

CERN LIBRARIES, GENEVA



CM-P00052373

PH I/COM-69/3

23 January 1969

PHYSICS I

ELECTRONICS EXPERIMENTS COMMITTEE

Memorandum

To : Members of the EEC
From : Λ^0 Spectrometer Group - University of Rome
(R. Bizzarri, U. Dore, P. Guidoni, I. Laakso, G. Marini,
G. Martellotti, F. Massa, P. Pistilli)
Subject : Test run proposal

=====
According to the suggestion of the EEC after discussion of our proposal (PH I/COM-68/53 and 57) on last dec. 4th, we have investigated the feasibility of a simplified and meaningful test run of the experiment. We submit therefore to the EEC the following remarks and proposal.

i) We are aware of the severe experimental problems connected with the "charged triggering" mode; however, we stress again that the proposed experiment is perfectly feasible via the "neutral triggering" mode alone. We think therefore that the needed test run will be best carried out with a "neutral triggering" simplified setup, which will then be able to explore - unchanged - the full momentum region between ~ 6 and ~ 12 GeV/c. The switch to "charged triggering" shall eventually come, in our opinion, as a second step in the operation of the experiment, in order to improve low-momentum-transfer efficiencies at low masses, and to allow for a better exploitation of the running time.

ii) A meaningful test run can be performed only in a medium-high energy beam. In fact the principal sources of background have kinematical and cross section dependences which prevent a safe extrapolation from a "low energy" (< 3 GeV/c) to a "medium energy" (6 to 12 GeV/c) momentum region (i.e. the background connected with Cerenkov inefficiency or with charged triggering will decrease at high energy, while γ 's from π^0 decay will be more and more collimated in the forward direction).

Furthermore, the crucial question of the obtainable resolution in the wanted mass and momentum region cannot be answered at much lower incoming momentum, or studying the associate production alone. This is true both for kinematical and physical reasons. (We need in fact a reasonable $K^*(1400)$ signal not cut by phase space, in order to check our resolution at high mass, etc.).

iii) The choice of the neutral trigger allows for the following changes in the apparatus, leading in turn to an almost unchanged overall efficiency in the mass-region 1.0/1.7 GeV, and to a substantial improvement in the associate production detection.

- a) The maximum angle of a detected track in the front thin-foil spark chambers will be limited to 55° ; thin foil spark chambers will be added at 90° on 3 sides of the beam.
- b) The Cerenkov counter will be filled with water.

In the enclosed fig. 1 we show the modified version of the proposed apparatus, foreseeing the neutral trigger alone, and its efficiency versus the missing mass spectrum. We ask therefore to perform a test run of the experiment, in the above specified conditions, in a medium energy (5 to 10 GeV/c) π^- beam, with $\sim 10^5$ particles per pulse. As the determination of the mass resolution is the main purpose of the test run, the momentum bite should not be worse than $\pm 1\%$. At least $10^4 \Lambda^0$'s should be collected, in order to be able to significantly detect narrow

physical signals (K_0 , $K_{(890)}^{\pi 0}$, $K_{(1490)}^{\pi 0}$). We estimate that a two-weeks period of running (one week for tuning of the apparatus plus one week of data collection) should be adequate for this purpose; a careful evaluation of the counting rate, and of the needed time, will be possible as soon as the available beam will be known (beams like d, p_3 , p_4 , p_5 could be used).

If this request will be accepted, we plan to be ready for the proposed test run by January 1970. We would like to have the possibility to test the Cerenkov counter with all the triggering logic in a low energy π^- beam in the late summer 1969 (before the P.S. shutdown). A two-weeks period on the T beam would be suitable for this purpose.

Our group is already engaged in the detailed design of the apparatus; the Rome bubble-chamber group is withdrawing an experiment, scheduled to run in summer 1969, in order to reinforce its contribution to this experiment. On the other side, actual construction of the apparatus will start only after the approval of the experiment. We ask therefore, both for budget and scientific reasons, a definite answer by the EEC about the present proposal.

Rome, January 18, 1969

FIGURE CAPTIONS

C_1, C_3, C_4, C_5 : plastic scintillators

C_{2i} : 20 plastic scintillators, shaped as circular sectors;
pulse height will be recorded

C : Water Cerenkov counter

SC_1 to SC_5 : thin foil spark chambers

SC_6 to SC_{10} : range spark chambers

SC_{11} : heavy-plate spark chambers

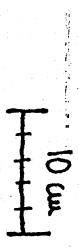
The insert shows the detection efficiency of the apparatus
versus the missing mass.

TRIGGERING

Beam $\bar{C}_1 C_{2i} C_{2j} C C_4$

0°

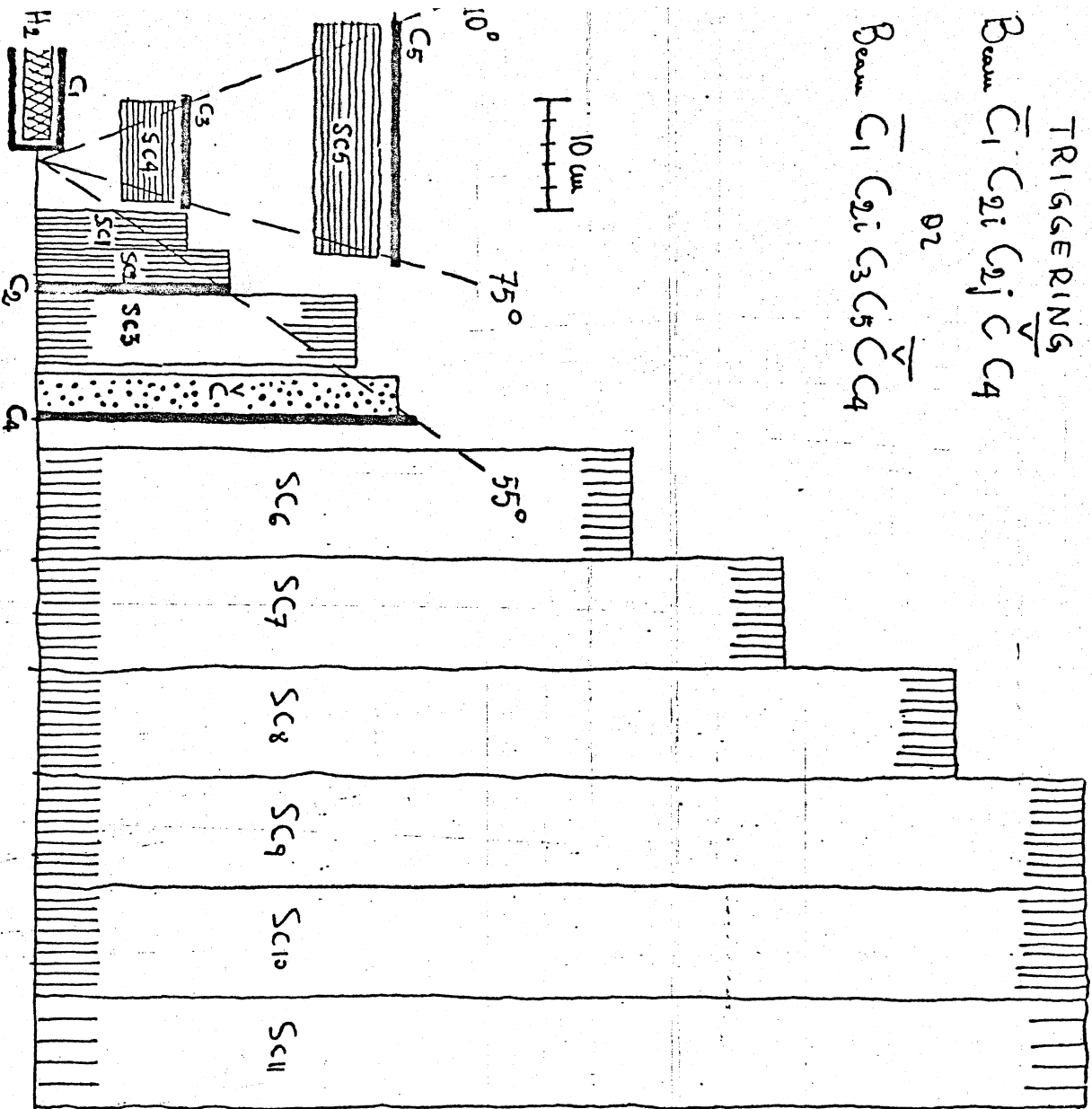
Beam $\bar{C}_1 C_{2i} C_3 C_5 C C_4$



10°

75°

55°



THE APPARATUS IS 2PI SYMMETRIC AROUND T- DIRECTION

