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Atom-based RF field measurement using all-infrared laser fields[1]
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— Atom-based sensors for electric fields could serve as an atomic measurement standard for field quantities, and could substantially expand the capabilities and fields of use of existing antenna technologies. Recently, a rapidly expanding body of research has shown that Rydberg electromagnetically induced transparency (EIT) in atomic vapors presents a novel venue to measuring electric fields, over a broad range of frequencies and strengths. Many of these works employ a 780nm probe laser and a 480nm coupling laser. Motivated by the needs the development of commercially viable electric-field sensors might present, we investigate a 3-photon Rydberg EIT scheme which uses only inexpensive diode lasers. The dependence of the 3-photon EIT signals on laser propagation directions and dressing-beam detuning is characterized. Further, the 3-photon optical technique has performed well in initial tests to measure microwave electric fields.

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