Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Sub-Wavelength Microwave Electric Field Imaging using Rydberg Atoms 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, JAMES SHAFFER, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, 440 W. Brooks St. Norman, OK 73019, USA, AMO-OU COLLABORATION, 5. PHYSIKALISCHES INSTITUT COLLABORATION — It is clearly important to pursue atomic standards for quantities like electromagnetic fields, time, length and gravity. We have recently shown that Alkali atoms in a vapor cell can serve as a standard for microwave electric field strength and that vector electrometry is also feasible. Here, we demonstrate, for the first time, that microwave electrometry using Rydberg atom electromagnetically induced transparency can be used to image microwave microwave electric fields with unprecedented precision. The spatial resolution of the method is sub-wavelength $\lambda/1933$. We present new data demonstrating the utility of the method. Our calculations using High Frequency Structural Simulator (Hfss) agree well with the pattern of the field measured by our experiment.

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Date submitted: 27 Jan 2014 Electronic form version 1.4