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Improved Thermochemical Beam Source of ThO for Measuring the Electric Dipole Moment of the Electron[1] ELIZABETH WEST, JACOB BARON, NICHOLAS HUTZLER, DANIEL ANG, JONATHAN HAEFNER, Harvard University, ZACK LASNER, Yale University, CRISTIAN PANDA, Harvard University, ADAM WEST, DAVID DEMILLE, Yale University, GERALD GABRIELSE, JOHN DOYLE, Harvard University, ACME COLLABORATION —
We report new results on a cryogenic buffer gas beam source of the reactive diatomic species thorium monoxide (ThO) for the ACME collaboration's measurement of the electric dipole moment of the electron (eEDM). The beam source is based on a high-temperature chemical reaction between thorium metal and thorium dioxide that produces ThO in the gas phase at a favorable rate. This source has been demonstrated to produce long, ≈ 80 ms pulses of ThO with a time-averaged flux 10 times larger than the previous ablation-based beam source [1]. Other beam properties, such as forward velocity, rotational temperature, and divergence have been measured and shown to be comparable to or only marginally less favorable than those of the ablation source. By enhancing the experiment's achievable count rate, this thermochemical beam source could improve the statistical sensitivity of a future iteration of the ACME collaboration's eEDM measurement by a factor of three. [1] N. Hutzler et al., *PCCP* **13**, (2011) 18976–18985.

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