Selected Abstracts from Other Physical Review Journals

Abstracts of papers that are published in other Physical Review journals and may be of interest to Physical Review A readers are printed below.

Measurement method for electric fields based on Stark spectroscopy of argon atoms V. P. Gavrilenko, H. J. Kim, T. Ikutake, J. B. Kim, Y. W. Choi, M. D. Bowden, K. Muraoka *Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga Fukuoka 816-8580, Japan* (Received 11 April 2000)

We report the development of a method for the measurement of electric fields in glow discharge plasmas, based on Stark spectroscopy of argon atoms. The method is based on laser excitation of transitions in atomic argon. The key feature of the method is that the electric field is determined by matching experimentally obtained absorption spectra to theoretically calculated spectra. The dependence of the positions of energy levels of argon atoms on the strength of the electric field was calculated by solving the Schrödinger equation for the argon atom. Measurements of Stark spectra were made in the sheath region of a glow discharge using laser optogalvanic spectroscopy. The wavelength of the laser radiation was tuned to the transitions $4s \Rightarrow nf$ ($n=7,8,\ldots,14$) of the argon atom. For $n=11$, the lower limit for electric field measurements was estimated to be 14 V/mm. [Phys. Rev. E **62**, 7201 (2000)]

Atoms in parallel fields: Analysis with diffractive periodic orbits S. M. Owen, T. S. Monteiro, and P. A. Dando *Department of Physics and Astronomy, University College London, Gower Street, London, WC1E 6BT, United Kingdom* (Received 25 February 2000)

We show that fluctuations in the density of states of nonhydrogenic atoms in parallel fields are strongly influenced by diffractive periodic orbits. Unlike typical systems with a diffractive point scatterer, the atomic core of small atoms like lithium and helium is best understood as a combined geometric and diffractive scatterer. Each Gutzwiller (geometric) periodic orbit is paired with a diffractive orbit of the same action. We investigate, particularly, amplitudes for contributions from repetitions, and multiple scattering orbits. We find that periodic orbit repetitions are described by ''hybrid'' orbits, combining both diffractive and geometric core scatters, and that by including all possible permutations we can obtain excellent agreement between the semiclassical model and accurate fully quantal calculations. For high repetitions, we find even one-scatter diffractive contributions become of the same order as those of the geometric periodic orbit for repetition numbers $n \sim \hbar^{-1/2}$. Although the contribution of individual diffractive orbits is suppressed by $O(\hbar^{1/2})$ relative to the geometric periodic orbits, the proliferation of diffractive orbits with increasing period means that the diffractive effect for the atom can persist in the $\hbar \rightarrow 0$ limit. [Phys. Rev. E **62**, 6388 (2000)]

Scattering-theory analysis of waveguide-resonator coupling Yong Xu, Yi Li, Reginald K. Lee, and Amnon Yariv *Department of Applied Physics, California Institute of Technology, MS 128-95, Pasadena, California 91125* (Received 14 May 2000)

Using a formalism similar to the quantum scattering theory, we analyze the problem of coupling between optical waveguides and high Q resonators. We give the optical transmission and reflection coefficients as functions of the waveguide-resonator coupling, cavity loss (gain), and cavity resonant frequency. Based on these results, the recently proposed concept of ''critical coupling'' is discussed. Using a matrix formalism based on the scattering analysis, we find the dispersion relation of indirectly coupled resonator optical waveguides. The coupling between waveguides and multiple cavities is investigated and the reflection and transmission coefficients are derived. [Phys. Rev. E **62**, 7389 (2000)]