Classical chaos in a novel inhomogeneous photonic billiard

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Dielectric microcavities / microlasers are becoming key components for novel opto-electronic devices. They represent a realization of a wave chaotic system (see companion contribution) where for instance the lack of symmetry in the resonator shape leads to non-integrable ray dynamics in the short-wavelength limit (*photonic billiard*). Contrary to usual procedure where a transition from a regular to a chaotic regime is induced by a geometric deformation of a circular cavity, we propose a scenario inducing rotational symmetry breaking by choosing an inhomogeneous dielectric material inside a circular cavity, i.e *chaos in an integrable billiard geometry* . We study the consequences of this choice, isolate the conditions for integrability in such systems, describe the transition to chaos and classify the effects of the symmetry of the inhomogeneous dielectric on the trajectories.

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