Microscopy Society of Southern Africa

Frank Reginald Nunes Nabarro 1916 -- 2006

One of South Africa's greatest scientists died in Johannesburg on 20 July 2006. A world-renowned physicist, he was one of the pioneers of solid- state physics, which underlies modern technology. Despite his age, he remained actively involved in research, both locally and internationally.

Frank Reginald Nunes Nabarro was born on 7 March 1916 in England. In 1935 he obtained a first-class honours degree in mathematics from New College, Oxford University, followed by a first in physics in 1937 and another in mathematics in 1938. At the University of Bristol his work under Professor N.F. Mott, a future Nobel Laureate in physics, earned him the Oxford degree of B.Sc. (then equivalent to an M.Sc.anywhere else). This was followed by an M.A. in 1945.

When World War II broke out he was involved in the aerial defence of London and then joined the Army Operational Research Group, headed by then Brigadier B.F.J. Schonland. His work on explosive effects of shells resulted in his being made a member of the Order of the British Empire.

From 1945 to 1949 Nabarro was a research fellow at the University of Bristol and then became a lecturer in metallurgy at the University of Birmingham, for which the university awarded him a D.Sc. in 1953. In this year he was invited to become professor of physics and head of the physics department at the University of the Witwatersrand, which needed to be strengthened and directed towards the physics of solids in order to co-operate more fruitfully with industry on the Witwatersrand. Nabarro built the physics department into one of the strongest in the country and made it a leader in metallurgical research. His own research centered on 'creep', or gradual metal failure under imposed stress, and crystal dislocations, which results in the deformation of metals.

Guided by the work of Zener, he was the first to propose that the contribution of grain boundaries to the flow stress was inversely proportional to the square root of the grain size. He predicted the existence and magnitude of diffusional creep and corrected Peierls's estimate of the stress required to move a dislocation through a perfect lattice. He furthermore showed how theoretical and experimental estimates of this stress could be reconciled. He later turned his attention to creep-resistant materials, in particular to the mechanism of rafting in superalloys, and more recently contributed to the theory of dislocation patterning.

During his period as Deputy Vice-Chancellor of the University of the Witwatersrand, his portfolio was described as "academic". This meant that he was responsible for academic staffing and planning, the organization of Senate business, and so on. The then Vice-Chancellor, Prof. D.J. du Plessis, was already planning, from 1978 onwards, the "transformation" of the university which would occur once the government allowed it to enroll students of all races. He set up three teams, to consider the academic implications, the finding of land to accommodate a large influx of students, and the financial aspects.

Professor Nabarro was responsible for the first team. He had to estimate how many new students the university could expect and when, how much accommodation they would need, and how this large number of students could move efficiently from one class to another.

This "Academic Plan" was the first to be drawn up by any South African university. Nabarro's team predicted that half of the university's student body would be "black" by the year 2000. This figure was already reached by 1997. They also realized that this influx of new students would suffer from poor education, with particular problems in mathematics, science and the use of the English language. With the aid of outside sponsors, they set up activities both within the university and in schools to help with these problems. Nabarro played a large part in coordinating these.

Frank Nabarro was one of five founding members of the SA Institute of Physics in 1955 who attended the jubilee celebration of the Institute last year. He was a Vice-President of the Institute and throughout his life he remained a loyal and enthusiastic supporter of its role in promoting Physics in South Africa.

He married Margaret Constance Dalziel (deceased 2 September 1997) on 25 June 1948. They had 3 sons and 2 daughters.

Professor Nabarro received the following awards:
MBE (1946) , Beilby Memorial Award (1950), FRS (1971), South Africa Medal of the South African Association for the Advancement of Science (1972), honorary Fellow of the Royal Society of South Africa (1973), De Beers Gold Medal, South African Institute of Physics (1980), Claude Harris Leon Foundation Award of Merit (1983), J F W Herschel Medal, Royal Society of South Africa (1988), Honorary Member, South African Institute of Physics (1991), CSIR Fellow, South Africa (1994), AIME R F Mehl Award (1995), Founder Member, Academy of Science of South Africa (1995), Foreign Associate, US National Academy of Engineering (1996), Institute of Materials Platinum Medal (1997), Honorary Member, Microscopy Society of Southern Africa (1998), Honorary President, Johannesburg Musical Society (1999), Order of Mapungubwe in Silver (2005).