Physical Research
Laboratory
Ahmedabad
India

VIKRAM AMBALAL SARABHAI PROFESSORSHIP

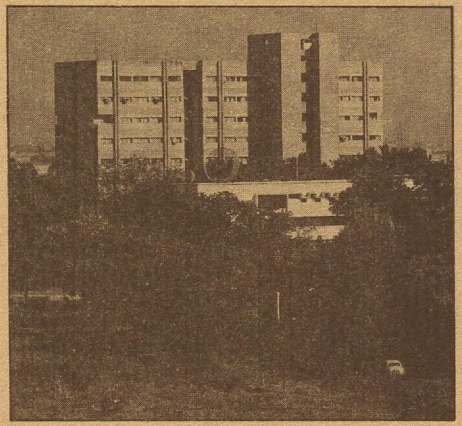
"In implementing change, we need to apply ourselves to people before we can apply ourselves to problems".

Dr. Vikram A. Sarabhai

Vikram A. Sarabhai Professorship

The Physical Research Laboratory (PRL) Ahmedabad was founded in 1947 by Dr. Vikram A. Sarabhai who retained his abiding interest in its activities to the end of his days. Dr. Sarabhai not only had outstanding organizational and managerial capability, but was deeply interested in scientific research. Under his tutelage, the Laboratory blossomed into a major national laboratory for space and earth sciences. PRL research today is deeply concerned with unearthing the mysteries of the earth and surrounding space, true to its insignia which represents the earth and the Sun immersed in a field of radiations that reach out to infinity.

The Vikram Sarabhai Professorship was instituted in 1977 to stimulate further research activity in space and earth sciences and to continuously generate winds of change in the scientific environment. The institution of this professorship was made possible mainly through the funds provided by the Sarabhai Foundation, Karmakshetra Charity Trust (No.2) and the Kasturbhai Lalbhai Charity Trust. This scheme/grant provides for inviting distinguished physicists to spend some time at PRL in delivering lectures, participating in research programmes, visiting other academic institutions in India and attending national scientific meetings.



Vikram Sarabhai Memorial Lectures

It is intended that the visit of VAS professors should not only provide stimulus to the programmes at the Physical Research Laboratory, but should also be beneficial to scientists all over India. The Physical Research Laboratory has hence started a Vikram Sarabhai Memorial lecture series for wider dissemination of the lectures given by the VAS professors at PRL among the Indian scientists.

Recipients of VAS Professorship

Professor J.E. Blamont Service D'Aeronomie due CNRS Paris, France	1977
Professor Tom Gehrels University of Arizona Tucson, USA	1978
Professor Arthur C. Clarke University of Moratuwa Sri Lanka	1979
Academician V.L. Ginzburg P.N. Lebedev Physical Institute of the Academy of Sciences of the USSR Moscow, USSR	1980
Professor M.K. Vainu Bappu Indian Institute of Astrophysics Bangalore, India	1981
Professor S. Chandrasekhar University of Chicago Chicago, USA	1981

Vikram Sarabhai—The Scientist

Vikram Sarabhai was born on August 12, 1919 at Ahmedabad in a family of wealthy industrialists and social workers. His early education was at a private school in Retreat organized by his parents. His scientific curiosity and creative practical talent were nurtured in this school. After passing his I.Sc. with distinction from the Gujarat College he proceeded to Cambridge, England, where he joined St. John's College and obtained Tripos in 1939. With the beginning of the second world war he returned to India. His love for physics, which was early formed and remained as intense as ever throughout his life, led him to the Indian Institute of Science, Bangalore, to work with Professor C.V. Raman. Dr. Homi Bhabha was also there at that time working on theories of mesons and cosmic ray physics. At the suggestion of Professor C.V. Raman, Sarabhai began work on cosmic ray intensity variations which later led him directly into studies of interplanetary space, solar-terrestrial relationships and geomagnetism. His first scientific contribution on "Time Distribution of Cosmic Rays" was published in 1942. In 1945, he returned to Cambridge University to continue investigations on cosmic rays and obtained a Ph.D degree in 1947 with a thesis on "Cosmic Ray Investigations in Tropical Latitudes". During this period he also carried out an accurate measurement of the cross-section for the photofission of 238-U by 6.2 meV γ-rays obtained from 19F(p,γ) reaction. This work also formed a part of his Ph.D thesis.

Dr. Sarabhai's original laboratory in "RETREAT", Shahibaug, Ahmedabad (1947)

Dr. Sarabhai at work in his laboratory

Soon after Dr. Sarabhai returned from Cambridge, he established the Physical Research Laboratory at Ahmedabad. Prof. K.R. Ramanathan joined as the first Director of the Laboratory in 1948, and work began with half a dozen research students and assistants in a few rooms of the M.G. Science Institute. Soon they built up a large devoted group of research scholars, many of whom have now become leaders in their own fields of research. Sarabhai remained associated with this Laboratory throughout his life inspite of his many and varied responsibilities, first as a Professor of Cosmic Rays, and then as Director during 1965-1971.

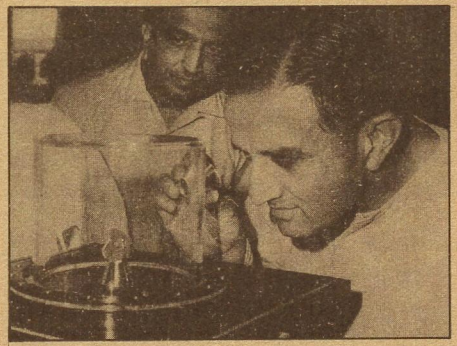
The Physical Research Laboratory set up a research station at Gulmarg in Kashmir in 1955 for measurements of cosmic ray intensities as well as atmospheric ozone and night airglow. The successful working of this station and the important scientific results obtained there encouraged the Department of Atomic Energy to set up a full-fledged High Altitude Research Laboratory at Gulmarg in 1963, thus fulfilling one of Dr. Sarabhai's long cherished plans.

At the Physical Research Laboratory (PRL), Dr. Sarabhai soon began a series of extensive studies on cosmic ray time variations. He and his students set up meson telescopes for measuring vertical intensities, and later constructed arrays of counters which formed telescopes looking east and west at 45° to the zenith. One of the first results was the clear establishment of a diurnal component of cosmic ray time variations of non-terestrial origin.

Dr. Sarabhai realised very early that such earth-based studies of cosmic ray time variations of extra-terrestrial origin would open up a new window on outer space. He therefore pursued these studies with great patience, energy and enthusiasm. He set up outstations of PRL at Kodaikanal, Trivandrum and Gulmarg to continue these investigations and also strove continuously to increase and extend the accuracy of observations by setting up super-neutron monitors and large area scintillation telescopes to improve the statistics. For many years this chain of cosmic ray stations generated valuable data. At a meeting of the Special Committee for the International Geophysical Year held at Brussels in 1953, Dr. Sarabhai presented a proposal for a world-wide study of variations of cosmic ray intensity. The proposal was accepted and PRL became an important centre participating in global cosmic ray studies and during the first International Geophysical Year (1957-58) was an important part of a global network.

A semidiurnal component in cosmic ray time variations was also soon established, although its presence remained somewhat more controversial till the super-neutron monitors became available. His efforts to provide a theoretical understanding of the origin of the semidiurnal component of the cosmic rays led to postulating and estimating gradients of cosmic ray intensity perpendicular to the plane of the ecliptic long before this could be confirmed by space-borne equipment.

A very large meson detection system was set up at a high altitude laboratory at Chacaltaya,



Examining a sample of the moon rock.

At Thumba Rocket Launching Centre, Trivandrum.

Bolivia by a group from MIT, U.S.A., and some Japanese workers. Sarabhai quickly seized this opportunity and sent a graduate student there to record and study short-period variations of 1-30 cycles per hour with great accuracy. This led to the discovery of micro-pulsations in cosmic ray intensity at the same frequencies as observed in magnetosphere and interplanetary space by satellites. A complete correspondence in spectral changes in interplanetary space, magnetosphere and in cosmic rays on earth could thus be established.

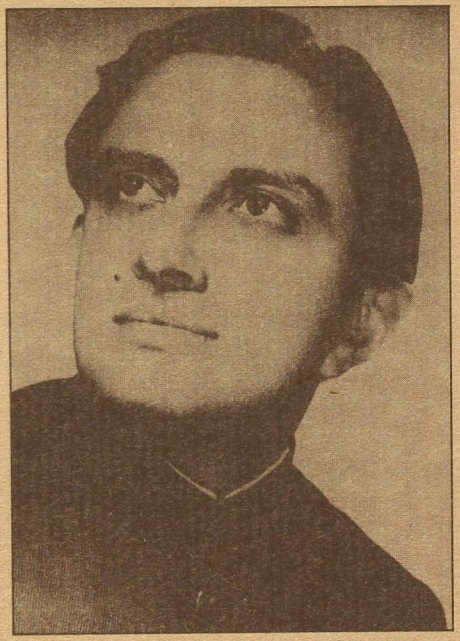
In the last few years Dr. Sarabhai got interested in fluctuations of the geomagnetic field and their origins. Sarabhai and co-workers studied the geomagnetic data from Trivandrum, Alibag, Honolulu and Guam for identifying the origin of geomagnetic variations. They were able to establish that a sizeable part of the geomagnetic field variations must originate in the current systems at the magneto-pause, as well as in the currents in the tail of the magnetosphere. It was also shown that such variations are well correlated with the kinetic energy density of the interplanetary plasma and the variance of the component of the interplanetary magnetic field perpendicular to the plane of the ecliptic.

Dr. Sarabhai's scientific contributions can be summarised by a favourite phrase of his : "If only one listens to the music in the (apparent) noise, the work becomes very rewarding indeed". He had the skill, the bold imagination, and a great originality of mind which characterised all his scientific work.

Vikram Sarabhai— The Visionary

Dr. Sarabhai was never an ivory-tower scientist. For nearly two decades, he actively guided the activities of the industries of the Sarabhai family. He also led the Indian delegation to the Productivity Congress held in Japan in 1956. To modernise the textile industry he persuaded the textile industrialists of Ahmedabad to set up, with support from the Council of Scientific and Industrial Research — an institute for Textile research. Thus, ATIRA — the Ahmedabad Textile Industry's Research Association — was born. Later he founded yet another organisation, the Indian Institute of Management, at Ahmedabad. He was the first Honorary Director of both these organisations. Dr. Sarabhai was also deeply interested in edūcation and started a group for the improvement of science education at PRL. The activity, which initially started in a room at PRL, grew to become the Community Science Centre at the Gujarat University Campus. The Centre was established in 1966 as an institution devoted to fostering scientific understanding and a spirit of enquiry amongst students, teachers, and laymen. The centre was set up under the auspices of the Nehru Foundation for Development which he established in 1965 to promote basic study and thinking on current problems of development.

By early sixties the use of satellites for exploring Earth's environment had become well established. It was also clear that in future, satellite technology would play an important role in identifying



With Prime Minsiter Indira Gandhi at Bhabha Atomic Research Centre, Bombay. The nuclear reactor is in the background.

and developing Earth's resources as well as in communication, education, agriculture, meteorology and defence. This awareness led to the creation of an Indian National Committee for Space Research (later renamed Indian Space Research Organisation) in the Department of Atomic Energy. Dr. Sarabhai, as the Chairman of this committee, immediately began directing his efforts and energies to the development of space science and technology in India. A rocket launching station at Thumba, very close to the magnetic equator, was estabished and was recognised by the United Nations as an International Equatorial Research Facility. Later, a Space Science and Technology Centre renamed after him as Vikram Sarabhai Space Centre was also established at Thumba where a large number of young Indian scientists and technologists had laid the foundations of a new space era for India. Like a magician creating flowers by rubbing hands, Dr. Sarabhai could and did set up a large number of different organisations. Another rocket range at Sriharikota near Madras on east coast, the Space Application Centre at Ahmedabad, which carried out the pioneering Satellite Instruction Television Experiment etc. are among the many units functioning under ISRO in different fields of space research, and bear witness to his abilities and vision.

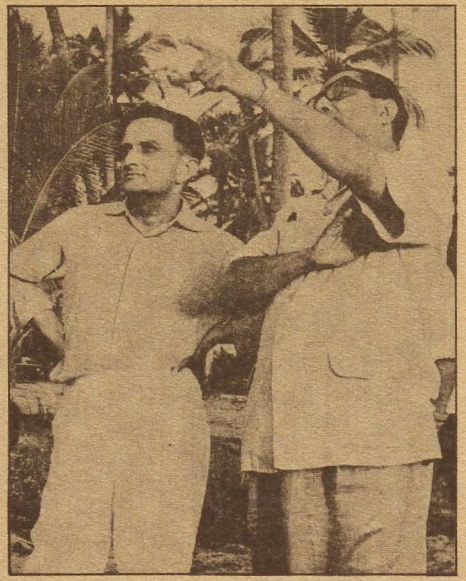
The sudden and tragic death of Prof. Homi Bhabha in 1966 brought additional responsibilities to Dr. Sarabhai. He was made Chairman of the Atomic Energy Commission and was entrusted with the task of carrying forward the scientific and technological revolution in the field of nuclear energy set in motion by Prof. Bhabha. Dr. Sarabhai's major

contributions to the nuclear energy programmes were introduction of modern concepts of management and operations research, and planning of large nuclear powered agro-industrial complex in the country.

With Jawaharlal Nehru and Homi Bhabha, Vikram Sarabhai was also keenly aware of the pivotal role that modern science and technology would play in shaping the future of India, and its "tryst with destiny" of which Nehru so eloquently spoke. "If a farmer of Kutch were to use atomic energy to raise his crops, would not that make him a new person?" - he would say. He worked tirelessly, sixteen to eighteen hours a day, rarely taking a day off from his strenuous schedule — to harness these new forces in the services of his nation. He was chairman of the Electronics Committee which produced an ambitious integrated plan for the development of the electronics industry. In the last years he produced a bold plan for the development of atomic energy and space research through the decade 1970-80, which encompassed not only nuclear power, materials, technology, heavy industries, agriculture and health, but also use of satellites for meteorology, communication, television education and social and rural development. He was always ready to learn the most advanced and novel technologies from all over the world, and try to grow them in India, as can be seen from his support of the remote sensing research programmes under ISRO.

Many honours came to Dr. Sarabhai. He was awarded the Bhatnagar Memorial award for Physics in 1962, Padma Bhushan

With Jawaharlal Nehru.



With Dr. Homi J. Bhabha

in 1966 and posthumously Padma Vibhushan. He presided over the Physics Section of the Indian Science Congress in 1961-62. He was elected Vice-President and Chairman of the UN Conference on Peaceful Uses of Outer Space in 1968, and he also presided over the Fourteenth General Conference of the International Atomic Energy Agency in 1970. He was deeply concerned with the peaceful uses of atomic energy and space research, and the immense benefits these technologies could bring to the developing nations. He was a member of the Pugwash Continuing Committee, and regularly attended the Pugwash Conferences.

Dr. Sarabhai married Mrinalini Swaminathan, a noted and charming dancer in 1942 and had a son Kartikeya and a daughter, Mallika.

Professor Bruno Rossi from MIT, Boston, while paying tribute to Dr. Sarabhai, said

"The stature of Vikram Sarabhai as a scientist depends not so much on any specific achievement as on the unique character of his scientific personality. For him scientific research was an act of love towards nature. He had an almost uncanny capability to absorb and store in his mind a vast amount of experimental and theoretical data. Having done that, and guided by what I am tempted to call an artistic intuition, he would then proceed to arrange these data into a self-consistent picture, bringing out hidden regularities and relationships; a picture which through the years, would progressively evolve and become more precise.

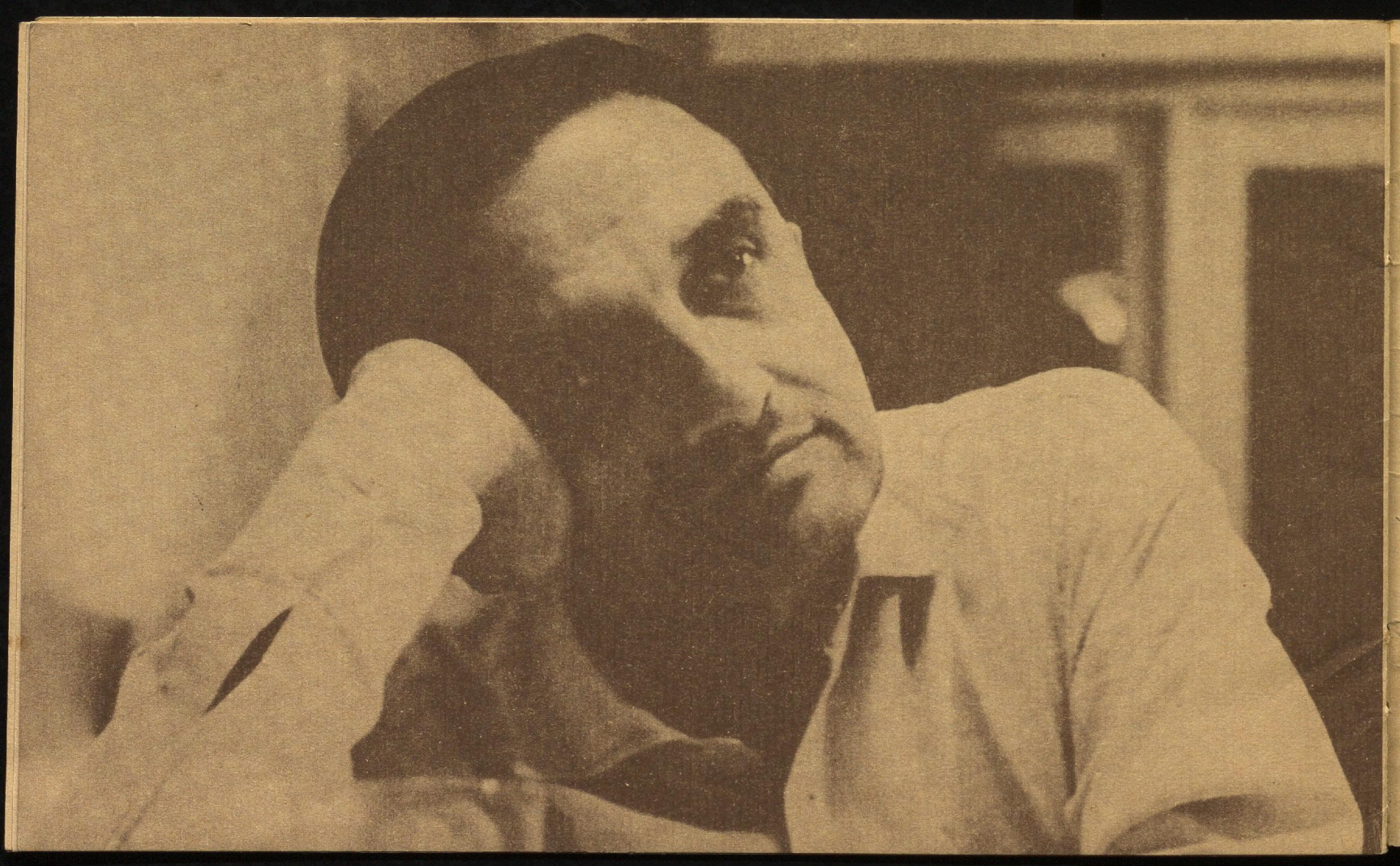
This is why his inspiring influence was so widely and so strongly felt. This is why his death dealt such a hard blow not only to the personal feelings of his fellow scientists, but to science itself".

"Vikram Ambalal Sarabhai would have been an extraordinary person in any stage in any part of the world. An imaginative and a creative scientist, a connoisseur of arts, a creator of organisations, a planner of decades with a vast range of interests and erudition, a visionary and a dreamer with infinite capacity for hard work —he was all that, and yet he was a humble and an intensely humane person who charmed and won the hearts of all who knew him."

— Professor S.P. Pandya

"It is difficult to meet a person who was more courteous, more polite, more kind, more modest, more simple than Vikram, inspite of the greatness that he achieved in the short span of life given to him. There is no question that he created for himself a unique position at the time of his death. He was indeed the colossus in Indian Science, providing the main springs of confidence that with science and technology we can transform the life in this country and its people."

— Professor M.G.K. Menon



"Countries have to provide facilities for its nationals to do front rank research within the resources that are available. It is equally necessary having produced the men who can do research, to organize task-oriented projects for the nation's practical problems."

Dr. Vikram A. Sarabhai
Imaginative scientist and creator of PRL and many other national institutions.

A view of PRL

"It is necessary in creative work to be able to see squirrels and birds."

Dr. Vikram A. Sarabhai

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