Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Quantum and classical analysis of circular and sectorial billiards with central harmonic potential MANUEL JURADO-TARACENA, ALEXIS D. PLASCENCIA, JULIO C. GUTIERREZ-VEGA, Photonics and Mathematical Optics Group, Tecnologico de Monterrey, Monterrey, Mexico 64849 — We present the classical and quantum solutions to a particle confined in a circular sectorial billiard under a central harmonic potential, attractive and repulsive. The classical analysis is done by applying the Hamilton-Jacobi formalism; we derive the characteristic equations for periodic orbits, give expressions for the length of the trajectories in terms of elliptic integrals and study some geometrical constructions for the billiard. The quantum analysis leads to the study of the confluent hypergeometric function, from which we obtain the characteristic values for the energy spectra and the probability distributions inside the circular and sectorial billiard. As verification for the attractive case, as we increase the billiard radius our results approach the unbounded solutions. Finally we compare the classical probability distributions, obtained by assuming the probability as proportional to the time spent by the particle in each space interval, with the quantum ones.

Alexis D. Plascencia
Photonics and Mathematical Optics Group,
Tecnologico de Monterrey, Monterrey, Mexico 64849

Date submitted: 27 Mar 2012 Electronic form version 1.4