

# Spectroscopic Studies of $5d_{3/2}nd$ $^1D_{0,2}$ Autoionization Lines of Barium under Collision with Rare Gases

K. Afrousheh<sup>1</sup>, M. Marafi<sup>1</sup>, Y. Makdisi<sup>1</sup>, J. Kokaj<sup>1</sup>, J. Mathew<sup>1</sup>, R. Nair<sup>1</sup> and G. Pichler<sup>1</sup>

<sup>1</sup>*Physics Department, Kuwait University, P.O.Box 5969, 13060 – Safat, Kuwait*  
pichler@ifs.hr

The spectroscopic behavior of  $5d_{3/2}nd$  ( $^1D_0$  and  $^1D_2$ ) autoionizing Rydberg series of barium were studied under collision with rare gases [1]. The series members from  $n = 8$  to  $n = 64$  were observed using two-photon excitation of the two valence electrons in the  $6s^2$   $^1S_0$  ground state of barium. The barium vapor was produced in a heat pipe-like oven, and a tunable dye laser pumped by an excimer laser was used as the excitation source. The obtained spectral data have Beutler-Fano profiles. These spectral lines were investigated when inert gases Ar, Kr and Xe at different pressures were introduced into the oven as perturbing gases. The collision-induced line shifts were measured and the shift parameters for the even parity  $5d_{3/2}nd$   $^1D_0$  and  $5d_{3/2}nd$   $^1D_2$  ( $n = 8 - 35$ ) autoionizing states were extracted from the data [2]. The collision-induced change in the spectral line shape at different Xe pressure was also explored.

## References:

- [1] M. Marafi, K. Afrousheh, Y. Makdisi, Z. Suji, J. Mathew, J. Phys.B: At. Mol. Opt. Phys. **42**, 145003 (2009).
- [2] K. Afrousheh, M. Marafi, J. Kokaj, Y. Makdisi, J. Mathew. Phys. Rev. A, **85**, 052517(2012).