

SPATIAL DISTRIBUTION OF HIGH-ENERGETIC NEUTRINOS IN THE 1967  
CERN NEUTRINO BEAM

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The spacial distribution of neutrinos in the new improved CERN neutrino beam has been calculated by Venus<sup>1)</sup>. Since there was a spark chamber setup exposed to the beam, these calculations can be checked experimentally by means of the startpoint distribution of the neutrino events in the spark chamber. Apart from a slight assymetry of the beam, we found a rather good agreement with the calculations.

The spark chamber setup consisted in the target chamber and the magnet chamber. They were separated by a concrete wall and the trigger counters. The details of the apparatus are published elsewhere<sup>2)</sup>. Since trigger counters were situated only at the downstream side of the target chamber, we had to take neutrino events with small emission angle  $\theta_{\mu\nu}$  of the triggering muon for the apex distribution. Otherwise we would have had to take into account an innegligible escape probability of muons produced far from the beam axis, which do not hit the counters. Therefore, and since events with small  $\theta_{\mu\nu}$  are mostly stemming from high-energetic neutrinos, we took a sample fulfilling the following criteria:

$$\theta_{\mu\nu} < 100 \text{ mrad}, E_{\mu} \gtrsim 3 \text{ GeV and apex within a fiducial area of } 2.4 \text{ m}^2.$$

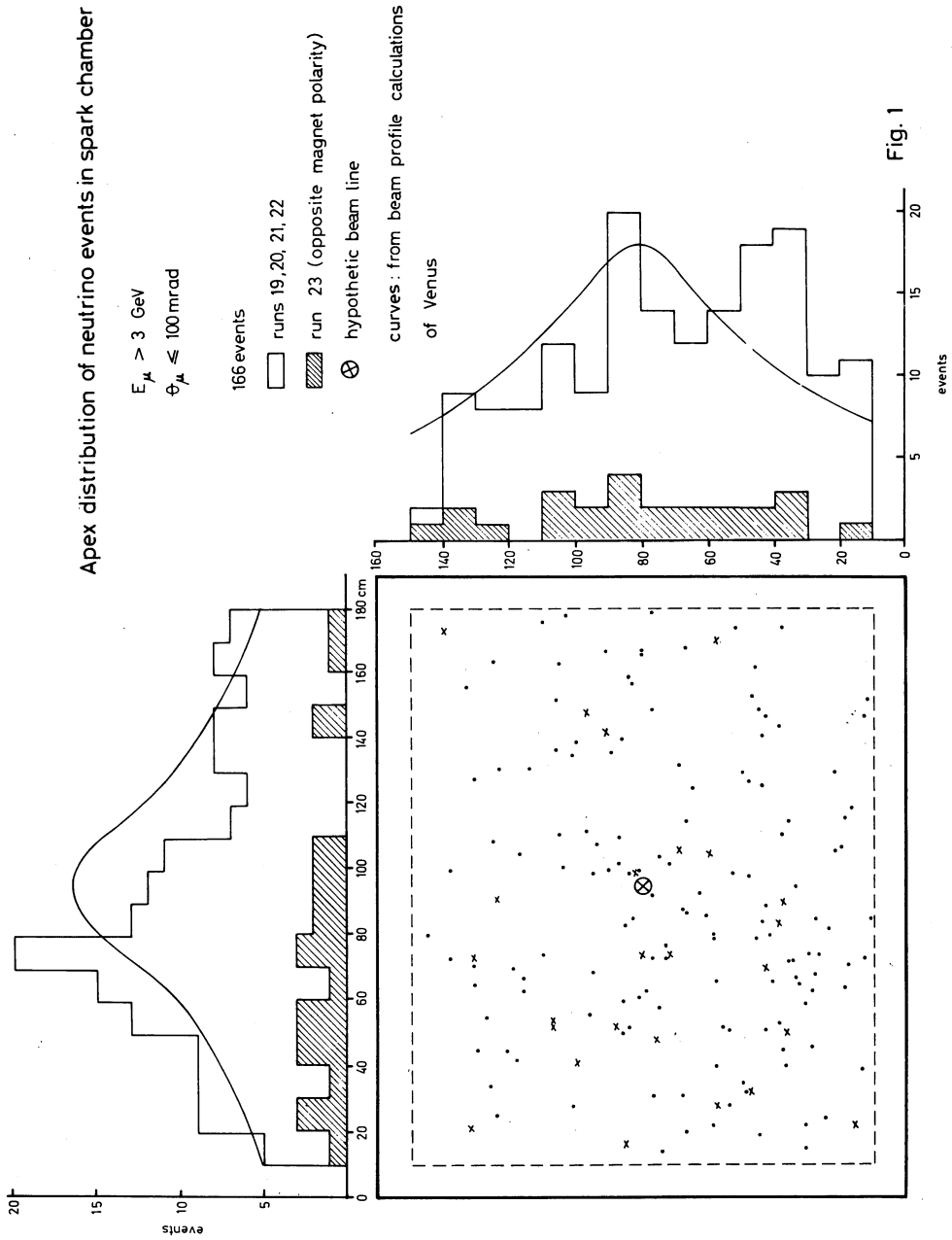
Because  $\theta_{\mu\nu}$  is so small and the fiducial area is smaller than the counter area ( $3.2 \text{ m}^2$ ), this sample needed no corrections due to counter geometry. The HLBC<sup>3)</sup> data show that the mean inelasticity ( $\Delta = E_{\nu} - E_{\mu}$ ) is  $\bar{\Delta} \approx 1 \text{ GeV}$  for  $E_{\mu} > 3 \text{ GeV}$ . Therefore, we have to compare our apex distribution with the calculations for  $E_{\nu} \gtrsim 4 \text{ GeV}$ . Figure 1 shows the results.

Figure 2 shows the distribution from a sample with still higher neutrino energy ( $E_{\nu} \gtrsim 6$  GeV). (The computations were done for a horn current of 230 kA in both cases).

We wish to thank Dr. W. Venus for the beam profile computations and Dr. B. Pattison for useful discussions.

- 1) W. Venus (unpublished)
- 2) K. Borer et al., Proceedings of this Conference
- 3) D. Cundy, private communication

Apex distribution of neutrino events in spark chamber



Apex distribution of neutrino events in spark chamber

$E_\mu > 5 \text{ GeV}$   
 $\Phi_\mu \leq 100 \text{ mrad}$   
57 events

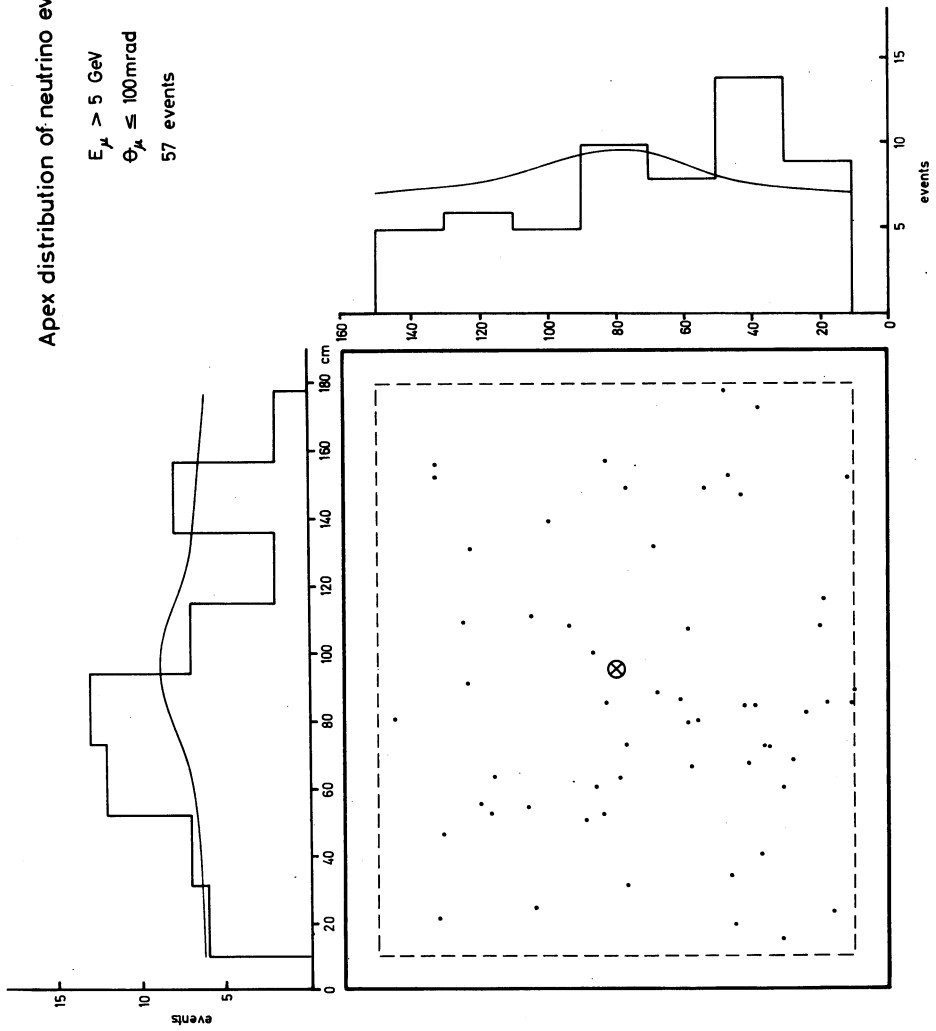


Fig.2