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NOTE BREVI

On the Zero-Point Radiation and the Inverse Compton Scattering.

F. CARDONE
Dipartimento di Fisica, Università di Roma «La Sapienza» - Roma
INFN, Sezione di Frascati - Frascati (Roma)

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Summary. — We analyse the measurement of high-energy photons coming from an inverse Compton effect between the LEP electrons and the thermal radiation of the LEP tube. Within the framework of the stochastic model for the zero-point radiation in the Planck distribution, we evaluated a cut-off energy of (0.066 ± 0.005) eV for a photon distribution at a temperature of 300 K.

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1. – Introduction.

The so-called zero-point term—depending only on the frequency and not on the temperature—was first introduced by Planck in his second theory of the spectral distribution of black-body radiation. Its physical meaning still remains obscure, and with it the precise origin of Planck distribution.

Starting from the Einstein-Ehrenfest paper [1], some authors developed stochastic models in which they suggested that the zero-point energy is an average of a real fluctuation of the electromagnetic field subsisting very close to zero temperature [2, 3]. Moreover, it has been pointed out that a zero-point field due to radiation arising from all the charges in the universe must exist everywhere, and it is a real version of the zero-point energy [4].

In this context the Planck distribution becomes

$$\mathrm{d}n = \frac{8\pi}{(ch)^3} E_0^2 \,\mathrm{d}E_0 \left[\frac{1}{\exp[E_0/kT]-1} + \frac{1}{2} g(E_0 - E_c) \right], \tag{1}$$

where

$$g(E_0 - E_c) = \begin{cases} 1 & \text{if } E_0 \leqslant E_c, \\ 0 & \text{if } E_0 > E_c. \end{cases}$$