Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Energetics and control of ultracold isotope-exchange reactions between heteronuclear dimers in external fields MICHAL TOMZA, Univ of Warsaw — We show that isotope-exchange reactions between ground-state alkali-metal, alkaline-earth-metal, and lanthanide heteronuclear dimers consisting of two isotopes of the same atom are exothermic with an energy change in the range of 1-8000 MHz, thus resulting in cold or ultracold products. For these chemical reactions, there are only one rovibrational and at most several hyperfine possible product states. The number and energetics of open and closed reactive channels can be controlled by the laser and magnetic fields. We suggest a laser-induced isotope- and state-selective Stark shift control to tune the exothermic isotope-exchange reactions to become endothermic, thus providing the ground for testing models of the chemical reactivity. The present proposal opens the way for studying the state-to-state dynamics of ultracold chemical reactions beyond the universal limit with a meaningful control over the quantum states of both reactants and products. [1] M. Tomza, Phys. Rev. Lett. 115, 063201 (2015)

Michal Tomza
Univ of Warsaw

Date submitted: 12 Jan 2017 Electronic form version 1.4