

Shreyas PUNACHA

PERSONAL DATA

EMAIL : shreyasp444@gmail.com

SEX : He / Him

ID : [ORCID](#)

EDUCATION

- 2021 Ph.D. in PHYSICS, **National Institute of Technology Karnataka**, Surathkal
Thesis: "Excitation wave dynamics and their interaction with external fields"
Advisor: Dr. T K SHAJAHAN
- 2014 Master of Science in PHYSICS, **Mangalore University**, Mangalore, Karnataka.
- 2012 Bachelor of Science in PHYSICS, **Vivekananda College**, Puttur, Karnataka.

COMPUTATIONAL SKILLS

NUMERICAL SOLUTIONS TO PDES | FINITE DIFFERENCE METHOD | PHASE FIELD METHOD
PARALLEL PROGRAMMING | MATHEMATICA | MESSAGE PASSING INTERFACE |
VERSION CONTROL | 3D MODELLING WITH MAYAVI
PROGRAMMING LANGUAGES: PYTHON | C | C++ | SHELL SCRIPTING | R | MATLAB
MARKUP LANGUAGES: LATEX | HTML

RESEARCH EXPERIENCE AND INTERESTS

NEUROSCIENCE | ELECTROPHYSIOLOGY OF CORTICAL SPIKES | BIOMECHANICS OF MASTICATION |
PATTERN FORMATION IN EXCITABLE MEDIA | COMPUTATIONAL BIOLOGY | SPIRAL WAVES |
CARDIAC ARRHYTHMIAS | LOW VOLTAGE DEFIBRILLATION | TONGUE AND MANDIBLE KINEMATICS

Present Interests:

My current research focuses on understanding the underlying principles of cortical and biomechanical control of the oral sensorimotor behaviour. I simultaneously collect the neural activity from chronically implanted microelectrode arrays in the cerebral cortex and recordings of the tongue kinematics using high-resolution biplanar videoradiography during a oral task performance in rhesus macaques. From the collected data, I try to understand how ageing and disease affects the sensorimotor behaviour.

Past Experience

My doctoral dissertation was centred around the study of dynamics of spiral waves in excitable media. My aim was to control the spiral waves causing cardiac arrhythmias using low-voltage electric fields. For this work, I designed algorithms and developed parallel programs using Message Passing Interface for various ionic and electrophysiological cardiac models in two and three dimensions.

I gained imaging and data analysis experience while working on pattern formation in Belousov-Zhabotinsky chemical reaction with experimentalists. Apart from this, I have worked on computational problems on Blackhole thermodynamics and fluid gravity.

SCHOLARSHIPS

- 2022-2024 Postdoctoral Fellowship, University of Washington, Seattle, Washington, United States.
- 2017-2021 Senior Research Fellowship, Ministry of Human Resource Development, National Institute of Technology Karnataka, Surathkal, India.
- 2015-2017 Junior Research Fellowship, Ministry of Human Resource Development, National Institute of Technology Karnataka, Surathkal, India.
- 2009-2012 Basic Science Fellowship, Department of Collegiate Education, Government of Karnataka, India.

TEACHING & MENTORING EXPERIENCE

- 2016-2020 | Mentored five Masters student projects with two leading to publications during the course of the Ph.D.
- 2017-2019 | Teaching Assistant for M.Sc. COMPUTATIONAL PHYSICS course at NITK Surathkal.
- 2015-2017 | Teaching Assistant for B.Tec. PHYSICS COURSE at NITK Surathkal.
- 2015-2016 | Laboratory Teaching Assistant for M.Sc. PHYSICS LABORATORY at NITK Surathkal.
- 2015-2020 | Laboratory Teaching Assistant for B.Tec. PHYSICS LABORATORY at NITK Surathkal.

PREPRINTS

1. S V Amrutha, Anupama Sebastian, Puthiyapurayil Sibeesh, **Shreyas Punacha** and TK Shajahan (2023). Theory and experiments of spiral unpinning in the Belousov-Zhabotinsky reaction using a circularly polarized electric field. arXiv e-prints, arXiv:2301.
2. A. Naveena Kumara, **Shreyas Punacha**, Karteek Hegde, C. L. A. Rizwan, M. S. Ali and K. M. Ajith. (2021) "Dynamics and kinetics of phase transition for regular AdS black holes in general relativity coupled to non-linear electrodynamics". *Submitted to Physical Review D.*, arXiv:2106.11095.

PUBLICATIONS

1. S V Amrutha, Anupama Sebastian, Puthiyapurayil Sibeesh, **Shreyas Punacha** and TK Shajahan (2023). Theory and experiments of spiral unpinning in the Belousov-Zhabotinsky reaction using a circularly polarized electric field. Under review in Chaos.
2. S V Amrutha, Anupama Sebastian, Puthiyapurayil Sibeesh, **Shreyas Punacha** and TK Shajahan (2022) "Mechanism of Spiral Wave Unpinning in the Belousov-Zhabotinsky Reaction with a DC Electric Field" *The Journal of Physical Chemistry C*, 126(46), 19618-19626.
3. Anupama Sebastian, S V Amrutha, **Shreyas Punacha** and T. K. Shajahan. (2022). "Dynamics of Chemical Excitation Waves Subjected to Subthreshold Electric Field in a Mathematical Model of the Belousov-Zhabotinsky Reaction" *Nonlinear Dynamics and Applications*, Springer, Cham, 2022, 1241-1249.
4. **Shreyas Punacha**, Naveena Kumara A and T. K. Shajahan (2020). "A theory of unpinning of spiral waves using circularly polarized electric fields in mathematical models of excitable media." *Physical Review E*, 102(3), 032411.
5. Naveena Kumara A, Ahmed Rizwan C. L., **Shreyas Punacha**, Ajith K. M and Md Sabir Ali (2020). "Photon Orbits and Thermodynamic Phase Transition of Regular Ads Black Holes." *Physical Review D*, 102, 084059.
6. **Shreyas Punacha**, Sebastian Berg, Anupama Sebastian, Valentin I Krinski, Stefan Luther and T. K. Shajahan (2019). "Spiral wave unpinning facilitated by wave emitting sites in cardiac monolayers". *Proceedings of Royal Society A*, 475 (2230) : 20190420.
7. **Shreyas Punacha**, M. Abhishek and T. K. Shajahan. (2019). "Unpinning spiral wave anchored to two obstacle". *Indian Academy of Sciences Conference Series*, 2.

SCHOOLS AND CONFERENCES

- 2018 Conference on Nonlinear Systems and Dynamics
Jawaharlal Nehru University, New Mehrauli Road, Delhi.
- 2018 IFCAM Summer School on Mathematical and Computational Biology
Indo-French Centre for Applied Mathematics,
Indian Institute of Science, Bangalore.
- 2016 4th Winter School on Nonlinear Dynamics
PSG college Coimbatore, Tamilnadu, India.
- 2013 Workshop on Quantum Mechanics and Applications
National Institute of Technology Surathkal, Karnataka, India.
- 2011 National Conference in Physics (CAPSRAA)
Govinda Dasa First Grade College, Surathkal, Karnataka, India.

LANGUAGES

KONKANI: Mother tongue

KANNADA: Native

TULU: Native

HINDI: Fluent

ENGLISH: Fluent

GERMAN: Level A1

EXTRAS

SETUP A 28 CORE DELL SERVER IN THE PHYSICS LABORATORY.

COORDINATED A SCIENCE OUTREACH INITIATIVE "THE PRINCIPIA" FOR HIGH SCHOOL STUDENTS IN KARNATAKA AND KERALA STATES OF INDIA.

AMATEUR BIRD PHOTOGRAPHER.

EBIRDER - AN ACTIVE PARTICIPANT IN [eBird](#), A CITIZEN SCIENCE PROJECT FOR BIRD OBSERVATION FROM CORNELL LAB OF ORNITHOLOGY.

REFERENCES

1. DR. FRITZIE ARCE-MC SHANE

ASSISTANT PROFESSOR

DEPARTMENT OF ORAL HEALTH SCIENCES

UNIVERSITY OF WASHINGTON

SEATTLE - 98195-7475, WASHINGTON, UNITED STATES.

EMAIL : fritziea@uw.edu

2. DR. T. K SHAJAHAN

ASSISTANT PROFESSOR

DEPARTMENT OF PHYSICS

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA (NITK), SURATHKAL

MANGALORE - 575025, KARNATAKA, INDIA.

EMAIL : shajahan@nitk.edu.in

3. DR. AJITH K M

ASSOCIATE PROFESSOR

DEPARTMENT OF PHYSICS

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA (NITK), SURATHKAL

MANGALORE - 575 025, KARNATAKA, INDIA.

EMAIL : ajith@nitk.ac.in