

SCIENCE RESEARCH COUNCIL
RUTHERFORD HIGH ENERGY LABORATORY

Nimrod : Background and Record

The availability of Nimrod has given British Universities a high energy physics facility comparable in significance with the world's five other major proton accelerators. It may be noted that one of these is at an international laboratory and three of the others are in the U.S.A.

Major Proton Synchrotrons

Location	Name	Energy (GeV)	Operating Intensity (protons/sec)
Lawrence Radiation Laboratory, U.S.A.	Bevatron	6	$5 \cdot 10^{11}$
Brookhaven National Laboratory, U.S.A.	AGS	33	$5 \cdot 10^{11}$
Argonne National Laboratory, U.S.A.	ZGS	12	$2 \cdot 10^{11}$
Dubna, U.S.S.R.	-	10	$4 \cdot 10^9$
Rutherford Laboratory, England	Nimrod	7.2	$5 \cdot 10^{11}$
CERN, Geneva	CPS	28	$5 \cdot 10^{11}$

Nimrod was constructed in the years 1957-63 at a cost of about £11 million. It first operated in August 1963 and came into serious experimental use in February 1964 with a mean intensity of 10^{11} protons/sec reaching the design intensity of $5 \cdot 10^{11}$ protons/sec about 6 months later. A doubling of this intensity can be anticipated with reasonable certainty during the next 12 months.

Efficient and flexible distribution of the accelerated protons to the various experiments is just as important as high intensity. Various techniques have been successfully developed on Nimrod for this purpose. For

example, it is possible to share each beam burst between three counter experiments (long spill, e.g. 300 millisec) and a bubble chamber (short spill, 500 microsec). Multiple short bursts can be provided enabling bubble chambers to take more than one picture per burst, an important recent development in this field. The circulating beam can be extracted with 20% efficiency for use on external targets, a facility which is essential for certain experiments and which can frequently lead to more efficient use of the beam than is possible with internal targets.

To date, the experimenters have had 4,500 hours of useful beam time, including 1000 hours during 1965 when the energy was limited to 2 GeV following the major alternator breakdown. 1500 hours of this total was obtained in a nearly continuous run which has just concluded. It lasted from January 31st to May 16th, 1966, with essential maintenance breaks only and 80% of the time scheduled for experimenters' use was attained.

Thirteen counter experiments have now been completed at Nimrod; $2 \cdot 10^5$ pictures have been taken in the 1.4 metre heavy liquid bubble chamber and $1.7 \cdot 10^6$ in the Saclay 80 cm liquid hydrogen chamber.

19th May, 1966