Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Three-body recombination of helium atoms from ultracold to thermal energies: classical trajectory vs. quantal calculations[1] JESUS PEREZ-RIOS, Physics Department, Purdue University, West Lafayette, IN 47907, USA, STEVE RAGOLE, Joint Quantum Institute, University of Maryland, College Park, MD 20742, USA, JIA WANG, Department of Physics, University of Connecticut, Storrs, CT 06269, USA, CHRIS H. GREENE, Physics Department, Purdue University, West Lafayette, IN 47907,USA — A general method to study classical scattering in n-dimensions is developed. Through classical trajectory calculations the new method is applied to compute the three-body recombination rate as a function of the collision energy for helium atoms, as an example. Quantum calculations are also performed for the $J^{\Pi} = 0^{+}$ symmetry of the three-body recombination rate in order to compare with the classical results, yielding good agreement for $E \sim 1$ K. The classical threshold law is derived and numerically confirmed for the three-body recombination rate. Finally, a relationship is found between the quantum and classical three-body elastic cross section which exhibits a similarity to the well-known shadow scattering in two-body collisions.

[1] J. Pérez-Ríos et al., J. Chem. Phys. **140**, 044307 (2014).

[1]This work was supported by DOE, Office of Science.

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Date submitted: 29 Jan 2014 Electronic form version 1.4