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JILA's search for the electron electric dipole moment: an order of magnitude improvement in sensitivity TANYA ROUSSY, WILLIAM B. CAIRNCROSS, KIA BOON NG, TANNER GROGAN, YAN ZHOU, JILA and University of Colorado, Boulder, YUVAL SHAGAM, JILA, NIST, and University of Colorado, Boulder, KEVIN BOYCE, ANTONIO VIGIL, MADELINE PETTINE, JILA and University of Colorado, Boulder, JUN YE, ERIC A. CORNELL, JILA, NIST, and University of Colorado, Boulder — We have recently overhauled our experimental apparatus with an eye towards enhancing our sensitivity to the electron's electric dipole moment. We have developed techniques for low-decoherence confinement, internal state cooling, multi-resonance spectroscopy, quantum-state specific imaging, and differential readout achieving the quantum projection noise limit; all at the relatively high internal temperature of 10 K and all in a system which is being directly probed for beyond-standard-model physics. Taken together, our advances will generate an order of magnitude improvement in sensitivity. Beyond these improvements, we are developing the next generation apparatus which will allow for a 100-fold increase in count rates while still enjoying the distinct advantages of a trapped-ion system.

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