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Photoionization cross sections for Ce^{8+} and Ce^{3+}; Experiment and theory[1] M. HABIBI, D.A. ESTEVES, R.A. PHANEUF, U.I. SAFRONOVA, University of Nevada, Reno, A. AGUILAR, A.L.D. KILCOYNE, Advanced Light Source, LBNL, C. CISNEROS, UNAM, Cuernavaca, Mexico, I.M. SAVUKOV, Los Alamos National Laboratory — Cross sections for single photoionization of Ce^{8+} and single and double photionization of Ce^{3+} in the energy range of $4d$ inner- shell excitations were studied using photoion spectroscopy with monochromatized synchrotron radiation. Resonance structure observed in the range 120 – 140 eV is attributed to $4d^{10}5s^25p^k4f^n$ - $4d^95s^25p^k4f^{n+1}$ transitions. Metastable $4d^{10}5s^25p4f$ states of Ce^{8+} were found to be important in interpreting the measurements. Relativistic many-body perturbation theory was used to evaluate multipole (M1, E2, and M3) matrix elements to obtain lifetimes of metastable levels. Extremely fast autoionizing decay is responsible for the broad spectra. Large-scale calculations using the COWAN code confirm that the natural widths of some levels of the $4d^95s^25p^k4f$ configurations are in the range 1–2 eV.

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