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First Observation of a Quadrupole Cooper Minimum in the Photoionization of Xe 5p P.C. DESHMUKH, Department of Physics, IIT, Madras-600036, India, O. HEMMERS, R. GUILLEMIN, A. WOLSKA, D.W. LINDLE, Department of Chemistry, UNLV, NV 89154, D. ROLLES, Advanced Light Source, LBNL, Berkeley, CA 94720, S.W. YU, LLNL, Livermore, CA 94550, S.T. MANSON, Department of Physics and Astronomy, GSU, Atlanta, GA 30303 — The nondipole photoelectron angular distribution parameter ξ ($= 3\delta + \gamma$) for xenon $5p_{1/2}$ and $5p_{3/2}$has been studied experimentally in the 80 - 200 eV range. In addition, calculations have been performed using the relativistic-random-phase approximation (RRPA) methodology with all relativistic single excitation/ionization channels down to 4s coupled in both the dipole and quadrupole manifolds. The results show significant disagreement between theory and experiment above about 130 eV photon energy, in contradistinction to the Xe 5s case where rather good agreement is found. Since it is known that the dipole amplitudes are well-represented by RRPA, the difficulty must be in the quadrupole channels. It was expected that the quadrupole channels should be accurate as well since the f-wave is resonant in Xe and the main quadrupole transitions, the $5p \rightarrow \mathrm{k}f$, are included in the calculation. However, we have found that these transitions each have a quadrupole Cooper minimum in the energy region of interest, so that quadrupole satellites, which are not included in the RRPA calculation, become important. This might be the first experimental indication of a quadrupole Cooper minimum.

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