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Dr. Syed Salman Ahmad Warsi is an accomplished physicist, academician, and educator with extensive expertise in condensed matter physics. He currently serves as an Associate Professor in the Department of Physics at Integral University, Lucknow, and brings more than 25 years of experience in teaching, research, and academic mentorship.

Throughout his academic career, Dr. Warsi has taught undergraduate and postgraduate students, making significant contributions to physics education through his dedicated teaching and research guidance. He has successfully supervised numerous B.Sc. and M.Sc. dissertations and projects and is actively involved in mentoring doctoral scholars pursuing Ph.D. research in Physics.

His research interests include liquid-crystal systems, nanoscale materials, and contemporary topics in condensed matter physics. Dr. Warsi has published several peer-reviewed research papers in reputed journals and continues to contribute actively to scientific research and academic development.

In addition to his research contributions, Dr. Warsi has co-authored important educational books, including:

- *ICSE Physics for Class X (2025)*
 - *ISC Practical Physics for Classes XI & XII (2021)*
- He has also served as editor of the following scholarly books:*
- *Characterization of Liquid Crystals and Photonic Crystals (2022)*
 - *Advances in Contemporary Physics: High Energy, Cosmology and Soft Matter (2025)*

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Published by: - Book Rivers

Website: - <https://www.bookrivers.com>

Email: publish@bookrivers.com

1st Print Edition – 2026

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Title: Contemporary Advances in Physics, Materials and Computational Sciences

Editor : Dr. Syed Salman Ahmad Warsi

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ISBN: 978-93-7837-031-1

MRP: 380 /-INR

(Printed in India)

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CHAPTER - 3

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ASTRONOMY

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This chapter examines the advancements, challenges, and limitations of Artificial Intelligence (AI) and Machine Learning (ML) in the study of the cosmos. The rapid expansion of high-volume astronomical datasets has necessitated the development of advanced computational frameworks for efficient data processing and analysis. Astronomy, regarded as the oldest scientific discipline, has evolved significantly from its mythological origins to the modern era. In contrast, AI is a contemporary field characterized by its problem-solving capabilities, language processing, and learning properties. The application of AI is increasingly essential in astronomy. Supervised, Unsupervised, and deep learning models have demonstrated strong performance in galaxy classification, exoplanet detection, and gravitational wave signal extraction. These models have transformed the field by enabling more accurate and efficient detection. Despite these advancements, significant challenges remain. This chapter discusses these challenges alongside potential solutions, contributing to the on-going integration of AI and ML within astronomy.

INTRODUCTION:

AI and ML simplify data processing, improve the detection of patterns, and automate the analysis of difficult processes. Consider a team of astronomers sitting at their computers late at night staring at a flow of data emitted by the NASA Space Telescope, Kepler [1]. In 2016, a computer algorithm simultaneously marked an abnormality in a spot that people would have overlooked; a small dip in the light of a star. This detection led to the identification of Kepler-90i which is an Earth-sized exoplanet orbiting a star that is almost 2,500 light-years from Earth [2]. It was one of the first times when AI contributed to redirecting human interest to a new world.