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Zero energy resonances in reactive scattering: anomalous temperature dependence of atom–molecule reaction rates I. SIMBOTIN, S. GHOSAL, R. CÔTÉ, University of Connecticut — We show that rate coefficients for inelastic processes—reactive, or nonreactive—in the (ultra)cold regime can be greatly affected by the presence of a resonance pole near $E = 0$ in the entrance channel. This problem has been investigated previously [E. Bodo *et al.*, J. Phys. B **37** (2004) 3641] but their analysis was restricted to the energy dependence of the reaction cross section for a particular case. Here, we present the general case, and we emphasize the possibility of a wide intermediate regime of temperatures where the rate coefficient has an anomalous temperature dependence; namely it increases as $1/T$ when T decreases. Eventually, the temperature dependence reverts back to the standard behavior given by Wigner's law, i.e., the rate coefficient becomes constant, but this may only be recovered at extremely low T (very deep into the ultracold regime). Thus, at least in some exceptional cases, most of the (ultra)cold regime could be dominated by this anomalous behavior.

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