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PyR@TE 2: automatic RGEs generation at two-loop with kinetic mixing

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Renormalization group equations are a key ingredient to extrapolate theories to higher energies. Even though their expression at two-loop for an arbitrary gauge field theory have been known for more than thirty years, deriving the full set of equations for a given model by hand is very challenging and prone to errors. To tackle this issue, we have introduced a python tool called PyR@TE; Python Renormalization group equations @ Two-loop for Everyone. With PyR@TE, it is easy to implement a given Lagrangian and derive the complete set of two-loop RGEs for all the parameters of the theory. In this talk, I will present the new version of this code, PyR@TE 2, which brings many new features and in particular the support of kinetic mixing when several U(1) gauge groups are involved. In addition, it is now possible to implement terms in the Lagrangian involving fields for which several gauge singlets exist. As a byproduct, results for several popular models are presented in this paper. Finally, the two-loop RGEs for the anomalous dimension of the scalar and fermion fields have been implemented as well.

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