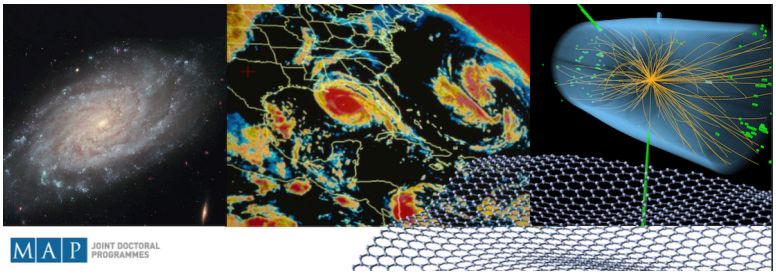

Contribution ID: **136** Type: **Contributed Talk (20 minutes)**

Using Machine Learning to Scan Beyond Standard Model Parameter Spaces

Friday 11 October 2024 15:30 (20 minutes)

In High Energy Physics, when testing theoretical models of new physics against experimental results, the customary approach is to simply sample random points from the parameter space of the model, calculate their predicted values for the desired observables and compare them to experimental data. However, due to the typically large number of parameters in these models, this process is highly time consuming and inefficient. We propose a solution to this by adopting optimization algorithms which make use of Machine Learning methods in order to improve the efficiency of this validation task.
A first study applied these methods to conventional Supersymmetry realisations, cMSSM and pMSSM, when confronted against Higgs mass and Dark Matter relic density constraints and the results show an increase in up to 3 orders of magnitude in sampling efficiency when compared to random sampling.
In a much more challenging scenario, a followup analysis was implemented for the scotogenic model, using an evolutionary multiobjective optimization algorithm, confronted against experimental constraints coming from the Higgs and neutrinos masses, lepton flavor violating decays, neutrino mixing and the anomalous magnetic moment of the muon. Preliminary results show at least 6 orders of magnitude increase in efficiency over random sampling.

Which topic best fits your talk?

High Energy Physics and Cosmology

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Session Classification: High Energy Physics & Cosmology II (Chair: Carlos Herdeiro, Universidade de Aveiro) - Sala Sousa Pinto, DM (11.2.6)