Felicitation of

INTERNATIONAL OLYMPIAD MEDALLISTS, 2021

in the sciences and mathematics

SCIENTIFIC PROGRAMME
09.30 to 11.30 hrs
Expository lectures by eminent scientists

AWARD CEREMONY
12.00 to 13.30 hrs

Wednesday, December 22, 2021

The event is organized by
Homi Bhabha Centre for Science Education, TIFR
in association with
Infosys Foundation and the **TIFR Endowment Fund.**

VENUE
Homi Bhabha Centre for Science Education, TIFR
V. N. Purav Marg, Mankhurd, Mumbai – 400 088
Tel: 022-25562132, 25580036
www.hbcse.tifr.res.in

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OLYMPIADS IN MATHEMATICS, SCIENCES AND INFORMATICS

The International Olympiads in Mathematics, Physics, Chemistry, Biology, Astronomy and Astrophysics, Junior Science, Earth Science and Informatics are annual academic competitions to stimulate and challenge bright young pre-university students. The aims of the International Olympiads are to promote academic excellence and also to foster friendship among students and teachers of different countries. India started participating in International Olympiads in Mathematics from 1989, in Physics, Chemistry, Biology, Astronomy and Informatics about a decade later, followed by participation in the Earth Science and the Junior Science Olympiads. India has hosted the International Mathematical Olympiad (1996), International Chemistry Olympiad (2001), International Astronomy Olympiad (2006), International Biology Olympiad (2008), International Earth Science Olympiad (2013), International Junior Science Olympiad (2013), International Physics Olympiad (2015) and International Olympiad on Astronomy and Astrophysics (2016).

Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR) is the nodal agency for implementing the Olympiad programme in Mathematics, Physics, Chemistry, Biology, Astronomy and Astrophysics, and Junior Science. The Olympiad programme in the five science subjects is overseen by a National Steering Committee. The Indian Olympiad programme typically involves three stages of selection. The first stage selects a few hundred students from among tens of thousands who appear for the preliminary examinations all over the country. The first stage of the science Olympiads is carried out by the Indian Association of Physics Teachers (IAPT) with support from teacher associations of chemistry and biology. In the mathematics Olympiads carried out under the aegis of the National Board of Higher Mathematics (NBHM), the first stage is conducted by the Mathematics Teachers' Association, India (MTAI) and the second stage is decentralised.

The higher stages in the five science subjects and mathematics are carried out by HBCSE with support from teachers and scientists nationwide. The second stage (third stage for mathematics) is the Indian National Olympiads – the most challenging contests in mathematics and sciences at the pre-college level held in the country. Between 35 and 50 national Olympiad winners in each subject undergo training and testing every summer at HBCSE, after which the Indian teams are selected to represent the country at the International Olympiads.

The Earth Science Olympiad programme is carried out by the Geological Society of India (GSI), the camp being held at Bengaluru or Chennai. The Junior Astronomy Olympiad is under the supervision of the National Council of Science Museums (NCSM) with the training camp being held at NCSM centres. The Informatics Olympiad programme is carried out by the Indian Association for Research in Computing Science (IARCS), the training camp being held at The International School, Bengaluru.

The Science Olympiad programme in India is funded by the Board of Research in Nuclear Sciences (BRNS) of the Department of Atomic Energy (DAE), the Department of Science and Technology (DST) and the Ministry of Education (MoE). The Mathematics Olympiad programme is funded by NBHM (DAE) and MoE. The Astronomy Olympiad programme is funded by the Department of Space (DOS), DAE, and NCSM. The Informatics Olympiad is funded by Indian Association for Research in Computing Science (IARCS), Sasken Technologies Ltd, TCS iON (a division of Tata Consultancy Services), CodeChef (a not-for-profit educational initiative of Unacademy) and Chennai Mathematical Institute. The Earth Science Olympiad programme is funded by the Ministry of Earth Sciences (MoES).

Indian students have been doing consistently well at the International Olympiads. In 2021 all the Olympiads were conducted in online mode and the performance was: Mathematics - 1 Gold, 1 Silver, 3 Bronze; Chemistry - 2 Gold, 2 Silver; Biology - 3 Silver, 1 Bronze; Astronomy and Astrophysics - 4 Gold, 1 Silver (top position in medals tally); Informatics - 2 Silver, 1 Bronze; Junior Science - 6 Gold (top position in medals tally). Out of the 29 students who participated in various Olympiads, 27 won either a gold, silver or bronze medal. Unfortunately, India could not participate in the international olympiads in Physics, Earth Science and Astronomy (Junior) this year due to disruption in the national programme and health concerns related to COVID-19 pandemic. Our Olympiad students are comparable with the best in the world and we are justifiably proud of them.

ACKNOWLEDGEMENTS

In 2002, Infosys Foundation instituted awards to Indian medallists in the International Olympiads. The awards consist of a cash prize of Rs 15000, the grant for which has been given to the TIFR Endowment Fund. HBCSE (TIFR) expresses its deep gratitude to Smt. Sudha Murty, Chair, Infosys Foundation for her spontaneous and generous response to the Institute's request for this support. We also thank the TIFR Endowment Fund for their proactive interest in the Olympiad programme.

The Government of India has been generously supportive of the Olympiad programme through its various agencies as listed above. We are thankful for this support and for the support for the Informatics Olympiad by the agencies listed. Finally, it is a pleasure to thank the Indian Association of Physics Teachers, the Association of Teachers in Biological Sciences, the Association of Chemistry Teachers, the Mathematics Teachers' Association (India), Indian Physics Association, National Council of Educational Research and Training, IARCS, GSI, NCSM and the large number of scientists and teachers from different institutions across the country for their enthusiastic collaboration in this exciting activity.

Arnab Bhattacharya
Chair, National Steering Committee
Science and Astronomy Olympiads.

Morning Session
Expository Lectures by Eminent Scientists

Lecture 1 (9:30 to 10:30 hrs)

Prof. Yamuna Krishnan
University of Chicago, USA

DNA nanodevices in Living Systems

Due to its nanoscale dimensions and ability to self-assemble via specific base pairing, DNA is rapidly taking on a new aspect where it is finding use as a construction element for architecture on the nanoscale. Structural DNA nanotechnology has yielded architectures of exquisite complexity and functionality *in vitro*. However, till 2009, the functionality of such synthetic DNA-based devices in living organisms remained elusive. Work from my group the last few years has bridged this gap where, we have chosen architecturally simple, DNA-based molecular devices and shown their functionality in complex living environments. Using one example from our lab, I will illustrate the potential of DNA based molecular devices as unique tools with which to interrogate living systems. We are exploring the full potential of DNA to probe a variety of second messengers and image protein activity within living cells and genetic model organisms.

About the Speaker

Prof. Yamuna Krishnan is a professor at the Department of Chemistry, University of Chicago, since August 2014. She won the Shanti Swarup Bhatnagar Prize for science and technology, in the year 2013 in the Chemical Sciences, the Infosys Prize for Physical Sciences in 2017 and the Sun Pharma Foundation Award for Basic Medical Research in 2020.

Her current research interests are in the areas related to structure and dynamics of nucleic acids, nucleic acid nanotechnology, cellular and subcellular technologies. Her lab tries to understand the functions from DNA beyond that of its traditional role as the genetic material. They develop versatile, chemical imaging technology using self-assembled DNA nanostructures to quantitatively image second messengers in real time, in living cells and genetic model organisms.

Morning Session
Expository Lectures by Eminent Scientists

Lecture 2 (10:30 to 11:30 hrs)

Prof. Chandrashekhar Khare
University of California Los Angeles, USA

25 Years after the Proof of Fermat's Last Theorem

In 1994 Andrew Wiles stunned the mathematical world by proving Fermat's Last Theorem. His was a very 20th century proof of Fermat's problem that was stated in the 17th century. I will talk about Wiles's monumental achievements, and give some ideas about what goes into Wiles's proof, why Fermat might have been mistaken that he had solved his problem, and the continuing relevance of the ideas of the proof of FLT to algebraic number theory.

About the Speaker

Prof. Chandrashekhar Khare is a professor of mathematics at the University of California Los Angeles. In 2005, he made a major advance in the field of Galois representations and number theory by proving the level 1 Serre conjecture, and later a proof of the full conjecture with Jean-Pierre Wintenberger.

Prof. Khare is the winner of the INSA Young Scientist Award (1999), Fermat Prize (2007), the Infosys Prize (2010), and the Cole Prize (2011). He has been on the Mathematical Sciences jury for the Infosys Prize from 2015, serving as Jury Chair from 2020.

Afternoon Session (12:00 – 13:30 hrs.) **Address & Award distribution by** **Prof. E. V. Sampathkumaran** Distinguished Professor (Retd.) & Raja Ramanna Fellow HBCSE, TIFR	

About the Chief Guest

Prof. Sampathkumaran is a condensed matter physicist and a Distinguished Professor, retired from the Tata Institute of Fundamental Research and is currently Raja Ramanna Fellow at HBCSE, TIFR. Known for his research on the thermal and transport behaviour of magnetic systems, Prof. Sampathkumaran is an elected fellow of all the three major Indian science academies viz. Indian Academy of Sciences, Indian National Science Academy and National Academy of Sciences, India as well as The World Academy of Sciences. The Council of Scientific and Industrial Research, the apex agency of the Government of India for scientific research, awarded him the Shanti Swarup Bhatnagar Prize for Science and Technology, one of the highest Indian science awards, for his contributions to physical sciences in 1999.

INDIAN DELEGATION TO THE 62nd INTERNATIONAL MATHEMATICAL OLYMPIAD 2021

The following team represented India at the 62nd International Mathematical Olympiad held online and hosted by Russia from July 14 to July 24, 2021.

Sr. no.	Students	Medals	
1	Pranjal Srivastava National Public School, Koramangala, Bengaluru	Gold	
2	Anish Kulkarni Late P. B. Jog Junior College, Kothrud, Pune	Silver	
3	Ananya Ranade MTES, Pune	Bronze	
4	Rohan Goyal K. R. Mangalam World School, Vikaspuri, New Delhi	Bronze	
5	Suchir Kaustav Delhi Public School, Noida	Bronze	
6	Vedant Saini Bhavan Vidyalaya, Chandigarh	--	

Leaders and Scientific Observers

1	Dr. S. Muralidharan Mathematical Teachers' Association (India)	Leader	
2	Mr. Sahil Mhaskar Chennai Mathematical Institute, Chennai	Deputy Leader	
3	Prof. S. R. Krishnan Indian Institute of Technology Bombay	Scientific Observer	
4	Mr. Anant Mudgal Chennai Mathematical Institute, Chennai	Scientific Observer	

INDIAN DELEGATION TO THE 53rd INTERNATIONAL CHEMISTRY OLYMPIAD 2021

The following team represented India at the 53rd International Chemistry Olympiad held online and hosted by Japan, from July 25 to August 02, 2021.

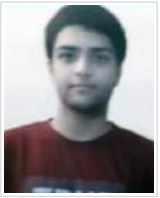
Sr. no.	Students	Medals	
1	Adarsh Reddy Madur Narayana Jr College, Hyderabad	Gold	
2	Dhananjay Raman Bal Bharati Public School, Delhi	Gold	
3	Mahit Rajesh Gadhiwala Scholar English Academy, Surat	Silver	
4	Rishit Singla Modern Vidya Niketan, Faridabad	Silver	

Leaders and Scientific Observers

1	Dr. Ankush Gupta HBCSE (TIFR), Mumbai	Head Mentor	
2	Prof. Nandita Madhavan Indian Institute of Technology Bombay	Mentor	
3	Dr. Dimple Dutta BARC, Mumbai	Scientific Observer	

INDIAN DELEGATION TO THE 32nd INTERNATIONAL BIOLOGY OLYMPIAD CHALLENGE 2021

The following team represented India at the 32nd International Biology Olympiad Challenge held online and hosted by Portugal from July 18 to July 23, 2021.

Sr. no.	Students	Medals	
1	Anshul Siwach Pragati Public School, Delhi	Silver	
2	Dhiren Bharadwaj Pragati Public School, Delhi	Silver	
3	Naman Singh Jayshree Periwal High School, Jaipur	Silver	
4	Swaraj Nandi Disha Delphi Public School, Kota	Bronze	

Leaders and Scientific Observers

1	Prof. Madan M. Chaturvedi Delhi University	Jury Member	
2	Prof. Rekha Vartak HBCSE, Mumbai	Jury Member	
3	Prof. Ram Kumar Mishra IISER Bhopal	Jury Member	
4	Dr. Sasikumar Menon TDM Lab, Mumbai	Jury Member	

INDIAN DELEGATION TO THE 14th INTERNATIONAL OLYMPIAD ON ASTRONOMY AND ASTROPHYSICS 2021

The following team represented India at the 14th International Olympiad on Astronomy and Astrophysics held online and hosted by Colombia from November 14 to November 21, 2021.

Sr. no.	Students	Medals	
1	Chahel Singh Disha Delphi Public School, Kota	Gold	
2	Anilesh Bansal Delhi Public School, Faridabad	Gold	
3	Suren S. M. Arya Public School, New Delhi	Gold	
4	Arhaan Ahmad Krishna Public School, Meerut	Gold	
5	Dhruv Ahlawat Alpha Junior College, Mumbai	Silver	

Leaders and Scientific Observers

1	Prof. Avinash Deshpande Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune	Leader	
2	Prof. A. N. Ramaprakash Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune	Leader	
3	Prof. Durgesh Tripathi Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune	Scientific Observer	
4	Prof. Sarita Vig Indian Institute of Space Science and Technology, Thiruvananthapuram	Scientific Observer	
5	Dr. Akshat Singhal Indian Institute of Technology Bombay	Scientific Observer	
6	Dr. Uttam Bhat University of California Santa Cruz, USA	Scientific Observer	

INDIAN DELEGATION TO THE 32nd INTERNATIONAL OLYMPIAD IN INFORMATICS 2020 (ONLINE MODE)

The following team represented India at the 32nd International Olympiad in Informatics held online and hosted by Singapore from September 13 to September 19, 2020.

Sr. no.	Students	Medals	
1	Rajarshi Basu Bodhicarya Senior Secondary School, Kolkata	Silver	
2	Udit Sanghi Bhavan Vidyalaya, Panchkula	Silver	
3	Shashwat Chandra Delhi Public School, RK Puram, New Delhi	Bronze	
4	Kshitij Sodani Delhi Public School, Gurgaon	Bronze	

Leaders and Scientific Observers

1	Prof. Madhavan Mukund Chennai Mathematical Institute, Chennai	Leader	
2	Prof. K Narayan Kumar Chennai Mathematical Institute, Chennai	Deputy Leader	

INDIAN DELEGATION TO THE 33rd INTERNATIONAL OLYMPIAD IN INFORMATICS 2021 (ONLINE MODE)

The following team represented India at the 33rd International Olympiad in Informatics held online and hosted by Singapore from June 19 to June 25, 2021.

Sr. no.	Students	Medals	
1	Udit Sanghi Bhavan Vidyalaya, Panchkula	Silver	
2	Kshitij Sodani Delhi Public School, Gurgaon	Silver	
3	Pranjal Srivastava National Public School, Koramangala, Bengaluru	Bronze	
4	Aditya Jain PACE Junior Science College, Mumbai	--	

Leaders and Scientific Observers

1	Prof. Madhavan Mukund Chennai Mathematical Institute, Chennai	Leader	
2	Prof. K Narayan Kumar Chennai Mathematical Institute, Chennai	Deputy Leader	

INDIAN DELEGATION TO THE 18th INTERNATIONAL JUNIOR SCIENCE OLYMPIAD 2021

The following team represented India at the 18th International Junior Science Olympiad held online and hosted by Dubai, UAE from December 12 to December 21, 2021.

Sr. no.	Students	Medals	
1	Aditya DL DAV Model School, Delhi	Gold	
2	Animesh Pradhan Modern Delhi Public School, Haryana	Gold	
3	Devesh Pankaj Bhaiya L. H. Patil English Medium School, Wavadade, Maharashtra	Gold	
4	Harshin Posina FIITJEE School, Telangana	Gold	
5	Rajdeep Mishra Air Force School Jamnagar, Gujarat	Gold	
6	Ved Lahoti Rankers International School, Madhya Pradesh	Gold	

Leaders and Scientific Observers

1	Prof. Abhijit Chavan S. P. College, Pune	Leader	
2	Dr. Anuttama Kulkarni HBCSE, Mumbai	Leader	
3	Ms. Saurabhee Huli Jamnabai Narsee International School, Mumbai	Leader	
4	Dr. Hemant Khanolkar Fr. Conceicao Rodrigues College of Engineering Father Agnel Ashram, Mumbai	Scientific Observer	
5	Ms. Shamali D. Khalatkar Shri Mathuradas Mohota College of Science, Nagpur	Scientific Observer	
6	Prof. Aniket Sule HBCSE, Mumbai	Scientific Observer	

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Programme

Scientific Talks (09:30 – 11:30 hrs)

09:30 – 10:30 hrs:	DNA nanodevices in Living Systems **Prof. Yamuna Krishnan** *University of Chicago, Chicago*
10:30 – 11:30 hrs:	25 years after the proof of Fermat's Last Theorem **Prof. Chandrashekhar Khare** *University of California Los Angeles (UCLA)*
11:30 – 12:00 hrs:	Break

Award Function (12:00 – 13:30 hrs)

Welcome:	**Prof. Arnab Bhattacharya** *Centre Director, HBCSE*
Distribution of awards &: Address by Chief Guest	**Prof. E. V. Sampathkumaran** *Distinguished Professor (Retd.) & Raja Ramanna Fellow, HBCSE, TIFR*
Vote of Thanks:	**Prof. Anwesh Mazumdar** *National Coordinator, Science Olympiads*
Venue:	Online