Dielectric Response in an SiO_2 Optical Fiber

$\varepsilon/\varepsilon_0$

Photonics IR
(λ=1.6-1.3 μm)

slope$\neq$0

anomalous dispersion

anomalous dispersion

slope$\neq$0

$\varepsilon/\varepsilon_0 > 1$

slope$\neq$0

1

~what gamma rays see…

ω

ω=0

Si-O bond absorption ω=(2πc)/(9 μm)

Si & O valence shell absorptions (first SHO quantum absorption— at E=(1)hω_0)
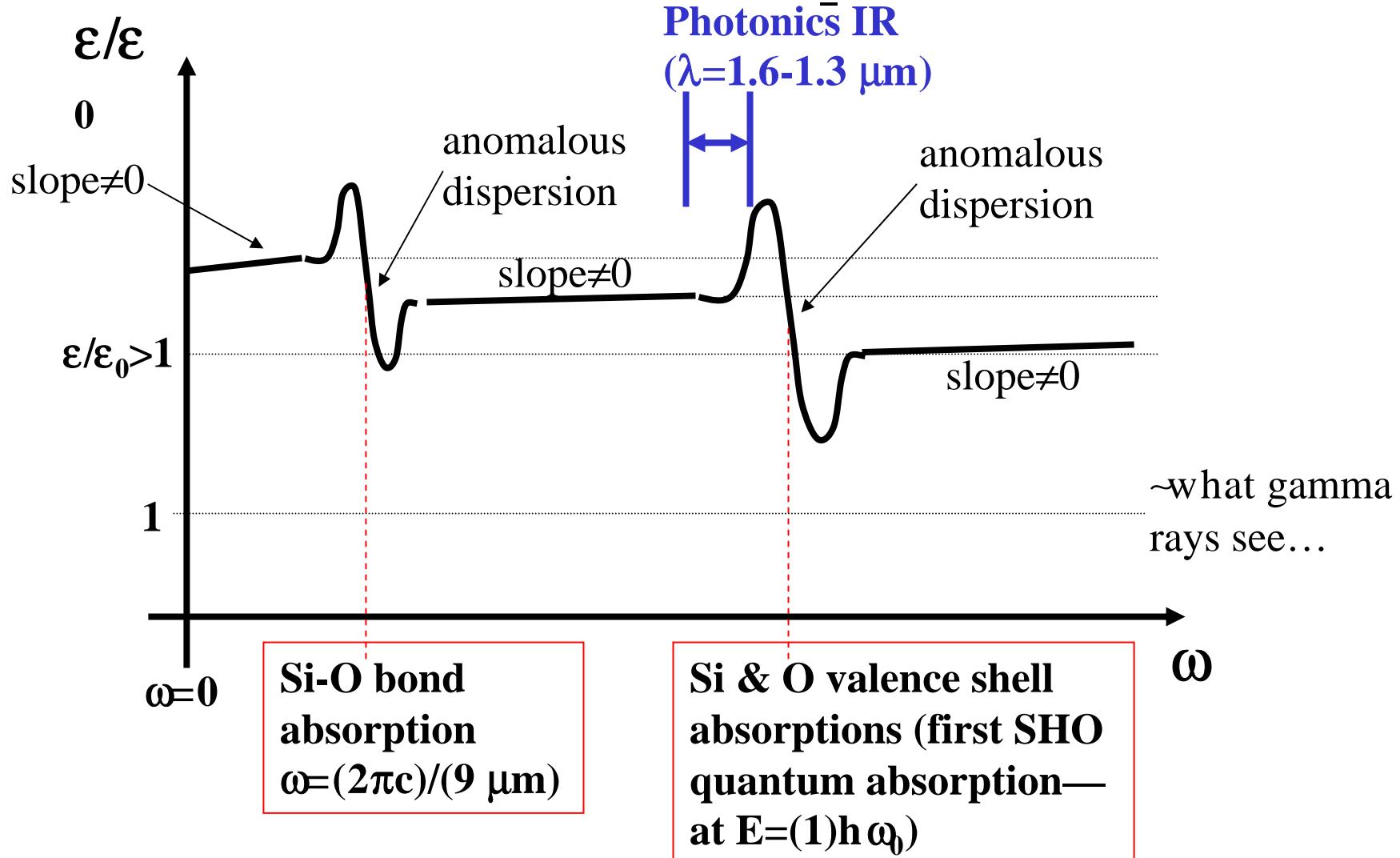
Note: the quantum model for the SHO (Simple Harmonic Oscillator) states that such a system will absorb at energy values $E_m = m\hbar\omega_0$ (m=1,2,…), where $\omega_0 = \sqrt{k/m}$ is the System's resonance frequency.