

# Rutherford Laboratory

## Technical leaflet

B6

### SPARK CHAMBER DATA REDUCTION

Sparks passing between the plates of a spark chamber can be detected by several methods. Those currently used, or under development, at the Rutherford Laboratory employ sonic, visual, wire and vidicon techniques. The initial method of accumulating the data is different in each case but subsequent analysis is similar. Spark positions are first established in three dimensions and are then linked together to form tracks, and finally the tracks are used to get physical parameters like momentum and direction.

A kinematical analysis is then performed in order to discover exactly what interaction took place in the apparatus. This fit makes use of physical conservation laws known to be obeyed at all interactions between particles or decay of particles.

#### (a) Sonic method

Here spark positions are measured by the time sound takes to travel to microphones set symmetrically around the chamber. The time is recorded in a fast core store buffer, together with other useful data, and this can be sent direct to the DDP-224 or written to a magnetic tape for later transmission and analysis. Each event (1 event/NIMROD pulse) is checked for consistency and some of the events are analysed completely in order to monitor the experiment and provide feed-back information for physicists via a typewriter or small visual display.

The checked data is stored temporarily on DDP magnetic tape. Once per hour the information is sent to the ORION computer where a more detailed but still partial analysis takes place. The full accurate analysis is performed on the Atlas computer.

#### (b) Visual method

The sparks are photographed by two cameras set perpendicular to one another and looking between the plates. The two stereoscopic views are imaged on to one film. This film is scanned for interesting events manually and the selected events are then measured by a CRT device controlled by the DDP-224, which produces several digitisings for every spark recorded. This information is transferred directly to the DDP-224, is checked and reduced in volume, and finally written to DDP-224 magnetic tape.

The magnetic tape is read on Atlas, the digitisings are converted to sparks and then the sparks are linked to form tracks or showers.

A geometrical reconstruction to combine the two 2-dimension stereo views into one 3-dimension representation precedes a kinematical analysis.



(c) Wire method

Here a mesh of wires, each connected directly to a ferrite core, is used to detect the position of the spark. At present an experiment is being set up and data will flow directly from the cores to a PDP 8 computer, then to the DDP-224.

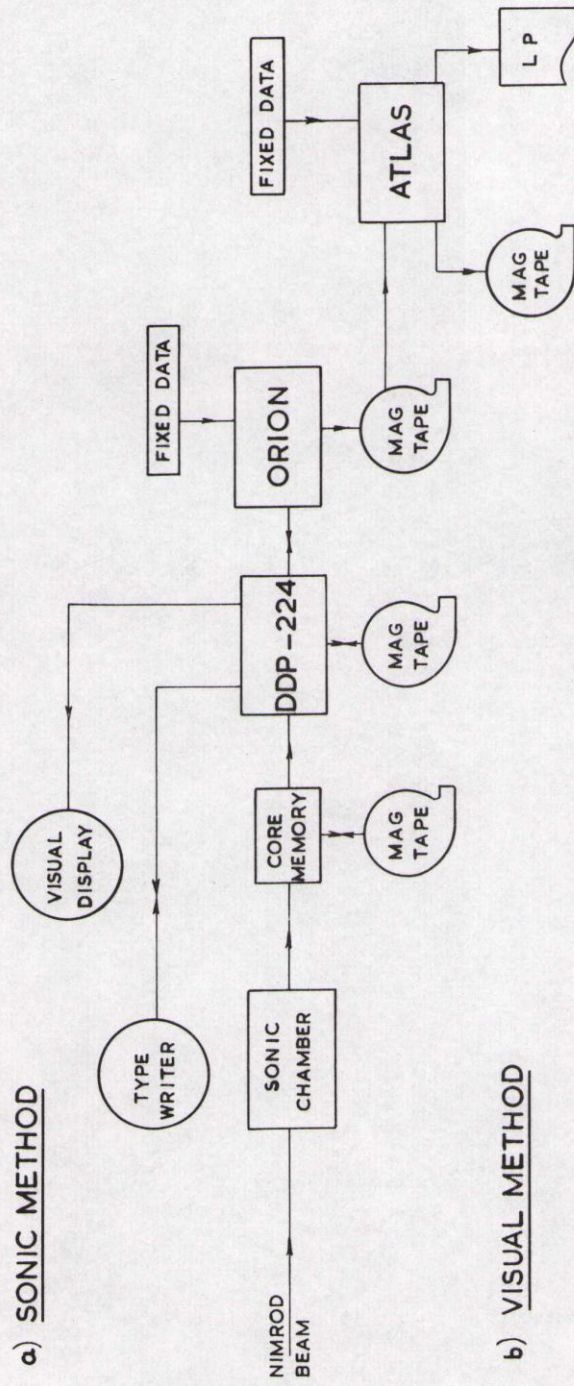
(d) Vidicon method

A scan between the plates is performed by a camera which digitises the sparks and records the information on scalars which can be transferred to magnetic tape for later analysis on Atlas.



## FLOW DIAGRAMS

### a) SONIC METHOD



### b) VISUAL METHOD

