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Controlled charge exchange between alkaline earth metals and their ions[1] ROBIN COTE, University of Connecticut — We theoretically investigate the prospects of realizing controlled charge exchange via magnetic Feshbach resonances in cold and ultracold collisions of atoms and ions. In particular, we focus on near-resonant charge exchange in heteroisotopic combinations of alkaline earth metals. We focus our discussion on Be + Be^+ and Ca + Ca^+. Alkaline-earth elements exhibit favorable electronic and hyperfine structure. The quantum scattering calculations are performed for a range of initial states and experimentally attainable magnetic fields in coupled-channel Feshbach projection formalism, where higher-order corrections such as the mass-polarization term are explicitely included. In addition, we predict a number of magnetic Feshbach resonances for different heteronuclear isotopic combinations of the listed and related alkaline earth elements. Our results imply that near-resonant charge-exchange could be used to control charge diffusion and mobility in cold samples.

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