

Biodata of Mayank N. VAHIA

Full name: MAYANK NALINKANT VAHIA

Date of Birth: September 24, 1956

Place of Birth: Kutch, Bhuj, North Gujarat, INDIA

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Present Position:

Professor (H); Tata Institute of Fundamental Research

Qualifications:

- B. Sc. (Physics and Mathematics); University of Bombay, 1977
- M. Sc. (Nuclear Physics); University of Bombay, 1979
- Ph. D. (Astrophysics); University of Bombay; 1984

Affiliations:

- Research Scholar; Tata Institute of Fundamental Research, August 1979 to January, 1984
- Research Associate; Tata Institute of Fundamental Research, Feb. 1984 to Jan. 1990
- Fellow; Tata Institute of Fundamental Research, February 1990 to July 1994
- Reader; Tata Institute of Fundamental Research, August 1994 till July 1998
- Associate Professor; Tata Institute of Fundamental Research, August 1998 to 2009
- Professor, Tata Institute of Fundamental Research, August 2009 onwards
- Principal Investigator, Archaeo Astronomy in Indian Context, Centre for Excellence in Basic Sciences, Mumbai (2007 - 2009)
- Visiting scientist, Louisiana State University, Baton Rouge, USA. September 1984 to December 1984
- Visiting Fellow, Max Planck Institut fur Physik und Astrophysik; Institut fur Extraterrestrische Physik; GERMANY, Jan 1988 to January 1989
- INSA Fellow, University of Durham, Durham, U.K. 1990 –1991 and 1998
- Visiting Scientist, University of California, San Diego, USA, July to September 1998
- Director, Nehru Planetarium, Worli, Mumbai April 2001 to June 2002
- Adjunct Professor, Manipal Advance Research Group, Manipal University, Jan 2008 -2010
- Adjunct Professor, National Institute of Advanced Studies, 2017 –
- Adjunct Professor, Department of Physics, University of Mumbai, 2015 –
- Recognised guide for Ph D at the following institutions

- Tata Institute of Fundamental Research: Astronomy
- Kashmir University: Physics
- Manipal University: X-ray Astronomy, Archaeo Astronomy and Cosmic Rays
- Yashwantrao Chauhan Open University, Nashik: Science Education
- Member Research and Recognition Committee, Yashvant Rao Chauhan Open University, Nashik, 2011 – 2013
- Member, International Committee to evaluate the proposal for excavation of a site in South China for possible early habitation headed by Dr. Sheldon Gosline, 2014
- Member, International Collaboration to integrate Asian data on Eclipses headed by Dr. Soma of National Astronomical Observatory of Japan, 2015
- Co Principle Investigator to set up a Carbon AMS facility at Mumbai University 2013 onwards.
- Member Executive Committee, National Council for Science Museums (Western Zone), 2010 onwards.
- Chairman Planning and Programme Committee for National Council for Science Museum (Western Zone), 2011 onwards

Activities of National Importance

- National Coordinator, Indian Astronomy Olympiad Programme since 1998
- Member of Management Council of Deccan College 2017 – 2019
- Member of Management Council of Ananthacharya Indological Research Institute, Mumbai, 2013 onward

Membership of Societies:

1. Member, Indian Physics Association (1979 -)
 - a. General Secretary (2003 - 2007)
2. Member, Astronomical Society of India (1984 -)
3. Member, Bombay Association for Science Education (1985 -)
 - a. Chairman (1995 - 2008)
4. Member, International Astronomical Union (1995 -)
5. Member, New York Academy of Sciences (1996)
6. Fellow, Royal Astronomical Society (2000 -)
7. Member, National Association of Science Communicators. (2001 -)
8. Member, Commonwealth Association for Science, Technology and Mathematics Education (2001 -)
9. Member, Indian Association of Physics Teachers (2003 -)
10. Fellow, Institute of Physics, UK (2004 -)
11. Member, Indian Nuclear Society (2004-)
12. Fellow, World Innovation Foundation (2005 -)
13. Member (Founder), Society for South Asian Archaeology (2005 - 2010)
14. Member, Archaeological Society of India (2006 -)
15. Member, National Academy of Sciences (2007 -)
16. Member, Executive Committee for the series of International Conferences on Oriental Astronomy (2013 -).
17. Fellow, Maharashtra Academy of Sciences (2016 -)

Research Interests:

Phenomenological and theoretical

- Solar Physics: Particle Emission from Sun, Movement of the Sun in the Galaxy,
- Origin of solar system
- Galactic Cosmic Rays, Origin and propagation,
- Stellar Physics, Magnetic fields of stars, Electromagnetic and Particle Emission from Stars
- Magnetosphere of Earth, Particle entry and release
- Computer Simulation of astrophysical environments,
- Archaeo-Astronomy, origin and growth of astronomy and science in India since prehistoric times

Experimental techniques

- Solid State Nuclear Detectors
- Solid state and crystal detectors for X rays and gamma rays
- Detectors for charged particles, dust & X rays and Gamma Rays

Science and society

- Science education and communication
- Understanding and concept building in science
- Impact of science on the development of society

History of astronomy and astronomy

- Origin of astronomy in India
- Oldest Observatories
- Harappan Civilisation, its culture and astronomy
- Astronomy in Sanskrit Literature
- Architecture and astronomy
- Evolution of science

Research Experience:

- 1979 to 1985: I worked on the problem of Particle Emission from Sun. The study involved the measurement of heavy element flux in solar cosmic rays emitted during the solar flare of August 4, 1972. This led to my Ph D. degree. I then worked on the interpretation of the results and showed that the flare particles are trapped in a flare loop in a very narrow temperature range and that betatron process may be effective in accelerating these particles.
- 1980 to 1989: I worked on the experiment to measure the charge states of solar and galactic cosmic rays through an experiment done on NASA's Space Shuttle in the Space Lab 3 mission. I was involved in all stages of the experiment. In 1987 I went to Germany to work on a similar experiment being done from the Max Planck Institute. I also studied the particle acceleration in the magnetosphere of stars.
- 1985 to 1995: I worked on flare mechanisms in stars, particularly flares of interbinary proportions and showed that they can explain several properties of some gamma ray bursts. I also simulated the behaviour of interbinary flares in relation to the binary rotation.

- 1995 to 1997: I worked on the X-ray observations of various galactic and extragalactic objects.
- 1995 to 1997: I worked on the Indian X-ray astronomy payload (IXAE) that was launched on an Indian Satellite in 1996.
- 1998 to 2004: I worked on aspect relating to the origin of cosmic rays and local features of the interstellar medium in the neighbourhood of the solar system.
- 1999 to 2004: I have been investigating the scenario that the Sun may once have had a companion that exploded and from whose residue, the solar system was born.
- 1997 to 2004: I worked on the Solar X-ray Spectrometer which was flown on an Indian Satellite in 2003. I also worked on a Russian project for measuring the X-ray emission from the Sun and I was involved in the manufacture of instruments for the ASTROSAT project.
- 2003 onwards: I am working on astronomical references in Ancient Indian Literature and various other aspects of Archaeo-Astronomy (summary of this contemporary work is attached).

I have published about 250 research publications in the above areas in various international journals or presented at international conferences where proceedings are published.

I have also published more than 50 popular articles and 3 books. I have edited another 3 books.

Involvement in Specific Programmes:

- Co PI, AMS experiment facility, University of Mumbai to be set up in 2017.
- Principal Investigator, Studies of Ancient Indian Sciences, Centre Excellence for Basic Sciences, Mumbai
- Principal Investigator, Archaeo Astronomy in Indian Context, funded by Jamsetji Tata Trust
- Co-investigator, Indian Astronomy Satellite (ASTROSAT) Soft X-ray Telescope experiment
- Gamma ray telescope to study the Sun and Stars, to be flown with Russian Collaboration in 2005. Main responsibility, execution of Project and development of low energy detectors
- Member, Indian X-ray Astronomy payload team (IXAS), main responsibility, manufacture of collimator and data analysis
- Co-investigator in the Experiment Determination of ionisation States of Solar & Galactic Cosmic Rays (ANURADHA) flown on NASA's Space Shuttle Space. Member, Indian experiment on Lab3 Mission, April 29 to May 7, 1985, main responsibility for the development for software for pre and post flight data analysis, detector development, instrument integration and science aspects, implementation of trajectory computation software etc., member Principle investigator's monitoring team for ANURADHA experiment during flight. April 29 to May 7, 1985

Educational Material created:

- EINSTEIN AND HIS UNIVERSE: Scripted and produced Nehru Planetarium Show no 27 (2001)

- OUR STAR, THE SUN: Scripted and produced Nehru Planetarium Show no 28 (2002)

Editorial Work:

- History of Indian Astronomy: A handbook, ed. K Ramsubramanian, Aniket Sule and Mayank Vahia, IIT Mumbai and TIFR, 2016
- Question papers of Indian National Astronomy Olympiad (1999 – 2008), Compiled by Aniket Sule, Anand Ghaisas and M N Vahia, Homi Bhabha Centre for Science Education.
- Fifty years at the frontiers of science Edited by S. Mukhi and M. N. Vahia Tata Institute of Fundamental Research (1996)
- Instrument and Electronics Colloquia, 1984 - 85 Edited by S. V. Damle, P. R. Apte R. Nagarajan and M. N. Vahia Tata Institute of Fundamental Research
- Nucleosynthesis Proceedings of Summer Workshop held at TIFR, May 19 23, 1980 Edited by S. Biswas, S. Ramadurai and M. N. Vahia Tata Institute of Fundamental Research GB"

Books written:

- Physical Sciences and the future of India, M N Vahia, Manipal University Press, 2014
- Perspectives of Early Astronomy in Indian Context, M N Vahia, Nisha Yadav and Srikumar Menon, National Council of Science Museums, 2016
- Stone Circles of Junapani, Riza Abbas and Mayank Vahia, ASI Southern circle 2017.

Science Popularisation:

- As Director, Nehru Planetarium, Mumbai 2001 – 2002 I made 2 science films and created several innovative programmes in astronomy education.
- Chairman, Science Popularisation and Public Outreach Committee, TIFR, 2003 – 2005 created the first public outreach, open house and other programmes for TIFR.
- As Chairman, and office bearer of the Bombay Association for Science Education, organised several workshops, symposia and other activities for school and college teachers & students.
- As the Chairman of the Science Popularisation Committee, I have been responsible for creating and executing a large number of programmes to improve the outreach of TIFR activities in the society.
- Member Scientific Committee of the Homi Bhabha Centre for Science Education (till 2005) that was awarded the National Award for Best Effort in Science Popularisation amongst Children by the National Council for Science and Technology Communication, Department of Science and Technology in 1999.
- Member Planning and Programme Committee of the Nehru Science Centre, Western Regional Centre of National Centre of Science Museums since 1995
- National Coordinator, Indian Astronomy Olympiad Programme (1999 -)
- National Coordinator, Indian Junior Science Olympiad Programme (2007- 2012)
- Indian team performance since 1999 (I was also one of the team leaders from 1999 to 2008):
 - International Astronomy Olympiad
 - 4th International Astronomy Olympiad, Crimea Ukraine, September 25 to October 2, 1999. All the six participants won a medal with a total tally of 2 Gold, 3 Silver and 1 Bronze Medals. Indian team stood second in the competition.

- 5th International Astronomy Olympiad, SAO Russia, October 20 to 27, 2000. Five of the six participants won a medal with a total tally of 2 Gold, 3 Silver medals. Indian team stood second in the competition.
- 6th International Astronomy Olympiad, Crimea Ukraine, September 26 to October 3, 2001. Five of the six participants won a medal with a total tally of 2 Gold, 2 Silver and 1 Bronze Medals. Indian team stood second in the competition.
- 7th International Astronomy Olympiad, SAO, Russia, October 21 to 31, 2002. All six participants won a medal with a total tally of 4 Gold, 1 Silver and 1 Bronze Medals. Indian team stood first in the competition.
- 8th International Astronomy Olympiad, Stockholm, Sweden, October 2 to 8, 2003, Six of the seven participants won a medal with a total tally of 4 Gold, 2 Silver Medals. Indian team stood first in the competition.
- 9th International Astronomy Olympiad, Crimea, Ukraine, October 2 to 8, 2004, all 5 participants won a medal with a total tally of 5 Gold, 1 Bronze Medals. Indian team stood first in the competition.
- 10th International Astronomy Olympiad, Beijing, China, October 24 to Nov 3, 2005, all 8 participants won a medal with a total tally of 5 Gold, 2 Silver and 1 Bronze Medals. Indian team stood first in the competition for the fourth consecutive year.
- 11th International Astronomy Olympiad in India in 2006, India, Mumbai, Indian team stood first with 5 Gold, 1 Silver and 1 Bronze Medal 7 out of 8 students got a medal.
- 12th International Astronomy Olympiad: Ukraine in 2007, Ukraine, Indian team stood third with 3 Gold, 2 Silver and 1 Bronze and all students got a medal
- 13th International Astronomy Olympiad: in 2008, Trieste, Italy, Indian team stood third with 1 Gold, 4 Silver and 1 Bronze and all students got a medal
- 14th International Astronomy Olympiad in 2009, Hangzhou China, India got 5 Gold 1 Silver and Indian team stood first by medal tally.
- 15th International Astronomy Olympiad: in 2010, Ukrain, India came 1st in Junior Category (but did not participate in the Senior Category) with 2 Gold, 1 Silver all the three students got a medal

International Olympiad in Astronomy and Astrophysics

- 1st International Olympiad in Astronomy and Astrophysics: 2007, India got 3 Gold and Indian team stood second by medal tally and all students got a medal.
- 2nd International Olympiad in Astronomy and Astrophysics: 2008, India got 2 Gold, 2 Silver and 1 Bronze medals Indian team stood first by medal tally. All students got a medal
- 3rd International Olympiad in Astronomy and Astrophysics: 2009, Tehran, India got 2 Gold, 2 Silver and 1 Bronze medals, India team stood first by medal tally. All students got a medal
- 4th International Olympiad in Astronomy and Astrophysics: 2010, Beijing, China, India got 3 Gold, and 2 Bronze medals, Indian team stood first by medal tally. All students got a medal.
- 5th International Olympiad in Astronomy and Astrophysics, 2012, India 3 Gold, 1 Silver and 1 Bronze Medals. All students got a medal and India stood 2nd in Medal tally.
- 14th International Astronomy Olympiad, Vilnius, Lithuania, 2013, India 3 Gold. All Indian students got Gold Medals and one got special award for best observations.

- 15th International Astronomy Olympiad, Vilnius, Kyrgyzstan, 2014. India 2 Silver and 1 Bronze.

International Junior Science Olympiad

- 4th International Junior Science Olympiad, 2007, Taipei, Taiwan, India got 3 silver medals. All students got a medal.
- 5th International Junior Science Olympiad, 2008, South Korea, India got 5 Silver, 1 Bronze, India came 13th by medal tally. All students got a medal.
- 6th International Junior Science Olympiad, 2009, Baku, Azerbaijan, India got 1 Gold and 5 Silver, India came 10th by medal's tally.
- 7th International Junior Science Olympiad, Baku, Azarbajan, India got 4 gold and 2 silver medals and India stood second in the medal tally.
- 8th International Junior Science Olympiad, Johannesburg, South Africa, August 2011, India stood second by medal tally with 2 god and 4 silver medals.
- Initiated the Indian programmes for the World Year of Physics in 2005 (“The Einstein Year”) and as the National Convener I coordinated more than a hundred different programmes including several meetings, student competitions, release of postage stamp by the President of India and other activities.
- Chairman, Scientific Review Committee (Western Zone) of the INTEL Science and Technology Fare, in 1999 to 2002
- Resource person, Mumbai University Academic Staff College: Gave lecture courses in Philosophy of Science titled Physical Science and their Implication on Human Thought, to the Orientation Course for College Teachers, Academic staff College, Mumbai University
- More than 100 popular science lectures to schools, colleges and general public
- Member, Board of Studies for M Tech in Space Engineering, Manipal Academy of Higher Education, (2007 - 2009)

Other activities:

- Secretary, 9th International Conference on Oriental Astronomy, Pune, India, November 2016
- Member, Scientific Organising Committee, Origin of Elements in the Solar System, New Orleans, August, 1999
- As Secretary of the TIFR Golden Jubilee Celebration worked extensively on presentation of various facets of TIFR and co-ordinated efforts in highlighting the Institute's activities through books, videos, public lectures & exhibition etc. (1996 - 1997)
- Member of the Organising Committee for the CASTME conference on the Role of Science, Technology and Mathematics Education, Goa, India, June 2001
- Member, Programme Committee, 2009 International Conference on Space Information Technology (ICSIT) to be held in Beijing, China in November 26-27, 2009.
- Member, Scientific Organising Committee, The Seventh International Conference on Oriental Astronomy (ICOA-7), September 6 (Mon) – 10 (Fri), 2010
- Secretary Indian Physics Association, 2003 – 2007.

Main Contributions to Fundamental Knowledge:

- 1) Study of evolution of science from early humanoids to the present.
- 2) Study of structure and grammar of Indus Script established the grammar of Indus Script in a language independent manner.

- 3) Created a framework for the origin and growth of astronomy in India from prehistoric period to modern time.
- 4) Established the nature and style of prehistoric astronomical observatories in India including in the Harappan Civilisation.
- 5) Relation between the Sun and interstellar medium over the past 10^8 years.
- 6) Hard X-ray emission from Flares and production of Solar Cosmic Rays
- 7) X-ray emissions from black hole candidate GRS1915+105
- 8) Charge states of anomalous cosmic rays

Main contributions science education and popularisation:

- 1) National Coordinator of Indian National Astronomy Olympiad from its inception in 1999 till date. For the past 7 years Indian team has been coming first in the International competition. About 10 of the students from this programme are currently pursuing Ph D in various branches of science and mathematics.
- 2) National Coordinator of Indian National Junior Science Olympiad from its inception in 2007.
- 3) Director Nehru Planetarium, Mumbai 2000 – 2001.
- 4) National Coordinator, World Year of Physics Programmes in India, 2005.
- 5) Chairman Science Popularisation and Public Outreach Committee of TIFR 2003 – 2005.
- 6) Chairman, Bombay Association for Science Education, 1998 – 2008.
- 7) Resource person for the lectures on physical sciences and their impact on society at the Academic Staff College, Mumbai University from 1999.
- 8) Member National Steering Committee for Olympiads 2010 onwards
- 9) Member Standing Committee for Earth Science Olympiad 2012 for 3 years