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An Experimental Apparatus for Studying Rydberg-Rydberg Interactions in Quantum Degenerate Gases of Strontium[1] FRANCISCO CAMARGO, ROGER DING, JAMES AMAN, XINYUE ZHANG, JOSEPH WHALEN, ROBERT FIELDS, F. BARRY DUNNING, THOMAS KILLIAN, Rice University — We discuss the design and construction of a new apparatus for creating and studying long-range interactions in ultracold gases of strontium by exploiting Rydberg states, either through their direct excitation or through laser-induced Rydberg dressing. Strontium features one fermionic (^{87}Sr) and three bosonic (^{84}Sr, ^{86}Sr, ^{88}Sr) isotopes, all of which have been brought to quantum degeneracy. It also possesses singlet and triplet Rydberg states that furnish a wide variety of attractive and repulsive interactions. Furthermore, strontium Rydberg atoms feature an optically active core electron which can be used to manipulate and detect Rydberg atoms. These features make strontium a promising system for studying interactions in ultracold Rydberg gases.

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