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【451】 Observational Prospects of Self-Interacting Scalar Ultralight Boson Clouds with Next-Generation Gravitational-Wave Detectors

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Ultralight ($< 10^{-10} \text{ eV}/c^2$) bosons are a broad category of theoretical particles naturally introduced by symmetry-breaking at the Planck scale (such as in quantum-gravity theories). Owing to their low mass, they are predicted to bind to black holes in rotating, hydrogen-like clouds, extract the rotational energy of their host black hole, and then generate continuous, quasi-monochromatic gravitational waves. These gravitational waves have detection prospects at current and future detectors, like aLIGO and Einstein Telescope, and here we discuss the sensitivity which could be achieved in directed (one black hole) searches for self-interacting scalar ultralight bosons. These searches are of particular interest as they function even without any coupling to the Standard-Model.

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