Contribution ID: **83**   Type: **Poster**

Machine Learning Applications for CLARA

CLARA is an electron accelerator test facility at STFC's Daresbury Laboratory in the UK. The first phase has been operated since 2018 for a wide range of accelerator applications. A major upgrade is presently being commissioned that increases the electron beam energy from ˜35 MeV to 250 MeV, and adds an experimental area featuring a new high-power laser. Machine learning will play an important role in the future development of the facility, with aims to deliver bespoke beam properties rapidly, to detect and diagnose anomalies, and to provide virtual diagnostics. This paper summarises machine learning applications under development, including photo-injector laser pulse shaping and a model to learn magnet hysteresis conditions to reduce the need for degaussing.

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Session Classification: Poster session

Track Classification: Surrogate Modelling and Digital Twins