

# Princeton University

Honors Faculty Members  
Receiving Emeritus Status



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The biographical sketches were written by  
colleagues in the departments of those honored.

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# Ronald Crosby Davidson



Ronald Crosby Davidson was born July 3, 1941, in Norwich, Ontario. He grew up on a family dairy farm, where he was driving a tractor by age 11 and pitching in wherever needed to get the job done. Ron learned at an early age how the annual cycle of farm activities was made up of seasonal tasks, none of which could tolerate postponement. Many years later, as director of the Princeton Plasma Physics Laboratory (PPPL), Ron would be struck by similarities in meeting the seasonal responsibilities for the annual budget cycle of a large national laboratory. And his colleagues would be struck by Ron's early-riser habits, incredible energy, and his penchant for getting things done as early as weather would permit.

Had he not been the younger brother, Ron would have inherited and been expected to run the family farm. Instead, after his schooling in a one-room elementary school, he developed a passion for physics and mathematics and later became known for his monumental impact in the field of plasma physics, both through his extraordinarily prolific academic contributions and through his numerous appointments to influential positions in scientific administration.

After meeting his wife-to-be, Jean, in high school, and after earning a B.Sc. in physics from McMaster University in 1963, Ron received his Ph.D. in astrophysical sciences from Princeton in 1966. Twenty-five years later, after an exceptionally distinguished career at several institutions, in both academic and scientific administrative positions, he returned to Princeton in 1991 as professor of astrophysical sciences, and where, until 1996, he also served as director of PPPL.

As director of PPPL, Ron oversaw the spectacular achievements of the Tokamak Fusion Test Reactor (TFTR) during its D-T (deuterium-tritium) campaign. In December 1993, for the first time in the history of tokamak plasma devices, a reactor fuel mix of 50 percent deuterium and 50 percent tritium was used. Introducing this fuel mix into TFTR released about 6 million watts of fusion power. In November 1994, cap-

turing the further attention of the lay press, TFTR achieved 10.7 million watts of fusion power for one second, enough to power momentarily 2,000 to 3,000 homes.

In between his times at Princeton, Ron was an assistant research physicist at the University of California–Berkeley from 1966 to 1968, an assistant professor of physics at the University of Maryland from 1968 to 1971, an Alfred P. Sloan Foundation Fellow from 1970 to 1972, an associate professor of physics from 1971 to 1973, a professor of physics at the University of Maryland from 1973 to 1978, and a professor of physics at the Massachusetts Institute of Technology from 1978 to 1991, where he also served as director of the MIT Plasma Fusion Center from 1978 to 1988.

Concomitant with his careers in scientific administration, Ron has had an illustrious academic career. Ron trained numerous graduate students, including many who have gone on to careers in science themselves and who traveled large distances to attend the “Davidson Fest” in 2007. He made numerous fundamental theoretical contributions to several areas of pure and applied plasma physics, including nonneutral plasmas, nonlinear effects and anomalous transport, kinetic equilibrium and stability properties, intense charged particle beam propagation in high-energy accelerators, and coherent radiation generation by relativistic electrons. Ron is the author of more than 450 journal articles and several books. His 1972 book *Methods in Nonlinear Plasma Theory* served as a key early textbook in the area of plasma physics. He is known also for his advanced research monographs, including *Theory of Nonneutral Plasmas* (1974), *Physics of Nonneutral Plasmas* (1990), and, with Hong Qin, *Physics of Intense Charged Particle Beams in High-Energy Accelerators* (2001).

Ron is also known for his distinguished service to the country in many other capacities. He served from 1976 to 1978 as the assistant director for applied plasma physics in the Office of Fusion Energy of the Department of Energy (DOE). He was the first chair of the DOE Magnetic Fusion Advisory Committee from 1982 to 1986. He also was elected to chair of two divisions of the American Physical Society, the Division of Plasma Physics, and the Division of Physics of Beams. Ron is also known

for his long-term editorship of *Physics of Plasma*, the preeminent journal for fundamental plasma research.

Among his many recognitions and honors, in 1986 Ron received DOE's Distinguished Associate Award and the Fusion Power Associates Leadership Award, in 1993 the Kaul Foundation Award for Excellence, and in 2005 the IEEE Particle Accelerator Science and Technology Award. In 2008 he was awarded the James Clerk Maxwell Prize in Plasma Physics, the highest honor in plasma physics, by the American Physical Society. He also received DOE's Science Outstanding Mentor Award in 2009.

Ron's transfer to emeritus status, like everything else he does, happened earlier than his colleagues (who did not grow up on a farm) likely imagined. However, this change of status is by no means a retirement, for Ron remains as principal research scientist at PPPL, where he continues to lead groundbreaking research on several projects. We are thus heartened by the prospect of continuing to enjoy his friendship, wisdom, and professional camaraderie. Nonetheless, while wishing Ron the best in his continued research endeavors, we also wish him through this transfer to emeritus status perhaps also a little more time to enjoy life with Jean and his wonderful family.