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FERMILAB PROPOSAL .....

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Study of Mechanism for Multiple Production of Particles at High Energies.
/Emulsion Exposure to 500 GeV Protons/

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REQUEST.

We are asking for the exposure of three nuclear emulsion stacks to 500 GeV proton beam at FNAL.

PHYSICS.

Particle-nucleus collisions are by now very rapidly developing branch of both particle and nuclear physics. The growing interest is caused by believe that interactions inside the nucleus can give us informations which are not available in elementary particles collisions / 1,2,3 /.

Till now we have done three emulsion exposures at Fermilab namely: E90 with 200 GeV protons, E249 with 400 GeV protons and E339 with 200 GeV negative pions. Using the data from the above exposures some of the experimental results we got have been published / 4,5,6,7,8/, the others are in preparation.

In these works we have done analysis of various parameters describing the hadron-nucleus collision and have found that in general the experimental data are in favour of the class of coherent production models. We would like to continue our investigations, which are now being carried on in collaboration with Fermilab under the NSF Grant No. OIP75-01319, by extending them to the highest possible accelerator energies. Therefore we are asking for the exposure of emulsions to 500 GeV proton beam at FNAL.

TECHNICAL DETAILS.

We propose to expose 3 stacks of stripped pellicles to the 500 GeV proton beam. Each stack will be composed of about 25 pellicles /600 micron thick/ with the dimensions 1.5 x 2.5 inches. The emulsion surfaces would be placed parallel to the proton beam within the accuracy of at least 10 mrad.

The density of proton tracks accumulated by each emulsion stack should be about 5×10^4 /cm^2.

METHOD.

Scanning, measurements and the analysis of the data will be done in the LaBoratory of High Energy Physics - Institute of Nuclear Physics Krakow, Poland.

We intend to collect an unbiased sample of over 1000 proton-emulsion nucleus interactions by means of following under the microscope primary proton tracks. In each interaction found, measurements of the multiplicity and angular distributions will be done.

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