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**Quantum Entanglement in Spinor Bose-Einstein Condensates and the Preparation of Dicke State** ZHEN ZHANG, LUMING DUAN, University of Michigan-Ann Arbor — The spin-1 Bose Einstein Condensate system can exhibit many interesting phenomena under the effect of linear and quadratic Zeeman effects, resulting from the rich spin texture and the long range correlation in the system. The manybody ground state is shown and phase transition and entanglement properties are described. We also propose a method to prepare the Dicke state, with time evolution from a state relatively easy to realise from current experimental cooling methods. The entanglement depth, which based only on the measuring of collective spin operators, is used to characterise the entanglement in the final prepared state. Various noises in the preparation process are also discussed.

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