Anisotropic polarizability of erbium atoms

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We report on the determination of the dynamical polarizability of ultracold erbium atoms in the ground and in one excited state at three different wavelengths, which are particularly relevant for optical trapping. Our study combines experimental measurements of the light shift and theoretical calculations. In particular, our experimental approach allows us to isolate the different contributions to the polarizability, namely, the isotropic scalar and anisotropic tensor part. For the latter contribution, we observe a clear dependence of the atomic polarizability on the angle between the laser-field-polarization axis and the quantization axis, set by the external magnetic field. Such an angle dependence is particularly pronounced in the excited-state polarizability. We compare our experimental findings with the theoretical values, based on semiempirical electronic structure calculations, and we observe a very good overall agreement. Our results pave the way to exploit the anisotropy of the tensor polarizability for spin-selective preparation and manipulation.

- H2020 [3]
- RySQ [4]
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