Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Disalignment of $Ne^*(2p_{10}[J=1])$ atoms due to $He(1s^2)$ atom collisions in glow discharges at 294 K CRISTIAN BAHRIM, Department of Chemistry and Physics, Lamar University, VAIBHAV KHADILKAR, Department of Computer Science, UT Dallas, HIRAKU MATSUKUMA, MASAHIRO HASUO, Department of Mechanical Engineering and Science, Kyoto University — Our experimental disalignment rate of the $Ne^*(2p_{10})$ atoms induced by He atom collisions in a gaseous mixture at 294 K using a laser-induced fluorescence spectroscopy method is (3.8 ± 0.3) x 10^{-17} m^3s^{-1}. This value is only 4.6% lower than our calculation of 4.3 x 10^{-17} m^3s^{-1} based on a quantum close-coupling many-channel method and the model potential proposed in [1]. In order to check the accuracy of our theoretical model, we calculate the energy-averaged cross section for destruction of alignment of the $Ne^*(2p_{10})$ atoms induced by He, and compare with measurements extracted from Hanle signals [2] at 315 ± 15 K. The experimental data of (3.20 ± 0.32) x 10^{-20} m^2 [2] is in agreement with our calculations of 3.25 x 10^{-20} m^2 at 300 K and 3.50 x 10^{-20} m^2 at 330 K. These results are about one order of magnitude smaller than for the $Ne^*(2p_5$ [J=1]) atoms [3] at the same temperature because of a weaker electrostatic interaction between He and $Ne^*(2p_{10})$ atoms than with $Ne^*(2p_5)$ [1]. [1] Bahrim C and Khadilkar V V 2009 *Phys. Rev. A* **79** 042715. [2] Carrington C G and Corney A 1971 *J. Phys. B* **4** 849-868. [3] Matsukuma H, Bahrim C and Hasuo M 2009 *J. Plasma Fusion Res. SERIES* **8** 169-173.

Cristian Bahrim
Department of Chemistry and Physics, Lamar University

Date submitted: 21 Jan 2010 Electronic form version 1.4