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PHENOMENOLOGICAL STUDY OF PROTON-NUCLEUS COLLISION

AT NAL ENERGIES IN EMULSION (400 GeV)

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Summary:

As an extension of our work #117, we would like to propose the emulsion exposure to the 300 and 400 GeV/c protons. The purpose of these exposures is to study the energy dependence of the cross section for the coherent production. According to our study using the 200 GeV/c proton, the coherent production is detected reasonably by a selection criterion,

$$\sum_i m_i \sin \theta_i (\approx q_{||}) \lesssim m_{\pi} / R$$

where m is the mass of the final charged particle, θ its emission angle, $q_{||}$ three dimensional momentum transfer of the proton parallel to the initial direction, m_{π} the pion mass and R the radius of the target nucleus. The result obtained shows that the cross section for the 3 prong coherent event reveals a tendency as flattening at the incident proton energy from 70 GeV to 200 GeV, while that for the 5 prong event continues to rise. It will be important to study any feature of these cross sections at higher energies from the point of view of understanding of the elementary particle production due to the diffractive nature.

Procedure:

Ordinary stack which consists of 24 sheets of pellicles, each having a size of 3"x6"x600 micron, is exposed to the proton beam with a density 2×10^4 protons/cm². The number of the coherent events per one pellicle is expected to be about 50 or more. These events will be detected by along-the-track-scanning.