

e-81-1-002

$$\frac{\Delta p}{p} = 10^{-3}$$

$$\Delta p \Delta x \geq \frac{\hbar}{2}$$

$$\Delta x \geq \frac{\hbar}{2 \Delta p} = \frac{\hbar}{2 m v} = 5.28 \cdot 10^{-20} \text{ \AA}$$

$$\Delta x \geq \frac{\hbar}{2 \Delta p} = \frac{\hbar}{2 \gamma m v}$$

$$\Delta x \geq 2.57 \text{ \AA}$$

$$m = 5 \cdot 10^{-3} \text{ kg}$$

$$v = 2 \text{ m/s}$$

(1c)

$$m = 9.1 \cdot 10^{-31} \text{ kg}$$

$$v = 1.8 \cdot 10^8 \text{ m/s}$$

$$\gamma = \frac{1}{\sqrt{1 - (v/c)^2}}$$

(2)