

在自旋极化 X_α 交换近似下类氦离子 振子强度的过渡态计算

朱 颀 人 宋 庆 峰 潘 守 甫
(吉林大学原子与分子物理研究所)

本文是文献[1]工作的继续,旨在通过对类氦离子单重态跃迁与三重态跃迁振子强度系统的计算鲜明地体现出自旋极化过渡态 X_α 方法的优点。表1列出 LiII、BeIII、BIV、CV、NVI、OVII 等六种轻类氦离子的 $^1S-^1P$ 、 $^3S-^3P$ 、 $^1P-^1D$ 等各类跃迁的振子强度值,结果与 Wiese 列表值^[2]很好地符合;对于表列各种离子,两种结果的平均相对偏离大致在 2~10% 之间。这再一次表明,过渡态 X_α 方法超出了弛豫意义本身而部分地计入了关联。我们看到,随着原子序数的增加,这种偏离呈现减小的趋势。

表 1

跃 迁	LiII	BeIII	BIV	CV	NVI	OVII
$1s^2\ ^1S-1s2p\ ^1P^0$	0.5019 (0.457)	0.5907 (0.522)	0.6432 (0.609)	0.6767 (0.647)	0.6997 (0.674)	0.7172 (0.694)
$1s^2\ ^1S-1s3p\ ^1P^0$	0.1165 (0.111)	0.1309 (0.127)	0.1378 (0.135)	0.1422 (0.141)	0.1449 (0.144)	0.1469 (0.146)
$1s2s\ ^1S-1s2p\ ^1P^0$	0.2761 (0.213)	0.1972 (0.149)	0.1527 (0.114)	0.1244 (0.093)	0.1050 (0.078)	—
$1s2s\ ^1S-1s3p\ ^1P^0$	0.2036 (0.256)	0.2615 (0.305)	0.2967 (0.333)	0.3201 (0.351)	0.3364 (0.364)	—
$1s2p\ ^1P^0-1s3d\ ^1D$	0.6886 (0.714)	0.6893 (0.711)	0.6897 (0.709)	0.6903 (0.707)	—	—
$1s2s\ ^3S-1s2p\ ^3P^0$	0.3370 (0.308)	0.2367 (0.213)	0.1812 (0.163)	0.1478 (0.132)	0.1236 (0.110)	—
$1s2s\ ^3S-1s3p\ ^3P^0$	0.1922 (0.186)	0.2559 (0.252)	0.2936 (0.291)	0.3183 (0.316)	0.3356 (0.334)	—
$1s2p\ ^3P^0-1s3d\ ^3D$	0.6150 (0.625)	0.6352 (0.640)	0.6494 (0.650)	0.6573 (0.657)	—	—

参 考 文 献

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Transition state calculations of oscillator strengths of helium-like ions in spin polarization X_α exchange approximation

ZHU QIREN SONG QINGFONG AND PAN SHOUFU

(Institute of Atomic and Molecular Physics, Jilin University, Changchun)

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Abstract

The paper aims to show obviously the advantage of spin polarization X_α exchange approximation for transition state calculation through systematic calculation of oscillator strengths of single-state and triple-state transitions in helium-like ions. This is the continuance of previous work by the authors.