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Quantum simulations of lattice models with alkaline-earth atoms ALEXEY GORSHKOV, Physics Department, Harvard University, Cambridge, MA 02138, USA, VICTOR GURARIE, MICHAEL HERMELE, JILA and Department of Physics, University of Colorado, Boulder, CO 80309, USA, EUGENE DEM-LER, MIKHAIL LUKIN, Physics Department, Harvard University, Cambridge, MA 02138, USA, ANA MARIA REY, JILA and Department of Physics, University of Colorado, Boulder, CO 80309, USA — We propose to use alkaline-earth atoms in optical lattices for quantum simulation of models that are beyond the generic Hubbard model and that rely on the interplay between spin and orbital degrees of freedom. In addition to being interesting and rich in their own right, such models may allow generating fundamental insights into the physics of solid-state systems such as transition metal oxides and heavy fermion materials, which exhibit numerous exotic properties including high temperature superconductivity and spin liquid phases.

> Alexey Gorshkov Physics Department, Harvard University, Cambridge, MA 02138, USA

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