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Bose-Einstein condensation of dipolar atoms JUERGEN STUHLER, AXEL GRIESMAIER, MARCO FATTORI, TOBIAS KOCH, SVEN HENSLER, JOERG WERNER, TILMAN PFAU, 5. Physikalisches Institut, Universitaet Stuttgart, 70550 Stuttgart, Germany — We report on the realization of a Bose-Einstein condensate (BEC) of chromium with up to 50,000 condensed ^{52}Cr atoms. The large magnetic dipole moment (6 Bohr magnetons) of chromium is unique among all species that have been Bose condensed so far. The preparation of the ^{52}Cr BEC requires novel cooling strategies that are adapted to its special electronic properties and to its dipolar character. The final step to reach quantum degeneracy is forced evaporative cooling of ^{52}Cr atoms within a crossed optical dipole trap. At a critical temperature of Tc $\sim$ 700 nK, we observe Bose-Einstein condensation of chromium by the appearance of a two-component velocity distribution. Released from an anisotropic trap, the BEC expands with an inversion of the aspect ratio. Exploiting one of our recently observed Feshbach resonances to tune the isotropic contact interaction should allow us to realize a dipolar BEC in which the magnetic dipole-dipole interaction is dominant. This will widely open the door for experimental studies of the effects of long-range and anisotropic dipolar interactions in degenerate quantum gases. Since chromium is the standard material in atom lithography, a ^{52}Cr BEC has potential for use in technical applications as a coherent source of atoms in nanostructuring processes.

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