

## LATEX PRACTICE

RAUL VILLALOBOS

$$\begin{aligned} (27) \\ \lambda &= 589 \times 10^{-9} \text{ m} \\ t &= 1.60 \times 10^{-8} \text{ s} \\ m &= 9.11 \times 10^{-31} \text{ kg} \end{aligned}$$

a. Find the  $\Delta E$

$$\Delta E \Delta t \geq \frac{\hbar}{2} ; \frac{\hbar}{4\pi}$$
$$\Delta E \geq \frac{\hbar}{4\pi\Delta t} ; \frac{6.626 \times 10^{-34} \text{ J s}}{4\pi \times 1.60 \times 10^{-8} \text{ s}} = 3.296 \times 10^{-27} \text{ J} \left( \frac{1 \text{ eV}}{1.602 \times 10^{-19} \text{ J}} \right)$$
$$\Delta E \geq 2.057 \times 10^{-8} \text{ eV}$$

b. Find  $f$

$$f = \frac{v}{\lambda} = \frac{3.00 \times 10^8 \frac{\text{m}}{\text{s}}}{589 \times 10^{-9} \text{ m}} = 5.093 \times 10^{14} \text{ Hz}$$

c. Find  $\Delta f$

$$\Delta E = h\Delta f ; \Delta f = \frac{\Delta E}{h} = \frac{3.296 \times 10^{-27} \text{ J}}{6.626 \times 10^{-34} \text{ J s}} = 4.974 \times 10^6 \text{ Hz}$$
$$\% = \frac{4.974 \times 10^6 \text{ Hz}}{5.093 \times 10^{14} \text{ Hz}} \times 100 = 9.766 \times 10^{-7} \%$$

Math problems from AoPS: Intro to Algebra  
**4.25** Expand the following:

(a)  $2(a + b - 3c - 5)$   
 $2a + 2b - 6c - 10$

(b)  $2x^2y \left( x^3y + \frac{4}{xy} \right)$   
 $2x^5y^2 + 8x$