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Resonant spin exchange between heteronuclear atoms assisted by periodic driving JUN-JIE CHEN[1], Tsinghua Univ, ZHI-FANG XU[2], SUSTech, LI YOU[3], Tsinghua Univ — Spin exchange (SE) is one of the most fundamental two-body interactions. It is essential to fascinating properties such as magnetic ordered states and collective spin excitations, *etc.*, in quantum many body systems. However, SE between heteronuclear atoms is typically small, suppressed by their large Zeeman energy difference in an external magnetic field. This work proposes a general scheme for inducing resonant exchange between spins or pseudo-spins of unmatched levels via periodic driving. The basic idea is illustrated with two heteronuclear atoms, for which analytical results describing their effective SE interaction strength are derived. It is then applied to the mixture of ground state ($F = 1$) ^{23}Na and ^{87}Rb atoms with a radio-frequency (rf) or microwave field near-resonant to the mismatched Zeeman level spacings. SE interaction engineered this way is applicable to ultracold quantum gas mixtures involving spinor Bose-Bose, Bose-Fermi, and Fermi-Fermi atoms.

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