

SPS IMPROVEMENT REPORT No. 123Tests with the West and North Air Čerenkov detectors

Mr. Volker RODEL

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Introduction

Two air Čerenkov detectors, of the integrating threshold type, have been installed in the West and North extraction beam-lines, in positions 610227 and 210272 respectively.

The physical and theoretical aspects of the detector as well as its first application to spill structure studies have already been dealt with in separate papers^{1,2)}.

Since the SPS start-up, the parameters of West Čerenkov detector have been measured and the first wide-band spill structures of the North extracted beam have been recorded by the North Čerenkov detector.

1. West Čerenkov test results (measured on 1.3.1978)

Firstly, the tank was operated under atmospheric pressure and the mirror system tested. The mirror system consists of four possible beam positions (BTV standard drive), namely:

- pos. 1 - mirror of aluminized mylar (25 mm)
- pos. 2 - 'black' mirror for background measurements
- pos. 3 - mirror as in pos. 1, but with a 10 mm diameter hole
- pos. 4 - A non-interfering position ('OUT').

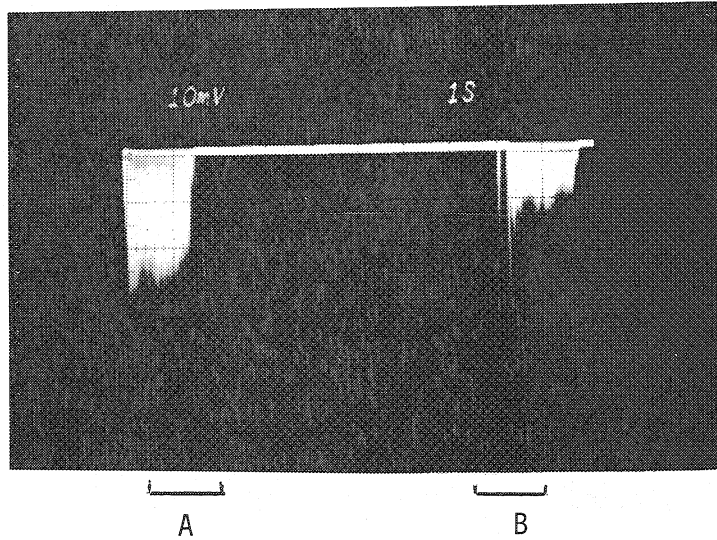
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CM-P00066792

Photo 1.1 shows two SPS cycles of the slow extraction at 210 GeV/c, taken with mirror 1 (part A) and mirror 3 (part B). The extracted beam intensities were identical.

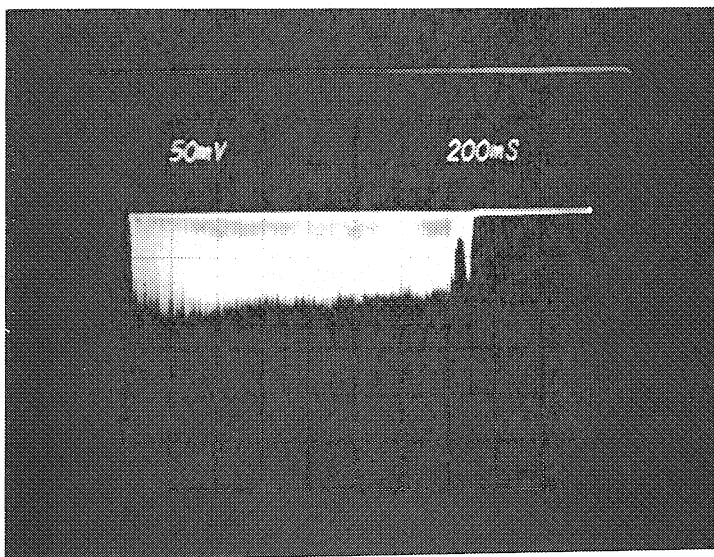
Photo 1.1



It can be seen that about 50% of the signal is lost due to mirror 3.

Secondly, the pressure versus signal dependence was tested. Photographs 1.2 to 1.4 show the obtained signals as function of gas pressure, i.e. refractive index, at a high tension of 1024 V and with mirror position 1.

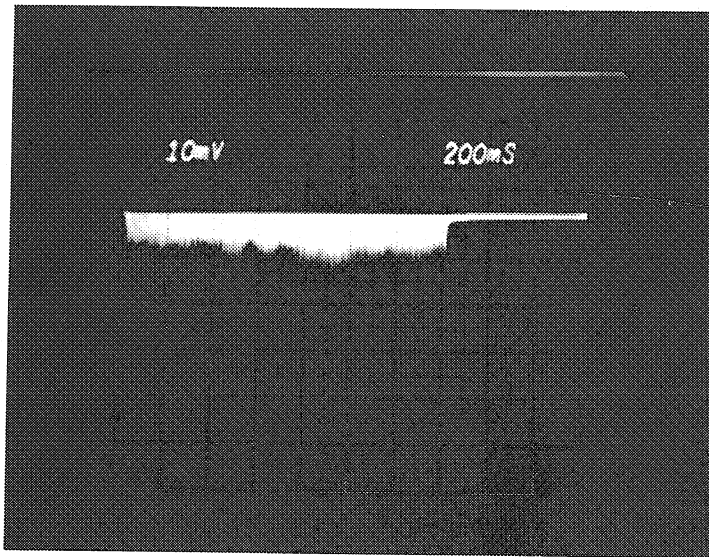
Photo 1.2



Pressure 760 Torr

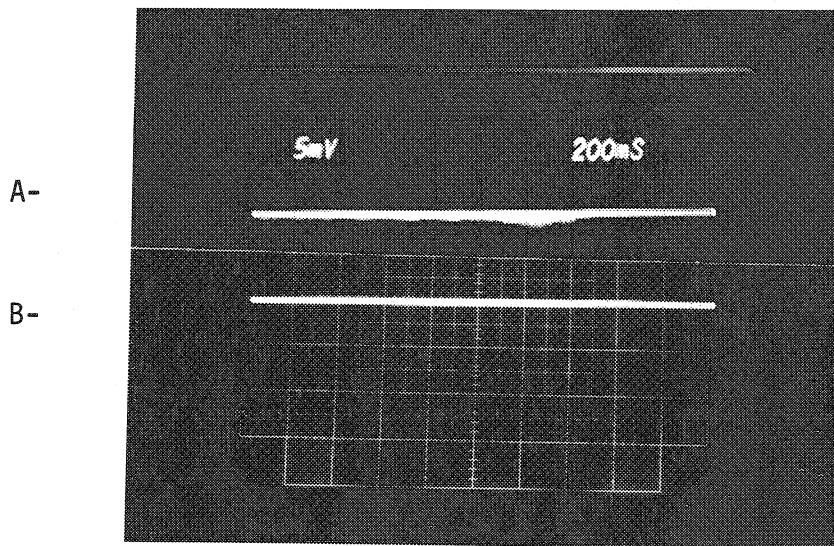
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Photo 1.3



Pressure 40 Torr

Photo 1.4



Pressure 10 Torr

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Furthermore, photo 1.4 (trace A) shows still light much below the threshold pressure (25.9 Torr).

This light is due to scintillation and is much lower than γ Cerenkov light. Trace B shows that by using the 'black' mirror the signal disappears completely and therefore the light seen under A must be the scintillation light. The attached curve shows the measured output of the PM versus pressure.

2. North γ Cerenkov test results (measured on 7.3.1978)

One of the first slow extractions at 400 GeV/c to the North Experimental area, is shown in picture 2.1. The duration of the spill was 480 ms at this moment and the intensity was less than 10^{12} ppp. The same spill, but taken with a fast oscilloscope, can be seen in picture 2.2.

Photo 2.1

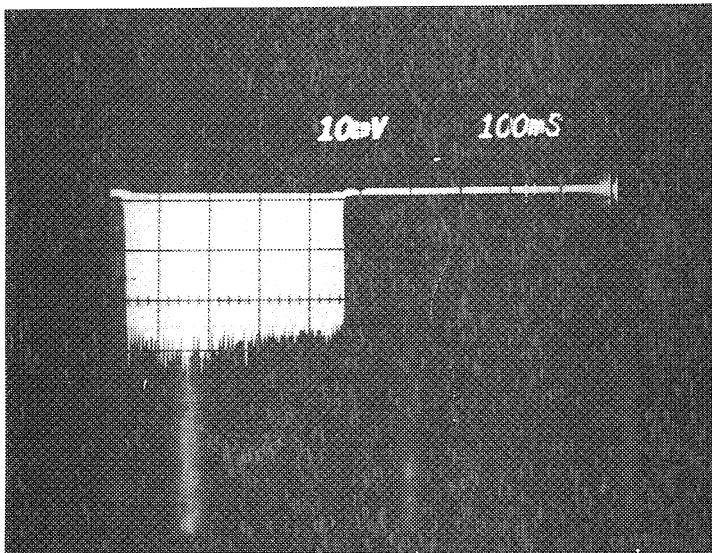
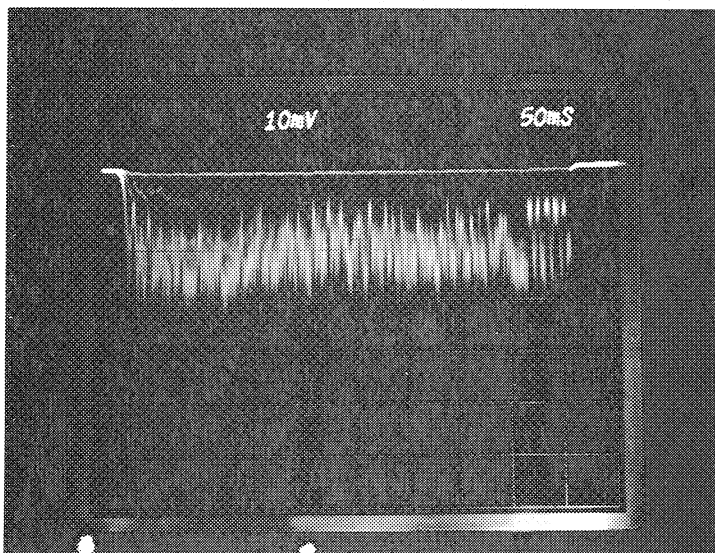


Photo 2.2



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Finally, pictures 2.3 and 2.4 show the wide-band structure of the slow extracted beam. The 44 kHz pattern can be seen clearly.

Photo 2.3

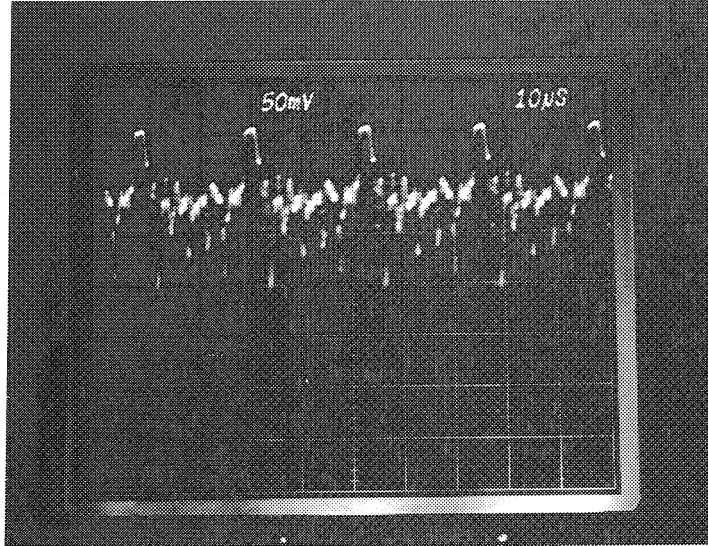
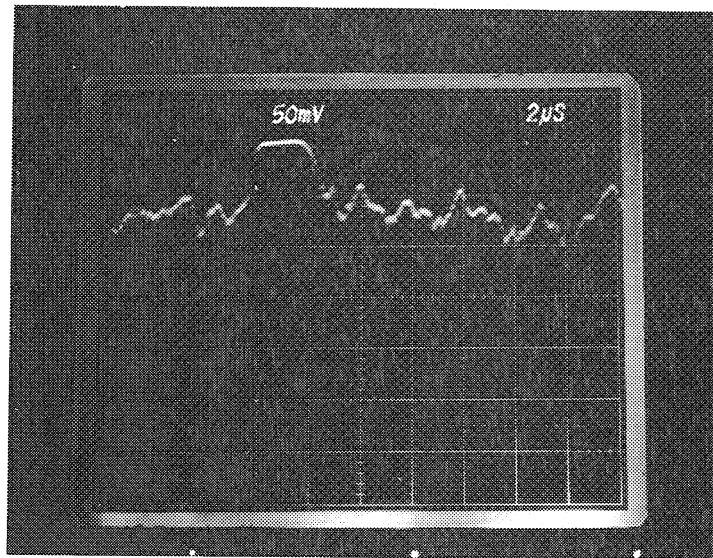


Photo 2.4



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References

1. The air Čerenkov detector, SPS/ABM/Tech.Note/77-9.
2. Observation du spill lent dans le gamma des moyennes fréquences, SPS Improvement Report No. 101.

Čherenkov west

