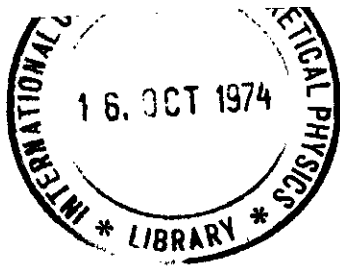


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INTERNAL REPORT  
(Limited distribution)

International Atomic Energy Agency

and

United Nations Educational Scientific and Cultural Organization

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

TOPICAL MEETING  
ON THE PHYSICS OF COLLIDING BEAMS

20 - 22 June 1974

(SUMMARIES AND CONTRIBUTIONS)

MIRAMARE - TRIESTE

July 1974

AN ESTIMATE OF THE MEAN TRANSVERSE MOMENTUM  
IN HADRON INTERACTIONS FOR  $10^5$  TO  $10^8$  GEV

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This was a comment following the summary of ISR results at high transverse momenta by Dr. P. Darriulat.

Cosmic ray experiments at high energies showed the existence of high  $p_{\perp}$  events about eight years ago. In 1973, the existence of particles with high  $p_{\perp}$  was established by many experiments at CERN and NAL. However, the high  $p_{\perp}$  particles at energies around 2000 GeV have very little effect on the mean  $p_{\perp}$ . The situation at energies greater than  $10^6$  GeV appears to be quite different.

REFERENCES

- A.M. Bakich et al., Can. J. Phys. 46, S30 (1968).  
C.B.A. McCusker et al., Phys. Rev. 177, 1902 (1968).  
A.M. Bakich et al., J. Phys. A 3, 662 (1970).

BEAM

Energy  $10^5$  to  $10^8$  GeV

Composition 40% protons, 20%  $\alpha$ 's and heavier nuclei up to and including Fe

Target 20 kms long,  $1000 \text{ g/cm}^2$  of O and N

Coverage The exact forward direction and  $2 \times 10^{-4}$  radians around it.

For  $E_p \approx 10^5$  GeV,  $\frac{r_{pL}}{h}$  is not noticeably different from ISR values.

For  $2 \times 10^6 \leq E_p < 6 \times 10^6$  GeV no events have  $\frac{r_{pL}}{h} < 1$  GeV/c and the mean,

$\left\langle \frac{r_{pL}}{h} \right\rangle = 5.1$  GeV/c, the max. value seen is 14 GeV/c.

The highest energy event  $E_p > 10^8$  GeV has  $\frac{r_{pL}}{h} \approx 100$  GeV/c.

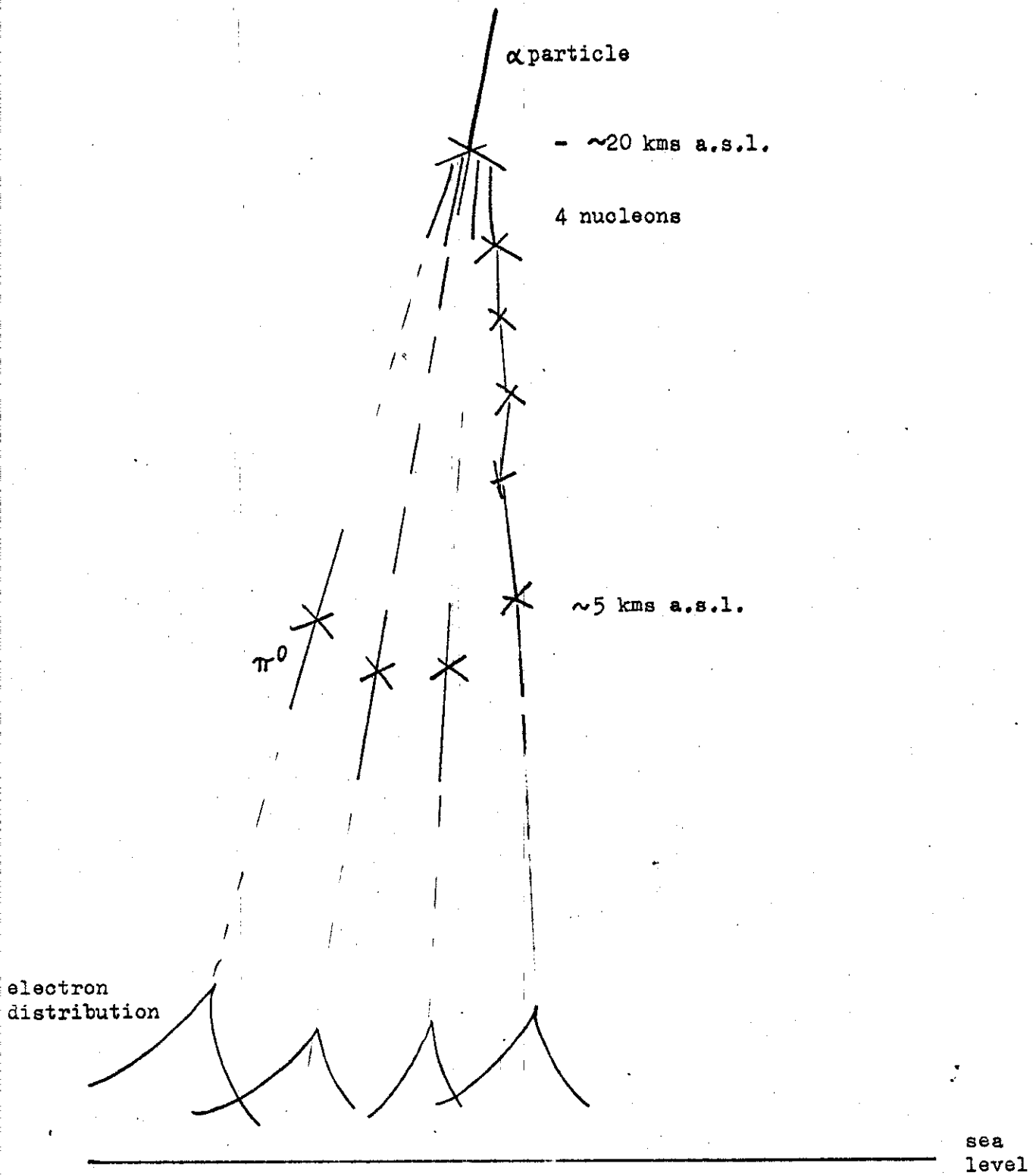


Diagram of air shower from an  $\alpha$ -particle primary