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Co-trapped heteronuclear Rydberg and Collisional Interactions in an Optical Dipole Trap[1] MATTHEW EBERT, CODY POOLE, XIAOYU JIANG, GENEVIEVE KEARNS, University of Wisconsin - Madison, EITE TIESINGA, National Institute of Standards and Technology, MARK SAFFMAN, University of Wisconsin - Madison — We present progress in demonstrating Rydberg interactions between a single Rb and a single Cs atom simultaneously trapped in a single 1064 nm optical tweezer. Rydberg levels in heteronuclear systems have different quantum defects, as opposed to homonuclear systems, and can therefore be chosen to minimize the Forster defect and increase the Rydberg interaction strength beyond symmetric Rydberg pairs at comparable energy levels. Additionally, multi-species systems are distinguishable and can be frequency multiplexed in a straightforward manner, enabling crosstalk free ancilla measurements for quantum error correction. To determine the feasibility of co-trapped heteronuclear samples for quantum information and communication applications, we also measure the heteronuclear collision rates between single Rb and single Cs atoms and resolve differences in the hyperfine collision rates. Photoassociation rate of the atoms into a molecular state via the 1064 nm trap laser is also measured.

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