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Anomaly aware machine learning for dark matter direct detection at DARWIN

Wednesday, 13 September 2023 16:45 (15 minutes)

This talk presents a novel approach to dark matter direct detection using anomaly aware machine learning techniques in the DARWIN next-generation dark matter direct detection experiment. I will introduce a semi-unsupervised deep learning pipeline that falls under the umbrella of generalized Simulation Based Inference (SBI), an approach that allows one to effectively learn likelihoods straight from simualted data, without the need for complex functional dependence on systematics or nuiscance parameters. I also present an inference procedure to detect non-background physics utilizing an anomlaly function derrived from the loss functions of the semi-unsupervised arcvhitecture. The pipeline's performance is evaluated using pseudo-data sets in a sensitivity forecasting task, and the results suggest that it offers improved sensitivity over traditional methods.

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