



INTERNATIONAL
CENTRE *for*
THEORETICAL
SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

About the ICTS

Spenta R. Wadia

29 May 2017



What is the Goal of the ICTS?



ICTS 2007-

- To bring together physicists, astronomers, cosmologists, mathematicians, biologists from all over the world, under one roof
- To work together to solve the most challenging questions posed by nature
- To provide advanced science education
- To help create a scientific temper in society

Enabled by:

1. Programs
2. In-house Research
3. Science Outreach

ICTS Programs

Discussion Meeting

INFORMATION PROCESSING IN BIOLOGICAL SYSTEMS

4th to 7th JANUARY 2016

RAMANJAN LECTURE HALL, ICTS CAMPUS, BANGALORE

The study of a variety of processes in biological systems, such as the neural code, the genetic code, and the evolution of a genome in the recent past, has led to a paradigm shift in the way we think about information processing in biological systems. This meeting will bring together leading experts in the field to discuss the latest developments in this area.

Speakers:

- Vijay Balachandran, IISc Bangalore, India
- David Blei, MIT, USA
- Chaitin G. G. King, IISc Bangalore, India
- John J. Hopfield, MIT, USA
- Michael J. Heuley, IISc Bangalore, India
- David S. H. Chan, IISc Bangalore, India
- Arjun Ghosh, IISc Bangalore, India
- Robert M. M. Riegler, IISc Bangalore, India
- Michael J. Heuley, IISc Bangalore, India
- Chaitin G. G. King, IISc Bangalore, India
- John J. Hopfield, MIT, USA
- Michael J. Heuley, IISc Bangalore, India
- David S. H. Chan, IISc Bangalore, India
- Arjun Ghosh, IISc Bangalore, India
- Robert M. M. Riegler, IISc Bangalore, India

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/01/04>

Deadline: Sunday 20 March, 2016

THE ICTS ABRAHAM SALAM MEMORIAL LECTURE

Overview of Particle Physics after the Higgs Discovery

FERNANDO QUEVEDO
 Universidad de Zaragoza, Spain

The discovery of the Higgs boson has been one of the greatest scientific achievements of fundamental science in decades, establishing the validity of the Standard Model of particle physics beyond reasonable doubt. It has also led to very strong constraints on what new physics may exist beyond the Standard Model and is starting to put doubts on some principles of physics such as naturalness. An overview is presented on what physics may be available to go beyond the Standard Model and address its main open questions, such as dark energy and dark matter. A brief overview will be presented on Abdu Salam's vision regarding fundamental physics and scientific policy.

DATE : Monday, 10 December 2015
 TIME : 5:30 pm
 VENUE : Faculty Hall, ICTS, Bangalore

WE ARE WELCOME

ICTS DISCUSSION MEETING

The Legacy of Emmy Noether

The legacy of Emmy Noether is profound. Her work on the connection between symmetry and conservation laws has shaped modern physics. This meeting will explore her contributions and their impact on contemporary research.

Speakers:

- A. Azeiteiro, IISc Bangalore
- R. K. Mishra, IISc Bangalore
- R. K. Mishra, IISc Bangalore

29 - 30 August, 2016

Madhava lecture hall, ICTS Bangalore

Application deadline: 01 JULY 2016

International applications only visit <http://www.icts.res.in/programs/2016/08/29>

ICTS PUBLIC LECTURE

Scaling of Electronic Devices: From the Vacuum Tube to a Single-Molecule Diode

The scaling of electronic devices has been a central theme in the development of modern electronics. This lecture will discuss the challenges and opportunities in scaling devices from the vacuum tube to the single-molecule diode.

Speakers:

- Latha Venkataraman, IISc Bangalore

Thursday, January 28, 2016
 4:30 pm
 Ramanjanan lecture hall, ICTS, Bangalore

Registration can be arranged for groups from groups@icts.res.in. Please email for details.

All are welcome.

SRINIVASA RAMANUJAN

Understanding non-equilibrium: some recent advances and a challenge for the future

The study of non-equilibrium systems has become a major focus in physics. This lecture will discuss recent advances in the field and the challenges that lie ahead.

Speakers:

- Herbert Spohn, Universität Konstanz, Germany

LECTURE 1: TUESDAY, 3 NOVEMBER, 2015 at 4:00 pm
 LECTURE 2: WEDNESDAY, 4 NOVEMBER, 2015 at 10:00 am
 LECTURE 3: THURSDAY, 5 NOVEMBER, 2015 at 10:00 am

VENUE : RAMANJANAN LECTURE HALL, ICTS CAMPUS, BANGALORE

EMAIL: programs@icts.res.in CONTACT: TEL: 080 2300 1200 | WEB: www.icts.res.in

SUBRAMANIAN CHANDRASEKHAR LECTURES

Random Matrix Theory and the Appearance of Emergent Behavior

Random Matrix Theory has found applications in various fields of physics, from quantum chaos to complex networks. This lecture will explore the emergence of behavior in these systems.

Speakers:

- Herbert Spohn, Universität Konstanz, Germany

Lecture 1: Thurs, 27 October 2015 at 4:00 pm
 Lecture 2: Fri, 30 October 2015 at 10:00 am
 Lecture 3: Thurs, 29 October 2015 at 10:00 am

VENUE: Ramanjanan lecture hall, ICTS campus, Bangalore

ICTS Summer Research Program on Dynamics of Complex Systems

Program Dates: 27 July 2015 - 22 Aug 2015

This program is open to all students and young researchers in physics, chemistry, biology, and engineering. The program will focus on the dynamics of complex systems, including topics such as network theory, chaos theory, and self-organized criticality.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/07/27>

Deadline: Sunday 20 March, 2016

EXTRAGALACTIC RELATIVISTIC JETS: CAUSE AND EFFECT

ICTS-TIFR campus, Bangalore, India

22 - 26 OCTOBER 2015

This program will focus on the study of extragalactic relativistic jets, including their formation, propagation, and interaction with the environment. The program will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/10/22>

Deadline: Sunday 20 March, 2016

School on Current Frontiers of Condensed Matter Research

June 20 - June 26, 2016

This school will focus on the current frontiers of condensed matter research, including topics such as topological materials, quantum magnetism, and quantum transport. The school will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/06/20>

Deadline: May 20, 2016

Winter School on Quantitative Systems Biology

27-20 December 2015
 ICTS Campus, Bangalore, India

This winter school will focus on quantitative systems biology, including topics such as stochastic modeling, network theory, and systems analysis. The school will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/12/27>

Deadline: May 20, 2016

DISCUSSION MEETING

Games, Epidemics and Behavior

27 June - 1 July, 2016
 Venue: Madhava Lecture Hall, ICTS, Bangalore

This meeting will focus on the study of games, epidemics, and behavior, including topics such as network theory, stochastic modeling, and systems analysis. The meeting will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/06/27>

Deadline: May 20, 2016

Einstein lectures

Einstein's legacy and the search for gravitational waves

Bruce Allen, MIT

This lecture will discuss the legacy of Albert Einstein and the search for gravitational waves. The lecture will include a discussion of Einstein's theory of general relativity and the recent detection of gravitational waves.

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/06/27>

Deadline: May 20, 2016

ALAN TURING LECTURES IN BIOLOGY

Second England School on Population Genetics

This lecture will focus on the study of population genetics, including topics such as natural selection, genetic drift, and the evolution of complex systems. The lecture will include a discussion of the work of Alan Turing and its impact on biology.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/06/27>

Deadline: May 20, 2016

ICTS DISCUSSION MEETING

THE FUTURE OF GRAVITATIONAL WAVES

22 December 2015 - 02 January 2016
 ICTS Campus, Bangalore, India

This meeting will focus on the future of gravitational waves, including topics such as the detection of gravitational waves, the study of black holes, and the implications for cosmology. The meeting will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/12/22>

Deadline: May 20, 2016

Modern Finance and Macroeconomics: A Multidisciplinary Approach

22 December 2015 - 02 January 2016
 ICTS Campus, Bangalore, India

This program will focus on modern finance and macroeconomics, including topics such as financial markets, economic growth, and the role of government. The program will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/12/22>

Deadline: May 20, 2016

RAMAN RESEARCH INSTITUTE

Bangalore School on Statistical Physics - VII

(a joint ICTS-RRI program)
 1 - 15 July 2016
 Venue: ICTS, Bangalore, India

This school will focus on statistical physics, including topics such as phase transitions, critical phenomena, and the study of complex systems. The school will include lectures, workshops, and a poster session.

Speakers:

- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore
- Arjun Ghosh, IISc Bangalore
- Chaitin G. G. King, IISc Bangalore
- John J. Hopfield, MIT
- Michael J. Heuley, IISc Bangalore
- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2016/07/01>

Deadline: May 20, 2016

ICTS DISCUSSION MEETING

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22 December 2015 - 02 January 2016
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Deadline: May 20, 2016

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- David S. H. Chan, IISc Bangalore

For details of the application process, please visit the program web page: <http://www.icts.res.in/programs/2015/12/22>

Deadline: May 20, 2016

-Programs:

Pedagogical Schools

Workshops and Conferences

Discussion meetings

Since 2007, ICTS has organized **118 programs** and **44 discussion meetings**, with over 5000 participants (1500+ from abroad) – tangible impact on the Indian science scene.

-Programs

A new model for scientific exchange and collaboration in India

Place to gather researchers to brainstorm; to incubate new ideas; to chart out roadmaps...

Strong pedagogical component benefits students and postdocs and even senior researchers

Talks archived on [YouTube](#) channel “[ictstalks](#)”

Sample Programs...

Random Matrix Theory and Applications

Cosmology with the CMB

Correlated Electrons and Frustrated Magnetism

Monsoon Workshop on String theory

Numerical Relativity

The Role of Theory in Biology

Mathematical Perspectives on Clouds, Climate and Tropical Meteorology

Scientific Discovery through Intensive Data Exploration

Modern Trends in Electron Transfer Chemistry: From Molecular Electronics to Devices

Infosys-ICTS Lecture series:

S. Chandrasekhar (physical sciences) - *Sen, Page, Frisch, Faddeev, Georges, Procaccia, Majumdar, Strominger, Sachdev, ...Spohn*
future... *Ellis (next week), Derrida, Seiberg, Berry, Sood, Srinivasan*

S. Ramanujan (mathematical sciences) - *Sarnak, Majda, Scholze, Khare..Jona-Lasinio* future... *Varadhan*

A.Turing (biology, computer science, engineering and related areas) - *Arora, Schapire, Kannan, Bialek...Moore*

ICTS as a platform for new initiatives:

Nodal Centre for LIGO-India (LIGO- Tier 3 data centre)

Pilot phase of INDIALIGHT - large data high speed network (2012)

ICTP-ICTS Quantitative Biology Program (next program at ICTS in December 2017)

Kavli Asian Winter Schools on Particles, Strings and Cosmology (next at ICTS in January 2018)

ICTS Summer Schools on CMT

ICTS-Brandeis-NSF Schools on Statistical Physics

Mathematics of Planet Earth (2013)

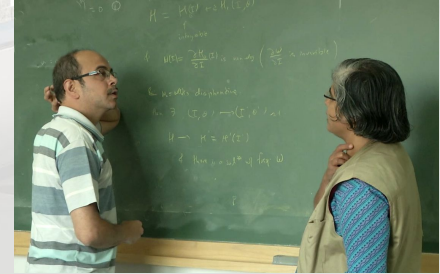
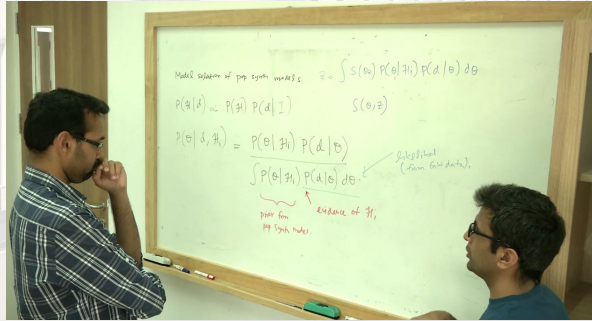
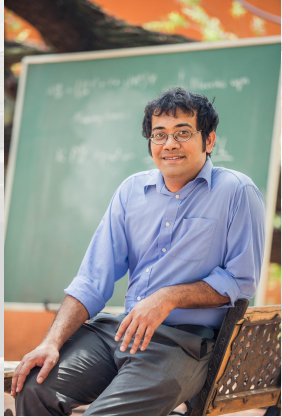
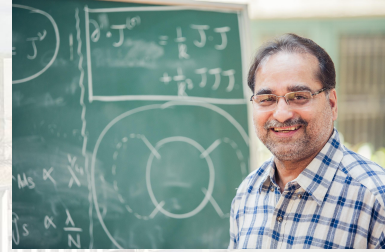
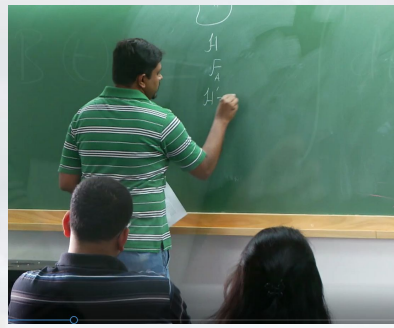
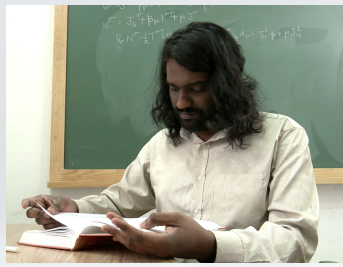
Summer Courses by Distinguished Scientists (presently Prof G. Srinivasan: “A Journey through the Universe”, 11 lectures on astrophysics and cosmology)

In-house Faculty

Highest quality faculty in the theoretical sciences, strong core strengths but interests across disciplines

Complex systems, Space-time Physics, Mathematics

Regular Faculty(16)+Junior (1)+Emeritus(1)+Visiting/Joint(2)



Research Areas...

- ❖ Data assimilation and Dynamical Systems
- ❖ Statistical Physics, Condensed Matter Physics, Fluids, Physical Biology
- ❖ Interdisciplinary Mathematics (PDEs, Geometry, Probability...)
- ❖ Astrophysical Relativity
- ❖ String Theory and Quantum Gravity

Postdoctoral and Graduate program in physics and mathematics

Posdocs (25), Students (29) + visiting students + S. N. Bhat summer program

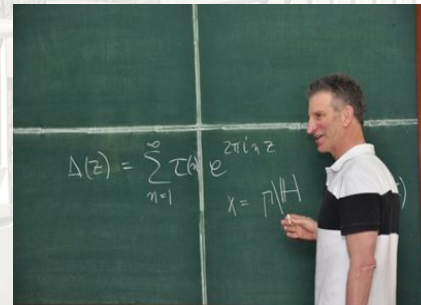
Science Outreach

*Stimulate and
harness the
young minds of
India....*



Public Lectures

Public lectures by eminent scientists act as sources of inspiration and foster an active interest in basic sciences in society...



❖ Einstein Lectures

❖ Abdus Salam Lectures



MATHEMATICS OF PLANET EARTH (MPE) 2013, BENGALURU

*An interactive exhibition on
Mathematics for the Billion.*

*Held at the VITM, Bengaluru from
22nd November to 1st December
2013...over 30,000 visitors*



Kaapi with Kuriosity

Why?

To stimulate curiosity in the sciences

For Whom?

High school and college students, professionals working in other fields but interested in science...

Once a month at the JN Planetarium or VITM

Topics...weather, neuroscience, string theory, mathematics...

Krish and Chandan



- This meeting has been organized in part to honor Krish and Chandan and celebrate their outstanding contributions to physics and Indian science
- It is a privilege and honor for us at ICTS to participate in the celebrations honoring them as they are among the true friends and strong supporters of the ICTS. Their help in creating this institute has been invaluable.
- Thanks to Aveek Bid, Pinaki Chaudhuri, Tanmoy Das, Smarajit Karmakar, Prabal Maiti, Subroto Mukerjee and Srikanth Sastry, for putting this meeting together.

