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Detectability of gravitational waves from superradiant instabilities of scalar fields SHROBANA GHOSH, Univ of Mississippi, ENRICO BARAUSSE, Institut dAstrophysique de Paris, Sorbonne Universites, EMANUELE BERTI, Univ of Mississippi, RICHARD BRITO, AEI Potsdam-Golm, VITOR CARDOSO, Instituto Superior Tecnico, Lisboa, IRINA DVORKIN, ANTOINE KLEIN, Institut dAstrophysique de Paris, Sorbonne Universites, PAOLO PANI, Sapienza University of Rome, MAURICIO RICHARTZ, Universidade Federal do ABC (UFABC) — Incident waves scattering off a black hole may get amplified at the expense of the rotational energy of the hole. Because of this process, known as superradiance, ultralight massive bosonic fields can form a non-axisymmetric cloud around the black hole due to repeated amplification. The growth of this bosonic cloud leads to emission of gravitational radiation, that could in principle be detected by ground-based gravitational wave detectors if the boson has mass $\sim 10^{-12}$eV or by LISA for masses $\sim 10^{-17}$eV. Therefore astrophysical black holes can serve as particle detectors. In the absence of detections, we can rule out the existence of bosons in the corresponding mass range. We explore near-term and long-term prospects for observing such events through follow-up searches of the continuous waves that would be emitted after black hole merger events of the kind detected by the LIGO/Virgo collaboration.

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