

## Study of Optical Effects Due to an Induced Polarization Third Order in the Electric Field Strength

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This paper presents the results of a series of experiments in which a giant pulsed ruby laser is used to study several different nonlinear optical effects arising from an induced optical polarization third order in the electric field strength. The various phenomena studied are special cases of either frequency mixing or intensity-dependent changes in the complex refractive index, including Raman laser action at a focus. A wide range of crystalline and isotropic materials was studied. The theory for these effects is extended to cover resonant interactions. The experimental results are interpreted in terms of simplified models, and quantitative values for the nonlinear polarizability coefficients are given. The rather large experimental uncertainties in these coefficients are discussed.

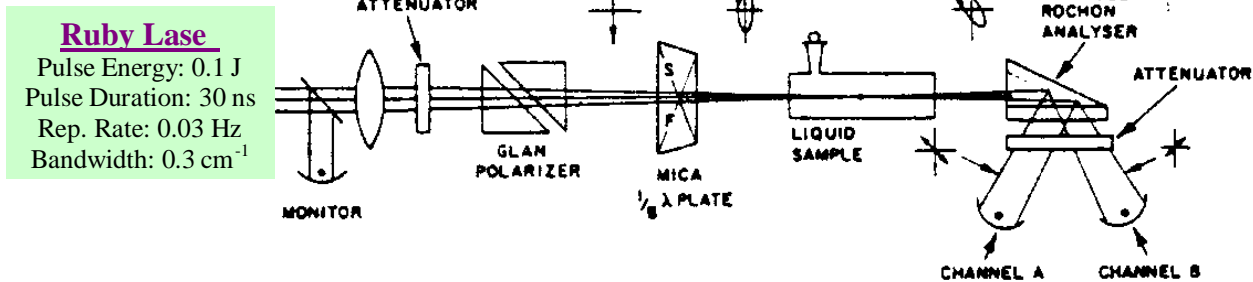


FIG. 7. Experimental arrangement used to detect intensity-dependent rotation of the vibrational ellipse. The state of polarization of the beam as seen when facing into the laser is indicated at several key positions. The rotation shown would result from a positive coefficient.

