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Speeding up differentiable programming with a Computer Algebra System

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In the ideal world, we describe our models with recognizable mathematical expressions and directly fit those models to large data samples with high performance. It turns out that this can be done by formulating our models with SymPy (a Computer Algebra System) and using its symbolic expression trees as template to computational back-ends like JAX and TensorFlow. The CAS can in fact further simplify the expression tree, which results in speed-ups in the numerical back-end.
In this talk, we have a look at amplitude analysis as a case study and use the Python libraries of the ComPWA project to formulate and fit large expressions to unbinned, multidimensional data sets.

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