

# Signatures of ultralight bosons in the orbital eccentricity of binary black holes

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It is well known that clouds of ultralight particles surrounding black holes produced by the superradiant instability can experience Landau-Zehner transitions if the black hole is part of a binary system.

We study the effect of orbital eccentricity, backreaction of the cloud onto it and observational possibilities with future gravitational-wave detectors like the Laser Interferometer Space Antenna, as well as the planned deciHertz gravitational-wave observatories. For black hole binaries with chirp masses below  $10 M_{\odot}$ , such effects would provide strong evidence for the existence of a new particle of mass between  $10^{-13} - 10^{-11}$  eV.

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yes

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