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Locking a laser beam in the vibrational motion of the dipoles on a dielectric surface[1] CRISTIAN BAHRIM, WEI-TAI HSU, AZAM NURUL, Department of Physics, Lamar University — Coupling two lasers of different intensities and wavelengths inside bulk matter, also known as EIT, has applications in slowing down light. EIT essentially transforms an opaque material to a given radiation into a transparent one, and can be applied in new optoelectronic devices, including quantum circuits, and in quantum computing. The main challenge in using this procedure comes from the difficulty in the coherent retrieval of the light signal squeezed inside the bulk matter after the EIT process ceases. We propose an alternative to the EIT mechanism in which we use the interaction between a weak probe laser beam reflected near the Brewster angle and a stronger coupling laser beam directed at normal incidence toward the same dielectric surface. As opposed to a classical EIT-type phenomenon, in our case (1) the dielectric is *transparent* to both incident lasers, and (2) the coupling between the two beams is realized *on* the dielectric surface, within one dipole layer in thickness. The signature of the coupling between the two lasers is indicated by (1) a shift in the value of the Brewster angle measured in the direction of the reflected probe beam toward a value associated to the electric permittivity of the dielectric in interaction with the stronger laser alone, and (2) an interference pattern near Brewster angle with several minima, which can be interpreted similarly as for light diffraction patterns. This result indicates that we can lock a laser beam on a dielectric surface.

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