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Large Energy Superpositions via Rydberg Dressing MOHAMMADSADEGH KHAZALI, HON WAI LAU, ADAM HUMENIUK, CHRISTOPH SIMON, Institute for Quantum Science and Technology, University of Calgary —
We propose to create superposition states of over 100 Strontium atoms being in a ground state or metastable optical clock state, using the Kerr-type interaction due to Rydberg state dressing in an optical lattice. The two components of the superposition can differ by of order 300 eV in energy, allowing tests of energy decoherence models with greatly improved sensitivity. We take into account the effects of higher-order nonlinearities, spatial inhomogeneity of the interaction, decay from the Rydberg state, and diminishing Rydberg level separation for increasing principal number.

M. Khazali, H. W. Lau, A. Humeniuk, C. Simon, arXiv:1509.01303v2 (2015)

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