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# Effects of spacetime topology and curvature on the resonance interatomic energy

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We study, using the formalism proposed by Dalibard, Dupont-Roc, and Cohen-Tannoudji, the resonance interatomic energy (RIE) of two identical two-level static atoms in a symmetric/antisymmetric entangled state, which are coupled to massless scalar fields, in a number of different spacetimes. We first show that the presence of a boundary in a flat Minkowski spacetime can dramatically modify the RIE of the two static atoms, resulting in an enhanced or weakened and even nullified RIE, as compared with that in the unbounded case; we then show that the RIE of the two atoms in the spacetime of a Schwarzschild black hole can be sharply affected by the spacetime curvature on one hand, but on the other hand it is surprisingly undisturbed by the Hawking radiation of the black hole; we finally show that the RIE of the two static atoms in the spacetime with an infinite and straight cosmic string (the so called cosmic string spacetime) is sensitive to the nontrivial topological structure of the spacetime, making the RIE of the two static atoms behaves in a manner very similar to that near a perfectly reflecting boundary in a flat Minkowski spacetime.

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