



ICTS

INTERNATIONAL
CENTRE *for*
THEORETICAL
SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Partnering in Excellence



Partnering in Excellence

Founded in 2007, International Centre for Theoretical Sciences (ICTS–TIFR) is a unique, transdisciplinary centre in India. It is created along the lines of the Kavli Institute of Theoretical Physics (KITP), Santa Barbara, Institute for Advanced Study (IAS), Princeton, Mathematical Sciences Research Institute (MSRI), Berkeley and the International Centre for Theoretical Physics (ICTP), Trieste, but adapted to the needs of Indian science. Spread over 19 acres in North Bengaluru, this beautiful world-class residential campus serves as an outstanding environment conducive to intensive research collaborations and training. ICTS is one of the three centres of the Tata Institute of Fundamental Research (TIFR), in Bengaluru. TIFR is an autonomous institute under the aegis of Department of Atomic Energy (DAE), Govt. of India.

ICTS–TIFR was created with three main goals:

1. carry out high quality research in the theoretical sciences.
2. through its programs, bring together the best scientists from all over the world; provide an environment for them to collaborate and work on the most challenging questions posed by nature.
3. stimulate and harness young minds of India and spread scientific temper and knowledge in society through its outreach activities.

ICTS–TIFR receives core funding from the Govt. of India through the DAE. In addition, research, programs and outreach at ICTS are also supported by institutional grants from the Simons Foundation, Airbus Corporate Foundation, Infosys Foundation, Infosys Science Foundation, Kavli Foundation and also through extramural grants raised by our faculty.

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Opportunities to associate with ICTS

In just over a decade, ICTS has established itself as a vibrant institution playing a transformative role in Indian science and education through its programs, research and science outreach. It has a transdisciplinary environment that nurtures path-breaking creativity that can reshape the landscape of scientific ideas. To scale up along this path, ICTS is seeking resources beyond its present funding.

Building on our foundations of excellence, we are launching a drive to secure the future of ICTS through the establishment of an Endowment Fund, with an initial target of \$3 Million and a five year goal of \$20 Million.

We invite you to partner with us in this exciting journey of its growth and support ICTS in its mission of creating and sustaining an outstanding, internationally competitive scientific hub in India. Your gift towards the ICTS Endowment Fund will give us the financial foundation we need to achieve our ambitious long-term and short term goals. As described below giving options include support for research chairs and centres, thematic programs, innovative outreach as well as naming opportunities for buildings and facilities. As a donor, you will become a *'Friend of ICTS'* and will receive our newsletters, invitations to our events, campus visits and interactions with our extended research community which includes eminent scientists and laureates from across the world.

An invitation to partner in the exciting
journey of the International Centre for
Theoretical Sciences



We offer opportunities to support ICTS under the broad categories described below. The following pages list specific purposes with the quantum of support needed for endowments in perpetuity. We are also open to discussing other options for giving, including grants and spend-down endowments as well as partial contributions towards specific causes.

A. Research

The ICTS faculty is of modest size (22 in number) but of the highest quality. Members are organized as a union of families of researchers in various areas of the theoretical sciences. There are 28 associated faculty, 32 postdoctoral fellows, 52 graduate students, and several visiting students at the undergraduate and master's levels.

The areas of research are broadly grouped into:

- 1 - statistical physics and condensed matter;
- 2 - fluid dynamics and turbulence;
- 3 - quantitative biology
- 4 - string theory and quantum gravity
- 5 - astrophysics and gravitational waves
- 6 - probability theory
- 7 - data science, dynamical systems and differential equations
- 8 - geometry and mathematical physics

Faculty members carry out cutting-edge research, provide intellectual leadership and nurture a rich scientific culture. Their eminence attracts the brightest students and postdoctoral researchers as well as outstanding organizers and participants for the Centre's programs. The associated faculty at ICTS are also deeply involved in the various activities of the Centre.



B. Programs

Organizing high-quality visitor-driven programs in the sciences and mathematics, combined with top-notch in-house research, is one of the core mandates of ICTS and one that sets it apart from all other institutions in the country.

Programs are congregations of researchers over varying periods of time, which creates an intensely interactive and participatory environment for breakthrough scientific research, especially within the Indian scientific community.

ICTS thus functions as a science hub, with the national and international scientific community as its main users. Other goals of the programming activities are:

- 1 - fostering important research areas in which the effort in India needs to be enhanced;
- 2 - incubating important new emerging areas of research;
- 3 - conducting schools for building specialized expertise in students and younger researchers; and
- 4 - enhancing science education and human resource development.
- 5 - feeding into our outreach activities.

ICTS also organizes lectures by eminent scientists on their work under three named lecture series, presently funded by the Infosys Foundation:

- 1 - **Subrahmanyan Chandrasekhar Lectures** (physical sciences);
- 2 - **Srinivasa Ramanujan Lectures** (mathematics and mathematical sciences); and
- 3 - **Alan Turing Lectures** (computer science, biological sciences and engineering sciences).

The lectures are usually associated with either a *Discussion Meeting* or a *Program* around the theme of the lectures.

Since its inception in 2007 ICTS has organized a total of 207 programs of varying lengths, 47 named lecture series with associated discussion meetings, and many public lectures. An average of nearly 1200 researchers, accounting for nearly 17000 participant-days, have participated in these activities annually. In the last couple of years, the average participation has risen to almost 2000 per annum. About half of these are junior researchers and a quarter are from abroad.

Illustrative programs

Air-sea Interactions in the Bay of Bengal from Monsoons to Mixing
Universality in Random Structures: Interfaces, Matrices, Sand Piles
Cosmology - The Next Decade
The Theoretical Basis of Machine Learning
Entropy, Information and Order in Soft Matter
AdS/CFT at 20 and Beyond
Laser Plasma Accelerator
The Future of Gravitational-Wave Astronomy
The Role of Theory in Biology
Scientific Discovery through Intensive Data Exploration

Some notable lectures

Infosys-ICTS Chandrasekhar Lectures (physical sciences)

X-ray and Microwave Cosmology by **Rashid Sunyaev**
Making Traversable Wormholes Understanding Global AdS₂ by **Juan Maldacena**
Fluctuations and Large Deviations in Nonequilibrium Systems by **Bernard Derrida**
Microscopic Stochastic Heat Engines using Nonequilibrium Bacterial Reservoirs by **Ajay Sood**
The Nonlinear Physics of Disordered Systems: from Amorphous Solids to Complex Flows by **Itamar Procaccia**

Infosys-ICTS Ramanujan Lectures (mathematical sciences)

Some Open Questions About Scaling Limits in Probability Theory by **Sourav Chatterjee**
Some New Results on Rationality by **Claire Voisin**
The Generalized Ramanujan Conjectures and Applications by **Peter Sarnak**
Locally Symmetric Spaces and Galois Representations by **Peter Scholze**

Infosys-ICTS Turing Lectures (biology, computer science, engineering and related areas)

Evolutionary dynamics and diversity in large populations by **Daniel Fisher**
Complexity, Phase Transitions, and Inference by **Cristopher Moore**
Alan Turing Lectures in Biology by **William Bialek**
Alan Turing Lectures by **Sanjeev Arora, Robert Schapire & Ravi Kannan**



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Giving Options

C Outreach

There is an acute need in India today to create its future scientific human resources. The two key ingredients in bringing this about are:

- awareness among students, of the fascinating questions science asks and tries to find answers to, and
- active engagement and support for its activities from society.

Public lectures by eminent scientists contribute to this process by acting as sources of inspiration and by fostering an interest in basic sciences in society. Our new activities like *Kaapi with Kuriosity* have created a steady audience for science in Bengaluru and the association with local outreach institutions like the planetarium has been very fruitful. Another aspect that contributes to ICTS outreach is that it makes the proceedings of its activities freely available on the ICTS website, YouTube, Facebook etc. Another new initiative is the *ICTS-NIAS Maths Circle* to identify mathematically gifted students at an early stage and hone their aptitude and mathematical skills.



Some outreach lectures

Observing the Birth of the Universe by **Lyman Page** (Vishveshwara Lecture)

How Quantum Physics Democratised Music: A Meditation on Physics and Technology by **Michael Berry** (Kaapi with Kuriosity talk)

Exploring the Universe with Gravitational Waves: From the Big Bang to Black Holes by **Kip S. Thorne** (Vishveshwara Lecture)

Usefulness of Useless Knowledge by **Robbert Dijkgraaf** (Public lecture)

Shapes and Geometry of Surfaces by **Mahan Mj** (Kaapi with Kuriosity talk)

Deciphering the Workings of Molecules, Building Blocks of Life, with the Electron Microscope by **Joachim Frank** (Public lecture)

Particles, Gravity and Strings by **Nathan Seiberg, Andrew Strominger** and **Cumrun Vafa** (Public lectures)

Poetry, Drumming and Mathematics by **Manjul Bhargava** (Public lecture)

The Architecture of Biological Complexity by **Sydney Brenner** (Public lecture)

D. Infrastructure

The ICTS campus is located in Hesaraghatta, north Bengaluru, and is spread over 19 acres. The campus has been designed to be self-contained and includes academic, housing and recreational facilities for more than 150 academic members, and about 120 visitors. The architectural design provides space for maximum academic interactions. It contains lecture halls with sufficient capacity for meetings with hundred plus participants, an auditorium, recreation spaces and comfortable housing for staff and visitors.

To meet the growing needs of the Institute, in line with its vision, there is a need for new facilities to be developed and for some of the older infrastructure to be refurbished. Your contribution will go a long way in ensuring that teaching, learning and research in ICTS continues to take place in an exceptional environment.

Giving causes	Description	Endowment needed (@ 6% interest rate)*
Named Chair Professorships	Distinguished faculty who are leaders in their respective fields can be invited to ICTS so that the institute and its activities can benefit from their experience and expertise. Endowed professors and Chairs are also a time-honored means of attracting and retaining eminent scholars and researchers. We would like to currently endow 3 Chairs at ICTS in different research areas.	INR 700 lakhs (\$ 1 million) per Chair
	Top up for Distinguished Named Chair Professors: Distinguished faculty can be rewarded with a top up to their salary and a modest contingency grant. We hope to award such fellowship top ups to three faculty each year.	INR 500 lakhs (\$ 700,000) per Chair
Named Chair Professorships for Paired Research	We would like to attract high-calibre international researchers from around the world, to spend dedicated periods of time at the ICTS campus over a long term program of 5 years, to build specific “paired” collaborative programs with ICTS researchers. These programs would be created in areas considered to be of mutual interest and which benefit the Indian research community. ICTS envisages recruiting early career faculty to support such collaborations, which would also be shaped by the vision and involvement of the external collaborator. We would like to endow five such Chairs.	INR 670 lakhs (\$ 1 million) per Chair
Early Career Faculty Awards	Young faculty with outstanding performance can be rewarded with a top up to their salary for a period of 3 years and a contingency grant. We hope to award ten such faculty.	INR 315 lakhs (\$ 500,000) per faculty
Postdoctoral Fellowships	ICTS has been successful at attracting post-doctoral fellows, particularly from abroad. We would like to strengthen this effort by garnering funds for: a) Additional postdoctoral fellowships (15 in number) b) Top up for existing postdoctoral fellows (25 in number)	a) INR 400 lakhs (\$ 600,000) per postdoc
		b) INR 110 lakhs (\$ 200,000) per postdoc (top up)

* The figures mentioned are for endowments in perpetuity. We are also open to discussing other options for giving, including grants and spend-down endowments as well as partial contributions towards specific causes.

Giving causes	Description	Endowment needed (@ 6% interest rate)*
PhD Student Fellowships	Top up for all PhD students at ICTS. We intend to make the PhD program at ICTS competitive, prestigious and on par with the best fellowships in the country. ICTS currently has 52 PhD students and it is expected to grow in the near future.	INR 135 lakhs (\$ 200,000) per student
Undergraduate Research Fellowships	These will be select fellowships for outstanding final year undergraduate students from across the country. The students will carry out research at ICTS for 1–2 full semesters. We will have 20 students under this category.	INR 120 lakhs (\$ 200,000) per student
ICTS Initiative on Monsoon Studies	Set up a <i>Centre for Excellence in Monsoon Studies</i> for studying the theoretical and mathematical foundations of the Indian Monsoon for better predictability.	INR 2500 lakhs (\$ 3.6 million) for 10 years
Data Science, Machine Learning and AI Initiative	Set up a <i>Centre for Excellence for Theoretical Understanding of Machine Learning and AI</i> bringing together a leading group of world-class researchers and practitioners. One of its goals will be to seed a strong machine learning community in the country.	INR 1500 lakhs (\$ 2.2 million) for 10 years
Centre for Exploring the Cosmos	The Centre will be a platform for research into fundamental questions about the origin and the evolution of the Universe. The particular areas will include Gravitational Waves, physics of black holes and related areas of Astrophysics and Cosmology.	INR 2500 lakhs (\$ 3.6 million) for 10 years
Centre for Complex Systems	This will be an interdisciplinary centre around the theme of Complexity in the fields of Physics (Condensed Matter and Statistical Physics), Biology and Theoretical Computer Science.	INR 2500 lakhs (\$ 3.6 million) for 10 years
Centre for Mathematical Sciences	This will be a novel centre with a transdisciplinary approach to mathematics. It will explore cutting edge maths and its linkages with other disciplines in Physics, Biology, Computer Science, Climate Science etc.	INR 2500 lakhs (\$ 3.6 million) for 10 years

Giving causes	Description	Endowment needed (@ 6% interest rate)*
Named Distinguished Visiting Chair Professorships	We aspire to attract international leaders of the topmost calibre to spend dedicated periods of time (2 weeks–2 months) at the ICTS campus. They can nurture new directions, guide the organization of key international meetings at ICTS in their areas of expertise, and help us establish linkages to other programs worldwide. We plan to endow five such Chairs.	INR 500 lakhs (\$ 700,000) per Chair
Visitor Program for Faculty Collaborations	International experts in various subjects can be awarded travel grants and honoraria for participating in programs at ICTS. This will cover 250 visitors per year.	INR 375 lakhs (\$ 600,000) per year
Visitor Program for Student Collaborations	ICTS intends to continue its support towards young researchers from India and abroad for participation in various programs and discussion meetings. The support will include travel grants and local hospitality. We will invite 250 such students per year.	INR 250 lakhs (\$ 400,000) per year
Thematic Research Programs	We plan to host a series of events over 5 years (school cum conference) in emerging areas such as Data Science, Artificial Intelligence, laser plasma acceleration, computational neuroscience to build capacity in the country.	INR 20 lakhs (\$ 30,000) per program



Giving causes	Description	Endowment needed (@ 6% interest rate)*
Kaapi with Kuriosity monthly lectures Running successfully for over 2 years now (since October 2016)	<i>Kaapi with Kuriosity</i> is a hugely popular monthly public lecture series organised by the ICTS, in collaboration with the Jawaharlal Nehru Planetarium. The aim of the talks in this series is to stimulate the scientific curiosity of the public.	INR 460 lakhs (\$ 700,000)
ICTS-NIAS Maths circle	The <i>Maths circle</i> is a new initiative of ICTS in Bengaluru (in cooperation with NIAS), that seeks to identify mathematically gifted students at an early stage so that their aptitude and mathematical skills can be honed.	INR 275 lakhs (\$ 400,000)
Special lectures	Public Lectures Public lectures bring exciting new developments in science to a general audience and are particularly aimed at students and civic society.	INR 115 lakhs (\$ 200,000)
	Distinguished lectures Distinguished Lectures are delivered by outstanding scientists and academicians. These are at a colloquium level and aimed at a broad scientific audience.	INR 70 lakhs (\$ 100,000)
	Abdus Salam Memorial Lectures are delivered by eminent researchers who are also involved in scientific institution building. Abdus Salam created the ICTP in Trieste, Italy, with the mission of promoting science in the developing world.	INR 90 lakhs (\$ 130,000)



Giving causes	Description	Endowment needed (@ 6% interest rate)*
	Einstein Lectures These are lectures by ICTS faculty (or noted visitors) which bring out the importance of fundamental research and are given at schools, colleges and other organizations all over India.	INR 50 lakhs (\$ 70,000)
	DD Kosambi Lectures are delivered by eminent scholars in the social sciences, arts and humanities. Kosambi was a mathematician and statistician who made pioneering and foundational contributions to the methods and study of ancient Indian history. He was the first professor of mathematics at the Tata Institute of Fundamental Research (1946-62).	INR 70 lakhs (\$ 100,000)
	Vishveshwara Lectures: Through the <i>Vishveshwara Lectures</i> , ICTS celebrates the life and work of C. V. Vishveshwara — a pioneer in black-hole physics and science outreach in India. Vishveshwara Lectures are given by leading scientists who have also contributed to communicating science to the layperson.	INR 70 lakhs (\$ 100,000)
Science outreach activities	ICTS invites support for its science outreach activities that communicate the excitement of science to young students and community. Some of the initiatives include workshops for school/college teachers, open day at ICTS, exposure to scientific research for high school students, school outreach activities, etc.	INR 100 lakhs (\$ 150,000)
Bangalore Area Science Hubba (BASH) In partnership with multiple science research institutes in the city	A unique 3-4 day science festival beginning in January 2020, aimed at members of the general public. The aim is to communicate some of the excitement and wonder of science in its multifaceted aspects and create a buzz about science in the city. This activity will be initially conducted for a period of 3 years.	Total of INR 800 lakhs per year (\$ 1.2 million) (multiple sponsorships available)

(Naming rights for various existing and new facilities are for a period of 10 years)

Giving causes	Description	Endowment needed (@ 6% interest rate)*
Existing infrastructure	Lounge space in the cafeteria (naming rights): to be furnished with equipment and resources to promote student activities.	INR 35 lakhs (\$ 50,000)
	Library: The <i>Panini Library</i> is the most distinctive structure on campus with its spiral ramp leading to a dome, which is reminiscent of the Guggenheim Museum in New York. Funds will provide equipment, furnishings and resources for the library.	INR 20 lakhs (\$ 30,000)
	Computational and IT infrastructure (naming rights): The campus is equipped with a state of the art data center, Turing Hall. Going ahead, ICTS has a computing requirement of an additional 16000 cores for its various research activities. The funding will also support general IT infrastructure, maintenance and upgradation.	INR 1000 lakhs (\$ 1.5 million)
	Sports complex and wellness centre (naming rights): The sports complex includes a well-equipped gymnasium, swimming pool as well as facilities for indoor sports such as badminton, squash, table tennis, foosball, carom, chess along with provisions for outdoor sports including volleyball and football. Gifts will support various facilities related projects, upgrades and repairs, and installation of renewable energy systems for the gymnasium and the swimming pool.	INR 175 lakhs (\$ 250,000)
	Seminar and auditorium complex (naming rights): Maintenance and upgradation	INR 250 lakhs (\$ 400,000)
	Lecture halls (3) + meeting rooms (2) (naming rights): Digital screens, equipment for webcasting and recording, besides upkeep.	INR 700 lakhs (\$ 1 million)
	Academic block (naming rights): Upkeep, new equipment	INR 300 lakhs (\$ 450,000) per year

Giving causes	Description	Endowment needed (@ 6% interest rate)*
	Visitors guest house (naming rights): Upkeep, new facilities in the rooms.	INR 250 lakhs (\$ 400,000)
	Permanent science exhibition (naming rights): Installation of interactive and digital exhibits at designated locations within the campus	INR 210 lakhs (\$ 300,000)
New infrastructure	Green building initiative: Purchase, construction, or integration of energy efficient, renewable energy and sustainable design features at the campus	Solar Power (607 KW)- INR 650 lakhs (\$ 1 million) Rain water harvesting - INR 15 lakhs (\$ 25,000) Drip irrigation - INR 150 lakhs (\$ 250,000) Water conservation and landscaping - INR 175 lakhs (\$ 300,000)
	Music and Arts: The arts have been an essential part of the TIFR culture from the start. Contributing towards this initiative will foster creativity and collaboration at ICTS.	Murals and sculptures - INR 125 lakhs (\$ 200,000)
	ICTS plans to have murals and sculptures at designated places on the campus and also bring musicians, artists, writers to be in residence.	15 lakhs per year (\$ 25,000)
	Campus expansion –20 acres Construction of buildings for Centres of excellence and new academic block: office space, lecture halls, lab space, guest house space.	125 crores (\$ 18 million)

Giving Policy - Highlights

We list below the highlights of our 'Giving Policy'. It encompasses key facets of giving and the regulations that govern them.

A. Facilities, spaces, endowments or programs may be named after individuals or entities whose generosity advances the academic mission of ICTS and furthers the capacity of the institute to meet its objectives. To ensure the appropriateness of the honour, ICTS follows the guidelines listed in its 'Giving Policy' as it makes decisions on a case-by-case basis.

B. Individuals, corporations and other organizations may be considered for naming recognition, if they have made significant financial contributions to ICTS related to the naming opportunity. Decisions regarding such a recognition are made on a case-by-case basis, in accordance with the policy guidelines, and taking into consideration the total cost of the project, the availability of other funds and the level of financial contribution.

C. The size of the board displaying the name of the facility, the collaterals that would carry the new name, etc., will be decided by ICTS in consultation with the donor. However, ICTS will have the final say in this matter. Streets or avenues can be named after people who have contributed significantly to the growth of the institute. It can also reflect the uniqueness of the campus with respect to geography, history, flora and fauna.

D. The various applications of gifts and naming opportunities are covered in this brochure. This list is not exhaustive and ICTS can choose to accept gifts that are not covered here. The details of the funding requirements of the various causes will be updated by the Resource Development and Societal Engagement (ResDev) Wing of the ICTS after consulting with the stakeholders of the institute.

All donations received within India are eligible for 100% deduction under Section 80G of the Income Tax Act.

For international foundations, ICTS-TIFR is registered under the Foreign Contribution Regulation Act (FCRA) and is certified as equivalent to a U.S. public charity.

All donations received from the US are eligible for tax exemption under 501(c)(3).

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