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Shake-up photoemission delay in Neon[1] SAAD MEHMOOD, DIDARUL ALAM, Dept. of Physics, University of Central FLorida, NICOLAS DOUGUET, Dept. of Physics, Kennesaw University, STEFAN DONSA, Inst. of Theoretical Physics, Vienna University of Technology, LUCA ARGENTI, Dept. of Physics and CREOL, University of Central FLorida — In the ionization of an atom, electrons emerge from different shells with different delays. A longstanding controversy surrounding the measured (21 ± 5 as at 105 eV) and computed (≤ 10 as) time delay difference between the $2s$- and $2p$-shell photoemission from neon [1] has been explained in a recent experimental work [2]. Shake-up channels, which were not resolved in [1], were responsible for the discrepancy between theoretical calculations and the experimental data. This new finding, however, still awaits quantitative theoretical confirmation. In particular, it is still to be determined whether other channels beyond the one identified as being responsible for the measurement bias, might also contribute. In this work, we report advances of a theoretical study conducted with the NEWSTOCK *ab initio* method to analyze and quantify the effect of shake-up channels above 70 eV photon energy in neon. [1] M. Schültze *et al.* Science **328** 1658 (2010), [2] M. Isinger *et al.* Science **358** 893 (2017).

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