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The Power of Series

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In quantum mechanics and quantum field theory the perturbative series usually have factorially growing coefficients, hence being non-convergent asymptotic expansions. In order to go beyond the approximation given by the optimal truncation one can Borel-resum the series but generically extra contributions (non-perturbative in the coupling) such as instantons, must be included to reproduce the exact results.

I will show that in a class of quantum mechanical problems one can define suitably modified perturbative expansions which are Borel-resummable to the exact results, avoiding the need to include instantons. The non-perturbative contributions are therefore encoded in the coefficients of the new expansions.

I will illustrate this explicitly in examples which are known to contain non-perturbative effects, such as the (supersymmetric) double-well potential and the perturbative expansion around a false vacuum. I will comment on possible extensions to quantum field theory.

Presentation type

Parallel talk

Primary author: SPADA, Gabriele (SISSA)

Presenter: SPADA, Gabriele (SISSA)

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