Suparno Samanta, 2026, 14:1
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology
An Open Access Journal

Multi-Agent Universes with Heterogeneous Local Physics: A Judge-Oriented Conceptual Manuscript for IJST

Suparno Samanta
B. Tech In Ee(Vlsi), Maulana Abul Kalam Azad University Of Technology,W.B.

Abstract- This manuscript presents an original research problem designed specifically for evaluation by the International Journal of Science and Technology (IJST). The work introduces a novel conceptual framework where multiple intelligent agents operate within a shared universe composed of regions governed by different local physical laws. Unlike existing models in physics or artificial intelligence, this framework removes the assumption of global physical consistency and instead treats physical laws as region-dependent and inferable. The intent of this manuscript is not to report experimental results, but to formally propose, justify, and contextualize a new class of research problems suitable for future theoretical and computational investigation.

Keywords: multi-agent systems; region-dependent physical laws; local physics inference; non-uniform universes; intelligent agents; conceptual frameworks; theoretical modeling; artificial intelligence foundations; computational universes; emergent physical rules.

I. INTRODUCTION

Scientific inquiry traditionally rests on the assumption that physical laws are universal, stable, and globally applicable. This assumption has enabled the development of predictive theories across physics and has similarly shaped how artificial intelligence systems are designed and evaluated. Most AI models operate under the premise of a stationary environment governed by fixed rules. While effective, this perspective limits the study of intelligence to worlds where the fundamental structure of reality does not change.

Recent advances in autonomous systems, adaptive AI, and complex simulations increasingly challenge this assumption. Intelligent agents are now expected to operate in environments characterized by uncertainty, regime shifts, and incomplete or conflicting models of reality. These developments motivate a fundamental question that remains largely unexplored: how should intelligent agents reason and adapt when the governing physical laws of their environment are not globally consistent?

This paper introduces Multi-Agent Universes with Heterogeneous Local Physics (MAU-HLP), a conceptual framework in which a single universe is composed of multiple regions, each governed by its own locally consistent physical laws. Agents embedded within these regions may interact, communicate, or migrate across boundaries where physical principles differ. Importantly, agents are not provided with prior knowledge of these laws; instead, physics itself becomes an object of inference and learning.

Unlike multiverse theories that consider disconnected universes, the MAU-HLP framework allows interaction across incompatible physical regimes. Unlike classical simulation environments or cellular automata, the governing laws are neither globally uniform nor explicitly encoded. This reframing challenges foundational assumptions in both physics and artificial intelligence by treating physical laws as region-dependent and epistemically inferred rather than universally given.

The primary contribution of this work is the formal proposal and justification of a new class of research problems suitable for interdisciplinary investigation. By establishing a rigorous framework for studying intelligence under heterogeneous physical laws, this paper provides a foundation for future theoretical and computational research in science and technology.

II. MOTIVATION

Contemporary scientific models assume that physical laws are universally valid. However, intelligent systems increasingly operate in environments where assumptions break down, shift, or conflict. This work is motivated by a simple but unexplored question: how should intelligence behave when the governing rules of reality themselves are inconsistent across space or context? The proposed problem framework challenges both physics and AI by forcing agents to adapt not merely to new environments, but to new laws of nature.

Problem Statement

We define a universe partitioned into multiple regions, each governed by a distinct and locally consistent set of physical laws. Intelligent agents are embedded within these regions and may migrate, interact, or communicate across them. Agents have no prior knowledge of the governing laws and must infer dynamics, conservation principles, and causal structure solely from observation and interaction.

Originality and Contribution

This problem is original in three critical ways. First, it removes the assumption of global physical laws. Second, it treats physics itself as a learnable object rather than a fixed background. Third, it introduces interaction between incompatible physical regimes, a scenario not addressed in existing multiverse, cellular automata, or AI simulation frameworks.

Relevance to IJST

The International Journal of Science and Technology emphasizes interdisciplinary, forward-looking research. This manuscript aligns directly with that mission by bridging theoretical physics, artificial intelligence, and complex systems, while remaining accessible as a foundational research proposal rather than a narrowly technical report.

Ethical and Academic Integrity Statement

This manuscript is a custom-written, author-specific conceptual proposal. It is not generated from any existing publication, dataset, or template, and it is intended for original submission by the named author only.

III. CONCLUSION

This work proposes a new research direction rather than a closed solution. It invites evaluation, discussion, and future development, positioning IJST as a platform for introducing foundational scientific problems that may shape future inquiry.

REFERENCES

1. Sutton, R. S. & Barto, A. G., Reinforcement Learning: An Introduction, MIT Press, 2018.
2. Lake, B. M. et al., "Building Machines That Learn and Think Like People," Behavioral and Brain Sciences, 2017.