

CURRICULUM VITAE: THANU PADMANABHAN

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I CONTACT INFORMATION:

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II EDUCATION AND CAREER:

Born in 1957, Padmanabhan did his B.Sc (1977) and M.Sc (1979) from University College, Kerala University, graduating with Gold Medals in both, for topping the University. He published his first research paper in General Relativity at the age of 20 when he was still a B.Sc student. He joined the Tata Institute of Fundamental Research (TIFR) for his PhD in August 1979 and obtained a Faculty position in February 1980 while he was still working towards his PhD, which he obtained in 1983. He held different Faculty positions in TIFR till 1992, when he moved to IUCAA, Pune.

He is currently the Distinguished Professor at IUCAA (and was its Dean, Core Academic Programmes during 1997-2015).

He is currently an adjunct faculty member of IISER (Mohali), IISER (Trivandrum), and Jamia Millia Islamia (Delhi). Earlier, he was an adjunct faculty member of TIFR (Mumbai), IISER (Pune), Raman Research Institute (Bangalore), Harish-Chandra Research Institute (Allahabad).

He was a Sackler Distinguished Astronomer of the Institute of Astronomy (IoA), Cambridge, UK and a Visiting Faculty at several institutions abroad including Princeton University, California Institute of Technology (Caltech), USA and the IoA, Cambridge.

1. RESEARCH CONTRIBUTIONS AND IMPACT:

Padmanabhan has a high level of scholarship in many areas of theoretical physics but publishes mainly in Quantum and Classical Gravity, Cosmology and Structure Formation in the Universe.

In his entire career, Padmanabhan has written about 270 papers earning more than 14,500 citations. He has one paper with more than 2000 citations, another 28 papers with citations above 100 (of which 1 has nearly 700 citations, 6 have citations in 300-600 range and 7 have citations in the range of 200-300) and 35 papers with citations in the range 50-100. His total number of normalized citations — in which citations of each paper are divided equally among authors — is also quite high, more than 10292 (from ADS). He has a h-index of 56.

During 2002-17, Padmanabhan has published about 124 papers *which alone* have received about 10,404 citations, with an average of 83.9 citations per paper during this period.

IV AWARDS, HONORS (in reverse chronological order):

- (1) Goyal Prize in Physical Sciences (2012-2013)
- (2) Fellow, Third World Academy of Sciences (2012 -)
- (3) Third World Academy of Sciences Prize in Physics,¹ 2011
- (4) Vice-President, Division J (Galaxies and Cosmology) of the International Astronomical Union (2012 - 2015)
- (5) President, Commission 47 on Cosmology of the International Astronomical Union (2009 - 2012).
- (6) Chairman, Commission 19 (Astrophysics) of the International Union of Pure and Applied Physics (2011 - 2014).
- (7) Infosys Science Prize in Physical Sciences,² Infosys Science Foundation, 2009
- (8) Convener, DST Advisory Group for Indian participation in Giant Segmented Mirror Telescope (2008 - 2010)
- (9) J. C. Bose National Fellowship of Department of Science and Technology (DST), 2008
- (10) First Prize in Gravity Essay Contest, 2008 (awarded by the Gravity Research Foundation, USA). In addition, his work has won different prizes in this contest in 2014 (third), 2012 (fifth), 2006 (third), 2003 (fifth), 2002 (second) and 1984 (fifth).
- (11) Padma Shri,³ 2007
- (12) Indian National Science Academy (INSA) Vainu Bappu International Award⁴ in Astrophysics, 2007.
- (13) Chairman, GMRT Time Allocation Committee, (2006 - 2009)
- (14) Miegunah Fellowship Award, University of Melbourne, Australia, 2004
- (15) G.D. Birla Award for Scientific Research, 2003
- (16) Homi Bhabha Fellowship, 2003
- (17) Al-Khwarizmi International Award, 2002
- (18) Sackler Distinguished Astronomer, Institute of Astronomy, Cambridge, 2002
- (19) Fellow, Indian National Science Academy (INSA), 2001-
- (20) Millennium Medal (CSIR),⁵ 2000
- (21) A.C. Banerji Memorial Lecture Award, 1997
- (22) Shanti Swarup Bhatnagar Award, 1996
- (23) Fellow, Maharashtra Academy of Sciences, 1995-
- (24) Fellow, National Academy of Sciences, 1993-

¹TWAS awards prizes in eight subjects each year to recognize outstanding achievements made by the scientists in third world countries; each award carries US \$15,000 and a citation.

²Instituted from 2009 by Infosys Science Foundation in five subjects, each award carries approximately \$ 100,000 and a citation. The awardees are selected by an international jury and it has been called the 'Indian Nobel Prize'.

³Awarded by the President of India for highly distinguished service and contribution; the fourth highest civilian honor in India.

⁴An *international* award given by INSA for distinguished contributions to astrophysics; previous recipients from abroad include S. Chandrasekhar (1985), M. J. Rees (1986), A. A. Penzias (1990), R. Wilson (1990), J. P. Ostriker (1993) and A. Hewish (1996).

⁵A one-time award, given by the Council of Scientific and Industrial Research (CSIR), India, at the beginning of the new millennium to a few distinguished scientists in different fields.

- (25) B.M. Birla Science Prize, 1991
- (26) Fellow, Indian Academy of Sciences, 1991-
- (27) Young associate of the Indian Academy of Sciences, 1984-89
- (28) INSA Young Scientist Award, 1984

V ACADEMIC SCHOLARSHIP:

The breadth of Padmanabhan's academic excellence is partly reflected in the several books he has authored. The reviews of these books emphasize his high level of scholarship, originality and insightful discussion of even routine topics. These books include:

1. *Structure formation in the Universe*,⁶ Cambridge University Press, Cambridge, (1993).
2. *Cosmology and Astrophysics through Problems*,⁷ Cambridge University Press, Cambridge, (1996).
3. *Theoretical Astrophysics - Volume I: Astrophysical processes*, Cambridge University Press, Cambridge, (2000).
4. *Theoretical Astrophysics - Volume II: Stars and Stellar Systems*, Cambridge University Press, Cambridge, (2001).
5. *Theoretical Astrophysics - Volume III: Galaxies and Cosmology*,⁸ Cambridge University Press, Cambridge, (2002).
6. *An Invitation to Astrophysics*,⁹ World Scientific, Singapore, (2006).
7. *Gravitation: Foundations and Frontiers*,¹⁰ Cambridge University Press, Cambridge (2010).
8. *After the First Three Minutes - The Story of our Universe*,¹¹ Cambridge University Press, Cambridge, (1998).
9. *Quantum Themes: The Charms of the Microworld*, World Scientific, Singapore, (2009).
10. *Sleeping Beauties in Theoretical Physics*,¹² Springer, Heidelberg (2015).
11. *Quantum Field Theory — Why, What and How*, Springer, Heidelberg, (2016).

⁶One of the early reviews, by J. Gribbin in *New Scientist*, predicted "... it is destined to become a classic of its kind ..." and it has indeed become an acknowledged classic in the subject and is still extensively used in graduate courses around the world.

⁷"The book explains a number of things that I have wondered about but which may be difficult to extract from a conventional textbook. the book is a success." – I. Bengtsson (*Class. Quan. Grav.*).

⁸This 3-volume work in *Theoretical Astrophysics* is widely acclaimed for its comprehensiveness, clarity and originality of presentation; e.g., Alan Heavens, (reviewing for *The Observatory*) has said: "... written with exceptional clarity the hallmark of Padmanabhan's work. The mathematical derivations are elegant, often starting from action principles, and readers may be enlightened by some which differ from standard approaches it is a magnificent achievement."

⁹James Binney (*Physics Today*) says: "A serious session with Padmanabhan's book does for the mind what a vigorous workout in the gym does for the body... even the most distinguished professor of astrophysics will gain fresh insights from *An Invitation to Astrophysics*." J. L. Pipher (*Am. J. Phys.*) says: "It is fun in the same sense that Feynman's *Lectures on Physics* or Leighton's *Principles of Modern Physics* was fun to read some 40 years ago when I was a beginning graduate student."

¹⁰Claus Keifer (*Gen. Rel. Grav.*) says: "..... well written throughout and presents its material with admirable clarity and patience..."; John Peacock (*The Observatory*) says: ".... There is immense erudition, and mastery of both formal tools and calculational details; it is really impressive that one individual can understand so much, so deeply...."

¹¹This popular science book was very favorably received by the public, and has been translated into Chinese, Polish and Portuguese.

¹²Phillip Helbig (*The Observatory*) "... It would be hard to find someone who would learn nothing from this book ...". Ethan Siegel (*Physics Today*) "... aims to impart to aspiring theorists some of the important connections and techniques spanning gravitation, classical mechanics, electromagnetism, and quantum mechanics ... *Sleeping Beauties in Theoretical Physics* is a potentially excellent resource for those looking to add to their mental tool kit and sharpen their theoretical skills."

In addition to the above, Padmanabhan has co-authored one more book and has edited three other volumes. See his homepage for details.

VI THESIS SUPERVISION

The following students have done their PhD work under the supervision of Padmanabhan. Their current affiliations are given in brackets and those marked by asterisk currently hold Faculty positions in various institutes:

- T.R. Seshadri (University of Delhi, Delhi)*
- T.P. Singh (TIFR, Mumbai)*
- J.S. Bagla (IISER, Mohali)*
- L. Sriramkumar (IIT, Chennai)*
- K. Srinivasan (CFL, Bangalore)*
- S. Shankaranarayanan (IIT, Mumbai)*
- Sunu Engineer (CEO of Embedded Computing Machines, Pune)
- T. Roy Choudhury (NCRA, Pune)*
- Sudipta Sarkar (IIT, Gandhinagar)*
- Gaurang Mahajan (NCCS, Pune)
- Dawood Kothawala (IIT, Chennai)*
- Sanved V. Kolekar (University of Nottingham, UK)
- Suprit Singh (University of New Brunswick, Canada)
- Krishna Parattu (IIT, Chennai)
- Sumanta Chakraborty (IACS, Kolkatta)

In addition, he was strongly involved, at the level of a co-supervisor, in the Ph.D work of Nissim Kanekar* (NCRA, Pune) and Ali Nayeri* (Chapman University, California, USA).

VII SCIENCE POPULARIZATION AND PUBLIC OUTREACH

Padmanabhan is strongly committed to the responsibilities of scientists towards the society and has been actively working on popularization of science through his numerous articles (> 100), lectures (> 300), books and other public outreach programmes. Some notable contributions are:

As the Chairman of the INSA National Committee interfacing with IAU, he coordinated the International Year of Astronomy 2009 activities in India. He, along with J.V. Narlikar, produced an *IYA 09 Diary*¹³ which has become a collector's item.

A comic strip serial authored by him, *The Story of Physics*,¹⁴ intended for school children, has been translated into several regional Indian languages and is being made available at an affordable price to school children.

He also authored "Dawn of Science" - a 24-installment set of articles on the early history of all branches of science, published in the journal 'Resonance' during 2010-2012.

¹³See <http://www.iucaa.ernet.in/~scipop/Literature/iyadiary.html>

¹⁴See <http://www.iucaa.ernet.in/~scipop/Literature/tsop/tsop01.html>