



# MACHINE LEARNING FOR ASTROPHYSICS

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## Flash Talk: Machine learning for radiometer calibration in global 21cm cosmology

*Thursday, 11 July 2024 12:55 (5 minutes)*

In this talk we propose a Physics based AI framework for precise radiometer calibration in global 21cm cosmology. These experiments aim to study formation of the first stars and galaxies by detecting the faint 21-cm radio emission from neutral hydrogen. This global or sky-averaged signal is predicted to be five orders of magnitude dimmer than the foregrounds. Therefore detection of the signal requires precise calibration of the instrument receiver, which non-trivially amplifies the signals detected by the antenna. Current analytic methods appear insufficient, causing a major bottleneck in all such experiments. Unlike other methods, our receiver calibration approach is expected to be agnostic to in-field variations in temperature and environment and furthermore does not rely on assumptions that certain critical components are impedance matched. For the first time we propose the use of machine learning for calibration of global 21-cm experiments.

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**Session Classification:** Cosmology & Simulations