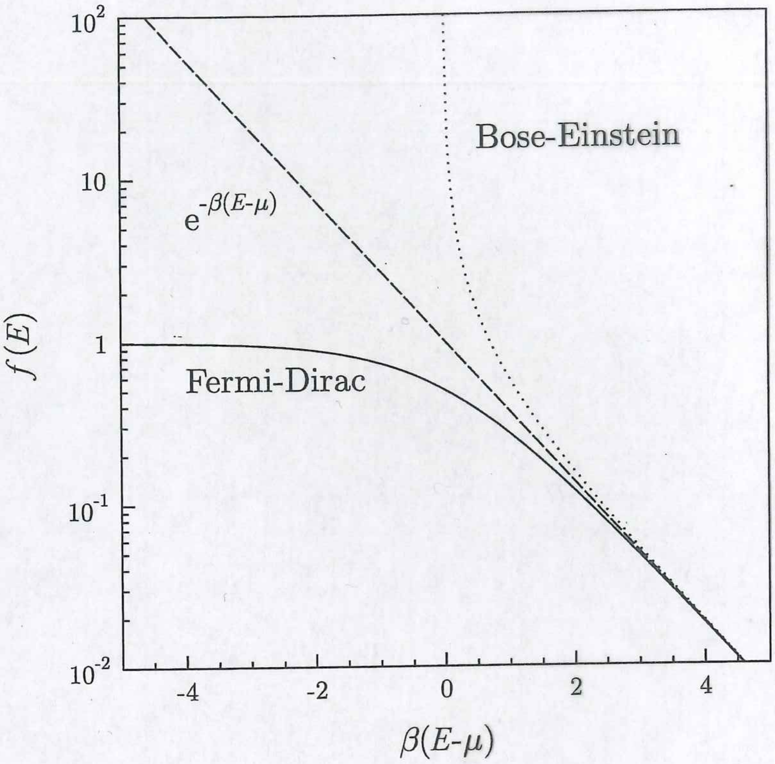

(μ, T) FiNKO!

Fig. 29.3 The Fermi–Dirac and Bose–Einstein distribution functions.

a state with energy E. We can therefore immediately write down the distribution function $f(E)$ for fermions as

$$\boxed{f(E) = \frac{1}{e^{\beta(E-\mu)} + 1},} \tag{29.26}$$

which is known as the **Fermi–Dirac distribution function**, and for bosons as

$$\boxed{f(E) = \frac{1}{e^{\beta(E-\mu)} - 1},} \tag{29.27}$$

which is known as the **Bose–Einstein distribution function**. Sometimes the term on the right-hand side of eqn 29.26 is referred to as the **Fermi factor** and the term on the right-hand side of eqn 29.27 is referred to as the **Bose factor**. These are sketched in Fig. 29.3. Note that in the limit $\beta(E-\mu) \gg 1$, both functions tend to the Boltzmann distribution $e^{-\beta(E-\mu)}$. This is because this limit corresponds to low-density (μ small) and here there are many more states thermally accessible to the particles than there are particles; thus double occupancy never occurs and the requirements of exchange symmetry become irrelevant and both fermions and bosons behave like classical particles. The differences, however, are particularly felt at high density. In particular, note that the

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