TABLE 9.1 THE THREE STATISTICAL DISTRIBUTION FUNCTIONS

	MAXWELL-BOLTZMANN	BOSE-EINSTEIN	FERMI-DIRAC
Applies to systems of	Identical, distinguishable particles	Identical, indistinguishable particles that do not obey exclusion principle	Identical, indistinguishable particles that obey exclusion principle
Category of particles	Classical	Bosons	Fermions
Properties of particles	Any spin, particles far enough apart so wave functions do not overlap	Spin 0, 1, 2, ... ; wave functions are symmetric to interchange of particle labels	Spin $\frac{1}{2}$, $\frac{3}{2}$, $\frac{5}{2}$, ... ; wave functions are antisymmetric to interchange of particle labels
Examples	Molecules of a gas	Photons in a cavity; phonons in a solid; liquid helium at low temperatures	Free electrons in a metal; electrons in a star whose atoms have collapsed (white dwarf stars)
Distribution function (number of particles in each state of energy ε at the temperature T)	$f_{MB}(\varepsilon) = Ae^{-\varepsilon/kT}$	$f_{BE}(\varepsilon) = \dfrac{1}{e^{\alpha}e^{\varepsilon/kT} - 1}$	$f_{FD}(\varepsilon) = \dfrac{1}{e^{(\varepsilon - \varepsilon_F)/kT} + 1}$
Properties of distribution	No limit to number of particles per state	No limit to number of particles per state; more particles per state than f_{MB} at low energies; approaches f_{MB} at high energies	Never more than 1 particle per state; fewer particles per state than f_{MB} at low energies; approaches f_{MB} at high energies