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# dilax: Differentiable Binned Likelihoods in JAX

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dilax is a software package for statistical inference using likelihood functions of binned data. It fulfils three key concepts: performance, differentiability, and object-oriented statistical model building.

dilax is build on JAX - a powerful autodifferentiation Python framework. By making every component in dilax a "PyTree", each component can be jit-compiled (jax.jit), vectorized (jax.vmap) and differentiated (jax.grad). This enables additionally novel computational concepts, such as running thousands of fits simultaneously on a GPU or differentiating through measurements of physical observables.

We present the key concepts of dilax, show its features, and discuss performance benchmarks with toy datasets.

## Significance

This project is a new statistics tool suited for typical measurements in LHC analyses. It focusses on performance, usability, and novel computing techniques such as autodifferentiation and vectorization of full fits. This project has not been presented so far. It introduces new concepts that have not been covered by other statistics libraries.

## References



## Experiment context, if any

Use case for CMS, ATLAS, LHCb analyses

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