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One-loop integrations with Hypergeometric functions

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Numerically stable analytic expression of a one-loop integration is one of the most important elements of the accurate calculations of one-loop corrections to the physical processes. It is known that these integrations are expressed by some generalized classes of Gauss hypergeometric functions. Power series expansions, differential equations, contiguous and many other identities are known for them. For Lauricella F_D functions, analytic properties are studied in detail, which provide useful information for the numerical stabilities.

We show that two- and three-point functions are exactly expressed in terms of F_D for arbitrary combinations of mass parameters in any space-time dimensions. We also show the relation between four-point functions and Aomoto-Gelfand hypergeometric functions.

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