

# Observation of post-collision interaction in electron-impact excitation of the $4p^6$ subshell in Rb

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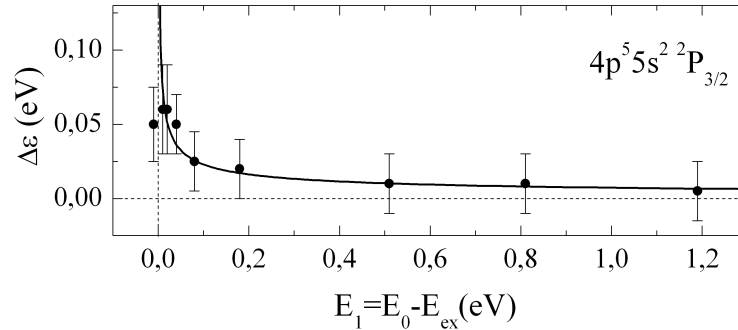
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**Abstract.** The first results on the PCI energy shift of the  $(4p^5 5s^2)^2P_{3/2,1/2}$  lines in Rb atoms are reported.

Negative ions influence essentially both excitation dynamics and PCI energy shift of autoionizing lines in ejected-electron spectra of alkali atoms. In particular, the energy shift of the  $(2p^5 3s^2)^2P_{3/2}$  and  $(3p^5 4s^2)^2P_{3/2}$  lines in Na and K spectra becomes of negative or positive sign depending on the presence or absence of negative-ion resonances in the excitation functions of corresponding autoionizing states. In contrast to these data, the energy dependence of the line shift for the  $(5p^5 6s^2)^2P_{3/2}$  state in Cs atoms possesses a simple asymptotic character.

In the present work, we report the first results on the PCI energy shift of the  $(4p^5 5s^2)^2P_{3/2,1/2}$  lines in Rb atoms. The measurements were performed with an incident-electron energy resolution of 0.2 eV over the impact energy range from the excitation threshold up to 17.5 eV. The data show an asymptotic character of the energy dependence of the PCI shift with the maximum values of 60 meV ( $^2P_{3/2}$ ) and 135 meV ( $^2P_{1/2}$ ) observed at threshold energies. From the fitting of the data by using the Barker–Berry formula  $\Delta\varepsilon=0.5\Gamma(R/E_1)^{0.5}$ , the energy width  $\Gamma$  of the  $(4p^5 5s^2)^2P_{3/2,1/2}$  states was estimated as 3.9 meV and 7.2 meV, respectively. The data are compared with the near-threshold excitation cross sections for the  $(4p^5 5s^2)^2P_{3/2,1/2}$  states.



**Figure 1:** The PCI energy shift for the  $(4p^5 5s^2)^2P_{3/2}$  autoionizing state in Rb atoms. The solid line presents the fitting result obtained by using the Barker–Berry formula.