Phys 651 Fall 2023

Worksheet #21

(Friday, December 1, 2023)

Name

Question (5 pts):

As you know, the uncertainty relation for arbitrary operators A, B is: $(\Delta A)^2 (\Delta B)^2 \geq \frac{1}{4}\left|\langle [A,B] \rangle\right|^2$, where ΔA and ΔB are uncertainties. Derive the uncertainty relations for the case of A = X and B = P for 1D harmonic oscillator in a Hamiltonian eigenstate |n >.

Comment on your result in the case of |n> being the ground state (i.e. n=0). Is this an expected result?