

Nonlinear Optics 2026 — Homework 2

Due Wednesday, February 18, 2026

Uncertainty relation for a radiating level

A pure state does not radiate. A not-so-pure state will have a finite lifetime T_1 , also called the energy relaxation time. The fluorescence radiation field amplitude decays as a single sided exponential

$$\mathcal{E}(t) = \mathcal{E}_0 e^{-t/\tau}$$

Find the traditional time-bandwidth product (product of the FWHM of the temporal and spectral intensities). Compare with the uncertainty product as derived from the Wigner distribution.