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Exciting Rydberg atom superposition states for control of resonant energy exchange[1] DONALD P. FAHEY, MICHAEL W. NOEL, Bryn Mawr College, THOMAS CARROLL, Ursinus College — Pairs of ultracold highly excited atoms can exchange energy over long distances through a dipole-dipole coupling. Application of a dc electric field makes it possible to tune these energy exchange processes into resonance via the Stark effect. Our experimental system allows individual $|m_j|$ sublevels of Rb Rydberg states to be excited, and then tuned into a dipole-dipole resonance. We can also excite coherent superpositions of these states, which can be used to control this energy exchange. We present experiments that investigate how this energy exchange proceeds for different initial $|m_j|$ state preparations.

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