Exercises

1. Use the definition of field quadratures $X_1(t)$ and $X_2(t)$ to verify what are their physical dimensions.

2. A ruby laser operating at 693nm emits pulses of energy 1mJ. Calculate the uncertainty in the phase of the laser light .

3. The proposed Laser Interferometer Space Antenna (LISA) experiment for gravity wave detection will use a standard Michelson interferometer (i.e. no power reciclying or cavity enhancement) with a laser operating at 1064 nm The length if the arms of the interferometer is 5×10^6 km and the power of the beams that form the interference pattern is $\sim 10^{-11}$ W. Calculate the minimum strain that can be detected.

4. !! Demonstrate that an elastic force $F=-kx(1-\varepsilon sin2\omega_0 t)$ modulated at twice the natural frequency ($\varepsilon<<1$) produces on an object of mass m oscillations that grow in time at one quadrature, while are damped at the other quadrature.