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Constructing model-agnostic likelihoods, a method for the reinterpretation of particle physics results

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Experimental High Energy Physics has entered an era of precision measurements. However, measurements of many of the accessible processes assume that the final states' underlying kinematic distribution is the same as the Standard Model prediction. This assumption introduces an implicit model-dependency into the measurement, rendering the reinterpretation of the experimental analysis complicated without reanalysing the underlying data.

We present a novel reweighting method in order to perform reinterpretation of particle physics measurements. It makes use of reweighting the Standard Model templates according to kinematic signal distributions of alternative theoretical models, prior to performing the statistical analysis. The generality of this method allows us to perform statistical inference in the space of theoretical parameters, assuming different kinematic distributions, according to a beyond Standard Model prediction.

The implementation - redist - is an extension to the pyhf software. It can easily be interfaced with the EOS software, which allows us to perform flavor physics phenomenology studies. Beyond the pyhf or HistFactory likelihood specification, only minimal information is necessary to make a likelihood model-agnostic and hence easily reinterpretable. We showcase that publishing such likelihoods is crucial for a full exploitation of experimental results.

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