pions; in arm 1 for charged pions by using the Cerenkov located in the magnet; in arm 2 by the lead glass system. With these trigger combinations we can study the correlation between the following sets of particles : $\pi^+\pi^+$, $\pi^+\pi^-$, $\pi^+\pi^o$, $\pi^-\pi^o$, $\pi^-\bar{\pi}$, $\pi^o\pi^o$ for a selected sample of high transverse momentum events. The last combination is possible because arm 1 is equipped with a shower chamber followed by a sandwich of scintillators and lead that measures energy. A special case of strong correlation, namely a heavy boson decaying into two pions can be searched for with great sensitivity.

Schedule

The installation of the two magnetic spectrometers is unchanged and will be done in January 1973 during the six week shut down. The lead glass will be installed during the first months of SACLAY's run and the two systems linked during the May shut down.

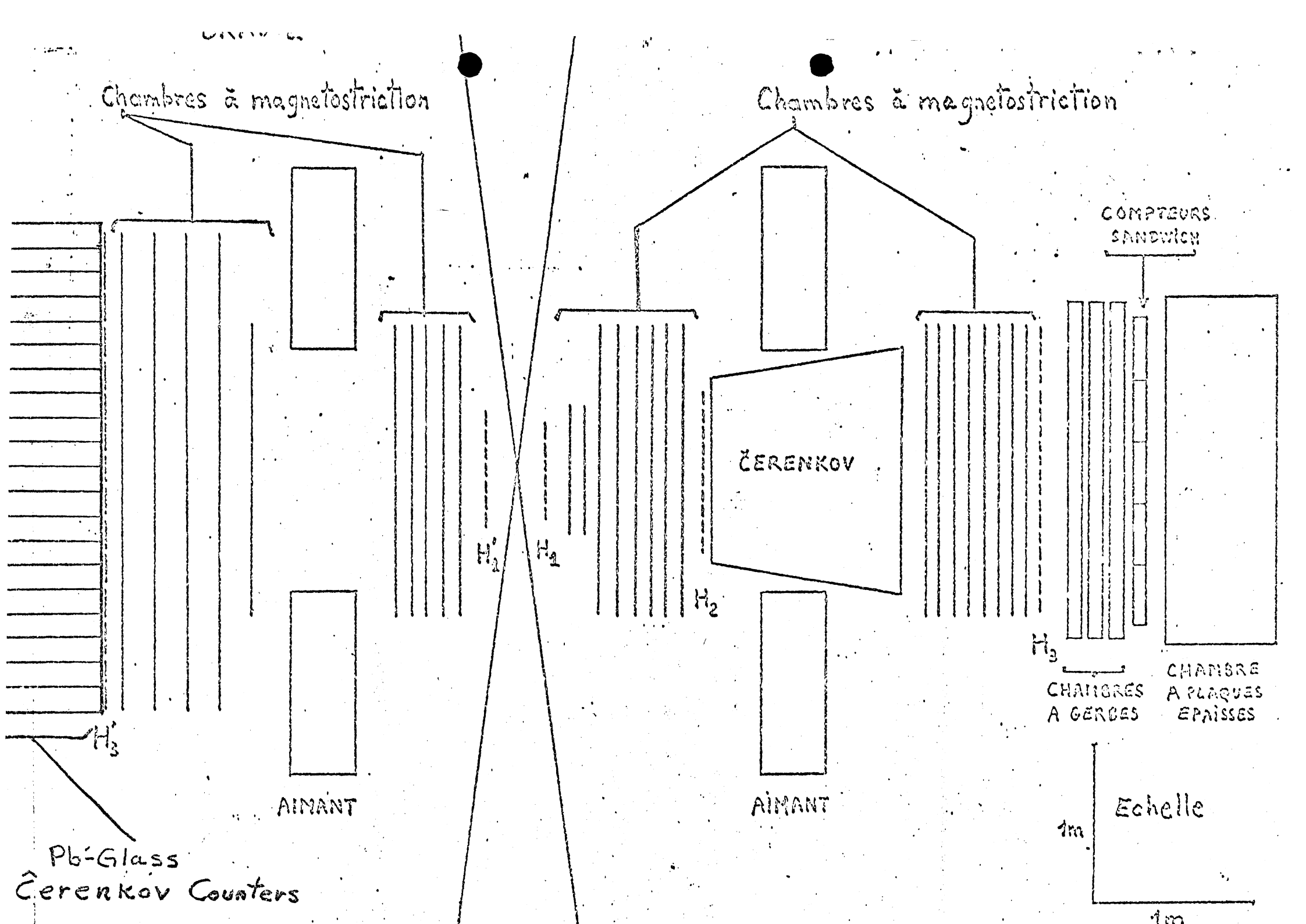
Arrangement

The groups have agreed that :

a) the correlation between charged particles at transverse momentum below 1.5 GeV/c will be done and analysed by the Saclay group alone.

b) The high transverse momentum physics and the search for electrons and electron pairs will be done jointly in collaboration.

The data taking for point A will clearly not be finished by May 1973. Some runs on point A will be taken beyond May 1973. Furthermore, the physics program that can be done with the more powerful apparatus proposed here will need additional running time. We estimate that the time required to fulfil the physics program presented in this addendum is such that the equipment should remain in intersection I-1 until about the end of 1973.


Chambres à magnetostriction
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COMPTEURS SANDWICH
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AIMANT
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