

Abstract Submitted
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Probing confinement resonances by photoionizing Xe inside a C₆₀⁺ molecular cage R.A. PHANEUF, Univ. of Nevada, Reno, USA, A.L.D. KILCOYNE, ALS, LBNL, Berkeley, USA, N.B. ARYAL, K.K. BARAL, C.M. THOMAS, Univ. of Nevada, Reno, USA, D.A. ESTEVES-MACALUSO, Univ. of Montana, Missoula, USA, R. LOMSADZE, Tbilisi State Univ., Georgia, T.W. GORCZYCA, Western Michigan Univ. Kalamazoo, USA, C.P. BALLANCE, Auburn Univ., Alabama, USA, S.T. MANSON, Georgia State Univ., Atlanta, USA, M.F. HASOGLU, Hasan Kalyoncu Univ., Sahinbey, Gaziantep, Turkey, J. HELFHUND, S. SCHIPPERS, A. MÜLLER, Univ. Giessen, Germany — Double photoionization accompanied by loss of n C atoms ($n = 0, 2, 4, 6$) was investigated by merging beams of Xe@C₆₀⁺ ions and synchrotron radiation and measuring the yields of product ions. The giant $4d$ dipole resonance of the caged Xe atom has a prominent signature in the cross section for these product channels, which together account for 6.2 ± 1.4 of the total Xe $4d$ oscillator strength of 10. Compared to that for a free Xe atom, the oscillator strength is redistributed in photon energy due to multipath interference of outgoing Xe $4d$ photoelectron waves that may be transmitted or reflected by the spherical C₆₀⁺ molecular cage, yielding so-called confinement resonances. The data are compared with an earlier measurement and with theoretical predictions for this single-molecule photoelectron interferometer system. Relativistic R-matrix calculations for the Xe atom in a spherical potential shell representing the fullerene cage show the sensitivity of the interference pattern to the molecular geometry.

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