

74. (a) Since  $p_x = p_y = 0$ ,  $\Delta p_x = \Delta p_y = 0$ . Thus from Eq. 39-20 both  $\Delta x$  and  $\Delta y$  are infinite. It is therefore impossible to assign a  $y$  or  $z$  coordinate to the position of an electron.
- (b) Since it is independent of  $y$  and  $z$  the wave function  $\Psi(x)$  should describe a plane wave that extends infinitely in both the  $y$  and  $z$  directions. Also from Fig. 39-11 we see that  $|\Psi(x)|^2$  extends infinitely along the  $x$  axis. Thus the matter wave described by  $\Psi(x)$  extends throughout the entire three-dimensional space.