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Quantum-Assisted Electrometry using Electromagnetically Induced Transparency with Rydberg Atoms in a Vapor Cell HAOQUAN FAN, SANTOSH KUMAR, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, 440 W. Brooks St. Norman, OK 73019, USA, RENATE DASHNER, HARALD KÜBLER, 5. Physikalisches Institut, Universität Stuttgart, Pfaffenwaldring 57 D-70550 Stuttgart, Germany, JON SEDLACEK, JAMES SHAFFER, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, 440 W. Brooks St. Norman, OK 73019, USA, OU TEAM, 5. PHYSIKALISCHES INSTITUT TEAM — We demonstrate a new type of atomic standard for microwave electric fields using Rydberg atoms in a vapor cell. We have used a bright resonance prepared within an electromagnetically induced transparency window in a Rydberg atom to achieve an electrometer with a sensitivity of 30 μV cm^{-1} $\sqrt{Hz}^{-1}$. In addition, we have demonstrated vector electrometry at a resolution of 0.5^o with similar sensitivity. Recently, we have also shown this scheme can achieve sub-wavelength spatial resolution $\lambda/1933$. Our experimental results agree very well with the finite difference time domain calculations. We present a summary of our experiments on atom-based electrometry to date.

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