ISOTOPIC EFFECTS IN CHEMICAL REACTIONS OF SINGLE IONS

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Chemical reactions using laser cooled ions are dominated by quantum effects due to their localized nature. Studying isotopic effects allows for the probing of reaction mechanisms and the topography of potential energy surfaces. Previously, single ion experiments involving Mg^+ and HD were done utilizing a nondestructive identification method based on the motional modes of the ions [a]. Our work focuses on reactions with single atomic calcium ions. A novel method that observes the sideband spectra of the $^2S_{1/2}$ to $^2D_{5/2}$ transition in Ca^+ for reaction detection is discussed.

[a] P. F. Staanum et al., Phys. Rev. Lett. **100**, 243003 (2008)