A BRNS Theme Meeting on role of Science and Technology in National Development was held at the Homi Bhabha Auditorium at the Tata Institute of Fundamental Research (TIFR) in Mumbai on 11 November 2017.

The Theme Meeting was organised jointly by National Centre for Science Communicators, Nehru Science Centre, Materials Research Society of India, Mumbai Chapter Indian Physics Association, Board of Research in Nuclear Sciences (BRNS) and Tata Institute of Fundamental Research as a tribute to the contribution to Science and Technology by Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India.

The topics for the Theme Meeting were Neutron Scattering for Studying Structure of Matter, High Pressure Physics, National Security, Nuclear Diplomacy, Rural Technology, Education, Science-Industry Synergy (Transportation Research and Development), National Knowledge Network and Nuclear Energy Power and Non-Power.

Dr. B.A. Dasannacharya, former Director, Solid State and Spectroscopy Group of Bhabha Atomic Research Centre (BARC) presented Dr. Chidambaram’s contribution to neutron crystallography and its recognition by the International Union of Crystallography by honouring him as the Vice-President.

He described the pioneering work of Dr. Chidambaram in building the Nuclear Magnetic Resonance equipment and the classic research done on hydrogen...
bond and the bent hydrogen model.

Dr. Raja Ramanna spotted Chidambaram’s talents and brought him to BARC where he started work on neutron scattering. He built a sophisticated instrument to rotate the crystal along three chosen axes and rotate the detector also along one of these. Dr. Chidambaram started with simple molecules and proceeded to increase the quality of the instrument and tackle more complex molecules.

Dr. S.K. Sikka, former Director of Atomic and Condensed Matter Physics Group at BARC, was Dr. Chidambaram’s first PhD student. He described the role of high pressure physics for national security and energy security as envisaged by Dr. Chidambaram. After developing the nuclear fuel cycle for energy security, six nuclear tests were conducted for national security.

He recollected the calculations of Dr. Chidambaram providing the shock equations of state of different materials in the implosion device. State-of-the-art computer codes for design, simulation and yield estimates of nuclear explosives were also advanced. Dr. Chidambaram led the team to investigations of phase transformations in titanium, zirconium and hafnium on alloying or under pressure which are vital to the Indian heavy water reactor regime.

Mr. Kiran Doshi, Former Ambassador of India to Austria, said the objective of nuclear diplomacy is to prevent other countries from acquiring the bomb. India refused to join the NPT. After India tested a nuclear device in 1974, the nuclear haves made every effort to make India sign up. Dr. Chidambaram withstood such pressures with disarming grace playing a balancing role as IAEA Leader and protecting national interests.

Dr. Anil Joshi of Himalayan Environmental Studies and Conservation Organisation focused on Dr. Chidambaram’s contribution to promoting technological accessibility in rural and remote areas and referred to him as the “hero of the mountains” and a “rural crusader”. He lauded Dr. Chidambaram’s initiative that enabled Central Food Technological Research Institute to work in Jammu & Kashmir and the North Eastern states. Temples and shrines like Vaishno Devi, Kedarnath and Badrinath were persuaded to make sweets from local millets thus empowering local farmers. Another vital area that received support from him was the management of forest fires. Villagers were trained in litter control and small tanks of water conserved via environmental isotope technology were created to keep moisture high and to prevent ignition of surface fires.

Dr. S.M Chitre, Distinguished Professor, Centre for Excellence in Basic Sciences, University of Mumbai pointed out the contributions made by Dr. Chidambaram in improving the quality of higher education. Citing the example of the Centre for Excellence in Basic Sciences launched by Dr. Chidambaram, he said it is inclusive and targeted students from non-urban and rural areas from economically challenged families. The national programmes in nuclear energy, space exploration, oceanography and life sciences need highly trained and motivated human resource and it was Dr. Chidambaram’s foresight that brought about a paradigm shift in higher education by networking institutions of higher learning.

Shri Neeraj Sinha, Scientist/ Adviser, Office of the Principal Dr. Sekhar Basu, Chairman, Atomic Energy Commission gave a detailed account of the national nuclear programme beginning with the first stage of setting up of the Pressurised Heavy Water Reactors and associated fuel cycle facilities.
Mr. Prabhakar S. Dhekne shared the experience of using distributed computing on ND Systems. The establishment of ANUNET and DAE-VIE annual meetings to network DAE IT people and users was Dr. Chidambaram’s idea. Dr. Chidambaram fostered in-house development of supercomputing.

Scientific Adviser to the Government of India, in his talk focused on Dr. R. Chidambaram’s current role as the Principal Scientific Adviser to the Government of India. Dr. Chidambaram endeavors to bring in synergy amongst the various scientific departments and other ministries in creating an enabling Science and Technology (S&T) ecosystem that encourages innovations across disciplines.

A major initiative of Dr. Chidambaram was to galvanize academia industry interaction in the sectors of automotive, machine-tools and electronics-hardware. Energetic thrust was given to develop the Advanced Ultra Supercritical (AUSC) technology for power generation through indigenous efforts.

Another brainchild of Dr. R. Chidambaram was the idea of doing small research and development activities, called pre-project R&D activities to address technological gap areas in identified technology areas where a small grant could make a big difference.

Mr. Prabhakar S. Dhekne, Scientific Consultant to the Principal Scientific Advisor to the Government of India, focused on Dr. Chidambaram’s role in Electronics, Computers and Communication Technology with emphasis on indigenisation, self-reliance and competitive research and development using cutting edge technologies.

He shared the experience of using distributed computing on ND Systems. The establishment of ANUNET (DAE wide satellite based network) and DAE-VIE (Vision for Information Exchange) annual meetings to network DAE IT people and users was Dr. Chidambaram’s idea. Dr. Chidambaram fostered in-house development of supercomputing. ANUPAM was the first supercomputer developed under his initiative and the latest version is ANUPAM-Aganya with high sustained processing power. He set up the Cyber Security Committee.

Dr. Chidambaram concentrated his attention on e-infrastructure projects and created the National Knowledge Network (NKN) connecting as many as 1650 institutes in the country along with international connectivity. NKN-enabled technology delivery model to rural areas was also conceptualised by him.

Dr. Chidambaram’s initiative created the Centre of Excellence in Nano-electronics with focus on the design, fabrication and characterisation of traditional and novel material based devices. He also gave a great fillip to Big Data Technology to develop disciplines of Climate science, Astrophysics and Bioscience.

Dr. Sekhar Basu, Chairman, Atomic Energy Commission gave a detailed account of the national nuclear programme beginning with the first stage of setting up of the Pressurised Heavy Water Reactors and associated fuel cycle facilities. These reactors will have an average capacity of 2.5 to 3 GWe per year for the next fifteen to twenty years. He announced the construction of ten PHWRs and two PWRs with an annual budget of Rs. 3,000 crores. Presently twenty two reactors are in operation and twenty one reactors are under construction which will take the nuclear capacity to 22,000 MWe by 2,030.

The second programme covers the exploration, mining and milling of Uranium and other metals. Established uranium reserve is 2,70,000 tonnes and an action plan has been drawn for increasing it to 7,50,000 tonnes in the next fifteen years. Uranium production will be increased from 500 to 5,000 tonnes.

The third programme is the second stage of the Indian Nuclear Power Programme. This includes the ten-fold rise in power from Fast Breeder Reactors and the creation of matching fuel cycle facilities in the back end. Fast Reactors Fuel Cycle Facility is being constructed. Three thermal reactors reprocessing plants are in operation and one large plant is under construction. Dr. Basu recalled the professional mentorship of Dr. Chidambaram.