

## Absorption and Recurrence Spectra of Li Rydberg Atom in Perpendicular Electric and Magnetic Fields

WANG De-Hua,<sup>1,2</sup> LIN Sheng-Lu,<sup>3</sup> WANG Mei-Shan,<sup>1</sup> and YANG Chuan-Lu<sup>1</sup>

<sup>1</sup> College of Physics and Electronic Engineering, Ludong University, Yantai 264025, China

<sup>2</sup> School of Physics and Microelectronics, Shandong University, Jinan 250100, China

<sup>3</sup> Department of Physics, Shandong Normal University, Jinan 250014, China

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**Abstract:** We develop the semi-closed orbit theory from two degrees of freedom to three non-separable degrees of freedom and put forward a new model potential for the Li Rydberg atom, which reduces the study of the system to an effective one-particle problem. Using this model potential and the closed orbit theory for three degrees of freedom, we calculate the recurrence spectra of Li Rydberg atom in perpendicular electric and magnetic fields. The closed orbits in the corresponding classical system have also been obtained. The Fourier transformed spectra of Li atom have allowed direct comparison between the resonance peaks and the scaled action values of closed orbits, whereas the nonhydrogenic resonance can be explained in terms of the new orbits created by the core scattering. Our result is in good agreement with the quantum spectra, which suggests that our calculation is correct.

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Key words: closed orbit theory, model potential, recurrence spectra, core scattering

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