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Coupling two lasers on a dielectric surface CRISTIAN BAHRIM, MD KHAIRUZZAMAN, MD MOZAMMAL RAJU, WEI-TAI HSU, Physics Department, Lamar University — We can modify the radiation perceived by a dielectric surface using a capacitor voltage set up across. The associated uniform electric field allows us to shift toward shorter wavelengths the optical response of the dielectric surface for a given monochromatic laser radiation incident on it. We use this capacitor configuration for coupling two laser beams incident simultaneously on the surface. The stronger coupling laser couples with the electric dipoles and impedes a probe laser to oscillate the same dipoles. The interaction between the two laser beams creates a destructive interference pattern in the Brewster angle region of the probe. Clear evidence of several minima of diffraction shows along the direction of reflection of the probe laser. This diffraction pattern indicates the 'lock in' of the probe laser on the surface. This new physics is related to an electromagnetic induced transparency (EIT)-type phenomenon with the major difference that in our case the coupling between two lasers is produced at the dielectric's surface rather than inside the bulk, as is typically the case in classical EIT. Our measurements indicate that the light is reflected by the first layer of dipoles on the surface, within one chemical bond.

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