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Spinor BECs in optical lattices and ultralow magnetic fields. CHAD FERTIG, JOSHUA HUGHES, WESAM EL QADI, University of Georgia — Bose-Einstein condensates (BECs) of spinor atomic gases have already proven to be powerful system in which to explore quantum magnetism over a range of parameters impossible to access in the solid-state. However, many exciting quantum magnetic phenomena predicted to occur for spinor BECs have remained unobserved, for two fundamental reasons: (1) Small spin interaction energies can imply impracticably long time scales for relaxation dynamics; (2) the phenomena may be strongly suppressed by the presence of typical background magnetic fields. At the University of Georgia we are currently constructing an all-optical 87-Rb BEC apparatus which incorporates extensive passive and active magnetic shielding expected to reduce background magnetic fields to below 1-microGauss, realizing the zero-field limit for our condensates. We will report on our progress, focusing on several novel features of the apparatus, including the design of the multi-layer mu-metal shield and a new method of direct offset locking two or more lasers.

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