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Ultracold Chromium: a dipolar quantum gas[1]

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We report on experiments using a Bose-Einstein condensate of chromium atoms [1]. We produce up to $\sim 10^5$ condensed ^{52}Cr atoms after forced evaporation within a crossed optical dipole trap. Due to its large magnetic moment ($6\mu_B$), the dipole-dipole interaction strength in chromium is comparable with the one of the van der Waals interaction. We prove the anisotropic nature of the dipolar interaction by releasing the condensate from a cigar shaped trap [2]. This is the first experimental observation of mechanical dipolar effects in a quantum gas. We also report on the observation of 14 Feshbach resonances in elastic collisions between polarized ultra-cold ^{52}Cr atoms [3]. This is the first observation of collisional Feshbach resonances in an atomic species with more than one valence electron. Moreover, such resonances constitute an important tool towards the realization of a purely dipolar interacting gas as they can be used to change strength and sign of the van der Waals interaction.

References

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