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## Finite-volume formalism for physical processes with an electroweak loop integral

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This study investigates finite-volume effects in physical processes involving the combination of long-range hadronic matrix elements with electroweak loop integrals. We adopt the idea of implementing the electroweak part in the infinite-volume version. A general approach is established for correcting finite-volume effects in cases where the hadronic intermediate states are dominated by either a single particle or two particles. The finite-volume formalism developed in this study has broad applications, including the QED corrections in various processes and the two-photon exchange contribution in  $K_L \rightarrow \mu^+ \mu^-$  decay.

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