
# Cross-Disciplinary Modelling of Multi-Messenger Transients Using AI and Machine Learning Frameworks

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## Abstract

Multi-messenger astronomy, integrating gravitational waves, neutrinos, and electromagnetic signals, has revolutionized the study of high-energy cosmic events. We propose a cross-disciplinary AI/ML framework to detect, classify, and model transient astrophysical phenomena across multiple wavelengths and messengers. This framework enhances signal-to-noise separation, real-time event correlation, and pattern recognition using data from gravitational wave observatories (e.g., LIGO, Virgo), radio telescopes, and optical surveys. Our aim is to develop a scalable pipeline for automated early detection and probable source classification, including neutron star mergers, supernovae, and gamma-ray bursts. This study highlights the significance of inter-BRICS collaboration in data sharing, model optimization, and joint observing strategies, outlining potential applications for future BRICS observatories and demonstrating how AI can accelerate multi-messenger astrophysics discoveries.