

SPECIAL ISSUE:

50 YEARS OF COMPUTERS AND PHYSICISTS

Fifty years ago, a physics graduate student burning the midnight oil might labor for several years with a lab notebook, Marchant desk calculator and graph paper. Today the time it takes to receive the PhD might be even longer, but today's tools were probably never dreamt of by that struggling student of the past.

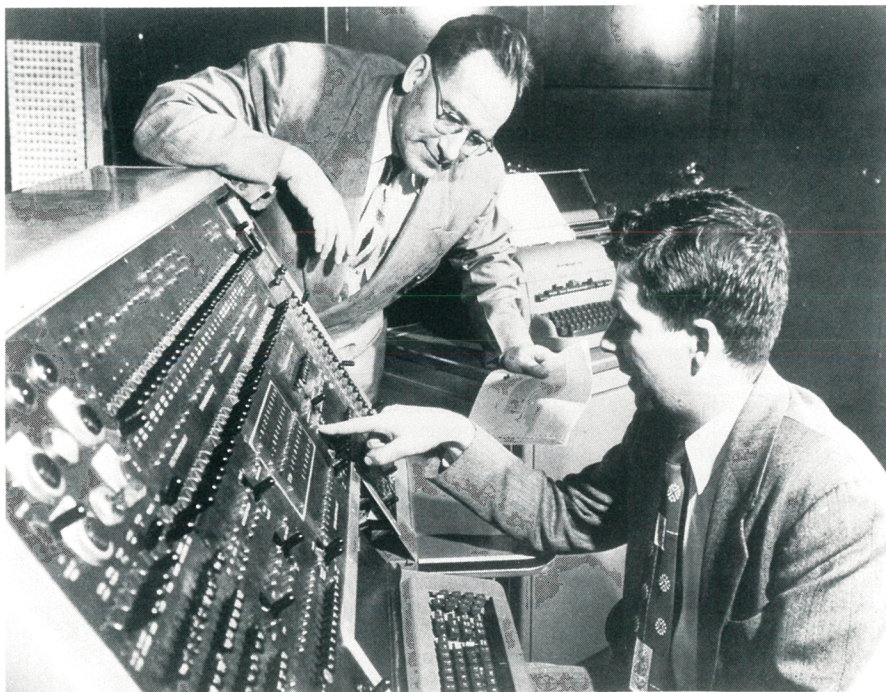
To celebrate the 50 years since the ENIAC, this special issue presents a sample of the contributions of physicists to computers and computing and the contributions of computers and computing to physicists. The subject is vast, and we have necessarily neglected many topics and individuals. From the earliest days, physicists have been key players in electronics, circuit design, storage, input and output devices, transistors, integrated circuits, VLSI, programming, advanced architectures, networks—you name it.

Two of the four articles in this special issue are devoted to history.

Alfred Brenner, much of whose professional life as a physicist has coincided with this 50-year period, summarizes each of those five decades in his article on page 24, "The Computing Revolution and the Physics Community." In the first decade the earliest computers were designed and built; in the second the modern computer era began; in the third, there was a period of controlled growth; in the fourth, hardware became diversified; in the fifth, computing and communications merged and advanced.

Robert Seidel, who is professor of the history of technology and director of the Charles Babbage Institute (The Center for the History of Computing) at the University of Minnesota, traces the impact of the national laboratories in his article on page 33, "From Mars to Minerva: The Origins of Scientific Computing in the AEC Labs."

While playing a vital role for the last 50 years in designing computers and developing computing tools, the physics community has pioneered the most sophisticated applications of these tools. The current frontier includes biological computers, single electrons as bits, the physics of producing realistic graphics, remote operation of experiments and observations, designing materials by computer,



PHYSICIST JOHN W. MAUCHLY LOOKS AT THE CONSOLE OF THE UNIVAC I, *circa* 1951, with an unidentified operator. Mauchly (standing) and J. Presper Eckert Jr built the ENIAC at the University of Pennsylvania's Moore School of Electrical Engineering. They then founded the Eckert-Mauchly Computer Corp and designed the UNIVAC I for the Census Bureau. In 1950 the company was bought by Remington Rand. (Photo courtesy of the Charles Babbage Institute.)

ultrafast gallium arsenide and pushing the limits of silicon technology.

We present two articles dealing with leading-edge research using computers. Michael Norman of the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign, in his article on page 42, "Probing Cosmic Mysteries by Supercomputer," discusses the impact of supercomputers on the solution of three long-standing puzzles in astrophysics—star formation, supernova explosions and large-scale cosmic structure formation.

In their article on page 50, "Data Acquisition and Analysis in Extremely High-Data-Rate Experiments," Joel Butler of Fermilab and David Quarrie of Lawrence Berkeley Laboratory discuss the ways in which high-energy physicists are using computers to cope with the extremely high data rates and large data sets in current and future experiments in particle physics. Present-day experiments produce hundreds of terabytes of data per year; future experiments will yield several petabytes per year.

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