Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Fiber-coupled Vapor Cell for Rydberg Electromagnetically-induced Transparency MATTHEW SIMONS, JOSHUA GORDON, CHRISTOPHER HOLLOWAY, National Institute of Standards and Technology — Rydberg atom-based RF electric field (E-field) measurements have the potential to become a new standard for RF calibrations. Rydberg states of alkali atoms (Cs, Rb) are coupled through electromagnetically-induced transparency (EIT), where an RF field can interact, causing Autler-Townes splitting. The split is proportional to the strength of the RF E-field, providing an SI-traceable, self-calibrated method for RF E-field metrology. A necessary step towards developing this technique as a new standard is the ability to directly compare the atom-based probe to existing E-field probes. Previously, this technique has been confined to the optical table, making measurements in typical RF calibration environments impossible. We demonstrate a fiber-coupled Cs vapor cell, with counter-propagating fields coupled through the cell via GRIN lenses, supporting Rydberg EIT. This probe can be scanned over printed circuit boards and co-planar waveguides, and placed in environments such as TEM cells and anechoic chambers.

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Date submitted: 29 Jan 2017 Electronic form version 1.4