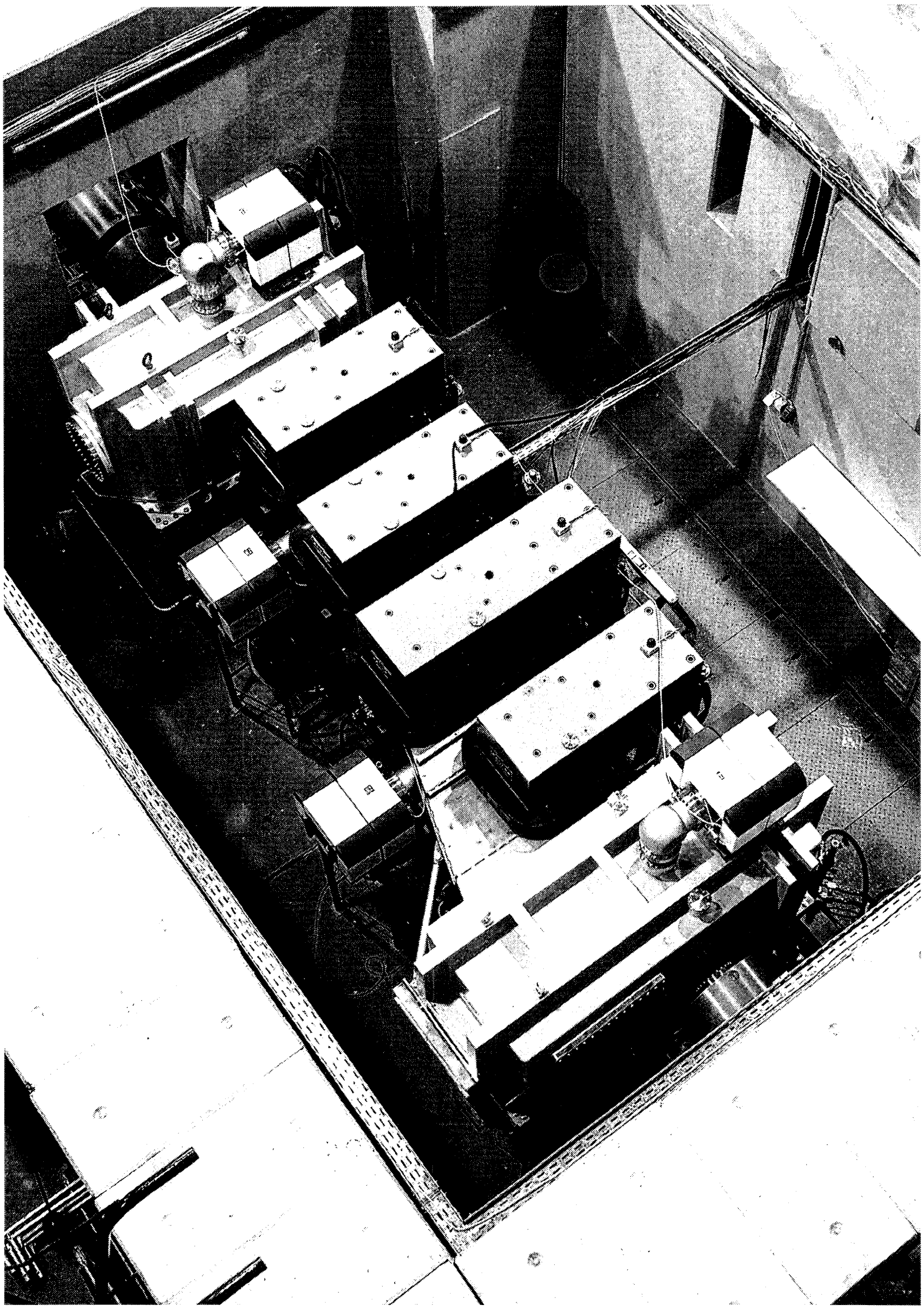
SHIP not at sea. The SHIP velocity filter/ separator for heavy reaction products at the GSI heavy ion Laboratory, Darmstadt, has added another feather to its already well-adorned cap with the discovery of nuclei 110 and 111, the heaviest ever seen.



In a series of important pre-experiments to tune the production of nucleus 110, the production of intermediate unstable superheavy nuclei (104 and 108) was examined in the fusion of titanium-50 and iron-58 on lead. As well as finding the optimum projectile energies, this also allowed single neutron evaporation to be studied - the nickel-62/lead-208 fusion reaction produces the 269/110 supernucleus and a single neutron.

A nickel beam energy of 311 MeV produces a chain of 4 alpha decays. This can be assigned to the isotope with the mass number 269 of the element 110 on the basis of delayed alpha-alpha coincidences.

The accurately measured decay data of the daughter isotopes of the elements 108 to 102, obtained in the pre-experiments, were used.

The isotope 269/110 decays with a half-life of (270+520-220) microseconds.

The SHIP group substituted nickel-64 for nickel-62 and were rewarded by formation of the nucleus 271/110.

For element 111, the nuclei decay by alpha emission into 268/109 and 264/107, the heaviest isotopes of these nuclei ever seen.

BEIJING
Green light for feasibility studies on tau-charm factory

Since first collisions were achieved at the Beijing Institute of High Energy Physics BEPC electron-positron collider in October 1989, nine million J/psi and 1.4 million psi primes have been collected, as well as integrated luminosities of five and 23 inverse picobarns collected from respectively the tau threshold and a collision energy of 4.03 GeV.

In addition, the BES spectrometer group has obtained several important tau results, including a precise measurement of the tau mass and precision studies of important tau decays. These results were a focus of interest at major meetings last summer.

With many physicists across the world interested in the future of the BEPC/BES complex, in October, came the good news that the Chinese leadership had promised to support Beijing's feasibility study

Cyclotron technology transferred to industry - the Ebco TR30 cyclotron installed for Nordion at the Canadian TRIUMF Laboratory in Vancouver is being upgraded from 500 microamps to 1 milliamp operation. (Photo Ebco)

project for a Tau-Charm Factory (tauCF) on the BEPC site.

BEPC's working energy, in the range 3 - 5.6 GeV, covers a high density region of resonances including charmonium, its excited states and production thresholds of many particles, such as the tau lepton pairs and charmed particles(mesons and baryons).

The present experimental statistics and detection resolution at BEPC/BES are not up to the task of testing the Standard Model to its limit and searching for new physics.

The tauCF would be a logical continuation of BEPC/BES. With a hundred times greater luminosity and tenfold detection accuracy, tauCF could play a decisive role in ongoing physics goals.

A SLAC (Stanford) workshop last summer on tauCF in the B-Factory Era underlined the importance of tauCF, with conclusion that a B-factory cannot replace tauCF. Many scientists have observed that Beijing is one of the best places for a tau-charm factory.

TRIUMF Technology transfer

n our occasional series highlighting the increasingly important area of technology transfer and industrial spinoff from high energy physics, this month the CERN Courier focuses on TRIUMF in Vancouver, Canada's major national facility for research in subatomic physics, a particularly illustrative example of the rewards and challenges involved.

TRIUMF is based on a 520 MeV negative hydrogen ion cyclotron meson factory operated by a consortium of Canadian universities. Although the primary funding from the Canadian government is earmarked for support of basic research, the laboratory has always fostered applications of the technologies available, supporting them with funds from other sources.

At first this "applied programme" involved simply the provision of particle beams for other scientific, medical and industrial uses - protons for the development of neutron-deficient radioisotopes, neutrons for activation analysis, pions for cancer therapy, and muons for chemistry and condensed-matter physics.

Twenty five years on, the technology transfer process has resulted not only in a significantly expanded internal applied programme, with many areas of activity quite independent of the big cyclotron, but also in a number of successful commercial operations in the Vancouver area.

Radioisotope production has been a particularly fruitful source for technology transfer, the early development work leading to two important initiatives - the establishment of a commercial radioisotope production facility on site and the inauguration of a positron emission tomography (PET) program at the University of British Columbia nearby.

In 1979 Atomic Energy of Canada Ltd's isotope production division (now Nordion International Inc.) decided to establish a western Canadian facility at TRIUMF, to produce the increasingly important neutron-deficient radioisotopes obtainable with accelerator beams, primarily for medical applications. This would complement their production of neutron-rich isotopes at nuclear reactors in eastern Canada. To complement the TRIUMF cyclotron beams, a 42 MeV 200 microamp CP42 negative hydrogen ion cyclotron was purchased and brought into operation in 1982.

Increasing demand soon led to this machine working at full capacity, so in 1987, after an extensive market search, Nordion decided to enter into a three-way agreement with TRIUMF