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Probing ultralight bosons with black holes and gravitational waves

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Ultralight boson particles, if they exist as theorized, could form clouds around rapidly rotating black holes through the phenomenon called superradiance. Such clouds are expected to emit long-lasting, quasimonochromatic gravitational radiation. Searching for gravitational waves emitted by boson clouds around black holes provides a new cosmic approach to interrogating the existence of ultralight bosons that are difficult to probe with conventional lab experiments. In this talk, I will provide a theoretical overview of the phenomenon, describe the gravitational wave signatures, and discuss the search prospects targeting stellar mass black holes.

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