

# RAL

## DESIGN & DISCOVERY

### Open Days July 1990

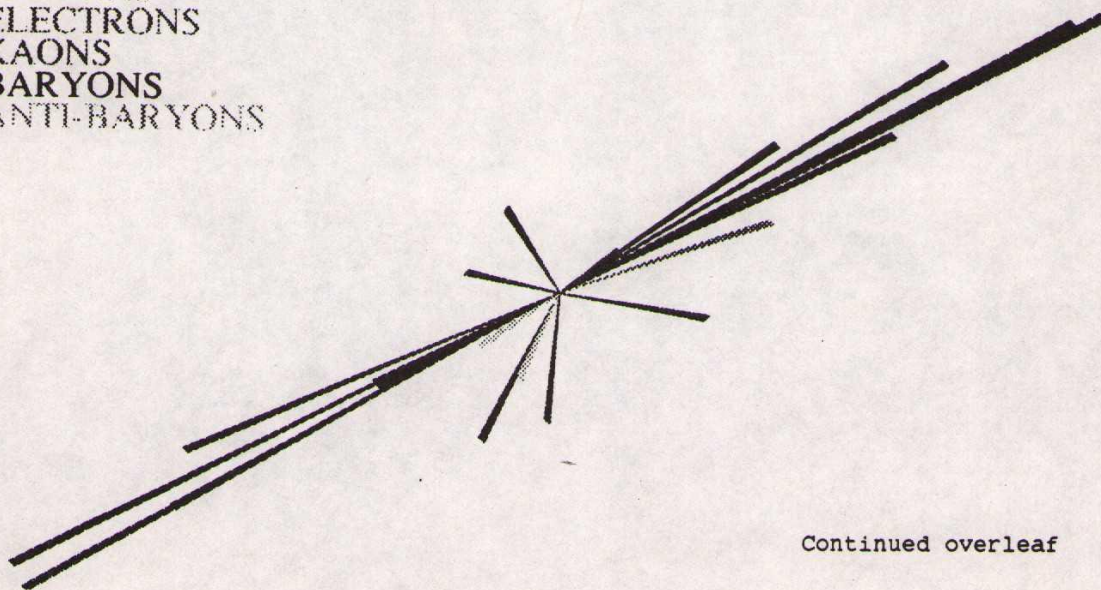
**RUTHERFORD APPLETON LABORATORY**  
SCIENCE AND ENGINEERING RESEARCH COUNCIL

#### SIMULATING PARTICLE PHYSICS EVENTS

When an electron hits a positron the two particles annihilate one another and generate new particles like quarks, which can only exist for an extremely short period of time. Very soon they bind together with other quarks to form hadrons (e.g. protons and pions). This process of combination is called "hadronisation".

When we undertake experiments at LEP we do not see the individual quarks formed in the collision but see the hadrons. Often the hadrons travel together in 'jets' in the approximate direction of the original quarks.

PIONS  
GAMMAS  
ELECTRONS  
KAONS  
BARYONS  
ANTI-BARYONS



Continued overleaf

It is the physicist's task to unravel the underlying physics from the jets of particles he measures. In effect the physicist must do the reverse of "hadronisation" by characterising the jets in terms of overall directions, widths etc.

In order to test our understanding of the physics of the collision and also to optimise our analysis methods, simulation programs are used to create collisions, hadronise the quarks, perform analysis on the jets of particles formed and then compare the jet properties with those of the original quarks.

