obituaries

out the very large projectile charge-state dependence of atomic collision processes. It was the initial research of Macdonald that provided the impetus for the development of a full-scale accelerator-based atomic physics program at Kansas State.

His research was consistently distinguished by originality and by thoroughness. Because his experimental studies were generally theoretically motivated, the results consequently had a large impact on the field of atomic collisions and formed the basis on which many others have built.

As fruitful as were his research efforts, there was another side of Macdonald that was known primarily to those who worked with him on a day-to-day basis. His desire to seek knowledge was complemented by his desire to share knowledge, to teach. He demanded the right to teach at the freshman-sophomore level where he could encounter non-science majors, for he firmly believed that in order for science to remain a valued part of our society it must be appreciated by all educated persons. Many desire to teach, but few deserve the title teacher so well as did James Macdonald. For those of us who encountered him, though his life was too brief, it was a privilege, for we did learn much from him.

C. E. HATHAWAY

Kansas State University

David W. Koopman

David W. Koopman, research professor of physics in the Institute for Physical Science and Technology at the University of Maryland, died on 21 December at the age of 44.

His research activities were concentrated at the interface between atomic processes and plasma phenomena. Prior to 1970, Koopman's principal interests were ion collision processes, including charge exchange by multiply-charged ions, and quantitative atomic spectroscopy using a shock tube as a light source. More recently, Koopman directed his studies towards plasma phenomena, laser applications, and problems of controlled fusion.

Koopman received a BA in physics from Amherst College in 1957 followed by MS (1959) and PhD (1964) degrees in physics from the University of Michigan at Ann Arbor, where he was a research student of the late Otto Laporte. He then joined the Maryland faculty in the Institute for Fluid Dynamics and Applied Mathematics which is now the Institute for Physical Science and Technology. Koopman was promoted to full research professor in 1973. During his 15 years at Maryland he directed the work of five

PhD thesis students and a number of research associates.

In addition to his research at Maryland, Koopman was a consulting scientist with the Maryland Institute of Technology, Inc., the Atlantic Research Corporation, and Versar, Inc. At Versar he was a co-discoverer of the laser guidance of electrical discharges in gases; this work led to his collaboration over the last five years with scientists at the US Naval Research Laboratory on high voltage, laser-guided sparks.

Koopman's work at Maryland in recent years has been concerned with momentum transfer and other dynamical aspects of rarefied plasma flow. These novel experiments involve laser-produced plasmas expanding into a stationary background plasma, studied by means of tunable lasers, holography and resonant scattering by ions.

Another program in which Koopman took great pride was the development of tunable coherent light sources in the vacuum ultraviolet. He and colleagues accomplished this in 1978 for the spectral region of hydrogen Lyman-alpha radiation—around 122 nanometers. Applications of this technique will make possible the measurement of hydrogen isotope concentrations in magnetically confined plasmas of the Tokamak type.

Those of us who have worked with David Koopman will remember him particularly for his high standards in scientific research, his persistence and patience with himself and others in solving even the most complex problems, and the good humor he brought to his scientific and personal relationships with us.

RITA MAHON
THOMAS D. WILKERSON
Institute for Physical Science and Technology
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Edward P. T. Tyndall

Edward P. T. Tyndall, former professor of physics at the University of Iowa, died in Long Beach, California, on 29 September. He was 86. Tyndall retired from his long-term teaching career at the University of Iowa in 1960.

Tyndall was born in Durban, South Africa, in 1893, of English parents. The family later moved to the Zulu Reservation high in the mountains north of Durban, where his father owned a trading post for the Zulu natives. When he was four years old the family returned to England for one year, then came to the US in 1898. Tyndall was educated in the Richmond, Va. public schools and received his AD degree from Richmond College in 1912. He taught in high schools in Virginia and North Carolina for the next three years.

Tyndall enrolled as a part-time gradu-