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**Magnetism, squeezing, and entanglement in dipolar spin-1 condensates** SU YI, HAN PU, Rice University — We investigate the magnetic response of a $F = 1$ spinor condensate with magnetic dipole-dipole interactions. The interplay of the collisional and dipolar interactions between atoms, and the magnetic Zeeman effect induces a rich variety of quantum phases in the ground state structure. Under a magnetic field sweep, the dipolar interaction gives rise to a stepwise magnetization curve. We also study the effects of the magnetic field on the spin squeezing and show that the behavior of the squeezing parameter clearly characterizes the quantum phases of our system. Finally, we propose a scheme to create the maximally entangled state between $|m_F = \pm 1\rangle$ atoms with a time varying transverse magnetic field. Our scheme involves only the ground state of the system, and is thus robust against spontaneous-emission-induced decoherence and is also independent of the atom number.

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