

Search for Gravitational Waves using a Network of RF Cavities

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The idea of searching for high frequency gravitational waves using resonant cavities in strong magnetic fields has recently received significant attention. In particular, cavities with rather small volumes that are currently used to search for axions are discussed in this context.

We show the optimization of RF-cavities to gravitational wave signals in the 8 GHz regime. High frequency gravitational waves could be generated e.g. by primordial black hole mergers of $\mathcal{O}(10^{-7})M_{\odot}$ or by super radiance instabilities of boson clouds around black holes. During the optimization process different cavity geometries, materials and analysis techniques have been investigated.

Although signatures of gravitational waves may be present as identifiable signals in a single cavity, it is highly challenging to distinguish them from noise. By analysing the correlation between signals from multiple (possibly even geographically separated) cavities it is not only possible to substantially increase the signal over noise ratio, but also to investigate the nature and the source of those gravitational wave signatures. This novel approach of a network of gravitational wave detectors for ultra high frequency gravitational waves is presented as well.

Collaboration

Role of Submitter

I am the presenter

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