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Universality of the hard-loop action

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The effective actions of gauge bosons, fermions and scalars, which are obtained within the hard-loop approximation, are shown to have unique forms for a whole class of gauge theories including QED, scalar QED, super QED, pure Yang-Mills, QCD, super Yang-Mills. The universality occurs irrespective of a field content of each theory and of variety of specific interactions. Consequently, the long-wavelength or semiclassical features of plasma systems governed by these theories such as collective excitations are almost identical. An origin of the universality, which holds within the limits of applicability of the hard-loop approach, is discussed.

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