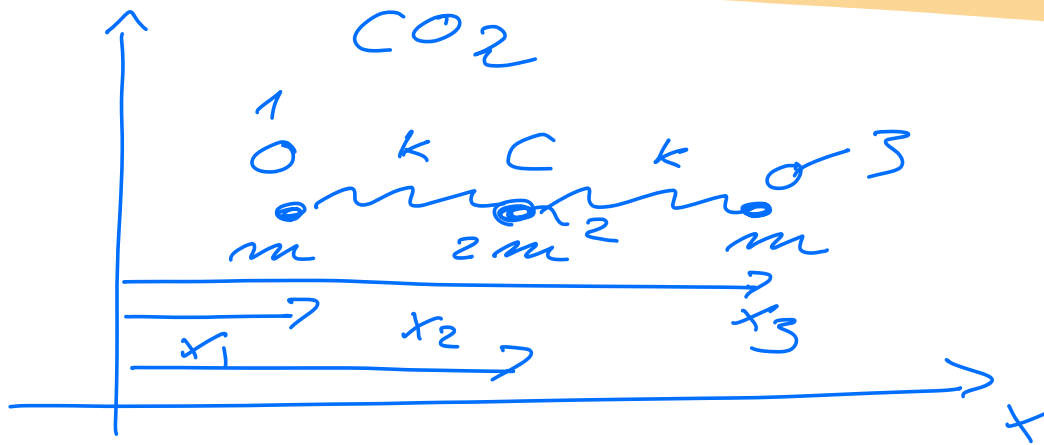


PHY 321, APRIL 29, 2022



$$X = \frac{x_1 + 2x_2 + x_3}{4}$$

$$q_1 = x_1 - x_2 \quad \text{and} \quad q_3 = x_3 - x_2$$

$$\mathcal{L} = \frac{3m}{8} (\dot{q}_1^2 + \dot{q}_3^2) - \frac{m \dot{q}_1 \dot{q}_3}{4} + 2m \dot{x}^2$$

$$q_1: -\frac{3}{4}m\ddot{q}_1 + \frac{m}{4}\ddot{q}_3 = -kq_1$$

$$q_3: -\frac{3}{4}m\ddot{q}_3 + \frac{m}{4}\ddot{q}_1 = -kq_3$$

$$q_1 = A e^{i\omega t}$$

$$q_3 = B e^{i\omega t}$$

$$\omega_0^2 = k/m$$

$$\frac{A}{B}$$

$$-\frac{3}{4} A (i\omega)^2 e^{i\omega t} + \frac{1}{4} (i\omega)^2 B e^{i\omega t} = -\omega_0^2 A e^{i\omega t}$$

$$\frac{3}{4} \omega^2 \frac{A}{B} - \frac{1}{4} \omega^2 = -\omega_0^2 \frac{A}{B}$$

$$\frac{A}{B} = ? \quad B = 1$$

$$\frac{A}{B} = \frac{\omega^2}{3\omega^2 - 4\omega_0^2}$$

$$\omega = \omega_0 \Rightarrow A = -B$$

$$\omega = \omega_0 \sqrt{2} \Rightarrow A = B$$