

PREFACE TO THE EDITION

It is with great pleasure that we present the forthcoming issue of the **International Journal of Pure Science Research Studies (IJPSRS)**, bringing together a diverse collection of scholarly contributions that reflect the depth, breadth, and evolving character of contemporary research in the pure sciences. The articles featured in this issue demonstrate how fundamental scientific theories, mathematical frameworks, and biological mechanisms continue to provide essential foundations for understanding increasingly complex natural and computational phenomena.

The issue opens with a review of Compressed Sensing, examining the mathematical principles underlying sparse signal recovery, the conditions required for successful reconstruction, and the algorithms that make such recovery computationally feasible. The discussion of stability under noisy measurements, together with applications in magnetic resonance imaging and radio astronomy, illustrates the productive relationship between theoretical mathematics and practical scientific problems.

The biological sciences are represented by a detailed examination of genetic regulation of photoperiod sensitivity in flowering plants. Focusing particularly on *Arabidopsis thaliana*, the article explores the interaction between light perception, circadian rhythms, and molecular regulators such as *CONSTANS* and *FLOWERING LOCUS T*. The study also highlights the broader significance of understanding flowering mechanisms for crop adaptation in the context of changing environmental and climatic conditions.

The issue further turns to fundamental questions in modern physics through a review of neutrino oscillations. By examining flavour mixing, mass-squared differences, mixing angles, and the continuing search for charge-parity violation and the absolute neutrino mass scale, the article provides an overview of both the established foundations and unresolved questions in neutrino physics. The discussion underscores how experimental observations continue to challenge and refine our understanding of particle physics.

A significant mathematical dimension of this issue is represented by the article on persistent homology and topological data analysis. By connecting mathematical topology with computational data analysis, the contribution demonstrates how topological features can be extracted across different scales and applied in areas ranging from neuroscience and materials science to genomics and machine learning. Its attention to persistence diagrams, stability, and emerging computational approaches reflects the growing importance of mathematical structures in contemporary data-driven research.

The issue also features a comprehensive review of optimal transport, tracing its development from the classical formulation of Monge and the mathematical contributions of Kantorovich to modern computational approaches. The discussion of Wasserstein distances, entropic regularisation, and numerical methods demonstrates the continuing evolution of this mathematical framework and its expanding applications in image retrieval, generative modelling, domain adaptation, and biological data analysis.

Completing this issue is a review of mycorrhizal symbioses, exploring the cellular mechanisms, ecological functions, and responses of plant–fungus associations to global environmental change. The article connects molecular interactions and nutrient exchange with wider questions of soil carbon, nitrogen cycling, plant productivity, and ecosystem responses to warming, nitrogen deposition, and land-use change. It highlights the importance of microscopic biological partnerships in shaping larger ecological processes.

Taken together, the contributions in this issue illustrate the remarkable diversity of contemporary pure science while revealing important connections across disciplines. From sparse mathematical representations and topological structures to quantum phenomena, genetic regulation, mathematical optimisation, and ecological symbiosis, these studies demonstrate how fundamental inquiry continues to expand the boundaries of scientific understanding.

We hope that this issue of IJPSRS will provide researchers, academicians, students, and scientific professionals with valuable perspectives on emerging developments in the pure sciences and encourage further investigation, interdisciplinary dialogue, and scholarly collaboration.

We sincerely thank all the authors, reviewers, and editorial contributors whose efforts have made this issue possible. We look forward to continuing our commitment to disseminating rigorous and meaningful research through the International Journal of Pure Science Research Studies.

Dr. Sandhya E
Chief editor

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