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Confinement resonances in the photoionization of $Ar@C_{60}$ and C_{60}

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Photoionization of Ar encaged at the center of C_{60} is studied in the present work in the single-channel static exchange approximation. The present work is devoted to the analysis of the photoionization of $Ar@C_{60}$ by applying the Schwinger variational method in the static-exchange approximation using the ePolyscat code. The realistic confinement potential employed in the present work explicitly includes the position of each carbon atoms on the C_{60}, which is a considerable improvement over the existing methods to address the structure and photo dynamics of confined system where the carbon shell is modeled by a uniform model potential. In the present study, photoionization from the deepest of the valence shells of C_{60} and Ar is considered. Significant differences in the resonances are observed as a result of encapsulation. Though there are differences in the shapes of the resonant features in the cross sections, the resonant state wave functions exhibit similarities between the different resonances of $Ar@C_{60}$ and C_{60}. This proves that the confinement resonance in the atomic cross section borrows its properties predominantly from the resonance in the C_{60} cage. Thus, even neglecting the effects of coupling to the many other open ionization channels in this system, we see that the realistic multi-center static-exchange cage potential can support one-electron resonances and these resonances appear both in the ionization of the endohedral atom as well as in ionization of cage electrons.

Biography

J. Jose has completed his Ph.D. at the age of 27 years from Indian Institute of Technology, Madras in the field of negative ion photodetachment and postdoctoral studies from Indian Institute of Technology, Mandi. He is currently a postdoctoral researcher in Texas A&M University with Dr. R. R. Lucchese.

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