Last class, we found that the wave packet that we constructed from a Gaussian distribution of k's centered around k_0 was,

$$f(x) = e^{-x^2/4\sigma} e^{-ik_0 x}$$

Sketch this wave packet.

ANNOUNCEMENTS

- Quiz 6 (next Friday) - Waves in conductors; details on Friday
- Volunteer for Physics and Astronomy Day (April 15, 2017)
  - Link to Sign-up!

What do y'all want to learn about after this week?

A. Potential theory and gauge (Ch. 10)
B. Accelerated charges and radiation (Ch. 11)
C. Special relativity (Ch. 12)

Fourier tells us that we can write a "pulse" by summing up sinusoidal functions:

$$f(x) = \int_{-\infty}^{\infty} a(k) e^{ikx} dk$$

If we were to compute $f(x) = \int_{-\infty}^{\infty} a(k) e^{ik(x-vt)} dk$ where v is a known constant, what would we get?

A. $f(x)$
B. $f(vt)$
C. $f(x - vt)$
D. Something complicated!
E. ???

Fourier tells us that we can write a "pulse" by summing up sinusoidal functions:

$$f(x) = \int_{-\infty}^{\infty} a(k) e^{ikx} dk$$

If we were to compute $f(x) = \int_{-\infty}^{\infty} a(k) e^{ik(x - v(k)t)} dk$ where $v(k)$ is function, what would we get?

A. $f(x)$
B. $f(vt)$
C. $f(x - vt)$
D. Something more complicated!
E. ???

For our atomic model of permittivity we found $\tilde{\varepsilon}$ to be

$$\tilde{\varepsilon} = \varepsilon_0 \left(1 + \frac{Nq^2}{\varepsilon_0 m} \sum_i \frac{f_i}{(\omega_i^2 - \omega^2) - i\gamma_i \omega} \right)$$

We also know that $\dfrac{n}{c} = \dfrac{\tilde{k}}{\omega} = \sqrt{\tilde{\varepsilon}\mu}$.

- Find (and simplify) a formula for n, assuming the term adding to "1" above is small.
- In that limit, find k_R and k_I. What does each one tell you, physically?
- Sketch both of these as functions of ω (assuming that only one term in that sum "dominates")