

PHYS 451: Quantum Mechanics I – Spring 2017
Quiz #4

Consider the uncertainty principle that relates the position (x) and energy (E) of a particle in a *stationary* state of the Hamiltonian $\hat{H} = \frac{p^2}{2m} + V(x)$. Using this uncertainty principle determine the expectation value of the momentum, $\langle p \rangle$, in that state.

Appendix: Heisenberg uncertainty principle

Position-momentum: $\Delta x \Delta p_x \geq \frac{\hbar}{2}$ Energy-time: $\Delta E \Delta t \geq \frac{\hbar}{2}$ General: $\Delta A \Delta B \geq \frac{1}{2} |\langle [\hat{A}, \hat{B}] \rangle|$