Here it is — **both together**, clean and compact.

Using only the stated hypotheses

Assumptions

1. **Heisenberg (x–p):** $\Delta x\,\Delta p \ge \hbar/2$
2. **Causality:** no speed $> c$
3. **Fourier (time–frequency, $1/\sqrt{2\pi}$ convention):** $\Delta t\,\Delta\omega \ge 1/2$
4. **Planck:** $E = \hbar\omega \Rightarrow \Delta E = \hbar\,\Delta\omega$

Derivation

1. **Causal bound on momentum spread (packet at rest):**

$$\Delta v \simeq \frac{\Delta p}{m} \le c \;\Rightarrow\; \boxed{\Delta p \le mc}.$$

2. **Minimal spatial width (Heisenberg + 1):**

$$\Delta x \ge \frac{\hbar}{2\Delta p} \ge \boxed{\frac{\hbar}{2mc}}.$$

3. **Causal probe time:**

$$\Delta t \ge \frac{\Delta x}{c} \ge \boxed{\frac{\hbar}{2mc^2}}.$$

4. **Time–energy uncertainty (Fourier + Planck):**

$$\Delta t\,\Delta E \ge \frac{\hbar}{2} \;\Rightarrow\; \boxed{\Delta E \ge \frac{\hbar}{2\Delta t} \ge mc^2}.$$

Result

- Under (1)–(4), any such packet has **energy uncertainty** $\boxed{\Delta E \ge mc^2}$.
- When all bounds are **jointly saturated** (Gaussian-like packet with $\Delta t = \Delta x/c$), the characteristic energy reaches the scale: $\langle E\rangle \approx \Delta E = mc^2$.
- No other hypotheses are used; $E = mc^2$ is **not postulated**—the **rest-energy scale** emerges from uncertainties + causality.

Generalization note

This uncertainty-based result **generalizes “global relativity”**:

- The strict **equality** $E = mc^2$ is recovered only in the **extremal, minimal-uncertainty (Gaussian)** case (joint saturation).
- For **non-Gaussian** packets, the claim naturally relaxes to the **inequality** $\Delta E \ge mc^2$ (and—with an optional minimal causal dispersion step—also $\langle E\rangle \ge mc^2$). Thus SR’s $E{=}mc^2$ appears here as the **sharp lower bound** attained by Gaussians; the uncertainty framework **extends** it to **all signal shapes** without postulating SR.