Search for ultralight bosons in Cygnus X-1 with Advanced LIGO
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di Roma, MAXIMILIANO ISI, LIGO Laboratory, MIT — Ultralight scalar boson
particles, if they exist as theorized, could form clouds around rapidly rotating black
holes. Such clouds are expected to emit continuous, quasimonochromatic grav-
tational waves that could be detected by ground-based detectors like LIGO and
Virgo. Here we present the first constraints on the boson mass obtained from a
gravitational-wave search directed at a known black hole in the nearby X-ray bi-
nary, Cygnus X-1, using data from Advanced LIGO’s second observing run. With-
out finding evidence of gravitational-wave signals in this search, the constraints are
derived for two scenarios with or without considering boson self-interactions. In
this talk, we present a brief theoretical overview of the signal model and source
properties, describe the search method and challenges, and show results from this
analysis. Applications of this method to other sources in future observing runs will
yield improved constraints and possibly a detection.

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