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Scale invariant hard thermal loop resummation.

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I will illustrate how our recently developed renormalization group optimized perturbation theory (RGOPT) resums perturbative expansions in thermal field theories. The convergence and scale dependence of RGOPT thermodynamical quantities are drastically improved as compared to standard perturbative expansions, and it cures the odd drastic scale dependence observed in other related methods such as the screened perturbation or (resummed) hard-thermal-loop (HTL) perturbation. I will present some recent results in scalar models, and first applications to HTL resummation for QCD thermodynamical quantities, also explaining the additional calculations needed in gauge theories with respect to standard HTLpt within our framework.

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