



Contribution ID: 39

Type: **Presentation**

## Monte Carlo Pulse Shape Discrimination model and fitter for liquid Argon dark matter detectors.

*Friday, 23 September 2022 14:35 (15 minutes)*

Pulse Shape Discrimination is a powerful tool to distinguish WIMP signals from electronic recoil background in liquid Argon detectors.

In order to accurately evaluate the expected rate of background events with uncertainty, a robust background model that can be tuned to the detector data and reliably extrapolated orders of magnitude beyond the available background statistics, is needed. We have developed a physics-driven toy simulation to model the complete detection process from scintillation to light detection. Since high statistics simulations are computationally expensive the model has been implemented in python using PyTorch framework, which significantly reduces the computation time using parallelization on multiple GPUs. On a single GPU, PyTorch implementation is 2 orders of magnitude faster than the ROOT based implementation. We'll discuss the model and its application to analyse the DEAP-3600 data.

**Primary authors:** CHOUDHARY, Sarthak (AstroCeNT); Prof. GAWRON, P.; Dr GUPTA, M; KUŹNIAK, Marcin (AstroCeNT / CAMK PAN); Prof. PAWELA, Ł.

**Presenter:** CHOUDHARY, Sarthak (AstroCeNT)

**Session Classification:** Signal reconstruction

**Track Classification:** Signal reconstruction and identification (analysis methods, simulations)