

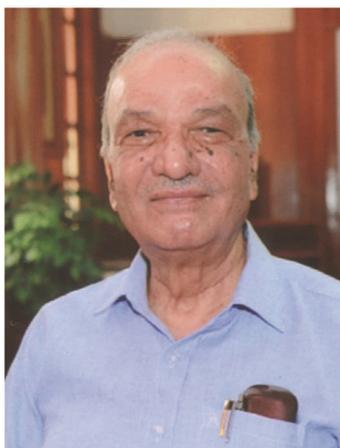
S. K. Joshi (1935–2020)

Professor Shri Krishna Joshi, who passed away on 15 May 2020, was a remarkable physicist, human being and leader of science in India. He was among the handful of scientists who started their professional life in the early years after independence, grew to prominence and became one of the leaders of science in India. Among them, he was notable for his special combination of professional and personal qualities. His demise leaves a void that is difficult to fill.

Joshi was born in Anarpa village, Champawat district of the Kumaon region, Uttarakhand on 6 June in 1935. He went to school there, walking many miles every day in the mountainous Himalayan terrain. The hardihood, energy and love for walking were lifelong gifts. His desire for higher education took him to Allahabad, where he did his B Sc and M Sc (in physics) at the Allahabad University, both with distinction. He started his career as a Lecturer in Physics at Allahabad University in 1957 immediately after his M Sc. He worked for his Ph D (awarded in 1962) with K. Banerjee, a pioneering crystallographer (his early work on direct methods in X-ray crystallography is still remembered internationally, 87 years after the proposal). He did experiments on diffuse X-ray scattering from organic crystals. His Ph D thesis was entitled 'Study of diffuse scattering of X-rays'.

Joshi, essentially a self-taught and extremely hard working scientist, struck out on his own even as a Ph D student. He started publishing papers on phonons in solids, particularly metals, both by himself and with other young colleagues and students. I counted about 50 papers starting from 1960 in this prolific period which lasted till 1965. Among other things, he developed novel force constant models for phonons. His subsequent two-year stint as a Visiting Lecturer at the University of California, Riverside, CA, USA, was transformative. Graduate students there recalled with amazement an excellent course of lectures on classical mechanics delivered by him entirely without notes. He also co-authored a well-known review on *Lattice Dynamics in Metals*, where his contribution was largely on force constant models. He came in direct contact with new methods in physics, new areas of research and reinvigorated himself.

In 1967, Joshi was offered the Professorship of Physics at Roorkee University (the earlier avatar of IIT Roorkee). He built up the place from a service department of what was still in essence the more than a century old Thomason College of Civil Engineering with a noticeable colonial hangover, to an active research and teaching department of quality. This he did through consistent hard work (he regularly spent more than



14 hours a day in the department) and by initiating work in areas unheard of in India then as research fields in physics, e.g. disordered systems and alloys, and strong correlations. He mentored a generation of dedicated students who transmitted his attitude to learning. He attracted good faculty to this obscure place. He did all this in a provincial university with constraints and practices which would have embittered and floored most of us. Amazingly, among people who grew up in the same academic milieu as him, he was non-hierarchical, broke away and explored new things (not recycled versions of the Ph D experience). His former students of that period (he had about 20 of them while at Roorkee during 1967–1986) recount how he sensed the coming of computational science and pushed people towards it in an era which seems antediluvian now. He was quite aware of his difficulties in mastering even FORTRAN, and in using the primitive behemoth which was the only computer Roorkee could afford then. He wanted his students not to be hobbled by such things. He would ask for and listen to long expositions from research scholars on their work, not as a 'boss' but as a fel-

low learner, and ask questions. He tried, and fairly successfully, to inculcate a research culture among colleagues who were already comfortably ensconced in the department. He transformed the M Sc education there, from one emphasizing memorization to one which gave weight to solving problems. All this appears trite, but it is amazing that so much was accomplished within that subsystem; his passion and compassion contributed crucially. His non-hierarchical attitude was refreshing; a friend recalled that when he and Joshi were to present their work at a conference, he insisted that the friend should do it, and get the credit for it. Another friend told me about the following exchange: A professor of the University: 'Professor Joshi, you have done research and got a Ph D. Why are you spending so much time in the department?'. Joshi: 'My student friends are doing much harder work. I want to know more about modern solid state physics from their novel work.'

Joshi's strong commitment, his emerging professional prominence, and his unique personal qualities meant that he was increasingly in demand for science administration-related activities, in Delhi and elsewhere. Roorkee is less than 180 km from Delhi, but it was not an easy ride then. The rickety bus started at 5.30 am, and you could get back the same evening if you were tough enough. He not only did that often, but also discussed physics with a fresh mind after returning from Delhi. In 1986 began the more publicly visible phase of his career, starting with the Directorship of the National Physical Laboratory (NPL), New Delhi. He doggedly attempted to steer the NPL from an insular research centric place to one which was meant to be a standards institution, which did economically fruitful work, but which nevertheless had legitimate room for those odd beings who ploughed their lonely furrows.

He became the Director General of Council of the Scientific and Industrial Research (CSIR) in 1991, at a critical juncture in our history. Economic liberalization had begun three months before he took charge; it seemed inevitable given the precarious financial situation of the country in the global village. The CSIR was no longer protected from the winds of change. In spite of its size (40

laboratories), large inhomogeneity in professional quality, and insular background, it had to become coherent, compete in the open, serve as a friendly source of innovation for the industry, as well as market its science and technology base. This had to be done fast, in a climate of small and perhaps shrinking budgets. He met these challenges. He constituted an active and powerful Advisory Committee which met frequently and helped bring cohesion and innovation to this large structure. He had a working plan devised for the CSIR as a whole, and for the constituent laboratories, to reinvent themselves to be relevant and strong in the new environment. His clear-eyed sense, his genuine ability to listen and to take colleagues along, his calm, gentle but firm and nonabrasive temperament were all valuable. He also was one of the two or three formal representatives of Indian Science in the world. In the latter capacity, he was an active participant in the support of science through the Commonwealth Science Council; he was its President from 1992 to 1995.

Joshi's address after 1995 was the National Physical Laboratory (Room 252 in NPL, New Delhi would find him); here he continued to do his physics. He held various academic positions and was involved in steering many institutions. For example, from 1997 to 2000 he was the Chair of the Recruitment and Assessment Board of DRDO, a gigantic collection of laboratories. From 2015 till his illness

made it impossible a few months ago, he actively chaired the National Accreditation Board of Testing and Calibration Laboratories, clearly related to one of the primary mandates of the NPL. These years were marked by his selfless contribution to the growth and well being of science in India through chairmanship or membership of innumerable 'Joshi committees'. He was in them, not because he was an innocuous and vacuous 'item', but because he was a non-judgemental, likeable person who listened to diverse points of view; but whose academic and personal integrity as well as knowledge of ground-level realities was unquestionable and who steered them clearly and quietly in a professionally appropriate direction. This is a quiet and long lasting contribution to institution building.

The scientific community of the country recognized his eminence in many ways. He was awarded the Bhatnagar Prize for Physical Sciences quite early, in 1972. He was a Fellow of all the three national academies of science, and was President of two. He was also internationally recognized; as an Honorary Fellow of the Russian Academy of Sciences, and a Fellow of the Third World Academy of Sciences.

Professor Joshi was, quite unusually for a person in any walk of life, both a personal and professional example. His personal qualities of genuine goodness that cannot be faked; his smiling demeanour and extremely intelligent actions

and reactions which came out of the often tentative-sounding, non-assertive but clear-headed and insightful personality, were an ideal for many. He was open and collegial. He listened to others. He had deeply held personal values, but did not judge people on that basis. He was gentle and not abrasive or assertive. Among his greatest strengths were his simplicity and humility. A child of the Himalayas, he was deeply religious and spiritual. He did not wear this on his sleeve, nor did he let it affect his professional practices.

Professionally, Professor Joshi was constantly growing. One of the last times I heard him was when he gave a talk in 2012 on the then recent discovery of the Higgs boson. He talked about it well and happily; he knew that the discovery was momentous, though it was far afield for many physicists like him and me. A friend told me about how, last year, he gave a long and contentful lecture on Meghnad Saha, an icon of Indian science, whose birth centenary was being celebrated.

It is our good fortune as a scientific community that such a leader was present at this time in our history.

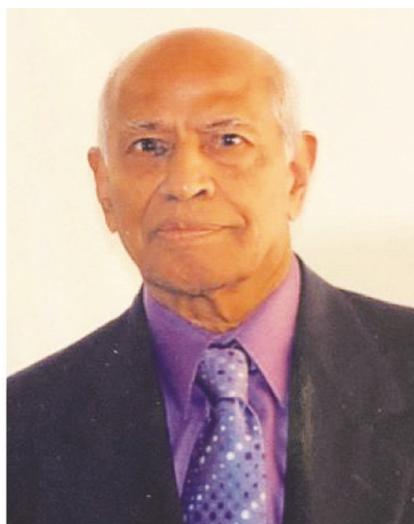
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Melkote K. Ramaswamy (1931–2020)

Melkote Krishnarao Ramaswamy passed away on 1 January 2020 peacefully at his home in Westerville, Ohio (USA). He was born on 4 January 1931 in Bengaluru, India into a large and loving family (he was the 4th eldest of 11 siblings). His formal education included a B Sc degree in Physics from Bangalore University, an MS in Physics from University of Arkansas, and a Ph D in Nuclear Physics from Johns Hopkins University. He then spent time as a post-doctoral fellow at Ohio State University.

Ramaswamy started his research career at Karnatak University, Dharwad as a Reader in Nuclear Physics. He then went to Ohio State University. In 1964–65 he was a Visiting Associate Professor



and Visiting Scientist in the American Institute of Physics. Between 1966 and 1972 he was an Associate Professor of Physics at the Fordham University in New York. He was then lured back to India to take up a Professorship at the Birla Institute of Technology and Science in Pilani from 1972 to 1977. He served as Warden of the Malaviya Bhavan hostel during this time. The move to Pilani proved to be very influential on his entire family, especially for his sons who were able to spend formative years in India. Since he kept his green card active through visiting professorships at Duke and Vanderbilt during this time, he was able to leave academia and return to the US in 1977.