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The Second Law of Thermodynamics: Mathematical Error
TEMUR Z. KALANOV, Home of Physical Problems, Pisatelskaya 6a, 700200 Tashkent, Uzbekistan — The critical analysis of the generally accepted foundations of thermodynamics is proposed. Within the framework of the work [1], the following statement is proved: Gibbs's quantum canonical distribution $f_n = f_0 \exp(-E_n/T)$ (whereE_n, $n = 0,\ 1,\ \ldots$, f_n, T are the energy of the subsystem, probability, and temperature, respectively) defines the correct relation of the thermal energy Q of the subsystem to the entropy S of the subsystem and the temperature T. This relation has the form: $S = Q/T$ and $\lim\limits_{T\to 0} S = 0$ (where $Q \equiv \sum\limits_{n=0}^{\infty} E_n f_n$, $S \equiv \sum\limits_{n=0}^{\infty} S_n f_n$, $S_n \equiv E_n/T = -\ln(f_n/f_0)$). Consequence: the second law (i.e. $dS = dQ/T$) of thermodynamics represents mathematical error. Ref.: [1] T.Z. Kalanov, "On the main errors underlying statistical physics." Bulletin of the APS, Vol. 47, No. 2 (2005), p. 164.

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