Quantum Optics P572 Teaser Question Apr. 7, 2015

Question: *Refractive index.*

The refractive index $n(\omega)$ describes the propagation of light through matter. In particular, for dielectric materials, $n(\omega) = c/v(\omega)$ where $v(\omega)$ is the phase velocity of the light at frequency ω. A gas of atoms seems like it should be a reasonably dielectric medium. Certainly if the light is far from an atomic resonance, the light picks up a phase from each atom and thus is properly described by a refractive index. (Why?) But what about on or near resonance – *isn't light absorbed* and *how can this be described by a refractive index?*