Frank Nabarro: World Renowned Materials Physicist

Nabarro receiving the Presidential Decoration, the Order of Mapungubwe in Silver from President Thabo Mbeki in 2005

Frank Nabarro, Emeritus Professor of Physics at the University of the Witwatersrand, passed away on 20 July 2006 at the age of 90, after a distinguished career in materials physics spanning almost seven decades. His impact on physics in South Africa and in particular the School of Physics at Wits was enormous, and he leaves behind a legacy that will long endure. Internationally he was best known for his pioneering contributions to the theory of crystal lattice dislocations, string-like defects in solids that limit their ultimate strength. He wielded a profound influence on the field through his monumental book "Theory of Crystal Dislocations", his extensive editing activities, and innumerable personal ties.

Nabarro grew up in the UK, and by the late 1930's had obtained degrees in mathematics and physics from Oxford University. Initially guided by Nobel Prize winner Neville Mott, he published the first ever calculations of the flexibility of dislocations, and how this influenced the permanent deformation that solids undergo when loaded. During the War years he worked for the British Army Operational Research Group, for which he was later awarded an MBE. After the War he resumed his academic career at Bristol University and later Birmingham University. During this period he wrote a number of seminal papers that are still today highly cited. His research output continued almost unabated throughout his life, and he rose to a position of unrivalled leadership in his field. He contributed key ideas to many topics, including creep (the phenomenon responsible e.g. for the sagging of the elevated section of the M1 in Johannesburg) and work hardening (pummeling a piece of

metal introduces so many dislocations they get tangled up and ironically can strengthen the metal). In recent years he turned his attention to creep resistant super-alloys used in the manufacture of jet engine turbine blades, and with de Villiers wrote an authoritative monograph on the subject.

In 1953 Nabarro moved to South Africa to take up the position of Head of the then Department of Physics at the University of the Witwatersrand. Within a few years he built up the department to significant strength in a number of areas. He served the University in various capacities, including a term as Deputy Vice Chancellor. During his tenure in that position he was responsible for drawing up the academic plan, the first for any South African University, that planned for the anticipated large influx of black students. He retired in 1984, but remained an active member of the University community, always generous with his time and wise counsel. Even as recently as two months ago he chaired a meeting that brought together interested parties in Gauteng to discuss the desirability of establishing a centre of excellence in biomaterials. He played an active role in the SA Institute of Physics, the Royal Society of SA and Academy of Science of SA.

Nabarro's energy and resilience were phenomenal and his intellectual vitality extraordinary. He never stopped being active in research, and there are still papers of his in the pipeline for publication. He was editing Volumes 13 and 14 of the definitive series of books "Dislocations in Solids" when he passed away. He travelled extensively, attending conferences and giving lectures wherever he went. Even as recently as May 2006 he visited China and India, and he was planning to attend the Materials Research Society meeting in Boston in November to receive a special edition of the journal Philosophical Magazine in his honour.

Nabarro was the recipient of numerous awards and honorary degrees. He was a Foreign Associate of the US Academy of Engineering, the only person on the African continent to be accorded that honor, and a fellow of the Royal Society of the UK, one of only two that there were in South Africa. His local stature was recognized recently with the award of the Presidential Decoration, the Order of Mapungubwe, in silver.

Frank Nabarro was not only an outstanding scientist, but also a well informed and cultured man. He shared a love of classical music with his wife Margaret, who for many years was the classical music critic of the Star. He was Honorary President of the Johannesburg Musical Society, and in memory of Margaret he established the Margaret Dalziel Nabarro Chamber Concert Fund.

He is survived by five children and a number of grandchildren.

(Submitted by Professor Arthur Every, Emeritus Professor, School of Physics, University of the Witwatersrand)