

$$\frac{\delta}{\delta \chi(\tau)} \Phi[\chi] = \lambda \frac{d\chi(\tau)}{d\tau} \Phi[\chi]$$

$$\frac{\delta}{\delta \chi(\tau)} \frac{d\chi(\tau)}{d\tau} = \frac{d\chi(\tau)}{d\tau} \frac{\delta}{\delta \chi(\tau)}$$

$$\frac{1}{2m} \left[-\frac{i\hbar}{\alpha} \frac{\delta}{\delta \chi(\tau)} - m \frac{d\chi(\tau)}{d\tau} \right]^2 \Phi[\chi]$$

$$= \frac{1}{2m} \left[-\frac{i\hbar}{\alpha} \lambda - m \right]^2 \left[\frac{d\chi(\tau)}{d\tau} \right]^2 \Phi[\chi]$$

$$\frac{1}{2m} \left[-\frac{i\hbar}{\alpha} \lambda - m \right]^2 = \frac{m}{2}$$