

Around the Laboratories

trapping efficiency, that the great attraction of this method lies.

Röntgen Prize

On 17 October the 1970 Röntgen Prize was awarded to G. Backenstoss (of CERN and Karlsruhe) for his work on 'exotic' atoms. The story of the latest discoveries in this field, where sigmic and antiprotonic atoms were identified, appeared in CERN COURIER two months ago (vol. 10, page 251). Observation of X-ray emission from exotic atoms is a source of a great deal of information on the nucleus.

The Röntgen Prize is awarded by the Science Faculty of Justus Liebig University in Giessen, Federal Republic of Germany, where Röntgen was Professor of Physics at the end of the last century when he discovered X-rays in 1895. It is given for distinguished work in experimental physics. It has not been awarded since 1967 and this year has therefore seen a triple award on the occasion of the opening of a 'Radiation Centre' at the University where research in physics and biophysics will be carried out using a 60 MeV electron linac. In addition to Backenstoss the Prize went to E. Stuhlinger of the Space Research Centre, Huntsville, Alabama, for his research in extra-terrestrial X-rays carried out using detectors in rockets and to T. Kirsten of the Max Planck Institute Heidelberg for his discovery of double beta decay.

The Röntgen Prize was awarded to J.B. Adams in 1960 for his leading role in the construction of the CERN proton synchrotron. This new award is a tribute to the whole team from CERN, Heidelberg and Karlsruhe who for about five years have been producing important results, first on mu-mesic and pi-mesic atoms working at the synchro-cyclotron and more recently on K-mesic, sigmic and antiprotonic atoms working at the proton synchrotron.

BERKELEY

'Proton decay' confirmed

...not, be it hastily said, the decay of the proton itself but the first clear observations of the radioactive decay of a nucleus by means of proton emission. The possibility of such a decay mechanism has been realized for a long time. It is possible to produce nuclei which are 'proton rich' such that the energy binding the proton in the nucleus falls to zero or to negative values. But to identify the process occurring is not easy. This has now been done at the Lawrence Radiation Laboratory, Berkeley, following previous work at Harwell in the UK. The achievement was reported in Physics Letters on 26 October.

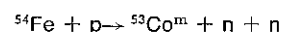
Four mechanisms of radioactive decay are well established - beta decay (emission of an electron or positron), alpha decay, gamma decay and spontaneous fission. 'Proton decay' is now added to the list. It has been looked for during the past few years particularly at Dubna where a team, led by V.A. Karnaikhov, has done much of the original thinking on this topic and reported some results, which were not conclusive, at the 'Conference on the Properties of Nuclei Far from the Region of Beta Stability' held at Leysin, Switzerland, from 31 August to 4 September 1970.

The results from the experiments at Harwell were also, by themselves, not conclusive. They were carried out by K.P. Jackson, C.U. Cardinal, H.C. Evans, N.A. Jelly and J. Cerny using the Variable Energy Cyclotron (built for Harwell by the Rutherford Laboratory) to accelerate oxygen ions which bombarded a calcium target. In the reaction, a cobalt isomer $^{53}\text{Co}^m$ can be produced, which is proton rich and is a comparatively long-lived excited state of cobalt-53. Though nuclei in the ground state which are proton unstable have not been found, the cobalt isomer is an unusual case where a high energy state is proton unstable. Its high spin value (19/2) prevents decay by electromagnetic radiation. In the Harwell experiments, protons which could have come from proton decay of the nucleus were observed but they could not be unambiguously distinguished, firstly because of the complexity of the oxygen-calcium nuclear interaction, and secondly because

it could not be proved that the emerging protons were not of the 'beta-delayed' type.

Beta-delayed proton emission has been known since the early 1960s from the work of Karnaikhov at Dubna and R.E. Bell at McGill, Canada. In this phenomenon the fundamental decay process is beta decay which is followed by the emission of a proton from the highly excited state of the daughter nucleus. It is not true radioactive decay by proton emission, though it also provides considerable information about nuclear properties. Studies on delayed proton emission are under way at CERN with ISOLDE (see CERN COURIER vol. 10, page 4) and the latest results were reported at Leysin.

Following the Harwell experiments, Cerny returned to Berkeley and, together with J.E. Esterl, R.A. Gough and R.G. Sextro, was able to carry out a 'cleaner' search using the 88 inch cyclotron to bombard iron-54 with protons again to produce nuclei of cobalt-53 m.



The cyclotron provided beam for 0.8 s and was then switched off while the iron target was observed for 0.6 s. Emerging protons were detected in a counter telescope and the absence of simultaneous beta particles confirmed that true proton decay of the cobalt isomer was being observed.

STANFORD (SLAC)

Half a SPEAR

As mentioned in the last issue of CERN COURIER, page 320, Stanford Linear Accelerator Centre are going ahead with the construction of an electron-positron storage ring which is a trimmed down version of their project SPEAR (Stanford Positron Electron Asymmetric Rings) described in vol. 9, page 271. SPEAR consisted of two asymmetric rings (slightly pear-shaped) overlapping to provide two beam interaction regions.

What is now being built is a single asymmetric ring in which both electrons and positrons will orbit in opposite directions. Two 'low beta' regions, where the beam will be specially concentrated, will be available for collision experiments. Initially, a single r.f. cavity will limit peak