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On the Correct Analysis of the Maxwell Distribution TEMUR Z. KALANOV, Home of Physical Problems, Pisatelskaya 6a, 700200 Tashkent, Uzbekistan — The critical analysis of the Maxwell distribution is proposed. The main results of the analysis are as follows. (1) As is known, an experimental device for studying the Maxwell distribution consists of the following basic physical subsystems: (a) ideal molecular gas enclosed in a vessel (gas is in the equilibrium state); (b) molecule beam which is emitted from the small aperture of the vessel (the small aperture is a stochastic source of quantum particles). (2) The energy of the molecule of the beam does not represent random quantity, since molecules does not collide with each other. In this case, only the set of the monoenergetic molecules emitted by the stochastic source is a random quantity. This set is called a quantum gas. The probability p_k that the quantum gas has the energy $E_n k$ is given by the Gibbs quantum canonical distribution: $p_k = p_0 \exp(-E_n k/T)$, $k = 0,\ 1,\ \ldots$ where k is the number of molecules with energy E_n; T is temperature of the molecule in the vessel. (3) The average number of the molecules with energyE_n represents the Planck distribution function: $f = \sum_{k=0}^{\infty} k p_k \equiv f_{(Planck)}$. (4) In classical case, the expression $E_n f_{(Planck)}$ represents the Maxwell distribution function: $f_{(Maxwell)} \sim E_n\, f_{(Planck)} \sim v^2 \exp\,(-mv^2/2T)$. Consequently, the generally accepted statement that the Maxwell distribution function describes gas enclosed in a vessel is a logical error.

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