

Professor Bob Siegel, Director of the Space Radiation Effects Laboratory, SREL, swept away by the literary style in vogue because of the USA Bicentennial Celebrations, was moved to circulate a request for experiment proposals at the Laboratory's synchro-cyclotron as follows:

Freshest Advices from Newport News on the Peninsula in Virginia

Notification, which should be construed as a Piece of authentic Intelligence, has been received from the National Science Foundation that the Space Radiation Effects Laboratory (known to the general Publick as SREL) shall continue to operate at its current Level of Activity through 1976, and hopefully beyond. This Laboratory shall thus continue to serve the Community of Scientists and other Practitioners of the highly esteemed Art of fundamental Research as far as the unwearied Diligence of its Staff can enable.

On April 30-May 1, the worthy SREL Program Advisory Committee (PAC) will gather from across the Continent and repair to Newport News, where they will meet in high Congress to deliberate on those Proposals which will have been submitted in good Time by present and prospective Users of SREL. Those from among the Constituency of Scientists who find the Study of Protons, Pions, and Muons at intermediate Energies to be a Vehicle of instructive Amusement should give Thought to submitting Proposals for the Use of cyclotron Time to 11970 Jefferson Avenue, Newport News, Virginia 23606. In these difficult Times the Uncertainties of the Mail make it advisable for the Prudent to submit their Proposals well in Advance of April 1.

Let All be assured that the Distractions of the colonial Capital at Williamsburg shall not serve to cause the Members of the PAC to deviate from the Course of true Virtue during their forthcoming Labours. Yet they will be provided with such Sustenance of which the Chesapeake Bay is capable (that being unsurpassed for both Quality and Bounty) as well as with such Libations as will cause them to review Proposals of Merit with kindly Temperaments moderated by Wisdom and Experience.

As to the Appartenances of Research which are allotted to the Users of SREL, we humbly offer an extensive Equipment Pool including Scopes, standard Logic, pulse height Analyzers and the Like to which many Scientists have become accustomed. An on-line data acquisition System with multi-programming Capabilities is also at the Service of those Users who are knowledgeable in the Realm of Bytes and save Taypes. The stopping Muon and Pion Beams are the especial Pride of the Management, and numerous Pieces of ancillary Apparatus are available. The Flexibility of the laboratory Accommodations and the Responsiveness of the Staff are such as to compensate for most real or imagined Deficiencies.

Thus SREL shall endeavour to deserve continued Instances of public Favour, and to be the Scene of numerous Discoveries which may be either curious or important, perchance both.

We remain the Publick's obliged, and devoted Servants.

R.T. Siegel

polarized proton target by a Michigan/Argonne group; and measurements of inclusive particle production asymmetries by a Rice/Minnesota/Argonne collaboration.

SREL **Muons à gogo**

The Space Radiation Effects Laboratory, SREL, operates a synchro-cyclotron which was modelled on the CERN 600 MeV machine. It was built during the years 1963 to 1965 for use by NASA to simulate the radiation environment in space when information was needed for the space programme. Since 1967 it has been operated by the College of William and Mary and since 1973 has received financial support from the National Science Foundation and the Commonwealth of Virginia.

The machine operates with an internal proton beam of 1.5 to 2 μA and has an extraction efficiency around 5 %. In 1972 it was modified to take helium ions also, accelerating helium-4 to 710 MeV with an internal current of about 0.5 μA and the same ejection efficiency.

There are extensive experimental areas (3700 m²) where pion beams are installed with momenta up to 400 MeV/c. The major experimental effort however is concentrated on the use of muon beams. A quadrupole muon channel with 28 cm aperture can provide a flux of 100 MeV/c muons of 6×10^5 per s.

Experiments include the study of muonic atoms (Chicago/Ottawa collaboration). They have measured the muonic X-rays of the 5 g to 4 f transition in lead and the 4 f to 3 d transition in barium with an accuracy better than 10 eV.

Positive muon precession in solids

(William Mary/Bell Laboratories) has been used to study the internal fields in ferromagnetics, type II superconductors and spin glasses where dilute random alloys have their spin orientations frozen in the matrix. The group is going on to study defects in solids, negative muon precession in biological systems and critical fluctuations in antiferromagnetics (mainly chromium). In addition, muon precession will be used to look at magnetic insulators, transition metals and rare earths.

Muon studies in gases (Yale/Heidelberg) have demonstrated the formation of stable muonic helium atoms, with one electron and one muon in orbit around the helium nucleus, in helium gas at 14 atmospheres with a 2% admixture of xenon. This analogue of muonium was observed via its characteristic Larmor precession and it is of importance in testing quantum electrodynamic predictions.

A measurement of the rate of asymmetry of radiative muon capture in calcium is nearing completion (William Mary). An external converter is used to materialize the photons and their energy is then measured in a sodium iodide crystal. This makes it possible to suppress the background due to neutrons from muon capture which has disturbed earlier measurements. Over 2500 events were gathered during a run ending at the beginning of March.

RUTHERFORD

Zooming in on bubble chamber events

Better bubble chamber picture patch-up was the motivation behind ASPECT

— a computer controlled graphics device, developed at the Rutherford Laboratory, which is now being considered for applications in other fields, including magnet design and crystallography. In contrast with other equipment of this type, the device uses its own purpose built hardware functions to perform complex coordinate transformations in real time, thus giving immediate response to operator signals and commands entered via tracker ball input devices.

Two things are making life more difficult in the measuring of bubble chamber film (at the Rutherford Laboratory, this is done on a Hough Powell Device or HPD). One is the move to bigger chambers since each frame of film from a big bubble chamber produces more digitisings than a comparable frame from a smaller chamber. Also, the pictures from big chambers give the viewer a more difficult pattern recognition problem to solve, mainly as a result of the increased density of graphical data. As well as having more tracks per event, these chambers show more events per unit area of film and have more digitisings which result from imperfections.

The second complicating feature is the use of new 'reduced guidance' techniques for digitising events with a minimum of operator input. Added to the demands of the big bubble chambers, this requires a larger number of points to be displayed 'flicker free' in the rescue system which attempts to measure events that have problems going through the HPD.

The viewer needs a system which presents the stored information in graphical form preserving, as far as possible, the accuracy and resolution of the original digitisings so that there is as much genuine picture data as possible available to assist in the patch-up process. The ASPECT device meets these requirements. It can dis-

play up to 50 000 points flicker free and zoom in on any required portion of a display. This particular ability to scale and translate two dimensional picture coordinates means that the one in a thousand resolution of the video screen is no longer the limiting factor for displayed resolution.

The 'zooming' transformation is done by a digital coordinate processor which can handle full accuracy digitisings from HPDs. In this way ASPECT provides a versatile viewing aperture which can be used to examine complete bubble chamber film frames or the detail contained in any area of film, up to an effective magnification of 500 times. By using a magnification system which acts on the digitally-stored file of x and y coordinates, ASPECT is able to utilize the full potential of the digitising, and the additional capability for lateral translation means that the required magnified area can be kept on screen all the time, enabling the operator to examine any required portion of a picture to a chosen level of detail.

Before commencing design work, the Rutherford graphics specialists decided that additional on-line graphics features could be easily incorporated and might be useful. This far-sighted approach seems to have paid off. As well as providing scaling and translation in real time from stored digital coordinates, the new equipment can also carry out additional coordinate transformations to rotate pictures in two and three dimensions. This enables structures or topologies to be examined from all sides, and with variable magnification.

Both a light pen and a cursor can be used, so enabling a wide range of interactive graphics operations to be carried out. The equipment incorporates hardware which ensures that the cursor 'follows' the light pen, so combining the convenience of a hand held light pen with the accuracy of a cursor