

Prep guide – Dispersion, group and phase velocities.

Big picture goal – Using a classical model of an electron, we'll see that index of refraction should vary with frequency. Also, we'll introduce the idea that there's more than one kind of wave speed.

1) Write down the differential equation describing the classical electron in a polarizable atom being driven by a plane wave. Assign physical meaning to each term.

2) What do the absorption length and index of refraction do in the vicinity of a resonance, at least according to this model?

3) What are group and phase velocities, and which is allowed to exceed  $c$ ?