Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Resonant dipolar collisions of microwave-dressed ultracold molecules ZOE YAN, Massachusetts Institute of Technology, JEE WOO PARK, Seoul National University, YIQI NI, Massachusetts Institute of Technology, HUAN-QIAN LOH, National University of Singapore, SEBASTIAN WILL, Columbia University, TIJS KARMAN, ITAMP, Harvard-Smithsonian Center for Astrophysics, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — We apply microwave dressing to ultracold, fermionic $^{23}Na^{40}K$ ground-state molecules and observe resonant dipolar collisions with cross sections exceeding three times the s-wave unitarity limit. The origin of these collisions is the resonant alignment of the approaching molecules' dipoles along the intermolecular axis, leading to strong attraction. We perform coupled-channels calculations that agree well with the experimentally observed collision rates. While collisions are here observed as laser-induced loss, microwave dressing on chemically stable molecules trapped in box potentials may enable the creation of strongly interacting dipolar gases of molecules. For molecules trapped in optical lattices, the strong induced interactions provide a crucial tool for applications in quantum computing and quantum simulation.

Zoe Yan
Massachusetts Institute of Technology

Date submitted: 30 Jan 2020 Electronic form version 1.4