

# Characterizing Silicon Pixel Devices in the Context ML in the Smartpixels Project

The Smartpixels project aims to deliver on-device data reduction using neural networks for fine granularity pixel sensors used in high-precision tracking detectors. This has resulted in two major implementations: a filter network and a regression network. Both of these networks deliver novel capabilities for pixels sensors, including on-sensor background rejection and single-sensor reconstruction of the charged particle incident angle. These capabilities are sensitive to the pitch and depletion thickness of the silicon device, as both of these parameters affect the amount of information presented to the neural network. In this contribution we will discuss the performance of the smartpixels regression and filtering neural networks as a function of the device parameters, demonstrating a codesign strategy that covers sensor, readout-asic, and machine learning.

## Focus areas

HEP

**Authors:** BEAN, Alice (The University of Kansas (US)); BADEA, Anthony (University of Chicago (US)); PARPIL-LON, Benjamin (Fermi National Accelerator Lab. (US)); SYAL, Chinar (Fermi National Accelerator Lab. (US)); MILLS, Corrinne (University of Illinois at Chicago (US)); SHEKAR, Danush (University of Illinois at Chicago (US)); JIANG, David (Univ. Illinois at Urbana Champaign (US)); BERRY, Douglas Ryan (Fermi National Accelerator Lab. (US)); HOWARD, Eliza Claire (University of Chicago (US)); FAHIM, Farah (Fermi National Accelerator Lab. (US)); DI GUGLIELMO, Giuseppe (Fermilab); DICKINSON, Jennet Elizabeth (Cornell University (US)); Ms YOO, Jieun (UIC); DIPETRILLO, Karri Folan (University of Chicago); GRAY, Lindsey (Fermi National Accelerator Lab. (US)); NEUBAUER, Mark (Univ. Illinois at Urbana Champaign (US)); LIU, Miaoyuan (Purdue University (US)); SWARTZ, Morris (Johns Hopkins University (JHU)); TRAN, Nhan (Fermi National Accelerator Lab. (US)); MAKSIMOVIC, Petar (Johns Hopkins University (US))