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Efficient search for new physics using Active Learning in the ATLAS Experiment with RECAST

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Searches for new physics and their reinterpretations constrain the parameter space of models with exclusion limits in typically only few dimensions. However, the relevant theory parameter space often extends into higher dimensions. Limited computing resources for signal process simulations impede the coverage of the full parameter space. We present an Active Learning approach based on the RECAST reinterpretation framework to address this limitation. Compared to the usual grid sampling, it reduces the number of parameter space points for which exclusion limits need to be determined. Consequentially, it allows to extend interpretations of searches to higher dimensional parameter spaces and therefore to raise their value, e.g. via the identification of barely excluded subspaces which motivate dedicated new searches. The procedure is demonstrated by reinterpreting a Dark Matter search performed by the ATLAS experiment, extending its interpretation from a 2 to a 4-dimensional parameter space while keeping the computational effort at a low level.

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