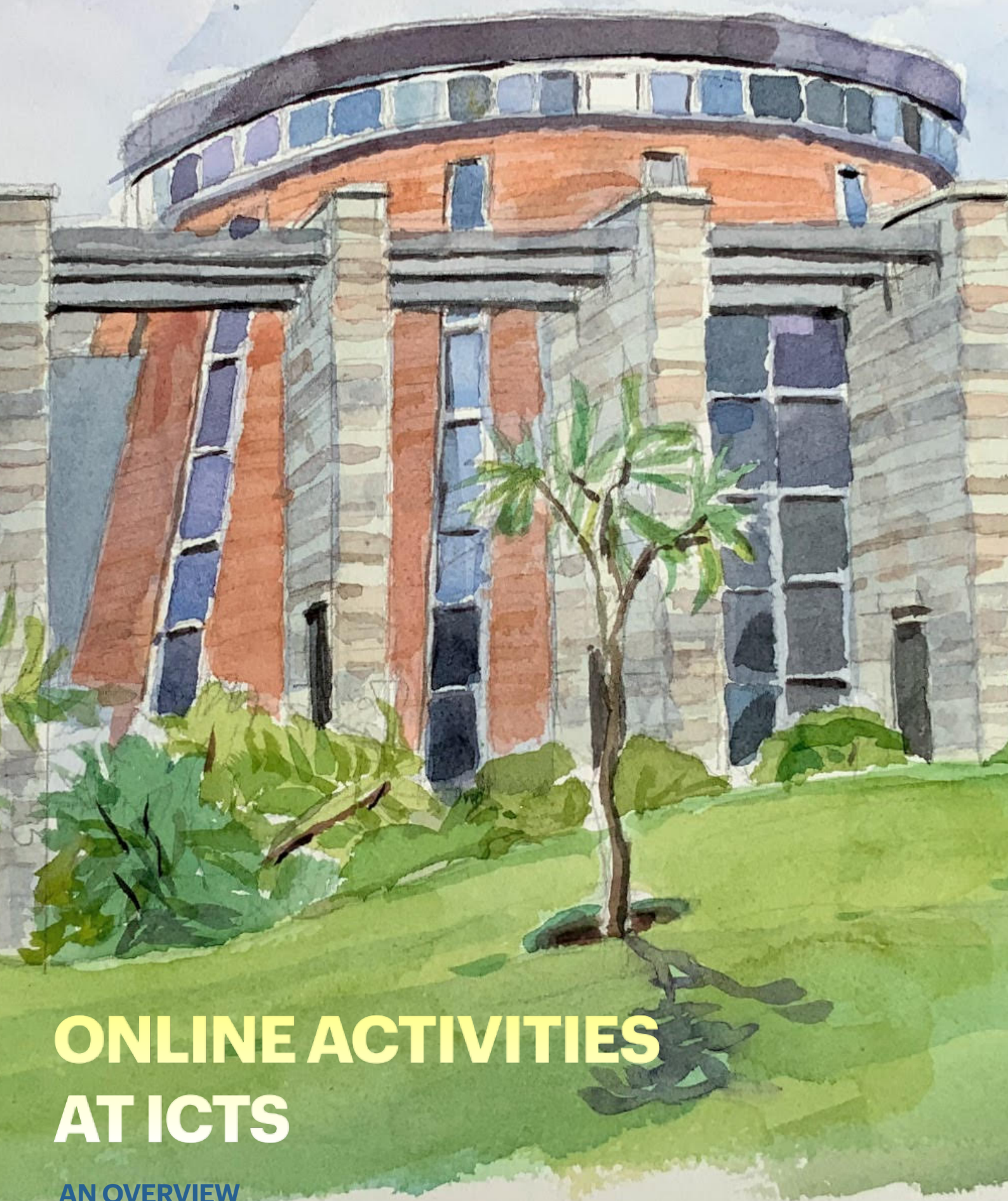


APRIL 2020 - JULY 2021



ONLINE ACTIVITIES AT ICTS

AN OVERVIEW

INTRODUCTION

Dear Friends and well-wishers of ICTS,

Rarely do events like covid-19 occur, but when they do, they fundamentally reshape our way of life and functioning. While we have still not fully emerged, as a planet, from the ravages of this pandemic and the long term consequences are difficult to foresee, we can see many ground shifting changes already. ICTS as an institution has been responding to these shifts and adapting our strategy to achieve the goal of furthering excellence in Indian and global science.

One of the major shifts has been in the way people have embraced Zoom and similar platforms for scientific communication and interaction. ICTS quickly pivoted to this new medium and indeed found it working enormously to our advantage. Curating research meetings with the world's top scientists and schools for junior researchers is one of the core mandates of ICTS, as are outreach activities to the public. We had our first online research meetings from April-May 2020 itself and found an enthusiastic response from the international scientific community to participating. Indeed, the barriers of visas, intercontinental air travel (and its associated carbon footprint) and jet lag suddenly disappeared. Many of our programs had many more participants (and a wider geographical spread) than would have been the case for an in-person meeting. Our youtube recordings were widely viewed and our international visibility soared - we were meeting a global desire amongst scientists as well as the public for interactions and intellectual stimulation.

We started several new lecture series and special activities to cater to this demand. Many of you have attended our "Where the Big Questions Are" events. We are inaugurating the new series "Technology and Cosmic Frontiers" with Kip Thorne on Aug. 19th. to bridge the gap that exists in India between fundamental science and technology. We embarked on "Vigyan Adda" for undergraduates to give a flavour of research and enlist more of them into this quest. Our "Kaapi with Kuriosity" (KwK) for the lay public morphed into the online "Kuriosity during Kuarantine" (KdK) and drew in people from outside Bangalore. "Cosmic Zoom" was an online exhibition with multiple talks across multiple scales in the universe.

In this booklet we showcase some of the most popular of these activities of the last year. You will find stimulating material for people across ages as well as backgrounds and interests. Hope you will in this way be able to participate in our journey and continue your strong support for our mission. We are now positioned very well as a global hub for science. In the coming years, we will be carrying forward, in hybrid mode, our activities which combine the best of both the in-person and online modes. Thus, we will hopefully emerge from the tragedy of these years empowered and enthused.

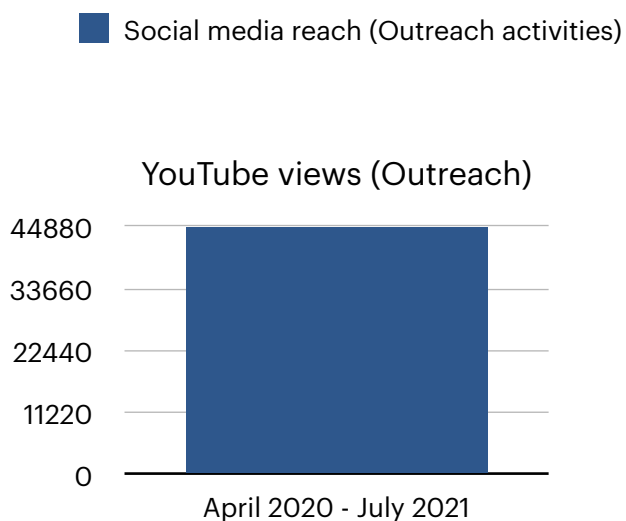
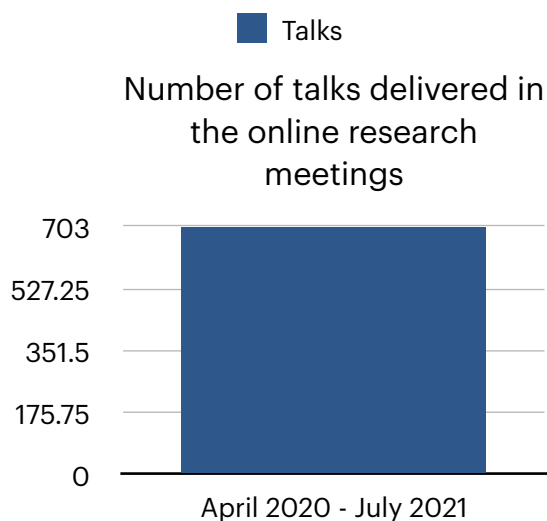
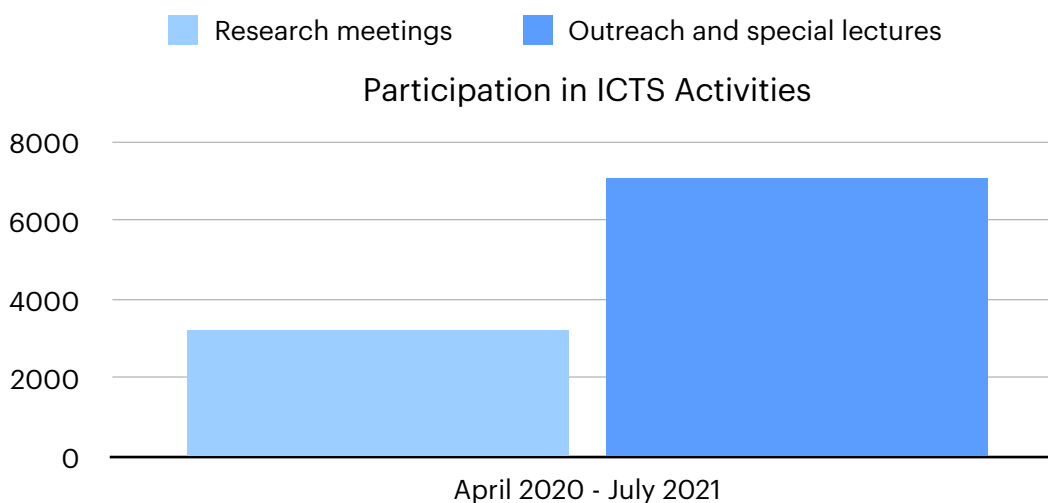
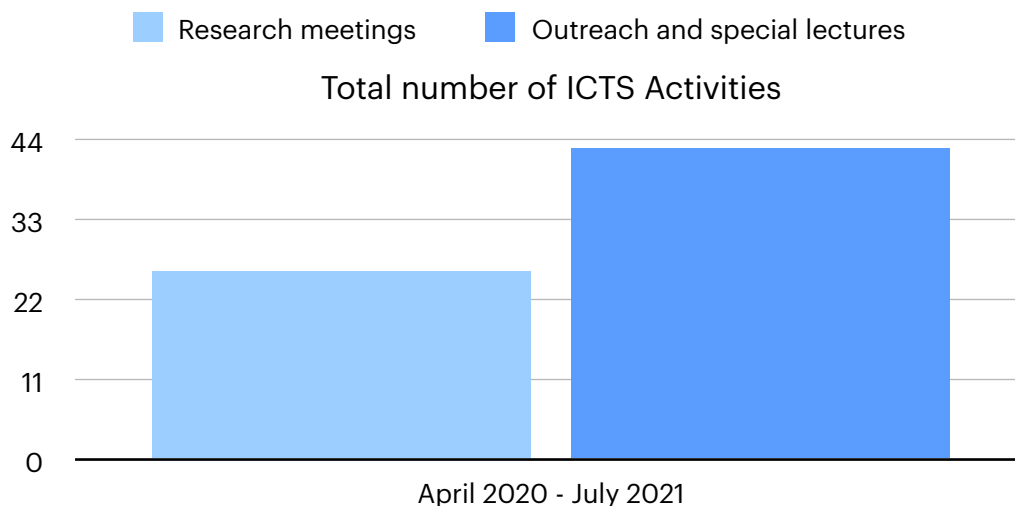
Warm regards,

Rajesh

Rajesh Gopakumar

Director, ICTS-TIFR, Bengaluru, Aug. 15th, 2021.

ICTS ACTIVITIES



ICTS OUTREACH LECTURES - HIGHLIGHTS

New lecture series launch this 19th!

Workshop for kids

Learning with Toys: Hands-on Science Activities

Procheta Mallik and Lakshmi Jois (Educator & Entrepreneur) ThinkTac

2 April 2021
10:30 AM

COSMICZOOM

ICTS



Day in the lab

A day in the lab: Indian Astronomical Observatory

Ramya Sethuram and Dorje Angchuk (Indian Astronomical Observatory)

5 Apr 2021
6 pm

COSMICZOOM

ICTS



Technology & Cosmic Frontiers

A lecture-symposium series from the Office of the Principal Scientific Advisor, Government of India and International Centre for Theoretical Sciences, Tata Institute of Fundamental Research

Kip Thorne
Richard P. Feynman Professor of Theoretical Physics (Emeritus), Caltech
Nobel Laureate in Physics, 2017

Rana Adhikari
Professor of Physics, Caltech

Exploring the Universe with Gravitational Waves
Six years ago LIGO initiated gravitational-wave astronomy, and with it the beginning of a revolution in our understanding of the universe. In this lecture I will briefly describe the gravitational waves with which LIGO explores the universe, the discoveries about black holes and neutron stars that LIGO has made in these past six years, a vision for the future of gravitational-wave astronomy, and the central role that LIGO-India will play.

The Technology of Gravitational-Wave Detectors
The detection of gravitational waves required driving many high precision technologies to their physical limits. In this talk, I will describe how the detection works, what obstacles were overcome, and what the future will require. These technologies have been making their way into other fields and industries over the past few decades. The new push towards exploiting quantum enhanced measurements and quantum engineered materials has the potential to revolutionize not only the field of gravitational wave detection, but also measurement, communication, and a host of other, earthly, ventures.

2021Aug19Thu@7pmOnline

ICTS INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

REGISTER <https://rb.gy/hp9met>
LIVE <https://youtu.be/5cc2DWnXuGI>



Vigyan Adda

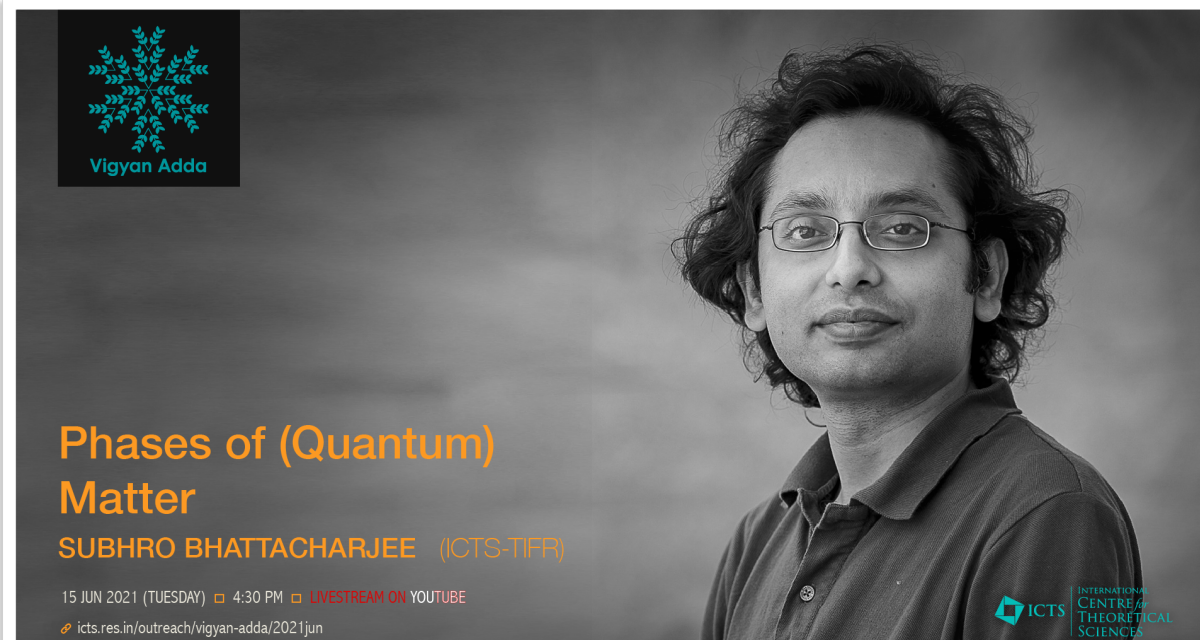
Phases of (Quantum) Matter

SUBHRO BHATTACHARJEE (ICTS-TIFR)

15 JUN 2021 (TUESDAY) 4:30 PM LIVESTREAM ON YOUTUBE

icts.res.in/outreach/vigyan-adda/2021jun

ICTS INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH





KURIOSITY DURING KUARANTINE 20 JUNE 2021
4 PM (SUNDAY)

Can we learn from INSECT SOCIETIES?

RAGHAVENDRA GADAGKAR
CENTRE FOR ECOLOGICAL SCIENCES, IISC, BENGALURU

LIVESTREAM ON **YouTube**

INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

IN ASSOCIATION WITH

INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Einstein lectures
PUBLIC LECTURE SERIES CELEBRATING THE CENTENARY OF ALBERT EINSTEIN'S GENERAL THEORY OF RELATIVITY

Einstein lecture by
Vijaykumar Krishnamurthy
ICTS-TIFR, Bengaluru


Physics of Life

Is there a (theoretical) physics of life? Living systems are possibly the most complex forms of matter known to us. As such, developing mathematical frameworks to explain the processes of life is a daunting task, requiring expertise in multiple disciplines. However, as biological experiments become more quantitative in nature, it is inevitable that we will need a theoretical physics of life, and a revolution of this kind is currently underway. In this talk, we will provide a broad picture of living systems from the perspective of self-organized matter physics, with a focus on the complexities inherent in such a description. In particular, we will focus on the fascinating morphogenetic patterns seen in cells and tissues, and discuss the physics underlying these emergent self-organization phenomena. The aim will be to provide a glimpse of the fascinating physics found in living systems, and to invite talented students to take up research in this challenging area.

Saturday, 21 November, 11 am (Online)

International Centre for Theoretical Sciences
Tata Institute of Fundamental Research
Shivokta, Hesaraghatta Road, Bangalore-560089
Tel: 080 4853 6554, E-mail: outreach@icts.res.in
<https://icts.res.in/lectures/einstein>

REGISTER ONLINE AT
<http://bit.ly/el2020nov21>



Vigyan Adda

Black Holes and the Reversibility of Time
SUVRAT RAJU (ICTS-TIFR)

22 DEC 2020 (TUESDAY) 4:30 PM LIVESTREAM ON YOUTUBE
icts.res.in/outreach/vigyan-adda/vigyanadda2020dec

INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

KURIOSITY DURING KUARANTINE 24 JAN 2021
4 PM (SUNDAY)

Symmetries of Nature & Nature of Symmetries

ROHINI M. GODBOLE
IISC, BENGALURU

LIVESTREAM ON **YouTube**

INTERNATIONAL CENTRE for THEORETICAL SCIENCES
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

 **KURIOSITY DURING KUARANTINE** 23 MAY 2021
4 PM (SUNDAY)





The Neutrino Story:
from impossible dreams
to unreachable stars

SRUBABATI GOSWAMI
PHYSICAL RESEARCH LABORATORY, AHMEDABAD

LIVESTREAM ON 


 **INTERNATIONAL CENTRE for THEORETICAL SCIENCES**
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

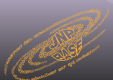
 **KURIOSITY DURING KUARANTINE** 17 MAY 2020
4 PM (SUNDAY)



Automating Mathematics?

SIDDHARTHA GADGIL
IISc BANGALORE

LIVESTREAM ON 

 **INTERNATIONAL CENTRE for THEORETICAL SCIENCES**
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS DISTINGUISHED LECTURE

STATISTICAL MECHANICAL ENSEMBLES AND TYPICAL BEHAVIOR OF MACROSCOPIC SYSTEMS

In this talk I will focus on describing, in a qualitative way, the reason statistical mechanics is able to predict, with great certainty, behavior of macroscopic systems, both in equilibrium and out of it.

I will relate this to the fact that this behaviour is typical for systems represented by the usual Gibbs ensembles or those derived from them. These take small phase space volume to indicate small probability.

I will not try to justify this here.


Joel Lebowitz

Joel Lebowitz was born in Taceva, then in Czechoslovakia, now Ukraine, in 1930 into a Jewish family. After earning a doctorate degree from Syracuse University, Lebowitz became a NSF fellow at Yale University, where his mentor was Lars Onsager. He worked at the Stevens Institute of Technology, in Hoboken, New Jersey, and Yeshiva University, in New York City, New York, before joining Rutgers University, in 1977, where he is the G.W. Hill Professor of Mathematics and Physics and director of the Center for Mathematical Sciences Research.

Lebowitz is a member of the National Academy of Science and has received many awards: the Boltzmann Medal, the Max Planck Medal, the Poincaré Prize, the "Grande Médaille" from the French Academy of Sciences and the 2021 Danie Heineman Prize in Mathematical Physics from the AIP and APS. Lebowitz is a Co-Chair of the Committee of Concerned Scientists which is dedicated to the protection of the human rights of scholars and students.

7.30pm – 9pm, 13 July 2021

ZOOM LINK : <https://bit.ly/ictsDJuly2021>
MEETING ID: 864 8057 5697 Passcode: 949485

 **INTERNATIONAL CENTRE for THEORETICAL SCIENCES**
TATA INSTITUTE OF FUNDAMENTAL RESEARCH



Hundred Years of Gravitational Lensing

PARAMESWARAN AJITH (ICTS-TIFR)

28 FEB 2021 (SUNDAY) □ 4:30 PM □ LIVESTREAM ON YOUTUBE

icts.res.in/outreach/vigyan-adda/vigyanadda2021feb



 **INTERNATIONAL CENTRE for THEORETICAL SCIENCES**
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

LIST OF SPECIAL LECTURES AT ICTS

April 2020 - July 2021

Sl No.	Special Lectures at ICTS (Online)	Date
Technology and Cosmic Frontiers		
1	'Exploring the Universe with Gravitational Waves' by Kip S. Thorne (Richard P. Feynman Professor of Theoretical Physics (Emeritus), Caltech Nobel Laureate in Physics, 2017) and 'The Technology of Gravitational-wave Detectors' by Rana Adhikari (Professor of Physics, Caltech)	Upcoming on 19 Aug 2021
ICTS Einstein Lecture		
2	Physics of Life by Vijaykumar Krishnamurthy (ICTS-TIFR)	21 Nov 2020
Vigyan Adda		
3	Heading towards turbulence by Rama Govindarajan (ICTS-TIFR)	15 Jul 2021
4	Phases of (Quantum) Matter by Subhro Bhattacharjee (ICTS-TIFR)	15 Jun 2021
5	Hundred Years of Gravitational Lensing by Parameswaran Ajith (ICTS-TIFR)	28 Feb 2021
6	Black Holes and the Reversibility of Time by Suvrat Raju (ICTS-TIFR)	22 Dec 2020
Cosmic Zoom		
7	Cosmology: From Big Bang to the Present Day by Tirthankar Roy (Theoretical Physicist - NCRA)	18 Apr 2021
8	The Life of Whales and Dolphins, (Special Focus on Arabian Sea Humpback Whales) by Dipani Sutaria (Ecologist, Saving our Seas)	17 Apr 2021
9	The Interesting Life of the Giant Honey Bee by Axel Brockmann (Biologist, National Centre for Biological Sciences)	16 Apr 2021
10	Life: Its Origin and Place in the Universe by Sanjay Jain (Physicist, University of Delhi and Santa Fe Institute)	15 Apr 2021

ICTS ACTIVITIES

11	Cloudy and Turbulent Days, and the Wait for Rain by Rama Govindarajan (Fluid dynamicists, International Centre for Theoretical Sciences)	14 Apr 2021
12	The Search for Habitable Worlds by Anand Narayanan (Astrophysicist, Indian Institute of Space Science and Technology)	11 Apr 2021
13	How do Insects Fly? by Sanjay P Sane and Colleagues (National Centre for Biological Sciences)	10 Apr 2021
14	The Impossible Dream of Neutrino Astronomy by Basu Dasgupta (Theoretical Physicist, TIFR)	9 Apr 2021
15	Solar System: A Testbed for Physical Theories by H R Madhusudan (Educator) (Jawaharlal Nehru Planetarium)	8 Apr 2021
16	Fundamental Building Blocks of Matter: Developing the Standard Model by Sreerup Raychaudhuri (Particle Physicist, TIFR)	7 Apr 2021
17	A Day in the Lab: Indian Astronomical Observatory by Ramya Sethuram (Indian Astronomical Observatory) and Dorje Angchuk (Indian Astronomical Observatory)	5 Apr 2021
18	From Micro to Macro: How Do We Use DNA to Study Large Animals like Tigers by Uma Ramakrishnan (NCBS)	4 Apr 2021
19	On Quantum Voyages by Smitha Vishveshwara (Condensed matter physicist, University of Illinois at Urbana-Champaign)	3 Apr 2021
20	Learning with Toys: Hands-on Science Activities for Children by Procheta Mallik (Scientist & Educationist, ThinkTac) and Lakshmi Jois (Educationist, ThinkTac)	2 Apr 2021
21	Project Dhvani: Forest Soundscapes from the Western Ghats by Vijay Ramesh (Ecologist, Columbia University)	1 Apr 2021
22	In Conversation: Organisms and Size - Why Size Matters by Amitabh Joshi (Evolutionary Biologists, JNCASR) and TNC Vidya (Evolutionary Biologists, JNCASR)	31 Mar 2021
23	The Story of Helium and the Birth of Astrophysics by Biman Nath (Astrophysicist & Author, Raman Research Institute)	29 Mar 2021
24	What's in a Diet? by Anura Kurpad (St John's Medical College)	28 Mar 2021

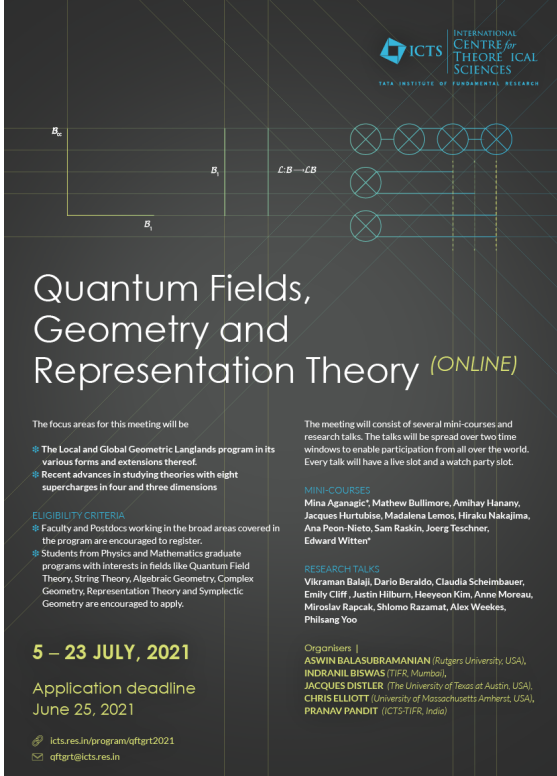
Kuriosity during Kuarantine		
25	Metallurgical Heritage of India by Sharada Srinivasan (National Institute of Advanced Studies, Bengaluru)	25 Jul 2021
26	Can We Learn from Insect Societies? by Raghavendra Gadagkar (Indian Institute of Science, Bengaluru)	20 Jun 2021
27	The Neutrino Story: From Impossible Dreams to Unreachable Stars by Srubabati Goswami (Physical Research Laboratory, Ahmedabad)	23 May 2021
28	Scientific Approaches to Understanding the Past by Parth R. Chauhan (Indian Institutes of Science Education and Research, Mohali)	25 Apr 2021
29	What's in a Diet? by Anura Kurpad (St John's Medical College, Bengaluru)	28 Mar 2021
30	Why is Climate Change a Wicked Problem? by Raghu Murtugudde (University of Maryland and Indian Institute of Technology, Bombay)	21 Feb 2021
31	Symmetries of Nature and Nature of Symmetries by Rohini M. Godbole (Indian Institute of Science, Bengaluru)	24 Jan 2021
32	Kolam: A Western Perspective by Claudia Silva (Photographer & Videographer) and Oscar Garcia-Prada (Institute of Mathematical Sciences, Madrid)	13 Dec 2020
33	Can Forests in India Influence Rainfall by Jagadish Krishnaswamy (Ashoka Trust for Research in Ecology and the Environment, Bengaluru)	22 Nov 2020
34	Cosmic Whisper from Binary Black Holes by Archana Pai (Indian Institute of Technology, Bombay)	18 Oct 2020
35	Agents of Change: The Role of Catalysts in the Modern World by Shobhana Narasimhan (Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru)	26 Sept 2020
36	A Life of Resonance with Quantum Matter: P.W.Anderson (1923-2020) by Ganapathy Baskaran (Professor Emeritus, The Institute of Mathematical Sciences, Chennai, Distinguished Professor, Indian Institute of Technology, Chennai, and Distinguished Visiting Research Chair, Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada)	23 Aug 2020

ICTS ACTIVITIES

37	Soft and Squishy Materials and How to Think About Them by Gautam Menon (Ashoka University and IMSc)	19 Jul 2020
38	Automating Mathematics? by Siddhartha Gadgil (Indian Institute of Science, Bangalore)	17 May 2020
Special events		
39	Gems of Ramanujan and their Lasting Impact on Mathematics by Manjul Bhargava (Princeton University, USA)	22 Dec 2020
40	Two Mathematicians, Their Work and Career Experiences: On Occasion of International Women in Mathematics Day	15 May 2021
41	Global Virtual Summit: Reimagining Entrepreneurship & Innovation for the Sustainable Development Goals	24 Apr 2021
ICTS Distinguished Lecture		
42	Statistical Mechanical Ensembles and Typical Behavior of Macroscopic Systems by Joel Lebowitz (Rutgers University, New Brunswick, USA)	13 July 2021
ICTS Foundation Day Lecture		
43	Generalized Hydrodynamics by Herbert Spohn (Technical University Munich, Germany)	26 Dec 2020

ICTS RESEARCH MEETINGS - HIGHLIGHTS

363 participants



Quantum Fields, Geometry and Representation Theory (ONLINE)

The focus areas for this meeting will be

- The Local and Global Geometric Langlands program in its various forms and extensions thereof.
- Recent advances in studying theories with eight supercharges in four and three dimensions

ELIGIBILITY CRITERIA

- Faculty and Postdocs working in the broad areas covered in the program are encouraged to register.
- Students from Physics and Mathematics graduate programs with interests in fields like Quantum Field Theory, String Theory, Algebraic Geometry, Complex Geometry, Representation Theory and Symplectic Geometry are encouraged to apply.

5 – 23 JULY, 2021

Application deadline
June 25, 2021

✉ icts.res.in/program/qfgrt2021
✉ qfgrt@icts.res.in


The meeting will consist of several mini-courses and research talks. The talks will be spread over two time windows to enable participation from all over the world. Every talk will have a live slot and a watch party slot.

MINI-COURSES
Mina Aganagic*, Matthew Bullimore, Amihay Hanany, Jacques Hurtubise, Madalena Lemos, Hiraku Nakajima, Ana Peon-Nieto, Sam Raskin, Joerg Teschner, Edward Witten*

RESEARCH TALKS
Vikraman Balaji, Dario Beraldo, Claudia Scheimbauer, Emily Cliff, Justin Hilburn, Heeyoon Kim, Anne Moreau, Miroslav Rappack, Shlomo Razamat, Alex Weekes, Philsang Yoo

Organizers
ASWIN BALASUBRAMANIAN (Rutgers University, USA), INDRIANIL BISWAS (TIFR, Mumbai), JACQUES DISTLER (The University of Texas at Austin, USA), CHRIS ELLIOTT (University of Massachusetts Amherst, USA), PRANAV PANDIT (ICTS-TIFR, India)

300 participants



PHYSICS OF THE EARLY UNIVERSE - AN ONLINE PRECURSOR

Due to the ongoing COVID-19 pandemic, we have postponed the original program that was scheduled for August 24–September 4, 2020. The new dates of the meeting that will be held at ICTS will be announced in due course. Meanwhile, we have planned an online precursor to the meeting which will be held during August 31–September 3, 2020.

31 AUGUST–3 SEPTEMBER, 2020

SPEAKERS

Andreas Albrecht (University of California Davis, USA)
Nicola Bartolo (University of Padua, Italy)
Robert Brandenberger (McGill University, Canada)
Yi Fu Cai (University of Science and Technology of China, China)
Katy Clough (University of Oxford, UK)
Fabio Finelli (INFN, Sezione di Padova, Italy)
Silvia Galli (Institut d'Astrophysique de Paris, France)
Chiraj Hazra (The Institute of Mathematical Sciences, India)
Jerome Martin (Institut d'Astrophysique de Paris, France)
Marco Peloso (INFN, Sezione di Padova, Italy)
Patrick Peter (Institut d'Astrophysique de Paris, France)

Jerome Quintin (Max Planck Institute for Gravitational Physics, Germany)
Alexandre Refregier (Institute for Particle Physics and Astrophysics, Switzerland)
Shih Sethi (Raman Research Institute, India)
Tarun Souradeep (Indian Institute of Space Education and Research, Pune, India)
Tetsuaki Suyama (Tokyo Institute of Technology, Japan)
Sanjiv Thrivedi (Tata Institute of Fundamental Research, India)
Vincent Vennin (Laboratoire Astroparticule et Cosmologie Paris, France)
Alexander Vikman (Central European Institute for Cosmology and Fundamental Physics, Czech Republic)
David Wands (University of Portsmouth, UK)
Masahide Yamaguchi (Tokyo Institute of Technology, Japan)

Organizers
Robert Brandenberger, Jerome Martin, Subodh Patil, L. Sriramkumar

✉ icts.res.in/program/peu
✉ peu2020@icts.res.in

Image Credits: NASA / WMAP Science Team

254 participants



LESS TRAVELLED PATH OF DARK MATTER: AXIONS AND PRIMORDIAL BLACKHOLES

Due to the ongoing COVID-19 pandemic, the original program has been canceled. However, the program will be conducted through online lectures.

9 – 13 NOV, 2020
Online Program

Application Deadline
15 October, 2020

Organizers
Subhojit Das, Koushik Dutta, Raghavan Rangarajan, Vikram Rantala

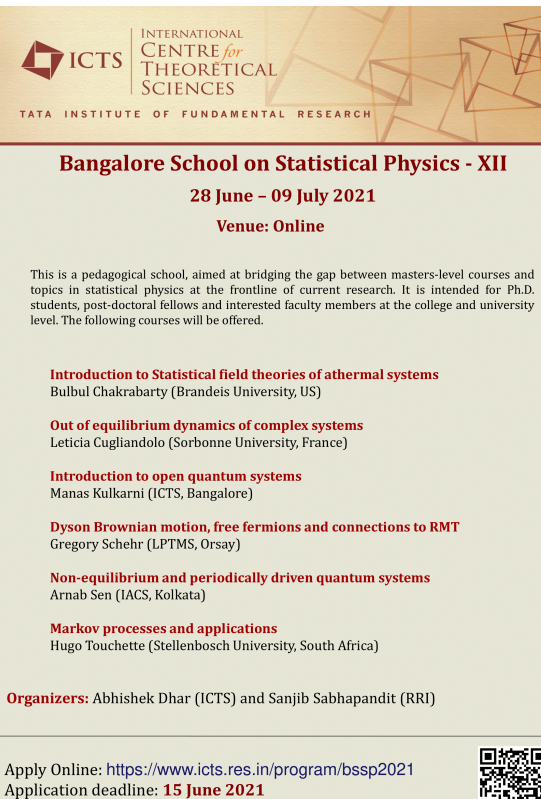
✉ icts.res.in/program/LTPDM2020
✉ ltpdm2020@icts.res.in

The existence of dark matter (DM) has been inferred from its gravitational interactions, yet the identity of the dark matter particles remains completely unknown. The dominant candidate for DM over the last 30 years has been Weakly Interacting Massive Particles (WIMPs). However, despite extensive underground (direct), telescope (indirect) and collider searches, dedicated experiments have not found any evidence of WIMPs. Meanwhile, several astrophysical small-scale structure and cosmological hints might be an indication that DM has non-gravitational interactions that cannot easily be explained with vanilla WIMPs.

This online workshop on the Less Travelled Path of Dark Matter (LTPDM) will bring together particle physicists and cosmologists from all over the world to address current trends in DM searches, focused on axions and primordial black holes, and map the way forward. The program will also include a school, with lectures addressed to students and postdocs, familiarizing them with new and advanced concepts.

We plan to have a longer physical workshop on dark matter, with a larger perspective, in the near future once the current global pandemic crisis has subsided.

204 participants



Bangalore School on Statistical Physics - XII

28 June – 09 July 2021

Venue: Online

This is a pedagogical school, aimed at bridging the gap between masters-level courses and topics in statistical physics at the frontline of current research. It is intended for Ph.D. students, post-doctoral fellows and interested faculty members at the college and university level. The following courses will be offered.

Introduction to Statistical field theories of athermal systems
Bulbul Chakrabarty (Brandeis University, US)

Out of equilibrium dynamics of complex systems
Leticia Cugliandolo (Sorbonne University, France)

Introduction to open quantum systems
Manas Kulkarni (ICTS, Bangalore)

Dyson Brownian motion, free fermions and connections to RMT
Gregory Schehr (LPTMS, Orsay)

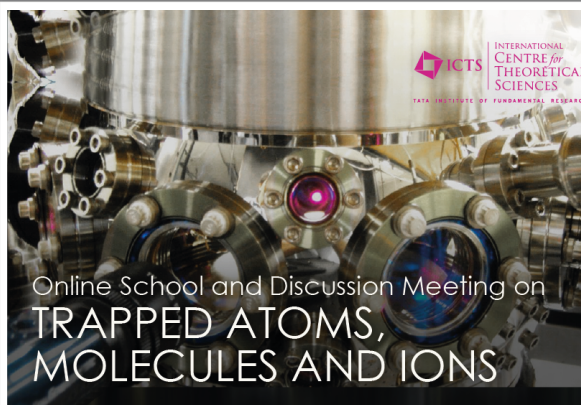
Non-equilibrium and periodically driven quantum systems
Arnab Sen (IACS, Kolkata)

Markov processes and applications
Hugo Touchette (Stellenbosch University, South Africa)

Organizers: Abhishek Dhar (ICTS) and Sanjib Sabhapandit (RRI)

Apply Online: <https://www.icts.res.in/program/bssp2021>
Application deadline: **15 June 2021**

198 participants



Online School and Discussion Meeting on TRAPPED ATOMS, MOLECULES AND IONS

The goal of this online school and discussion meeting is to update students and researchers with the recent developments in Ultracold Trapped Atomic, Molecular and Ionic systems. The primary emphasis will be on experimental aspects. The unifying underlying theme is: control of quantum states. It is expected that the attendees will imbibe a significant amount of technical know-how from the School, in addition to the physical concepts driving the research. The aforesaid Discussion Meeting will provide a platform to showcase some of the latest developments in the field.

LECTURE TOPICS
 1 – TRAPPED ION QUANTUM COMPUTING AND SIMULATION
 2 – RYDBERG SYSTEMS
 3 – ULTRACOLD MOLECULES AND MIXTURES
 4 – EMERGENT TOPICS IN AMO SCIENCES

10 – 22 MAY, 2021
 Application deadline | 15 APRIL, 2021


Organisers |
 SOURAV DUTTA (TIFR, Mumbai),
 BIMALENDU DEB (IACS Kolkata),
 SAIKAT GHOSH (IIT Kanpur)

icts.res.in/program/tamions-2021
tamions@icts.res.in


CONFIRMED SPEAKERS*
 Immanuel Bloch (MPI Quantum Optics)
 Tilman Esslinger (ETH Zurich)
 Johannes Hecker Denschlag (Ulm University)
 Rudolf Grimm (University Innsbruck)
 Subhadeep Gupta (University of Washington)
 Markus Hennrich (Stockholm University)
 Jonathan Home (ETH Zurich)
 Selim Jochim (Heidelberg University)
 Robin Kaiser (Université Côte d'Azur, CNRS)
 Dietrich Leibfried (NIST, USA)
 Hanns-Christoph Nägerl (University Innsbruck)
 Tilman Pfau (University of Stuttgart)
 Christian Roos (University Innsbruck)
 Vladan Vuletić (MIT, USA)
 Matthias Weidemüller (Heidelberg University)
 Stefan Willitsch (University of Basel)
 Jun Ye (University of Colorado)
 Tanya Zelenovskaya (Columbia University)
 Martin Zwerle (MIT, USA)

* See website for updated list

ELIGIBILITY
 We encourage young researchers and students (who have completed at least 1 year of MSc by May 2021) to participate in this program and to apply online



190 participants



Thirsting for Theoretical Biology


TTB2021, which will be held online, aims to showcase examples of successful theory-experiment collaborations in the study of living matter. Topics to be covered will include the regulation of genetic activity, chromosome dynamics, cytoskeletal organization, molecular motors, cellular energetics, stem cells, cell-cell interactions, and morphogenesis.

Organisers |
 VAISHNAVI ANANTHANARAYANAN (UNSW and EMBL, Australia),
 VIJAY KUMAR KRISHNAMURTHY (ICTS-TIFR, India),
 VIDYANAND NARJUNDIAH (Centre for Human Genetics, India)

SPEAKERS
 ANJANA BADRINARAYANAN (NCBS, India)
 EREZ BRAUN (Technion, Israel)
 BENJAMIN FRIEDRICH (TU Dresden, Germany)
 PAULIEN HOGEGEWEG (U. Utrecht, Netherlands)
 KINNETT KEREN (Technion, Israel)
 GUSJE KOENDERINK (TU Delft, Netherlands)
 SHIGERU KONDO (Osaka U., Japan)
 APROTIM MAZUMDER (TIFR-TCS, India)
 GAUTAM MENON (Ashoka U., India)
 FRANCESCA MERLIN (IHMPST CNRS, France)
 CARL MÖDES (MPICBG CSB, Germany)
 SREELAJA NAIR (IIT Bombay, India)
 CAREN NORDEN (IGC, Portugal)
 NENAD PAVIN (U. Zagreb, Croatia)
 SRIRAM RAMASWAMY (IISc, India)
 MADAN RAO (NCBS, India)
 PIERRE SENS (ESPCI, France)
 PRERNA SHARMA (IISc, India)
 MAHAK SHARMA (IISER Mohali, India)
 IVA TOLIC (RBI, Croatia)

11 – 22 JANUARY, 2021
 Application deadline
 31 Dec 2020

icts.res.in/discussion-meeting/ttb2021
ttb@icts.res.in



152 participants



NON-HERMITIAN PHYSICS (ONLINE)

The scope of the proposed online meeting is highly interdisciplinary and aims to bring together the recent works of mathematicians, theoretical physicists and experimental physicists working on different aspects of non-Hermitian Physics/Open Quantum Systems.

BROAD TOPICS/AREAS that will be included (but not restricted to) in this meeting are
 NON-HERMITIAN/PSEUDO-HERMITIAN QUANTUM THEORIES
 OPEN QUANTUM SYSTEMS (recent theoretical developments, state-of-the-art numerical advances and experimental progress)
 APPLICATIONS IN OPTICS AND NON-EQUILIBRIUM STATISTICAL MECHANICS
 CAVITY-QED AND CIRCUIT-QED SYSTEMS (Hybrid Quantum Systems)
 PT-SYMMETRIC DISCRETE SYSTEMS WITH APPLICATIONS IN CONDENSED MATTER AND PHOTONICS, TOPOLOGICAL PROPERTIES OF MATTER

SCOPE FOR THE YOUNG RESEARCHERS:
 Graduate students, post-doctoral fellows and young researchers interested/working in the fields related to non-Hermitian Systems / Open Quantum Systems may apply to participate in this online meeting. Those interested in applying must upload their CV with a list of publications

22 – 26 MARCH, 2021
 Application deadline | 15 March, 2021

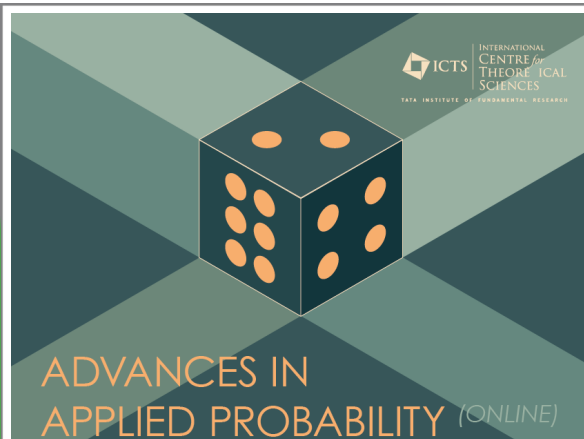
Organisers |
 MANAS KULKARNI (ICTS, India),
 BHABANI PRASAD MANDAL (Banaras Hindu Univ., India)

icts.res.in/program/nhp2021
nhp@icts.res.in

SPEAKERS
 Aashish Clerk (The Univ. of Chicago, US)
 Abhishek Dhar (ICTS, India)
 Ali Mostafaezadeh (Koc Univ., Istanbul, Turkey)
 Amrindra K. Sarmah (IIT Guwahati, India)
 Andreas Fring (City Univ., UK)
 Anirban Pathak (Jawahar Institute of Information Technology, India)
 Beatriz Olmos-Sanchez (Eberhard Karls Univ. of Tübingen, Germany)
 Bhabani Prasad Mandal (Banaras Hindu Univ., India)
 Bijay Agarwala (IISER Pune, India)
 Carl M. Bender (Washington Univ., US)
 Elena Del Valle (Universitat Autònoma de Madrid, Spain)
 Eva-Maria Graefe (Imperial College London, UK)
 Fabio Bagarello (Univ. of Palermo, Italy)
 Francisco Correa (Universidad Austral de Chile, Chile)
 Franco Nori (RIKEN, Japan)
 Garmon Savannah (Osaka Prefecture Univ., Japan)
 Geraldine Haack (Univ. of Geneva, Switzerland)
 Jacqueline Bloch (Univ. of Paris-Saclay, France)
 Jason Petta (Princeton Univ., US)
 Joshua Feinberg (Univ. of Haifa, Israel)
 Juzar Thingna (ICS-IBS, South Korea)
 Manas Kulkarni (ICTS, India)
 Miloslav Znojil (Institute of Nuclear Physics, Czech Republic)
 Naomichi Hatano (Institute of Industrial Science, Japan)
 Peter Millington (Univ. of Nottingham, UK)
 Pijush K. Ghosh (Vivek Bharti Univ., India)
 Prasanna Venkatesh (IIT Gandhinagar, India)
 Prashant Panigrahi (IISER Kolkata, India)
 Ranjan Modak (Banaras Hindu Univ., India)
 Takis Kontos (École Normale Supérieure de Paris, France)
 Uwe G. Eberhardt (Helmholtz Zentrum Dresden-Rossendorf, Germany)
 Vibhor Singh (IISc, India)
 Yogesh N. Joglekar (Indiana Univ.-Purdue Univ. Indianapolis, US)
 Hosho Katsura (Univ. of Tokyo, Japan)
 Konstantinos Makris (Univ. of Crete, Greece)
 Rajamani Vijayaraghavan (TIFR, India)



151 participants



ADVANCES IN APPLIED PROBABILITY (ONLINE)

In this one week program on Advances in Applied Probability second edition (AAP II), we will have some of the leading researchers in applied probability conduct short courses in emerging areas including:

- (1) Statistical learning theory
- (2) High dimensional computation
- (3) Monte Carlo methods
- (4) Discrete probability
- (5) Percolation
- (6) Empirical methods in probability

The program will include eighteen research talks mostly between 5:30 pm to 8:30 pm IST, spread over five days.


Eligibility criterion: Familiarity with probability at advanced undergraduate level

4 – 8 JANUARY, 2021
 Deadline for applying is 31 DECEMBER 2020.


program@icts.res.in
icts.res.in/program/aapi2021

SPEAKERS
 Nima Anari (Stanford University, US)
 Shubhajit Goswami (TIFR Mumbai, India)
 Navin Goyal (Microsoft Research Bengaluru, India)
 Anette (Pek) Hosoi (Massachusetts Institute of Technology, US)
 Gabor Lugosi (Pompeu Fabra University, Spain)
 Shie Mannor (Technion - Israel Institute of Technology, Israel)
 Jonathan Mattingly (Duke University, US)
 Natesh Pillai (Harvard University, US)
 Alexandre Prottere (KTH Royal Institute of Technology, Sweden)
 Alexander Rakhlin (Massachusetts Institute of Technology, US)
 Gareth Roberts (University of Warwick, Coventry, UK)
 Rahul Roy (Indian Statistical Institute, Delhi, India)
 Nike Sun (Massachusetts Institute of Technology, US)
 Joel Tropp (California Institute of Technology, US)
 Santosh Vempala (Georgia Institute of Technology, US)
 Mengdi Wang (Princeton University, US)

Organisers |
 Vivek Borkar (IIT Bombay, India), Sandeep Juneja (TIFR Mumbai, India), Kavita Ramanan (Brown University, US), Devavrat Shah (MIT, US), Piyush Srivastava (TIFR Mumbai, India)



140 participants



INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

STATISTICAL BIOLOGICAL PHYSICS: FROM SINGLE MOLECULE TO CELL (ONLINE)

The program intends to bring statistical physicists, molecular cell biologists, system biologists, physical chemists and mathematical biologists to an interdisciplinary meeting focussing on the common theme of "Fluctuations and noise" in stochastic biological processes. The common conceptual themes and theoretical techniques (both mathematical and computational) and their applications to subcellular and cellular phenomena will be presented by leading theorists. The successes and limitations of the new powerful experimental techniques developed over the last few years for probing these phenomena and the current technical challenges, will be discussed by renowned experimentalists.

7-18 DECEMBER 2020

APPLICATION DEADLINE: 31 OCTOBER, 2020

Organizers:
Debabrata Chowdhury, Anbarish Kumar and Prabal K. Maiti


ICTS.RES.IN/PROGRAM/STBP
stbp@icts.res.in

ELIGIBILITY CRITERIA:
Research scholars already registered for Ph.D. at recognized Universities, IITs, IISERs, NISER, research institutes are eligible to apply provided the applicant's area of research is covered by the main topics of this program. A final year student of 2-year M.Sc. program or 3-year Integrated M.Sc. program or M.S. is also eligible to apply if the applicant is carrying out any project work on a topic related to this program under the guidance of a faculty member of a recognized university. IISER, IIT, IISER, NISER or an equivalent institution. Exceptions can be made for undergraduate candidates with proven record of academic excellence. Applicants are expected to provide a brief write up on their research project in the statement of purpose and how attending the workshop is going to help them. Shortlisting will be done on the basis of their academic record and statement of purpose. Merely satisfying the eligibility criteria does not automatically guarantee selection because the number of participants who can be accommodated is very limited.


INVITED LECTURERS AND SEMINAR SPEAKERS

<p>Aleksandr Aleshin (University of Illinois, USA)</p> <p>Vishwani Ananthanarayanan (Indian Institute of Science, Bengaluru)</p> <p>Anand Bhattacharjee (Jawahar Institute of Science, New Delhi)</p> <p>Shoun Chakrabarti (National Centre for Biological Sciences, Bengaluru)</p> <p>Shaktanta Chatterjee (D. Bose National Centre, Kolkata)</p> <p>Qiang Cui (Boston University, USA)</p> <p>Dibyendu Das (Indian Institute of Technology, Bombay)</p> <p>Dipjyoti Das (Indian Institute of Science Education and Research, Kolkata)</p> <p>Peter Friedl (University of Michigan, USA)</p> <p>Nir S. Gov (Weizmann Institute of Science, Israel)</p> <p>Steven P. Gross (University of California, USA)</p> <p>Helmut Gruber (Max-Planck Institute-BPC, Germany)</p> <p>Jeremy Gunawardena (Harvard University, USA)</p> <p>Jonathan Howard (Yale University, USA)</p> <p>Tawseer Hussain (Indian Institute of Science, Bengaluru)</p> <p>Kavita Jain (Jawahar Institute of Science, Bengaluru)</p> <p>Mohit Kumar Jolly (Indian Institute of Science, Bengaluru)</p> <p>Frank Jülicher (Max-Planck Institute-BPC, Germany)</p>	<p>Kunihiko Kaneko (University of Tokyo, Japan)</p> <p>Stefan Klump (University of Göttingen, Germany)</p> <p>Anatoly Kolomoisky (Rice University, USA)</p> <p>Vijaykumar Krishnamoorthy (International Centre for Theoretical Sciences, Bengaluru)</p> <p>Joachim Krag (University of Cologne, Germany)</p> <p>Herbert Levine (Northeastern University, USA)</p> <p>Roop Malik (IIT Bombay, India)</p> <p>Alex Mogilner (Courant Institute, USA)</p> <p>Ranjith Padinhathoor (Indian Institute of Technology, Bombay)</p> <p>Raja Paul (Indian Association for the Cultivation of Science, Kolkata)</p> <p>Madan Rao (National Centre for Biological Sciences, India)</p> <p>Mohd Subali Rizvi (Indian Institute of Technology, Hyderabad)</p> <p>Jennifer L. Ross (Syracuse University, USA)</p> <p>Masaki Sasaki (University of Nagoya, Japan)</p> <p>Ana-Suncana Smith (University of Erlangen, Germany)</p> <p>Nagarajan Valdehl (Beckman Center, USA)</p>
--	---

The duration of invited lectures and invited seminars are 60 minutes and 30 minutes, respectively. Each lecture and seminar will be followed by a 15-minute question-answer session.



136 participants



INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Turbulence: Problems at the Interface of Mathematics and Physics (ONLINE)


Recently, there has been an important advance in the ab initio mathematical understanding of turbulence: by using tools from Gromov's convex integration theory and closely related to Nash's paper on isometric embeddings, the construction of weak (distributional) solutions of the Euler equation for an incompressible, inviscid fluid has been achieved: these solutions have K41 scaling properties and possess Ons49 anomalous dissipation. This provides us with a novel framework for synthesizing turbulent flows with realistic dynamics. The time is now ripe to bring together a wide range of specialists for a new assault on the turbulence problem. We propose a cohesive mathematical, physical, and numerical strategy for constructing a large class of weak dissipative solutions with multifractal scaling, now genuinely deduced from the hydrodynamical equations. The investigation of the associated invariant measure (i.e., the long-time statistical properties) should reveal to what extent the scaling properties are characterized by universal exponents. Furthermore, there are indications that turbulence with (spatial) power-law forcing has at least two different regimes (dependent on the power-law forcing): one with scale invariant statistics and one with multifractal statistics, i.e., broken scale invariance. These can be disentangled by using a variant of theories of spontaneous stochasticity rough paths and regularity structures, as recently applied to the Kardar-Parisi-Zhang (KPZ) equation. This two-week Discussion Meeting will first introduce participants to these developments and then have (a) specialised talks by leading experts in these areas and (b) focused discussions between them to make progress on the solutions of the challenging problems here.

7 - 18 DECEMBER, 2020

Application deadline: November 15, 2020

Organizers:
URIEL FRISCH (Observatoire de la Côte d'Azur and CNRS, France), KONSTANTIN KHANIN (Univ. of Toronto, Canada), RAHUL PANDIT (Indian Institute of Science, Bengaluru)

ICTS.RES.IN/PROGRAM/TPMP2020
tpmp@icts.res.in



125 participants



INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Recent Developments in S-matrix theory

Scattering amplitudes have played a central role in quantum field theory since its inception. Recent years have seen a remarkable advance in our understanding of scattering amplitudes, both for theoretical and phenomenological purposes. Apart from playing a prominent role in high-energy particle physics, these developments have far-reaching implications in a wide range: from hidden symmetries of gauge theories and gravity, to string perturbation and ambi-twistor strings, to new mathematics such as positive geometries.

We see that there is an intricate web of remarkable recent developments in our understanding of scattering Amplitudes from UV to deep IR. This program will bring together researchers working in scattering amplitudes, IR physics and asymptotic symmetries and mathematics, with the goals of:

- Reviewing recent progress with both pedagogical lectures and research talks strengthening connections between areas of mathematics and physics
- Relevant to these topics
- Inspiring further progress and collaborations among the participants.

Eligibility Criteria: The program is targeted towards senior (fourth year and above) advanced PhD students, postdocs and faculty. All participants, including those from Bengaluru are requested to register, for organizational purpose.

13 - 31 JULY, 2020
Ramanujan Hall, ICTS, Bengaluru

Application deadline: 29 FEBRUARY 2020

Organizers:
Alok Laddha, Yu-tin Huang, Song He

rdst@icts.res.in
icts.res.in/program/rdst2020



LIST OF RESEARCH MEETINGS AT ICTS

April 2020 - July 2021

Sl No.	Research meetings (Online)	Duration
1	Gravitational Wave Astrophysics	18 - 22 May 2020
2	Bangalore School on Statistical Physics - XI	29 Jun - 10 Jul 2020
3	Discussion Meeting on Zero Mean Curvature Surfaces	07 - 15 Jul 2020
4	Recent Developments in S-matrix theory	20 - 31 Jul 2020
5	Zariski-dense Subgroups and Number-theoretic Techniques in Lie Groups and Geometry	30 Jul 2020
6	Virtual Meeting on Compact Stars and QCD 2020 (Originally "Compact Stars in the QCD Phase Diagram VIII: The era of multi-messenger Astronomy")	17 - 21 Aug 2020
7	Knots through Web	24 - 28 Aug 2020
8	Physics of the Early Universe - An Online Precursor	31 Aug- 03 Sept 2020
9	Extreme Nonequilibrium QCD	05 - 09 Oct 2020
10	Less Travelled Path of Dark Matter: Axions and Primordial Black Holes	09 - 13 Nov 2020
11	Recent developments Around P-adic Modular Forms	30 Nov - 04 Dec 2020
12	Winter School on Quantitative Systems Biology: Quantitative Approaches in Ecosystem Ecology	30 Nov - 18 Dec 2020
13	Statistical Biological Physics: From Single Molecule to Cell	07 - 18 Dec 2020
14	Turbulence: Problems at the Interface of Mathematics and Physics	07 - 18 Dec 2020
15	Advances in Applied Probability II	04 - 08 Jan 2021
16	Thirsting for Theoretical Biology	11 - 22 Jan 2021

ICTS ACTIVITIES

17	Nonperturbative and Numerical Approaches to Quantum Gravity, String Theory and Holography	18 - 22 Jan 2021
18	Dualities in Topology and Algebra	01 - 13 Feb 2021
19	Multi-scale Analysis: Thematic Lectures and Meeting (MATHLEC-2021)	15 - 19 Feb 2021
20	Probabilistic Methods in Negative Curvature	01 - 12 Mar 2021
21	Non-Hermitian Physics	22 - 26 Mar 2021
22	Online School and Discussion Meeting on Trapped Atoms, Molecules and Ions	10 - 22 May 2021
23	Summer School for Women in Mathematics and Statistics	14 - 25 Jun 2021
24	Bangalore School on Statistical Physics - XII	28 Jun - 09 Jul 2021
25	ICTS Summer School on Gravitational-Wave Astronomy	05 - 16 Jul 2021
26	Quantum Fields, Geometry and Representation Theory 2021	05 - 23 Jul 2021