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Towards multiplexed and continuous trapped-ion spectroscopy for the JILA Gen. III eEDM experiment SUN YOOL PARK, KIA BOON NG, NOAH SCHLOSSBERGER, University of Colorado, Boulder, YAN ZHOU, University of Nevada, Las Vegas, TANYA ROUSSY, TANNER GROGAN, YUVAL SHAGAM, ANTONIO VIGIL, MADELINE PETTINE, ERIC CORNELL, JUN YE, University of Colorado, Boulder — The third-generation (Gen. III) measurement of the electron's electric dipole moment (eEDM) at JILA utilizes ThF+, rather than HfF+, because: (i) the eEDM sensitive state of ThF+ promises a longer coherence time (˜20 seconds) [1,2], and (ii) its 50% larger effective electric field increases eEDM sensitivity [3]. To take full advantage of the long coherence time, we are designing a "conveyor belt" of 100 ion traps called the Bucket Brigade (B.B.). The B.B. continuously loads and reads out ThF+, allowing for a 10,000% duty cycle that leads to more precise measurements. The Gen. III experiment will also include cryogenics to eliminate blackbody radiation effects that are detrimental to the coherence time. Here, we present the progress on the design of the Gen. III eEDM experiment including the geometry of the B.B. and cryogenics schemes. [1] Gresh, Daniel N., et al. *Journal of Molecular Spectroscopy* 319 (2016): 1-9. [2] Zhou, Yan et al. J. Mol. Spec. 358, (2019) 1-16 [3] Skripnikov, L. V., and A. V. Titov. *Physical Review A* 91.4 (2015): 042504.

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