## PLANCK2025 - The 27th International Conference From the Planck Scale to the Electroweak Scale



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## **Functional Methods Beyond One-Loop Order**

Tuesday 27 May 2025 18:20 (20 minutes)

We present recent advances in functional techniques beyond one-loop order suitable for precision matching and running computations in the effective field theories. Expanding the generating functional and quantum effective action up to two-loop order, we analyze how the relevant terms can be evaluated. The formalism is then generalized to theories with mixed spin as well as gauge fields, where we show how the gauge covariance can be preserved in the evaluation of the quantum effective action. Finally, we demonstrate the application of this formalism through two concrete examples: scalar toy model and Euler-Heisenberg Lagrangian in QED.

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