$$H(q,p) = \frac{1}{2}kq^2 + \frac{1}{2m}p^2$$

$$q = A\cos(\omega t + \phi)$$

$$p = -m\omega A \sin(\omega t + \phi)$$

$$(m\dot{q})$$

$\omega = \sqrt{\frac{k}{m}}$ elkarrekiko parametrizatuak

$$E = \frac{1}{2}m\omega^2 A^2$$

fase-espazioa ↓

$$\frac{q^2}{(2E/m\omega^2)} + \frac{p^2}{(2mE)} = 1$$

fase-espazioa
↳ desagertzaile

$$\left[\frac{X^2}{\left[\left(\frac{2}{m\omega^2}\right)^{1/2} E^{1/2}\right]^2} + \frac{Y^2}{\left[(2mE)^{1/2}\right]^2} = 1\right] \qquad \frac{X^2}{a^2} + \frac{Y^2}{b^2} = 1$$

ardatzak $(E)^{1/2}$ eskalan proportzionalak

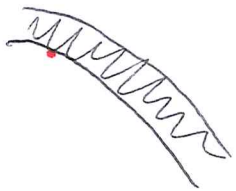
area $\frac{2\pi E}{\omega}$

Orbita

$$\pi\left(\frac{2}{m\omega^2}\right)^{1/2} E^{1/2} \cdot (2m)^{1/2} E^{1/2} = \frac{2\pi E}{\omega}$$

$$\frac{2\pi}{\omega}\left(E + \tfrac{1}{2}\Delta\right) - \frac{2\pi}{\omega}\left(E - \tfrac{1}{2}\Delta\right) = \frac{2\pi\Delta}{\omega}$$

geruzak hartuta $\left(E - \frac{1}{2}\Delta\ ,\ E + \frac{1}{2}\Delta\right)$



zenbat mikroegoera dagoen zatitako.

Kuantika