CAMERA VIEW OF COSMIC RAYS IN THE 25-FOOT BUBBLE CHAMBER

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ABSTRACT

Pictures of cosmic-ray muons and strong-interaction events in the 25-foot bubble chamber are simulated. It is assumed that the cosmic-ray muon flux is cut in half by shielding (11 feet of density 3.6 g/cm^3 material). The problem of particles produced in the neutrino shield or coils for neutrino experiments is not considered.

I. ASSUMPTIONS

The assumptions used were:

1. There is sufficient shielding (11 feet path length of density 3.6 g/cm^3 material) to cut the muon flux in half, i.e., stop up to 2.0 GeV/c muons. This shielding also eliminates all other cosmic rays.

2. The muon spectrum that enters the chamber is

$$dN/dp = 0.44e^{-0.41p} \qquad (p \text{ in GeV/c}).$$

3. Normal-incidence muon intensity is

$$I_\mu = 0.85 \times 10^{-2} \text{ sr}^{-1} \text{ cm}^{-2} \text{ sec}^{-1}.$$

4. Flux falls off as $\cos^2 \theta$ from vertical.

5. Only those muons traversing a horizontal area equal to the chamber area and 3 meters above the chamber center enter it.

6. The magnetic field (40 kG) is uniform and just fills a volume equal to the area × 6 meters (center ≠ 3 meters). (Note: this field does not satisfy Maxwell's equations.)

7. The above assumptions give 20 muons per picture for 8 msec sensitive time. Note the tracks in the figures are all the same width, whereas in fact that they will have various widths depending on when they enter.

8. The two interactions are from K^- of 50 GeV/c [see 25-Foot Design Report (BNL-12400) pages 63-64].

COMMENTS

1. The number of cosmic-ray muons used in this report is consistent with estimates made by R. D. Sard (SS-15) and D. Jovanovic (SS-81).

2. This report <u>does</u> <u>not</u> consider the ν background of 10-25 particles from the coils and 75-200 from the ν shield. [See the reports by J. Peoples (B.1-68-97) and D. Jovanovic (SS-81).]

3. It is believed that these figures provide a very rough estimate of what strong interactions will look like.
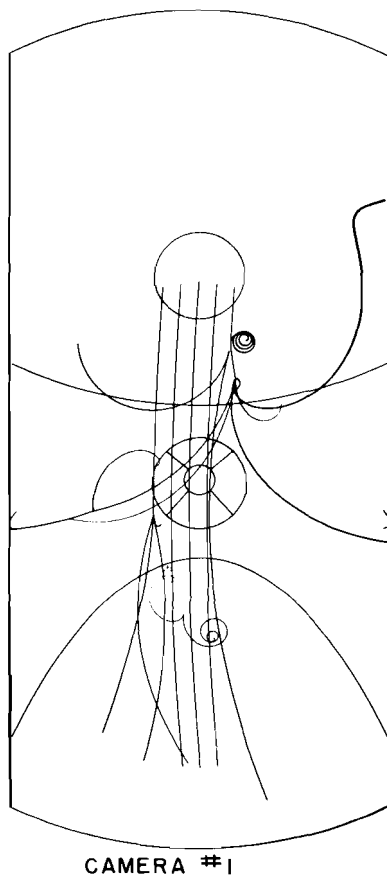

CAMERA #1

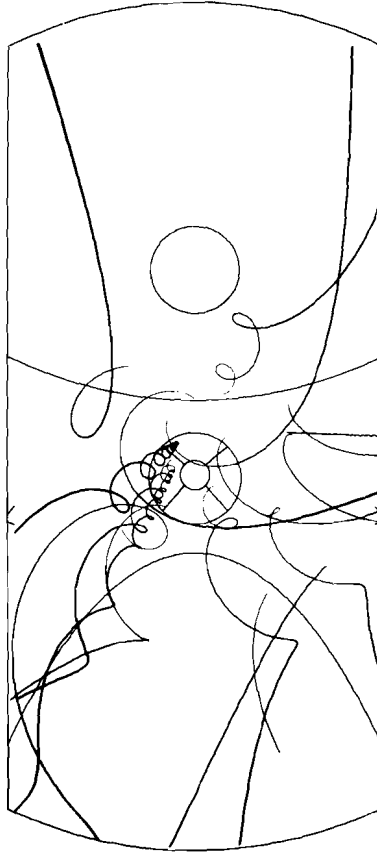Fig. 1. Image for camera 1 film of two 50 GeV/c K^- interactions.
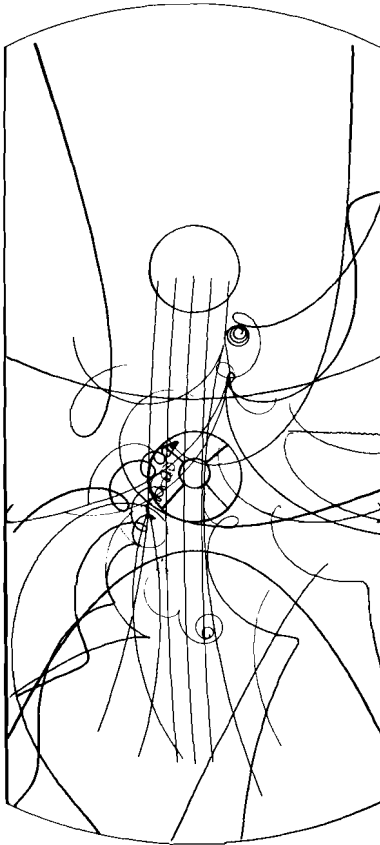
Fig. 2. Image for camera 1 film of 20 cosmic rays.

Fig. 3. Combination of Figs. 1 and 2.