

Prof G Ambika, IISER Tirupati - Curriculum Vitae

- **Name** - G. Ambika
- **Designation**- Professor, Chair, Physics and Dean, Academics
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Tirupati –517 507, India
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Professional

- Editorial Board Member, Proceedings of Royal Society A , London
- Reviewer, Nature Scientific Reports, PLoS ONE, Physica A, BMC Bioinformatics, Chaos, Nonlinear Dynamics, Chaos Solitons and Fractals, J Theor Biology, Communications in Nonlinear Science & Numerical Simulation, Pramana, J Physics, J Earth System Science
- Member, National Organizing Committee, Conference on Nonlinear Systems and Dynamics (CNSD)
- Reviewer, DST SERB Project Proposals
- Nodal Officer, Vigyan Jyothi, DST
- Member, Selection committee- INDO-U.S. Fellowship for Women in STEMM' (WISTEMM)-KIRAN,DST
- Subject Expert Committee (SEC) – Physical & Mathematical Sciences, DST Women Scientist Scheme (WOS-A)
- Associate, IUCAA, Pune since 1995
- Senate Member, NIT Raipur- 2015-
- Subject Expert, Union Public Service Commission, Delhi
- Member, Board of studies, G. H. Rasoni Institute of Engineering & Technology, Pune

- Member, Board of studies, Maharajas College, Cochin
- Associate, Physical Research Lab, Ahmedabad 2008-10
- Member, Higher Education Council, Kerala, 2006-09

Professional training and experience

| Nature of training | University / Institute | Period |
|--------------------------|---|------------|
| Ph.D. | Cochin University of Sci & Tech.(CUSAT), Cochin | 1988 |
| Research | Post doctoral RA, CSIR, Cochin Univ. Sci. & Tech, Cochin | 1989-1994 |
| Teaching & Research | Lecturer in Physics | 1976-1989 |
| Teaching & Research | Reader in Physics, Maharajas College, Cochin, MG University | 1994-2006 |
| Administration | Principal, PMG College, Chalakkudy, Kerala | 2006 |
| Teaching & Research | Associate Professor, IISER, Pune | 2006-2012 |
| | Professor of Physics , IISER Pune | 2012-2018 |
| Academics Administration | Dean, Examinations, IISER Pune | 2006- 2009 |
| | Dean, Graduate Studies, IISER Pune | 2009-2018 |

Research Collaborations

- Prof Juergen Kurths, Potsdam Institute for Climate Impact Research, Potsdam, Germany
- Prof G Rangarajan, IISc, Bangalore
- Prof Vijayalakshmi Ravindranath, CNS, IISc, Bangalore
- Dr R Misra- IUCAA, Pune
- Dr K P Harikrishnan, Cochin College, Kochi
- Prof R E Amritkar, IITRAM, Ahmedabad
- Dr Chandrasheel Bahagwat, IISER Pune
- Dr M S Santhanam, IISER Pune
- Dr Arijit Bhattacharyay, IISER Pune
- Dr Neelesh Dahanukar, IISER Pune

Research Projects

- 'Study of Universal constants & Universality relations in Nonlinear Maps' awarded by the **UGC**, New Delhi during 1988-89.
- Stochastic resonance studies in Pendulum systems and two parameter maps' from **DST**, New Delhi – 2000-03.
- Emergent dynamics on growing networks with comparable time scales- from **DST** , Delhi- 2010-13
- **DST DAAD project** sanctioned on “Interacting networks to model and control dynamics of complex systems”- Exchange visits with Transdisciplinary Concepts and Methods, Potsdam, Germany-2012-14
- Complexity Measures from multifractal analysis to characterize ECG data for diagnosis and therapy- **DST SERB**- 2015- ongoing
- Nonlinear dynamic methods for the study and prognosis of blood-brain barrier disruption in diabetic stroke- submitted under **BRICS** call for Proposal(2017) for Multilateral Research and Development Project jointly with Prof Juergen Kurths, Saratov State University, Saratov, Russia and Prof Wei Lin, Fudan University, Shanghai, China

Research Groups and Training

Post-doctoral Fellows

- Abhijit Sonawane- Jan2011-Aug2012
- Snehal Shekatkar- May 2016-June 2017

PhD students

- K I Thomas- Studies related to Chaotic behaviour in Nonlinear Dynamical Systems – May 2004.
- Sujatha N V- Chaos and Pattern formation in coupled Non linear maps- April 2005
- Kamala Menon – Fractal Patterns & Stochastic Resonance in Coupled Map Lattices – June2010
- Ambika K - Studies on stability, synchronization and scaling behavior in coupled nonlinear systems –Sept2010

- Resmi V – Environmental Effects in the dynamics of coupled nonlinear systems- July2012
- Snehal Shekatkar- Structure, Dynamics and Control of complex networks- May 2016
- Kajari Gupta- Dynamics on networks with varying time scales- submitted
- Sandip V George- Dynamics of Variable stars - ongoing
- G A R S R K Kashyap- Connectivity and Complexity in Complex networks – ongoing
- Sneha Kachhara- Detection of dynamical transitions from data- ongoing

Project Assistants

- Yogesh .V.Deshpande -2011-12
- Ashutosh Agnihotri -2012-13
- Yamini Kotriwar- 2015-18

Undergraduate students

Summer/ semester projects/MS thesis supervised for MS / MTech/ BTech -70

Outreach Activities

- Lectures given in colleges & schools- **70**
- Resource person for refresher courses and SERC schools-**35**

List of selected publications

1. Snehal M. Shekatkar, Yamini Kotriwar, K.P. Harikrishnan and **G. Ambika**, Detecting abnormality in heart dynamics from multifractal analysis of ECG signals, Scientific Reports 7: 15127(2017)- DOI:10.1038/s41598-017-15498-z, <http://rdcu.be/yuXc>
2. G. Kashyap and **G Ambika**, Mechanisms for tuning clustering and degree-correlations in directed networks, Journal of Complex Networks(2017)0000, 1-21, <https://doi.org/10.1093/comnet/cnx057>

3. K. P. Harikrishnan, R. Misra and **G. Ambika**, Is a hyperchaotic attractor superposition of two multifractals, *Chaos Solitons and Fractals* 103, 450-459(2017) <https://doi.org/10.1016/j.chaos.2017.06.031>
4. Sandip V. George, **G. Ambika** and R. Misra, Detecting dynamical states from noisy time series using bicoherence- *Nonlinear Dyn* (2017) 89:465–479-, DOI 10.1007/s11071-017-3465-
5. Rinku Jacob, K. P. Harikrishnan, R. Misra and **G. Ambika** , Measure for degree heterogeneity in complex networks and its application to recurrence network analysis, (2017) *R. Soc. open sci.* 4: 160757- <http://dx.doi.org/10.1098/rsos.160757>
6. Kajari Gupta and **G. Ambika**, Suppression of dynamics and frequency synchronization in coupled slow and fast dynamical systems, *Eur Phys J B* 89(6), 1-8 (2016)- DOI: 10.1140/epjb/e2016-70068-8
7. Rinku Jacob, K. P. Harikrishnan, R. Misra and **G. Ambika**, Uniform framework for the recurrence-network analysis of chaotic time series, *Phy Rev E* 93, 012202 (2016)
8. Sandip V. George, **G. Ambika** and R. Misra, Effect of data gaps on correlation dimension computed from light curves of variable stars, *Astrophys Space Sci* , 360:5 (2015)
9. Bedartha Goswami, Snehal M. Shekatkar, Aljoscha Rheinwalt, **G. Ambika**, and Juergen Kurths, A random interacting network model for complex networks, *Scientific Reports* , 5:18183 ,(2015).
Snehal M. Shekatkar, Chandrasheel Bhagwat and **G. Ambika**, Divisibility patterns of natural numbers on a complex network, *Scientific Reports* , 5:14280 ,(2015).
10. Snehal M Shekatkar & **G. Ambika**- Novel coupling scheme to control dynamics of coupled discrete systems- *Commun Nonlinear Sci Numer Simulat* 25, 50–65 (2015)
11. Chiranjit Mitra, **G. Ambika** and Soumitro Banerjee –Dynamical behaviours in time-delay systems with delayed feedback and digitized coupling - *Chaos, Solitons and Fractals*, 69, 188–200 (2014)

12. Tanvi P Gujarati and **G. Ambika**- Virus Antibody dynamics in primary and secondary Dengue infection- Journal of Mathematical Biology, 69, 1773-1800(2014)
13. V Resmi, **G. Ambika** , R E Amritkar and G Rangarajan- Amplitude death in complex networks induced by environment- Phys Rev E 85, 046211(2012)
14. K P Harikrishnan, R Misra, **G. Ambika**, R E Amritkar –Parametric characterisation of a chaotic attractor using two scale Cantor measure- Physica **D239**, 420-427, (2010)

Invited talks (2015-)

1. Characterization and Synchronization of chaos- Science Academies Lecture workshop on Basics of Nonlinear Dynamics- Jan 21-22, 2015
2. Recurrence networks and analysis of chaotic time series- Conference on Nonlinear Systems and Dynamics, CNSD 2015, IISER Mohali, March 13-15, 2015
3. Complex Recurrence Networks and Time series- Indo US Workshop on Time Series Analysis, WTSA organized jointly by IISER Pune and SAMSI-SAVI, USA- May 25-30 2015
4. Environmental effects in the dynamics of Coupled systems- National Seminar on Recent Trends and Applications in Nonlinear Dynamics, D B College, Kottayam, July 09-11, 2015
5. Complex networks and time series, IIT Ropar, Aug 11, 2015
6. Complex networks from chaotic time series- Dynamics Days, Europe- University of Exeter, UK- Sept 05-11, 2015
7. Control of dynamics in coupled discrete systems- National seminar on Dynamical Systems and Chaos- St Mary's college, Sultan Bathery, Jan 26, 2016
8. Divisibility Pattern of Natural Numbers on a complex network- Complex System Approach to Self organization CSAS, IIT Chennai, Feb 1-5, 2016
9. Complexity Measures from Time series- Special session on Time series analysis, CSAS, 2016

10. Characterization and time series analysis- 3 lectures at 5th SERC school on non linear dynamics PSG college of Technology, Coimbatore, Dec 2016
11. Heterogeneity measure for recurrence networks from chaotic and noisy time series- CNSD IISER Kolkata, Dec 2016
12. Recurrence-network analysis of chaotic and noisy time series-PNLD July 2016
13. Geometry of Nature- Science Day lecture –IISER Tirupati, Feb 28, 2017
14. Detecting Dynamics form Data and Fractals in Chaotic systems- Workshop on ``Basic Aspects of Nonlinear Dynamics and their Applications” IISER, Thiruvananthapuram
15. Time series analysis- SERB school on NLD, SPPU, Pune- Jan 2018

Outreach- Lectures in colleges and INSPIRE schools(2015-)

1. Control of dynamics in coupled systems- Recent trends in Physics and Research, UGC National seminar, St Xavier’s college, Aluva- Dec15, 2015
2. Geometry of Nature- Modern College, Pune- Aug 13, 2016
3. Detecting dynamics from data- Maharajas college- Silver Jubilee of research Centre- Aug 30, 2016
4. Fractal Geometry- DST INSPIRE camp, IISER Pune Dec 18-22, 2017

International academic visits (2015-)

- University of Melbourne, Australia as part of delegation from IISER Pune for discussions on Blended BSc Curriculum- June7-11, 2015
- Dynamic Days Europe, University of Exeter, UK- Sept 05-11, 2015
- International Conference, Humboldt University, Berlin, July 2016

Organization(2015-)

- Indo- US Workshop on Time Series Analysis WTSA 2015- jointly with SAMSI, USA- funded by Indo - US S&T Forum, New Delhi and NSF, USA- May 25-31, 2015 .

Design of curriculum

- As Member of Board of Studies, MG University, Kottayam, involved in revising the syllabus and designing courses for colleges under the University and the University Centre. Introduced special papers in Theoretical Physics and project work at the M Sc level.
- As Member, Restructuring Committee for UG education, Higher Education Council, Kerala, involved in re-designing the UG education in Kerala, grading system and semester structure in the state.
- Took initiative in designing the courses and curriculum structure in Physics for Semesters 5-8 in IISER, Pune and the academic programs, courses like IDC, HSS.
- As Dean of Graduate studies at IISER Pune, developed the BS MS curriculum and course structure, grading pattern etc.
- Involved in the design of the curriculum for Blended BSc program jointly with University of Melbourne

G Ambika
Aug, 2018