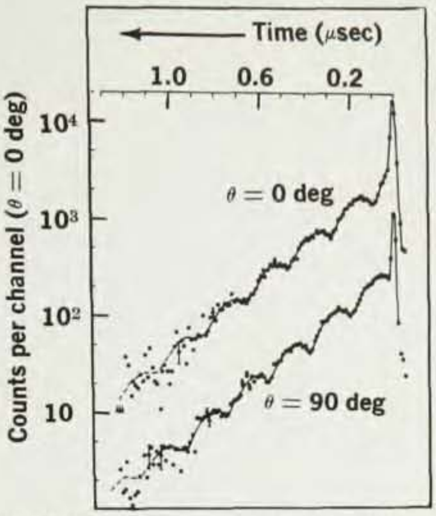
ments of the magnetic field at the sites of rare-earth isotopes in iron.

In a continuation of this work, Felix Boehm, Hagemann and Aage Winther measured local magnetic fields of 10 rare earths implanted in iron foils. The results support the conclusions of Grodzins and collaborators that these elements couple antiferromagnetically with the magnetic moments of the iron atoms. The result contradicted predictions that took into account only the polarization of the 4f-shell electrons. The ion-implantation experiments strongly imply that the coupling is affected by the more distant 5p electrons as well as the 4f ones.

Ion implantation and angular-precession in high internal fields permits measurement of magnetic moments of quite short-lived nuclear levels. For example in 21 Nov. 1966 *Phys. Rev. Letters,* Borchers, Jeff Bronson, Daniel Murnick and Grodzins working at the University of Wisconsin and MIT report magnetic moments of the 2^+ first excited states of five even tellurium isotopes. These states vary in lifetime from 4.36 to 13.4 picosec, about a factor of 10 or better than the shortest lifetimes of states for which magnetic moments have previously been measured.

The method is also applicable to long lived states. Recently Alan Poletti at Brookhaven National Laboratory and David Fossan of SUNY, Stony Brook, used ion implantation to measure the magnetic moment of the long lived 1.13-MeV 5^+ state of F^{18} (*Phys. Rev.* to be published). They aligned these states by detecting protons emitted backward from the $O^{16}(He^3,p)F^{18}$ reaction. The F^{18} recoiled into a copper lattice, which maintained the alignment while precession was produced by an external field of about 6 kG.

The 5^+ state is so long lived that it precesses many times while the F^{18} nuclei decay. The angular distribution of the gammas from these aligned nuclei has two peaks, which pass the detector each 360-deg precession. The gammas are detected at a fixed angle in coincidence with protons populating the state and are recorded as a function of the time interval between



DECAY CURVES of 5^+ state of F^{18} show two bumps for each time the peak of the angular distribution precessed past counters. Each pair of bumps represents a 360-deg precession.

the two emissions. The result is an exponential decay curve on which are superimposed peaks and valleys of the gamma distribution as shown in the figure. The two curves in the figure were taken 90 deg apart so their peaks are 90 deg out of phase. From these data one gets both the halflife, 228 nsec, and the magnetic moment 2.840 $\pm$ 0.065 nuclear magnetons, of the state.

Mössbauer effect. Two years ago Dietrich Seyboth, Felix E. Obenshain and Gordon Czjzek of ORNL found that the Mössbauer effect could be observed with levels of nuclei reached by Coulomb excitation. These same experimenters along with James L. C. Ford Jr used Coulomb excitation to study the Mössbauer effect in Ge^{73}; this nucleus has no levels suitable for the Mössbauer effect that can be populated by the radioactive decay of either of the adjacent nuclides, As^{73} or Ga^{73}; that is, Ge^{73} could not be used for the Mössbauer effect except by Coulomb excitation.

Now in 3 April 1967 *Phys. Rev. Letters* Czjzek, Ford, John C. Love, Obenshain and Horst H. F. Wegener report they have combined ion implantation and the technique of Mössbauer effect by Coulomb excitation. They bombarded targets of Ge^{73} with high-energy oxygen ions. Behind the targets were thin foils of material chosen to be the Mössbauer host, and the Coulomb-excited nuclei recoiled into these. Chromium, iron, copper and natural germanium were used as hosts. The fine structure and width and depth of the Mössbauer absorption peaks provide information about the lattice parameters and properties of the different host materials. The obvious advantage of the technique is the ease with which the host material can be varied. —CHH

NRAO Radio Array Could Have 1-Second Resolution

A proposed new radio telescope would aim at 1-second-of-arc resolution in order to detect sources a hundred times as faint as presently detectable ones and the zero of cosmological time —that is, the edge of the observable universe. Described as the radio analog of the 5-meter optical telescope, it would, say its proposers, revolutionize radio astronomy. Today's instruments have the resolution of the unaided eye whereas the new instrument would approach that of the 5-meter telescope.

The National Radio Astronomy Observatory describes the instrument in a report that Associated Universities Inc. has transmitted to the National Science Foundation. The two-volume document is partly a response to the National Academy of Sciences report *Ground-Based Astronomy, A Ten-Year Program* (discussed in PHYSICS TODAY, February 1965, page 19).

The correlator array would have 36 25-meter-diameter paraboloids that would move along 21-km-long arms of a Y. A high, dry area of southwestern United States would be the site.

AUI should design and construct VLA (Very Large Array), says the report, and then operate it as one of the facilities of NRAO. Use, based on scientific merit of programs, would be open to all. The report sees a small resident technical staff and at least 70% of observing time allocated to persons who are not members of the NRAO staff. These are the same policies that govern NRAO telescopes at Green Bank, W. Va.

George Swenson was chairman of the VLA design group. The report estimates that construction would cost \$36.1 million and take four years, and it recommends allocation of \$59.1 million to include ancillary expenses. Annual operating cost would be \$1.7 million. □