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Enhanced electric field sensitivity of rf-dressed Rydberg dark states M. TANASITTIKOSOL, M.G. BASON, Durham University, UK, A. SARGSYAN, Institute for Physical Research, Armenia, A.K. MOHAPATRA, University of Stuttgart, Germany, D. SARKISYAN, Institute for Physical Research, Armenia, R.M. POTVLIEGE, C.S. ADAMS, Durham University, UK — We demonstrate the formation of Rydberg dark states dressed by a radio frequency (rf) field. Microwave or rf dressing of Rydberg states has previously been observed using laser excitation and field ionization of an atomic beam or of cold atoms. Here, however, the resulting Floquet states are observed as EIT resonances in the absorption spectrum of the probe laser beam in a vapor cell. We show that these rf-dressed dark states have an enhanced sensitivity to dc electric fields compared to their bare counterparts. We also show that the strength of the dc electric field is encoded not only in the overall shift of the corresponding EIT feature but also in the shape of the transparency window. As a consequence, and as we illustrate by an actual measurement, rf dressing may help determine the dc field without absolute knowledge of the laser frequency i.e. the precise measurements of the dc field is independent of laser frequency fluctuations. In addition, our results suggest that space charges within the enclosed cell reduce electric field inhomogeneities within the interaction region.

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