Abstract Submitted
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Giant autoionization resonance enhancement and term-dependence of photoionization time delay in half-filled subshell atoms: the Mn atom[1] VALERIY DOLMATOV, Univ of North Alabama, ANATOLI KHEIFETS, The Australian National University, STEVEN MANSON, Georgia State University, PRANAWA DESHMUKH, Indian Institute of Technology Madras, India — Time delay in photoelectron emission from atoms has become a hot topic of modern studies. To date, as far as we know, neither the significance of autoionization resonances in photoionization time delays has been established, nor features in time delays brought about by the configuration of open-shell atoms have been uncovered. To remedy the situation, we have studied the $3d$- and $4s$-photoionization time delays in the Mn($...3d^5 4s^2$, ^6S) atom, which possesses a $3d^5$ half-filled subshell in its ground-state configuration, in the region of the well-known $3p \rightarrow 3d$ giant autoionization resonance ($\hbar\omega \approx 50$ eV, $\gamma \approx 2$ eV). The dramatic impact of the resonance on $3d$- and $4s$-time delay is demonstrated and the physics behind it is unraveled. Strong term-dependence of the $4s$-time delay [Mn $\rightarrow$ Mn$^+$($4s^1$,^5S) vs. Mn $\rightarrow$ Mn$^+$($4s^1$,^7S)] is discovered. The crucial importance of accounting for both the dominant $3d \rightarrow f$ and the (generally) smaller $3d \rightarrow p$ transitions in the calculation of the $3d$-photoinization time delay is established and explained.

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Valeriy Dolmatov
Univ of North Alabama

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