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Dual Species Rydberg and Collisional Interactions in an Optical Dipole Trap[1] MATTHEW EBERT, GARRETT HICKMAN, ALPHONSE MARRA, XIAOYU JIANG, TRENT GRAHAM, MARK SAFFMAN, University of Wisconsin-Madison, UNIVERSITY OF WISCONSIN-MADISON TEAM — We present progress in demonstrating Rydberg interactions between a single Rb and a single Cs atom simultaneously trapped in a single 976 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. Frequency multiplexing both the state preparation and state readout is used in characterizing elastic and inelastic collision rates between Rb and Cs, as well as enabling crosstalk free ancilla measurements for quantum error correction.

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