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Entangling Trapped Ions through Spin-Dependent Bichromatic Forces KATHY-ANNE BRICKMAN, MARK ACTON, LOUIS DESLAURIERS, PAUL HALJAN, PATRICIA LEE, CHRISTOPHER MONROE, FOCUS Center and Department of Physics, University of Michigan — We experimentally demonstrate a two-ion entangling gate utilizing the Molmer-Sorensen gate scheme. Pairs of hyperfine ground states of ¹¹¹Cd⁺ ions, insensitive to magnetic fields to first order, are used as qubits that are entangled through bichromatic stimulated Raman transitions. The spectral arrangement of the Raman beams is tailored to suppress phase noise accumulation between gates. This suppression may be critical for reliably performing consecutive gates of this type within quantum algorithms. This work is supported by the U.S. National Security Agency and the Advanced Research and Development Activity under Army Research Office contract, and the National Science Foundation ITR Program.

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