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Three-Body Recombination of Cold Atoms HIROYA SUNO, BRETT D. ESRY, Department of Physics, Kansas State University, CHRIS H. GREENE, Department of Physics, JILA and University of Colorado, JAMES P. BURKE, JR., NIST, Gaithersburg —

In the present work, we shall study three-body recombination of cold helium atoms: $^4He +^4 He +^4 He \rightarrow^4 He_2 +^4 He$. This study extends previous work [1] where *ultra*-cold alkali atoms were treated. An extra difficulty comes from the fact that not only zero total angular momentum $J =$3D 0 states, but also $J > 0$ states should be taken into account because of their higher binding energy. We will use a modified version of Smith-Whitten hyperspherical coordinates [2]. Using these coordinates, one can easily introduce the symmetrization effects for three identical bosons, so that the configuration space can be reduced by a factor of 3. Coupled equations in an adiabatic hyperspherical representation are then solved using the variational R-matrix method. The interaction used is a sum of helium dimer potentials from A.R. Janzen and R.A. Aziz [3]. Our goal is to calculate the "event rate constant" $K_3 =$3D $\frac{\hbar k}{\mu}\sigma$ or the "recombination length" $\varrho_3 =$3D $(\mu K_3/\hbar)^{1/4}$, where σ is the cross section for three-body recombination, μ is the three-body reduced mass.

[1] B.D. Esry et al., Phys. Rev. Lett., 83;1751 (1999)
[2] B.K. Kendrick et al., J. Chem. Phys., 110;6673 (1999)
[3] A.R. Janzen and R.A. Aziz, J. Chem. Phys., 103;9626 (1995)

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- [X] Prefer Poster Session

Hiroya Suno
suno@phys.ksu.edu
Department of Physics, Kansas State University

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