Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Effect of p-wave resonances on the threshold behavior of ultracold chemical reactions[1] R. CÔTÉ, I. SIMBOTIN, J. WANG, University of Connecticut, S. GHOSAL, Chemistry Department, BITS Pilani, Hyderabad, India — In previous work we have studied the effects of s-wave resonances on the threshold behavior for ultracold chemical reactions, and we now extend our analysis to higher partial waves. Although s-wave is dominant in the limit $k \to 0$, p-wave or d-wave contributions can be resonantly enhanced at ultralow energy. If the corresponding partial wave has a resonance pole very close to the threshold, the ultracold regime is divided in two separate domains. The Wigner regime will be displaced towards much lower energies, while the remaining part of the ultracold regime is characterized by an anomalous k-dependence for the inelastic and reaction cross sections; the newly found behavior, $\sigma_\ell(k) \sim k^{2\ell-5}$, is valid for $k_{\rm pole} \ll k \ll k_{\rm low}$. For $k \approx k_{\rm pole}$ the behavior changes over into the familiar Wigner threshold law, $\sigma_\ell(k) \sim k^{2\ell-1}$, which is now valid only for $k \ll k_{\rm pole}$. We illustrate our findings with numerical results of reaction cross sections for benchmark systems, such as H_2 + Cl and H_2 + D.

[1]Partial support from the Department of Energy, Office of Basic Energy Sciences.

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Date submitted: 25 Jan 2013 Electronic form version 1.4