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Temperature dependence of Rb($5P$)+Rb($5P$) →Rb($6P$)+Rb($5S$) energy pooling process S.J. SWEENEY, J. MCANDREW, King's College, J. HUENNEKENS, Lehigh University — We describe recent progress on a cell-based experiment studying the temperature dependence of energy pooling collisions between excited rubidium atoms in a vapor. We create a thermal population of Rb($5P_J$) atoms using a cw tunable diode laser tuned to the $5S_{1/2} \rightarrow 5P_{1/2}$ transition. Fine-structure changing collisions populate the $5P_{3/2}$ state while energy pooling collisions between $5P$ atoms (of either the same or different Jvalue) will populate higher energy levels. We measure the $6P_{J'} \rightarrow 5S_{1/2}$ fluorescence at right angles to the laser beam and normalize this signal to a combination of the $5P_{3/2} \rightarrow 5S_{1/2}$ fluorescence and $5P_{1/2} \rightarrow 5S_{1/2}$ fluorescence (proportional to each of the $5P_J$ densities, respectively). Varying the temperature of the oven containing the rubidium cell allows us to map the temperature dependence of the Rb($5P_J$)+Rb($5P_J$) →Rb($6P_{J'}$)+Rb($5S_{1/2}$) energy pooling rate coefficient. Our preliminary results indicate a temperature dependence does exist, but further work is required to verify these results.

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