

Abstract Submitted
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Electric and magnetic long-range interactions between two Erbium atoms OLIVIER DULIEU, Laboratoire Aime Cotton, CNRS, Orsay, MAXENCE LEPERS, MIREILLE AYMAR, ELIANE LUC, JEAN-FRANCOIS WYART, Laboratoire Aime Cotton, CNRS, Orsay, France — Lanthanides have recently attracted a lot of interest in the field of laser-cooling and trapping. Their high magnetic dipole moment - seven Bohr magnetons for Erbium - opens new prospects for the precise control of their mutual interactions. As they are also characterized by a high orbital angular momentum, they also interact through their permanent electric quadrupole moments. We have studied the combined effects of the magnetic-dipole and electric-quadrupole interaction as functions of the distance R between two atoms of Erbium. Although they scale as R^{-3} and R^{-5} respectively, we have shown that the two types of interaction can compete with each other in a wide range of interatomic distances. This is due to the weakness of magnetic forces compared to electric ones. For example, we observe long-range wells, which could drastically influence the collisional properties of the atoms. Our calculations can be generalized to other lanthanides, like Dysprosium.

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