Contribution ID: **45** Type: **not specified**

Deep Learning Development and Deployment for Low-Latency Gravitational-Wave Astronomy

Monday, 18 July 2022 20:40 (20 minutes)

The successful electromagnetic observation of the neutron star merger GW170817 led to explosive growth in the field of multi-messenger astronomy. With that growth has come new challenges and opportunities. The computational needs of gravitational-wave astronomy have risen alongside the sensitivity of the global network of gravitational-wave detectors, and will continue to rise as more detectors with even greater sensitivity come online in the next decade. As the scale of data ramps up, new techniques are desired that will allow for low-latency detection of gravitational-waves and enable multi-messenger followup. We present two deep learning networks that are being developed to address this demand: DeepClean and BBHnet. In combination, these networks form an end-to-end pipeline capable of denoising gravitational-wave strain data and detecting binary black hole mergers. We also present steps that have been taken in the development of these algorithms that will encourage their widespread adoption and use. Taking lessons from industry and the field of machine learning operations, tools and procedures have been created that simplify the process of consistently training, testing, and implementing machine learning networks. This lowers the barrier to entry for end users, and ensures that effective analysis tools are actually applied to important science questions.

In-person or Virtual?

In-person

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Session Classification: Poster Session