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Atomic clocks as exotic field telescopes in multi-messenger astronomy

Our work [Dailey et al., Nature Astronomy 5, 150 (2021)] extends the gravitational and electromag-netic modalities of multi-messenger astronomy to exotic (beyond the Standard Model of elementary particles) fields. We are interested in a direct detection of exotic fields emitted by the powerful astrophysical events such as binary black hole mergers. While the progenitors can be located in another galaxy, we demonstrate that modern atomic clocks are sensitive to exotic fields plausibly emitted in the mergers due to (i) the exquisite sensitivity of atomic clocks and (ii) because of the enormous amounts of energy released in the mergers.

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