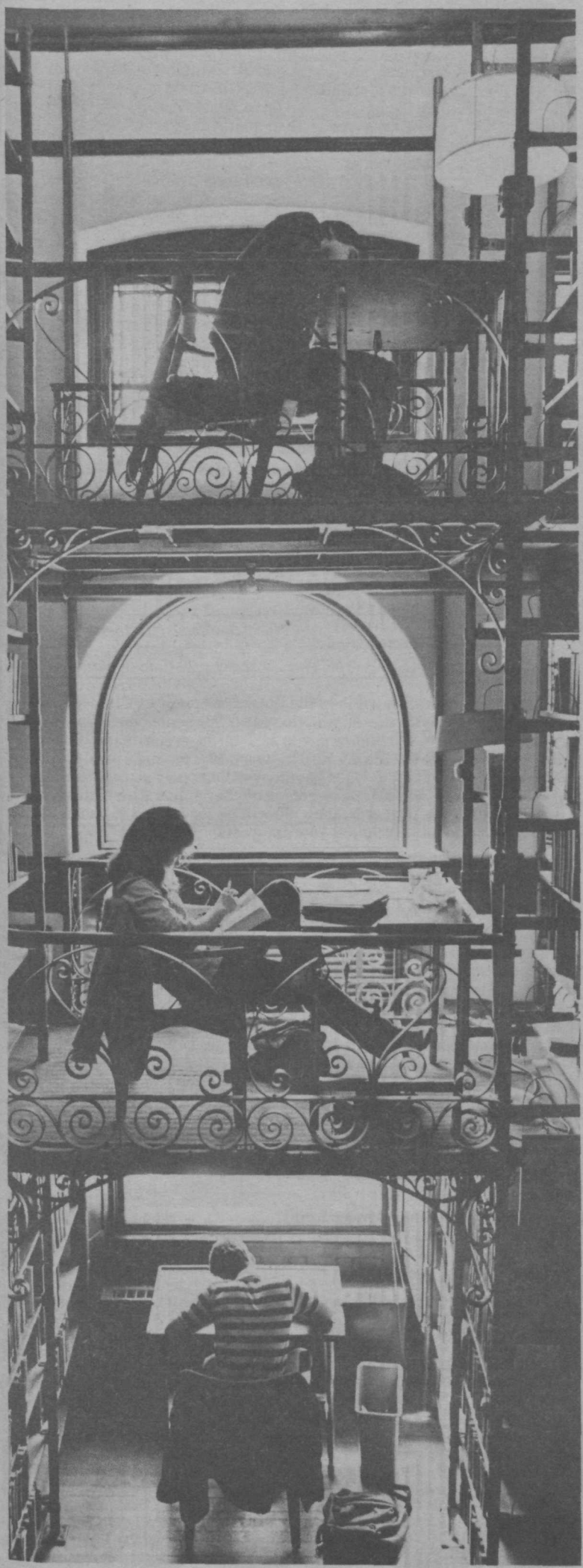
Cornell Chronicle

Volume 13, Number 29 Thursday, April 29, 1982



A study in silhouettes in the A. D. White Room of Uris Library is also a study in concentration.

Breakthrough at Newman Lab

Physicists Succeed at Superconductivity

Using CESR, the Cornell Electron Storage Ring, a team of scientists and technicians from the Floyd R. Newman Laboratory of Nuclear Studies has succeeded in accelerating a high energy particle beam by means of a superconducting microwave resonator.

This is the first time that a superconducting resonator has been used in a storage ring accelerator. The resonator was held in a bath of liquid helium at a temperature close to absolute zero during the experiment.

The achievement was announced this week by Boyce D. McDaniel, professor of physics and director of the Newman Laboratory. The team that carried out the first storage ring test, on Sunday, April 18, was coordinated by Ronald M. Sundelin, senior research associate at the laboratory.

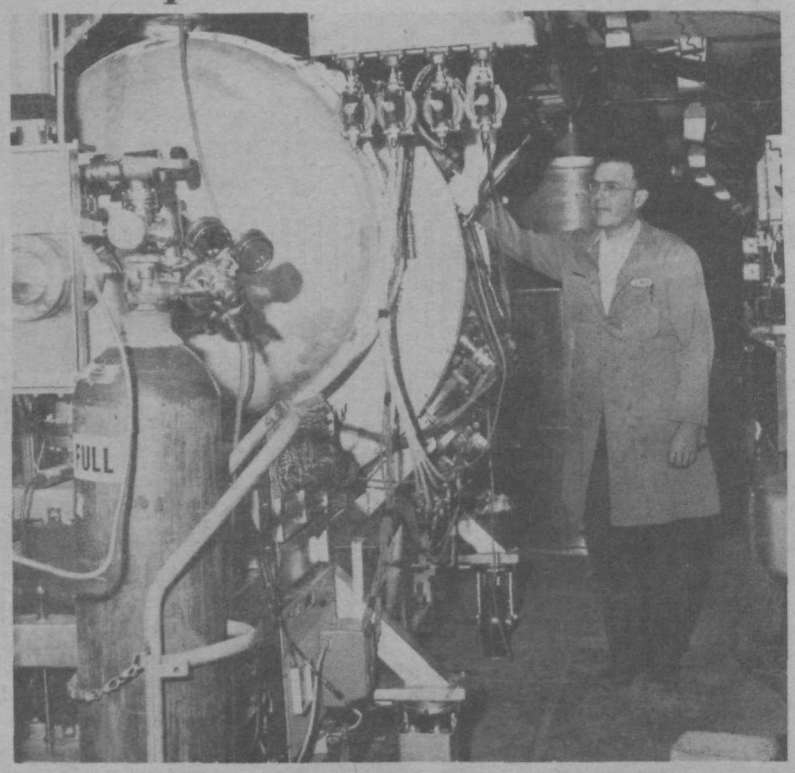
Background

Superconductivity is a phenomenon which permits certain substances, such as the metal niobium, to carry electrical currents with little or no energy loss. By this means Cornell researchers were able to increase the energy of particles by 2 million electron volts (the measure of particle beam energy) with a microwave electrical power of 5 watts, about the same power required by a household night light. Normally, hundreds of thousands of watts would be necessary to produce similar accelerations with microwaves.

High energy particle beams are used by scientists to probe and measure the properties of the most fundanental units of matter and the forces that govern their structure. The higher the energy of particle beams, the smaller the objects that can be probed by the beams. One way of using particle beams to probe matter is to make them collide against each other in devices called storage rings.

A Major Step

Development of the superconducting microwave resonator is considered critical to the design of the next generation of electron-positron storage rings. This achievement is a major step toward submitting a proposal to build CESR II, a 50 x 50 billion electron volt collider currently being designed by a team led by Maury Tigner, professor of physics at Cornell.



Professor of Physics Maury Tigner, leader of the team designing the proposed CESR II, with the superconducting microwave resonator and associated equipment as installed in CESR I.

Microwave cavities are needed to accelerate electrons and the particles of the opposite charge, positrons, and to keep them moving around storage rings at nearly the speed of light. Research efforts to develop superconducting microwave cavities made of niobium have been underway at Cornell since 1969, and have been funded by the National Science Foundation.

Further development of superconducting resonator technology will permit scientists and engineers to build accelerators for fundamental matter research much more economically than is now possible by dramatically reducing the electrical power requirements of accelerators.

No Chronicle Next Week

With this issue, Cornell Chronicle begins winding down toward a summer publication schedule which will include eight issues between now and the time it resumes weekly frequency in late August. The next issue will be on May 13, and the one after that on June 10, before Alumni Reunion weekend.

Look! Up in the Air! (See Page 3)