

# Chaos-assisted directional light emission from microcavity lasers

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We study the effect of dynamical tunneling on emission from ray-chaotic microcavities by introducing a suitably designed deformed disk cavity. We focus on its high quality factor modes strongly localized along a stable periodic ray orbit confined by total internal reflection. It is shown that dominant emission originates from the tunneling from the periodic ray orbit to chaotic ones, the latter eventually escape from the cavity refractively, resulting in directional emission unexpected from the geometry of the periodic orbit, but fully explained by unstable manifolds of chaotic ray dynamics. Experimentally performing selective excitation of those modes, we succeeded in observing the directional emission in good agreement with theoretical prediction. This provides decisive experimental evidence of dynamical tunneling in a ray-chaotic microcavity.

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