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Rydberg Electromagnetically-Induced Transparency and Autler-Townes Splitting in the Presence of Band-Limited White Gaussian Noise¹ MATTHEW SIMONS, MARCUS KAUTZ, CHRISTOPHER HOLLOWAY, National Institute of Standards and Technology, DAVID ANDERSON, Rydberg Technologies, GEORG RAITHEL, Rydberg Technologies, University of Michigan, DANIEL STACK, MARC ST. JOHN, WANSHENG SU, The MITRE Corporation — Rydberg electromagnetically-induced transparency (EIT) and Autler-Townes (AT) splitting in an alkali vapor constitute a promising approach to self-calibrated, SI-traceable radio frequency (RF) electric field (E-field) measurements. In order for this method to become an accepted metrology standard it is necessary to understand the effect of RF noise. We investigate the effect of band-limited white Gaussian noise (BLWGN) on EIT/AT-based RF E-field measurements, for noise bands centered around the measurement frequency as well as blue- and red-shifted noise bands. We characterize the conditions under which RF E-field measurements can be severely distorted by the BLWGN, and provide a theoretical model to predict these effects.

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