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**INFORMATION ABOUT TATA INSTITUTE OF FUNDAMENTAL RESEARCH (TIFR)**

***Introduction:-Tata Institute of Fundamental Research***

***TIFR is a National Centre of the Government of India, under the umbrella of the Department of Atomic Energy, as well as a deemed University awarding degrees for master's and doctoral programs. The Institute was founded in 1945 with support from the Sir Dorabji Tata Trust under the vision of Dr. Homi Bhabha. TIFR, carry out basic research in physics, chemistry, biology, mathematics, computer science and science education. Their main campus is located in Mumbai, with centres at Pune, Bengaluru and Hyderabad. [1]***

**Reference:- TATA INSTITUTE OF FUNDAMENTAL RESEARCH**

**www.tifr.res.in**

**History :-**

**In 1944, Homi J. Bhabha, known for his role in the development of the Indian atomic energy programme, wrote to the Sir Dorabji Tata Trust requesting financial assistance to set up a scientific research institute.With support from J.R.D. Tata, then chairman of the Tata Group, TIFR was founded on 1 June 1945, and Homi Bhabha was appointed its first director. The institute initially operated within the campus of the Indian Institute of Science, Bangalore before relocating to Mumbai later that year. TIFR's new campus in Colaba was designed by Chicago-based architect Helmuth Bartsch and was inaugurated by Prime Minister Jawaharlal Nehru on 15 January 1962.**

**Shortly after Indian Independence, in 1949, the Council of Scientific and Industrial Research (CSIR) designated TIFR to be the centre for all large-scale projects in nuclear research. The first theoretical physics group was set up by Bhabha's students B.M. Udgaonkar and K.S. Singhvi. In December 1950, Bhabha organised an international conference at TIFR on elementary particle physics. Several world-renowned scientists attended the conference, including Rudolf Peierls, Léon Rosenfeld, William Fowler as well as Meghnad Saha, Vikram Sarabhai and others providing expertise from India. In the 1950s, TIFR gained prominence in the field of cosmic ray physics, with the setting up of research facilities in Ooty and in the Kolar gold mine. In 1957, India's first digital computer, TIFRAC was built in TIFR. Acting on the suggestions of British physiologist Archibald Hill, Bhabha invited Obaid Siddiqi to set up a research group in molecular biology. This ultimately resulted in the establishment of the National Centre for Biological Sciences (NCBS), Bangalore twenty years later. In 1970, TIFR started research in radio astronomy with the setting up of the Ooty Radio Telescope.**

*Reference:-https://en. Wikipedia’org/wiki/TATA INSTITUTE OF FUNDAMENTAL RESEARCH*

**1.1 TATA INSTITUTE OF FUNDAMENTAL RESEARCH CAMPUS (MUMBAI)**

1.2 TATA INSTITUTE OF FUNDAMENTAL RESEARCH CAMPUS (HYDERABAD)

**Research**

**Research at TIFR is distributed across three schools, working over the mathematical sciences, natural sciences, technology and computer science.**

**School of Mathematics:**

**Since its birth in the 1950s, several contributions to mathematics have come from TIFR School of Mathematics. Notable contributions from TIFR mathematicians include Raghavan Narasimhan's proof of the embedding of open Riemann surfaces in**

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**\mathbb {C} ^{3}, C. S. Seshadri's work on projective modules over polynomial rings and M. S. Narasimhan's results in the theory of pseudo differential operators.**

**Narasimhan and Seshadri wrote a seminal paper on stable vector bundles, work which has been recognised as one of the most influential articles in the area.[8] M. S. Raghunathan started research at TIFR on algebraic and discrete groups, and was recognised for his work on rigidity.**

**The School of Natural Sciences is further split into seven departments working in several areas of physics, chemistry and biology.**

**Within physics, the Department of Theoretical Physics (DTP) was set up by Bhabha, who conducted research in high energy physics and Condensed Matter Physics. The department worked on the major advances in this period such as Quantum Field Theory, string theory, and superconductivity.The current faculty includes Sandip Trivedi, Shiraz Minwalla, Abhijit Gadde, and Gautam Mandal. Several early faculty members at the institution were renowned in their fields. These include Ashoke Sen, who conducted seminal work on String Theory, specifically S-Duality, while at this institution. Other distinguished members were Spenta Wadia, Sunil Mukhi, Deepak Dhar and Nandini Trivedi.**

**The Department of Astrophysics works in areas like stellar binaries, gravitational waves and cosmology. TIFR is involved in building India's first gravity wave detector.**

**The High Energy Physics Department, TIFR has been involved in major accelerator projects like the KEK, Tevatron, LEP and the LHC. TIFR also runs the Pelletron particle accelerator facility. Bhabha's motivation resulted in the development of an NMR spectrometer for solid state studies. The Department of Condensed Matter Physics and Material Sciences also conducts experimental research in high-temperature superconductivity, nanoelectronics and nanophotonics.**

**School of Technology and Computer Science:**

**The School of Technology and Computer Science grew out of early activities carried out at TIFR for building digital computers. Today, its activities cover areas such as Algorithms, Complexity Theory, Formal Method, Applied Probability, Learning Theory, Mathematical Finance, Information Theory, Communications, etc.**

**Department of Biological Science**

**The Department Of Biological Sciences was set up by Obaid Siddiqi in early 1960s as a molecular biology group.[citation needed] Over the years has expanded to encompass various other branches of modern**

**biology. The department has fourteen labs covering various aspects of modern molecular and cell biology.**

➢ **Degrees** The Institute will conduct a Doctor of Philosophy (Ph.D.) program in the areas of Biology, Chemistry, Computer and Systems Science, Mathematics, Physics, Science Education. It will also conduct an Integrated M.Sc-Ph.D. (I-Ph.D) program, where both the M.Sc. and Ph.D. degrees will be awarded together on the completion of requirements for both degrees. In some of the above subjects, Master of Science (M.Sc.) programs will also be conducted. There will be no separate M.Phil. program, however M.Phil. may be awarded as an Exit Degree if the specified requirements are completed by students in the Ph.D. programs. The Ph.D. degree will be awarded upon favourable evaluation of a thesis, based on original research, submitted by the candidate. The program will require a strong foundation and a breadth of understanding in the area of research undertaken. The student will therefore meet appropriate course and other academic requirements, in addition to writing a thesis on the research work. The award of the M.Sc. degree will be based on satisfactory completion of courses, and submission of reports or a thesis as applicable. The detailed requirements for each degree will be prescribed by the appropriate Subject Board

**Administration of Degree programs** A Dean of Graduate Studies (Dean GS) will be appointed on an annual basis by the Chairperson of the Academic Council. The Dean's functions will be to oversee procedural and administrative matters concerning the Academic programs of the Institute (including the Centres), to coordinate activities of the various Subject Boards, to facilitate interdisciplinary programs, and to interface with external agencies. The Dean will be a member of the Academic Council. An administrator of the rank of Assistant Registrar or higher will be entrusted with the work involved in the running of the Academic program, and will report to the Dean, Graduate Studies. The Assistant Registrar's office (the University Cell) will provide administrative support to the Dean and Subject Boards by maintaining academic records, organising admissions, making announcements, processing examinations and theses, and carrying out any such additional work as may be assigned by the Dean GS.

**Awarding of degrees** The Academic Council will take a formal decision on the award of the degree, based on the recommendation of the Subject Boards and its own evaluation of the examiner reports of the thesis. The final degree certificate will be signed by the Chair, Academic Council (TIFR Director) and the Chair of the TIFR Governing Council. If the evaluation report of the viva voce examination is positive and the case for awarding of the degree is clear, the Subject Board may advise the Dean GS to issue a provisional certificate once the candidate submits the final version of the Thesis. In addition, for the I-PhD students, the Subject Board may recommend that the Dean GS gives a provisional M.Sc. certificate once the student has registered for Ph.D. (by completing all the requirements). The final Ph.D. and M.Phil. degrees will include the title of the thesis, however they will not mention the name of the subject. The final M.Sc.

degree will include the name of the subject and a Class that reflects the coursework grades of the student, however it will not include the name of the thesis, if any. The Class will be assigned as follows: “First Class with Distinction” for the CGPA (Cumulative Grade Point Average, on a scale of 100) of 75 and above, “First Class” for the CGPA between 60 and 75, and “Second Class” for the CGPA between 50 and 60. No degree will be awarded if the CGPA is below 50.

**Special provisions for TIFR Scientific Staff**: Scientific Staff working for TIFR will be permitted to work for a degree at TIFR provided their thesis supervisor is a TIFR member and they fulfil the same academic requirements as are set down for TIFR students. However in view of the fact that such individuals have other responsibilities, they may be permitted extra time to complete the requirements, at the discretion of the Subject Board. Each such member will be enrolled on a case to case basis, with the respective Department Chairperson, Dean, or Centre Director making a recommendation to the Dean GS, who will refer it to the relevant Subject Board for their opinion. Upon receiving a recommendation from the Subject Board, the Dean GS will forward it to the Chairman, Academic Council for approval.

**At TIFR Mumbai :**

**Department of Astronomy and Astrophysics**

**The research programs of DAA span the whole of Astrophysics and include the study of the Sun, the stars, exoplanets, compact objects (black holes and neutron stars), the matter between the stars, gravitational waves, galaxies, transient phenomena and cosmology. These research areas are addressed with a combination of theoretical, simulation and observational work. The department has pioneered, built and**

**continues to contribute significantly to ground and space-based instrumentation in the X-ray and infrared wavelengths.**

**Department of Condensed Matter Physics and Material Sciences**

**Research in DCMPMS asks questions about the nature of materials that are in the condensed state – familiar condensed phases like solids or liquids, but also more exotic phases such as the superconducting phase at low temperatures, magnetically-ordered phases etc. They also work on semiconductors and nanostructured materials, and soft-matter. Electronic, physical, mechanical, optical, and chemical properties of materials are studied in relation to their structure. The emphasis is on the experimental measurement of various properties using different probes in an attempt to understand the underlying physical behavior. Fabrication of optoelectronic, plasmonic, and superconducting device structures serve as test systems to study novel phenomena, as well as to enable real world applications.**

**Department of High Energy Physics**

**The Department of High Energy Physics is engaged in experiments which investigate the origin, evolution, and the ultimate fate of the universe using accelerator-based and non-accelerator based techniques. At present, the department has activities in large-scale international collaborations at CERN, KEK, fermilab, as well as home-grown experiments in the areas of cosmic ray physics, gravitational physics, and cold**

**atoms. With expertise in instrumentation and detector development, the department is a major driver of the upcoming Indian Neutrino Observatory.**

**Department of Nuclear and Atomic Physics**

**The Department of Nuclear and Atomic Physics has experimental programs in molecular dynamics and control, high intensity laser-matter interactions, ultrafast phenomena, nano and mesoscopic optics, nuclear structure and dynamics, many-body nuclear physics at finite temperature and angular momentum, search for neutrinoless double beta decay, nuclear spectroscopy, accelerator-based atomic and condensed matter physics, studies of ultracold atoms and molecules, as well as theoretical studies of nuclear and quark matter.**

**Department of Theoretical Physics**

**The scientists in the Department of Theoretical Physics work closely with experiments and data to build theories to understand everything, from the tiniest subatomic particles to the whole universe, i.e., condensed matter and statistical physics, cosmology and astroparticle physics, high energy physics including electroweak and strong interactions, as well as string theory and mathematical physics. The department has a vibrant research atmosphere, with internationally acclaimed faculty, active graduate research, a vigorous**

**postdoctoral program, and dozens of international experts visiting every year to collaborate and exchange ideas.**

**At Centers :**

**International Centre for Theoretical Sciences, Bengaluru**

**The ICTS-TIFR in Bengaluru is a unique centre in India with three main goals: housing highest quality research cutting across disciplines in physical and mathematical sciences, organising global collaborative research programs, and undertaking vigorous science outreach activities. Researchers work on astrophysics, string theory, complex systems, and related areas in mathematics.**

**National Centre for Radio Astronomy, Pune**

**NCRA-TIFR in Pune, carries out cutting-edge research centred on low frequency radio astronomy in wide-ranging areas, e.g., solar physics, pulsars, active galactic nuclei, the interstellar medium, supernova remnants, the Galactic Centre, nearby galaxies, high-redshift galaxies, fundamental constant evolution, and the epoch of reionization. NCRA-TIFR has built and operates the largest steerable radio telescope in the world, the Giant Metrewave Radio Telescope, as well as the Ooty Radio Telescope. It offers challenging opportunities to work at the frontiers of astronomy and astrophysics, as well as in instrumentation development. In recent times, NCRA-TIFR has taken the lead in participating in international projects such as the Square Kilometre Array.**

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| **TIFR Centre for Interdisciplinary Sciences, Hyderabad Tata Institute of Fundamental Research**  |
| **Type**  | **Public Deemed university**  |
| **Established**  | **1 June 1945; 78 years ago**  |
| **Director**  | **Jayaram N Chengalur**  |
| **Academic staff**  | **268[1]**  |
| **Students**  | **696[1]**  |
| **Postgraduates**  | **45[1]**  |
| **Doctoral students**  | **651[1]**  |
| **Location**  | **Mumbai** **,** **Maharashtra** **,** **India**  |
| **Campus**  | **Urban**  |
| **Website**  | **www.tifr.res.in**  |