Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Influence of reagent rotation on exchange reaction rates in the $Li + Li_2^*(A^1\Sigma_u^+)$ **system** JACOB FANTHORPE, RAMESH MARHATTA, Wesleyan University, MARK ROSENBERRY, Siena College, PAUL OXLEY, College of the Holy Cross, BRIAN STEWART, Wesleyan University — We have measured collision-induced level-to-level inelastic and reactive rate constants for the system

$$^7Li_2^*(A^1\Sigma_u^+)(v_i, j_i) + {}^7Li \rightarrow {}^7Li + {}^7Li_2^*(A^1\Sigma_u^+)(v_f, j_f) \quad (1)$$

under single-collision conditions at a temperature of 933K. The experiment was conducted for $j_i = 3$ - 64 and $v_i = 2$ - 5. We report over 1400 level-to-level inelastic and reactive rate constants with $-5 \leq \Delta v \leq 2$ and $-40 \leq \Delta j \leq 50$. By varying initial rotational energy by more than two orders of magnitude, we are able to report the effect of initial molecular rotation on reactive energy transfer in $Li_2 - Li$ collisions for the first time and compare the results with theory. Reactive j_f-distributions are well modeled by a modified statistical theory. We employ quasiclassical trajectory simulations in conjunction with Reverse Monte Carlo methods to fit a modified LEPS potential surface to our experimental data. Simulations using this fitted potential surface allow us to compare the j_i dependence of total reactive cross sections with theory.

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Date submitted: 31 Jan 2020 Electronic form version 1.4