

THE STRANGELY FAMILIAR WORLD OF UNFAMILIAR ION-PAIR RYDBERG STATES: EXOTIC ATOMS MADE FROM MOLECULES

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We have recently demonstrated that it is possible to produce a new form of Rydberg state by exciting molecules into very high vibrational levels of an excited ion-pair state. ^a These "nuclear" Rydberg states share many common features with their hydrogenic analogues, and can be used for a new form of threshold photoionization spectroscopy that is very reminiscent of mass analyzed threshold ionization (MATI) or zero kinetic energy (ZEKE) spectroscopy. This spectroscopy, called TIPPS for threshold ion-pair production spectroscopy, can be used for accurate bond energy determination, ^b spectroscopy of molecular ions, ^c, or to study the dynamics of ion-pair production. ^d This talk will discuss this new form of spectroscopy, and the similarities in behaviour between hydrogenic Rydberg states and nuclear Rydberg states. [Acknowledgements: The work to be discussed in this talk was carried out by the following past and present group members: James Martin, Ralph Shiell, Xiaokun Hu, Qichi Hu, Mohamed Musa. Financial support from NSERC and ACS-PRF is acknowledged]

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