

Abstract Submitted
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Manipulation of heteronuclear spin dynamics with microwave and vector light shift¹ LINTAO LI, BO LU², BING ZHU³, DAJUN WANG, Chinese Univ of Hong Kong — We report the study of heteronuclear spin-exchange dynamics starting from a spin-1 mixture of Rb|1,0> and Na|1,0> atoms. which depends on the competition between the Zeeman energy and interspecies spin-dependent interaction energy. Within a narrow magnetic field window around 1 G, we have observed a dramatic enhancement of a particular process: $\text{Rb}|1,0\rangle + \text{Na}|1,0\rangle \Leftrightarrow \text{Rb}|1,1\rangle + \text{Na}|1,-1\rangle$. We also demonstrated the ability to precisely manipulate this process via a far-detuned microwave or laser field. The microwave method, similar to that in single-species spinor gases, tunes the species-selective quadratic Zeeman energy. As a comparison, the light field shifts the species-dependent linear Zeeman energy. Both methods are shown to be powerful and flexible in our system. Our investigations have revealed the richness of quantum manipulations in heteronuclear spinor systems.

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