Cherenkov radiation near a dielectric medium at finite temperatures

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Abstract

A field theoretical derivation is given for the average number of Cherenkov photon emission by a charged particle, in a dielectric medium of permitivity ε_1, moving parallel to the plane surface of a different dielectric medium of permitivity $\varepsilon_2 > \varepsilon_1$ at finite temperatures. Near threshold for the speed of the charged particle, it is shown that an enhancement of about 31% of this number is possible in the presence of the second medium, by choosing specific windows, obtained from a general formula, centered about points of the spectrum at any temperature and arbitrary values of the permitivities $\varepsilon_1, \varepsilon_2 > \varepsilon_1$. The conditions for this 31% enhancement are explicitly worked out for blue and red light.