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P: 3
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133:273637 Photodetachments of the metastable nsnp2 4P states of Be-, Mg-, and Ca- ions. Zeng, Jiaolong; Yuan, Jianmin; Lu, Qisheng Department of Applied Physics, National University of Defense Technology Changsha 410073, Peop. Rep. China Phys. Rev. A: At., Mol., Opt. Phys., 62(2), 022713/1-022713/8 (English) 2000. Close-coupling calcns. are performed on the photodetachments of the metastable nsnp2 4P states of the neg. Be (n = 2), Mg (n = 3), and Ca (n = 4) ions by using the R-matrix method. The calcns. are carried out with the consideration of excitations of 1 electron from core. The results show that this effect is much more important for Ca- than for Be- and Mg- . For Be-, the total and partial cross sections are obtained from the threshold to a photon energy of 0.5 Ry. The calcd. total cross section

exhibits 2 4Po Feshbach resonances and 1 4Do shape resonance. Close agreement is found with the available theor. calcns. and the only exptl. datum of Pegg and co-workers [Phys. Rev. A 50, 3861(1994)]. For the Ca- and Mg- ions, the total and partial cross sections are calcd. from the threshold to a photon energy of 0.25 Ry. For the Ca- ion, the resonances are found for both 4Po and 4Do symmetries just below the 3D threshold. For the Mg- ion, only a 4Po resonance is predicted. No rapid increase assocd. with the opening of the 4s5s 3S channel is found in the total cross section of Ca-. The rapid increase of the photodetachment cross section of Ca- in the expt. by Hanstorp et al. [D. Hanstorp et al., Phys. Rev. Lett. 63, 368(1989)] should not be attributed to the Ca-(4s4p2 4P)+h.nu. Ca(4s5s 3S)+kp ionization process. This result is consistent with the conclusion of Petrunin and co-workers [Phys. Rev. Lett. 76, 744(1996)] that there was no Ca- (4s4p2 4P) ions obsd. by Hanstorp et al.