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# Machine learning-driven longitudinal phase space reconstruction for enhanced beam tuning at LANSCE

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The Los Alamos Neutron Science Center (LANSCE) relies on accurate tuning of its Drift Tube Linacs (DTLs) to maintain beam quality and operational efficiency. This work introduces a novel machine-learning-based approach to reconstruct the longitudinal phase space (LPS) at the entrance of DTL Tank 1 using two-dimensional phase scans from Tanks 1 and 2. A Deep Neural Network trained on synthetic datasets generated by GPU-accelerated simulations integrates real-time diagnostic data to infer high-resolution LPS distributions. By solving this inverse problem efficiently, the method improves beam delivery precision while reducing operator intervention. Early results indicate that this approach can enhance LANSCE's operational capabilities, providing a robust framework for accelerator tuning and diagnostics.

## Footnotes

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