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Field redefinitions and infinite field anomalous dimension

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Field redefinitions are commonly used to remove redundant operators from the Lagrangian and thereby transform to a minimal operator basis. This is, for example, necessary when the theory has first been renormalized with off-shell kinematics in a larger basis. Working through an explicit example in the O(N) model, I will argue that such field redefinitions, while leaving the S-matrix invariant and finite, lead to infinite field anomalous dimensions γ_ϕ at two loops. These divergences cannot be removed by counterterms without reintroducing redundant operators.

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