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Likelihood preservation and statistical reproduction of searches for new physics

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Likelihoods associated with statistical fits in searches for new physics are beginning to be published by LHC experiments on HEPData [arXiv:1704.05473]. The first of these is the search for bottom-squark pair production by ATLAS [ATLAS-CONF-2019-011]. These likelihoods adhere to a specification first defined by the HistFactory p.d.f. template [CERN-OPEN-2012-016]. This is per-se independent of its implementation in ROOT and it is useful to be able to run statistical analysis outside of the ROOT and RooStats/RooFit framework. We introduce a JSON schema that fully describes the HistFactory statistical model and is sufficient to reproduce key results from published ATLAS analyses. Using two independent implementations of the model, one in ROOT and one in pure Python, we reproduce the sbottom multi- b limits using the published likelihoods on HEPData underscoring the implementation independence and long-term viability of the archived data.

Consider for promotion

Yes

Primary authors: STARK, Giordon Holtsberg (University of California, Santa Cruz (US)); HEINRICH, Lukas Alexander (CERN); FEICKERT, Matthew (Southern Methodist University (US)); CRANMER, Kyle Stuart (New York University (US))

Presenter: FEICKERT, Matthew (Southern Methodist University (US))

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