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Scientific Spokesman:
J. J. Lord
Department of Physics, FM 15
University of Washington
Seattle, WA 98195
(206) 543-2777

EMULSION EXPOSURE TO 1,000 GeV, OR
HIGHEST ENERGY PROTONS

Submitted by:

R. Davisson
J. J. Lord
Department of Physics FM 15
University of Washington
Seattle, WA 98195

Peter Kotzer
Washington Natural Philosophy Institute
PO Box 714
Auburn, NY 13021

Prof. E.V. Kolomeets
Dept. of Physics
Kazakh State University
Alma Ata, Kazakhstan

ABSTRACT

It is proposed to carry out an experiment in which protons of energies close to 1,000 GeV bombard emulsion nuclei and 10 micrometer diameter tungsten targets. The objective will be to determine if the quark-gluon phase of matter can be produced in proton collisions. Collisions with very small tungsten targets will make it possible to observe the possible decay of the quark-gluon matter for times of the order of 10^{-14} second. Central collisions will be examined but also detailed studies will be made of diffractive collisions with tungsten. There is some evidence that diffractive collisions might be important in the production of quark-gluon states.

INTRODUCTION

While numerous searches have been made for the quark-gluon phase of matter little more than a hint has been obtained for its existence¹. A recent observation of low-multiplicity cosmic ray interactions at energies over 10 TeV indicate that there may be an excessive production of gamma₂ rays in diffractive-like collisions. These observations by Jurak et al² show that there are about 2.5 times more gamma rays than would be expected if the collision process led to the normal pion and kaon production. Other cosmic ray observations by Iwai et al³ found jets of low energy gamma rays produced in the forward direction in 90 TeV proton collisions. Again, the number of gamma rays was about 2.5 times larger than would be expected from normal pion and kaon production.

PROPOSED EXPERIMENT

It is proposed to expose 6 stacks of emulsions with microtargets to the highest energy proton beam. Energies as close as possible to 1,000 GeV would be most important. Each stack would have dimensions of about 10 cm x 20 cm x 5 cm. Three of the stacks would be exposed to about 50,000 protons/sq. cm. and three to about 150,000 / sq. cm.

- 1 Burnett et al 20th Int. Cosmic Ray Conf. Vol 5 . Page 198,
Moscow, Aug 2-15, 1987
- 2 Burnett et al 20th Int. Cosmic Ray Conf. Vol 5 . Page 189,
Moscow, Aug 2-15, 1987
- 3 Burnett et al 20th Int. Cosmic Ray Conf. Vol 5 . Page 185,
Moscow, Aug 2-15, 1987