

Vale Professor Robert Dewar: 1944-2024

In April 2024 Australia lost one of the pioneers in plasma physics. Em/Prof. Robert (Bob) Leith Dewar, FAA, FAPS, FAI was a giant in the field of theoretical plasma physics, with important contributions in Magnetohydrodynamics (MHD) and in dynamical systems.

Robert Leith Dewar was born on March 1, 1944 in Melbourne. He was the eldest of three children to Elizabeth (Betty) and Robert Alfred Dewar, an industrial chemist and inventor. Pursuing a passion for science, he completed a MSc thesis in 1967 at the University of Melbourne on "Particle-field interactions in a plasma" under the supervision of the late theoretical physicist Prof. Kenneth Hines. Bob was the first PhD student of renowned astrophysicist and pioneer of fusion energy Russell Kulsrud, completing a PhD from Princeton University in 1970 "Averaged Lagrangian methods and nearly periodic motions in plasmas."

Bob focused much of his career in the field of toroidal magnetic confinement fusion science, employed as a research fellow at the University of Maryland (1970-71), a staff scientist of the Princeton Plasma Physics Laboratory (1971-1973, 1977-1981), and an ANU academic (1974-1977) with a continuing position from 1982 and Emeritus Professor status from 2011.

In a career spanning 50 years he wrote several books and over 200 peer reviewed publications. His research interests spanned a wealth of topics: MHD equilibrium and stability, kinetic theory and wave-particle interaction, as well as the complex mathematical quest to find a well posed mathematical formulation and solution of stellarator fields. Some of these have made profound contributions in the field of toroidal magnetic confinement fusion energy, on topics such as the theory of ballooning modes in three-dimensional toroidal systems; wave-particle interaction, and saturation; MHD equilibrium and stability; Taylor relaxation and Hamiltonian maps. Further, several of these works have large citations in adjacent fields, such as solar and space physics and laser-plasma interaction theory.

Bob worked closely with computer simulation and with experimentalists and has made important contributions to magnetic fusion research and to astrophysics. Over the last two decades Bob had been instrumental in the development of a multiple region relaxed MHD model to describe general stellarator fields, and was presently working on a generalisation of such models to systems that preserve magnetic helicity with a weak ideal Ohm's law constraint.

Bob initiated several major collaborations across physics and mathematics, including the National Plasma Fusion Research Facility, the Australian Research Council Complex Open Systems Research Network, and led the ANU's plasma theory and modelling group until retirement in 2011. He was recognised for service to Australian society in physical sciences and engineering through a Centenary Medal in 2001. Perhaps most importantly, he has left a legacy in both research and teaching, spanning 5 postdocs, 16 PhD, and many Masters and Honours students. Many of these now hold prominent positions in the field.

In addition to science, Bob was an outdoor enthusiast, with a passion for bushwalking (especially with the Canberra Bushwalking Club and Brindabella Bushwalking Clubs) and

skiing. Bob had a deep and enquiring mind into all things and was simply a terrific person. Few of us were untouched by his graciousness.

At the time of his death, Bob was undertaking a 6-month sabbatical at the Isaac Newton Institute for Mathematical Sciences, where he was an active participant in the programme on Anti-Diffusive Dynamics, interacting with colleagues from a broad range of research areas. He had recently celebrated his 80th birthday in Cambridge together with his daughter Sophie and her family.

Bob was married to Margot Ellis Dewar (nee Taylor, d 2005) and Julie Anne Clegg (d 2020). He is survived by his daughter Sophie Dewar, his granddaughter Dara, his son-in-law Brendan, his sisters Jenny and Shona and their families, and his stepchildren Rachel and Rowan and their families. Bob will be deeply missed by friends and colleagues of the ANU and by the international scientific community.

Authors

Matthew Hole, Boyd Blackwell, Rod Boswell, Henry Gardner, Stuart Hudson, Amitava Bhattacharjee, Adelle Wright.