

## COLLAPSE OF POLARIZED ATOMIC STATES IN MAGNETIC FIELDS

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**Abstract.** On the basis of graphical techniques, we have derived analytical expressions for the photoelectron current upon photoionization of polarized atomic states by polarized light in magnetic fields. We show as an example the observed signal when two-photon excited xenon state with  $J=2$ ,  $M=2$  ( $j_1$ -coupling) is photoionized by right-circular polarized photons in an applied magnetic field which results in the Paschen–Back effect. The presented results are of interest in spectroscopy of low temperature laboratory plasma as well as for astrophysical research.

## 1. RESULTS AND DISCUSSION

In this contribution we present a progress of our cooperative work in newly open areas of our investigation. On the basis of graphical techniques described in the book by E. El-Baz and B. Castel (Graphical Methods of Spin Algebras, New York, 1972) we have derived analytical expressions for the photoelectron current  $I(t)$  upon photoionization of polarized atomic states by polarized light in magnetic fields. Figure 1 exhibits as an example the observed signal when two-photon

excited xenon state with  $J=2$ ,  $M=2$  ( $jl$ -coupling) is photoionized by right-circular polarized photons in an applied magnetic field which results in the Paschen–Back effect.

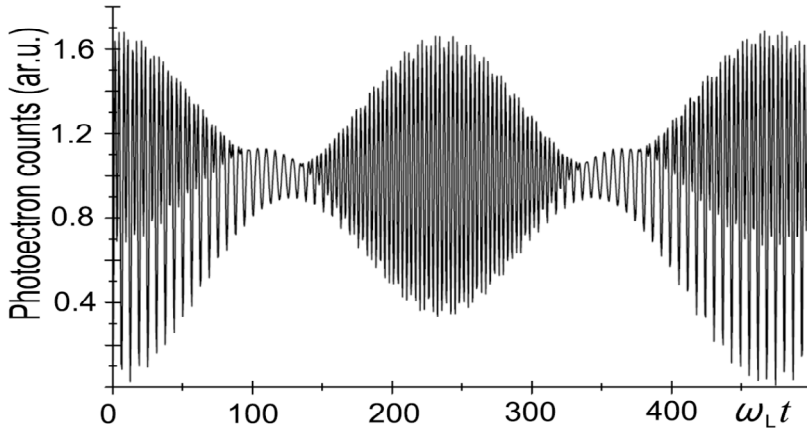


Figure 1: Graphical presentation of the photoionization current  $I$  for the polarized Xe state  $P_{3/2} 6p^2 [3/2]_3$ .

## 2. CONCLUSION

We show that the results of presented investigation are very important not only in physics such as astrophysics, plasma physics but also in spectroscopy of laboratory plasma (see e.g. Condon& Shortley 1959, Foot 2005, Dimitrijević et al. 2019).

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