



Eighth lecture

Nonlinear optics

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Fourth Stage

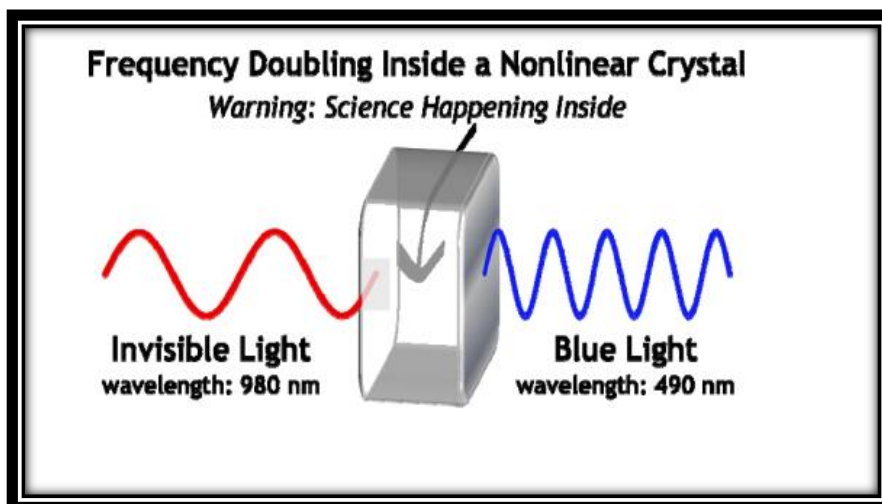
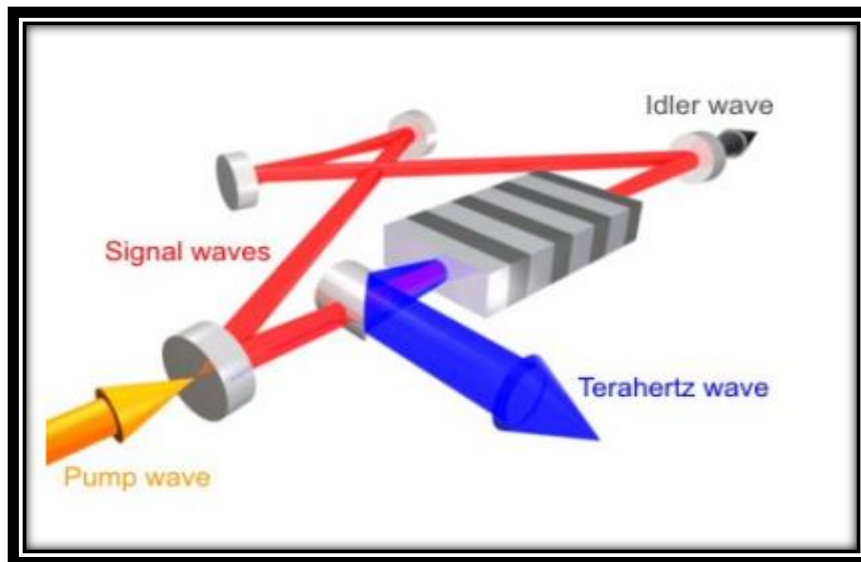
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Introduction to nonlinear optics

What are nonlinear-optical effects and why do they occur? Maxwell's equations in a medium Nonlinear-optical media Second-harmonic generation Conservation laws for photons ("Phase-matching")



Nonlinear Optics can produce many exotic effects

Sending infrared light into a crystal yielded this display of green light: Nonlinear optics allows us to change the color of a light beam, to change its shape in space and time, and to create the shortest events ever made by humans. Nonlinear optical phenomena are the basis of many components of optical communications systems, optical sensing, and materials research.

Why do nonlinear-optical effects occur?

Recall that, in normal linear optics, a light wave acts on a molecule, which vibrates and then emits its own light wave that interferes with the original light wave.

