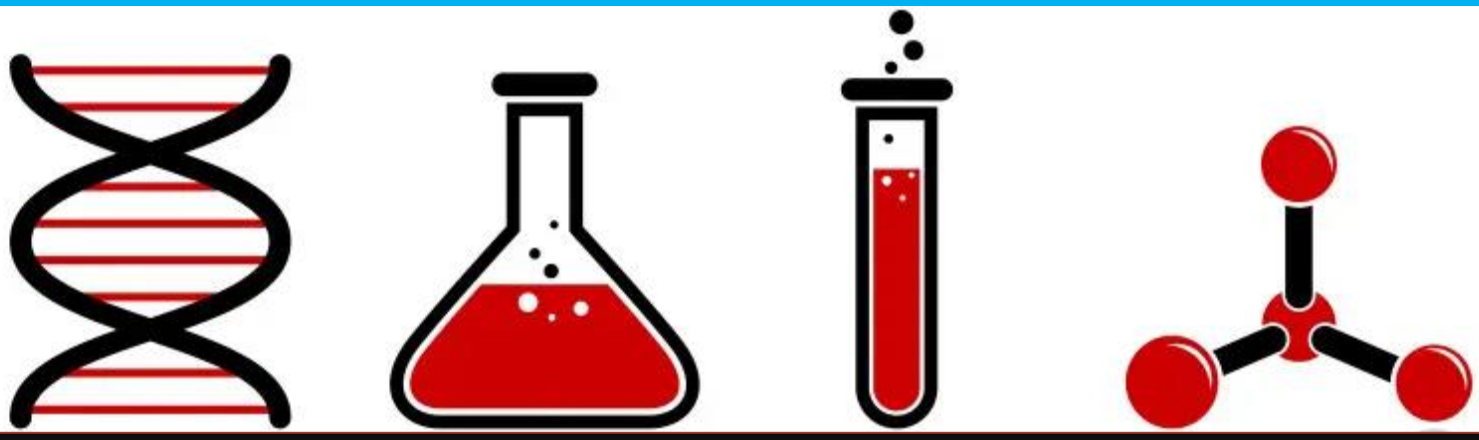
SWAMI VIVEKANANDA UNIVERSITY

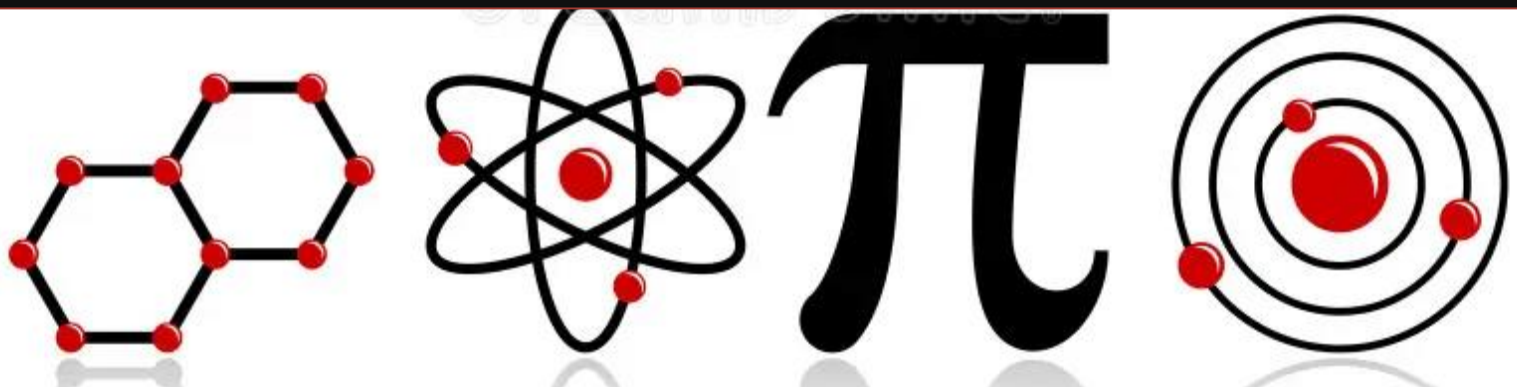
NEWSLETTER

VOL III, ISSUE I

JANUARY - FEBRUARY 2026



SCHOOL OF BASIC SCIENCES



MESSAGE FROM THE HOD

Dr. SUBHABRATA MONDAL
HOD and Assistant Professor
School of Basic Sciences

It gives me the greatest joy to connect with you through this edition of the four-newsletter. The School of Basic Sciences continues to uphold its commitment to academic excellence, research, and innovation. Our dedicated faculty and bright students are making remarkable strides in the various fields, contributing to the ever-expanding frontiers of knowledge. This year, we have witnessed significant accomplishments, from groundbreaking research publications to student accomplishments in national and international forums. Our department remains focused on fostering a culture of inquiry, curiosity, and collaboration, ensuring that our students receive the best foundation in the fundamental sciences. I take this opportunity to express my sincere gratitude to our faculty, researchers, and students for their unwavering dedication. Let's continue to strive for excellence and work toward making meaningful contributions to science and society.

MESSAGE FROM THE CONVENOR

Dr. KAZI HASIBUR RAHMAN
Assistant Professor
School of Basic Sciences

The School of Basic Sciences is committed to fostering a culture of curiosity, innovation, and academic excellence. As we embark on another exciting semester, I encourage everyone to explore the wonders of science, collaborate across disciplines, and push the boundaries of knowledge. Let's make the most of the opportunities ahead, whether in the lab, classroom, or beyond. Together, we can achieve remarkable milestones and contribute meaningfully to the scientific community. Wishing you all a productive and inspiring term ahead!

Editor's Note

TEACHER EDITOR'S

We would like to express our gratitude to the respected Head of the Department, Faculty members, Editorial team members, and article contributors for their contributions to the newsletter's FIRST edition in 2026. This newsletter's content includes fascinating articles and the most recent scientific advancements. Being a member of the editorial team is an excellent experience for us. Students are encouraged to develop an engrossing interest in science by this newsletter.

Dr. Sagar Chakraborty

Assistant Professor
School of Basic Sciences

Mr. Tanmoy Pal

Assistant Professor
School of Basic Sciences

Dr. Shilpa Maity

Assistant Professor
School of Basic Sciences

Team Basic Sciences

Events

MEMORIE'S

Ph.D. Viva-Voce Examination in Department of Mathematics

11/ 02/ 2026

Ph.D. Viva-Voce Examination of Mr. Animesh Sinha in Department of Mathematics under the supervision of Dr. Najnin Islam

SEMINAR ON INDIAN KNOWLEDGE SYSTEM

16/ 02/ 2026

ज्ञान-विज्ञान विमुक्तये

NEP SAARTHI INITIATIVE

Seminar Organized by

Department of Mathematics, SVU

In collaboration with Dum Dum Motijheel College

An Introduction to Indian Knowledge System and Major Contributions of Ancient Mathematicians

Speaker:

Dr. Krishna Pada Das

Associate Professor

Department of Mathematics

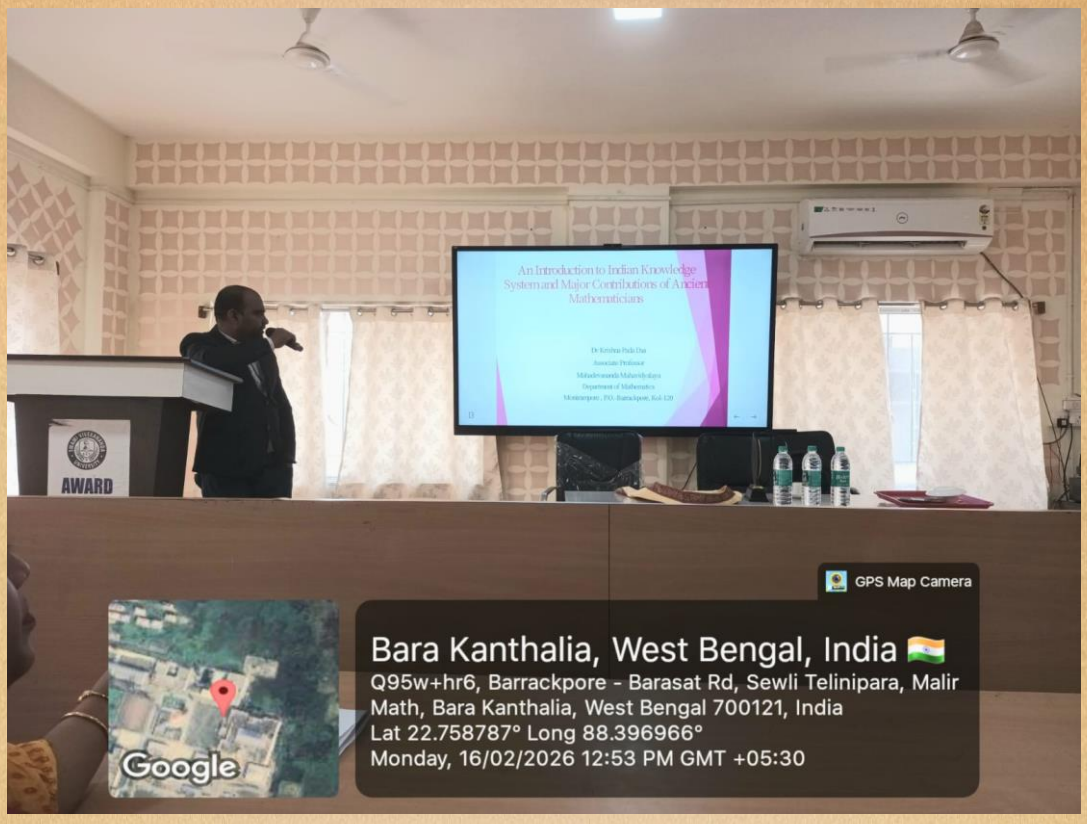
Mahadevananda Mahavidyalaya

Date & Time: 16th February 2026 | 11 AM

Venue: Block MS Hall 1A

SEMINAR ON INDIAN KNOWLEDGE SYSTEM

16/ 02/ 2026



SEMINAR ON INDIAN KNOWLEDGE SYSTEM

17/ 02/ 2026

ज्ञान-विज्ञान विमुक्तये

NEP SAARTHI Initiative

2026

17th Feb, 2026 | 12 P.M (onwards) | MS Hall 2A

DAY-2

Keynote Speaker

Dr. Kausik Chatterjee
Associate Professor
Satyapriya Roy College of Education

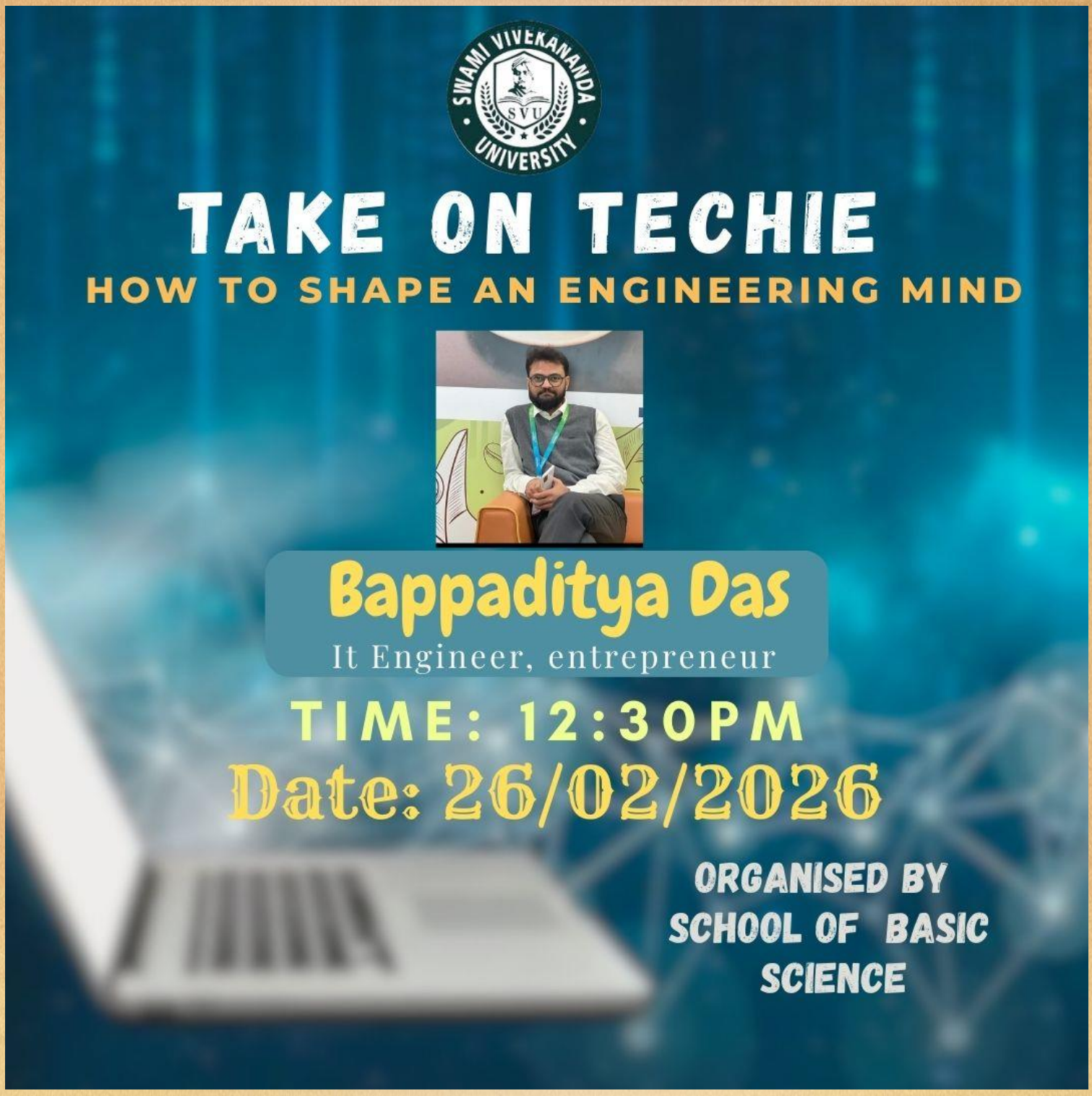
Topic:
Integrating Indian Knowledge Systems with Modern Science and Technology

Organized by
Schoool of Basic Sciences
Swami Vivekananda University

In collaboration with
Dinabandhu Mahavidyalaya

TAKE ON TECHIE

26/ 02/ 2026



Expert lecture delivered by Dr. Arpita Sarkar

10/ 02/ 2026

Certificate of Appreciation

Sri Satya Sai University of Technology & Medical Sciences under the aegis of IUPAC, Global Women's Breakfast (GWB)Association of Chemistry Teachers (ACT)

ORGANISING

International Seminar

(In Hybrid Mode) delivered Expert Lecture by

Dr.Arpita Sarkar

Associate Professor,Swami Vivekanand University

Topic -Mesoporous Materials Emerging Frontiers in Adsorption,Catalysis and Photocatalysis

In recognition of your outstanding contributions and dedication to Appreciation.

DATE:10/02/2026

Place:Sehore

Dr.Geeta Khoobchandani
Convenor

Dr.Ranjit Kumar Puse
Convenor

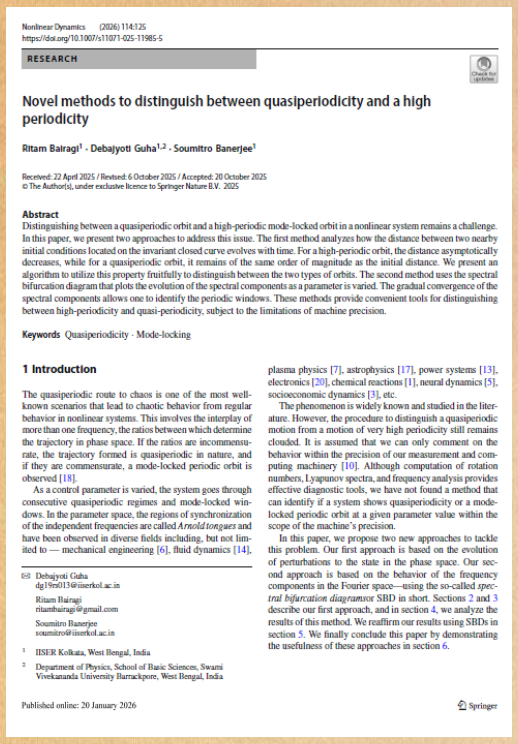
Prof.(Dr.) Mukesh Tiwari
VICE CHANCELLOR

Articles

Write-ups That Inspire

JOURNAL ARTICLE

Novel methods to distinguish between quasiperiodicity and a high periodicity



Nonlinear Dynamics (2026) 114:125
https://doi.org/10.1007/s11071-025-11985-5

RESEARCH

Novel methods to distinguish between quasiperiodicity and a high periodicity

Ritam Bairagi[1] · Debajyoti Guha[1,2] · Soumitro Banerjee[1]

Received: 22 April 2025 / Revised: 6 October 2025 / Accepted: 20 October 2025

Abstract
Distinguishing between a quasiperiodic orbit and a high-periodic mode-locked orbit in a nonlinear system remains a challenge. In this paper, we present two approaches to address this issue. The first method analyzes how the distance between two nearby initial conditions located on the invariant closed curve evolves with time. For a high-periodic orbit, the distance asymptotically decreases, while for a quasiperiodic orbit, it remains of the same order of magnitude as the initial distance. We present an algorithm to utilize this property fruitfully to distinguish between the two types of orbits. The second method uses the spectral bifurcation diagram that plots the evolution of the spectral components as a parameter is varied. The gradual convergence of the spectral components allows one to identify the periodic windows. These methods provide convenient tools for distinguishing between high-periodicity and quasi-periodicity, subject to the limitations of machine precision.

Keywords Quasiperiodicity · Mode-locking

1 Introduction

The quasiperiodic route to chaos is one of the most well-known scenarios that lead to chaotic behavior from regular behavior in nonlinear systems. This involves the interplay of more than one frequency, the ratios between which determine the trajectory in phase space. If the ratios are incommensurate, the trajectory formed is quasiperiodic in nature, and if they are commensurate, a mode-locked periodic orbit is observed [18].

As a control parameter is varied, the system goes through consecutive quasiperiodic regimes and mode-locked windows. In the parameter space, the regions of synchronization of the independent frequencies are called *Arnold tongues* and have been observed in diverse fields including, but not limited to — mechanical engineering [6], fluid dynamics [14], plasma physics [7], astrophysics [17], power systems [13], electronics [20], chemical reactions [1], neural dynamics [5], socioeconomic dynamics [3], etc.

The phenomenon is widely known and studied in the literature. However, the procedure to distinguish a quasiperiodic motion from a motion of very high periodicity still remains clouded. It is assumed that we can only comment on the behavior within the precision of our measurement and computing machinery [10]. Although computation of rotation numbers, Lyapunov spectra, and frequency analysis provides effective diagnostic tools, we have not found a method that can identify if a system shows quasiperiodicity or a mode-locked periodic orbit at a given parameter value within the scope of the machine's precision.

In this paper, we propose two new approaches to tackle this problem. Our first approach is based on the evolution of perturbations to the state in the phase space. Our second approach is based on the behavior of the frequency components in the Fourier space—using the so-called *spectral bifurcation diagrams*or SBD in short. Sections 2 and 3 describe our first approach, and in section 4, we analyze the results of this method. We reaffirm our results using SBDs in section 5. We finally conclude this paper by demonstrating the usefulness of these approaches in section 6.

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Springer

Author(s) Ritam Bairagi, Debajyoti Guha, Soumitro Banerjee.
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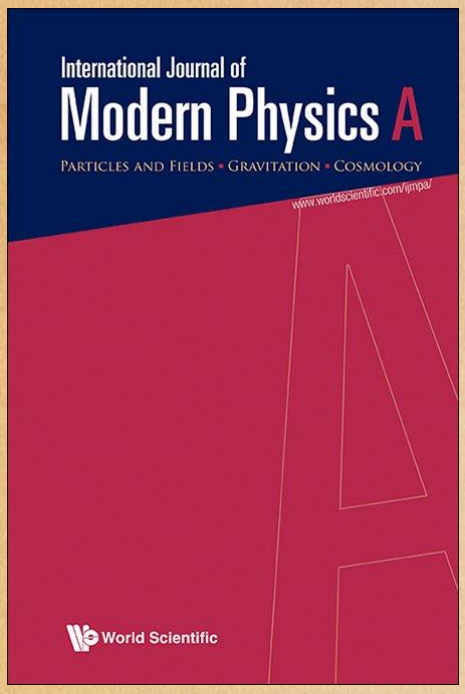
DOI : https://doi.org/10.1007/s11071-025-11985-5
IF : 5.4 (SCI)

DESCRIPTION

Distinguishing between a quasiperiodic orbit and a high-periodic mode-locked orbit in a nonlinear system remains a challenge. In this paper, author present two approaches to address this issue. The first method analyzes how the distance between two nearby initial conditions located on the invariant closed curve evolves with time. For a high-periodic orbit, the distance asymptotically decreases, while for a quasiperiodic orbit, it remains of the same order of magnitude as the initial distance. We present an algorithm to utilize this property fruitfully to distinguish between the two types of orbits. The second method uses the spectral bifurcation diagram that plots the evolution of the spectral components as a parameter is varied.

JOURNAL ARTICLE

Cosmological consequences of f(T,Σ) modified gravity theory: An observational analysis



Author(s) Gopal Sardar and Subenoy Chakraborty
Journal: International Journal of Modern Physics
Publisher : World Scientific
Language: English
Publication Year: 2026
DOI : https://doi.org/10.1142/S0217751X26500399
IF : 1.6 (SCI)

DESCRIPTION

This work deals with a modified gravity theory by extending f(T) gravity with a general coupling of the torsion scalar T and the trace of the matter energy–momentum tensor Σ. In the background of the flat FLRW space-time, the dark energy is considered as a perfect fluid having equation of state ω_{de} for the present modified gravity theory. Usually, power law form in each argument has been chosen for the arbitrary function "f" in the modified gravity theory. Finally, the present model has been compared with recent observational data.