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**Laser-free trapped-ion entangling gates with simultaneous insensitivity to qubit and motional decoherence**[1] R. T. SUTHERLAND, Lawrence Livermore Natl Lab, R. SRINIVAS, S. C. BURD, H. M. KNAACK, National Institute of Standards and Technology; University of Colorado, Boulder, A. C. WILSON, National Institute of Standards and Technology, D. J. WINELAND, National Institute of Standards and Technology; University of Colorado, Boulder; University of Oregon, D. LEIBFRIED, National Institute of Standards and Technology, D. T. C. ALLCOCK, National Institute of Standards and Technology; University of Colorado, Boulder; University of Oregon, D. H. SLICHTER, National Institute of Standards and Technology, S. B. LIBBY, Lawrence Livermore Natl Lab — The dominant error sources for state-of-the-art laser-free trapped-ion entangling gates are decoherence of the qubit state and the ion motion. The effect of these decoherence mechanisms can be suppressed with additional control fields, or with techniques that have the disadvantage of reducing gate speed. Here, we propose using a near-motional-frequency magnetic field gradient to implement a laser-free gate that is simultaneously resilient to both types of decoherence, does not require additional control fields, and has a relatively small cost in gate speed.

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