Abstract Submitted
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A photonic switching mechanism using polarized light incident on dielectric surfaces. CRISTIAN BAHRIM, AZAM NURUL, Department of Physics, Lamar University — Our experimental studies indicate that a probe laser of energy E_L assisted by a capacitor voltage of energy E_C induces vibrations of the dipoles located on the dielectric surface at higher frequencies as compared with the case when the probe laser is alone. This finding is consistent with a scalar addition of energies and produces a shift in the energy: $E = E_L + E_C = (\omega_L + \omega_C)$ absorbed by dipoles, and implicitly, of the refraction index (n) of the dielectric surface. Experimentally, we analyze the interaction between light and certain dielectric surfaces using the relative permittivity (ε_R) extracted from accurate measurements of refractive indices for light incident at Brewster angle [1]. We can show that the variation of ε_R, which is proportional with n^2, is due to a competition between an increase in the vibrational frequency of the dipoles on the dielectric surface interacting with the probe laser and an increase in the polarization of the electric dipoles [2]. We find that heavy silica-based glasses, such as flint glasses do not allow the dipoles to rotate freely at low capacitor voltages due to the presence of massive PbO molecules. Therefore, lesser dense dielectrics, such as crown glasses, could be more efficient photonic switching devices. [1] C. Bahrim and W. Hsu, *American Journal of Physics* **77**, 337 (2009). [2] C. Bahrim, et al., *Journal of Applied Mathematics and Physics* **2,** 1105 (2014).

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