

$$\left(\langle x_i^2 \rangle - \langle x_i^2 \rangle\right) \left(\langle p_i^2 \rangle - \langle p_i^2 \rangle\right) = \frac{1}{4} \left(1 - \frac{P_i^2}{E_p^2}\right) \left(1 + \frac{P_i^2}{m^2}\right) + \mathcal{O}\left(\frac{1}{\sigma}\right)$$