

From sum-integrals to continuum integrals and back

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Within finite-temperature quantum field theory, the evaluation of vacuum-type sum-integrals plays a central role in the determination of equilibrium observables, such as the free energy (or pressure) of a thermal system.

As has been repeatedly observed in the past, many two-loop sum-integrals can be decomposed into one-loop factors, allowing for analytic solutions in the space-time dimension d .

In this talk, we sketch a recent proof that this decomposition is generic, and give an algorithm that constructs this decomposition for any massless bosonic two-loop vacuum sum-integral. A number of related insights into a special class of two-loop massive vacuum integrals are discussed along the way.

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