Kittel TP

5.1 Set up chemical potential per particle analogous to (eq. 5.17).

$$\mu = \tau \ln \frac{n(r)}{n_Q} + \frac{1}{2} M r^2 \omega^2 .$$

$$\mu(0) = \tau \ln \frac{n(0)}{n_Q} .$$

At equilibrium, $\mu(r) = \mu(0)$.

$$\frac{\mu(r)}{\tau} = \ln\left(\frac{n(r)}{n_Q}\right) + \frac{1}{2}\frac{M}{\tau} r^2 \omega^2 = \ln\left[\frac{n(0)}{n_Q}\right].$$

$$\ln\left[\frac{n(r)}{n(0)}\right] = -\frac{1}{2}\frac{M}{\tau} r^2 \omega^2 .$$

$$\boxed{n(r) = n(0)\, e^{-\frac{1}{2}\frac{M}{\tau} r^2 \omega^2}}$$

This is counterintuitive as one expects $n(r)$ to increase with r due to centripetal force, yet $n(r)$ decreases exponentially with r^2

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