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**Deterministic preparation of Dicke states of donor nuclear spins in silicon**<sup>1</sup> YU LUO, HONGYI YU, WANG YAO, Department of Physics and Center of Theoretical and Computational Physics, The University of Hong Kong, Hong Kong, China — We present a scheme to deterministically prepare various symmetric and asymmetric Dicke states for donor nuclear spins in silicon. The state preparation is realized by cooperative pumping of nuclear spins by coupled donor electrons, and the required controls are in situ to the prototype Kane's architecture for quantum computation. This scheme only requires a sub-gigahertz donor exchange coupling which can be achieved without atomically precise donor placement, hence it could be a practical way to prepare multipartite entanglement of spins in silicon with current technology. All desired Dicke states appear as the steady state under various pumping scenarios and therefore the preparation is robust and does not require accurate temporal controls. Numerical simulations with realistic parameters show that Dicke states of 10 - 20 qubits can be prepared with high fidelity in the presence of decoherence and undesired dynamics.

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