11-3 Soln

The energy levels are given by

$$E_n = -\left(\frac{\hbar^2 F^2}{2m}\right)^{1/3} Z_n ,$$

where Zn is a zero of the airy function. For n = 1, Z_1 = -2.338. The mass of xenon is about $131.3 \times 1.67 \times 10^{-27}$ kg = 2.2×10^{-25} kg. The force F is the weight, gm, which is then 2.2×10^{-24} Newtons.

$$E_1 = -\left(\frac{(1.055 \times 10^{-34})^2 (2.2 \times 10^{-24})^2}{2(2.2 \times 10^{-25})}\right)^{1/3} (-2.338) = 1.24 \times 10^{-30} \text{ Joules} .$$