

his MS (1959) and PhD (1961) in electrical engineering from Stanford University. He then joined Bell Laboratories, where his initial research on gas lasers led to his 1964 discovery of laser action on the excited vibrational rotational transitions of carbon dioxide. This discovery and his subsequent invention of vibrational energy transfer between molecules eventually led to the demonstration that the carbon-dioxide laser could achieve high cw and pulsed power output without sacrificing high conversion efficiencies. Using the CO<sub>2</sub> laser, Patel made pioneering studies of nonlinear optical processes in the infrared region. In 1969 he invented the spin-flip Raman laser, a tunable infrared laser that uses high-power molecular lasers as its source of pump radiation. With the Raman laser, Patel made high-resolution spectroscopic studies of the ground and vibrationally excited states of molecular gases; he further demonstrated the laser's usefulness in detecting concentrations of atmospheric pollutants as small as one part in 10<sup>12</sup> at atmospheric pressure. He developed the software that controlled the first laser-based spectroscopic equipment to take real-time measurements, via balloon, of stratospheric nitric oxide. The information obtained in these experiments was important to the understanding of the problem of ozone depletion by man-made nitrogen-oxide emissions from sources such as the SST. Patel became the director of Bell's electronics research laboratory in 1970. He became director of the physical research laboratory in 1976 and, in 1981, became executive director of research of Bell's physics division. Patel's current research interests include measurements of Lamb shifts in heavy hydrogenic atoms, the spectroscopy of highly transparent liquids and solids, and the surgical and medical applications of CO<sub>2</sub> lasers.

PATEL



## American Academy of Arts and Sciences elects new members

The American Academy of Arts and Sciences recently elected 85 new members, including the following whose work is in physics or related fields: Howard C. Berg, Caltech; Raymond Davis Jr, Brookhaven National Laboratory; Richard E. Dickerson, University of California at Los Angeles; David J. Gross, Princeton University; Pierre C. Hohenberg, Bell Laboratories; Walter D. Knight, University of California at Berkeley; Roland W. Schmitt, General Electric Company; Abner E. Shimony, Boston University; William P. Slichter, Bell Laboratories, and James A. Westphal, Caltech.

The Academy also elected 19 new foreign members, including astrophysicist Donald Lynden-Bell of Cambridge University, Cambridge, UK.

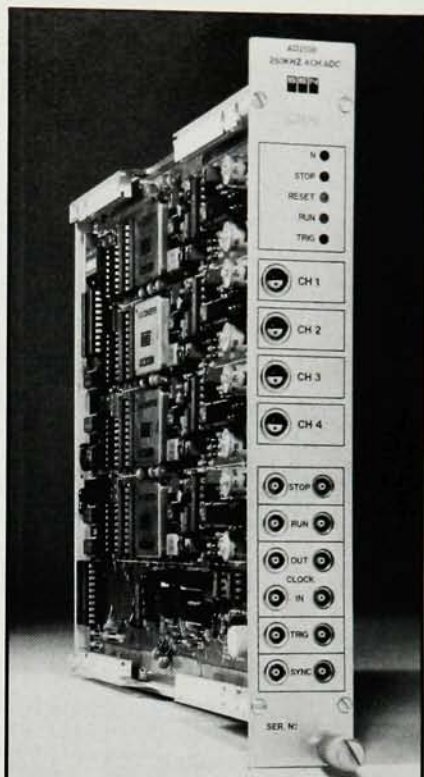
### in brief

**Charles E. Whittle**, assistant director of the Institute for Energy Analysis at Oak Ridge Associated Universities since its founding in 1974, has been appointed director of that institute. ORAU is a nonprofit association of some 50 colleges and universities that conducts research in energy-, health- and environment-related fields for the Department of Energy and other private and governmental organizations, as well as for its own member institutions. His predecessor, Alvin M. Weinberg, will remain at the Institute as a Distinguished Fellow and will continue his current research.

**Richard H. Kropschot**, associate director of the US DOE Office of Basic Energy Sciences for the past five years, was appointed head of Lawrence Berkeley Laboratory's newly established engineering division. Prior to joining DOE, he worked for 28 years at the National Bureau of Standards, becoming, in 1978, chief of the thermophysical properties division.

**Richard T. Williams**, formerly head of the ultraviolet technology section, optical probes branch of the Naval Research Laboratory in Washington, D.C., has joined the physics department at Wake Forest University in North Carolina as a Reynolds Professor of Physics.

**James F. Decker**, formerly director of applied plasma physics and director of scientific computing at the Department of Energy, has been appointed deputy director of the DOE Office of Energy Research.



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