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Proposal for an experiment to study the production of hyperfragments from 3-6 GeV/c  $K^-$  meson interactions by using loaded and less sensitive types of photographic emulsion

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## 1. Introduction

It has been recently shown by the  $K^-$  European Collaboration that in the interactions of 0.8 GeV/c  $K^-$  mesons in emulsion very heavy hyperfragments are produced with mass numbers ranging from  $\sim 60$  to  $\sim 90$ <sup>1)</sup>. These hyperfragments are the residual spallation products of the primary disintegrations of Ag and Br, containing bound  $\Lambda^0$  hyperons. Further study of the hyperfragments produced by 1.5 GeV/c  $K^-$  mesons and of the ordinary fragments emitted from 24 GeV/c proton interactions are in progress in the Warsaw laboratory<sup>2),3)</sup>. In the latter experiment emulsions with reduced sensitivity were used; the reasons for using such emulsions have been discussed in ref.3).

## 2. Purpose of the experiment

It is proposed to extend the present studies to hyperfragments produced by  $K^-$  mesons of still higher momentum, i.e. 3 - 6 GeV/c, when a beam of such  $K^-$  mesons becomes available at CERN<sup>4)</sup>. The purpose of this experiment is to see how the hyperfragment production processes depend on the energy of the incident  $K^-$  mesons and on the mass of the target nucleus. For these reasons it is proposed to use - apart from ordinary Ilford K.5 or L.4 emulsion - special emulsion loaded with heavy elements, for instance Bi, and also less sensitive emulsion such as Ilford K.2. The use of emulsion loaded with heavy elements may enable the study of even heavier residual hyperfragments and perhaps of the fission fragments of heavy elements containing  $\Lambda^0$  hyperons<sup>5)</sup>. By making use of emulsion with reduced

sensitivity it should be possible to study the charge distribution of particles accompanying the production of a very heavy hyperfragment and hence to estimate statistically its charge <sup>6)</sup>. The comparison of hyperfragment production features at various incident  $K^-$  meson energies is expected to give useful information on their production mechanism.

### 3. Experimental conditions and execution of the proposed programme

This proposal is put forward on behalf of the University College London (Professor E.H.S.Burhop) and the University of Warsaw but it is possible that other laboratories of the  $K^-$  European Collaboration also may be interested in such an experiment. For this reason the exact size and composition of the stack and the details of the required exposure will be specified at a later date. However it is to be expected that it would be convenient if the parameters of the 3 - 6 GeV/c  $K^-$  beam (i.e. its intensity, purity and cross - section) were similar to those of the 1.5 GeV/c  $K^-$  beam ( $k_2$ ) used earlier by the  $K^-$  European Collaboration for a similar exposure.

The number of physicists and scanners participating in future in this work will be given after consultation among the interested laboratories.

### References

- 1) B.D.Jones, B.Sanjeevaiah, J.Zakrzewski, M.Csejthey-Barth, J.P.Lagnaux, J.Sacton, M.J.Benisten, E.H.S.Burhop and D.H.Davis, Proceedings of the Aix-en-Provence Conference p.363 (1961) and Phys. Rev. 127, 236 (1962); see also N. Nickols, S.Curtis and D.Prowse, Physics Letters, 1, 327 (1962), and J.R.Kenyon, preprint (1962)
- 2) E.H.S. Burhop's Proposal E 39 on behalf of the  $K^-$  European Collaboration, Em C 61/11 (1961).
- 3) M.Danyusz, J.Pniowski, S.J.St.Lorant and J.Zakrzewski, Em C 62/20 (1962).
- 4) This was envisaged in the proposal E 39 - see ref 2).
- 5) The loading of emulsion with fissile material in connection with the

hyperfragment studies was first suggested by R.Levi-Setti and W.E.Slater N.C. 14, 895 (1959). One of us (J.Z.) is grateful to Professor H.G. de Carvalho for useful discussions on using Bi loaded emulsion in this type of studies.

6) J.Zakrzewski and S.J.St.Lorant, N.C. 25, 693 (1962)