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Absolute Measurement of STIRAP Efficiency[1] XIAOXU LU, YUAN SUN, CLAIRE ALLRED[2], HAROLD METCALF, Stony Brook University, Stony Brook NY 11794-3800 — Driving atoms from an initial to a final state of the same parity via an intermediate state of opposite parity is most efficiently done using STIRAP[3], because it doesn't populate the intermediate state. For optical transitions this requires appropriate pulses of light in the counter-intuitive order - first coupling the intermediate and final states. We populate Rydberg states of He ($n = 26$) in a beam of average velocity 1070 m/s by having them cross two laser beams in a tunable dc electric field of ~ 100 V/cm. The "red" light near $\lambda = 796$ nm connects the 3^3P states to the Rydberg states and the "blue" beam connects the metastable 2^3S state atoms emitted by our source to their 3^3P states. By varying the relative position of these beams we can vary the order and overlap encountered by the atoms. We vary the dc field to sweep across several Stark states of the Rydberg manifold. We measure the absolute efficiency using a curved wavefront beam of $\lambda = 1.083\,\mu$m light to deflect residual 2^3S atoms out of the beam, and we measure their flux with and without the STIRAP beams. This uncontaminated measurement has high absolute accuracy.

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[3]U. Gaubatz et al., *J. Chem. Phys.*, **92**, 5363 (1990).

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