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Measurement of nD Rydberg-ground molecules in Rb JAMIE MACLENNAN, GEORG RAITHEL, University of Michigan — We experimentally measure the energies of several Rydberg-ground molecular bound states in Rb(nD + $5S_{1/2}$), including vibrationally excited states. Because these molecular states arise from the scattering interaction of a Rydberg electron with a ground-state atom, their measurement allows an estimate of scattering lengths. Photoassociation out of an optical dipole trap facilitates our observation of molecules of relatively low principal quantum numbers, leading to good resolution of the bound-energy measurements. The study further addresses hyperfine-mixed singlet-triplet states.

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