

The High Resolution Ionization Spectra of Ca near 3D Threshold under High DC Electric Field

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In the effort of measuring the Stark effect of Ca autoionization states near the 3d threshold, we had a good preliminary result shown in Figure 1 by using NSRRC Seya beam-line. Spectral features changes as applied field strength changes as it is displayed in the spectrum. Unfortunately, a totally different story has to be narrated while using U9 beam-line. It possesses not only high energy resolution but also high photon flux. With the advantage of U9 superior characteristics, it allows us probing more detailed variation of autoionization state of Ca near 3d threshold under high DC electric field. Figure 2 shows the observed Stark effect of spectral lines around Ca 3d10p ¹P°. For comparison, only two mixed peaks, 3d10p ¹P° and 3d10p ³P°, were observed with low applied field as shown in Figure 1. Under the same field strength, at least three major peaks could be identified in Figure 2. It is noted that as the strength of applied field reached 10,000 V/cm, 3d10p ¹P° resonance was split into two peaks shown at the center in Figure 2. Also three distinct peaks of 3d9f ³D° resonance were observed and the separation between peaks had been found agree with Stark effect quite well.

Owing to the outstanding energy resolution of U9 beamline, the more detail Stark effect spectrum of metal vapors could be investigated and it became possible to further our understanding of electron correlation in divalent atom.

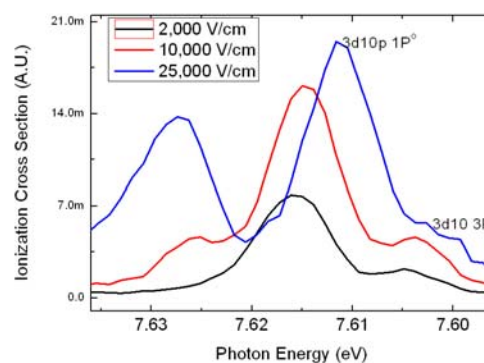


Figure 1. The measured stark effect spectra of doubly ionization states, 3d10p ¹P° and 3d10p ³P°, of Ca with Seya beam-line.

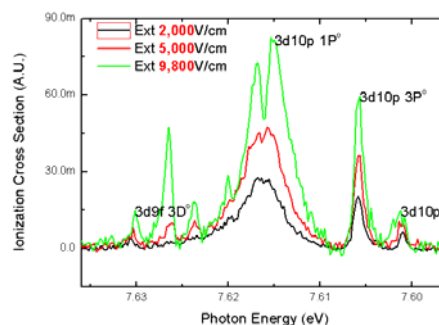


Figure 2. The Stark effect spectra of Ca around 3d10p observed with U9 beamline.