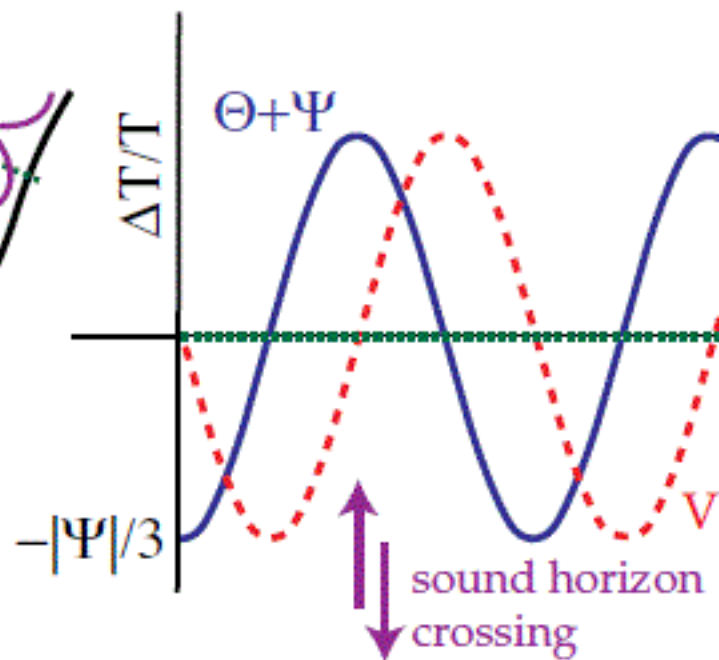
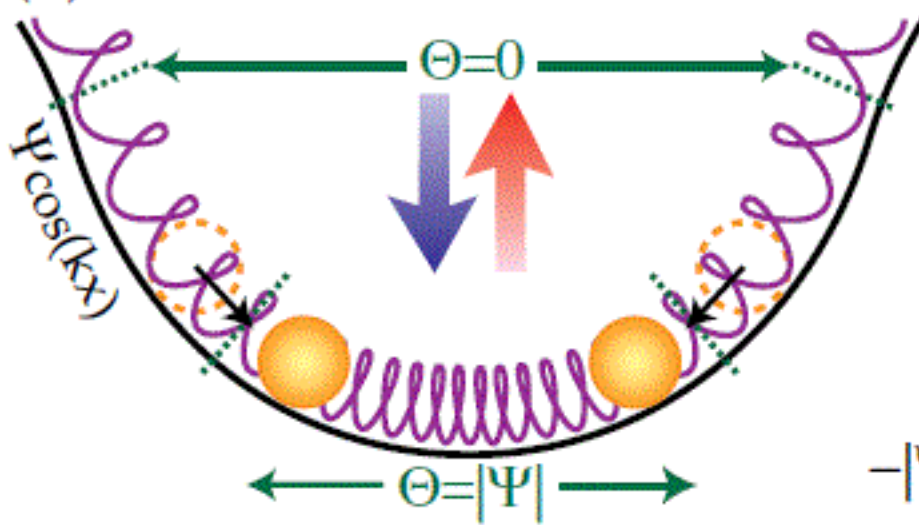


(a) Acoustic Oscillations



(b) Baryon Drag

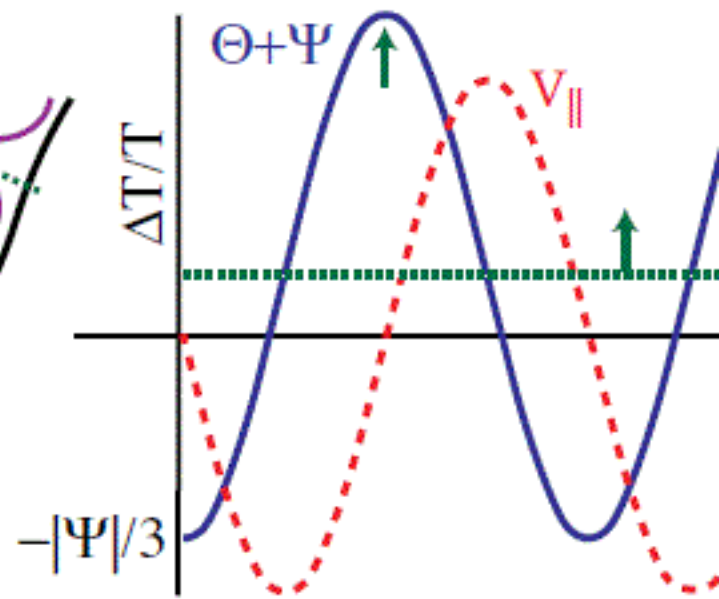
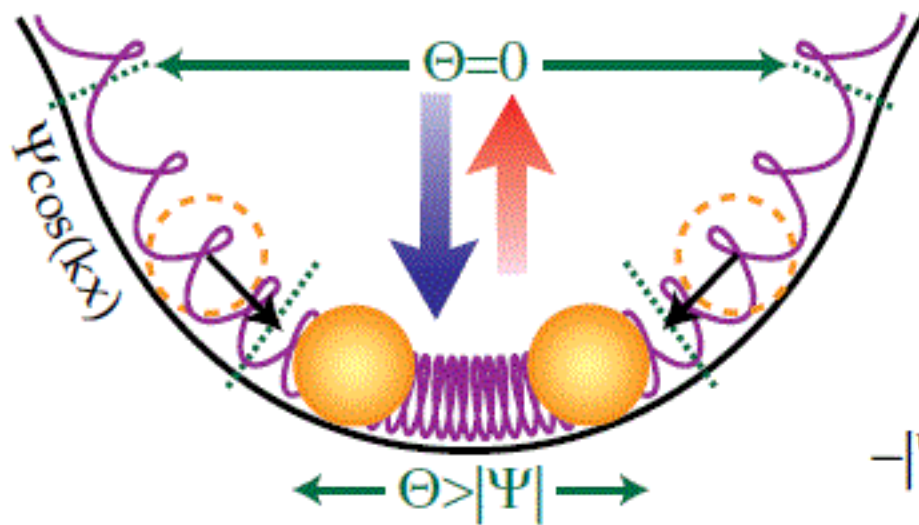


Figure 1. (a) Acoustic oscillations. Photon pressure resists gravitational compression of the fluid setting up acoustic oscillations (left panel, real space $-\pi/2 \lesssim kx \lesssim \pi/2$). Spikes and orange balls schematically represent fluid pressure and effective mass respectively. Gravity sets the zero point such that $\Theta \cos(kx) = -\Psi \cos(kx)$ at equilibrium with oscillations of amplitude $\Psi/3$ (right panel). The displacement is cancelled by the redshift $\Psi/3$ that photons experience climbing out of the well. Velocity oscillations lead to a Doppler shift $V_{||}$ shifted by $\pi/2$ in phase from the temperature perturbation. (b) Baryon drag increases the gravitating mass, causing more infall and a net zero point displacement, $\Theta > |\Psi|$, and redshift. Temperature crests (compression) are enhanced over troughs (rarefaction) due to Doppler contributions.