

PH III-67/44  
9 October 1967

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CM-P00073479

PHYSICS III COMMITTEE

LETTER OF INTENTION TO MEASURE THE RADIATIVE  
CAPTURE OF  $\pi^-$  MESONS IN HYDROGEN

by

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(received 6 October 1967)

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The cross-section for the reaction  $\pi^- + p \rightarrow \gamma + n$  with  $\pi^-$  mesons in flight is very poorly known. The recent calculations of pion photoproduction by Berends, Donnachie and Weaver<sup>(1)</sup> would be put to a critical test by measurements of radiative  $\pi^-$  capture.

We have the intention to propose in the near future an experimental investigation at the SC of the process  $\pi^- + p \rightarrow \gamma + n$  with  $\pi^-$  mesons in flight. We shall probably use time-of-flight techniques for the determination of neutron energies and heavy-plate optical spark chambers for the detection of the coincident  $\gamma$  ray. Compared to the 1961 CERN experiment of Gatti, Hillman, Middelkoop, Yamagata and Zavattini<sup>(2)</sup> we should be able to collect data about ten times faster and go to higher energies of the incident pion and outgoing neutron.

The detectors necessary for the study of the reaction  $\pi^- + p \rightarrow \gamma + n$  would be suitable also for the investigation of radiative capture of stopped  $\pi^-$  in nuclei. The recent calculations of Murphy et al.<sup>(3)</sup> confirm again the

interest of these measurements for nuclear physics. Since the rate of data collection should be quite high in this case (several hundred events per hour) a few elements could probably be examined while testing the equipment for the main experiment.

For the time being we envisage that the experiment be done in collaboration between a group from the University of Lausanne and one from CERN, each comprising 3 to 4 physicists. The financial effort should also be shared among the two institutions.

#### REFERENCES

1. F.A. Behrends, A. Donnachie and D.L. Weaver, CERN Preprints TH 703 (1966) and TH 744 (1967).
2. G. Gatti, P. Hillman, W.C. Middelkoop, T. Yamagata and E. Zavattini, Phys. Rev. Letters 6, 706 (1961).
3. J.D. Murphy, R. Raphael, H. Oberall, R.F. Wagner, D.K. Anderson and C. Werntz, Phys. Rev. Letters 19, 714 (1967).