

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Vibrational State Resolved Lifetimes of the Na₂ 2¹Σ_u⁺ Double Well-State. LUTZ HUWEL, ROY ANUNCIADO, NADEEPA JAYASUNDARA, Wesleyan University, SETH ASHMAN, Providence College — Lifetimes of individual Na₂ ro-vibrational levels of the 2¹Σ_u⁺ double well-state have been measured using a delayed photoionization technique. Ground state Na₂ produced in a molecular beam is excited resonantly by the doubled output of a pulsed dye laser in the range 333 – 357 nm and then ionized by a 532 nm photon from a time-delayed Nd:YAG laser. By appropriate excitation laser tuning and systematic variation of the probe laser delay, ro-vibrational level resolved lifetimes are obtained for v=25-49. The double well state lifetime values are found to decrease from about 50 ns at v=25 to about 40 ns near the barrier at around v=33 and then to increase back to about 50 ns at the highest observed level of v= 49. We have also performed lifetime calculations using the Leve8 and Bcont programs by Leroy¹, the latter in a version modified by Brett McGeehan. We find that including only bound-bound transitions, the theoretical lifetime values are too large by a factor of up to 2. Inclusion of pertinent bound-free transitions improves the agreement noticeably. ¹R. J. Le Roy, LEVEL 8.0: *A Computer Program for Solving the Radial Schrödinger Equation for Bound and Quasibound Levels*, University of Waterloo Chemical Physics Research Report CP-663 (2007); see [http://leroy.uwaterloo.ca/programs/..](http://leroy.uwaterloo.ca/programs/)

Lutz Huwel
Wesleyan Univ

Date submitted: 26 Jan 2016

Electronic form version 1.4