

# Bridging GW and HEP: Next Generation AI at the Frontier

*Thursday, 27 February 2025 11:00 (30 minutes)*

Gravitational Wave (GW) Physics has entered a new Multi-Messenger Astronomy (MMA) era, marked by increasing detections from GW observatories led by LIGO, Virgo, and KAGRA collaborations. This presentation will introduce the KAGRA experiment and explore the transformative role of machine learning (ML) in GW data analysis —some successful ML key applications, among which glitch identification, will be discussed. demonstrate the transformative role of machine learning (ML) in GW data analysis.

This talk also bridges advancements in computational techniques between fundamental research in Astrophysics and High-Energy Physics (HEP). Innovative solutions for addressing next-generation data analysis challenges will be presented, with a focus on the use of modern ML tools within the ROOT C++ Framework (CERN) and introducing Anaconda HEP-Forge for rapid software deployments. These tools, available as simple libraries, integrate key requirements for astrophysical analysis —such as vector manipulation, KAFKA & other Cloud data transfers, and complex tensor computations—enabling efficient ML training & inference on both CPU and GPU technologies.

**Primary author:** MEYER-CONDE, Marco (Tokyo City University)

**Co-authors:** Prof. TAKAHASHI, Hirotaka (Tokyo City University); Dr YAMAMOTO, Takahiro S. (University Of Tokyo); Dr SAKAI, Yusuke (Tokyo City University)

**Presenter:** MEYER-CONDE, Marco (Tokyo City University)

**Session Classification:** Morning Talks