1.1 Distribution functions

Quantum mechanical particles are principally not distinguishable. Thus the many particle states are either totally antisymmetric (Fermions, half integer spin) or totally symmetric (Bosons, integer spins).
The distribution function (probability to occupy a state) for Fermions is the Fermi-Dirac distribution

$$f(E,\mu,T) = \frac{1}{\exp\left(\frac{E-\mu}{kT}\right)+1} \quad . \tag{1.1}$$

The distribution function for Bosons is the Bose-Einstein distribution

$$f(E,\mu,T) = \frac{1}{\exp\left(\frac{E-\mu}{kT}\right)-1} \quad . \tag{1.2}$$

If the number of quantum mechanical particles is much smaller than the number of possible states, or if the temperature is "high enough" the probability to occupy states becomes very small, i.e. $f(E,\mu,T) \ll 1$ or $\exp\left(\frac{E-\mu}{kT}\right) \gg 1$.
Both quantum mechanical distribution functions simplify to the Boltzmann distribution function

$$f(E,\mu,T) = \exp\left(-\frac{E-\mu}{kT}\right) \quad . \tag{1.3}$$

Under this diluted condition even quantum mechanical particles can be interpreted as being principally distinguishable, e.g. only one electron can be found within a certain volume, i.e. they can be interpreted as classical particles.