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Langmuir probe data interpretation with a neural network¹

MATTHEW LAZO, XIN ZHANG, FRANCESCA POLI, Princeton Plasma Physics Laboratory — Particle diagnostics of tokamak edge plasmas are commonly performed with Langmuir probes, which are swept at several kHz and produce a large volume of data to be processed for each shot of plasma. Each probe trace is manually truncated and fitted to find corresponding plasma parameters. However, because standard Langmuir probe characteristics are well-understood for a near-Maxwellian plasma and can be simulated easily as a piecewise function with added noise, an opportunity arises to develop an automated, neural network-based workflow to extract relevant plasma parameters. The NN is trained on simulated Langmuir probe data, then put to work on real data taken from tokamak experiments.

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