

Renormalization for the self-potential of a scalar charge in static space-times

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Abstract

A method is presented which allows for the renormalization of the self-potential for a scalar point charge at rest in static curved space-time. The method is suitable for the scalar field with arbitrary mass m and coupling to the scalar curvature. The asymptotic behavior of self-potential is obtained in the limit in which the Compton wavelength $1/m$ of the massive scalar field is much smaller than the characteristic scale of curvature of the background gravitational field. The self-force is calculated in this limit. © 2011 American Physical Society.

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