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Towards two-loop computations in four dimensions with the Loop-Tree Duality

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We propose a new algorithm based on the Loop-Tree Duality theorem to renormalise and calculate two-loop diagrams. The ultraviolet singularities are locally cancelled in a systematic way and at the integrand level, allowing for a full four-dimensional numerical implementation of the method. In particular, we apply the method to calculate the $H \to \gamma\gamma$ amplitude at two-loop level, and find an excellent agreement with already available literature results. We also present other advantages of the Loop-Tree Duality formalism, such as the possibility to write unintegrated amplitudes in a universal way, regardless of the particle running inside the loop.

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