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Looking for ultralight scalars with LIGO-Virgo-KAGRA binaries

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New ultralight (pseudo)scalar particles arise generically in extensions to the Standard Model. If their de Broglie wavelength is larger than the radii of compact objects (like black holes and neutron stars) they can form large-density halos around these objects, resembling a gravitational (hydrogen) atom. Building up the "gravitational chemistry": when their de Broglie wavelength is larger than the separation distance of compact binaries, they can form global states resembling a gravitational (ionized dihydrogen) molecule. In this talk, I will show that the current observations from the LIGO-Virgo-KAGRA collaboration can already be used to place stringent constraints on the presence of ultralight bosons around compact binary coalescences.

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