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Prospects for detection of ultra high frequency gravitational waves from compact binary coalescences with resonant cavities

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As underlined by recent events, numerous efforts are directed towards exploring gravitational waves (GWs) in the low frequency regime, below the LIGO-Virgo-KAGRA ranges. The high frequency regime, however, remains vastly unexplored. There is a good reason for that: no substantial signal is expected from known astrophysical or cosmological sources above few kHz. (Ultra) high frequency GWs are however expected from many beyond standard model sources, among which primordial black holes.

This presentation aims at clarifying the situation about compact binary coalescences that might be observed with haloscope experiments sensitive to gravitational waves in the 1-10 GHz band, taking the GrAHal experiment as a benchmark. Different relevant physical regimes are considered in details and some formulas encountered in the literature are revised.

Notably, the distances that can be probed and expected event rates are evaluated, taking into account degeneracies between physical parameters.

Finally, this presentation also discuss where experimental efforts should be focused to improve the sensitivity.

Based on: <https://arxiv.org/pdf/2303.06006.pdf>

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