

Abstract Submitted  
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**The generalization of Lu-Fano plot for multi-channel atomic spectra with multiple ionization thresholds**<sup>1</sup> XIANG GAO, Beijing Computational Science Research Center, China, RUI JIN, Tsinghua University, XIAO-YING HAN, Institute of Applied Physics and Computational Mathematics, JIA-MING LI, Tsinghua University — Understanding the detailed dynamics of electron-ion interactions is of fundamental importance in the fields of astrophysics and so on. It's important to provide the related atomic data with accuracies determined. Using our modified R-matrix code R-Eigen [1], we can directly calculate the short-range scattering matrices corresponding to the physical parameters associated with the multichannel quantum defect theory (MQDT) for both the discrete and continuous energy regions. Various physical quantities can then be derived from a straightforward application of the MQDT procedure. Through analytical continuation properties of short-range scattering matrices, we demonstrated that the precisions of scattering calculations can be determined readily in a systematical way by using the Lu-Fano plot [2] for Kr atom with two ionization thresholds [1]. We will show our studies of the graphical representations of the MQDT solutions of atomic spectra with multiple ionization thresholds, which is a generalization of Lu-Fano plot [2] for the cases with two thresholds. In this way, we can determine the related scattering calculation precisions by using the spectroscopic data for general atoms with multiple ionization thresholds. We can also elucidate the intimate relations between the discrete energy levels and adjacent resonant autoionization spectra. [1] X. Gao and J. M. Li, Phys. Rev. A **89**, 022710 (2014). [2] C. M. Lee and K. T. Lu, Phys. Rev. A **8**, 1241 (1973).

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