SUSY 2024
Theory meets Experiment
Madrid
10-14 June 2024

Contribution ID: **169** Type: **Parallel Talk**

Modular tool for bayesian analysis with Machine Learning in DM Direct Detection

Tuesday, June 11, 2024 4:26 PM (17 minutes)

In this work we present a modular procedure for estimating the dark matter (DM) parameters from DM direct detection experiments. We use machine learning techniques to perform a Bayesian analysis to determine the discovery potential and to estimate the model parameters without the need of assuming a likelihood functional form. Since each dataset can be trained individually, one of the main advantages of the method is that the inclusion of new experimental data is simple and fast. This allows to include, combine, or remove datasets, either data representations or results from different detectors, using already trained algorithms in a modular fashion. In order to illustrate this method we consider the case of WIMP DM within the framework of effective field theory (EFT) to describe the DM-nucleus scattering cross section in a XENON-like experiment. We show the results in the DM mass, coupling-coefficient amplitude and phase space of the EFT operators.

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Session Classification: Dark matter, astroparticles and gravitational waves

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