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Locking a probe laser beam on a dielectric surface using a stronger coupling laser CRISTIAN BAHRIM, NURUL AZAM, Department of Physics, Lamar University — We propose an experimental method for locking a probe laser on the dipoles of a dielectric glass surface. Our configuration creates an Electromagnetic Induced Transparency (EIT)-like environment, where the interaction between light and matter takes place at the surface of a solid insulating material, instead of deep inside a gaseous medium, as is typically the case in EIT experiments. EIT allows through quantum destructive interference between a weak probe laser beam and a stronger coupling laser beam to slow down the probe laser. In our experiments, we observe that in the presence of a stronger coupling laser, the probe laser forms an interference pattern, with evenly spaced minima of interference in the reflectance measured in the Brewster angle region. Also, a maximum (instead of a minimum as suggested by Brewster's law) appears at the Brewster angle due to a stronger interaction of the dielectric dipoles with a coupling laser beam. The influence of a capacitor voltage which is set up across the dielectric surface on the interference pattern is carefully analyzed. A possible application of this research is in developing optoelectronic switching devices and optical quantum memory.

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